Prepared on 00/00/00 by First name, surname

Living Lab project brief – Fire Danger Assessment

Key SRS contact for this project

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Description of the paper

This paper provides a brief overview of a potential project that could usefully inform the SRS Department's work.

This paper is in essence a template for a potential dissertation Living Lab project that a member of staff would like to propose. The question and research is intended to inform and/or make recommendations to the SRS Department's work areas. It should also align with one or more of the Sustainable Development Goals (see below for more context).

The Vision for Change:

Wildfires present an increasing risk across the UK as a result of continuing climate changes. This project will investigate the establishment of vegetation monitoring approaches at SRS Forest & Peatland project sites (Drumbrae) in the context of fire danger assessment. More widely, this project will support ongoing evaluation of existing Scottish Wildfire Forum Wildfire Danger Assessments methods and the current development of improved fire danger rating systems (e.g. Scottish Fire Danger Rating System, UK Fire Danger Rating System. In particular, supporting further research into the moisture response of heathland fuels (e.g. heather) and associated flammability.

Draft research question

Can local monitoring from SRS Forest & Peatland sites be used in conjunction with existing fire danger assessment methods and to support their continuing development?

Background

The university's Forest & Peatland (F&P) Project has the objective of sequestering all CO_2 from university travel emissions over a 50 year period. This will include significant landscape restoration efforts (e.g. tree planting, peatland restoration) while considering overall sustainability in terms of ecological, economic and social aspects which also requires consideration of climatic and environmental changes. For example, climate change effects may present additional wildfire risks within the UK and this risk must be considered

as part of sustainable, resilient land management strategies which can also support other practitioners globally and contribute in particular to SDG 15 (Life on Land).

Recent high profile UK vegetation fires (e.g. Saddleworth Moor fire, Cannich wildfires) have received much attention however wildfires have in fact been included in the UK National Risk Register since 2013. In the UK, spring typically experiences the highest fire activity, with a secondary fire season in mid-to-late summer. However, a recent ecological assessment at the first F&P site (Drumbrae, a 431 hectare site near Stirling) identified an increasing risk of fires during future summer periods, given predicted climate changes.

In the UK, flammability of vegetation is primarily controlled by the vegetation availability and moisture content. The subsequent fire behaviour is also affected by the weather (e.g. temperature, relative humidity, wind speed/direction) and fire weather predictions can be used to conduct regional fire danger assessments using fire danger rating systems. For example, the Met Office issues Fire Severity Index (FSI) maps for England & Wales which act as a trigger for land access restrictions according to the Countryside and Rights of Way Act (2000). However, most existing assessment methods are based on the earlier Canadian Fire Danger Rating System which may not adequately incorporate the behaviour of common UK heathland-type fuels (e.g. heather). Local, site-level data collection may allow for improved description of moisture dynamics in these vegetation systems and allow for more detailed model validation.

This project will assess existing fire danger prediction frameworks in the UK and investigate the integration of local site monitoring (vegetation and weather) data into existing fire danger rating frameworks (e.g. Scottish Wildfire Forum Wildfire Danger Assessments) and to support the ongoing development of improved fire danger models (e.g. Scottish Fire Danger Rating System, UK Fire Danger Rating System). In the longer term, this would support improved understanding of the fire danger trends at SRS sites under a variety of future climate scenarios.

This project will require the collection of vegetation (e.g. heather, moss, grass) moisture samples from the Drumbrae site. Developing an appropriate sampling methodology, aligned with Scottish Wildfire Forum Wildfire Danger Assessments, will form an important part of this project. The project will also utilise weather data from nearby weather stations e.g. using available Met Office weather data.

UK Met Office, Fire Severity Index https://www.metoffice.gov.uk/public/weather/fire-severity-index/#?tab=map&fcTime=1697108400&zoom=5&lon=-4.00&lat=55.74

Forest & Peatland Project: Learning, Teaching & Research Strategy (2023-2028)
https://www.ed.ac.uk/sites/default/files/atoms/files/learning_teaching_and_research_strategy.pdf

Drumbrae Site
https://www.ed.ac.uk/sustainability/programmes-and-projects/climate-strategy/carbon-sequestration/drumbrae

Met Office Weather Data
https://www.metoffice.gov.uk/research/climate/maps-and-data/data/index

Objectives

- Identify and highlight key SDG issues related to resilience in landscape restoration efforts to highlight the problem.
- Assess the suitability of existing fire risk assessment/fire danger prediction methods (particularly at a site-scale) and identify appropriate supporting monitoring approaches.

- Make recommendations to the University regarding any options recommended within the project.
- Consider how the collected vegetation moisture samples can provide insight to support ongoing fire danger rating system developments in Scotland and the UK.

Data set provision

Research data may be available from the publicly available Data Library found here: https://www.ed.ac.uk/sustainability/programmes-and-projects/student-leadership-for-sustainability/living-lab-projects/sdg-data-library

Data needed for this project	Data sets available from and contact information
Fuel Moisture Samples (Drumbrae)	To be completed as part of the project
Weather Data (Drumbrae)	UK Met Office

Outputs

*The project write up or dissertation will be a researcher's own piece of research. They will decide what they think the results show and draw their own conclusions. An additional **secondary output** is required of all SRS living lab dissertation projects. This output will be shared with colleagues within and out with SRS, so that we can try to make operations changes based on the researcher's recommendations.*

Output format	Insert not applicable or Yes (with further detail)
Presentation to a number of stakeholders	**Yes (Report on findings & recommendations)**
Mixed media resource for reuse	**Yes (Risk Mapping Resources)**
Report with operational recommendations	**Yes (Risk Forecasting)**
Resources for staff/student behaviour change	**Yes (Suitability of existing FRDS for site access)**
Resources for staff/student training	
Other, please specify	

Transformational change with the SDGs

The Sustainable Development Goals showcase 17 things humanity must do to ensure peace and prosperity for people and the planet, now and into the future. The table below marks which main SDG this project is relevant for and up to 3 SDG sub-themes.

The information in this table was obtained with permission from the UN sustainable goals website, https://www.un.org/sustainabledevelopment/sustainable-development-goals/

The Sustainable Development Goals for 2030	Yes (x), sub-SDG (s)	The Sustainable Development Goals for 2030	Yes(x), sub-SDG (s)
Economic growth must be inclusive to provide sustainable jobs and promote equality.		**The food and agriculture sector offers key solutions for development, and is central for hunger and poverty eradication.**	

	Ensuring healthy lives and promoting the well-being for all at all ages is essential to sustainable development.	s		Obtaining a quality educations is the foundation o improving people's lives and sustainable development.	
	Gender equality is not only a fundamental human right, but a necessary foundation for peaceful, prosperous and sustainable world.			Clean, accessible water for all is an essential part of the world we want to live in.	
	Energy is central to nearly every major challenge and opportunity.			Sustainable economic growth will require societies to create the conditions that allow people to have quality jobs.	
	Investments in infrastructure are crucial to achieving sustainable development.			To reduce inequalities, policies should be universal in principle paying attention to the needs of disadvantaged and marginalised populations.	
	There needs to be a future in which cities provide opportunities for all, with access to basic services, energy, housing, transport & more.			It's about doing more and better with less and decoupling economic growth from environmental degradation.	
	Climate change is a global challenge that affects everyone, everywhere.	s		Careful management of this essential global resource is a key feature of a sustainable future.	
	Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.	x		Access to justice for all, and building effective, accountable institutions at all levels.	
	Revitalise the global partnership for sustainable development.	s			

The University of Edinburgh Strategy 2030

Strategy 2030 can be found here:
https://www.ed.ac.uk/about/strategy-2030

The Social and Civic Responsibility Delivery Plan.

To deliver Social and Civic Responsibility at the University of Edinburgh, we have chosen three strategic objectives and one cross-cutting theme. The project's relevance to these is outlined in the table below.

The Social and Civic Responsibility Delivery Plan can be found here:
https://www.ed.ac.uk/files/atoms/files/social_and_civic_responsibility_delivery_plan_2020.pdf

Social and Civic Responsibility Delivery Plan – Objectives and one cross-cutting theme	Briefly describe the project's link to the objectives, how it is relevant and how this project works towards those objectives.
We will become a zero carbon and zero waste university - Increasing opportunities and raising aspirations by making education and employment an achievable goal for more people in Scotland and globally.	Y – Supporting zero carbon efforts by providing additional insights into risk forecasting approaches at SRS sites.

We will widen participation in higher education and support inclusion - Increasing opportunities and raising aspirations by making education and employment an achievable goal for more people in Scotland and globally.	
We will work together with local communities - to contribute to improve the lives of people across the Edinburgh City Region and beyond.	Y – Efforts to assess and improve existing fire danger rating systems will help inform land access management around the UK and fire danger assessment methodologies globally.
Cross cutting theme: In our operations, research and teaching we will engage critically with, and contribute to the Sustainable Development Goals - including the promotion, protection and respect for human rights.	Y – Clear relevance to targets of SDG 15 (Life on Land) with the potential to support the university's land restoration and carbon sequestration efforts but also to inform ongoing research and development efforts focused on the development of improved, next generation fire danger rating systems.