

Green Growth in Croatia's Agricultural Sector

World Bank Group

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LIST OF ACRONYMS	
AKIS	Agricultural Knowledge and Innovation System
ANC	Areas Under Natural Constraints
ASA	Advisory Services and Analytics (World Bank)
CAFAS	Croatian Agriculture and Forestry Advisory Service
CAP	Common Agricultural Policy of the European Union
CMO	Common Market Organisation (of the EU)
EC	European Commission
EIP	European Innovation Partnerships
ENRD	European Network for Rural Development
ESIF	European Structural and Investment Funds
EU	European Union
EU-27	Full current EU membership
EU-28	Full EU membership prior to the departure of the United Kingdom
EUR	Euro
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPP	Green Public Procurement
HAPIH	Croatian Agency for Agriculture and Food
NARDS	National Agriculture and Rural Development Strategy
NDM	New Delivery Model for CAP data
NDS	National Development Strategy
NRRP/NPOO	National Resilience and Recovery Plan of Croatia
NSP	National Strategic Plan (for the CAP)
OECD	Organisation for Economic Co-operation and Development
OG	Operational Group
PDO	Protected Designation of Origin
PMEF	Performance Monitoring and Evaluation Framework

PRO AKIS	Prospects for Farmers' Support: Advisory Support in European AKIS
R&D	Research and Development
RED	Renewable Energy Directive (EU)
SDGs	Sustainable Development Goals (of the United Nations)
SME	Small and Medium-sized Enterprise
SOM	Soil Organic Matter
STARS	Strategic Transformation in Agriculture and Rural Space (World Bank)
SWOT	Strengths, Weaknesses, Opportunities, and Threats
UAA	Utilized Agricultural Area
YF	Young Farmer under the age of 35

1. Overview

This Note is about identifying synergies that can increase the pace of progress towards sustainable agriculture growth in Croatia. The authors have examined the requirements of the new CAP and the alignment of Croatia's domestic policies with the CAP objectives. The new CAP includes, by implication or specification, the European Green Deal, which has been a factor in setting the objectives of this Note.

The note's overall finding is that, with some qualifications, Croatia comes to the table with some significant advantages. For one, Croatia has the potential for "leap-frogging" compared to earlier EU member countries, partly because it has less to "undo", in terms of earlier "modernization efforts" that were previously required by the EU in the name of agricultural self-sufficiency and protecting rural communities from volatile markets. The original purpose of the CAP was to preserve or improve farmers' incomes by driving efficiency and raising production levels. With the Green Deal, these earlier objectives have been nuanced and the need to reduce carbon emissions and adapt to and mitigate the effects of climate change have come into focus.

Croatia has, thus, the opportunity to modernize its agriculture sector in ways that will attract maximum support under the new CAP and the Green Deal, thus accelerating the transformation, possibly overtaking older member states in the EU. The country must, however, continue to prioritize policies in support of sustainable development of agriculture and manifest its commitment to green growth by supporting the objectives of the European Green Deal.

Box1.1: Key findings of this study

This Note identifies the following suggestions to contribute to Croatian agriculture's transformation:

- "Sustainably 'Made in Croatia'" would represent an approach in which government support is directed to measures that promote an image of Croatia that includes commitment to both environmentally responsible methods and high-quality agricultural output. This implies direct support to farmers and the supply chain, but also to stimulating demand at home and abroad by education and evidence-based informational programs. Examples of where this has been done successfully demonstrate the viability of such an approach. However, the administrative rules, procedures, and regulations need to be simplified and streamlined;
- Organic farming presents another opportunity for the Croatian agriculture sector and is one of the key priorities of the European Commission. With some reservation, it is possible to see Croatian farmers expanding their organic production, drawing on unspoiled pasture and arable land and adopting organic procedures for new products. However, government must step in to promote organic agriculture through the development of well-trained advisory services and an improved supply-chain organization, and by improving the application of the labelling system to reassure consumers of food and industrial goods;

- Linked to the principle of educating consumers and opening the market is that of supplying the tools and systems for farmers to understand the importance of sustainability and apply its principles. This requires that Croatia should strengthen its agricultural knowledge and innovation system (AKIS) in several ways including through public and private organizations. There are many avenues for EU member states to explore in the domain of AKIS and a number of countries have realized the benefits of systemic consolidation or the merging of ministries and agencies with AKIS responsibilities. An effort on the home front must be accompanied by ensuring a supply of trained and talented Croatian participants in Europe-wide research and innovation activities, so that they can apply lessons and apply experience at home. Again, the EU provides many opportunities for research cooperation that should be exploited by Croatia to enhance the quality of its human capital in this area;
- The proposed CAP 2023-2027 will adopt a results-based approach. To track progress, such as agro-environmental commitments to be triggered by the European Green Deal, member countries will utilize a Performance Monitoring and Evaluation Framework (PMEF). This new approach presents many challenges for all stakeholders involved in designing and implementing the new framework: from the Commission to national authorities, and all the way to paying agencies and beneficiaries at farm level. By learning from the initiatives, technologies, and experiences of actors in other European countries, much may be gained such as ideas for effective data collection and management. Digitization has been recognized as a priority for the Government of Croatia and will play an important role in this context, for example, by enabling land-use mapping, risk management, assessment of land quality/degradation, and viability of crops and grazing animals; and
- Rural communities have the greatest potential both to contribute to, and benefit from, green growth in the agriculture sector – currently largely undermined by a lack of trained labor and entrepreneurship in rural areas. However, for the rural areas to be a place seen as a desirable living space, potential (or current) farmers must have access to services such as health and education, public transport, and broadband Internet. Improving access to land – for example, by solving issues of land registry and allocation of state land – will also be a major step towards enabling generational renewal and entrepreneurship in the sector.

Agriculture in Croatia

The Republic of Croatia is in southern Central Europe on the Adriatic Sea with a land area of 56,578 km² and an area along the coastline of 31,067 km². Agriculture (including agriculture, fisheries, and forestry), despite a declining trend, remains an important part of the economy, representing 1.1% of the EU's GDP¹ and 4% of the

¹ Eurostat, European Commission. (2021). *Performance of the agricultural sector*. [Performance of the agricultural sector - Statistics Explained \(europa.eu\)](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&plugin=1)

Croatian GDP in 2018^{2,3}. Climatic and geographic conditions, combined with the traditional significance of agriculture and the sustainability of current practices under favorable pedoclimatic conditions, make Croatia potentially a leading sustainable food system within the European Union. According to the Ministry of Agriculture, 7.5% of the national workforce is employed in the primary production sector, and a substantial additional number of workers are informally engaged in agriculture. Clean air, access to abundant markets, land and water resources, and the historically diverse farming systems create a biodiverse mosaic that could be a considerable strength. However, climate change threatens the future of the agriculture sector, which is vulnerable to extreme and unpredictable weather events such as hail and drought, desertification, land/forest degradation, loss of crop cultivars and nutrition quality, ocean salination, increased surface temperatures, and rising sea levels. The European Green Deal's ambitious target of improving the sustainability of the agriculture sector provides both an immense opportunity for Croatia to leverage funds and resources, and a challenge because of the many changes in the sector required to meet the demands of the Green Deal.

The agriculture sector has been shaped as much by the geopolitical history of the country, as its climatic and geographic conditions. Entry to the EU and the Common Market in 2013 opened an opportunity to reach half a billion consumers with access to Common Agriculture Policy (CAP) subsidies and support. However, during the pre-accession period (2008-2012), the primary sector failed fully to utilize pre-accession funds, leaving many farmers unprepared. Hence, the agriculture sector had difficulty adapting to the new economic circumstances, and consequently faces negative value-added and gross output growth.⁴ In 2017, Croatia had an agri-food deficit with EU countries of EUR 1.38 billion, with imports of primary and high-value processed products outpacing exports.⁵ The competitive capacity of Croatian farms is limited by small farm size and low levels of producer aggregation. Furthermore, low labor and land productivity prevent the structural transformation of the agri-food sector. Although improvements in agricultural productivity have been significant over the past decade, the increase has been slow and the productivity gap with other EU countries remains large. Croatia's low agricultural factor productivity has mainly been driven by low capital investment and R&D expenditure.⁶

Croatia's unfavorable structure of agricultural holdings is characterized by small family-owned units; 70% of Croatian farms are of less than five hectares,⁷ and are often spatially fragmented, further limiting the potential for increasing competitiveness. The main constraint on the development of an effective land market and improvement in agricultural productivity is the inefficient land administration system, which results in lack of clarity in land titles. Low value-added production, such as of arable crops, occupies two thirds of available agricultural land.

² SMARTER. *Agri-food sector importance*. (2019). ([Značaj poljoprivredno-prehrambenog sektora - SMARTER](#))

³ Grgić I., S. Krznar and V. BRATIĆ. (2019). *Agricultural production of the Republic of Croatia before and after accession*. - University of Zagreb, Faculty of Agriculture [985178.1.pdf \(irb.hr\)](#)

⁴ The World Bank. (2019). *Sector diagnostic and analysis of public spending in agriculture and rural development*. [World Bank Document](#)

⁵ Ibid.

⁶ The World Bank. (2019) *Productive Inclusion for Agricultural Competitiveness in Croatia*, [World Bank document](#)

⁷ European Commission. (2020). *Commission recommendations for Croatia's CAP strategic plan*.

Livestock production also represents an important element of land use, though it is in decline.⁸ Cattle production has steadily fallen, with a cumulative drop of 36% in total head between 2008 and 2018.⁹ This collapse echoes a 60% drop in the number of farms between 2007 and 2016.¹⁰ The same trend is currently underway in pig production, where 50% of pork breeding specialized farms have disappeared in the last ten years.¹¹ Although average herd size has increased, the rapid decline in all sectors suggests a crisis of rural viability, with very low rates of vertical and horizontal integration in the agricultural food chain. The main impact of this decline is the disappearance of medium-sized holdings, leaving only small or large-sized operations. Fragmentation in primary production, combined with a lack of competition and investment in food processing, constrains the development and expansion of well-functioning agri-food value chains in Croatia. A low level of investment in innovation has further contributed to the decline.

One of the unique characteristics of Croatia's agriculture sector is the comparative paucity of farmers' associations and organizations – as also observed by the World Bank's Strategic Transformation in Agriculture and Rural Space (STARS) engagement: only 0.23% of registered producers are identified as organized into cooperatives.¹² The development of agriculture cooperatives is stagnant, and contracts between the farmers and the agro-processing industry are almost non-existent. Consequently, processing enterprises and large-scale retail operations have gradually been returning to vertically and horizontally integrated companies in order to secure their supply of raw materials. This is important because associations offer opportunities for increasing producers' bargaining power, for supporting rural communities, and for improving the environmental sustainability of the sector through knowledge and innovation exchanges.

Other impediments to improving the sector include insufficient structuring and financial support of advisory services,¹³ but the Ministry of Agriculture currently lacks sufficient advisory capacity to help farmers transition towards more profitable and sustainable means of production. The country spends half the EU average on Research and Development (R&D);¹⁴ increasing R&D investment (as a percentage of GDP) to halve the gap between Croatia and the overall European Union (EU-28, now EU-27 following the departure of the United Kingdom in January 2020) average would increase agricultural labor productivity by 12%.¹⁵

There is a strong correlation between rurality and poverty, with farmers the most exposed. Over a quarter (27%) of the rural population in Croatia is at risk of poverty, compared to 12% of urban dwellers.¹⁶ This is a

⁸ The World Bank. (2021). *Livestock sector analysis in support of the preparation of the Croatia National CAP Strategic Plan for 2021-2027* (P171507).

⁹ Ibid

¹⁰ Ibid

¹¹ Ibid

¹² The World Bank. (2019). *Sector Diagnostic and Analysis of Public Spending in Agriculture and Rural Development*. [World Bank Document](#)

¹³ Ibid

¹⁴ The World Bank. (2020). *Strategic Transformation in Agriculture and Rural Space (STARS RAS) Background Document - Agriculture Knowledge and Innovation Systems (AKIS) in Croatia*. [AKIS.pdf \(poljoprivreda2020.hr\)](#)

¹⁵ The World Bank. (2019). *Sector Diagnostic and Analysis of Public Spending in Agriculture and Rural Development*. [World Bank Document](#)

¹⁶ The World Bank. (2021). *Beyond the farm. A Vision and Roadmap for the Strategic Transformation of Agriculture and Rural Space*. <https://poljoprivreda2020.hr/wp-content/uploads/2020/06/Beyond-the-Farm-Croatia-C.pdf>.

tendency observed in all EU countries, but Croatian farmers are the poorest in the Union.¹⁷ The agricultural income per worker was about 36% of the average wage in the whole economy between 2005 and 2018, ranging from 29% in 2012 to 44% in 2018, is slightly lower than the EU average.¹⁸ Furthermore, the 2016 share of young farmers (YF) – defined as those under the age of 35 – in Croatia was 5.1% (equal to the EU average).¹⁹ Croatian YFs are more likely to invest in and produce high quality food, create alternative and local agri-food networks, and innovate with more sustainable business models. However, their potential is limited by low education, insufficient extension and advisory services, shortage of subsidies, difficulties in accessing credit, and the overall difficult business environment for producers and agribusiness small and medium enterprises (SMEs).²⁰ Improving the livelihoods of farmers and opening opportunities for the next generation is key to maintaining rural activity and viability, as well as empowering farmers to make sustainable investments.

Objective of the Note

This Note is part of the World Bank’s Advisory Services and Analytics (ASA) and is offered in the context of Croatia’s new agricultural strategy and the country’s need to align itself with new EU policy frameworks and requirements. It identifies development opportunities for Croatia’s agriculture sector and the complementarities between improving competitiveness and enhancing environmental performance, while supporting viable rural areas, and resilience to climate change. The Note is forward-looking and demonstrates levers for the promotion of “green growth” in the context of the preparation of Croatia’s National Strategic Plan for the new CAP, which is due for implementation in 2023.

The Note is based on an analysis of EU policies and recommendations, World Bank reports, Croatian national development strategies, the National Resilience and Recovery Plan (NRRP) and data sources on environmental performance. It also includes the outcome of consultations with stakeholders and experts in Croatia and in other EU member countries.

2. Introduction

New objectives under the European Green Deal

Croatia and the other 26 EU member countries are preparing to realize the European Commission’s vision in the European Green Deal: to make the EU’s economy sustainable and reduce GHG emissions by 55% of 1990 levels by 2030. Each country must strive to meet the objectives outlined in the “Farm to Fork Strategy”, “The Biodiversity Strategy for 2030”, and other strategies relating to from the Green Deal. Within these strategies, the European Commission has outlined three targets for improving the environmental sustainability of Europe’s

¹⁷ European Commission. (N.D.). *CAP objective 1: farmers income*. https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/key_policies/documents/cap_specific_objectives_-_brief_1_-_ensuring_viable_farm_income.pdf

¹⁸ European Commission. (2019). *Analytical factsheet for Croatia: Nine objectives for a future Common Agricultural Policy* https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/by_country/documents/analytical_factsheet_hr.pdf

¹⁹ European Commission. (2020). *Commission recommendations for Croatia’s CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

²⁰ Ibid

agricultural sector by 2030: (i) to reduce the use and risk of chemical and more hazardous pesticides by 50%; (ii) to reduce nutrient losses by at least 50%, while ensuring no deterioration in soil fertility and to reduce fertilizer use by at least 20%; (iii) and to reach 25% of total farmland under organic farming.

The COVID-19 pandemic has had a devastating impact on the European and global economies, particularly for countries dependent on tourism, and there are recovery resources available to EU members through the “Next Generation EU” fund of EUR 750 billion, but access to these funds is conditional on their being used in a sustainable manner to promote environmental protection alongside social and economic development. While adhering to the Green Deal targets is not a legal obligation for member states, the EC will invite all member states to set explicit national values for the targets and encourage ambitious National Strategic Plan (NSP) proposals, with a no backsliding clause on environmental action.²¹ The post-2020 CAP is under negotiation but will undoubtedly include increased environmental ambitions through a ring-fenced budget for eco-schemes in the first pillar, enhanced conditionality that raises the minimum threshold farmers must meet to benefit from CAP subsidies, and by the promotion of agri-environmental measures and more funding for research and innovation under the “Horizon Mission: Soil and Health”. This is a potential moment of opportunity for member countries to access funds and ensure that recovery and growth include core measures for environmental protection and climate adaptation.

Green growth and its relevance to Croatian agriculture

The Organisation for Economic Co-operation and Development (OECD) defines “Green Growth” as, “fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies”.²² On 25 June 2009, the meeting of the OECD Council at Ministerial Level adopted a declaration on green growth, “Public investment should be consistent with a long-term framework for generating sustainable growth”. These virtuous investments “shall also go with the aim of avoiding or removing environmentally harmful policies that might thwart green growth, such as subsidies (that) contribute to negative environmental outcomes”.²³

The concept is, however, becoming more controversial and has been criticized as an attempt at a half-way solution, rather than the radical approach needed to tackle climate change and reach the United Nations’ Sustainable Development Goals (SDGs). Nonetheless, the green growth concept remains a valuable framework for countries facing new economic situations such as Croatia, where growth remains an important objective and has to be reconciled with environmentally respectful reform.

Croatia is one of the 47 states that adhere to the 2009 OECD declaration on green growth, and agriculture is one of the central areas for the country’s green-growth strategies. Since joining the European Union, it has been restructuring its agriculture sector, to adjust to and best benefit from the new market opportunities provided by the

²¹ European Commission. (2020). *Analysis of links between CAP reform and Green Deal*. (2020) https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/sustainability_and_natural_resources/documents/analysis-of-links-between-cap-and-green-deal_en.pdf

²² OECD. (2019). *Green growth and sustainable development*. <https://www.oecd.org/greengrowth/>

²³ OECD. (2009). *Declaration on green growth*. [44077822.pdf \(oecd.org\)](https://www.oecd.org/dataoecd/44/07/44077822.pdf)

bloc while revitalizing the agriculture sector. However, the principle of growth in Croatia also involves increasing yields and production, which can lead to unsustainable levels of natural-resource use and emissions. The struggle, therefore, is to find a way of enhancing Croatian agriculture's competitiveness without inducing negative environmental outcomes.

The National Agriculture and Rural Development Strategy (NARDS), the National Recovery and Resilience Plan (NRRP [Croatian: NPOO]), the National Development Strategy, and the reform of the CAP, taken together offer a major opportunity for Croatia to promote green growth.

Current agro-environmental situation

Problems of data availability and reliability complicate analyses of Croatian agro-environmental issues. This is clearly a challenge for Croatian agriculture and must be tackled to make decision processes easier and efficient, as also pointed out by STARS. For example, as of 2019 there was no data available on the mean soil organic carbon concentration, on the production of renewable energy from agriculture, or on the nature and distribution of farmland birds. There are also large gaps in the data on water abstraction.²⁴

Low average use of pesticides and mineral fertilizer

Croatia is rich in natural resources and biodiversity, with an overall good record in protection of natural resources.²⁵ Fragmented mosaics of small farms, which are important for the protection of farmland biodiversity, characterize extensive cropland, and, over the second decade of the 21st century, there has been a decreasing trend in pesticide use and fertilizer application. Indeed, pesticide use decreased on average from 0.6 to 0.5 kg/ha in the 5 years 2013 to 2018²⁶, a trend not seen in neighboring countries.

The use of mineral fertilization has also decreased since 2000 from an average intensity of inorganic phosphorous fertilization of 19 kg/ha in 2000 to 10 kg/ha in 2018, which is still high, but much closer to the averages for neighboring countries. Slovenia, for example, has had a similar experience, but Hungary has experienced a clear increase in inorganic phosphorous fertilization. Croatia had a sharp decline in mineral nitrogen fertilization, from an average of 100kg/ha spread in 2000, or more than 50% more than neighboring countries, to an average of 45 kg/ha in 2016, which is comparable to the levels in neighboring countries. However, this downward trend has not been consistent, between 2016 and 2018, Croatian levels grew from 45 kg/ha to almost 70 kg/ha.

These trends in mineral fertilizer application are reflected in water quality indicators, where the nitrogen surplus in Croatia has decreased from 122 to 43 kg N/ha/year between 2000 and 2016, while the phosphorus surplus decreased over the same period from 19 to -4 kg P/ha/year. Analyses of the ground-water stations in Croatia

²⁴ European Commission. (2019). *Analytical factsheet for Croatia: Nine objective for a future Common Agricultural Policy*. [analytical factsheet hr.pdf \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN)

²⁵ European Commission. (2020). *Commission recommendations for Croatia's CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

²⁶ European Commission. (N.D.). *CAP Indicators*. https://agridata.ec.europa.eu/extensions/DataPortal/cmef_indicators.html

in 2012 concluded that all of them produced high quality water.²⁷ Nevertheless, contributing to the Green Deal target of reducing nutrient losses while protecting soil fertility would require an increase in the use of organic-based fertilizers and better manure and livestock management.²⁸

Soil quality and climate change adaptation

Climate change is exacerbating existing issues such as soil erosion²⁹ and drought periods³⁰ in Croatia further weakening the resilience of agriculture. The newspaper, *Vecernji News*, reported on 10 April 2021, that Croatia produces “21% less food than it would if the climate had remained the same as in the 1960s”.³¹ There is, therefore, a double objective: adapt Croatian agriculture to climate change and use the sector to mitigate its effects.

Soil quality is not only important for agricultural production, but also for preserving biodiversity, as soils hold 25% of all biodiversity in the earth.³² One of the most significant challenges Croatian agricultural resilience faces is that 23%³³ of agricultural land is threatened by erosion,³⁴ which is common, due to the country’s location in the center of the Mediterranean Basin.³⁵ Croatia has an average soil loss rate from water erosion of 3.16 tons per hectare per year compared to the EU mean of 2.46 tons.³⁶ Certain management practices and land-use types, such as conventional tillage³⁷ and bare soil in winter months,³⁸ can leave soils vulnerable to erosion. In addition, low levels of soil organic matter (SOM) are common in Eastern Croatia,³⁹ but the extent of the problem country-wide is unknown due to the lack of data, which is a problem because water retention in soil is strongly linked to the Soil Organic Matter (SOM) rate⁴⁰ and 41% of agriculture’s overall greenhouse gas (GHG) emissions are linked to soil mismanagement.⁴¹ The STARS Pilot 2 Guidance Note mentions that organic matter in the soil is low in the most productive areas of the country (the eastern Croatia average is 2.3% SOM) compared with other European Countries (i.e., Austria and Poland with 6-12%). Decreases in SOM rates is driven by the intensification and specialization of farms observed on most fertile’ Croatian territories, such as Slavonia and to conversion of pasture

²⁷ European Commission. (2019). *Analytical factsheet for Croatia: Nine objective for a future Common Agricultural Policy*. [analytical factsheet_hr.pdf \(europa.eu\)](https://eur-lex.europa.eu/legal-content/hr/pdf/?uri=CELEX:52020SC0384&from=EN)

²⁸ European Commission. (2020). *Commission recommendations for Croatia’s CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

²⁹ European Commission. (2019). *Environmental implementation review for Croatia*. [The Environmental implementation review - Croatia \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN)

³⁰ The World Bank. (2019). *Sector Diagnostic and Analysis of Public Spending in Agriculture and Rural Development*. [World Bank Document](https://www.worldbank.org/publications/sector-diagnostic-and-analysis-of-public-spending-in-agriculture-and-rural-development)

³¹ Večernji list, April 10th 2021: <https://www.vecernji.hr/techsci/proizvodimo-21-manje-hrane-nego-sto-bismo-da-je-klima-ostala-ista-kao-60-ih-1482684>

³² European Commission. (2010). *The factory of life: Why soil biodiversity is so important in the EU*. https://ec.europa.eu/environment/archives/soil/pdf/soil_biodiversity_brochure_en.pdf

³³ The World Bank. (2019). *Sector Diagnostic and Analysis of Public Spending in Agriculture and Rural Development*. [World Bank Document](https://www.worldbank.org/publications/sector-diagnostic-and-analysis-of-public-spending-in-agriculture-and-rural-development)

³⁴ Ibid

³⁵ European Commission. (2020). *Commission recommendations for Croatia’s CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

³⁶ Panagos, P. et. al. (2015). “[The new assessment of soil loss by water erosion in Europe](https://doi.org/10.1016/j.envsci.2015.05.001)”. *Environmental Science and Policy*. Vol. 54 pp 438-447

³⁷ European Commission. (N.D.) *CAP Indicators*. https://agridata.ec.europa.eu/extensions/DataPortal/cmef_indicators.html

³⁸ Ibid.

³⁹ Durdevic, B., Jug, I., Jug, D., Bogunovic, I., Vukadinovic, V., Stipesevic, B., Brozovic, B. (2019). “Spatial variability of soil organic matter content in Eastern Croatia assessed using different interpolation methods”. *International Agrophysics* 33(1):31-3

⁴⁰ Lal R. (2020). *Soil organic matter and water retention*. Ohio State University.

⁴¹ European Commission. *Commission recommendations for Croatia’s CAP strategic plan*. (2020). <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

into crop land (Osijek and Baranja regions). Farming intensification is often characterized by a simplification of crop cycles, which leads to a drop of soil fertility,⁴² and ultimately mineral fertilization dependency.⁴³ In the absence of organic fertilizer from livestock, farmers may become reliant on mineral fertilizer, which has a high carbon footprint (20.7% of national agricultural GHG emissions are caused by mineral fertilization⁴⁴).⁴⁵

There is, therefore, a real opportunity in de-specializing Croatian territories to reconnect organic manure and nutrient cycles. This will bring back synergies between plants and animals found in mixed crop-livestock systems but on a larger territorial scale allowing for conciliation between competitive production and soil conservation.

Soil data is collected by the Faculty of Agriculture of the University of Zagreb, the Institute of Agriculture in Poreč, and the Croatian Agency for Agriculture and Food (HAPIH). But, no digital soil database or any soil information system exist in Croatia, which makes soil data availability and reliability very difficult. This is clearly a challenge for Croatian agriculture and must be tackled to improve decision processes.

Improving soil management through increasing SOM and mitigating the threat of erosion will be key challenges for Croatia in the coming years. The 6% of agricultural land in Croatia under contract in 2018 for improving soil management could be increased by leveraging the opportunities available in the next Horizon Europe framework.⁴⁶ This would lead to substantial reductions of GHG emissions in the agricultural sector and better resilience to drought exposure, which is especially interesting, given the low deployment of irrigation systems (1% of agricultural land in 2018⁴⁷). However, there are worrying trends in soil use as the intensification of agriculture gathers momentum, especially in fertile regions.⁴⁸ The STARS Pilot 2 Note provides further guidance in this regard.

Greenhouse gas (GHG) emissions

Agriculture is responsible for 14.8% of total national GHG emissions, (without taking into consideration land use, land-use change and forestry) with an estimated 2.72 million tons of CO₂ equivalent in 2018.⁴⁹ Total

⁴² The World Bank. (2019). *Strategic Transformation in Agriculture and Rural Space (STARS RAS) - Croatian agricultural policy and CAP instruments*.

⁴³ Đurđević B., I. Jug, D. Jug, I. Bogunović, V. Vukadinović, B. Stipešević, and B. Brozović. (2018). "Spatial variability of soil organic matter content in Eastern Croatia assessed using different interpolation methods". *International Agrophysics* 33(1):31-39

⁴⁴ The World Bank. (2019). *Sector Diagnostic and Analysis of Public Spending in Agriculture and Rural Development*. [World Bank Document](#)

⁴⁵ Nardi S., Morari F., Berti A., Tosoni M., Giardini L. (2003). "Soil organic matter properties after 40 years of different use of organic and mineral fertilisers" *European Journal of Agronomy* "[Soil organic matter properties after 40 years of different use of organic and mineral fertilisers](#)" - [ScienceDirect](#).

⁴⁶ European Commission. (2020). *Commission recommendations for Croatia's CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

⁴⁷ The World Bank. (2019). *Sector Diagnostic and Analysis of Public Spending in Agriculture and Rural Development*. [World Bank Document](#)

⁴⁸ European Commission. (2020). *Commission recommendations for Croatia's CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

⁴⁹ European Commission. (2020). *Commission recommendations for Croatia's CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

GHG emissions from agriculture decreased from 1995 to 2018 by 39%, and by 14.45% compared to 2005. Emissions of CH₄ and N₂O per hectare of utilized agricultural area (UAA) in Croatia are below the EU-average.⁵⁰

Progress in GHG emissions has slowed since Croatia's EU accession and have been stabilizing, with equivalent emissions in 2013 and 2018.⁵¹ It is important to note that these trends are largely driven by a decrease in the livestock population and remain above EU objectives. GHG emissions in agriculture in Croatia are caused by 3 main factors: soil mismanagement (41%), enteric fermentation linked to livestock (36%), and manure mismanagement (20%).⁵² On-farm approaches that have been identified to address these factors include permanent soil cover, sustainable use of tillage, livestock genetic and feed management, and manure storage and valorization. The new CAP features support for these solutions for real emissions savings.

Stakeholder perceptions

Environmental organizations and private entities, driven by civil society, scientists, and producers participate in shaping sustainable food systems. In Croatia, as with most European countries, there is a combination of organizations (e.g., ECOLOGICA, Green Istria) that are unique to Croatia, as well as organizations and cooperatives that are members of international movements, such as Life (European Coordination Via Campesina) and Lokvina (IFOAM). Interviews with six Croatian stakeholders (Annex 2) were held in May 2021, in order to map their perspectives and compare them with the results of the analysis conducted in this Note. Overall, the discussions supported the conclusions from the previous section, although new challenges (such as those related to large carnivores) were identified. The interviews were also an opportunity to discuss the regional and sectoral variations behind the national statistics presented above. The following is a summary of the main challenges for improving the agro-environmental sustainability of the Croatian farming sector, which were consistently identified by the stakeholders.

A main concern is the lack of both vertical and horizontal cooperation along the supply chain. Cooperation between farmers allows for diversification and creates economies of scale, as well as providing more independence and resilience towards the competition and retailers. Cooperatives are developing, but they remain marginal. This is partially due to the legacy of centrally coordinated organization of producers during the socialist era which have had an impact on producers' trust - as observed by the STARS engagement. Cooperation between ministries, and between European, national, and local authorities, would also increase administration effectiveness and clarity.

The administrative burden is another frequently cited obstacle. For example, organic certification remains difficult, farmers struggle to get compensation for wolf attacks, and CAP subsidies are underexploited because of bottlenecks in the administrative process. Promotional donation campaigns have, however, shown very interesting results. For example, in the northern part of the country, Varaždin County provided milk cooling systems to small farmers to overcome collection-delay problems. Such campaigns make stakeholders aware of the financial help available and demonstrate the relevance and availability of subsidies.

⁵⁰ European Commission. (N.D.) *CAP Indicators*. https://agridata.ec.europa.eu/extensions/DataPortal/cmef_indicators.html

⁵¹ European Commission. (2020). *Commission recommendations for Croatia's CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

⁵² Ibid

Also related to the performance of public institutions, stakeholders expressed the need to reinforce public service to producers and recognize their environmental custody. Better public services would lead to better land registration, accurate and strict environmental controls, and promote consumer confidence in high-quality, certified products. Involving concerned stakeholders in the decision-making process was a popular proposal among interviewees and could, indeed, produce more understanding and generate field-oriented strategies.

Interviewees mentioned the potential role of public procurement to foster the demand for sustainable and local products. The role of the public authorities in purchasing food is very important in Croatia; some 33 million meals are bought in the city of Zagreb each year by public institutions. Stakeholders thus mentioned that public procurement of food represents an avenue for developing the market for quality and environmentally safe products and supporting the participation of small-scale producers. Interviewees also mentioned the possibility of implementing preferential tax regimes as a further way to support sustainable food production systems in the country.

On environmental issues, stakeholders confirmed that soil degradation is a major threat throughout the national territory, although it varies according to region. In the north, where the soil used to be the most fertile in Croatia, there is now the lowest level of organic matter, according to Professor Ante Biško from Zagreb Faculty of Agriculture. This is due to agricultural intensification, systematic tillage, and monocropping. The lack of data makes it difficult fully to evaluate this threat. Only Osijek-Baranja County has an independent department to scientifically monitor soil quality. Additionally, the impact of livestock concentration due to continued farming specialization has produced nutrient imbalances, with excesses in regions specialized in breeding, and shortages where breeding is no longer practiced. This situation is a major threat for the environment in both cases.

Land registration issues and unclear land-use planning were repeatedly mentioned as major obstacles to agricultural development and sustainable urban growth. Differing and incomplete land registration documentation, and sometimes superimposed but conflicting laws on land use, add to a general sense of incomprehension. Strengthening land registration and data harmonization is the way forward to unlock access to land and facilitate the expansion of farming. It would also reinforce control of urban planning and militate against illegal construction. There is also a need for the authorities to facilitate fair access to state-owned agricultural land, which represents some 30% of the national stock, to promote sustainable and consistent agricultural development. There is, therefore, a need to establish clear criteria and cogent agricultural strategies at the local level to accompany local authorities in charge of distribution, to facilitate the implementation of European and national objectives.

Tourism was noted to have had controversial impacts on the environment. On the one hand, some stakeholders noted that tourists come to Croatia to enjoy nature and are disposed to consume local and high-quality products including food. Therefore, tourism, which is responsible of a high proportion of national GDP, is strongly linked to nature conservation and low-income farming. Tourism is also one of the opportunities identified for promoting sustainable growth. For example, local fruit and vegetable producers in Istria are engaged in supplying coastal hotels and restaurants and more could be done to develop such initiatives. On the other hand, some stakeholders mentioned the development of mass tourism that threatens agricultural land and biodiversity to make way for tourism infrastructure. The general opinion was that tourism can offer an opportunity if it is well managed; it is the local administration's responsibility to better direct and control their urban planning.

Stakeholders mentioned a general lack of awareness about agri-environmental issues and options. Farmers often ignore the consequences of using pesticides, and view prohibition on their use as an additional burden instead of a necessary improvement. This problem can only be dealt with by a strong and highly trained advisory team. Continuous improvement of knowledge and skills is an essential driver for the transition towards a competitive and sustainable agriculture sector in Croatia. Currently, the most prominent “advisors” to whom farmers have access are the pesticide vendors, who are unlikely to be entirely neutral. The ratio for extension services in Croatia is one agricultural extension worker for 585 farms, according to the European Commission. This figure is in line with stakeholders’ opinions and underlines the need to develop advisory services. The advisory system in Croatia is weakened by the failure to reinforce its outreach to the sector, allowing farmers and stakeholders to be informed, educated, and competent to receive the necessary support for efficient operations. The system also lacks stated objectives to create synergies between farmers and advisors. Privatization of advisory services could contribute to an efficiency increase, which could be profitable for farmers. Improving the capacity of advisory services and supporting collective and collaborative learning by farmers is required to enhance productivity and sustainability, including the green growth earning capacity of farms. Farmers and the advisory service can apply for tenders (Horizon 2020, promotion measures, education and knowledge transfer) to further expand their knowledge and to exchange experiences with other member states. But Croatia barely uses the minimum of these funds that are crucial for the development of Croatian family farms and advisors in the future programming period.

The need exists to train farmers in organic farming measures before they make the transition. The younger generation of farmers appears to be the most trained and aware, supporting the development of competitive and relevant organic farms. Raising awareness of the challenges and opportunities offered by organic, sustainable agriculture from the classroom to the parliament would contribute to reducing poverty and inequality, while improving community health and welfare, and facilitate the introduction of environmentally sound policies and measures.

Zagreb County is currently leading the charge to become 100% organic agriculture by 2030, which implies strongly reinforcing organic supplies through farmers’ involvement in the process, but also establishing communication campaigns aimed at consumers, which currently seem to be neglected. Increases in organic farming practices in Croatia was overall perceived as a positive trend, but there was concern with the fact that there is a concentration of organic certification and support amongst few beneficiaries. Ensuring that small and medium sized farmers and entrepreneurs could access rural development measures for organic production was therefore identified as an important consideration for the next programming period of the CAP. Raising awareness among consumers was mentioned as an under-utilized approach to bringing more stability in demand for environmentally sustainable production and greater traction for related development strategies.

3. Policies and Strategies

Introduction to key strategies in Croatia

The vision for 2030 constitutes a new horizon for Croatia, mapped out by the European Green Deal and propelled by COVID-19 recovery plans. Nationally, four key strategies will define the path to 2030: the NARDS, the National Development Strategy for 2030, and the NRRP, as well as the National Strategic Plan for the Common Agriculture Policy (CAP) 2020-2030 (NSP) expected to be adopted by the government in mid-2021. The NRRP tackles elements of reforms that are not regulated by the CAP, such as land reform, digital transformation of agriculture, and streamlining food donation and food banks.

The first three strategies relate to promoting green growth, overall, stressing alignment of agricultural development priorities with the objectives of the European Green Deal. While the NARDS is wholly related to agriculture, the other two strategies place the sector as a key priority (Table 3.1).

The NRRP, which is unique in that it offers a roadmap for short-term (2-5 years) investment needs and is therefore the best indicator of ‘next-steps’ and priorities in Croatia, prioritizes modernizing agriculture. It emphasizes that “all planned reforms include an element of digitalization of agriculture” (p. 343, NRRP). It provides examples that include smart-farming technologies, targeted water use, access to protective equipment and fertilizer application. The focus is on using modern technology to raise farmers’ efficiency, promoting productivity, increasing farmers’ autonomy, and reducing reliance on external inputs through a combination of digital and nature-based solutions. There is an emphasis on investing in producer organizations and improving access to digital markets for farmers. Croatia is one of the EU member countries with the lowest share of physical area under agri-environment and climate measures (under 1%) as of 2019.⁵³ All the Croatian efforts and visions for sustainable growth need to be met by adequate investments and access to finance.

National Agriculture and Rural Development Strategy (NARDS)

The NARDS is a proposal drafted by the World Bank Group and published in April 2021 to provide guidance for the Croatian Ministry of Agriculture (MoA) with respect to the design, implementation, monitoring and evaluation of Croatia’s post-2020 agriculture and rural development plans funded mainly through the national budget as well as the EU CAP, Structural and Investment Funds (ESIF), and Horizon Europe.⁵⁴

National Development Strategy for 2030

This strategy was published in February 2021 and was the result of dialogue between the Ministry of Agriculture of Croatia and stakeholders, as well as multiple working groups, through participatory workshops,

⁵³ The World Bank. (2019). *Sector Diagnostic and Analysis of Public Spending in Agriculture and Rural Development*. [World Bank Document](#)

⁵⁴ The World Bank. (2020). *Fact Sheet: RAS for Croatia 2030 National Development Strategy*. [Fact Sheet: RAS for Croatia 2030 National Development Strategy \(worldbank.org\)](#)

meetings with the business sector, development forums held in several Croatian counties, and many other events in which stakeholders contributed their experience and views.⁵⁵

National Recovery and Resilience Plan (NRRP)

The NRRP was submitted in April 2021 to the European Commission in response to its requirement of such a document from each member country. It is complementary to the National Development Strategy 2030, whose reform effort is central to achieving the 2030 vision of Croatia, to build a “competitive, innovative and safe country, recognized identity and culture, preserve resources, good living conditions and equal opportunities for all”. The reference for the development of NRRP was the set of objectives pursued by Croatia for economic recovery, complementarity with other plans and investments, and current and expected macroeconomic and social impacts. The implementation of the NRRP includes time limits, milestones, and targets to reflect the progress made in the implementation of reforms and investments, which will be linked to the disbursement of the funds. A total of EUR 30 billion will be needed by Croatia, principally from the Regional Development Fund, in the next 7 years, of which EUR 4.2 billion will be for agriculture and EUR 182 million for rural development.⁵⁶

National Strategic Plan (NSP) for the Common Agriculture Policy (CAP)

While the final version of the new CAP has yet to be published (June 2021), it is known that the new CAP will have increased environmental ambitions: three of the nine main objectives proposed by the Commission are directly related to setting higher ambitions for environmental and climate action. Some 40% of the overall CAP budget is expected to contribute to climate action. Furthermore, the CAP will be implemented with a New Delivery Model (NDM) that allows for a more simplified, flexible, and results-based approach for member states through the introduction of the National Strategic Plans (NSP). Croatia will therefore tailor the elements of the New Green Architecture (Enhanced conditionality, eco-schemes, and agri-environmental measures) according to a SWOT analysis conducted nationally. For example, based on the needs-analysis, Croatia will select the eco-schemes (e.g. conversion to organic farming) most relevant for Croatian farmers and most effective in tackling Green Deal objectives, and then determine the level of funding and monitoring framework for each one.⁵⁷

In order to support member states in aligning their NSPs with the Green Deal targets, the European Commission has published recommendations outlining key elements per country. The recommendations are embedded throughout this report, but can be summarized as follows: In order to bolster environmental care and climate action and to contribute to the environmental and climate-related objectives of the Union, Croatia can use CAP measures to promote practices that enhance soil health and carbon content, increase low-carbon farming practices and improve assessment tools, promote precision farming and integrated livestock management, sustain

⁵⁵ The World Bank. (2020). *National Development Strategy - Croatia 2030: roadmap to a better future*. [Naslov \(worldbank.org\)](#)

⁵⁶ Vlada Republike Hrvatske. (2021). *Nacionalni plan oporavka i otpornosti 2021-2026*. [51 - 3 NPOO.pdf \(gov.hr\)](#)

⁵⁷ European Commission. (2020). *List of potential agricultural practices that eco-schemes could support*. https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/key_policies/documents/factsheet-agri-practices-under-ecoscheme_en.pdf

the growth of the area under organic farming, and fully apply and enforce enhanced conditionality including Statutory Management Requirements such as the Nature Directive.⁵⁸

According to the NRRP, the NSP is likely to encourage partnerships between producers and intermediaries in supply chains and aggregating agricultural knowledge systems (including the development of a central farming information system and the digitization of information flows). Some key objectives will include increasing the value of agricultural output from EUR 17 billion to EUR 30 billion per year by 2030, doubling farmers' incomes, increasing the share of agricultural workers to 8% of the total labor force, increasing share for young farmers from 12.7% to 20%, and reducing the rural poverty rate by 25%. These are currently tentative proposals and are subject to change, hence they cannot be analyzed in detail for this Note.

Table 3.1: Comparison of Strategies

Strategy	National Agriculture and Rural Development Strategy (NARDS) for Croatia for 2020-2030	National Development Strategy for 2030	National Recovery and Resilience Plan (NRRP) for 2021- 2026
Vision	<i>Future policies and programs will try to enable the Croatian agri-food sector to increasingly compete in international markets based on a differentiated and focused market strategy.</i>	<i>Croatia is in 2030, a competitive, innovative, and secure country with a recognizable identity and culture, a land of preserved resources, quality living conditions, and equal opportunities for all</i>	<i>To use the funds to gain momentum in Croatia's development, accelerate the technological modernization of the economy, and make better use of natural resources.</i>
Overall Strategic Objectives / Goals	<ul style="list-style-type: none"> • Increasing the productivity and climate resilience of agricultural production • Strengthening the competitiveness of the business environment and the agri-food system • Renewing the rural economy and improving livelihoods in the rural space • Stimulating agri-food innovation 	<ul style="list-style-type: none"> • Competitive and innovative economy • Educated and employed people • Efficient judiciary, public administration, and state property management • Global recognition and strengthening of the international position and role of Croatia • Healthy, active quality of life • Demographic revitalization and better position of family • Security for sustainable development • Ecological and energy transition for climate neutrality • Food self-sufficiency and development of bioeconomy • Sustainable mobility • Digital transition of society and the economy • Development of assisted areas and areas with special development needs • Strengthening regional competitiveness 	<ul style="list-style-type: none"> • Improve the competitiveness of the economy • Improve the efficiency of public administration • Strengthen education, science and research • Stimulate employment and develop skills in the labor market • Renovation of buildings and improved health care

⁵⁸ European Commission. (2020). *Commission recommendations for Croatia's CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

Key Policy Priorities/ Reforms related to Green Growth	<ul style="list-style-type: none"> • Target public and private funds towards more productive agricultural investments • Scale-up climate-smart agriculture and sustainable land management • Facilitate diversified and integrated domestic agri-food markets • Empower more entrepreneurs • Link agri-food sector to growth opportunities • Integrate national agricultural knowledge and innovation systems 	<ul style="list-style-type: none"> • Increase productivity of agriculture and aquaculture and their resilience to climate change in an environmentally and sustainable way • Contribute to climate neutrality, reduce pesticide use and increase environmental production in line with the new EU directive in the Green Deal and the Farm to Fork and BDS strategy • Strengthen competitiveness and innovation in agriculture and aquaculture • Revitalizing rural areas and improving the quality of life in rural and coastal areas 	<ul style="list-style-type: none"> • Establish a network of logistics infrastructure to strengthen the production chain in the fruit and vegetable sector • Advancing farmland restructuring and reparcelling systems • Smart Agriculture • Improvement of food donation system
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4. Key levers for promoting Green Growth in Croatian Agriculture

“Made in Croatia – Sustainably”

Promoting sustainable domestic supply chains could be a central lever to ensure green growth in Croatia. It forms the foundation for ensuring that green growth objectives are tackled across the whole supply chain, a concept that is a cornerstone of the Farm to Fork Strategy. Contributing to strengthening competitiveness and innovation in agriculture, as detailed in the National Development Strategy for 2030 would also be in line with the NRRP reform related to establishing a network of logistics infrastructure to strengthen the production chain in the fruit and vegetable sector. This lever would facilitate diversified and integrated domestic agri-food markets and empower more entrepreneurs, which are two key policy priorities specified in the NARDS. Importantly, such support should be targeted appropriately, so that innovation also contributes to low-carbon development and resilience in the sector. Instruments of this lever include structuring the supply, improving market differentiation, and redirecting government support.

Structuring the supply

The food supply chain in Croatia currently has very low vertical integration of agricultural producers, processors, distributors, and the market, so that most actors have control of only one stage of production.⁵⁹ This leads to a fragmented, inefficient, and fragile system with weaknesses that were brought into sharp focus during the COVID-19 pandemic. Investment in infrastructure (such as processing or storage facilities) is key to empowering farmers to close production cycles.

Local cooperation could, especially for Croatia, be a way to foster innovation and economies of scale. European Union support to agriculture and agri-food supply chains aggregation could be better leveraged by

⁵⁹ The World Bank. (2020). *Strategic Transformation in Agriculture and Rural Space (STARS RAS) Background Document Productive Inclusion for Agricultural Competitiveness in Croatia*. [Croatia-Productive-Inclusion.pdf \(poljoprivreda2020.hr\)](#)

covering up to 80% of the spending invested for its development.⁶⁰ A relevant example is currently operating in Croatia. “Najbolje ' z Međimurja” is the first Croatian local supply chain, bringing together 21 producers. The EU supported the cooperative’s development through the European Territorial Cooperation (ETC), better known as Interreg tool aimed at fostering mutual assistance and peer learning, offering the cooperative the capacity to increase its members’ income and market local products at prices customers can afford.⁶¹

Local and structured supply chains can be more reactive to changing demands. For example, Croatian demand is moving from raw milk towards processed milk-based products that suffer from European competition. Strengthening national upstream and downstream milk supply chains, therefore, represents a double opportunity for Croatia to increase cattle farmers’ income, while mitigating the increasing national food trade imbalance in this sector.⁶²

Enabling more active professional organizations is also a way to develop stronger business links among domestic stakeholders in the food system and to increase competitiveness and resilience. In the beef sector, for example, which benefits from relatively low feed costs, competitiveness is limited by the dependence on relatively expensive imported calves. Feedlots largely depend on international market fluctuations and the cost of calves can reach 60% of the entire production cost, which drastically reduces Croatian farmers competitiveness. Stronger collaborations between the dairy sector and the beef sector, as well as between cow-calf operations and feedlots, based on commercially oriented sub-sector organizations would allow the progressive incorporation and continuity of the value chain, from birth to meat processing in Croatia, thus improving competitiveness, sustainability, and resilience vis-à-vis international markets.

The NRRP prioritizes an improvement of the logistics infrastructure for the fruit and vegetable sector to improve the incomes of small farms. This measure will include investment support for establishing adequate cooling chambers, storage facilities, and packaging and labelling of products. Importantly, these funds will only become available to those producers who are affiliated with a producer organization, which will promote collaboration and exchange. This is a potentially promising measure, and it would benefit from being extended to other sectors, in particular, to dairy.⁶³ It would also be relevant to couple such measures with support to labeling, as discussed below.

Market differentiation

The European Commission will allocate EUR 182.9 million in 2021 to fund promotional activities for EU agri-food products at home and abroad. These funds will be allocated in accordance with promotion policy guidelines that are under public consultation to reshape the work program in line with the ambitions of the European Green Deal. For example, almost half the budget will be for promoting organic products and will also

⁶⁰ Dupraz, P. (2020). *Le Green Deal: un défi pour la politique agricole commune*. [Présentation PowerPoint \(citepa.org\)](#)

⁶¹ Lokvina Hrvatske. (2018). *First Croatian small supply chain “Best from Međimurje”*. [Najbolje z Međimurja kratki opskrbeni lanac | Lokvina Hrvatska](#) and https://ec.europa.eu/regional_policy/en/policy/cooperation/european-territorial/

⁶² The World Bank. (2021). *Livestock sector analysis in support of the preparation of the Croatia National CAP Strategic Plan for 2021-2027*. (P171507).

⁶³ Ibid

promote EU quality schemes, such as geographical indications.⁶⁴ By leveraging the potential of these resources for promotion and encouraging the production of sustainable agri-food products, Croatian producers may be prepared to meet the targeted increases in demand. Box B 4.1. provides examples of such labeling initiatives developed by member countries.

Food and beverage purchases represent 30% of household expenses in Croatia and there is a growing tourism industry, which means that the market potential for domestic demand is significant.⁶⁵ As of April 2021, Croatia had 31 agri-food products registered under the EU quality schemes: protected designation of origin (PDO) and protected geographical indications (PGI), with 21 additional products in the pipeline, ranking it 9th in the EU for the total number of products with such labels.⁶⁶ While ample efforts are made to label domestic products for their cultural dimension and quality, such as PDO/PGI, little is done to reward sustainable production practices and supply chains involving limited transportation and reduced GHG emissions.

The most utilized and recognizable environmental-quality label in Croatian foodstuffs is the organic label (EKO HR). Beyond leveraging the transition to certified organic production (discussed below), there is enormous potential for fostering private markets of labels that focus on agroecological practices that can improve sustainability, food safety, and resilience to climate change. For example, the European Union will be publishing a proposal for a Carbon Farming initiative following the “*Technical Guidance Handbook – setting up and implementing result-based carbon farming mechanisms in the EU*” that will pave the way for results-based EU carbon farming schemes⁶⁷. There may be opportunities for Croatia to leverage this new quality-designation scheme in addition to other existing labeling schemes, and provide farmers and processors added value for public goods. Farmers in other European countries such as Ireland, France, the Netherlands, and Germany utilize a wider diversity of certification and labelling that can provide added-value for farmers and processors who adopt a more diverse range of agro-environmental practices.

Small-scale farmers are important in Croatia, and through the Farm to Fork Strategy, the EU has stressed the importance of supporting them in meeting high safety and sustainability standards to ensure their competitiveness and capacity to access global markets.

CAP tools, such as the new eco-schemes and agri-environmental measures, in combination with advisory services, will be central to supporting conventional farmers in their transition to business models and quality labelling schemes that are both more competitive and environmentally friendly. This will be a core element of the forthcoming National Strategic Plan, which also raises well-known issues related to the need for simplified administrative procedures. Anecdotal evidence from focus groups and interviewees, indicates that the administrative burden for farmers to apply for agri-environment and climate funds are often so overwhelming, in

⁶⁴ European Commission. *Promotion of EU farm products*. (2021) https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/market-measures/promotion-eu-farm-products_en

⁶⁵ The World Bank. *Sector Diagnostic and Analysis of Public Spending in Agriculture and Rural Development*. (2019) [World Bank Document](#)

⁶⁶ The Plitvice Times. (2021). *31 Croatian agriculture and food products certified as PDO/PGI to date*. [31 Croatian agricultural and food products certified as PDO/PGI to date | Plitvice Times](#)

⁶⁷ European Commission. (2021). *Commission sets the carbon farming initiative in motion*. [Commission sets the carbon farming initiative in motion | Climate Action \(europa.eu\)](#)

particular for small-scale farmers, that they abandon the effort. To facilitate uptake, the application process would benefit from being simplified and accelerated, access to necessary co-financing options eased, and adequately trained advisors deployed.

Box 4.1: Selected European labelling initiatives

Origin Green⁶⁸ – Ireland's food and drink sustainability program, run by the Irish Food Board, *Bord Bia*. This is the only one in the world that operates at a national level and is part of a quality assurance scheme that assesses the sustainability of the entire food chain. Sectors included are dairy, beef and lamb, and the program will eventually be extended to pig meat, poultry, eggs, horticulture and grain. It provides both measuring and feedback to farmers, empowering them with the advisory services they need.

Label Bas Carbone⁶⁹ – Created by the French Ministry of Ecological and Solidarity Transition in 2019, the low-carbon label is the first climate certification framework adopted in France and aims to contribute to the achievement of the National Low Carbon Strategy. The label is expanding from forestry to the broader agriculture sector through the CAP'2 ER and CARBON AGRI project by measuring, accounting, and advising farmers on certifying emissions reductions for a carbon market.

Weidemelk⁷⁰ – Since 2015, the “meadow milk” logo has been managed by the *Stichting Weidegang*, an organization in the Netherlands aiming to stimulate market demand and advocating grass-fed dairy production through advice to farmers. The certification guarantees that the dairy cows have been grazing in meadows for at least 120 days a year, for a minimum of 6 hours a day, and certification is carried out by a third party.

Naturland⁷¹ – This German organization was founded in the 1980s and has a long history of certifying and advising producers and processors with standards and other sectors beyond those of organic, such as fair trade and certain types of textile manufacture.

Fostering market development

Gearing agricultural development towards competitiveness and sustainability requires strong government intervention and support. An essential element is the development of a larger, more efficient and transparent market for green products. Public institutions have a major role to play in enabling such market development, with fair access and opportunities for all economic actors across the value chain. A combination of support for market differentiation and promotional action can incentivize the development of local, high-quality and environmentally

⁶⁸ Bord Bia. (N.D.) *Sustainable Quality Assurance Schemes*. [Bord Bia Quality Assurance Scheme - Quality Irish Food - Bord Bia](#)

⁶⁹ France Carbon Agri Association. (2021). *Carbon Agri Methodology*. [Méthodologie Carbon Agri - France Carbon Agri Association \(france-carbon-agri.fr\)](#)

⁷⁰ Weidemelk. [Weidemelk - Home](#)

⁷¹ Naturland. [Naturland standards](#)

friendly value chains, which will also contribute to sustaining farmers' incomes. Such support can also provide marketing for SMEs, establish new high-value tourism-related markets and improve the recognition of Croatian foods domestically and abroad. Green public procurement (GPP) is also a potential intervention, given the still relatively low awareness of the health and environmental benefits of such value chains among consumers (domestic and tourists), and the affordability issues that affect the poor. Procurement of food by central and local authorities is already well developed; stakeholders mentioned the figure of 33 million meals per year in the Zagreb area (see section 2: stakeholder perceptions). This type of green procurement that relies on labeling and certification schemes would also incentivize the proper implementation of these schemes, including control procedures.

The Organic Action Plan indicates that the European Commission will be updating EU GPP criteria for food, catering and vending machines and encouraging member states to set ambitious national targets for an increase in the use of GPP by public authorities in cities, towns and regions. Such measures for promoting national consumption of sustainable products should be in line with the EU's Common Market Organisation (CMO), which is designed "... to provide a safety net to agricultural markets through the use of market-support tools, exceptional measures and aid schemes for certain sectors (in particular fruit and vegetables, and wine), to encourage producer cooperation through producer organisations and specific rules on competition, and to lay down marketing standards for certain products."⁷² Implementing public procurement measures also requires developing processes and monitoring frameworks to ensure transparency and a fair competition.

Transition towards organic supply chains

Boosting the production and consumption of value-added quality schemes, such as an EU Organic label, simultaneously tackles multiple priorities: shifting the focus of agri-food production from quantity to quality and addressing climate change and environmental sustainability in the NARDS, and in the National Development Strategy to contribute to the objectives in the Farm to Fork and Biodiversity Strategies by 2030, increasing resilience to climate change in an environmentally sustainable way. The European Commission has laid down objectives of reducing the use and risk of chemical and more hazardous pesticides by 50%, and of reaching 25% organic farming on all European land by 2050 in the 27 measures of the Farm to Fork Strategy and the 39 measures of the Biodiversity Strategy for 2030. The Organic Action Plan, published in March 2021, sets out the actions that the Commission, stakeholders and member countries can take to promote the achievement of these objectives. Aligned with the objectives, the percentage of UAA farmed organically in Croatia is increasing, largely driven by CAP rural development measures.^{73 74} For perspective, at the end of 2018, Croatia had over 167,000 agricultural producers, which means that the organic share was only 2.6%. The total land area under organic farming in 2018 amounted to 103,166 ha, which represents 6.9% of the total UAA and places Croatia slightly below the EU28 average of 8.6%⁷⁵ Organic farming as a lever for sustainable agriculture in line with the EU objectives is

⁷² See https://eur-lex.europa.eu/summary/glossary/common_agricultural_markets.html

⁷³ European Commission. (2020). *Commission recommendations for Croatia's CAP strategic plan*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0384&from=EN>

⁷⁴ https://www.dzs.hr/Hrv_Eng/publication/2019/01-01-19_01_2019.htm

⁷⁵ <https://www.organicseurope.bio/about-us/organic-in-europe/> and https://www.dzs.hr/Hrv_Eng/publication/2019/01-01-19_01_2019.htm

particularly relevant for Croatia. With 26% of agricultural land classified as Natura 2000 areas,⁷⁶ which is the highest rate of the European Union, the country has, indeed, the opportunity to transform mandatory environment-friendly agricultural practices into a means of promoting economic productivity of the land.

The transition to organic farming in Croatia faces multiple challenges including insufficient seed supplies,⁷⁷ limited domestic demand (partially explained by a lack of consumer trust in the label), and a shortage of organizations that can deliver credible certification and technical advisory services. According to an analysis conducted in the context of the NARDS, there is potential for growth in organic production across all the major sub-sectors. Soybean, in particular, was identified by STARS as highly suitable for organic production and can fit well into organic farming schemes. Such growth can be based on demand from both inside and outside the EU but it is also underpinned by the ecological objectives of the European Green Deal; the underlying principles of organic production lead to greater climate adaptation and resilience, especially for crops, since there is potentially less reliance on external inputs, tilling, and increased crop rotation and diversification of land use.

In Croatia, larger farms are leading the way: the average area under organic farming is some 23.5 ha, which is extremely high, given that the average size of agricultural holdings is only 5 ha.⁷⁸ The organic label, however, could also be utilized by small farms, but across the EU they face relatively high costs and have to deal with the red tape linked to organic certification. To address these challenges, Organic Regulation 2018/848 introduced a system of “group certification” to enable small farms to work together to reduce inspection and certification costs.⁷⁹ Moreover, the Organic Action Plan explicitly stresses that small farms, micro-enterprises and SMEs should receive special attention during the implementation of any GPP measures. The promotion of these opportunities is important for the many smallholder farmers in Croatia.

Arable land makes up 48.7% of the total area under organic farming, followed by pasture and meadows with 38.4%. A similar trend in 2018/2019 was observed in the EU-28, overall, where arable land and grassland represent 45% and 44%, respectively, of the total area under organic farming.⁸⁰ The Croatian Chamber of Economy puts the annual value on the Croatian market of organic products at some EUR 100 million or an average of EUR 23 per capita; the share of organic products in total consumption is 2.2%.⁸¹ In the EU-28, the average spend per person on organic products was EUR 84 in 2018, which implies a certain lack of “organic awareness” in

⁷⁶ European Commission. (2019). *Analytical factsheet for Croatia: Nine objectives for a future Common Agricultural Policy* https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/by_country/documents/analytical_factsheet_hr.pdf

⁷⁷ Pešak, S., (2020). *Hrvatski savez udruga ekoloških proizvođača. Ekološka proizvodnja povrtnog sjemena na obiteljskom gospodarstvu. Ekološka by Tiskara Žalac - issue*

⁷⁸ According to ARKOD database

⁷⁹ EUR-Lex. (2018). *Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on Organic production and labelling of organic products*. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018R0848>

⁸⁰ <https://www.organicseurope.bio/about-us/organic-in-europe/> and https://www.dzs.hr/Hrv_Eng/publication/2019/01-01-19_01_2019.htm

⁸¹ Ministry of Agriculture. (2019). *Godišnje Izvješće O Stanju Poljoprivrede U 2018*.

https://poljoprivreda.gov.hr/UserDocsImages/dokumenti/poljoprivredna_politika/zeleno_izvjesce/2019_11_13_Zeleno%20izvjesce2018.pdf, page 59

Croatia, compared to price. The three countries that consume the most organic products are Germany (EUR 10.9 billion turnover in 2018), followed by France (EUR 9.7 billion) and Italy (EUR 3.6 billion).⁸²

Currently, 1,500 tons of organically grown beef and veal products are generated annually in Croatia, and 571 tons of sheep meat products.⁸³ However, organically produced cow's milk declined by 50% between 2017 and 2018,⁸⁴ which might have been caused by high prices and a kind of skepticism from consumers. Elsewhere in the economy, the beef and pork meat sub-sectors clearly have room to grow if demand can be stimulated for organically produced meat. The solution is two-pronged, but both prongs rely on communication and education. The organic market will grow if consumer demand can be created and stimulated by educating consumers about the benefits of organic products, including their contribution to sustainable development and human environmental health. If farmers are made aware of the demand for high-quality organic products they can be assisted in changing practices by promoting organic processing and vaunting its virtues as a means of tapping into high-value markets inside and beyond the EU.

The specific potential for transition to organic production by sub sector, has been analyzed in the NARDS. Linked to the livestock sub-sectors, the cereal sub-sector also offers potential for Croatian producers to ramp up organic livestock feed production. The vegetable and fruit sub-sectors offer similar possibilities, in that there is potential to increase consumer demand driven by the tourism sector and to tap into the increasing consumer preference for organic fruit and vegetables in the EU. However, there are constraints in the fruit and vegetable sub-sector linked to its underdevelopment and the limited number of producers who pursue value adding activities (for example, in agri-tourism or processing). Organic methods could also be developed in viticulture. Croatia enjoys favorable agro-ecological conditions for growing organic wine that could even improve from the effects of climate change, and there is potential growth in the market from shifting consumer preferences towards organic wine in the EU. As with the fruit and vegetable sub-sector, however, this is a generally underdeveloped sector with little investment from producers in value-added activities such as processing, storage, branding or marketing. Industrial crops – for example, sugar beets, rapeseed oil, feedstock, biomass energy and hemp – are also in a position to benefit from increasing organic production for export to EU and global markets as demand increases, and as organic production offers an opportunity for higher margins and as a method of climate adaptation.

NARDS contains a commitment to “Expand the conversion towards organic and agro-ecological production systems through measures that include targeted and area-based support for the conversion to organic (e.g., eco-schemes or agri-environmental measures in the CAP), cooperation mechanisms, and boosting AKIS for organic production. This policy priority needs to be included in the NRRP and the National Development Strategy.

⁸² <https://www.intotheminds.com/blog/en/research-organic-market/#para1>

⁸³ Croatian Bureau of Statistics. (2019). *Organic production in 2018*. [EKOLOŠKA PROIZVODNJA U 2018./ORGANIC FARMING, 2018 \(dzs.hr\)](https://dzs.hr/ekološka_proizvodnja_u_2018/organic_farming_2018)

⁸⁴ *Ekološka Proizvodnja U 2018*. (2018). *Organic Farming, 2018 (dzs.hr)*.

Promoting agricultural knowledge and innovation systems for environmental sustainability

As agriculture adapts to a changing climate and societal demands for more sustainability, producing a durable and effective agricultural knowledge and innovation system (AKIS) is critical. This is recognized in the NARDS objective to integrate national agricultural knowledge and innovation systems, in the National Development Strategy for 2030 to strengthen competitiveness and innovation in agriculture, and in the NRRP, which includes a measure to promote the digital transformation of agriculture. The STARS report on AKIS contains extensive analysis of Croatia's needs and opportunities in the field.

AKIS in Croatia is in the process of reform that includes merging the independent centralized state-run knowledge resource within the Croatian Agriculture and Forestry Advisory Service (CAFAS) with the Ministry of Agriculture. European Innovation Partnership projects (EIPs) – "...partnerships that bring together relevant parties at EU, national and regional levels to streamline, simplify and better coordinate existing financial instruments and initiatives."⁸⁵ – will assume a greater role to develop more potential for the development of AKIS through vertical partnerships.⁸⁶ EIP projects are implemented through Operational Groups (OG) that will increase the focus on supporting agricultural sustainability. These reforms are in line with the CAP 2021-2027 target of establishing a well-organized, modernized and functional AKIS that covers the nine objectives of the CAP⁸⁷ including those relevant to environmental performance.

The OGs could have an important role in connecting farmers, researchers, advisors, and other actors in order to initiate and develop new approaches in various areas of the agricultural sector; for "for example, they could ensure the improvement of the economic results of farms and food processors through the exchange of expert knowledge and good practice. Limited contact between farmers, the research sector, and the food-processing industry has resulted in a lack of awareness of the development and implementation of innovative projects. Co-operation (M16) with investment in OGs operating within the EIP will contribute to the development of innovations in agriculture, and thus establish a stronger AKIS. According to official Paying Agency data, a total of HRK 892,792 is allocated to *Support for the setting-up of operational groups*, which is insufficient, given the needs. The main beneficiaries are Croatian agriculture universities and research institutions.⁸⁸ Increasing the involvement of Croatian actors in European-funded research and innovation (R&I) opportunities (European Innovation Partnerships, Horizon Europe), would help to promote exchange with international bodies. As of 2016, Croatia had one of the lowest number of applications and share of participation in grants for Horizon 2020 projects.⁸⁹ Additional European funds have been provided for multi-actor and participatory projects in the new

⁸⁵ See: https://ec.europa.eu/info/research-and-innovation/strategy/goals-research-and-innovation-policy/open-innovation-resources/european-innovation-partnerships-eips_en

⁸⁶ The World Bank. (2020). *Strategic Transformation in Agriculture and Rural Space (STARS RAS). Background Document - Agriculture Knowledge and Innovation Systems (AKIS) in Croatia*. [AKIS.pdf \(poljoprivreda2020.hr\)](#)

⁸⁷ They are to: ensure a fair income for farmers; increase competitiveness; rebalance power in the food chain; promote climate change action; encourage environmental care; preserve landscapes and biodiversity; support generational renewal; underpin vibrant rural areas; and to protect food and health quality.

⁸⁸ Paying Agency. (N.D.). https://www.aprrr.hr/wp-content/uploads/2021/05/Rang-lista-1.-natjecaj-16_1_1-.pdf, f

⁸⁹ European Commission. (2015). *First Results Horizon 2020*. [HORIZON 2020 - First Results \(europa.eu\)](#)

Horizon Europe infrastructure, particularly in the “Soil and Health” mission area.⁹⁰ This will address, among other priorities, increasing soil organic carbon and reducing the risk of soil erosion. Croatia needs to increase the skill sets of its participants in such initiatives and opportunities by providing public advice and training, establishing links between producers, advisors, agribusinesses and scientific institutions. Croatian agriculture universities and research institutions are key actors in AKIS, but there is no established relationship between them and farm advisory services.⁹¹ However, Croatian research institutions receive some of the lowest R&D expenditure in the EU with just under 1% of GDP,⁹² which, in 2018, was less than half the EU average (0.97%/GDP vs 2.18%/GDP). Enhancing the research potential, specifically for the departments and graduate programs already in operation such as the “Agroecology and Organic Agriculture with Agrotourism, Ecology and Nature Preservation” within the Agronomic University of Zagreb,⁹³ and programs at the University of Osijek⁹⁴, the Faculty of Science⁹⁵ and the College of Agriculture in Križevci.⁹⁶ Further ensuring that there are agroecology/organic agriculture departments across all agronomic faculties in Croatia will contribute to fostering innovation in the sector.

Special attention must be paid to address the needs of small and medium-sized farms, as they often have slow rates of uptake of new knowledge and innovation.⁹⁷ For example, one study from the European research and action project, PROAKIS, found that public advisory services for small-scale farmers are primarily mobilized to complete subsidy application forms. This challenge could be partially addressed by simplifying the forms.⁹⁸ This highlights the need to design AKIS systems that can meet the challenges faced by Croatian farmers with operations of all sizes and scales.

Box 4.2: Some beneficiaries of EU AKIS support

TITRIS⁹⁹ – the Lithuanian Agricultural Advisory Service (LAAS) created this national innovation platform to collect and curate results from Lithuanian innovation projects and other relevant information in one place. This was a direct result from the involvement of LAAS in an EIP-AGRI Operational Group related to innovation. With TITRIS, advisers can find up-to-date information to demonstrate the potential concrete benefits of specific innovations to farmers and foresters.

L’Atelier Paysan¹⁰⁰ – this French project is helping farmers develop technological solutions, tools and machinery adapted to the agro-ecological needs of their farms. The scheme showcases innovations and provides on-farm training in organic vegetable production, vineyard seeders, self-built chicken coops, or renovating agricultural buildings.

NEFERTITI¹⁰¹ – is a project aimed at establishing an EU-wide highly connected network of demonstration and pilot farms designed to enhance knowledge exchange, cross fertilization of ideas among actors and efficient

⁹⁰ European Commission. (N.D.) *Mission area: Soil health and food*. □ https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/missions-horizon-europe/soil-health-and-food_en

⁹⁹ Titris. (N.D.). [The Applied Innovation Research and Results Information System \(Izukt.lt\)](#)

¹⁰⁰ L’atelier paysan. (N.D.) *Users’ project*. [Le projet UsageR·E·s - L’Atelier Paysan](#)

innovation uptake in the farming sector through peer-to-peer demonstration techniques on 10 major agricultural challenges in Europe, including environmental sustainability.

SFATE¹⁰² – Smart Farm Training for Employment is an ERASMUS+ project that has created a web portal to help share information with farmers, agriculture students and teachers, advisers and other actors on available smart-farming technologies, how they work and the advantages they offer.

Streamlining data monitoring and evaluation capacity for environmental performance

Unless indicated otherwise, the following analysis is based on the presentations of the seminar, “*Towards Green Growth: Performance, Monitoring and Evaluation in the new CAP*”, organized by the World Bank on the 18th of May 2021, of which a summary of outcomes can be found in Annex 1. The new CAP reforms will introduce a new results-based approach, which Member States will tailor based on an evidence-based needs assessment. The European Green Deal has laid out new environmental ambitions that will require a more robust framework for data collection, monitoring, and evaluation of very complex agro-environmental indicators. Some of the primary challenges for Croatia, include the timing of agro-environmental measures, the expense associated with data collection, and the potential administrative burden for beneficiaries. Agro-environmental measures may take years to design and be taken up by beneficiaries, Croatia currently only implements CAP measures for one programming period at a time, making long-term benefits difficult to assess. Data collection can be expensive, but it also relies heavily on the input of beneficiaries themselves, which is currently an aspect to improve in Croatia. This is because beneficiaries already face an immense administrative burden, so data collection must be simplified, and trust must be established between data collectors and the beneficiaries themselves.

There are many opportunities for meeting the challenges of the new Performance, Monitoring and Evaluation Framework (PMEF). For one, including more environmental data in the Farm Accountancy Data

⁹³ University of Zagreb, Faculty of Agriculture. (N.D.) *Organic Agriculture*. [Organic Agriculture / Undergraduate Studies \(BS\) / University of Zagreb Faculty of Agriculture \(unizg.hr\)](#)

⁹⁴ Agrobiotech sciences faculty of Osijek. (N.D.) *Organic farming*. [Ekološka poljoprivreda - Studiji | Fakultet agrobiotehničkih znanosti Osijek \(unios.hr\)](#)

⁹⁵ University of Zagreb. *Learning outcomes graduate program of ecology and nature preservation*. (N.D.). <http://www.pmf.unizg.hr/images/50021479/Learning%20outcomes%20graduate%20programme%20of%20ecology%20and%20nature%20preservation.pdf>

⁹⁶ Križevci college of agriculture. *Križevci college of agriculture contribution to sustainable and organic Agriculture education*. (2008) [KRIŽEVCI COLLEGE OF AGRICULTURE CONTRIBUTION TO SUSTAINABLE AND ORGANIC AGRICULTURE EDUCATION \(srce.hr\)](#)

⁹⁷ Standing Committee on Agricultural Research (SCAR) (2019). *4th Report of the Strategic Working group on AKIS*. https://scar-europe.org/images/AKIS/Documents/report-preparing-for-future-akis-in-europe_en.pdf

⁹⁸ Knierim, A., Dirimanova, V., Kania, J., Labarthe, P., Laurent, C., Madureira, L., Prager, K, (2015): PRO AKIS - Policy recommendations. Available at www.proakis.eu

⁹⁹ Titris. (N.D.). [The Applied Innovation Research and Results Information System \(Izukt.It\)](#)

¹⁰⁰ L'atelier paysan. (N.D.) *Users' project*. [Le projet UsageR-E-s - L'Atelier Paysan](#)

¹⁰¹ Nefertiti. (N.D.) *Nefertiti H2020 project*. [nefertiti – nefertiti \(nefertiti-h2020.eu\)](#)

¹⁰² Sfate (N.D.) *Smart Farm Training for Employment*. [Sfate](#)

Network survey would help target measures and policy in a more efficient manner, additionally, it would prepare for the transition towards a new Farm Sustainability Data Network (FSDN).

The surveys and reviews carried out to prepare this Note indicate a paucity of data on agro-environmental issues, and particularly on the health and quality of soils and water, nutrient contents, biodiversity status, as well as GHG emissions from farming systems. Developing such a monitoring information system has been proposed in the NARDS, through the proposal of a National Agroecological Zoning and Land Resources Management System. Additionally, it will be required in the context of the new CAP and the results-based management of the programs it introduces.

Insufficient land-use data organization and storage is a fundamental obstacle to improving the functionality of land markets, enhancing the environmental sustainability of farming practices, and identifying correspondence between production systems and agro-ecological zone characteristics. Upgrading the use of risk management instruments (which will be key in the adaptation to climate change), and access to R&D and uptake of knowledge and technology, are essential to supporting decision making and climate and sustainability investments.¹⁰³ The proposed NAEZ-LRMS tool, would help better identify Areas Under Natural Constraints (ANC). It could be used for climate-change impact assessments, analyzing the origin of yield gaps, assessing land degradation, land-use optimization modelling, and explaining adaptation behaviors needed to cope with climate change.

New digital tools provide an opportunity for simplifying and digitizing administrative procedures for all actors along the value chain, as well as for the public authorities. Significant progress has been achieved in several EU member states in this regard, and there is, therefore, plenty of opportunity for Croatia to learn from their experience, in addition to being able to harmonize data collection techniques and methodologies with European initiatives. Connecting with the EU's Joint Research Centre and EIP networks, which is proposed by the European Commission in its recommendations for the new CAP, is an important step in this regard. The National Recovery and Resilience plan places digitization as a core tool to promote agriculture, administration efficiency, research, and education.

Using satellite and sensory technology to monitor indicators is also providing new solutions to the challenges of collecting agro-environmental data. New Copernicus sensors, such as Sentinel-8 LSTM (Land Surface Temperature)¹⁰⁴ will be important elements from the point of view of paying agencies and service providers. For example, they can help detect irrigation, a key indicator for Croatia. Having said that, satellite technology has its limits and cannot directly detect all agro-environmental indicators, such as pesticide application, fertilizer use, or even tillage management, which is also very important for the Croatian context. More research, collaboration, and exchange with research institutes are needed to determine the best method for capturing and processing all this data.

¹⁰³ The World Bank. (2021). *Beyond the farm. A Vision and Roadmap for the Strategic Transformation of Agriculture and Rural Space*

<https://poljoprivreda2020.hr/wp-content/uploads/2020/06/Beyond-the-Farm-Croatia-C.pdf>.

¹⁰⁴ European Space Agency. (2020). *New Copernicus Sentinel-3 STM processing baseline*.

Advancing digital agriculture is a priority in both the NARDS and the NRRP, and, as detailed in the STARS report on Productive Inclusion, Croatia is well-positioned to take advantage of continuous developments in digital agriculture markets. The next CAP will offer ample funding streams and frameworks to underpin the digitization of farming systems through, for example, rural development programs and under the Cohesion Policy. Notwithstanding support from the EU, the high cost of installing modern and digital technologies remains a significant obstacle for Croatian SMEs.

Additionally, many EU projects are involved in developing and piloting new data-management tools and systems, but Croatian partners are largely absent from such projects. Box 4.3 provides a list that the European Network for Rural Development evaluation (ENRD) helpdesk has gathered on several EU Projects focused on developing the data-management systems of member states, and either directly or indirectly improving the monitoring and evaluation of the CAP. Paying agencies, farmers, producer organizations, and regional managing authorities would benefit from being incentivized to participate in such projects as partners or to pilot the technologies and the new systems developed as outputs.

Box 4.3: Data collection through Earth observation systems

Sen4CAP (Sentinels for Common Agriculture Policy): aims to provide evidence of how the European Space Agency's Copernicus Sentinel-derived information can support the modernization and simplification of the CAP post-2020, and to provide validated algorithms, products, workflows, and best practices for agriculture monitoring. Some examples of implementation in Spain (Castilla y Leon) and Denmark in partnership with JRC can be found at <http://esa-sen4cap.org/>.

NIVA (New IACS Vision in Action): aims to use analysis to propose how IACS could be modernized and improved for the new CAP, mainly through the use of Earth Observations. It applies technological innovations from the Sen4CAP project to develop an efficient EO monitoring system. An example of implementation from France can be found at <https://www.niva4cap.eu/project>.

SENSAGRI (Sentinels Synergy for Agriculture): aims to exploit the unprecedented capacity of Sentinel-1 and Sentinel-2 to develop an innovative portfolio of prototype agricultural monitoring services, see: <http://sensagri.eu/>.

Smart farming and use of Internet of things (IoT)-based technologies and systems:

FLINT (Farm Level Indicators for New Topics in Policy Evaluation): focuses on the current and future CAP sustainability and environmental objectives, aiming to demonstrate the feasibility of collecting policy-relevant data in different administrative environments and how new farm-level indicators can be used to evaluate and improve the targeting of policies. Examples of implementation in Ireland and Hungary are available at <https://www.flint-fp7.eu/>.

MEF4CAP (Monitoring and Evaluation Frameworks for the Common Agricultural Policy): seeks to identify future needs for sustainability information from different stakeholders in the agri-food sector and connect them with technological developments to improve monitoring. MEF4CAP builds on several other EU-level research projects, e.g., satellite innovations from projects such as SEN4CAP and FLINT, to modernize FADN and data collection. See <https://mef4cap.eu/>.

ATLAS (Agricultural Interoperability and Analysis System): is developing an open platform to create a sustainable environment for innovative agriculture. The project addresses the lack of data interoperability in agriculture by combining the use of agricultural equipment with sensor systems and data analysis. The ATLAS platform aims to deliver a service offering hardware and software interoperability using data from sensors to demonstrate the benefits of digital agriculture in a wide range of sectors affecting modern agriculture. See <https://www.atlas-h2020.eu/>.

CAPSELLA: develops innovative ICT solutions tailored to the needs of all food-, field- and seed-related actors involved in agrobiodiversity. See <http://www.capsella.eu/>.

DEMETER: aims to lead the digital transformation of Europe's agri-food sector through the rapid adoption of advanced IoT technologies, data science and smart farming, to ensure its long-term viability and sustainability. It intends to create a farm management registry system to build knowledge and empower the farmer. See <https://h2020-demeter.eu/about-demeter/>.

Smart-AKIS: is a European network that brings smart farming technologies to the attention of the European agricultural community. The network aims to bring users and researchers closer together to identify and implement new smart farming technologies that are responsive to the needs of farmers. Smart AKIS developed the Smart Farming Platform, a free platform providing a number of tools for disseminating and making Smart Farming technologies easier to use. See <https://smart-akis.com/SFCPPortal/#/app-h/dashboard>.

Presentations of cases and a report summarizing discussions published on the ENRD website are available at:

https://enrd.ec.europa.eu/evaluation/good-practice-workshops/improving-data-management-and-information-systems-purpose-cap_en .

Increasing the viability and vitality of rural areas

Green growth requires an abundant combination of tools, knowledge, skilled labor, and creativity. In densely populated Croatian urban locations, this combination is easier to access than it is in remote and isolated rural areas. Therefore, a key objective is to make rural areas fit-for-purpose and attractive to the next generation. This point is made very clear in the key objectives of the NARDS: *Renewing the rural economy and improving the livelihoods in rural space*, and the National Development Strategy 2030 *Revitalizing rural areas and improving the quality of life in rural and coastal areas*. Box 4.4. provides examples of EU member countries initiatives aiming at supporting the establishment of new farmers that are of relevance to Croatia.

Access to basic infrastructure, such as broadband internet, is not only a key to facilitating the implementation of modern and digital tools for improving sustainability but is vital in meeting the standards and expectations of young farmers. Access to reliable broadband would contribute to solutions for the whole supply chain, from new precision-farming technologies to online platforms for local distribution, and to education and training opportunities. Both the NRRP and the National Development Strategy recognize that agriculture faces a fundamental need for a digital transition and, hence, it is a key sector for which adequate coverage of broadband access must be provided.

Another key to facilitating sustainable agriculture for the next generation of farmers is to overcome the major obstacle of lack of access to land. Enabling fair and efficient access to land resources will require the resolution of a range of issues including inefficient and lengthy procedures for the allocation of state-owned agricultural land, the absence of an efficient land registration system that includes digital mapping, and mismatches between the cadaster and land registration. Addressing land fragmentation is a key priority in the NRRP and is related to green growth: "Agricultural land consolidation procedures and the ongoing monitoring of agricultural

land are prerequisites for the application of modern agricultural production, construction of irrigation infrastructures, improving productivity, and ultimately raising competitiveness”. Solutions include developing a well-regulated agricultural land market to increase the consolidation of plots, through the implementations of the 2015 Law on Reparcelling. While consolidation is a major objective, reparcelling must be an equitable process that maintains a diversity of farmers who are unable to maintain their plots through cash and/or new employment opportunities.

Box 4.4: Support for new farmers – some examples

Ireland’s Land Mobility Service¹⁰⁵ – The Land Mobility brokerage service is organized by Ireland’s young farmer association, *Macra na Feirme*, and aims at providing information for land-seekers, outlining and exploring options, acting as an honest broker, providing a confidential service facilitating land mobility, and working with farmers’ existing professional advisers.

Point Vert farm incubator¹⁰⁶ – Established in Belgium in 2013 by a Local Action Group (LAG) *Pays de Condruses*, as part of a LEADER+ project, this NGO groups seven municipalities in the Province of Liege to promote sustainable agriculture. *Point Vert* was started to help newcomers from outside farming to begin their organic production by offering training and advice, access to small plots of land, shared tools and infrastructure, marketing training and support, and technical advice.

AS Ziedi JP¹⁰⁷ - an example of *circular economy*, where one segment’s products or waste serve as raw material for other business segments. A farm in Latvia comprised of 4000 ha is where 1,000 dairy cows are being kept to produce biogas.

Bioenergy could represent a growing sector of activity to help maintain vitality of rural areas by offering new opportunities for employment, reducing farmers’ costs, and contributing to the objectives of the European Green Deal. Biofuels made from biomass can serve as a renewable alternative to fossil fuels, helping to reduce GHG emissions, which is an important goal of the European Green Deal. However, attention to the Indirect Land Use Change (ILUC) effect must be maintained along with the potential for unsustainable agricultural intensification that the bioenergy sector could induce.^{108,109} In recent years, and especially since 2018, the market development of biofuels in Europe has been driven by binding targets set in the Renewable Energy Directive (RED) for producing at least 10% of energy from renewable sources for transport energy use by 2020. While most national renewable energy targets in Europe are yet to be written into law, a revision of RED II will align the

¹⁰⁵ The land mobility service. *Land mobility 2019 report*. (2020). <https://landmobility.ie>

¹⁰⁶ Access to Land. *New Entrants Handbook*. (2018). a21_newentrants_handbook.pdf ([accessstoland.eu](https://www.accessstoland.eu))

¹⁰⁷ Global Network of Lighthouse Farms. (N.D.) *Circular economy*. [Global Network of Lighthouse Farms](https://www.globalnetworkoflighthousefarms.org/)

¹⁰⁸ Delzeit R., Britz W. (2012). [An Economic Assessment of Biogas Production and Land Use under the German Renewable Energy Source Act \(ethz.ch\)](https://www.ethz.ch/en/research-and-education/research-groups/energy-research/energy-source-act-ethz.ch) (2012)

¹⁰⁹ European Union (2009). “Renewable Energy Directive, on the promotion of the use of energy from renewable sources”. *Official Journal of the European Union*. [Directive](https://eur-lex.europa.eu/eli/dir/2009/28/20090520)

Directive with more ambitious climate targets under the EU Green Deal. Each member state will be required to have a minimum share of renewable energy in final energy consumption in the transport sector of 14% by 2030.¹¹⁰

The future expansion of biofuel markets in Europe will involve the development of second-generation products that use energy crops grown on marginal land as feedstocks, thus reducing ILUC effects. Within the 14% transport sub-target, there is a dedicated target for such advanced biofuels. The contribution of advanced biofuels and biogas produced from feedstock as a share of final consumption of energy in the transport sector will, according to RED II, be at least 0.2% in 2022, at least 1% in 2025 and at least 3.5% in 2030.¹¹¹

The National Energy and Climate Plan for the Republic of Croatia for the period 2021-2030 aims to foster the national bioenergy sector and match European requirements. Measure TR-13 of the plan “Advanced biofuels market development plan” and measure TR-5 of the plan “Regulatory framework development for cleaner transport” have been set up to facilitate reaching national objectives by 2030 in terms of promoting biofuel production and consumption, especially in the transport sector.¹¹² The Ministry of the Environment and Energy and the Ministry of Construction and Physical Planning oversee the implementation of these measures.¹¹³

Croatia has a great potential for agriculture and forestry because of its geographical location, and environmental and climatic conditions. Therefore, large amounts of biodegradable residues from agriculture, forestry, wood processing, and the food industry are available, and they can become a valuable feedstock for biofuel production (including for second-generation processes) and the transition into a sustainable bioeconomy.

Domestic production of biofuels so far is low, with some of the planned undertakings not having yet materialized. Biodiesel production in country has actually declined from just over 700 barrels per day (bpd) to almost none in 2021. Biofuels in Croatia are mainly used to generate electricity and heat. The main resource for biogas production is manure, generally from cattle, and corn or grass silage as feedstock for digesters. Some wood residues – mostly from beech – are also used in energy production.

The deployment of biofuels was initially driven by the increase in demand for conventional products. Biodiesel Vukovar LLC, a member of the Envien Group, is currently the largest biodiesel plant in the Republic of Croatia, capable of producing 35,000 tons of biodiesel per year, but currently operating at a much reduced level.¹¹⁴ Private investors, such as Osatina Grupa, have built biogas plants next to cattle farms,¹¹⁵ while a leading food processing group in Slavonia, Žito Group, bases its energy production on manure from the Group’s farms, and on silage and other organic residues in a biogas plant.¹¹⁶

¹¹⁰ European Union. (2018). Renewable Energy Directive, *Official Journal of the European Union*. [Directive](#)

¹¹¹ <https://ec.europa.eu/jrc/en/jec/renewable-energy-recast-2030-red-ii>

¹¹² European Commission. (2018). Renewable Energy – Recast to 2030 (RED II). Official Journal of the European Union. [Renewable Energy – Recast to 2030 \(RED II\) | EU Science Hub \(europa.eu\)](#)

¹¹³ Croatian Ministry of Environment and Energy (2019). Integrated National Energy and Climate Plan for the Republic of Croatia for the period 2021-2030. [Integrated Nacional Energy and Climate Plan for the Republic of Croatia.pdf \(gov.hr\)](#)

¹¹⁴ Biodiesel Vukovar LLC, [official page](#)

¹¹⁵ Osatina Grupa, [Official website](#)

¹¹⁶ Žito Group, [Official website](#)

The national oil company INA, together with Faculty of Agriculture, University of Zagreb, are participating in a project in Sisak, 60 km from Zagreb, funded by the EU's Bio-Based Industries Joint Undertaking called "Growing Advanced Industrial Crops on Marginal Lands for Biorefineries" (GRACE), the main goal of which is to produce sustainable products from *miscanthus x giganteus*, a sterile, non-invasive, high-yield grass. This project is a part of the NRRP and is important if the country is to meet the objectives of the National Energy and Climate Plan by 2030. The Sisak biorefinery could be crucial for the development of biofuels throughout the region. There is currently no significant competition for the Sisak plant and it could be the center of further industrial development focused on advanced and green technologies.

Entry points

Based on the findings of this analysis, the following table introduces main opportunities, challenges and policy entry points by lever and broad agricultural sub-sector.

Table 4.1: Entry points for green growth, by agriculture sector

	Made in Croatia – Sustainably			Transition towards Organic supply chains			Promoting agricultural knowledge and innovation systems for environmental sustainability			Streamlining data monitoring and evaluation capacity for environmental performance			Increasing the viability and vitality of Rural areas		
	Opportunities	Constraints	Policy entry points	Opportunities	Constraints	Policy entry points	Opportunities	Constraints	Policy entry points	Opportunities	Constraints	Policy entry points	Opportunities	Constraints	Policy entry points
Cross-cutting	<ul style="list-style-type: none"> •Growing demand, domestic and linked to tourism 	<ul style="list-style-type: none"> •Lack of consumer awareness •Markets strongly linked to foreign countries 	<ul style="list-style-type: none"> •Preparation of the National Strategic Plan for the New CAP •Rural development program supporting investments for processing •Farm to Fork and Biodiversity strategies promoting environmental objectives 	<ul style="list-style-type: none"> •Increasing demand, including from tourism •Organic EU label and support measures •High rate of Natura 2000 agricultural land areas 	<ul style="list-style-type: none"> •Limited land access for growth •Lack of inputs, knowledge and skills •Lack of controls and therefore of trust among consumers 	<ul style="list-style-type: none"> •Preparation of the National Strategic Plan for the New CAP •Farm to Fork strategy: 25% of organic farming by 2030 •Improve the implementation of certification schemes •Support market development 	<ul style="list-style-type: none"> •Presence of agroecology departments across universities in Croatia •Generational renewal among stakeholders in the value chain, institutions and service providers •Innovation can lead to significant savings for farmers 	<ul style="list-style-type: none"> •Lack of connection between producers’ advisors, and experts •Lack of professional organizations 	<ul style="list-style-type: none"> •Objective 7 of the new CAP is to support generational renewal •EIP-AGRI funds to foster knowledge sharing •Horizon Europe program supporting R&I 	<ul style="list-style-type: none"> •Digitalization is high on the domestic and EC agendas •Experience from agricultural measures •Results from STARS Pilot 	<ul style="list-style-type: none"> •Lack of activities in piloting new digital data and tools •Weak land registry 	<ul style="list-style-type: none"> •Build on digitalization activities included in NRRP •Gather data from various sources into a central data repository system for agriculture and environment •Homogenize control protocols and analyses 	<ul style="list-style-type: none"> •Favorable agroecological conditions and climate •Market expansion potential •Development of job-creating food processing activities 	<ul style="list-style-type: none"> •Land access (land fragmentation) •Underdeveloped services and transport and communication infrastructure •Weak marketing infrastructure 	<ul style="list-style-type: none"> •Preparation of the National Strategic Plan for the New CAP •Address the issue of access to land and credit •Promote entrepreneurship, cooperation and professional organizations •Support the development of marketing and cooling infrastructure in targeted areas.

Live-stock	<ul style="list-style-type: none"> •Specialty products in pork and dairy •Feed availability •Domestic demand (market potential) 	<ul style="list-style-type: none"> •Limited organization and agglomeration among small holders 	<ul style="list-style-type: none"> •NRRP program on fruits and vegetable may be expanded to livestock •Include environmental sustainability in existing labeling and promotion campaigns 	<ul style="list-style-type: none"> •Quality products opportunity •Abundant grasslands suitable for organic farming 	<ul style="list-style-type: none"> •Limited domestic demand (consumers priority is price) 	<ul style="list-style-type: none"> •Promote market development, e.g. through green public procurement 	<ul style="list-style-type: none"> •Large operators in Milk and producers associations in Beef can contribute to plans and investments for capacity development and innovation 	<i>None in addition to those listed in cross-cutting</i>	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> •Large operators in Milk and producers associations in Beef can contribute to mid-term data development plans • Potential links with precision farming 	<ul style="list-style-type: none"> • Paucity of data on GHG emissions and nutrient contents • Lack of data on pasture area and pasture management 	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> •Some labor-intensive sectors, e.g. dairy •Potential development of bioenergy sector 	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> •Support to bioenergy sector in the context of National Strategic Plan for new CAP
Fruit and vegetable	<ul style="list-style-type: none"> •Diversity of agroecological conditions and conducive climate for quality products •Consumer preference 	<ul style="list-style-type: none"> •Limited organization and agglomeration among small holders •Few existing labels 	<ul style="list-style-type: none"> •Enable the development of certification and labels 	<ul style="list-style-type: none"> •Consumer preference for organic fruit and vegetables in the EU and Croatia 	<ul style="list-style-type: none"> •Insufficient seed supply •Lack of value-addition activities 	<ul style="list-style-type: none"> •Promote market development, e.g. through green public procurement •Promote the development of knowledge and services 	<i>None in addition to those listed in cross-cutting</i>	<i>None in addition to those listed in cross-cutting</i>	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> •STARS Pilot generated a database and tool of direct relevance and that could be built upon. 	<i>None in addition to those listed in cross-cutting</i>	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> •Labor-intensive sector 	<ul style="list-style-type: none"> •Irrigation systems are underdeveloped and unutilized 	<i>None in addition to those listed in cross-cutting</i>
Cereals and oilseeds	<ul style="list-style-type: none"> •Competitiveness of the sector and growing local demand (livestock) 	<ul style="list-style-type: none"> •Commodity goods, offering limited options for market premiums 	<ul style="list-style-type: none"> •Expand demand through growth in processing and livestock sectors 	<ul style="list-style-type: none"> •Connection with organic livestock production (organic feed for livestock) 	<ul style="list-style-type: none"> •Insufficient seed supply • Limited labeling options 	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> •Large operators can contribute to plans and investments for capacity development and innovation 	<i>None in addition to those listed in cross-cutting</i>	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> • Link with precision farming: digital tools for crop monitoring system •Large operators can contribute to mid-term data development plans 	<i>None in addition to those listed in cross-cutting</i>	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> •Potential development of bioenergy sector 	<i>None in addition to those listed in cross-cutting</i>	<ul style="list-style-type: none"> •Support to bioenergy sector in the context of National Strategic Plan for new CAP

5. Conclusion

Croatia is in a unique position to benefit from the growing demand, investments, and knowledge opportunities for improving the sustainability and resilience of the agriculture sector that are being unlocked domestically and across the European Union. In general, the country benefits from a starting point of relatively low agro-environmental threats and pressure on natural resources, although some localized impacts are observed, especially in water management. This provides scope for growth, provided that adequate measures are taken to decouple growth from negative environmental impacts. This Note offers the results of a cross-cutting analysis of national strategies and policies, new CAP orientations, current agro-environmental issues, and regional experience pertaining to green growth in the agriculture sector.

Long-term strategies for the country place agro-environmental sustainability high on the agenda for 2030 and beyond. This prioritization is exemplified by the proposals to “Scale-up climate-smart agriculture and sustainable land management in the NARDS” and to “Increase productivity of agriculture and aquaculture and their resilience to climate change in an environmentally and sustainable way” in the National Development Strategy for 2030.

Implementation of these strategies and policies, and ensuring their environmental sustainability will require particular attention, resources and capacity development. Some of the short-term investments outlined in the NRRP will contribute to this, but also to other policy objectives, such as the digitization and modernization of agriculture. This is especially true in the areas of research and development, technical advisory services, consumer information, and performance benchmarking along the supply chains. The new CAP and the preparation of the National Strategic Plan represent a major opportunity for the country to prepare for and enable this transition. This Note identifies five levers for promoting green growth in Croatian agriculture.

Reinforcing sustainable national agricultural production and making it more market-oriented is both a necessity and an opportunity for sustainable Croatian agriculture. Promoting strong and sustainable supply chains would improve farmers’ incomes and the Croatian agriculture sector’s resilience to international price volatility. This would imply stimulating demand and raising consumers’ awareness of healthy food and environmental considerations. It would also require to foster farming and agri-food entrepreneurship by providing training and advisory services and easing administrative processes. Local cooperation between stakeholders, from producers to processors and distributors, will allow economies of scales for each link in the supply chain ensure a better distribution of value-added. Further guidance in this regard is provided in the STARS pilot 1.

Organic farming is especially well-suited to Croatia. Overall good natural resource availability and the need to adapt to climate change make this way of farming especially opportune, while the growing demand for local and high-quality, such as organic, products has been steady, especially among the urban population and foreign tourists. Organic farming can be an economically viable strategy, as the global market is unsaturated with organic products, and with demand and support expected to increase with the momentum from the European Green

Deal's Organic Action Plan. However, the transition from conventional and/or integrated production to organic methods is not simple and requires technological and marketing knowledge and skill. These need to be strengthened throughout the various organizations and stakeholders involved: the private sector, ministries, and academia. The domestic market for organic products is also insufficiently organized, partially due to limited processing capacity and insufficient consumer information. In addition, the domestic market is not properly controlled and there is misuse of the name "eco" or "bio", which renders it necessary to invest additional efforts in the development of marketing and quality standards and control.

A well-organized and functional AKIS is absolutely necessary in the pursuit of an effective, sustainable and competitive agriculture sector in Europe and, specifically, in Croatia. AKIS needs to be strengthened through cooperation between AKIS actors in Croatia to promote knowledge sharing in agriculture. Advisory services, chambers of agriculture, schools, the research sector, and the Ministry of Agriculture need to work together to create positive synergies and provide more specific and targeted support to farmers. AKIS capacities urgently need to be reinforced, keeping agricultural stakeholders informed, educated, and able to seek and use appropriate support for efficient business operations.

The proposed CAP 2023-2027 will be implemented with a New Delivery Model which allows for a more simplified, flexible, and results-based approach for member countries through the introduction of the NSP. In order to track progress on the objectives presented in the Strategic Plan, such as those agro-environmental commitments that will be triggered by the European Green Deal, member countries will utilize a PMEF. This new approach presents many challenges for all stakeholders involved in designing and implementing this new framework from the Commission to national authorities, and all the way to paying agencies and beneficiaries at farm level.

The Republic of Croatia has enjoyed many positive results from agro-environmental measures in the previous CAP, but, in this new framework, there will be particular challenges: the time associated with testing and implementing new agro-environmental monitoring systems, the cost of adopting new digital technologies at multiple levels, the capacity for cooperation among the relevant institutions, and the willingness of beneficiaries to share data. By learning from the initiatives, technologies, and experiences of actors in other European countries, a lot may be gained such as tips for effective data collection for the new Farm Sustainability Data Network, the opportunities (and limitations) of Sentinel satellite technologies, relevant considerations when fostering cooperation between institutions for promoting data sharing, and the importance of establishing trust with beneficiaries on an individual basis.

Finally, there is a pressing need to target those people in the rural areas, that are most affected by diseases related to nutritional and phytosanitary issues. They require access to high-quality products at affordable prices. Closing the gap for access to quality products between urban and rural areas will contribute to halting the rural exodus. These populations are also among those with the greatest potential to both contribute to, and benefit from, green growth in the agriculture sector: the deployment of such growth will create jobs in the rural space and require a surge in trained labor and entrepreneurship. Improving access to services in rural areas, such as broadband and health and education, will make rural communities more attractive to live in and will support innovation in agriculture. Access to land is a major limiting factor to generational renewal in the sector. Finally, dedicating

particular attention to young farmers, who face much of the constraints above, will enhance rural dynamism through their creating new economic opportunities and will contribute to developing more sustainable agriculture.

ANNEX 1:

TOWARDS GREEN GROWTH: PMEAF IN THE NEW CAP – ONLINE SEMINAR REPORT

May 18th 2021

I. Summary

The proposed Common Agriculture Policy (CAP) 2023-2027 will be implemented with a New Delivery Model that allows for a more simplified, flexible, and results-based approach for member states through the introduction of the National Strategic Plans (NSP). In order to track progress on the objectives laid out in the NSP, such as those agro-environmental commitments that will be triggered by the European Green Deal, member states will utilize a Performance, Monitoring and Evaluation Framework (PMEAF). This new approach presents many challenges for all stakeholders involved in designing and implementing it, ranging from the European Commission (EC), to national authorities, to paying agencies and to beneficiaries at farm level. In order to support Croatian stakeholders in the preparation of this new PMEAF, the World Bank organized a webinar on May 18th, 2021.

The Republic of Croatia has enjoyed many positive results from agro-environmental measures in the previous CAP, but in the new framework the particular challenges will be the time associated with testing and implementing new agro-environmental monitoring systems, the cost of adopting new digital technologies at multiple levels, the capacity for cooperation among the relevant institutions, and the willingness for beneficiaries to share data. By learning from the initiatives, technologies, and experiences of actors in other European countries, much may be gained such as tips for effective data collection for the new Farm Sustainability Data Network (FSDN), the opportunities (and limitations) of Sentinel satellite technologies, relevant considerations when fostering cooperation between institutions for promoting data sharing, and the importance of establishing trust with beneficiaries on an individual basis. The following report is a summary of the information provided to the webinar from the speakers.

II. Context

New ambitions stemming from the European Green Deal for transitioning agricultural systems across the European Union will require an equally ambitious framework for collecting, monitoring and evaluating progress. The three European institutions (the Commission [EC] the Council and the Parliament) are in the midst of tripartite negotiations (known as the “Trilogue”) over CAP reform, which aims for a simplified, results-based and flexible delivery model for member states through the introduction of NSPs. Additionally, it will incorporate a level of ambition related to the environment through three of the nine main objectives, specifically related to climate, environment and natural resources. In order to assess how the NSPs are contributing to the CAP’s objectives, the new PMEAF, which triggers a transition from compliance to a performance-based approach, has been proposed. The PMEAF is, in brief, a set of common objectives covering the whole CAP, common indicators, quantified targets, and milestones, and new data management and reporting activities. This new framework, in combination with the increased ambitions of the European Green Deal, such as improvements in biodiversity, reduction of pesticide use, and improvement in soil-nutrient use efficiency, are providing new technical challenges as well as opportunities for member states to transition to a more efficient and digital system.

III. Agenda and participation

The objective of the webinar was to identify development opportunities for the Croatian agriculture sector and find synergies between improving competitiveness, supporting viable rural areas, and enhancing

environmental performance and resilience to climate change in the context of setting indicators, data collection, and monitoring. Over 40 participants from across Europe joined the webinar for which interpretation was provided in English and Croatian, with all slides translated into Croatian. No participants from Croatia's paying agency were able to attend.

Several stakeholders from Croatia asked for the slides and recording post-event, and the speakers provided very relevant information that directly addressed some of the challenges and concerns identified by both Goran Lipavić as well as Sophie Helaine in their introductions. Below is the agenda and biographies of the speakers.

AGENDA:		
14:00 – 14:10	Welcome	Goran Bejnrauch, Gospodarski list magazine
14:10 – 14:15	Introduction	Pierre Gerber, The World Bank
14:15 – 14:30	Introduction of new agro-environmental PMEF under new CAP	Sophie Helaine, European Commission
14:30 – 14:50	Croatia's Monitoring and Evaluation Framework	Goran Lipavić, Croatian Ministry of Agriculture
14:50 – 15:05	Farm data collection, case study from Ireland	Trevor Donnellan, Teagasc
15:05 – 15:15	Q&A	Goran Bejnrauch, Gospodarski list magazine
15:15 – 15:30	Crop and farm management monitoring, Sen4CAP case studies from Spain	David A Nafria Garcia, Instituto Tecnológico Agrario de Castilla y León
15:30 – 15:40	Q&A	Goran Bejnrauch, Gospodarski list magazine
15:40 – 16:00	Reflections and Conclusions	TBC

Speakers

Pierre Gerber - is a senior agricultural economist at the World Bank where he leads a program aiming at mainstreaming climate and environmental considerations within the global portfolio of livestock operations. This involves project design and supervision, analytical work, as well as the piloting of novel financing options in the sector. He is also an Extraordinary Professor at the Department of Animal Sciences, Wageningen University in the Netherlands. Pierre has over 20 years of experience in analysing trends in global livestock systems.

Sophie Helaine - is Head of the Monitoring and Evaluation Unit, in DG Agriculture and Rural Development at the European Commission (DG AGRI). She is in charge of developing the new Performance Monitoring and Evaluation Framework (PMEF) of the CAP. An agro-economist, she has strong experience in economic analysis of agricultural markets and policy.

Goran Lipavić – is Director of Croatia's Directorate for Aid to Agriculture and Rural Development. He is responsible for the Managing Authority for the Rural Development Program 2014-2020 (PRR) and for the Strategic Plan of the CAP for the period 2023-2027. Goran has a specialty in animal husbandry. He has been employed in the Ministry of Agriculture since 2006 in the field of plant and livestock production and rural development.

Trevor Donnellan - is Head of the Agricultural Economics and Farm Surveys Department at Teagasc (Ireland's Agricultural Research Institute). He is a member of the Teagasc (FAPRI-Ireland) modelling team which undertakes economic analysis of agricultural markets and policy issues affecting the agri-food sector. He is also Head of the National Farm Survey (NFS) which is responsible for the provision of Irish data for the European Commission's Farm Accountancy Network (FADN). In this role he has placed a high priority on increasing the amount of farm sustainability data that is collected and used for policy evaluation and policy design

David A. Nafria Garcia - is Head of Geographic Information Unit for the Instituto Tecnológico Agrario de Castilla y León (Spanish regional agriculture technology institute) (ITACyL). He is responsible for projects related to the use of Geoinformation in agriculture using satellite imaging, meteorological data and modelling.

IV. The primary difference between the current CMEF and the new PMEF

Sophie Helaine, from DG AGRI, provided a partial overview and introduction to the new Performance Monitoring and Evaluation Framework (PMEF). The primary difference between the Common Monitoring and Evaluation Framework (CMEF) and the PMEF is the switch from compliance to performance, meaning that the design must be subject to more evidence-based analysis during the whole process, and even before implementation. Furthermore, all indicators will be part of the basic act, meaning that they will be common across the EU and will not be defined through delegated or implementing acts. The PMEF's intervention logic involves the definition of four indicators: member states will need to define their **context** indicators (e.g. status of soils under threat of erosion), the **output** indicators (e.g. share of land that will be under commitments to improve the quality of soil), the **impact** indicators and the **result** indicator.

The EC acknowledges that the uptake of agro-environmental measures takes time, especially as farmers and agencies need to adapt to new measures, so there is no expectation of a linear process. Furthermore, member states will be required to assess if the interventions will be 'green' or 'dark green,' an indication of the level of ambition of a given measure. Sometimes member states have low needs in certain areas and it makes more sense for them to set a low target. That is why it is made to be so flexible for member states to choose the objective of the result indicator.

Results indicators will be translating the ambitions of member states; a very important difference in the new PMEF is that it will require member states to be very specific in their NSPs because quantified targets will be required for the results indicators for the whole CAP (including eco-schemes and agro-environment measures). Furthermore, results indicators will also need to be set at a level of ambition that goes beyond conditionality. Animal welfare will need to be included in the indicators, which is a novelty, along with the requirement to check installed energy capacity in terms of megawatts annually (as opposed to every two years). Another important change is that member states will report investments from the beginning; in the current CMEF member states are asked to report when actions are completed, which gives the EC a very late understanding of what was happening on the ground.

V. Current status of CMEF in Croatia related to environmental payments

Goran Lipavić, from the Croatian Ministry of Agriculture, presented on the experiences and incoming challenges for Croatia in monitoring agro-environmental measures. Climate action in Croatia must be achieved hand-in-hand with economic growth, territorial development, and social inclusion. Agro-environmental measures were first introduced in Croatia starting in 2015 under the CMEF 2014-2020, and, overall, the results are positive in terms of number of beneficiaries, targets achieved, and impact.

By 2020, 28,025 hectares of farmland have been granted aid through Measure 10 (somewhat under the target value of 36,000 hectares), a multi-annual commitment to protect natural resources that was unknown territory for Croatia. In those areas, positive trends appeared in terms of biodiversity, reduction in soil erosion, and reduction in the use of pesticides. Additionally, the total area of support for organic farmers was over 100,000 hectares, slightly surpassing the target, so this is seen by the Ministry of Agriculture as a successful initiative. In vocational training through measure 1.1.1 – *“Vocational training for multiple compliance, and package of measures for agriculture on, environment and climate change, organic farming”* – by the end of 2020, Croatia had 46,271 participants in training, due to the efforts of advisors on the ground.

The indicator *“Population index of common bird species on agricultural land”* also known as the *Farm Bird Index*, has also been monitored since 2015, but it is too early to draw conclusions about overall status and it must be monitored for a longer period. Having said that, there is already a positive correlation between the implementation of IACS rural development measures (primarily agro-environmental payments and payments for

organic farming) on the number of birds in agricultural habitats and on bird population density (individuals per area). Therefore, since 2019, two more projects have been launched to monitor and assess the impact of agriculture on biodiversity.

VI. Challenges of new PMEF for Croatia

From the perspective of the Ministry of Agriculture of Croatia, as presented by Mr. Lipavić, the new PMEF will be complex, challenging, extensive and demanding. Agro-environmental measures take many years to build and require long-term continuity for reliable analysis; currently Croatia only implements CAP measures for one programming period at a time, and has only been doing this since 2015. Additionally, due to the complexity, the level of data collection that will be required will be expensive and require new investments. Beyond cost, capacity often depends on the beneficiaries of the measures themselves to reliably provide data. This is further complicated by the administrative burden already incurred by farmers, so monitoring must be in line with simplification for beneficiaries.

From the perspective of the EC, as presented by Ms. Helaine, the new PMEF will be challenging in that the EC will require more data at farm level to avoid double counting, reporting on indicators appropriately, and to plan LEADER effectively. (The LEADER approach, from the French phrase *Liaison Entre Actions de Développement de l'Économie Rurale*, or, "Links between activities for the development of rural economy" is intended to engage people and local organizations as development actors rather than beneficiaries, empowering them to contribute to the future development of their rural areas by forming area based Local Action Group (LAG) partnerships between the public, private and civil sectors.) The EC will want to conduct proper analysis and evaluation of progress, so officials are preparing another data request to member states, in which disaggregated data at beneficiary and intervention level will also need to be reported. As a major challenge in ensuring the effectiveness of measures, the EC will try to eliminate double accounting and ensure that each beneficiary is unique. Furthermore, the conditionality indicator will be reported separately, which has led to a new project with the Joint Research Centre (JRC) to help member states reporting on conditionality. Additionally, this will be the first time results indicators and sectoral interventions will be mixed, which will be very complex. Finally, it was stressed that monitoring LEADER measures will be more challenging.

Solutions, tips, and new technologies

Towards a Farm Sustainability Data Network (FSDN)

The current Farm Accountancy Data Network (FADN) will require more information on agri-environmental data from farmers, and according to Ms. Helaine, will eventually be renamed and transformed into the (FSDN). The conversion to FSDN will be completed in the second quarter of 2022. Trevor Donnellan presented on the experience with the FLINT² Project that helped develop a methodology for expanding agro-environmental data collection in Ireland. The result has benefited policy makers, farmers, and the wider rural community and farm households because interacting economic data with new environmental and social data has helped in better understanding farming systems and allowed for the design of more effective and informed measures. Mr. Donnellan provided seven tips for success:

1. Identify and reduce duplications in data collection activity, thus, where possible, use data that has already been provided for administrative purposes, such as Agriculture Ministry data;
2. Ensure a strong relationship between the farmer and the data recorder, so there is trust and assurance of confidentiality;

3. Environmental data is quite detailed and it is challenging to develop metrics. Therefore, shortcut proxy measures can sometimes be useful, but they are not always the most accurate;
4. Ideally have one consolidated survey for the same population type (as opposed to multiple surveys for different population samples);
5. Some data may not need to be collected on an annual basis, and may be collected less frequently, but this really depends on how often the data changes from one year to the next;
6. Ensure that the data is used to develop/modify policy and not to assess whether a farmer has breached a regulation or not; and
7. Start as soon as possible, as it will take many years to increase data collection at farm level.

Some remaining key challenges regarding agro-environmental data collection still exist at a very technical level. For example, pesticide use will be challenging to count because of the diversity of pesticides involved, and the different brand names make it difficult to consolidate data. Additionally, biodiversity is challenging; it may be measurable with satellite imaging, but that is limited because both the quantity and the quality of biodiversity is important.

Digital technology and Sentinel satellites

David A. Nafría García from ITACyL, presented on how to set up Earth Observation products for monitoring crop systems in the new CAP. His presentation focused on advice and suggestions for paying agencies to maximize the potential for using existing knowledge and technologies for digitizing monitoring systems. Many opportunities exist. For example, new sensors will soon be available, such as Sentinel-8 LSTM³ (Land Surface Temperature Monitoring) that may help with the collection of some agro-environmental indicators, such as strip cropping and crop rotation. While pesticide and fertilizer application may not be easily collected with satellite technology, irrigation, can be measured indirectly. For example, if the temperatures are high and there is crop growth, then assumptions may be made about irrigation. Measuring tillage practices and crop protection products will require more testing of algorithms.

Promoting collaboration between stakeholder bodies/beneficiaries

Ensuring cooperation with all competent bodies and institutions, as well as maintaining trust with beneficiaries is key to improving data collection capacity. Mr. Donnellan recognized that General Data Protection Regulation (GDPR) compliance can actually be a challenge, as the regulation sets up rules that should be followed to allow data sharing, but the rules make people and organizations nervous about breaching the regulation, so they avoid sharing. While GDPR is crucial, there must be an improvement in understanding among all relevant stakeholders, so it does not become an obstacle. Furthermore, Mr. Nafría García stressed the importance of collaboration internationally, and leveraging the pre-existing development, tools and technology in other countries and European projects (e.g., Sen4CAP4).

Beneficiaries (i.e. farmers, land-managers, etc.) should feel assured that their data is protected and that they will not be burdened with more administrative steps. New tools should, therefore, not only be for monitoring progress, but a beneficial decision-support tool for farmers. For example, the SATIVUM⁵ app developed by ITACyL can be downloaded on a smart phone, and, as it is integrated with the Farm Sustainability Tool (FAST)⁶, it can help farmers make decisions about when to apply fertilizers, crop protection products, etc. These tools also foster digitization in agriculture, a key objective to improving the competitiveness and modernization of the sector.

ANNEX 2: STAKEHOLDERS CONSULTED

Agricultural cooperative island of Krk: the cooperative is leading projects based on circular economy principles for sheep producers. From wool processing to sheep slaughterhouses, the cooperative aims at diversifying farmers activities, and is promoting economies of scale for farmers through aggregation. Karla Škorjanc is the cooperative's Managing Director. She is also involved in "Agroecology Europe", a European association looking for agroecological consideration awareness at the European scale. Interview held on May 6th, 2021.

WWF Adria: World Wide Fund for Nature is a Non-Governmental Organization created in 1961, that aims at promoting sustainable development and protecting the environment worldwide. Petra Remeta is the Conservation Programs Manager for the WWF in Adriatic area. Neven Slopac focuses on cohabitation between wolves and farmers in Croatia. Interviews held on May 14th, 2021, and on May 21st, 2021.

Association "Green Istria": Green Istria association is one of the leading environmental organizations in Croatia which aims at promoting sustainable development and public awareness at a national, regional, and local level. Dušica Radojčić is the program manager of the Green Istria association. Interview held on May 21st, 2021.

Lokvina: Lokvina is a firm that promotes organic farming in Croatia. It is a member of "International Federation of Organic Agriculture Movements" (IFOAM), which brings together stakeholders involved in creating more sustainable food systems worldwide. Andrea Vugrinović has been engaged in the distribution of organic seeds and consulting in organic agriculture over the past eight years. She is the Croatian representative in the IFOAM Organics International Council. Interview held on May 21st, 2021.

Environmental Institute ECOLOGICA: Sonja Karoglan Todorović is the Director of the Environmental Institute ECOLOGICA, a non-profit organization specialized in development of organic agriculture since 1999. She is an expert consultant on the European Union Common Agricultural Policy, especially for rural development including organic farming and agri-environment measures. Interview held on May 24th, 2021.

Life: Life is a member of the European Coordination Via Campesina. It is an organization that brings together stakeholders who want to promote sustainable peasant agriculture. Via Campesina supports more than 200 million farmers in 81 countries through 182 organizations. In Croatia, the association LIFE is the national satellite for Via Campesina, with around 500 members in the country. Robert Hadžić is a Croatian farmer, a member of the LIFE association, and a specialist in agriculture and rurality projects. Interview held on May 24th, 2021.