

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe:

How can policy foster agroforestry towards climate change adaptation?



9 - 10 October 2018, Budapest
WORKSHOP REPORT



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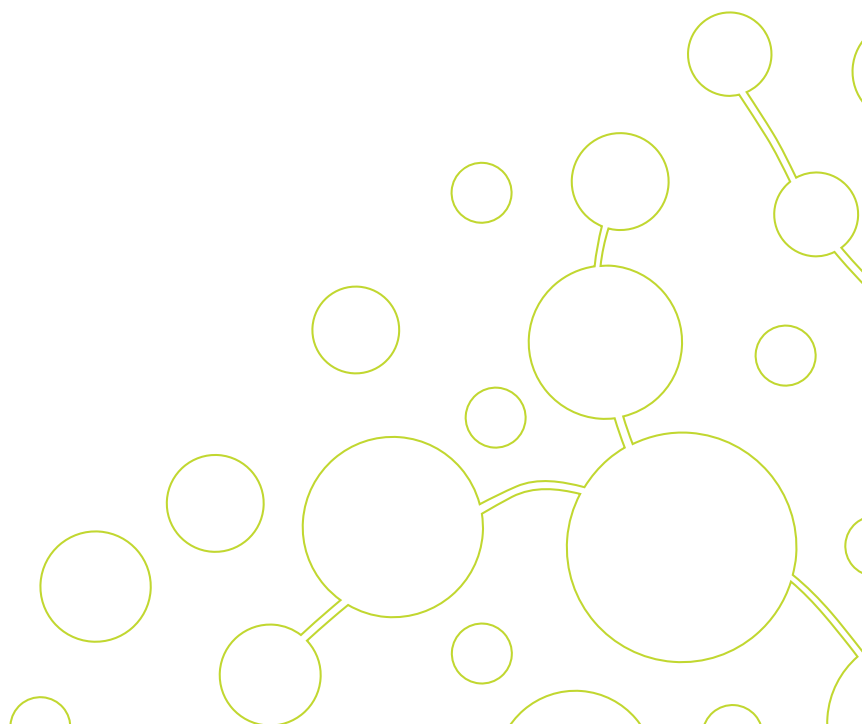
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Presentations delivered at the workshop are available at the FOREST EUROPE website at:
<https://foresteurope.org/event/13961/>



Understanding the Contribution of Agroforestry to Landscape Resilience in Europe:

*How can policy foster agroforestry towards
climate change adaptation?*

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Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Acknowledgments

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Special thanks go to the moderators, speakers, panellists who provided the content for the workshop and this report:

Tamas Szedlak - *DG AGRI, European Commission*

Mercedes Rois Diaz - *European Forest Institute*

Anastasia Pantera - *Aristotle University of Thessaloniki, Greece*

Robert Borek - *State Research Institute, Poland*

Maria Rosa Mosquera Losada - *University of Santiago de Compostela, Spain*

Attila Borovics - *NAIK Forest Research Institute, Hungary*

Zsolt Keserű - *NAIK Forest Research Institute, Hungary*

Alain Olivier - *Université Laval Quebec, Canada*

Fabien Balaguer - *French Agroforestry Association*

Eugene Curran - *Forest Service, Ireland*

Dirk Freese - *Brandenburg University of Technology, Germany*

José Ramón Guzmán Álvarez - *Regional Ministry of Environment, Andalusia, Spain*

Ganna O. Lobchenko - *National University of Life and Environmental Sciences of Ukraine*

Natalie Vysotska - *Ukrainian Research Institute of Forestry and Forest Melioration*

Nikolaus Lienbacher - *Chamber of Agriculture, Austria*

Özgür Balci - *General Directorate of Forestry, Turkey*

Patrick Worms - *International Centre for Research in Agroforestry*

The organizers would also like to express sincere thanks to all the participants and those who contributed to the discussions.

How can policy foster agroforestry towards climate change adaptation?

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Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Political background

In the Madrid Ministerial Declaration and the Ministerial Resolution 2 “*Protection of forests in changing environment*”, adopted at the Seventh Ministerial Conference on the Protection of Forests in Europe held in October 2015, the signatory countries and the European Union clearly expressed their awareness on changing climate patterns and associated natural hazards.

The signatories of the Ministerial Declaration and Resolution have recognised the severity of climate change and its related effects such as increasing temperatures, fluctuation of precipitation, and more extreme events, such as storms, floods, fires, heat waves and droughts, soil erosion, desertification, and damage caused by pests and diseases. They also highlighted transboundary nature of these threats, as well as the pressure of a growing population and the challenges of land-use changes.

Therefore, commitments made in Madrid call for intensification of information exchange on management experience in maintaining the protective functions, taking stock of the particular solutions under different climatic conditions, and to promote interaction between research, policies and forest management related to forest hazards.

With the aim to put these policy commitments into practice, the FOREST EUROPE Work Programme for 2016-2020 includes a specific activity focused

on **sharing expertise and experience on agroforestry as a way to contribute to combating climate change.**

Potential of agroforestry should be seen in the context of **global strategic policies**, such as those adopted under the United Nations and Food and Agriculture Organisation of the United Nations. Agroforestry is fully aligned with the **2030 Agenda for Sustainable Development and its Sustainable Development Goals** as well as the **FAO Guidelines for Sustainable Agriculture and Rural Development**. Moreover, agroforestry can contribute to the implementation of a large number of European level initiatives including the Pan-European Biodiversity and Landscape Strategy, the European Convention of Landscapes, the Bioeconomy Strategy and the European Climate Change Programme. Agroforestry in the EU should be also understood in connection with the Common Agricultural Policy (CAP). In this context, the Cork 2.0 Declaration was established by different policy actors and farmers dealing with agricultural and forestry lands.

Whilst agroforestry can effectively contribute to a number of high-level environmental and societal goals, the value of some of these benefits still has not been appropriately recognized at policy level or reflected by markets.

How can policy foster agroforestry towards climate change adaptation?

Agroforestry as a tool for landscape resilience in Europe

Agroforestry represents one of the climate change adaptation measures, contributes to rehabilitation of degraded land while providing livelihood and food security for people. The main agroforestry practices include silvoarable agroforestry, riparian buffer strips, silvopasture, forest farming, improved fallow and multipurpose trees¹, with three main systems applied in Europe: the arable agroforestry, livestock agroforestry and high value tree agroforestry².

In Europe, applicability of the particular agroforestry practices varies across the continent significantly depending on several factors such as natural conditions, legislative framework regulating land use, cultural aspects etc. For example, in the Mediterranean, agroforestry practices may represent an important management option for reducing fire risk in fire-prone forests. In this region, agro-silvo-pastoral systems can play a key role in preventing or reducing fire damage.

In other conditions agroforestry systems may include shelterbelts in agricultural fields, riparian vegetation, short rotation forestry and coppices on abandoned agricultural land, or maintaining of traditional landscape mosaics. Such agroforestry components may have positive impacts on landscape resilience, e.g. through increased biodiversity and reduced wind speed and soil erosion, improved water quality and increased carbon sequestration in agricultural land. Agroforestry can play an important role at landscape level, where it can contribute to improving the health and well-being of both rural and urban communities.

Demand for food and other agricultural products is expected to increase significantly (by 50 % between 2012 and 2050). The increasing demand will reflect structural changes, owing to factors such

as population growth, urbanization, and per capita increases in income while the natural resource base that agriculture depends on will become increasingly stressed. Producing more with less while preserving and enhancing the livelihoods of small-scale and family farmers is a key challenge for the future. Substantial improvements in resource efficiency and gains in resource conservation will need to be achieved globally to meet growing and changing food demand, and halt and reverse environmental degradation.

Moreover, the negative effects of intensive use of chemicals in crop production have become increasingly visible and pose serious sustainability concerns. To address these issues, investments in agriculture, fishery and forestry, and funding the research and development aimed at implementation of sustainable production systems and practices, including agroforestry are needed. Agroforestry and other forms of climate-smart agriculture can help ecosystems and local communities to adapt to, mitigate and build resilience to climate change, and address country-specific needs and gender-specific contexts.

Pan-European region, with its significant variability in natural conditions, has a huge diversity of traditional and modern agroforestry systems with high environmental and cultural value. This region has high potential for establishment of modern agroforestry systems. Currently, agroforestry is only applied in less than 10 % of agricultural land in Europe. Existing and new agroforestry systems can be used for sharing experiences and peer learning about interactions, symbioses, biodiversity protection and other benefits of agroforestry practices in particular conditions while contributing to resilience of the landscape.

¹ https://link.springer.com/chapter/10.1007/978-1-4020-8272-6_1

² <https://www.sciencedirect.com/science/article/pii/S0167880917301159>

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Workshop objectives

Main purpose of the workshop was to share state-of-the-art knowledge and build mutual understanding and cooperation in the field of agroforestry between agricultural and forest sectors with the aim to increase ecological resilience at landscape level.

The workshop focused on searching possible options for further joint work between agricultural and forest sectors and formulating recommendations on further steps in the pan-European region, to promote agroforestry as a tool for adaptation of landscape to climate change, combating land degradation and desertification,

forest fragmentation and improving biodiversity protection, water regime and soil fertility, etc.

The audience included representatives of the forest and agricultural sectors, as well as other related sectors, where agroforestry integration stands as one of the possible ways for sustainable land-use management. The workshop has established a common platform for agriculture and forest sector stakeholders such as policy makers, researchers, representatives of academia and education with the aim to promote application of agroforestry for increasing landscape resilience and adaptation to climate change.

Specific objectives

- To explore benefits and potentials of agroforestry to strengthen landscape resilience, adaptation to climate change as well as to well-being of societies;
- To exchange experiences, share expertise and examples of successful implementation of agroforestry approaches across pan-European region;
- To discuss main drivers and barriers for agroforestry in order to formulate recommendations for its further promotion;
- To exchange views on how to promote interplay, cross-sectoral cooperation and partnerships between relevant stakeholders from different policy domains to support adaptation to climate change.

Main barriers and drivers for the further development of agroforestry

Whilst agroforestry contributes to a number of high-level environmental and societal goals (increased biodiversity and carbon storage, improved water quality, and high value agricultural products), the value of some of these benefits is not fully perceived by markets and some current policies constrain agroforestry application. Stakeholder studies in AGFORWARD (a research project funded by the European Commission focusing, *inter alia*, on promotion of agroforestry in Europe through

policy development and dissemination) identified that a key limitation for agroforestry uptake is the complexity of the associated administration. Development of a European Agroforestry Strategy, which would include aspects related to its promotion, education, innovation and research and provide guidance for national agroforestry strategies, was recommended as a step forward to promote agroforestry.

How can policy foster agroforestry towards climate change adaptation?

Agroforestry can take place at a range of scales (e.g. plot, farm and landscape). At farm and landscape scale it can be implemented in systems that are able to diversify production (e.g. food, forage, timber and fuelwood), provide ecosystem services (soil restoration, water, preservation, climate regulation, biodiversity enhancement), thus increasing both resilience and profitability. In the light of the rapidly progressing climate change on one hand and the increasing demand for timber and food on the other, agroforestry systems could focus on high value timber production as well as diversification of products and ecosystem services. Although profit provided by agroforestry may vary at the plot and farm levels, at the global level the profit is considerable, especially when environmental services are taken into account.

Besides these environmental benefits of agroforestry acknowledged at the global level (e.g. 2030 Agenda for Sustainable development, UN Strategic Plan for forests 2017-2030) as well as at the EU level, traditional heritage agricultural systems

must be recognised in this regard since main drivers for the farmers to implement agroforestry is the tradition in the families, communities and regions as well as increasing number of consumers demanding local products from family farms. Co-operation between farmers, landowners and foresters with different partners along value chains is lacking, and improving this cooperation might allow exploitation of the benefits of agroforestry in the future. Encouragement of joined-up thinking between agricultural and forestry sectors fostering bioeconomy and circular economy is desirable.

Positive effects of trees and shrubs to adapt agricultural landscapes to climate change, mitigating some of its negative effects or intensity, are not sufficiently acknowledged and promoted among the public and policy makers. Moreover, the lack of knowledge among landowners about agroforestry is considered to be a limiting factor so it needs to be improved through various types of education.

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Workshop conclusions

Potential recommendations for strengthening inter-sectoral cooperation and coordination in the field of agroforestry

- To strengthen joint work between the forest and agricultural sector at all levels, including coordination between various relevant international processes and organizations working at European and global levels such as FOREST EUROPE, FAO, IUFRO, EFI, GACSA and GRA.
- To promote creation and networking of national agroforestry focal points to stimulate discussions at various international fora.
- To improve cooperation between farmers, landowners and foresters with different partners along whole value chains in order to promote agroforestry on the basis of positive experiences of farmer associations. Develop an inventory/database of the existing demonstration sites and existing examples of good practices all over Europe for this purpose.
- To organise small stakeholders in agroforestry into bigger interest groups at national as well as international levels in order to advocate for payments for ecosystem services provided by agroforestry systems.
- To promote agroforestry as a topic in the existing regional rural development networks in the European Union.

Potential recommendations for strengthening policy and legal framework in agroforestry

- To work towards inclusion of the agroforestry to agricultural and other related strategies and policies at all levels (agriculture, forest, bioeconomy, biodiversity, landscape, climate change adaptation etc.) with a view to developing dedicated agroforestry strategy at EU level.
- To make efforts towards development and implementation of legislation promoting application of agroforestry practices as applicable in particular national and subnational contexts.
- To develop and apply support measures addressing the farmers' needs, and to develop a set of agroforestry indicators for result-oriented payments including payments for environmental services.
- To enhance data monitoring reporting on agroforestry systems on forest as well as agricultural lands to support evidence-based policy making.
- To promote the use of agroforestry as a tool of prevention of forest fires in the Mediterranean region. Similarly, consider use and enable testing agroforestry practices (e.g. silvopastoral schemes) on abandoned agricultural land and/or as a part of active management of protected areas where appropriate. To promote agroforestry, however, it is also necessary to clearly revoke unsustainable agroforestry practices, such as overgrazing on forest land.
- To organise science-policy events for decision makers at national, EU and international levels and inviting high-level representatives such as ministers and EU commissioners (food, agriculture, environment sectors) to provide inputs for the formulation of science-based policies.

How can policy foster agroforestry towards climate change adaptation?

The workshop participants also discussed specific opportunities at EU policy level and potential of European Union's Common Agricultural Policy for promotion of agroforestry. Discussion among the participants suggested that agroforestry should be defined in a clear way at EU policy level, but without denying flexibility to allow Member states to create locally adapted, site-specific type of agroforestry systems. Regarding the Common Agricultural Policy, it was discussed that agroforestry measures linked to the Rural Development Programmes (measure 222 in CAP 2007-2013 or measure 8.2

in the 2014-2020) could be formulated as direct payments for agricultural lands. Such system of direct payments would be beneficial for wider uptake of agroforestry measures in the Member States. Moreover, a need to simplify administration procedures and to reduce bureaucracy for farmers willing to implement agroforestry practices was formulated during this discussion. Deeper discussion on Common Agricultural Policy and its agroforestry measures has been, however, beyond the scope of this workshop.

Potential recommendations for strengthening communication and promotion of agroforestry at all levels

- To disseminate successful stories amongst conventional farmers and land owners, proving that agroforestry diversifies the products and other benefits.
- To raise awareness among farmers on available financial support for agroforestry.
- To communicate and raise awareness on agroforestry and positive effects of trees and bushes in landscapes among general public with special focus on young generation. Messages such as "agroforestry plants water" to demonstrate that trees can increase water infiltration and improve its quality, or other similar messages as "agroforestry for biodiversity", "agroforestry for climate change mitigation and adaptation" can be examples to be used in communication strategies.
- To make use of innovative communication methods, e. g. joining art and technologies and activities, e.g. immersive week involving journalists to educate them on agroforestry with the primary aim to create documentaries and news to raise awareness at all levels.
- To raise consumer awareness on agroforestry products and consider appropriate product labelling also enabling traceability of the products.
- To take advantage of links to youth international networks (such as International Forest Students Association IFSA).
- To designate International Day of Agroforestry to increase public awareness.

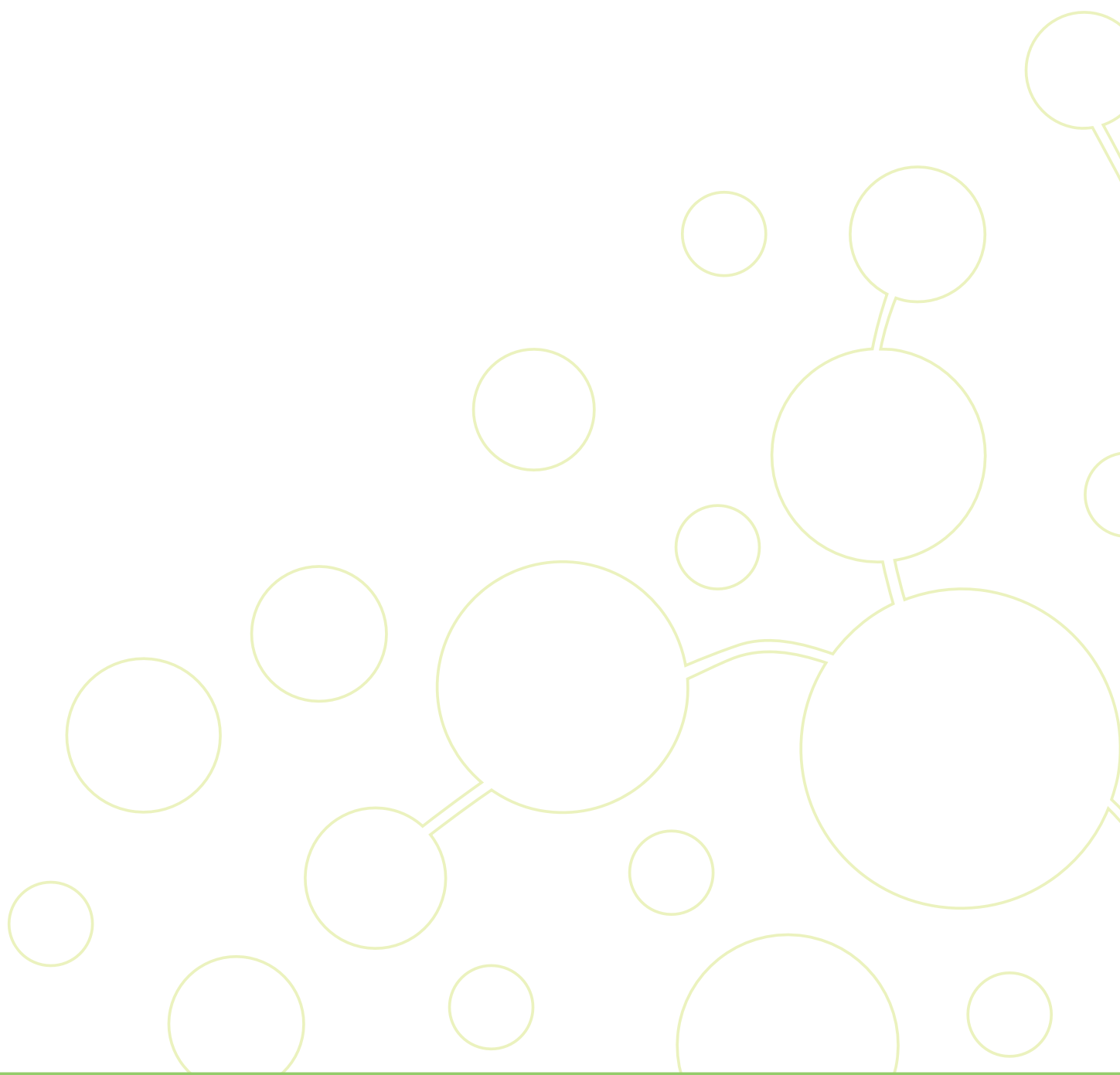
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Potential recommendations for strengthening research and innovation, education and training in agroforestry all levels

- To consider possibilities to include agroforestry topics to all levels of education mainly vocational and higher education, continuing education and leadership programs as well as into environmental education in primary schools.
- To develop agroforestry extension services providing knowledge transfer from the latest agroforestry research findings to operational level and policy makers.
- To motivate farmers to improve their knowledge and skills needed including knowledge of new business models.
- To promote cooperation between educators, students and farmers in order to exchange knowledge on agroforestry practices, pilot case studies and support education for trainers and farmers.
- To organise summer and winter schools and online courses to promote agroforestry systems involving student associations or collaboration with international organizations, and exploiting full potential of funding mechanisms for student and teacher mobility to this end.
- To promote research on application of innovative technologies in agroforestry and climate-smart agriculture (such as use of drones, remote sensing, precision irrigation).

How can policy foster agroforestry towards climate change adaptation?

ANNEXES



Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Programme overview - Tuesday, 9 October 2018

Chair: Tamas Szedlak, Moderator: Mercedes Rois Diaz

Plenary Session: *Benefits of agroforestry and its potential contribution to climate change adaptation increasing resilience of landscape*

Agroforestry as a tool to increase resilience and food security

Simone Borelli - Food and Agriculture Organisation of the United Nations

Why do we need agroforestry for our landscape to be resilient?

Mercedes Rois Diaz - European Forest Institute

Adaptation and decision support in agroforestry

Attila Borovics - NAIK Forest Research Institute, Hungary

Plenary Session: *Policies and governance needed to enhance agroforestry*

Policies and governance needed to enhance agroforestry

Maria Rosa Mosquera Losada - University of Santiago de Compostela, Spain

Policies and governance needed to enhance agroforestry: the case of Quebec, Canada

Alain Olivier - Université Laval Quebec, Canada

Forests and agroforestry in the CAP

Tamas Szedlak - DG AGRI, European Commission

Agroforestry development in France: from local to national level (and beyond...)

Fabien Balaguer - French Agroforestry Association (AFAF), France

Agroforestry Policy in Ireland

Eugene Curran - Forest Service, Ireland

Plenary Session: *Countries' experiences and perspectives: Learning from case studies*

Advances in Agroforestry in Germany

Dirk Freese - Brandenburg University of Technology, Germany

Current state of agroforestry research in Hungary

Zsolt Keserű - NAIK Forest Research Institute, Hungary

Dehesa and Montado: Challenges and Opportunities of Two Historic Agroforestry Systems in a Changing Context

José Ramón Guzmán Álvarez - Regional Ministry of Environment, Andalusia, Spain

Windbreaks as a part of agroforestry systems in Ukraine

Natalie Vysotska, Ganna O. Lobchenko - National University of Life and Environmental Sciences of Ukraine

Agroforestry in Austria - different from history

Nikolaus Lienbacher - Chamber of Agriculture, Salzburg, Austria

Harvesting of non wood forestry products in Turkey

Özgür Balci - General Directorate of Forestry, Turkey

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Programme overview - Wednesday, 10 October 2018

Parallel sessions: *Main barriers and drivers for the further development of agroforestry*

Parallel session I: *Agroforestry in Mediterranean region*

Moderator: Anastasia Pantera

Parallel session II: *Agroforestry in Temperate region*

Moderator: Robert Borek

Parallel sessions: *How to promote agroforestry to support climate change adaptation?*

Parallel session I: *Discussion on potential recommendations for strengthening cross-sectoral cooperation, education and training, research and innovation, communication*

Moderator: Ludmila Marušáková

Parallel session II: *Recommendations for strengthening policy and legal framework*

Moderator: Maria Rosa Mosquera Losada

Plenary Session

Reports from sub-groups and general discussion on the outputs

General discussion at the plenary

Conclusions and closing remarks

Chair: Tamas Szedlak, Moderator: Mercedes Rois Diaz

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Speakers Background

Simone Borelli



Simone Borelli holds a first degree in Forest Science from the Università della Tuscia, Italy, an M. Sc. in Watershed Management from the University of Arizona and Postgraduate Diploma in Public Management from the University of London. He has worked for the Food and Agriculture Organization of the UN (FAO) for over 20 years in different positions and is currently responsible for the Agroforestry and Urban Forestry programmes in the Forestry Department. In this capacity, he provides technical support to FAO field projects, provides policy advice to member countries and develops technical publications. In addition to FAO, he has also worked for WWF, IPGRI (now Bioversity) and as a consultant for public institutions and the private sector.

Tamas Szedlak



Tamas SZEDLAK graduated as a forester in 1978, and then he received an MSc on forestry in 1987. In 1992, he wrote his thesis on agroforestry and got his second degree on tropical agriculture and forestry. After working more than 10 years in forests at the Hungarian State Forest Service, he became an official of the Ministry of Agriculture in Budapest, and he contributed to the country's preparation to the accession to the EU. Since 2004, he works for the European Commission in the Directorate General Agriculture and Rural Development. He deals with various forestry related issues, in particularly related to forestry in rural development and practical aspects of forestry under the changing climate. He follows the forestry and agroforestry related policy development, including the preparation of the legislative background for the CAP post 2020 period.

Mercedes Rois Diaz



Mercedes Rois Díaz (M.Sc. in Forest Sciences, 2000) is a researcher in the Bioeconomy Unit at the European Forest Institute. Currently she works in the AFINET project (Agroforestry Innovation Networks, H2020), which aims at taking up research results into agricultural practice, improving knowledge exchange between scientists and practitioners, with a special focus on silvoarable and silvopastoral agroforestry systems design, their management, production and profitability. In the past she worked in the AGFORWARD project (Agroforestry that will advance Rural Development) focusing on the driving factors for the farmers implementing agroforestry or not, and the analysis of policies influencing the uptake of agroforestry across Europe. Further, she was involved in the VALERIE project (VALorising European Research for Innovation in Agriculture and Forestry, FP7) which aimed at boosting the uptake of innovations by facilitating knowledge exchange between farmers, foresters and researchers to improve the uptake of research outputs. She also worked on developing indicators on forest biodiversity in the framework of the European Environment Agency, and the application of sewage sludge on silvopastoral systems.

José Ramón Guzmán Álvarez



Forestry Engineer, working at the Regional Ministry of Environment in Andalucía (Spain). Phd in Agronomy studying the History, Geography and Ecology of Olive landscapes in Andalucía. Dealing with mediterranean Agroforestry system as technician involved in the application of Andalusian law for dehesas and as Director of Life bioDehesa (LIFE11/BIO/ES/000726), taking part as well as representative in projects Life MONTADO ADAPT and POCTEP SUDOE PRODEHESA MONTADO.

How can policy foster agroforestry towards climate change adaptation?

Maria Rosa Mosquera Losada



Dr María Rosa Mosquera-Losada, Distinguished Professor of the Crop Production and Project Engineering Department of the University of Santiago de Compostela. Current President of the Spanish Agroforestry Federation. Chair of the Arable Crop working group of the Global Research Alliance (official IPPC observer) and of the “Enabling Environment working group” of the Global Alliance for Climate Smart Agriculture (FAO). Editor of the books “Silvopastoralism and Sustainable Land Management” (CAB International) and “European Agroforestry Federation” (Springer). Author of over 400 peer reviewed papers, 70 of which are indexed in the JCR (90 % of papers in the first decile) about the subject of agroforestry. Main responsible of the reports of “Biodiversity indicators on silvopastoralism across Europe” written for the European Environmental Agency and “Current status of Agroforestry EU policy” and “Agroforestry Policy recommendations for EU” as leader of the Policy section of the AGFORWARD Project. She is the current coordinator of the most important Agroforestry Network in Europe: AFINET.

Zsolt Keserű



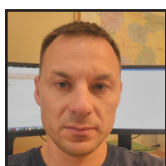
Zsolt Keserű is a senior scientist and Head of department at National Agricultural Research and Innovation Centre, Forest Research Institute, Püspökladány Experimental Station, Department of Plantation Forestry, Hungary. His main activities and responsibilities are in plantation forestry and agroforestry. He is member of the Public Body – Hungarian Academy of Sciences, president of Hungarian Academy of Sciences-Regional Committee in Debrecen, Working Committee of Forestry, Nature Conservation and Game Management and Honorary Associate Professor, at University of Debrecen, Faculty of Agriculture.

Patrick Worms



Patrick Worms trained as a molecular geneticist and is the Senior Science Policy Advisor of the World Agroforestry Centre, the world's premier research institution studying the roles of trees in agricultural landscapes. He serves as President of the European Agroforestry Federation, as a member of the steering committee of Initiatives for Land, Lives and Peace, and as a Trustee of AFS Magyarország, among others. Patrick's work sits at the nexus of land restoration and human security; the evidence is mounting that the clever marrying of traditional and advanced knowledge is the most promising pathway to a resilient rural prosperity, a giant help to mitigate our impact on biodiversity and the atmosphere and, tantalizingly, peace in a warming world.

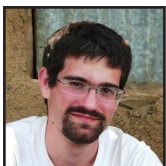
Robert Borek



Robert is agronomy engineer working in Institute of Soil Science and Plant Cultivation – State Research Institute (IUNG-PIB) in Puławy, Poland. Since 2014, he is involved in policy-making in agroforestry, working for European Agroforestry Federation (elected national delegate). He initiated Polish movement of agroforestry, that resulted in establishment of Polish Agroforestry Association in June 2015, which he is the chair of. He is working in different transdisciplinary research projects involving farmers and advisors, related to climate-smart agriculture (LCAgri), agroforestry (SustainFARM, AFINET) and bio-economy strategy (BioEcon). On behalf of IUNG, he is involved in EIP-AGRI Operational Group “Agroforestry in the Zielawa Valley” funded by Polish RDP Programme. The research activities in Poland are carried out jointly with works and expertise being performed for Ministry of Agriculture and Rural Development, supervising IUNG-PIB.

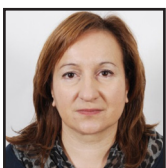
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Fabien Balaguer



Fabien graduated from France as an agronomist and holds an MSc in agroforestry from Bangor University (UK - 2011). His MSc. thesis was done at the World Agroforestry Centre - ICRAF on local agro-ecological knowledge of tree cover change in the Blue Nile Basin, Ethiopia. He then served as an agroforestry project officer for development NGOs across the Sahel, primarily in Senegal, Burkina Faso, and Ethiopia. He is now the director of the French Agroforestry Association where he works on developing partnerships at all geographical scales to strengthen and encourage the transition towards a more sustainable agriculture that creates "fertile soils in fertile landscapes". He is also a member of the European Agroforestry Federation (EURAF).

Anastasia Pantera



Anastasia Pantera is professor at the Department of Forestry and Natural Environment Management, TEI of Central Greece, at Karpenissi, Greece. She has a Doctoral diploma on Agroforestry from Aristotle University of Thessaloniki and a M.Sc. diploma from Purdue University, USA on Forest Ecology and Biology. She has worked as a forester for the Hellenic Forest Service. She served as the Head of the Research Sections "Environmental Pollution Control" and "Forest Genetics and Development", of the Technological Research Center of Central Greece. She has organised six (6) stakeholders groups meeting throughout Greece on agroforestry. She has coordinated 8 research projects on agroforestry, forest ecology, ecology and vegetation, environmental education, long-distance learning and participated in 12 as team member on climate change, land rehabilitation after forest fires and on environmental education. She has taught courses on agroforestry, forest

soils, forest ecology, and forest vegetation. She has over 120 publications in scientific journal, conference proceedings and books. She acts as scientific editor in two international scientific journals. She was invited speaker in 14 conferences. She had a scholarship from the National Scholarships Institution (IKY) for postgraduate study abroad. Since 1993 she is a member in the Honorary Scientific (Honorary Society) American Company "Xi Sigma Pi".

Attila Borovics



Attila Borovics (Hungary), director of NAIK Forest Research Institute and strategic deputy director-general of NAIK (National Agricultural Research and Innovation Centre). Main field of activity: strengthening the integrative cooperation between agricultural research institutes, strengthening international cooperation (agribusiness, knowledge transfer, science diplomacy), developing practical solutions to adapting to climate change, development of tree plantations and agroforestry systems, evolutionary and ecological research in forestry, decision support for farmers, foresters, regulatory authorities and policymakers.

Eugene Curran



Eugene studied forestry in University College Dublin. After graduating he worked for the Forest and Wildlife Service in the area forest management. He then worked with Coillte and spent most of his time in research. In 1994 he moved to the Forest Service, Department of Agriculture Food and the Marine, and is working as District Forestry Inspector in the South West of Ireland. His main duties include processing applications for grant aided forestry plantations, processing felling licences, monitoring tree health and promoting agroforestry in Ireland.

How can policy foster agroforestry towards climate change adaptation?

Dirk Freese

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Alain Olivier



Alain Olivier is a Full-Time Professor in Agroforestry in the Faculty of Agricultural and Food Sciences at Université Laval, Québec, Canada. He holds a BSc in Agronomy and a PhD in Plant Biology. He is director of the Interdisciplinary Group of Research in Agroforestry as well as of the Chair in International Development of Université Laval. His research program focuses on analyzing the constraints and incentives to the implementation of agroforestry systems, in an interdisciplinary perspective, including insights on technical, ecological, social, economic and policy aspects. He is also interested in the contribution of agroforestry to food security and to the mitigation of and adaptation to climate change.

Ľudmila Marušáková



As the head of FOREST EUROPE Liaison Unit Bratislava and a Policy Advisor, she is responsible for developing pan-European forest policy under the ministerial process known as FOREST EUROPE. Formerly she was working in the field of continuing education and training of forestry professionals, forest communication and forest related environmental education at National Forest Centre in Slovakia where she as a deputy director of the Institute for Forest Consulting and Education, coordinated international activities.

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Abstracts of Presentations

Agroforestry as a tool to increase resilience and food security

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Climate change is a growing threat to the agriculture sector and its negative effects on agricultural and forestry production are already being felt in many places. Unless climate change is addressed, agricultural productivity will decline with serious implications for food security.

Agroforestry is a key approach for the integration of climate change adaptation and mitigation objectives, generating significant co-benefits for local ecosystems and biodiversity. Integrating crops with trees and/or livestock, it provides diversified production that can increase farmers' resilience to market fluctuations and failures that may result from the impacts of climate change. Farmers often respond to climate variations by progressively modifying their farming practices and integrating trees on farms. The adaptive capacity of farmers is influenced by the nature and extent of trade-offs between the components of the farming system, and their degree of integration. Therefore, successful integration rests on the flexibility to reduce trade-offs and competition between the various production components of the farming system. Agroforestry, offers farmers a greater number of risk management strategies and options to adapt to climate-induced disturbances than specialized systems as farming systems that allow for the substitution of component parts are less vulnerable. Agroforestry plays a key role in building resilience and can play a role in mitigating greenhouse gases from agriculture, as their emission intensities are typically lower than the sum of those from specialized systems.

Of course, not all tree, crop and livestock species positively interact when integrated in

an agroforestry system. Foreseeing whether the interactions among components will remain positive or negative in an evolving climate requires understanding of the direct and indirect impacts of climate change, the trade-offs among the components of the farming system, and the capacities to minimize negative interactions and maximize the benefits of integration.

In addition to providing technical support and testing different options through field projects, FAO coordinates its adaptation activities through the FAO-Adapt Programme. FAO-Adapt is an umbrella to all our adaptation activities, including short-term and long-term adaptation measures and aims to enhance coordination, efficiency and visibility of FAO's adaptation work.

Core principles of the Programme are:

- Mainstream climate change into development
- Support country-driven processes
- Build synergies between adaptation and mitigation
- Promote ecosystem approach
- Design participatory, gender-sensitive and location-specific adaptation activities
- Deliver through partnerships and as ONE UN
- Support transboundary collaboration
- Develop a long-term programmatic approach

A wide range of publications, capacity development activities and tools complements the work of FAO-Adapt.

How can policy foster agroforestry towards climate change adaptation?

Forests and agroforestry in the CAP

Tamas Szedlak¹

¹ European Commission, DG Agriculture and Rural Development

The Common Agricultural Policy (CAP) is one of the most important policies funded by the EU. The EU has promoted agroforestry in both the previous (2007-2013) and the current (2014-2020) budgetary period. This presentation reflects on the evolution of this measure over the time, and provides some insights on lessons learnt.

CAP 2007-2013

Agroforestry was introduced for the first time as a “new” topic supported by the CAP 2007-2013, and it formed part of the forestry measures, labelled as “Measure 222: First establishment of agroforestry systems on agricultural land.” The measure supported 275 beneficiaries, establishing 2904 ha of new agroforestry systems.

CAP 2014-2020

Based on the experience from the preceding programming period, the legal framework for Rural Development, laid down in Regulation (EU) 1305/2013, includes a revised agroforestry measure. Amendments introduced by Regulation (EU) 2017/2393, the so-called Omnibus regulation, provided for the possibility to support the regeneration or renovation of existing agroforestry systems under the title “Measure 8.2 Establishment, regeneration or renovation of agroforestry

systems.” This amended measure covers; a) 80 % of the costs of establishment, regeneration and/or renovation, and b) the annual premium per hectare to cover the costs of maintenance for a maximum period of 5 years.

Post 2020 CAP

The Communication “Future of Food and Farming”, issued by the European Commission in November 2017¹, and the proposal for a regulation² provides orientations for the CAP post-2020. The Communication underlines the need for giving more flexibility and responsibility to Member States as regards the design of their CAP support schemes, laid down in national CAP Strategic Plans. The EU will establish the common EU objectives to be pursued by all national CAP Strategic Plans in order to ensure “common” achievements of this common policy. The EU objectives address, among other, the contributions of agriculture to climate-change mitigation and adaptation, improving resource efficiency, and increasing competitiveness of EU agriculture. The EU will also define only broad types of interventions, which are to be fine-tuned by Member States according to their needs. The proposal for a regulation is under consultation process both in the European Council and in the European Parliament.

¹ https://ec.europa.eu/agriculture/sites/agriculture/files/future-of-cap/future_of_food_and_farming_communication_en.pdf

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A392%3AFIN>

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Why do we need agroforestry for our landscape to be resilient?

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Agroforestry is considered by FAO as a sustainable land use and listed as one of the top 10 innovations for adapting agriculture to climate change. Agroforestry systems are resilient and can contribute to reduce the impacts from extreme events such as heat waves or floods, thus it is a suitable measure for climate change adaptation and mitigation: it contributes to reduce forest fire risk and intensity, increases shadow for animals and pasture, reduces fertilizer inputs, increases productivity, favours short supply chains, increase carbon sequestration, and enhances landscape heterogeneity.

Based on the LUCAS database (Land Use and Land Cover Survey), it is estimated that agroforestry covers 15.4 million hectares in the EU27, i.e. 3.6 % of the total area or 8.8 % of the Utilized Agricultural Land. The main type are silvopastoral systems, both grazed broadleaved forests and open forests like 'dehesas' and 'montados', as well as permanent crops such as olive groves and fruit orchards. The main motivation for European farmers to implement agroforestry have been family or regional traditions, as well as knowledge about the management of such systems and the diversification of the products they can obtain. More knowledge leads to a higher interest in using agroforestry.

While large parts of the European farmland suffer from several environmental problems (soil erosion, water pollution from nitrates, low biodiversity, etc.), converting farmland into agroforestry could markedly reduce greenhouse gasses emissions, depending on the type of agroforestry introduced. This shows the potential to introduce agroforestry systems in vulnerable areas across Europe. Furthermore, fires are less likely to occur in agroforestry land in comparison to forest, shrublands or grasslands and when they occur, they are often less intense in agroforestry areas.

One of the objectives of the project AFINET 'Agroforestry Innovations Network' (H2020) is to search for innovations in the different regions across Europe. In total, 88 innovations were identified together with the stakeholders across Europe. For instance, in Finland, three innovations have been top rated: 1) alley cropping initially introduced to reduce erosion but it helped to reduce also the impact of the recent droughts, 2) mushroom cultivation in logs as a forest management tool, and 3) sheep grazing in young forest stands reducing the need for pre-commercial thinning.

How can policy foster agroforestry towards climate change adaptation?

Dehesa and Montado: Challenges and Opportunities of Two Historic Agroforestry Systems in a Changing Context

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The dehesa, named montado in Portugal, is largely known as a characteristic landscape located on the south-western area of the Iberian Peninsula. Dehesa and montado are as well historic agroforestry systems (AF), in fact, one of the more extended AF in all Europe.

“Dehesas” are commonly identified as a type of open oak forest pastureland that can be found in Spain and Portugal. However, it has not been a legal concept till recently; its diffuseness to be defined is one of its weaknesses.

Dehesas and montados have shifted considerably in the last decades. From 1960 onwards, the management style have intensified and a number of severe problems have arisen as the lack of tree layer regeneration and the effect of tree decline, commonly named as “seca”, due to factors as increasing temperatures and fungi diseases.

When thinking about protecting the dehesas against their major threats, political measures in the form of public investments and incentive programs based on the explicit or implicit recognition of the public services they provide are tools to be considered. As most public incomes depends on subsidies under European Union agriculture policies, there is a need to be well understood in the EU regulation framework in order to obtain good results in the implementation of the policies.

At present, there is a remarkable interest in promoting agroforestry systems as a sustainable

type of farmland. The dehesa and montado paradigm, with their mixed design (far over the general tendency to simplification) and their set of economic products and non-commercial environmental services, may play an important role as an example of making things differently: “adehesar”, making dehesas, would be a promising tool for managing lands.

Above all, one of the major challenges of XXI century dehesas and montados is to enhance their adaptation capacity to global warming, reducing their vulnerability. Dehesa and montado are agroforestry systems coming from the past with the need of updating its management practices. However, a deeper conclusion emerges when the diagnosis is made taking into account the loss of context stability due to variation in the environmental variables: a non-equilibrium system which was steady under certain circumstances has to cope in the present, and more in the future, with increasing stressing factors that may overcome its resilience.

What European collaboration projects as Life bioDehesa, Life Montado and POCTEP Prodehesa Montado are showing (and working in) is the need of the system to be redefined in order to lead it the chance of accommodating to changes. In other words, it is more than just a matter of climatic adaptation: we have to work in the adaptation of the whole socio-economic and ecological system.

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Policies and governance needed to enhance agroforestry

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The Common Agricultural Policy (CAP) is one of the most important drivers of farming systems in Europe, that, therefore should promote agroforestry as a sustainable land use system that can be implemented in any type of land use: arable, permanent grasslands, permanent crops and forest lands. Agroforestry EU policy should provide a global framework to include agroforestry practices (silvopasture, silvoarable, forest farming, homegardens and riparian buffer strips) in any type of this land use to foster diversification of products coming from the land and resilience of farming systems against extreme events. A clear definition, supported by the FAO,

should be adopted to create a comfortable and adaptable framework for all EU Member states: *“the deliberate integration of woody vegetation (trees and/or shrubs) as an upper storey on land, with pasture (consumed by animals) or an agricultural crop in the lower storey. The woody species can be evenly or unevenly distributed or occur on the border of plots. The woody species can deliver forestry or agricultural products or other ecosystem services (i.e. provisioning, regulating or cultural)”*. Furthermore, the recognition of the agroforestry at plot, farm and landscape level should be awarded and directed to farmers and cooperation among farmers.

How can policy foster agroforestry towards climate change adaptation?

Current state of agroforestry research in Hungary

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Hungary was the first country in Central Europe that started the implementation of the EU's 222 measure (First establishment of agroforestry systems on agricultural land). Its aims to provide opportunities for establishing wooded pastures and maintain and develop the mosaic landscape structure.

Agroforestry used to be a widespread technology of land use in Hungary during the past century. However during recent decades it has disappeared from large areas of the Hungarian countryside. The negative effects of climate change urge us to address and find ways to adapt or to mitigate it.

In Hungary, agricultural land (including crop and grasslands) occupy cca. 60 % of the land area. Of the arable land 85% can be found in agro-environmentally sensitive areas. In these areas the nutrient content is very low and floods and drought periods are very frequent. Consequently we have to find the suitable growing technology that can provide the sustainable and profitable management under unfavourable site conditions. To achieve these goals agroforestry can be an effective solution.

The Hungarian National Agricultural Research and Innovation Centre's (NARIC) Forest Research

Institute (FRI) Department of Plantation Forestry started to study agroforestry systems and constructed its first trials in 2014. Since then further experiments have been set up and the institution has started to spread the knowledge of agroforestry, its characteristics and specialities, through agricultural and forestry forums and conferences, based on international literature, and examples. The aim is to establish trials across the whole country, to be able to study different sites where profitable plantation forestry and agroforestry technologies can be tested under the ecosystem of Hungary, providing models, and options to forestry and agriculture in marginal areas. In these experiments we investigate mainly soil moisture, carbon cycle, light capture and root growth, as these factors are remarkable in researching and mitigating climate change.

It is important to investigate and determine the relation between the trees and the companion crops including agroecology, yield (production) and economy. The results of our research project will be most likely applied mainly by private agricultural land owners, local governments and their joint organizations, furthermore by private forest owners and forestry companies owned by state.

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Agroforestry in the EU Common Agricultural Policy - Past, Present and Future

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In the Rural Development Regulation (1305/2013) of the current CAP (2014-20), “agroforestry” is defined as a “land use systems in which trees are grown in combination with agriculture on the same land”. Grants are available in 35 Rural Development Plans (under CAP Pillar II) to establish and maintain agroforestry, or one quarter of all RDPs. In the previous CAP (2007-2013), agroforestry establishment was available in only 5 of them.

The 2018 Omnibus Regulation expanded agroforestry options still further by confirming that the agroforestry submeasure can support the natural regeneration of trees in existing silvopasture. This Regulation also announced an optional change in the definition of permanent grasslands eligible for direct payments to “include shrubs or trees that produce animal feed but are not directly grazed by animals”. Today, tree planting outside forests is confusingly supported through a range of Pillar II measures, and EURAF asks for their consolidation.

72,529 ha of agroforestry would be established in 2014-2020 at a cost of 123.3 million € should the submeasure be implemented in full. But Member States may not fully release the funds. Farmers may be sceptical. Only 6.5 % of the planned spending and 4.3 % of the planned area actually materialised under the previous CAP. Many farmers are concerned that they may lose their direct payments should remote sensing count too

many trees on their land, even if they can prove that “agriculture remains predominant”.

Yet agroforestry is gaining traction in next CAP (2021-2027), obliging national authorities to produce strategic plans which quantify how the CAP’s nine economic, environmental and social objectives will be met. The three most relevant to agroforestry are:

- climate change mitigation and adaptation, and sustainable energy;
- the sustainable development and efficient management of natural resources (water, soil, air);
- protect biodiversity, enhance ecosystem services and preserve habitats and landscapes.

The new CAP emphasises developing indicators to measure the impact of policies in meeting these objectives. From the agroforestry perspective, these could include:

- minimum percentages of “landscape features” (including tree features) to be met by all farmers under Pillar I;
- tree planting using GIS-based “farm nutrient sustainability tools” that codify soil characteristics, terrain and field boundaries, and predict GHG budgets under Pillar I; and
- developing participative agroforestry agri-environment-climate schemes under Pillar II.

How can policy foster agroforestry towards climate change adaptation?

Agroforestry in Temperate region

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The potential of agroforestry as a sustainable land-use system has not yet been fully realised in temperate regions. Silvopasture being the most common agroforestry (AF) practice in Europe is particularly important in UK, Ireland, France, Sweden, Finland and hilly regions of Poland, Czech Republic, Slovakia, Hungary and Romania, but is often present in landscapes of Baltic countries as well. In Switzerland and partly Austria, traditional fruit orchards grazed or intercropped are still quite common. The fragmented structure of farms and diverse topography favour the presence of small groups of trees on agricultural land of Poland, western Ukraine, Romania and Bulgaria. Alley cropping systems for short rotation woody biomass production are receiving increasing interest in Germany. The most advanced temperate European countries in terms of development of modern AF systems and support level are France (with National Plan for the Development of Agroforestry), UK and Belgium. Important types of traditional AF practices that are still present in central and northern France include grazed orchards, the “bocages”, and fruit trees or poplar plantations intercropped with field crops. In UK pollarding, pannage practices and hedgerows are popular. Hungary is the only country in Central Europe implementing RDP agroforestry measures. Intercropping of forest

trees, alley cropping systems and windbreaks can be found also there, the first two in Czech Republic as well. The main AF systems in Romania are shelterbelts, riparian buffers, taungya (kind of silvoarable system) and wooded pastures. Bulgaria has achieved good results in the establishment of AF practices, such as windbreaks, riparian buffers, forest farming and silvopastoral areas. Windbreaks network is common type of agroforestry in former Soviet Republic countries – apart from Russia, in Belarus, Ukraine and Moldova. Probably large parts of smallholders there still manage traditional silvoarable and silvopastoral systems in traditional fruit orchards.

AF practices and systems are not fully recognized as agroforestry and main challenges of AF development are linked to a better technical and economic knowledge. Agroforestry in EU is promoted by several measures in RDP 2014-2020, however most of the countries of Central and Eastern Europe have not adopted agroforestry-related measures. One should mention the problems outside EU – for instance in Ukraine, the main problem is lack of legal status of shelterbelts, blocking their transfer to private owners or communes. Intersectoral actions are needed to legalise agroforestry and strengthen its position in Europe.

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Agroforestry development in France: from local to national level (and beyond...)

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Over the past two decades, France has seen a gradual (re)development of agroforestry practices, in a wide range of forms and contexts. This shift in focus, initially born “on the field”, was strengthened from 2007 onwards with the creation and launch of the French Agroforestry Association, which connected stakeholders together from the local to the national level. This set the groundwork for collaborative initiatives from multiple actors, including farmers and practitioners, technical experts from the agricultural and forestry sectors, decision makers, and researchers.

In 2011, the European Agroforestry Federation (EURAF) was created at the French Ministry of Agriculture in Paris.

As one of the key results of all this work, in 2015 a national agroforestry development plan (2015-2020) was launched by Stephane Le Foll, then Minister of Agriculture. The objective of this plan, one of the keystones of the Agroecological Project for France, is to officially “encourage development and sustainable management of agroforestry systems in France”. Within this framework, 5 goals are given priority to guide development and research work across the country: 1) to better understand the diversity of agroforestry systems and their functioning principles, 2) to improve the regulatory and legal framework and strengthen financial support of the agroforestry transition,

3) to develop technical advice, and training of agroforestry, 4) to improve the economics and marketing of agroforestry products in a sustainable way, and 5) to disseminate agroforestry internationally.

Also in 2015, the “French rural network for agroforestry” was launched, led by the French Agroforestry Association. A consortium of 18 national and regional partners was established, thus allowing improved knowledge exchange across the 13 regions of France and paving the way for policy adaptations at multiple scales. Today, an extensive network of partners from practice, research, and the teaching sector work together on a range of projects and initiatives, benefitting from both a strong local anchoring and a national coherence, thus optimising results, and continuously creating new opportunities for cooperation. Key actors from the natural resource and environmental management (eg. river conservationists, landscapers, regional park officers, hunting associations) are now involved in what is becoming a societal transition at landscape level, engaging much more than just the farming “experts”. Consumers are also an increasingly important target through the involvement of major actors from the agri-food sector in farmer-led marketing initiatives such as the national challenge “For an agriculture of life”.

How can policy foster agroforestry towards climate change adaptation?

Agroforestry in Mediterranean Region

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The Mediterranean basin is characterized by a variety of bioclimates, species and farming systems adapted to local needs and environments with agroforestry being one of the most ancient land uses. Agroforestry is the practice of deliberately integrating woody vegetation (trees or shrubs) with crops and/or animal systems to benefit from the resulting ecological and economic interactions (Mosquera-Losada et al, 2018). Silvopastoralism has been one of the older agroforestry land uses, as mentioned by many ancient writers. In silvopastoral systems there is a joint wood and animal production. The forests component in the Mediterranean region may be coniferous of *Pinus* sp., *Abies* sp., *Juniperus* sp., or broadleaved mainly of *Quercus* sp., depending on the location and environmental conditions. Livestock production systems may be sedentary with a permanent base throughout the year or transhumant with seasonal movement of the animals. Major “High Nature and Cultural Value” agroforestry systems prevail in the Mediterranean such as the Dehesa in Spain and the Montado in Portugal (Moreno et al 2018). Another distinct agroforestry category is the “High-value tree agroforestry systems” which involves the intercropping or grazing of orchards or groves of fruit trees or plantations of trees grown for high value timber (Pantera et al, 2018). The systems can be combined with agricultural or

grass grazed by sheep. Pollarding is still a living practice throughout the Mediterranean. Chestnut and walnut agroforestry are also traditional land uses system in mountainous areas. There are various combinations of olive agroforestry such as grazed by chickens or intercropped by crops or species such as asparagus and flowers. The intercropping of high value tree systems can help to reduce cultivation costs, while the use of understorey nitrogen-fixing crops can reduce fertiliser needs for the tree crop and maintain or increase tree yields. Grazing can reduce mowing costs and provide an additional source of revenue. A series of selected agroforestry systems are introduced in the innovation and best practice leaflets, produced under the “AGFORWARD” project (Burgess et al, 2018).

The Mediterranean basin is the place that has and still further needs to face main environmental challenges, being one of the more vulnerable areas of the globe due to changing climate, under sustainable management. Additionally, existing research indicates that appropriate application of agroforestry principles and practices is a key mean by which the European Union might achieve more sustainable production methods whilst producing both profits for farmers and environmental benefits for society.

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Adaptation and decision support in agroforestry

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„We are shooting a moving target” when we talk about the effects of climate change, therefore timely solutions are necessary for constantly changing conditions. It cannot be forgotten that in solving the problems of climate change affecting agriculture, there is only one key player apart from intelligent people, the living plant itself from which the community of trees that are the basis of the agroforestry system plays a special role. In doing so, we must recognize the adaptation processes of our tree species and introduce new farming and planting practices in line with the speed of the human-induced climate change.

Researchers are responsible for collecting and evaluating available information. All these data, which had been accessible separately for a long time, had to be made easily available for some sites of actual intervention using only the toolkit provided by GIS and applying new evaluation methods. Accepting the month average rainfall and temperate data of given sites by climatologists, the future development of climatic conditions can be determined, using the newly developed forestry aridity index. So it is a realistic idea that future

sites are predictable and, therefore, we can make suggestions about the target stocks, tree species and even the origins and sources of propagation materials from tree species safe to apply.

Conscious and well-established propagating material management can therefore be an immediate response to climate change problems. The essence of selecting propagation material for adaptation is that separation of sources of propagation material is done solely on an ecological basis instead of traditional geographical areas of origin. In this process, pre-adapted propagation material resources are determined on the basis of a preliminary estimation for future climate conditions for planting agroforestry sites. The web-based application helps the farmers to find the best sources of propagation material for their own stocks required to be restored for the 2050 planning periods, with a warmer and drier habitat than the site of use, considering the whole Carpathian Basin and the Balkans. If they are applied in a documentable way, financial recognition is obtainable according to current Hungarian regulations.

How can policy foster agroforestry towards climate change adaptation?

Agroforestry Policy in Ireland

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The level of tree cover in the Republic of Ireland (RoI) is the second lowest in Europe at 11 %, in Northern Ireland (NI) it is only 6 %. The EU average tree cover is 38 %. Ireland has 62 % grass cover and the 4th largest cattle herd in the EU. Agricultural intensification has raised concerns in Ireland over the level of emissions and other possible negative environmental impacts.

Trees are seen as a good way of sequestering carbon and ameliorating the harmful effects of siltation run off and nutrient leaching into vulnerable watercourses. The Republic of Ireland has an afforestation programme with a variety of tree planting options on offer to land owners. In 2010 the Department of Agriculture Food and the Marine decided to investigate the potential of agroforestry in the South of Ireland. Based on an assessment of AFBI (Agri-Food & Biosciences Institute) agroforestry research trials in Loughgall in Northern Ireland a number of demonstration plots were established in the South of Ireland. It was decided to concentrate on silvopastoral systems as these systems appeared to work in the Northern Ireland trials. The demonstration plots were considered a success and a grant

aided agroforestry measure was introduced to the afforestation programme in 2014. A target of 195 hectares of agroforestry planting was set for 2020. Currently there are 54 hectares at various stages of approval. The Republic of Ireland is probably unique in Europe, in that the funding comes from the forestry sector as opposed to the agricultural sector. In addition Irelands forestry measures are paid from the Irish exchequer as opposed to EU pillar II funding.

Due to the environmental, economic and aesthetic benefits that accrue to agroforestry enhancing landholdings in environmentally sensitive areas, using agroforestry has great potential. The benefits to animal welfare are becoming increasingly obvious too.

Northern Ireland is a separate jurisdiction and the funding is from the Environmental Farming Scheme (under priority 4, EU pillar II) and is administered from the agricultural sector. Currently 24 applicants have applied for the scheme with 32.5 hectares.

Both jurisdictions (NI & RoI) have different approaches and both are successful.

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Advances in Agroforestry in Germany

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Agroforestry systems are traditional land management systems that are recently under development in the temperate zone. These systems are defined as sustainable ways of land use which integrate both agricultural and forestry practices on the same land and at the same time. Agroforestry systems are able to contribute to the ecological but also to the economic revaluation of agricultural production areas, especially in regions with marginal land, representing an alternative to land abandonment and afforestation.

However, despite numerous advantages in modern agricultural practice, agroforestry systems have so far hardly been implemented. The project AUFWERTEN (Environmental services of Agroforestry for value-added and energy) offers the opportunity to develop contacts with practitioners, associations and other research institutes in order to illuminate the topic of agroforestry scientifically more profound and to promote the attention for this sustainable form of land use in practice. In this context, project participation allows learning processes to be more innovative and more focused in communicating

research results into practice, thereby improving the perception of and the incorporation of scientific findings into practical work.

The second project introduced here is called SIGNAL (Sustainable intensification of agriculture through agroforestry). The overall goal is the evaluation of existing long-term experimental agroforestry systems in Germany and comparison with conventional agricultural systems. It will be scientifically proved that innovative agroforestry systems are ecologically and economically more sustainable. To achieve the goal natural science-based analyses of agroforestry systems will be carried followed up by socio-economic evaluations.

Agroforestry systems improve the efficiency of utilisation of natural resources, improve microclimatic conditions within the system, mitigate severe soil erosion problems and nutrient losses, enhance landscape biodiversity, lead to an overall high biomass production for valuable timber or energetical conversion (fuelwood), and thus matching the increasing demand for a self-supply with bioenergy in rural decentralized areas.

How can policy foster agroforestry towards climate change adaptation?

Agroforestry in Austria – different from history

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Austria is not a good example for agroforestry. A major part of the Austrian national territory is covered by the Alps. Due to the high share of mountainous areas there are only small areas available for agricultural production. 75 % of the area is less-favoured area. This makes it more challenging to ensure the environmental compatibility of the economic development. The priorities of the Austrian regional policy are among other things the strengthening of innovative power of enterprises and the increase in resource and energy efficiency.

In 2016, Austria featured 162.000 agricultural and forestry holdings, which are still small-scaled (45 ha of total area per holding, 19.8 ha of utilised agricultural area and 19.3 ha of arable farming area). In 2017, Austria featured 1.3 million ha of arable land. Austria has again the highest share of utilized agricultural area under organic management in the EU. Roughly 20 % of the holdings are managed in an organic way. 90 % of the area is managed under agri-environmental schemes. The production of regional food with high quality gets more and more important for consumers.

Domestic family-run farms tend to our unique cultivated landscapes, supply the population with high-quality food and are committed to mitigating climate change. Dynamic rural regions are the cornerstones of a high quality of life and a guarantor of food security. The output of the

agricultural industry accounted for 7.3 billion euros in 2017. 49 % came from livestock production and 41 % were delivered from plant production. There is a high dependency on common agricultural policy payments for the farm holdings. More than 80 % of the farm holdings manage agricultural land as well as forests.

Forests in Austria are versatile multi-talents and an important economic factor. Forests provide us with wood, give habitats to animals and plants and offer humans a place for recreation. Forests supply the energy of the future. This makes sustainable forest management all the more important. About half of the Austrian territory is covered with forests, the most important tree species is spruce, which accounts 51 %, followed by beech with a share of 10 %. More than half of the forest area is for private forests covering less than 200 ha. More than 80 % of the Austrian forest is privately owned.

There is an increasing importance of forest management for mixed farming and forestry holdings. Austria has a special legal framework, the Austrian Forest Law, with specific management regulations. A clear and stable property law ensures long-term land tenure. Inheritance law and inheritance taxes ensure a smooth handover of forest holdings to the next generation without endangering economic viability. The importance of agricultural services and non-agricultural secondary activities is increasing.

Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Windbreaks as a part of agroforestry systems in Ukraine

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Positive influence of the forest on the agricultural fields is used since XIX century on the territory of Ukraine. Ukraine has more than 200 years history of protective afforestation and agroforestry systems. First prototype of agroforestry systems with windbreaks on agricultural fields was created by V. Lomykovskyy in 1809-1837 and the result of these measures was improved and more stable crops yield in protected margins in between of windbreaks. On the first stage windbreaks afforestation had occasional and unsystematic character. Drought of 1892 in Steppe zone caused activation of scientific researches and it was organized expedition leaded by V. Dokuchaev. In the second half of the nineteenth century Steppe afforestation planning became national scale project. Since the early 30th of the XX century, it was carried out on a regular basis in frames of the five-year plans for the development of the national economy of the Soviet Union. Nowadays the total area of windbreaks is about 440 thousands ha with protection of 13 mln ha of arable lands, but this figure is twice as low as optimal.

Windbreaks are placed on agricultural lands in flat terrain and slopes of less than 2-3 degrees, where the main damage to crops is brought with dry winds. Effect of windbreaks on crop fields'

microclimate depends on stands construction, causing different wind transmission. But in general effective agronomic influence of windbreaks spreads on distance of 25-30 heights of the stand and provides decreasing of wind speed for 40-60 %, temperature decreasing during summer season and increasing during winter for 1-3 degree, humidity increasing for 3-5 %, soil moisture evaporation decreasing for 20-25 %, snow retention and as a result 10-20 % higher annual yields of agricultural crops. Importantly, economic benefits from using windbreaks start since 10-15 years old, including the covering of the cost of creation.

At the same time ecological potential of windbreaks with features of forest biogeocenosis is significant in its multifunctional use as ecological corridor for regional ecological networks. Windbreak also has climate change mitigation value via carbon sequestration. The average compactness of the fractions biomass of windbreaks oak trunk is 5-11 % higher than for massive forest plantations. Thus ecological-economical efficiency of agroforestry systems is 20-25 % higher than open agricultural lands with losing 3 % of arable area only for creation of windbreaks.

How can policy foster agroforestry towards climate change adaptation?

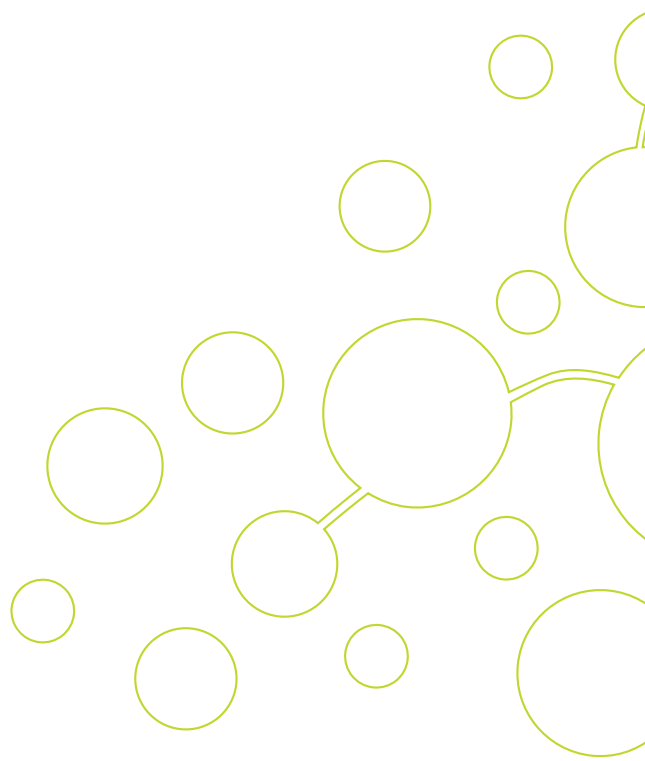
Policies and governance needed to enhance agroforestry: the case of Quebec, Canada

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Although the rate of adoption of agroforestry is still low in the province of Quebec, Canada, a growing interest toward agroforestry is observable among various stakeholders of the agricultural, forestry, environment and territorial planning sectors. Such an interest led to the creation, in 2008, of an Agroforestry Committee supported by the Quebec Reference Center for Agriculture and Agri-Food (CRAAQ), a network of experts and organizations aiming at sharing of information and knowledge management and dissemination. The mandate of the Agroforestry Committee, which comprises representatives from farmers' and foresters' unions, agricultural and forestry advisory groups, universities, research centers and ministries (agriculture, forestry), is to contribute to the development of agroforestry systems offering solutions to the issues of rural territories in Quebec by fostering networking, sharing of information and knowledge transfer. In the last years, the Agroforestry Committee organized various events whose participants identified the absence of recognition at the political level and the lack of technical and financial support as some of the most important constraints to adoption of agroforestry. Thus, a working group stemming from the Agroforestry Committee was set up in order to draw up a document about the strategies to put in place to stimulate the adoption of agroforestry

practices. The study identifies the possible contribution of agroforestry to the resolution of six main issues of the agroecosystem: soil health, biodiversity, water quality, climate change, rural landscape and profitability. The current extent of agroforestry systems in the agricultural landscape is described, and an inventory of the resources available to farmers and landowners who wish to use agroforestry practices is made out: availability and accessibility of practical knowledge, advice, technical services, materials, training and education resources, research, and institutional and policy support. An analysis of the current situation in view of the challenges faced by the agroecosystem brings the working group to make six recommendations: the recognition by the public authorities of the potential of agroforestry systems; an increased technology transfer through the setting up of networks of agroforestry advisors and demonstration sites; the provision of financial support to producers through a program specifically dedicated to agroforestry; the creation of new knowledge through research activities; the development of adapted plant material; and an increased dialogue between the various actors of the agriculture, forestry, environment and rural development sectors. The implementation of these recommendations should help the scaling-up of agroforestry in Quebec.



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