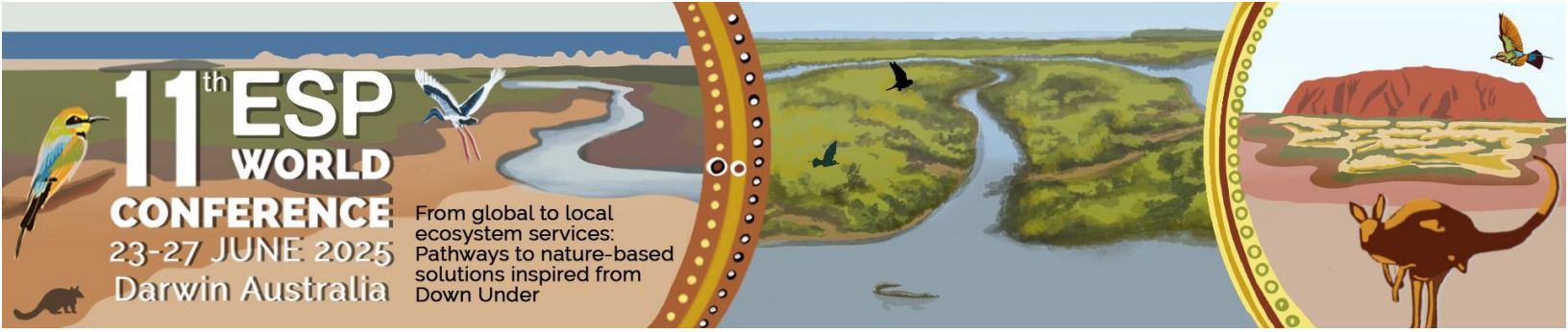


BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

ID: T2a

Harnessing Ecosystem Services for Climate-Resilient Agriculture and Inclusive Development

	Name	Organisation	E-mail
Host:	Vince van 't Hoff	Foundation for Sustainable Development	vince.vanthoff@fsd.nl

Abstract:

This session will focus on integrating ecosystem services into climate-resilient agriculture while fostering inclusive development. It will highlight pathways to Nature-based Solutions (NbS) inspired by Australian ecosystems and global practices. Through case studies, discussions, and shared experiences, participants will explore actionable strategies to enhance biodiversity, food security, and sustainable livelihoods. Particular emphasis will be placed on empowering marginalized groups, such as women and youth, within agricultural value chains.

Goals and objectives of the session:

1. Share innovative examples of NbS that connect local actions to global ecosystem service challenges.

2. Facilitate knowledge exchange on leveraging indigenous and scientific knowledge in agriculture.

3. Identify practical strategies for integrating marginalized communities into ecosystem service solutions.

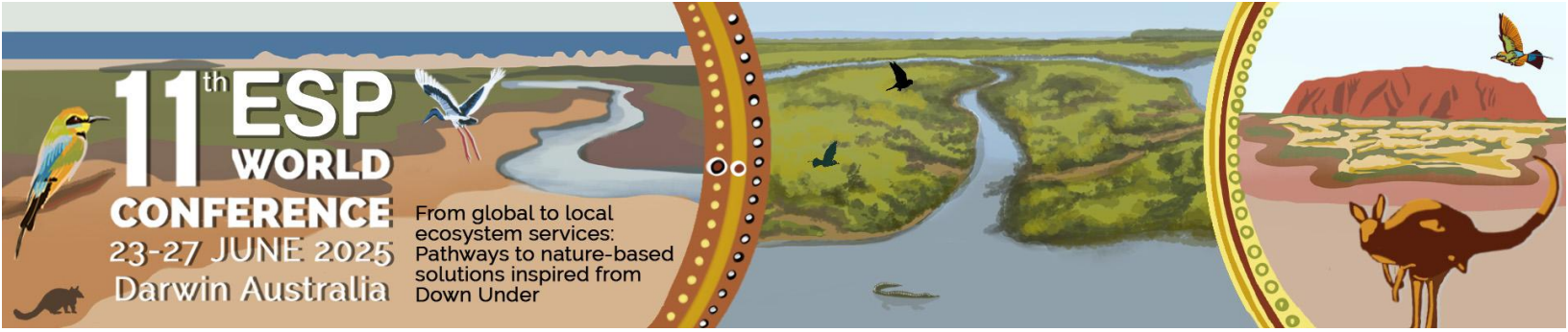
4. Strengthen partnerships among researchers, practitioners, and policymakers to scale successful practices.

Planned output / Deliverables:

1. A shared document summarizing key discussions and strategies.

2. Policy recommendations and actionable steps for scaling Nature-based Solutions.

3. A network of participants interested in collaborating on future initiatives.



II. SESSION PROGRAM

Room: Waterfront 1
Date of session: Tuesday 24 June
Time of session: 10:30-12:30

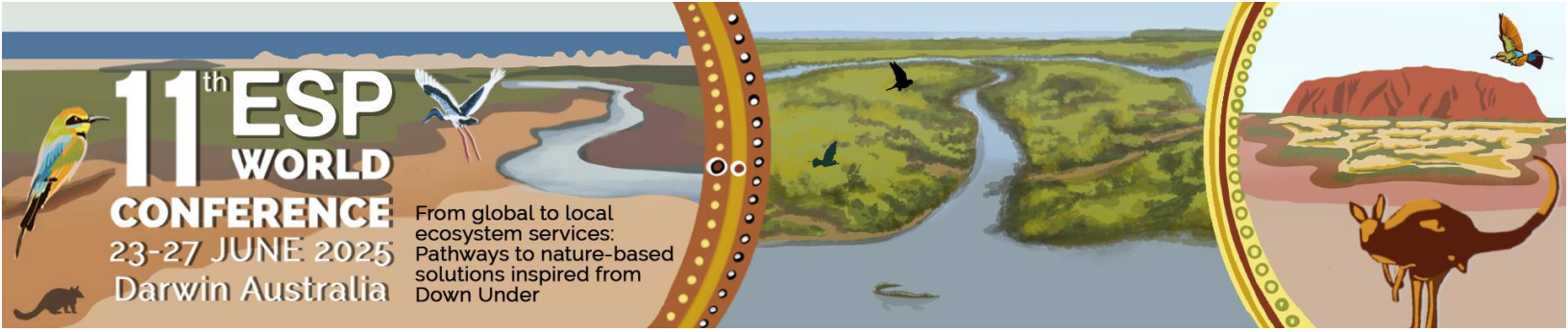
Teams meeting link

Timetable speakers:

Time	First name	Surname	Organization	Title of presentation
10:30 - 10:35	Vince	van't Hoff	Foundation for Sustainable Development	Welcome and overview of the session
10:35 - 10:50 (teams meeting)	Suraj	Goswami	Indian Institute of Forest Management Bhopal India	Identifying Key factors for enhancing farmers' income through adoption of trees growing as a nature-based solution in Bihar, India
10:50 - 11:05	Ana Carolina	De Mattos e Avila	The University of Queensland	Effects of Organic Compost Application on Nitrogen Availability and Soil Physical Properties: A Case Study in Farms of Queensland, Australia
11:05 - 11:20	Kuan-Ting	Lin	Department of Bioenvironmental Systems Engineering, National Taiwan University	Ecosystem Services for Climate-Resilient Rice Production: Linking Soil Attributes and Productivity
11:20 - 11:35	Warwick	Ragg	National Farmers' Federation	Reimagining Data Visualisation
11:35- 11:50	Ram	Pandit	The University of Western Australia	Barriers and Opportunities to Invest in Natural Capital Production Landscapes: Learnings from Investors and Growers Surveys
11:50 - 12:30	Vince	van't Hoff	Foundation for Sustainable Development	General discussion

III. LIST OF ABSTRACTS

The first author is the presenting author unless indicated otherwise.



1. Identifying Key factors for enhancing farmers' income through adoption of trees growing as a nature-based solution in Bihar, India

First authors(s): Suraj Goswami

Other author(s): Bhaskar Sinha, Jigyasa Bisaria

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Keywords: Trees Outside Forests, Nature-based Solution, Carbon Sequestration, Green Cover, Rural Economy

Trees outside forest (TOF), which comprises private forests, tree orchards, trees on farmlands, trees on community lands, roadside plantations, home gardens, etc, are primarily found outside the notified government forest. TOF provides multiple ecosystem benefits to society and it contributes significantly to the rural economy. India is a developing country with more than half of the population dependent on agriculture and natural resources for their livelihood. Adoption of growing trees on the farmer's land can immensely enhance the income of the rural poor, in addition to other benefits. Furthermore, this will also help India achieve the targets committed under the nationally determined contribution towards increased green cover and additional carbon sequestration.

Despite the multiple benefits of growing trees and the government's promotion of its adoption by farmers on their land, the TOF in India has not increased significantly. In this context, the current study in the land-locked state of Bihar, with the highest productivity of TOF, attempts to identify the factors that hinder tree-growing by the farmers. We conducted a primary survey amongst 256 farmers (tree growers) in two districts (West Champaran and Patna) of Bihar, which identified four major factors, i.e., resource availability, market linkages, the grower's economic condition and institutional framework, influencing the adoption of tree growing by the farmers.

Results revealed that the institutional framework is the most influential factor at the farmer's level, followed by growers' economic conditions, market linkages, and resource availability. There

is a need to establish a good institutional framework such as support from government and private agencies, farmers' cooperatives, training on tree management and agroforestry, financial support and a robust policy framework. Also, good market linkages and the availability of quality plant materials are essential for successfully increasing trees outside the forest and farmers' income as a nature-based solution in Bihar, India.

2. Effects of Organic Compost Application on Nitrogen Availability and Soil Physical Properties: A Case Study in Farms of Queensland, Australia

First authors(s): Ana Carolina De Mattos E Avila

Other author(s): Johannes Biala, Yash Dang, Jackson Adriano Albuquerque, Gunnar Kirchhof

First author affiliation: The University of Queensland

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Keywords: compost application, nitrogen availability, soil physics, Vertosol, farms

Soil degradation threatens agricultural sustainability, particularly in Vertosols, due to their high susceptibility to compaction and low permeability. This case study analysed the effects of organic compost application on nitrogen availability and soil physical properties in three farms in Queensland, Australia: Roma (Brown Vertosol), Dalby (Black Vertosol), and Goovigen (Black Vertosol). Soil analyses were conducted to assess the impact of compost on total nitrogen, total carbon, bulk density, soil strength, field capacity, permanent wilting point, and hydraulic properties. Results indicate that compost application significantly increased total nitrogen and carbon levels, especially in Dalby and Goovigen ($p < 0.01$), enhancing soil fertility and contributing to carbon sequestration, a key factor in climate change mitigation. Additionally, compost reduced soil strength in Dalby and Goovigen, suggesting lower compaction and improved soil structure, which improves root growth and water infiltration. In Goovigen, compost application increased water retention capacity, with higher field capacity and permanent wilting point, improving crop resilience during drought periods. The findings of this case study highlight the potential of organic compost addition to enhance soil fertility and physical properties in

Vertosols, promoting more sustainable and climate-resilient agriculture. Long-term studies are recommended to optimize application rates and assess cumulative effects on agricultural productivity and soil health.

3. Ecosystem Services for Climate-Resilient Rice Production: Linking Soil Attributes and Productivity

First authors(s): Kuan-Ting Lin

Other author(s): Shu-Yuan Pan, Mei-Hua Yuan, I-Ting Zhang, Horng-Yuh Guo, Yu-Chieh Huang,

First author affiliation: Department of Bioenvironmental Systems Engineering, National Taiwan University, Taiwan

Contact: d09622005@ntu.edu.tw

Keywords: food security, soil property, ecosystem service, mapping and assessment, climate resilience

Ecosystem services (ES) are integral to climate-resilient rice production by supporting soil health, water regulation, and climate resilience. However, the interactions between ES, rice yields, and soil attributes remain inadequately understood. This study explored ES from a soil-centered perspective and assessed their relationships with rice productivity and soil conditions. Using field observations, remote sensing, soil surveys, and InVEST modeling, we evaluated five ES indicators in a key rice-producing region in Taiwan: crop provisioning (CP), soil carbon storage (CS), water retention (WR), nutrient retention (NR), and soil retention (SR). We mapped ES distributions, analyzed their relationship with rice productivity and soil properties using boxplots and Pearson correlations. To support policy implementation, we conducted an economic assessment to integrate overall ES through economic assessment and identified spatial clusters using Anselin Local Moran's I statistic. Results indicate that agricultural ES distribution is influenced by soil properties and precipitation. Higher levels of CS, NR, and SR were associated with greater rice yields, highlighting the importance of soil-regulating services in sustaining productivity and enhancing climate resilience. Additionally, soils with coarse textures and low drainage were found

to promote CS, which contributes to climate mitigation. Carbon storage and water regulation dominate overall ES integration, reflecting current market mechanisms prioritizing climate-related services driven by growing climate policy incentives. Cluster analysis revealed three distinct ES hotspots, offering insights for localized sustainable land management. These findings underscore the importance of conservation agriculture and integrated nutrient management in preserving soil-related ES, in enhancing soil resilience, stabilizing rice yields, and supporting climate adaptation strategies. By linking soil attributes with ES and productivity, this study provides actionable insights for sustainable farming under climate change while ensuring long-term soil health and food security.

4. Reimagining Data Visualisation

First authors(s): Warwick Ragg

First author affiliation: National Farmers' Federation, Australia

Other author(s): No

Contact first author: WRagg@nff.org.au

Keywords: Agriculture, ESG, Food and fibre, NRM, Data sharing

Sustainability in Australian agriculture is essential to ensure the long-term viability of the industry, protect natural resources, and meet global market demands. Agricultural Nature-Based Solutions (NBS) play a key role in demonstrating the sector's environmental credentials while addressing the challenges of food and fibre production, climate change, and biodiversity loss.

The Australian Agricultural Sustainability Framework (AASF) is at the forefront of aligning sustainable agricultural practices with global standards. The ongoing work of the AASF moves agriculture towards the goals of the National Agricultural Traceability Strategy 2023-33. By establishing common sustainability principles, criteria, and indicators, the AASF supports consistent language across the sector and supply chain. A key challenge in sustainability reporting is the fragmented and anarchic agricultural data environment. The AASF Data

Ecosystem aims to improve data governance and interoperability to enhance sustainability reporting while creating a structure for data collected in the future. These initiatives and solutions from Australian agriculture will be discussed.

The sustainable management of our planet's ecosystems offer significant opportunities for the financial sector, with benefits in carbon sequestration, income generation, and increased biodiversity. Market-based solutions including agricultural NBS in Australia present significant opportunities to drive positive environmental outcomes while maintaining productivity. Landholder engagement is essential to ensuring practical, on-the-ground implementation of such projects. There is also a significant role for the financial sector in supporting sustainability through investment in NBS.

5. Barriers and Opportunities to Invest in Natural Capital Production Landscapes: Learnings from Investors and Growers Surveys

First authors(s): Ram Pandit

Other author(s): Tom Picton-Warlow, Jon Sarmiento, Fiona Dempster, Lizzy Lowe

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Keywords: Natural Capital Production Landscape (NCPL), asset class, investment, barriers, opportunities

Natural capital is one of the key form of capitals contributing to human wellbeing. Its degradation has resulted into biodiversity loss and nature's decline, leading to shortages of ecosystem services – e.g., water, pollination – affecting households and businesses. There is growing realisation across businesses to consider their dependency and impact on nature into their financial models. There is also a growing interest among investors to invest in nature for environmental, social and governance requirements. Agricultural system and surrounding natural capital jointly form a composite 'production landscape' where the value of natural capital can be

monetized to develop natural asset companies. It is one of the ways to engage investors and growers to improve cultural, social, environmental, and economic outcomes for agricultural producers and the broader society. Within this context, this research aims to understand barriers and opportunities a) for growers to manage natural capital in agricultural systems and their attitudes towards listing Nature as an Asset Class; and b) for investors to invest in natural capital in such production landscapes in Australia. We implemented surveys across a range of growers/landowners (supply side) and investors (demand side) and obtained over 60 and 40 survey responses from them, respectively. The findings revealed that: a) diversifying farming profit to make growers more resilient should be the target of such an approach; and b) investors' primary concerns to invest in NCPLs include lack of tangible and profitable natural capital project examples, lack of liquidity, regulatory issues. Both growers and investors identified multiple opportunities in NCPL approach to develop nature as an asset class.

Overcoming barriers and leveraging opportunities in natural capital production through a landscape approach can create substantial benefits for both growers and investors. With Australia's policy landscape increasingly supporting natural capital in agriculture, this approach will enhance sustainability, resilience, and long-term economic prosperity.