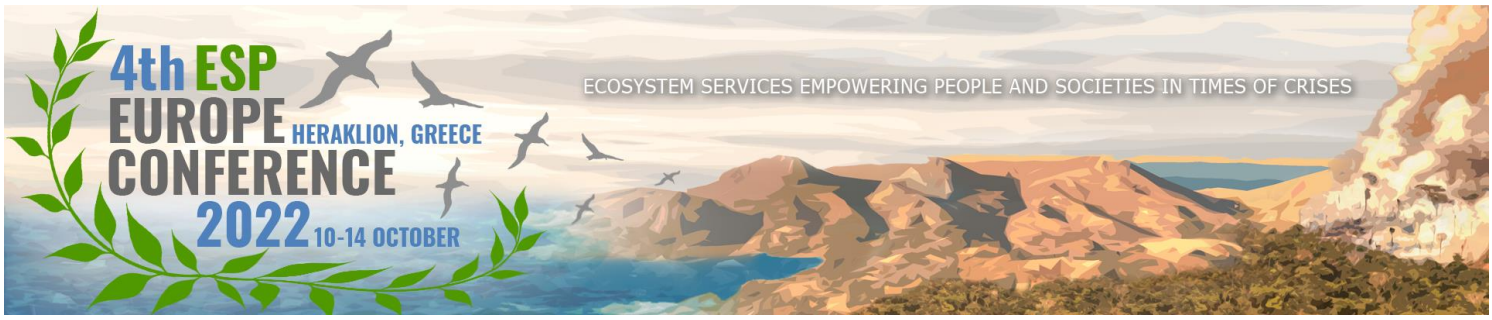


BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

ID: S1a

Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers)

Hosts:

	Title	Name	Organisation	E-mail
Host:		Simone Martino	The James Hutton Institute	simone.martino@hutton.ac.uk
Co-host(s):		Benedetto Rugani	Luxembourg Institute of Science and Technology (LIST)	benedetto.rugani@list.lu
		Paola Ovando Pol	Consejo Superior de Investigaciones Científicas - CSIC - Spain	paola.ovando@csic.es
		Alastair Simmons	Taskscape Associates Limited	alastair.simmons@taskscape.org.uk
		Graham Begg	The James Hutton Institute	graham.begg@hutton.ac.uk

Abstract:

Background

The Natural Capital (NC) approach is becoming a dominant paradigm for achieving sustainability for corporate and public decision making by adding the natural capital and ecosystem services dimension to traditional evaluation tools such as cost benefit analysis, cost-effectiveness analysis or multi-criteria decision aid or deliberative approaches. The implementation of NC builds on physical and monetary accounting of some environmental assets like renewable (e.g., forests) or abiotic resources (e.g., water), mainly at national scale, to inform the contribution of nature to our economy (UN, 2014), but protocols to account for ecosystems are also emerging (UNSC, 2021). Other UK initiatives are proposing protocols for testing the NC approach for corporate (Natural Capital Coalition, 2016) or guidance such as the initiative Enabling a Natural Capital Approach (DEFRA, 2021) to help understand natural capital at scales lower than national one and link it to private schemes financing nature-based solutions.

More recently, the international scientific community is calling for a more inclusive approach to wealth (Dasgupta review, 2021), and national policies such as the Scottish "Land Use Strategy 2021-2026" underline the importance of providing a holistic strategy explaining the

contribution of natural capital to sustainability and societal wellbeing through its integration with human-induced capitals (human, social, and physical). Recent progress in environmental accounting entails the correction of the GDP as the standard national wealth measure by accounting for the decline in natural capital and the net gains of human and reproducible capitals (Barbier 2019). However, efforts towards inclusive wealth at scale of corporate or of land use policies operating at landscape scale are in their infancy. Attempts to work with the four capitals (natural, social, human, and produced) are proposed by the Capitals Coalition (https://capitalscoalition.org/), however, it is not straightforward for an organisation to identify and apply indicators for the four capitals in an integrated manner. There is need to improve our understanding on the capacity of these tools to support decision making and on the factors that may limit or enable the mainstreaming of more complete and inclusive indicators systems to evaluate the performance of an economy or a business and their positive and negative effects on the productive factors that support them (natural and human) and the transition to more sustainable productions systems and economies.

Session scope

This session builds on the contribution offered by the H2020 project FRAMEwork (https://www.framework-biodiversity.eu) in advancing a NC approach for the European biodiversity sensitive farming systems. The project promotes the formation of Farmer Clusters where groups of farmers can work collectively via participative and deliberative process to generate effective, targeted, and efficient management plans in collaboration with scientists and local stakeholders at a catchment or regional scale. Under the FRAMEwork approach the dynamics of actors is modelled by reconstructing the socio-ecological systems using the narrative of NC also taking into consideration the consequences of farmers' collective actions as part of the agro-food system and landscape management in enhancing human and social capital.

Building on the experience of the FRAMEwork project, in this session we want to open a discussion underpinning the implementation of NC under different lenses, exploring the relationships with human-induced capitals, the link with socio-ecological systems and the need to downscale accounting approaches for the management of land use to take account of local cultural-related aspects. During the session, the general discussion on the role of natural capital in achieving sustainability will be interspersed with presentations targeting NC at different scales, from businesses to the analysis of land use polices. We are calling for papers exploring NC approaches that embed monetary and non-monetary strategies and provide paradigmatic examples that can help business strategists or land use decision makers to achieve sustainability and to raise awareness of the importance of different natural capital to the vast public. Finally, to enhance our communication outputs we will offer insights gained from knowledge exchange and communications strategies to a vast public as matured in the FRAMEwork project by the formulation of media content (an innovative example of podcasts, as already developed in FRAMEwork, can be found here: https://linktr.ee/prophets_wizards_pod). Taskscape Associates Ltd. (hereafter taskscape),

partner in FRAMEwork with long-lasting expertise in research communication (https://www.taskscape.org.uk/), will join the session and support the Team in these outreach activities.

References

Barbier, E. 2019. The concept of Natural capital, Oxford Review of Economic Policy, 35(1), 14-36.

Dasgupta, P. 2021. The economics of biodiversity. HM Treasury, UK.

Defra, 2021. Enabling a Natural Capital Approach guidance. Available at Enabling a Natural Capital Approach guidance - GOV.UK (www.gov.uk)

Natural Capital Coalition, 2016. Natural Capital Protocol. (Online) Available at: www.naturalcapitalcoalition.org/protocol

OECD, 2022. Measuring the non-financial performance of firms through the lens of the OECD Well-being Framework: A common measurement framework for "Scope 1" Social performance. OECD papers on Wellbeing and Inequalities N.3. https://dx.doi.org/10.1787/28850c7f-en.

Stebbings, E., Hooper, T., Austen, M.C., Papathanasopoulou, E. Yan, X. 2021. Accounting for benefits from natural capital: Applying a novel composite indicator framework to the marine environment. Ecosystem Services 50, 101308.

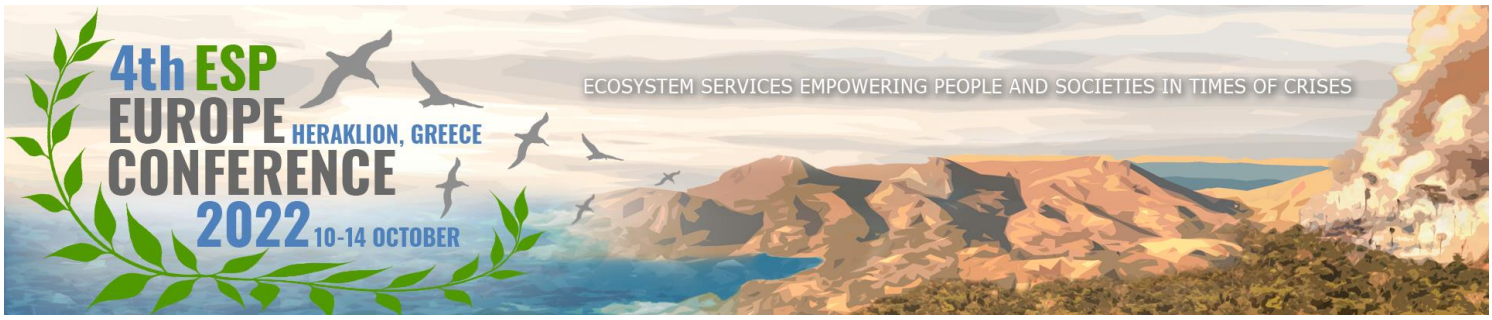
UN, 2014. System of Environmental-Economic Accounting 2012 Experimental Ecosystem Accounting. New York.

UNSC, 2021. System of Environmental-Economic Accounting — Ecosystem Accounting. White cover publication, pre-edited text subject to official editing."

Goals and objectives of the session:

The session aims to stimulate debate and knowledge exchange on the implementation of Natural Capital approaches in the agricultural sector exploring the relationships with human, social and cultural aspects of agro-ecosystems. The objectives of this session are:

1. to consider the NC approach at different scales (from national to smaller tiers);
2. to raise the importance of an integrated capital approach to achieve strong sustainability;
3. to propose approaches that focus on integrated monetary and non-monetary estimates of natural capital and wealth in terrestrial sectors focusing mainly on agriculture;
4. to consider how the natural capital can be implemented in social-ecological models;
5. to consider innovative ways to address natural capital based on participatory approaches through the integration of techniques (e.g., participatory, analytical, visualization, digital mapping, use of app for collecting data through citizen science approaches) that may offer a holistic understanding of NC as complex systems and advance the synergy effects and trade-offs between their various components.



6. to effectively reach a broad audience, raise societal awareness of natural capital, ecosystem services, ontological aspects and cultural approaches embedded in different societies that may be useful to address solutions for the protection of biodiversity and the promotion of wellbeing.

Planned output / Deliverables:

The overarching output of this session is an innovative communication on the importance of natural capital blending traditional presentations and more general discussion that will be captured by:

- the publication of scientific papers on a special issue targeting the natural capital approach under different lenses as per objects detailed above.
- a special episode of an interdisciplinary knowledge exchange podcast that currently reaches around 1,000 organic listeners per month and that has been designed to generate resources for educators across FRAMEwork's core topics https://linktr.ee/prophets_wizards_pod

Among the journals to be targeted, we have identified the following three potential candidates:

- Ecosystem Services (https://www.sciencedirect.com/journal/ecosystem-services)
- The international Journal of Biodiversity Science, Ecosystem Services and Management (https://www.tandfonline.com/journals/tbsm21)
- Ecosystem and People (https://www.tandfonline.com/journals/tbsm22)

Presentations will be selected on the quality of the abstracts and adherence to the objectives above mentioned. One of the presentations will be based on natural capital strategies developed in the FRAMEwork project. The final contribution by Taskscape will share and discuss insight gained from knowledge exchange and communications activity embarked on with actors and audiences engaging with facets of the Capitals approach while tackling FRAMEwork project challenges.

The presentations will be proposed inside the general discussion of topics addressing the role of natural capital and ecosystem services from an ontological, epistemological and cultural perspectives, touching also the role of monetary valuation and accounting, as a pathway to sustainability.

Session format:

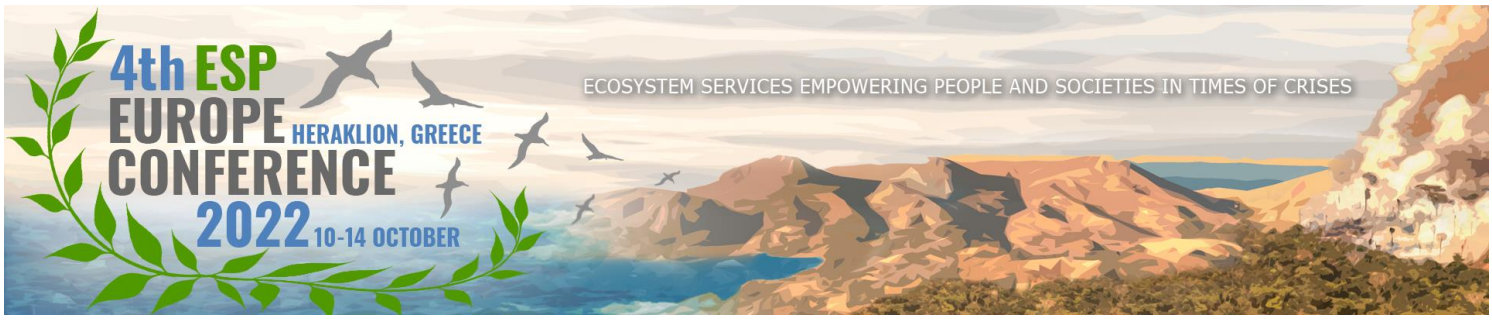
Other (Discussion with panellists and short presentations, interspersed within the discussion)

Voluntary contributions accepted:

Yes, I allow any abstract to be submitted to my session for review

Related to ESP Working Group/National Network:

Sectoral Working Groups: SWG 1 – ES in Agricultural production systems



II. SESSION PROGRAM

Date of session: Tuesday 11 October 2022
Time of session: 13:30 – 15:30

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
13:30	Simone	Martino	The James Hutton Institute, Scotland	Introduction to the session
13:34	Graham	Begg	The James Hutton Institute, Scotland	Introduction to the H2020 Framework project: aims, innovation and impacts
13:43	Alastair	Simmons	Taskscape Associates ltd, England	Navigating communication around Natural Capital to support sustainability and wellbeing benefits in Farmer Clusters – considerations for the agricultural transition– Part 1 – setting the scene on communication in the Framework project
13:51	Niamh	McHugh	Game and Wildlife Conservation Trust, England	Farmer Clusters: A FRAMEwork for increasing natural capital in agricultural landscapes
14:00	Annely	Holm	Estonian University of Life Sciences, Estonia	Restoring the connectivity of seminatural grasslands on Muhu island, Estonia. Example of LIFE project “LIFE connecting meadows”.
14:08	Sylvanus	Doe	UCD Centre for Sustainable Development Studies, University College Dublin, Ireland	Rights to burn global savannas and UN SDGs: longing for ecosystem services, wellbeing and sustainability
14:17	Mike	Rivington	The James Hutton Institute, Scotland	Climate Change impacts on Natural Capital Value
14:26	Patricia	Albert	World Heritage Manager, City of Bamberg, Germany	Bamberg’s historically rooted urban horticulture – applying traditional knowledge to the future

Time	First name	Surname	Organization	Title of presentation
14:35	Gerid	Hager	International Institute for Applied Systems Analysis (IIASA), Austria	The potential of citizen science for Natural Capital and Ecosystem Services assessment in agri-environmental systems
14:43	Maria	Nijnik	The James Hutton Institute, Scotland	Incorporating participatory assessment methods into natural capital valuation
14:52	Simone	Martino	The James Hutton Institute, Scotland	Integrating Natural Capital in socio-ecological farm systems for gaining sustainability and wellbeing in EU farmer clusters
15:00	Alastair	Simmons	Taskscape Associates ltd, England	Navigating communication around Natural Capital to support sustainability and wellbeing benefits in Farmer Clusters – considerations for the agricultural transition- Part 2 – communication challenges & moderation of a discussion recorded for an episode of the podcast 'Prophets, Wizards & the Quest to Value Nature'.

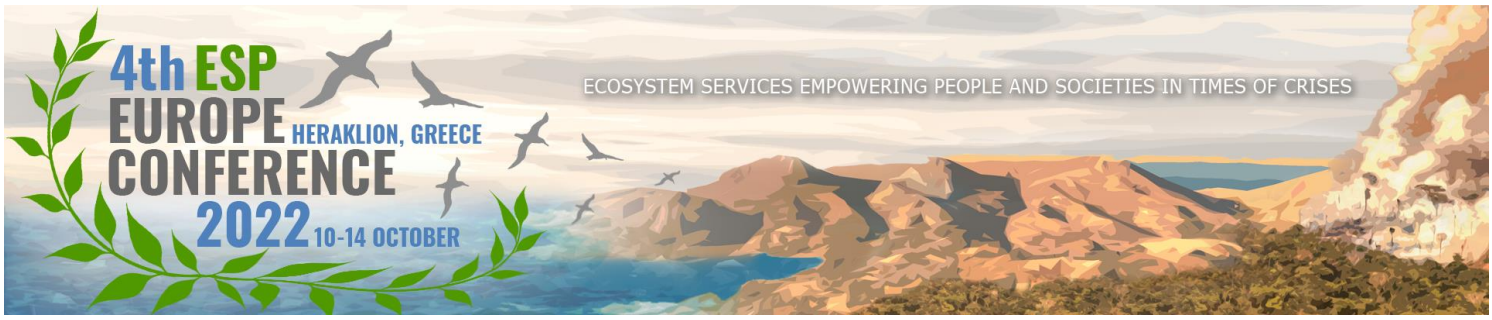
III. ABSTRACTS

Abstracts are ordered based on the session program. The first author is the presenting author unless indicated otherwise.

1. Type of submission: Abstract

S. Sectoral Working Group sessions: S1a – Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

Farmer Clusters: A FRAMEwork for increasing natural capital in agricultural landscapes



Presenting author: Niamh McHugh

Other author(s): Ellie Ness, John Holland, Clare Buckerfield, Jürgen Friedel, Marietta Metzker, Aliyeh Salehi, Walter Starz

Affiliation: Game and Wildlife Conservation Trust,

Contact: nmchugh@gwct.org.uk

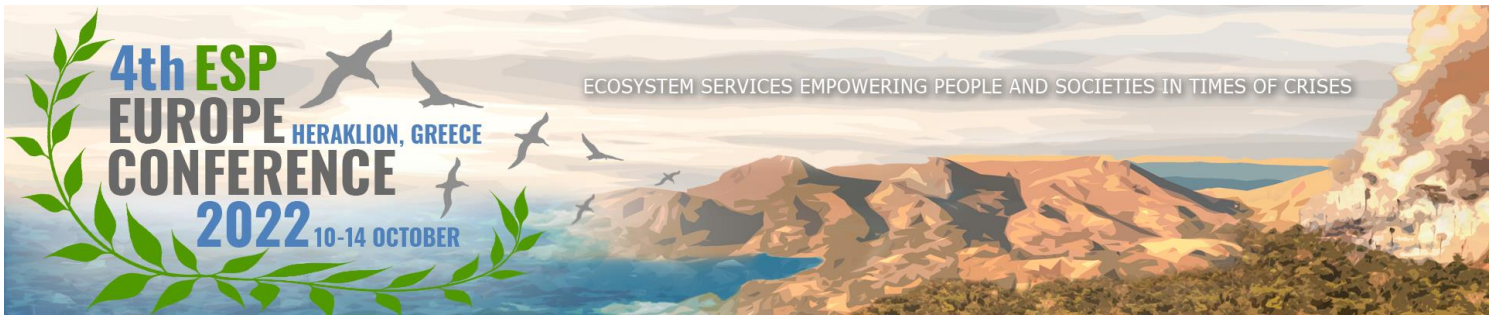
Across the European Union (EU), 173 million hectares of land is used for agricultural production and due to the use of intensive farming methods this land is a major contributor to ecosystem degradation and biodiversity loss. As a result of this, there is an increasing interest in the development and application of biodiversity sensitive farming systems designed to mitigate for these effects. One emerging solution is the Farmer Cluster concept, a movement which began in 2015 and has grown to encompass over 100 Farmer Clusters in the UK. A 'Farmer Cluster' is a community of farmers, located in the same region, who share knowledge, support and motivate each other to improve biodiversity and the ecological health of their farms. Through Farmer Clusters therefore the potential to increase the natural capital of farmland. Farmer Clusters have become increasingly popular in the UK, but evidence of the environmental benefits of Farmer Clusters is largely anecdotal. The European FRAMEwork project aims to introduce Farmer Clusters to a further eight European countries, and scientifically evaluate their effectiveness from the outset. The project will also develop this concept further to deliver Advanced Farmer Clusters, in nine countries including England, by providing a new level of technological support to help farmers reach their goals, including a decision support tool and an information hub. Here we provide an overview of the history and development of the Farmer Cluster concept along with a series of case studes demonstrating Natural Capital gains through landscape scale management of Farmer Clusters.

Keywords: agroecology, biodiversity, agi-environment, farmland, conservation

2. Type of submission: Abstract

S. Sectoral Working Group sessions: S1a - Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

Bamberg's historically rooted urban horticulture - applying traditional knowledge to the future



Presenting author: Patricia Alberth

Affiliation: City of Bamberg, Germany

Contact: patricia.alberth@stadt.bamberg.de

The Town of Bamberg was inscribed on the UNESCO World Heritage List in 1993 on the basis of its medieval urban layout and its well preserved historic buildings, mainly from the Middle Ages and the Baroque era. The World Heritage site includes the three historic districts Bergstadt (City on the Hills), Inselstadt (Island District) as well as the Gärtnerstadt (Market Gardeners' District) with its urban fields.

Urban horticulture is not a new trend in Bamberg, but looks back on centuries of tradition. The knowledge of cultivating and harvesting crops as well as seed propagation is passed down from generation to generation. This knowledge and skill is so valuable that inner-city commercial horticulture in Bamberg was included in the National Register of Intangible Cultural Heritage in 2016 – a tribute to the local knowledge bearers: the gardeners. In times of climate change and disrupted supply chains, they play a key role in local food supply.

The paper will elaborate how Bamberg's gardeners can be involved in the Smart City initiative and how their knowledge can contribute to climate resilience.

Keywords: gardening tradition; local food production; urban horticulture; Bamberg; heritage

3. Type of submission: Abstract

S. Sectoral Working Group sessions: S1a – Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

Climate Change impacts on Natural Capital Value

Presenting author: Mike Rivington

Other author(s): Matt Aitkenhead, Zisis Gagkas, Maria Nijnik, Alessandro Gimona, Simone Martino,

Affiliation: James Hutton Institute, United Kingdom

Contact: mike.rivington@hutton.ac.uk

This Project's aim is to assess how climate change impacts Natural Capital assets and their ability to provide ecosystem services. The response of an asset to climate change and hence ability to provide ecosystem services, and corresponding monetary and ecosystem functional value, is strongly influenced by its condition and interaction with other biotic and abiotic

processes. Impacts are explored through application of climate change projections to an asset using combined high resolution spatial modelling and asset specific assessment criteria. The purpose is to inform valuation discussion, support policy and strategic plan development, aligning with parallel Scottish Government funded projects to value Natural Capital.

New approaches to value and protect Natural Capital, whilst competition for benefits from land increases (e.g. food production and large investments are being made in carbon offsetting schemes on agricultural land), need to understand how climate change impacts an asset in the future. This poses a question 'How to value Natural Capital incorporating future risks to functional ability?'. Or, if an asset has a certain value now, but is vulnerable to climate change impacts, how can it be better valued to help promote additional protection? Similarly, investors may want to know if their investments are secure given uncertain future climate risks. This presentation aims to stimulate debate on this.

Examples are provided of simulated climate impacts on barley, a key asset in Scotland through supporting livestock and distilling businesses, and how land capability for agriculture may change in the future. These studies identify locations at greater risk (e.g. reduced yield due to water limitations) and where land use change may either achieve or threaten multiple monetary and ecosystem function benefits. Such information can be used in conjunction with studies on Social Capital to help better understand how beneficial land use and food system transformations may be achieved.

Keywords: Climate change; impacts; Natural Capital value.

4. Type of submission: Abstract

S. Sectoral Working Group sessions: S1a - Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

Rights to burn global savannas and UN SDGs: longing for ecosystem services, wellbeing and sustainability

Presenting author: Sylvanus S.P. Doe
Affiliation: Earth System Governance Project; Utrecht University, The Netherlands; GeoSustainabilty Consulting, Ghana, Ghana
Contact: pxfa016@alumni.rhul.ac.uk

Savannas are habitable but they are also extreme ecozones characterised by hot atmospheric temperatures at times reaching 31OC. Over 1.7 billion people depend on global savannas for

bushmeat, honey, water, biomaterials, insects and herbal medicine for health, survival, security and wealth. Yet from Australia, California to cerrado of Brazil as well as the savannas of Mali, Ghana and Burkina Faso, climate-induced wildfires are destroying savanna ecosystem services. Investments in dry forests, livelihoods and agrobiodiversity are at risk. With a rising urgency to achieve the UN Sustainable Development Goals (SDGs) and the Paris Climate Agreement (PCA), burning savannas is becoming an international climate and human rights issue. This is strengthened by recent UN resolution that endorses sustainable environment as a universal human rights. Some ears do not want to hear this.

In tropical savannas, fires are culturally celebrated and utilised by indigenous hunters, farmers and migrant herders to manage ecosystems. However, as desert relics intensify in dry savannas, government policies to regulate fires have rather thinned access, fertilized injustice and limited human wellbeings. A longing desire to burn in order to eat bushmeat carries with it power, rights and entitlements to savanna resources. How rights and policies interact to influence Agenda 2030 and PCA are not explicitly known in the context of significant science of sustainability.

This paper gathers qualitative data from coastal and guinea savannas of West Africa to assess societal "rights" to burn "common" savannas in the face of international policy agendas to localise and achieve SDG targets, including elimination of desertification and GHGs. It critically reviews fire laws and policies from other savanna regions to unearth challenges posed by fires to the SDGs. The socioecological cost of wildfires on savannas are examined to inform new SDG policy, dialogue and research on the sensitive interface of fires and ecosystems.

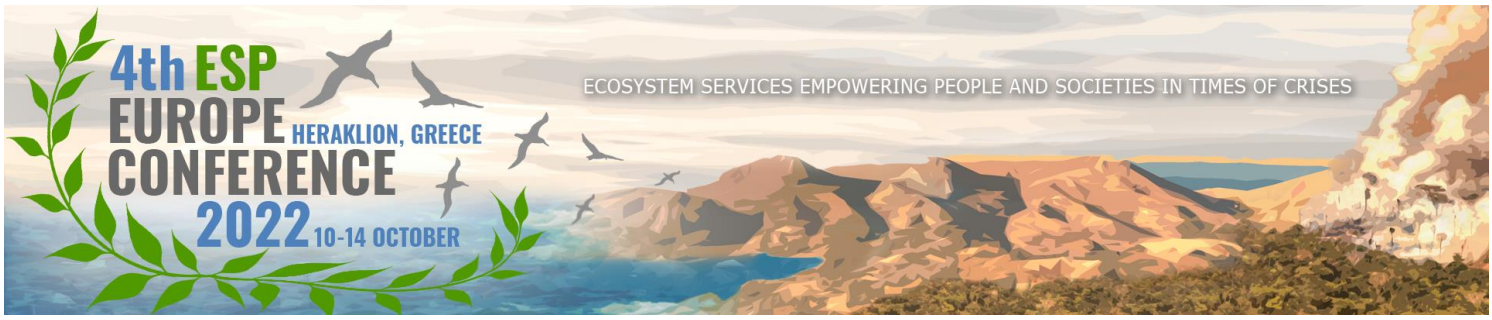
Keywords: rights, savannas, fire policy, SDGs, sustainability

5. Type of submission: Abstract

S. Sectoral Working Group sessions: S1a - Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

Navigating communication around Natural Capital to support sustainability and wellbeing benefits in Farmer Clusters - considerations for the agricultural transition.

Presenting author: Alastair Simmons
Affiliation: Taskscape Associates Ltd, United Kingdom
Contact: info@taskscape.org.uk



The H2020 FRAMEwork project is an ongoing initiative developing a multi-actor, transdisciplinary strategy for Biodiversity-Sensitive Farming (https://www.framework-biodiversity.eu/) operating at a landscape scale with regional groups of farmers in Farmer Clusters. These Clusters are progressing on sustainable transition paths, for different EU farming systems, conserving agrobiodiversity, and benefitting from the provision of enhanced Ecosystem Services (ES) while mitigating economic risks.

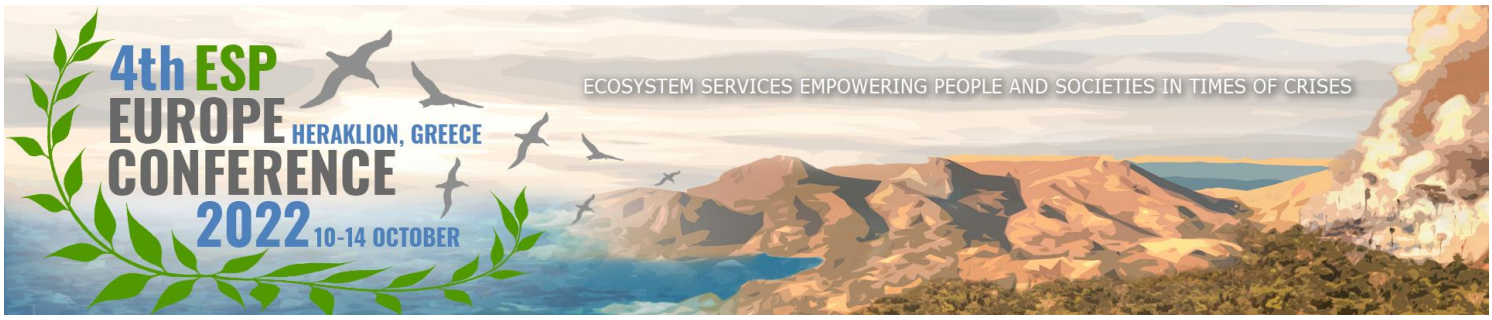
To contribute to the sustainability of the Farmer Clusters, FRAMEwork has integrated natural capital in farming's socio-ecological system, but also addresses other forms of capitals (economic, financial, human, knowledge, social and natural) to contribute to the analysis and communication of "inclusive wealth". The successful establishment of 11 clusters, across a variety of landscape circumstances and farm business types, demonstrates the willingness of diverse farmers to coalesce around beneficial biodiversity-sensitive goals. The diverse engagement seen from private and public sectors also demonstrates the relevance of multi-benefit, multi-valent, approaches to building agroecological resilience.

Taskscape's Communications, Knowledge Exchange and Participation work on Framework and analysis of its Farmer Cluster network and similar networks will inform three facilitative contributions to Session 1A that explore related communication challenges and goals: (1) will set the scene with a brief presentation and identify issues to consider during the following S1A presentations, (2) will briefly synthesise resultant input from conference participants into a question set, (3) will moderate a discussion informed by the question set recorded for an episode of the podcast 'Prophets, Wizards & the Quest to Value Nature'. The Foodlands series of this podcast was inaugurated by Science Communicator Charles Mann and relevant Framework participants like Louise Amand, Capitals Coalition. It enters Framework and project topics into the discussion of Natural Capital across the Global North. We aim to speak to, and discuss, invigorating questions for positioning capitals approaches within the transition to sustainable biodiversity-sensitive agriculture.

6. Type of submission: Abstract

S. Sectoral Working Group sessions: S1a - Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

Integrating Natural Capital in socio-ecological farm systems for gaining sustainability and wellbeing in EU farm clusters



Presenting author: simone martino

Other author(s): Benedetto Rugani, Graham Begg, Paola Ovando, Trinity Ndlovu, Claudio Petucco, Niamh McHugh, Alastair Simmons

Affiliation: The James Hutton Institute, United Kingdom

Contact: simone.martino@hutton.ac.uk

The H2020 FRAMEwork project is an ongoing initiative developing a multi-actor and transdisciplinary strategy for Biodiversity-Sensitive Farming (https://www.framework-biodiversity.eu/) operating at a landscape scale with groups of neighbouring farmers operating as Farmer Cluster. These Farmer Clusters want to enable transition paths for different EU farming systems to conserve biodiversity and benefit from the provision of enhanced Ecosystem Services (ES), whilst also mitigating any potential agronomic or economic risks.

To contribute to the sustainability of the Farm Clusters, FRAMEwork has developed a participatory method that integrates natural capital in the farming socio-ecological system, but addresses also other forms of capitals (economic, financial, human, social and natural) to contribute to the analysis of "inclusive wealth". In developing the socio-ecological networks, stakeholders' knowledge will be acquired by workshops where local, regional, national stakeholders and main actors of the supply chain will be invited to discuss structure, governance, analysis of dependencies on natural capital and relations between capitals.

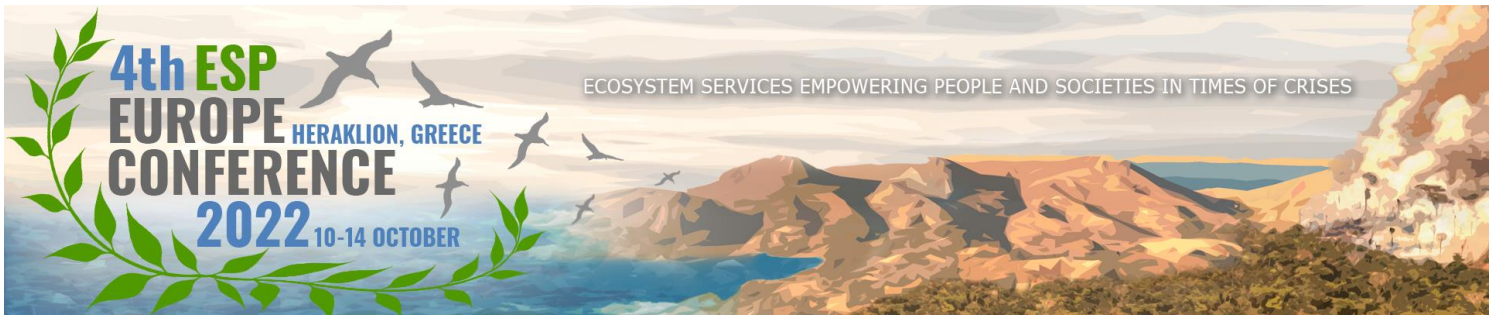
The comparison of the FRAMEwork Farmer Clusters has the ambition to address the following questions:

1. To what extent the different governance of the selected farms contributes to the protection of biodiversity and natural capital?

2. How do farms within each Farmer Cluster perform in terms of raw material, energy, product and service flows?

3. To what extent does governance and complexity of the social-ecological system of the farms contributes to embed several forms capitals (human, social, economic, financial, natural) to achieve more inclusive wealth?

The information acquired will be used to identify network elements (nodes and edges) representing the demand and supply sides of ecosystem services, but also the social and ecological interactions between actors (collective action by farmers that enhance social capital) that may support biodiversity management through the role played by agrobiodiversity practices.



Keywords: farmer clusters, socio-ecological systems, network analysis, natural capital, integrated capitals approach.

7. Type of submission: Abstract

S. Sectoral Working Group sessions: S1a - Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

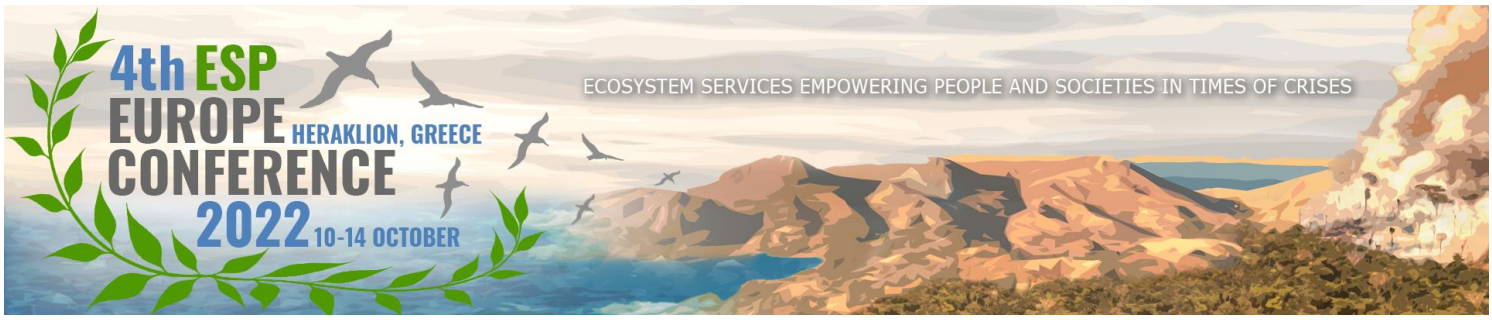
Incorporating participatory assessment methods into natural capital valuation

Presenting author: Maria Nijnik
Other author(s): David Miller, Simone Martino, Stanislav Martinat, Kerry Waylen, Chen Wang, Margaret McKeen, Alessandro Gimona
Affiliation: James Hutton Institute, United Kingdom
Contact: maria.nijnik@hutton.ac.uk

In this paper, taking inspiration from ideas developed in the literature and related policy documents, we analyse a range of methods to value natural capital (NC). Then, based on empirical examples from our previous and ongoing research, we consider major opportunities, challenges, and complexities of NC valuation, seeking to answer the question: Can the incorporation of participatory and digital techniques into NC valuation offer new perspectives that enhance the basis for decision-making?

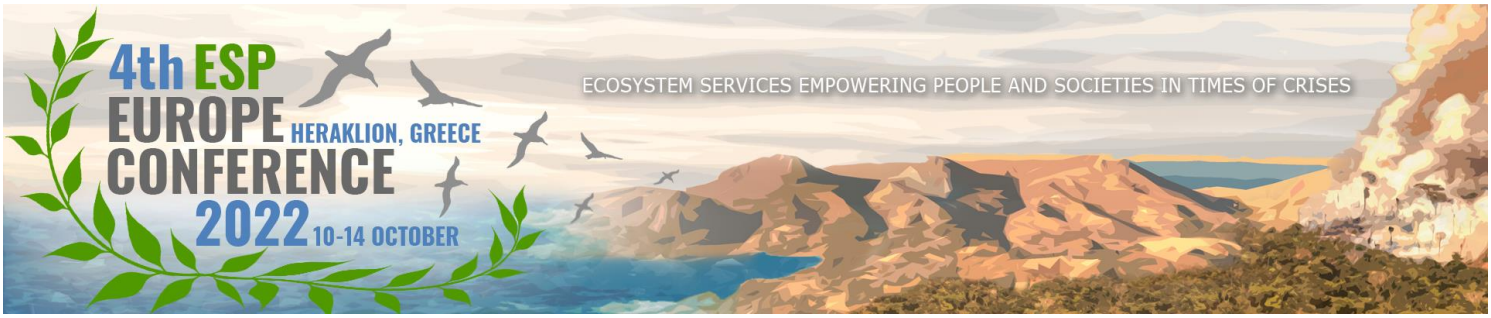
Monetary valuation alone is likely to be insufficient and/or inappropriate. This is because ecosystems and their services to people are complex with numerous inter-dependencies, and some components of NC may be unique and 'critical' (i.e., close to extinction). It can also be difficult to accomplish due to a shortage of robust primary valuations, numerous uncertainties, and various other reasons (Nijnik & Miller, 2017).

We examined when certain valuation methods are most pertinent, and how to integrate participatory and digital techniques for the outputs to be most useful to decision makers. We found that the involvement of stakeholders and the use of visualization techniques (Miller et al., 2020) offer a means for mutual learning, and the co-development of capabilities that will enhance the use of valuation knowledge in decision-making. Additionally, a proper combination of methods enables more meaningful values to be placed on NC. Lastly, differentiating attitudinal types (e.g., using a PQ method, Nijnik et al., 2018) can help improve the valuation evidence base, since different people may have differing perspectives on the values of different types of NC.



Further research is required on particular issues of the best approaches for incorporating stakeholder perspectives into new strategies targeting sustainable development and the green recovery, and whether an increase in social capital created through participation in research and consultation translates into more effective implementation of policies, on the ground.

Keywords: non-monetary valuation, participatory approaches, stakeholder evaluation



8.Type of submission: Invited speaker abstract

S. Sectoral Working Group sessions: S1a - Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

The potential of citizen science for Natural Capital and Ecosystem Services assessment in agri-environmental systems

Presenting author: Gerid Hager
Other author(s): Finn Danielsen, Gitte Kragh
Affiliation: International Institure for Applied Systems Analysis (IIASA)
Contact: hager@iiasa.ac.at

Citizen science (CS), broadly understood as public participation in scientific research, has been rapidly growing in many fields of application and with different foci, encompassing approaches such as community-based monitoring, citizen observatories, and volunteered geographic information, amongst others. Recently, linkages of CS with Ecosystem Services (ES) and Natural Capital (NC) approaches have been explored, uncovering existing links as well as identifying ways in which CS can help advance such approaches. National strategy plans, including the UK's Natural Capital and Ecosystem Assessment, are also starting to recognise CS as one important building block for data collection and implementation of such plans.

This presentation will situate CS in relation to ES and NC approaches focusing on agri-environmental systems, outlining the current state of understanding and highlighting several areas in which CS can provide tested methods and mechanisms to the NC/ES field including integration with national NC/ES assessment frameworks, using CS for NC/ES research and modelling as well as establishing localised approaches, such as community-based and co-developed NC/ES monitoring and management networks and programmes. We will provide use cases from agriculture and natural resource management across the globe, including from the FRAMEwork project, to illustrate the examples, and outline challenges and opportunities for future applications.

Parallels will also be drawn to related sustainability-focused concepts and assessment frameworks, such as the Sustainable Development Goals and the Post-2020 Global Biodiversity Framework, where the potential of CS to contribute to official indicator monitoring as well as goal and target level implementation has been studied in-depth and

demonstrated by several examples. Policy pathways and recommended roadmaps developed for linking the SDGs with citizen science will further illuminate the potential of CS for enriching NC and ES framing and assessment.

Acknowledgement: FRAMEwork received funding from the European Union's H2020 research and innovation programme under grant agreement No. 862731.

Keywords: Citizen Science, Natural Capital, Ecosystem Services

9.Type of submission: Invited speaker abstract

S. Sectoral Working Group sessions: S1a - Navigating Natural Capital and Inclusive Wealth for gaining sustainability and wellbeing for the farming community (businesses, supply chain and consumers

Restoring the connectivity of seminatural grasslands on Muhu island, Estonia. Example of LIFE project "LIFE connecting meadows"

Presenting author: Annely Holm

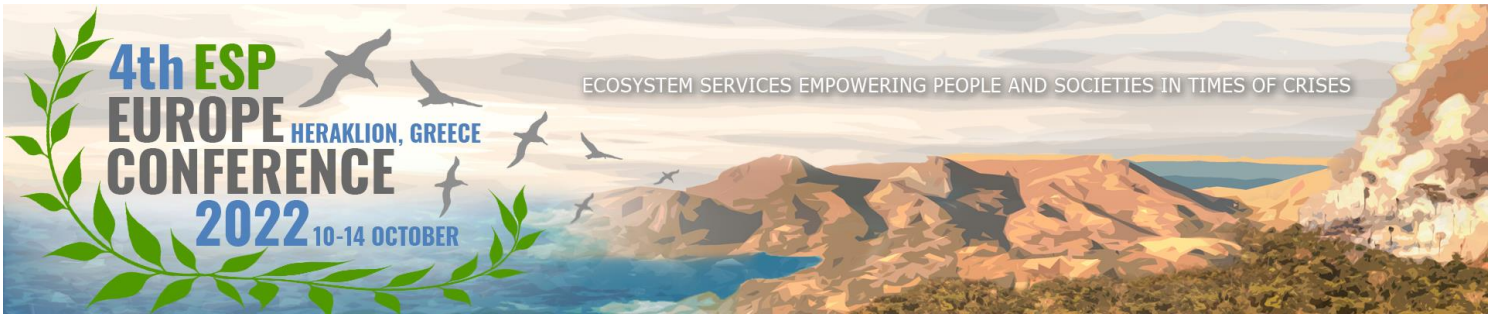
Other author(s): Kadri Tali, Ott Luuk

Affiliation: Estonian University of Life Sciences, Tartu, Estonia

Contact: annely.holm@emu.ee

Although the Estonian wooded meadows, alvars and coastal meadows have suffered large decrease in habitat area during past 60 years, most if the light demanding species are still present on sites as remnant populations, occurring on few remaining open spots on each site. However, eventually species richness will start to correspond to current, smaller and more fragmented habitat areas, which results in extinctions of currently present remnant populations. In addition to decreasing habitat area, the increasing isolation of remnant habitat patches have resulted in very low ecological connectivity - they are too far apart from each other to allow necessary seed dispersal between the sites.

In 2019 LIFE project "LIFE connecting meadows" started in Muhu island, Estonia, Landscape scale planning of the restoration concept is used in the project to plan the restoration of semi-natural grassland patches to give maximum effect to create connectivity. We demonstrate the importance of metapopulation level in habitat and species protection and the expertise will be distributed and put into further practice on bigger island - Gotland, Sweden. As a result, the model is available to use on the country level.



Keywords: semi-natural grasslands, connectivity, LIFE connecting meadows, Muhu island, Estonia