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INCREASED RESILIENCE OF AGRICULTURE SECTOR THROUGH PROMOTION OF CLIMATE SMART AGRICULTURE PRACTICES

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SDGs:



Country: Republic of North Macedonia

Project Code: TCP/MCD/3705

FAO Contribution: USD 280 000

Duration: 1 January 2020 – 31 December 2021

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Implementing Partners

Ministry of Agriculture, Forestry and Water Economy (MAFWE), State Hydrometeorological Service (HMS).

Beneficiaries

Ministry of Agriculture, Forestry and Water Economy, HMS staff, and pilot site participants, including farmers, fruit-growers, teachers and students.

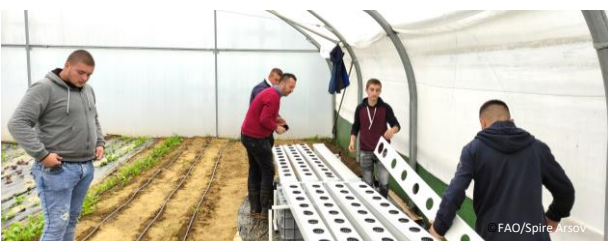
Country Programming Framework (CPF) Outputs

Government Priority 3: Improving capacity for sustainable management of natural resources and climate change mitigation and adaptation. Output: 3.1 Resilience of agricultural sector to natural hazards and capacities on plant protection strengthened; and Output 3.2: Improved national capacity for flood protection, and sustainable water management and extreme climatic events in the agriculture sector in context of integrated climate change adaptation/disaster risk reduction responses to changing climate.



BACKGROUND

The negative effect of climate risks on agriculture in the Republic of North Macedonia is increasing. The agriculture sector, particularly the small farm sector, is exposed to prolonged heat waves, increasingly severe droughts and floods. Less than ten percent of agricultural land is irrigated and, with the exception of the western parts of the country, water deficiencies occur in summer, resulting in significant moisture stress for summer crops. A case study on the influence of excessive heat on livestock breeding found that the yearly number of live pigs was 2.14 percent lower per litter when high temperatures were taken into account, while analysis of viticulture showed that both table and wine grapes were vulnerable to increases in temperature.



The agriculture sector is highly exposed and vulnerable to climate risks. The adaptive capacity of the sector is low for several reasons: i) small primary producers with low annual incomes and limited ability to implement adaptation measures; ii) small plots that prevent the effective implementation of adaptive measures; iii) insufficient technical and financial support to farmers to help them to cope with the negative impacts of climate change; iv) low awareness among key players about climate change and its negative effects on agriculture; v) weak networking and a low level of coordination among institutions; vi) a lack of effective organization to disseminate good practices to farmers; and vii) a lack of demand-driven agrometeorological products and services to reduce climate risks in agriculture sector.

The project aimed to strengthen the institutional and technical capacity of national institutions, support the establishment of climate change policies in agriculture, and promote climate-smart practices to increase the resilience of the agriculture sector.

IMPACT

The project helped to establish strong policy and institutional frameworks in the agricultural sector that will serve as a foundation for increased climate change resilience in the country. The extensive research and policy input provided to MAFWE on climate change in agriculture was used to align the National Agriculture and Rural Development Strategy (NARDS) with the European Union, and was the basis for the introduction into the strategy of a chapter on “Natural resource management policies and mitigating the impact of climate change”. The project also supported MAFWE in the development of the National Irrigation and Drainage Strategy 2022-2031, one of the first high-level policy documents focused specifically on the management of natural resources in agriculture. Finally, the introduction and piloting of climate smart agriculture (CSA) technologies in three pilot areas is expected to have a long-term impact on the introduction and adoption of readily available methods for climate-resilient and economically sustainable food production throughout the country.

ACHIEVEMENT OF RESULTS

The project contributed to key aspects of increased resilience of agriculture to climate change in the country. It had two outputs. The first regarded improved institutional and technical capacities at national level. A major project achievement was to provide support to the Water Economy Directorate to develop an irrigation and drainage strategy for the Government that integrated the impacts of climate change. A comprehensive analysis was conducted, compiling background information on the status of drainage and irrigation infrastructure and practices, along with a scientific climate analysis of issues relating to water balances and status in the country. Combined with consultations and surveys of all key institutional actors, this led to the development of a draft National Irrigation and Drainage Strategy 2022-2031.

It was expected that the project would support the institutionalization of damage and loss modules under the Sendai Framework. At the request of MAFWE and following consultation with national stakeholders this was not carried out as the country was not prepared to institutionalize such systemic changes. In its place, the project identified the steps needed to upgrade national information systems to incorporate damage and loss monitoring indicators, and provided a report highlighting the key aspects to be addressed.

As project implementation coincided with the development of NARDS 2021 -2027, the project was able to provide significant input into national policies. A report was prepared on climate change in the agricultural sector, containing potential climate mitigation and adaptation measures, and policy recommendations. With regard to capacity development under this output, a two-day targeted training event was organized for the national Hydrometeorological Service, based on a deep assessment of the hydrometeorological network and capacity. In collaboration with MAFWE and the HMS, the project supported the development and upgrade of the www.agrometeo.mk platform, to allow better access and timely exchange of climate data. This allowed the HMS to add three new weather stations to the existing three stations for automatic data-sharing.



Output 2 regarded the introduction of innovative CSA technologies and practices. With support from MAFWE, three pilot sites were selected. The first, at a vocational high school with over 300 students studying food and agriculture production, included the establishment of a modern plastic tunnel, equipped with an irrigation system, two hydroponic-type substrate systems and heating. Training was provided to the staff and a small number of students in hydroponic systems and the use of controlled environments for modern agriculture production. The second pilot site was established in partnership with the country's largest agriculture cooperative, which also operates local irrigation systems over 300 ha. At this site, two technologies were demonstrated to train and motivate farmers with small plots to diversify production and adapt to extreme weather events. The third pilot site was established with the cooperation of a fruit growers' association and included the creation of a sub-soil irrigation system. This site was chosen as it is located in a region with no irrigation systems and the largest number of borehole irrigation sites in the country. The project thus introduced high efficiency irrigation in a region where the river basin and local aquifers are under significant strain. The project also attempted to popularize crop diversification in order to raise awareness of sustainable environmental practices, and climate change adaptation through diversification.

IMPLEMENTATION OF WORK PLAN AND BUDGET

The project faced problems during implementation that caused delays in some activities, such as the recruitment of consultants, and the procurement of planting materials and other supplies from overseas. Further significant delays were caused by the outbreak of the COVID-19 pandemic in March 2020, which obliged the project to replace physical workshops with online workshops, or to substitute other activities. Despite these impediments, the project was able to deliver all its envisaged outputs after the granting of a no-cost extension to December 2021.

FOLLOW-UP FOR GOVERNMENT ATTENTION

The most significant activity requiring government follow-up is to ensure that the national Irrigation and Drainage Strategy is adopted and implemented as soon as possible. In addition, it is recommended that the government continue to cooperate with the pilot site partners in order to motivate the spread and adoption of the newly introduced technologies in the country.



SUSTAINABILITY

1. Capacity development

A large number of stakeholders and beneficiaries received support in the introduction of the new policies, agriculture practices and climate tools in the country. By providing technical capacity-building, policy products and technology directly to the relevant institutions, both public and non-governmental, the project ensured that the dissemination of knowledge and expertise would continue well beyond the end of the project.

2. Gender equality

The project targeted both men and women, who benefited equitably from the results achieved.

3. Environmental sustainability

The project was focused on enhancing environmental sustainability with appropriate policies and strategies on natural resource management. The established pilot sites promoted climate-resilient sustainable agriculture production and management practices that would enable farmers to improve food security and livelihoods.

4. Human Rights-based Approach (HRBA) – in particular Right to Food and Decent Work

The project made use of both top-down and bottom-up approaches to ensure participation, accountability and transparency in the development of policies and strategy for natural resources management to address climate change. As a result, these respond effectively to meeting the full range of rights for everyone, including those without immediate development potential.

5. Technological sustainability

The project ensured that all the technologies introduced were in line with stakeholder needs and that they were within the capacities of the public and private sector in the country. It also ensured affordable access for their dissemination and maintenance through embedded institutional capacities and national market options.

6. Economic sustainability

All the pilot sites are hosted by relevant institutions and organizations with the capacity to maintain the sites, upgrade them and ensure continuous open visits and dissemination.



DOCUMENTS AND OUTREACH PRODUCTS

- ❑ **Cukaliev, O.** 2021. *Agrometeorological Services in Republic of North Macedonia* (analysis and training materials). February 2021. 130 pp.
- ❑ **Petkovski, V.** 2021. *Report on Assessment of Damage and Loss Information Systems in Agriculture in North Macedonia*. May 2021. 26 pp.
- ❑ **Cukaliev, O.** 2021. *Report on climate change in agricultural sector, mitigation and adaptation measures and policy recommendations*. Policy input report. August 2021. 97 pp.
- ❑ **Cukaliev, O.** 2021. *National Drainage and Irrigation Strategy 2022-2031*. August 2021. (In English and local language versions.) 97 pp.



ACHIEVEMENT OF RESULTS - LOGICAL FRAMEWORK

Expected Impact	The country is capable of taking actions towards combating climate change impacts on agriculture (related to SDG 13) and reducing the direct agricultural loss due to risks of extreme weather and climate events (Sendai Framework for Disaster Risk Reduction)		
Outcome	Increased resilience of agriculture sector by strengthening institutional capacity and coordination at the national level, and promotion of climate resilient good practices at local level		
	Indicator	Direct agricultural loss attributed to climate-related disasters significantly reduced.	
	Baseline	0	
	End Target	At least by 25 percent.	
Comments and follow-up action to be taken	The achievement of this project outcome indicator cannot be evaluated in the short timeframe of project implementation. It is anticipated that effective implementation of the policies and strategies, the capacity strengthening of climate services, and CSA resilience technologies will achieve the envisaged target within the next 2-5 years.		
Output 1			
Improved institutional and technical capacities at the national level to promote climate resilience in agriculture sectors			
	Indicators	Target	Achieved
	Number of institutional mechanisms relevant to climate resilience in agriculture sectors developed.	Four: - Irrigation and drainage strategy developed. - Damage and Loss Assessment system operationalized - Review report of national policies and plans related to climate change and agriculture completed. - Information system and network set up.	Yes
Baseline	0		
Comments	This output achieved significant results and provided the following outputs: - Irrigation and drainage strategy developed. - Damage and Loss Assessment report provided - Review report of national policies and plans related to climate change and agriculture completed and introduced into the National Agriculture and Rural Development strategy. - Information system and network set up through update of www.agrometeo.mk of HMS.		
Activity 1.1			
Development of irrigation and drainage strategy			
	Achieved	Yes	
	Comments	In constant consultation with MAFWE and representatives from the joint water stock company in the country, the project developed the country's first national document dedicated to drainage and irrigation, entitled "National Drainage and Irrigation Strategy". The document was developed and reviewed by MAFWE and revised in line with the country's needs. At the end of the project, the document was being prepared to be introduced into the national policy system and it was expected that it would be adopted in the first or second quarter of 2022. The delay has been partly caused by governmental changes.	
Activity 1.2			
Institutionalization of Damage and Loss Assessment Methodology			
	Achieved	Partially	
	Comments	On the request of the beneficiary and following extensive research and consultation with national stakeholders, it was concluded that the beneficiary was not institutionally capable (it being no longer within the ministry's purview to affect changes on this particular policy) and that the country was not prepared at this time to institutionalize such systemic changes. An extensive analysis, including an assessment of statistic data collection, analysis and management, was therefore performed, after which the beneficiary was provided with a report highlighting the key aspects that need to be addressed in both the short and long term in order to introduce FAO damage and loss methodologies.	
Activity 1.3			
Harmonization of selected national policies and plans relevant to climate change and agriculture to European Union regulation			
	Achieved	Yes	
	Comments	As project implementation coincided with the government's development of the new National Agriculture and Rural Development Strategy 2021-2027, in coordination with the beneficiary, the project was in a position to provide significant input into national policies. A national consultant was therefore hired to perform a review and to develop a "Report on climate change in agricultural sector, mitigation and adaptation measures and policy recommendations (policy input report)". The major conclusions and recommendation from this report served as a basis for introducing European Union standardized climate change components into the key national policy document.	

Activity 1.4	Establishment of institutional mechanism to promote climate information sharing and application in agriculture		
	Achieved	Yes	
	Comments	During implementation, it was found that the country has a number of institutional mechanisms for climate effort coordination and that the key missing aspect is the exchange of climate data. The key national Web site for climate information in agriculture www.agrometeo.mk was therefore strengthened through the recruitment of a national information technology (IT) consultant, significantly improving the functionality of this platform. The Web platform was expanded to include more stations, providing national coverage of the key agricultural regions, and will be further expanded in the future.	
Activity 1.5	Strengthening of operational capacity of State Hydrometeorological Service		
	Achieved	Yes	
	Comments	As part of this output, a two-day targeted training event was organized for the HMS. The focus of the training was to build up capacity on climate modelling and especially the FAO-developed crop growth model AQUACROP, enabling the HMS to follow up on crop water requirements. The training also prepared key HMS staff to operate and manage the updated agrometeo platform. An international study tour was originally envisaged but did not take place because of COVID-19 restrictions.	
Output 2	Improved climate smart agricultural innovative technologies and practices demonstrated in field plots for farmers' training		
	Indicators	Target	Achieved
	Number of field demonstration sites established.	At least two pilot field demonstration sites established.	Yes
Baseline	0		
Comments	This output significantly outperformed, establishing three pilot sites and demonstrating four different key climate smart methodologies, including sub-soil water conservation and mulching, closed soil production with climate control, hail and heat protection for vineyards, and substrate production using two controlled types of hydroponic/substrate technologies. The pilot sites were set in three different locations in Strumica, Resen and Miravci.		
Activity 2.1	Demonstration of irrigation scheduling system (time/amount), based on optimization models		
	Achieved	Yes	
	Comments	The project introduced an advanced calculation model for providing semi-automated irrigation inputs based on rainfall, evapotranspiration, crop and last irrigated input. The tool was developed in cooperation with the HMS and the national IT and Web consultant, under the leadership of the national agrometeorology consultant. The tool was inserted into the www.agrometeo.mk platform and is now available for three site-specific locations, but will be available nationwide with the inclusion and expansion of more automated stations by the HMS; this is expected to occur gradually during the course of 2022.	
Activity 2.2	Establish 2 pilot demonstration sites on CSA innovative technologies and land management practices for farmers training		
	Achieved	Yes	
	Comments	As part of this output, instead of the two pilot sites envisaged, three pilot sites were established in order to broaden the reach of the project. The pilot sites in Strumica, Resen and Miravci demonstrated the use of sub-soil water conservation and mulching, closed soil production with climate control, hail and heat protection for vineyards, and substrate production using two controlled types of hydroponic/ substrate technologies.	
Activity 2.3	Conduct farmers and community training on the pilot demonstration sites		
	Achieved	Yes	
	Comments	The project ensured that all direct beneficiaries received continuous on-site training during the setup phases of the pilot sites, to ensure sustainability. Owing to COVID-19 travel restrictions, the international CSA specialist was able to undertake only one country mission at the end of the project, during which two rounds of training were held for each site, covering such topics as: substrate culture production, controlled climate production, raspberry production, sub-soil irrigation and scheduling, and protected structures for vineyards.	
Activity 2.4	Adopt pest and diseases management practices based on the weather and climate parameters		
	Achieved	Partially	
	Comments	Under this activity, it was foreseen that the HMS would be supported in the revision of existing pest/disease forecasting models and in their improvement through the incorporation of additional parameters based on observations by two participants from HMS after two weeks of specialist training in Italy. However, this output was partially completed as part of activities under FMM/GLO/139/MUL. The project thus refocused both time and resources on creating advanced irrigation scheduling recommendations.	

Partnerships and Outreach

For more information, please contact: Reporting@fao.org

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