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Conference Abstract

The value of long-term socio-ecological research platforms in transdisciplinary research in Scotland

Jan Dick[‡], Simon Rolph[§], Kata Sara-aho[|], Tomáš Martinovic[¶], Chris Andrews[‡], Dylan Powell[#], Dylan Carbone[§], Joe Marsh Rossney[‡]

‡ UK Centre for Ecology & Hydrology, Edinburgh, United Kingdom
§ UK Centre for Ecology & Hydrology, Wallingford, United Kingdom
| CSC - IT Center for Science, Espoo, Finland
¶ VSB - Technical University of Ostrava, Ostrava, Czech Republic
# University of Stirling, Stirling, United Kingdom

Corresponding author: Jan Dick (jand@ceh.ac.uk)

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Abstract

The growing interest in transdisciplinarity as a mode of research and development, i.e. ‘problem solving science’, co-developed with non-academic stakeholders, is evidenced by the increase in academic literature and funding calls on the topic. Transdisciplinary research, particularly in the environmental, health and education sectors has the potential to better inform funding practices, policy and research impacts. However, academia often struggles with fully enabling either interdisciplinary or transdisciplinary science because of institutional barriers, funding constraints, time limitations, and evaluation criteria which can all hinder collaboration (Harris et al. 2024). The longitudinal studies which characterise long-term socio-ecological research (LTSER) platforms (Mirtl et al. 2021) can overcome some of these barriers through deep understanding of the local environmental and cultural issues, consistency of personal relationships and persistence of funding rounds, while setting local knowledge gaps in a global context.

LTSER platforms encompass classic long-term ecological research (LTER) sites, but also include the broader geographic area that contains them, along with cultural, administrative, historic, economic and other social dimensions of the region. A review involving 25 self-selected LTSER platforms of the International Long-Term Ecological

Research (ILTER) network assessed 4983 publications, of which 1112 were deemed relevant to the socio-ecological objectives of the platform (Dick et al. 2018).

In this presentation we will focus on the Cairngorms LTSER platform established in 2013 and the research journey conducted on sustainable appreciation of nature by humans which informs the Cairngorms National Park Sustainable Tourism Strategy. Tourism is vital to the Cairngorms National Park, accounting for 30% of the economy (GVA) and 43% of employment. Visitors and locals appreciate the outstanding landscapes, wildlife and huge range of activities available. The park was awarded the EUROPARC Federation charter for Sustainable Tourism in Protected Areas in early 2000's and has used the federation's five principles to practically manage and develop tourism in the area. The 2017 verifier's evaluation report highlights the positive improvements but also comments on the need for a deeper knowledge about the recreational potential of the whole Cairngorms National Park to inform visitors and so reduce the high concentration of visitors in certain places and times.

The Cairngorms LTSER platform formed one case studies in the EU funded OpenNess project which aimed to translate the concepts of ecosystem services and natural capital into operational frameworks that provided tested, practical and tailored solutions. A recreational potential model ESTIMAP-Recreation (Zulian et al. 2013) was further developed for the Cairngorms (Zulian et al. 2018) providing a practical example of co-production and collaboration (Dick et al. 2022). Further research funding was won in the form of the Biodiversity Digital Twin (BioDT) project, an innovative EU funded project which provided a practical example of knowledge co-production and collaboration tackling critical global biodiversity challenges. The recreation and biodiversity cultural ecosystem services digital twin (Rolph et al. 2024) build on the previous work and focused on the management of the cultural ecosystem services provided by landscapes i.e. non-material benefits people obtain from ecosystems, such as recreation, tourism. Biodiversity is central to these services as it enhances human experiences and connects people to nature. The hope is that by combining recreational potential and the probability of sighting biodiversity the prototype digital twin increases awareness of the recreational potential of the whole park (Fig. 1). Stakeholders have co-designed the prototype digital twin (Dick et al. 2025).

This work has been further advanced through the SPEAK project funded by the UK Natural Environment Research Council 'Growing Shoots' programme. The SPEAK project is focused on the co-production of knowledge related to the use of the digital twin of recreational potential to increase awareness of places to visit while passively monitoring human behaviour coupled with biomarker data (Powell 2024). The SPEAK project funded 40 Garmin Instinct 2 watches which will collect location and biometric data while the wearers spend time in nature (Fig. 2). The volunteers will use the recreational potential model to select suitable places to recreate while wearing a Garmin watch, enabling analysis of the value of nature. We will conduct a workshop to enable the governance of this type of project to be co-developed with participants and the wider community.

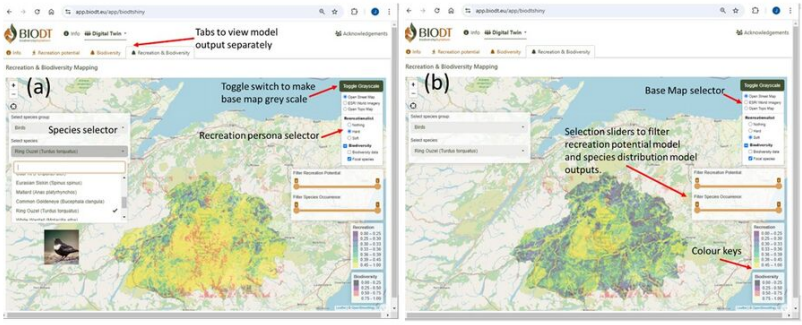

Figure 1. doi

Graphical User Interface of the BioDT recreation and biodiversity cultural ecosystem services prototype digital twin. (a) model parameterised for a **'hard'** recreationalist i.e. someone who prefers high-adrenaline activities. (b) model parameterised for a **'soft'** recreationalist i.e. some who prefers gentle slopes and activities that do not require a high fitness level.

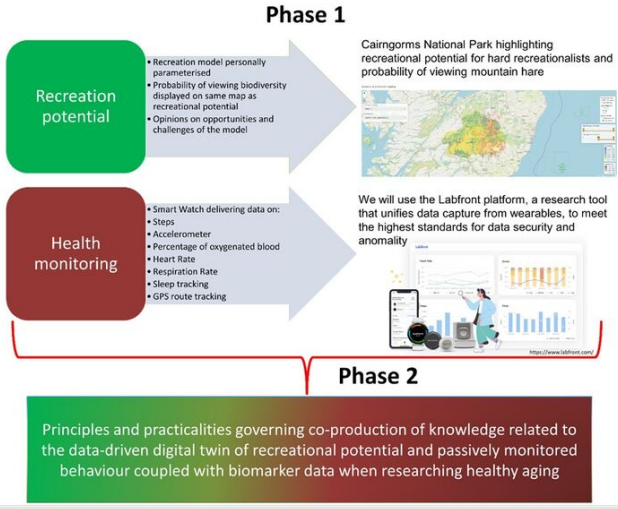

Figure 2. doi

Schematic of the SPEAK project highlighting the interdisciplinary linkages between the natural, social and clinic scientist and transdisciplinary elements with volunteers wearing trackable watches and an open workshop to develop governance principles.

Our work links to the global developments enhancing inter- and transdisciplinary science such as the recent IPBES thematic assessment report on interlinkages among

biodiversity, water, food and health. This report stresses the nexus approach, which echoes the WAILS approach of eLTER Research Infrastructure (Mirtl et al. 2021). The continuity of personnel during successive projects is a major advantage of the LTSER platform approach, while the increasing inter- and transdisciplinary nature of the research fits the current funding landscape.

Keywords

co-produced knowledge, wearable technology, interdisciplinary

Presenting author

Jan Dick

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Conflicts of interest

The authors have declared that no competing interests exist.

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