Environment, Natural Resources and Agriculture Strategic Research Programme 2022-2027

RESAS
Rural & Environmental Science and Analytical Services

END OF PROJECT REPORT

Purpose of End of Project Report

SRP 2022-27 projects provide quarterly progress reports and annual narrative summaries as well as research outcomes throughout the term of the project via the Researchfish platform. This end of project report provides additional information when a project finishes that can be used to summarise what the project has delivered, lessons learned and next steps. This report will be published on the SRP 2022-27 project webpages of SEFARI Gateway or on the Scottish Government website. *All sections must be completed*

Project Researchfish ID	RI-B7-7		
Project Name	Climate change, biodiversity loss and changing diets		
Principal Investigator	Baukje de Roos		
Start Date	1st April 2022	**Completion Date**	31st July 2023

Purpose of the project

This project addressed Theme B, Topic 7, RQ 4 '*Research into dietary choices - how should we understand the changing Scottish diet and what can be done to promote climate responsible choices and those which improve biodiversity?*'.

The purpose of this research was to i) review what is currently known about the potential impact of changing to more healthy, environmentally sustainable and affordable diets on climate change and biodiversity loss; ii) to gather relevant insights into how this impact can be practically measured and communicated to consumers, specifically on the meal and food level; and iii) to assess how cultural factors, as well as individual life stage, socio-economical, demographical and geographical factors, are associated with a 'readiness-to-change' towards more environmentally sustainable food choices.

The key driver for this research is the knowledge that food is the single strongest lever to optimise human health, environmental sustainability and biodiversity on Earth. Shifting towards a more sustainable food system is paramount to achieving the Scottish Government's target to become Net Zero by 2045. The Scottish Government is also committed to achieve the ambitions laid out in their national food and drink policy 'Becoming a Good Food Nation (2014)', aiming to provide everyone in Scotland with ready access to healthy and nutritious food, and to reduce the environmental impact of our food production and consumption, through a combination of non-legislative and legislative means (Good Food Nation Act). However, despite an increasing concern about the environmental impact of dietary choices, both from a policy as well as consumer perspective, there is no agreement on how to measure the environmental sustainability of diets and foods, or how best to communicate the potential impact of individual dietary choices on climate change and biodiversity in particular.

Environmental sustainability has become an important consideration for dietary guidelines and nutrition policies in many European countries. However, we lack clear metrics and tools to

measure the impact of food behaviours of consumers on major environmental issues like climate change and biodiversity. The work in this project is expected to provide valuable information for policy makers at Scottish Government to aid the development of national guidance for dietary change as well as targets to measure change, especially in relation to the Good Food Nation Act and its plans in the next years.

Objectives achieved/not achieved

We successfully achieved each of the two key objectives:

1) To assess the current status of our knowledge about the nature of dietary scenarios required to address the global challenges of climate change and biodiversity loss.
2) To evaluate available and emerging tools and approaches aimed to measure and communicate the impact of changing towards more environmentally sustainable meals and food choices to consumers at a real-world level.

To achieve these key objectives, we completed a rapid literature search and narrative review based on recently published key papers and reports to evaluate the potential impact of changing to more healthy, environmentally sustainable and affordable diets on climate change and biodiversity loss. We also completed a systematic review, aided by artificial intelligence approaches, aiming to map and synthesise current evidence on the commonly used definitions and measures of the environmental impacts of human diets in the literature.

To put this all in a Scottish context, we analysed what can be considered a typical Scottish breakfast, lunch and dinner, and based on this we developed examples of swaps of frequently consumed food items to make a meal more environmentally sustainable. These food swaps subsequently formed the basis for the ‘readiness-to-change’ survey, where we identified how cultural and individual life stage, socio-economical, demographical, and geographical factors are associated with a 'readiness-to-change' to consumption of more environmentally sustainable meal and food options in Scottish adults (>18 years).

Finally, we organised a roundtable event, gathering academic and non-academic stakeholders to discuss and debate how we can accelerate change in relation to climate change and changing diets, taking a consumer perspective, and how we can ensure that policies implemented to guide a transition to a more healthy and sustainable food systems are just and fair.

Outcomes

i. We completed a **rapid qualitative narrative review** report that evaluates our current knowledge of the nature of dietary scenarios required to address the global challenges of climate change and biodiversity loss. The report was put in a Scottish context by quantifying a ‘typical’ Scottish breakfast, lunch and dinner, and identifying relevant food swaps to make a such meals more environmentally sustainable.

ii. We wrote and submitted an **academic paper** entitled "*Measuring the environmental impact of human diets in scientific research - An artificial intelligence-aided systematic review*" to the journal Nutrition Reviews. This paper systematically reviews and synthesises current evidence on the commonly used definitions and measures of the environmental impacts of human diets. Our systematic search identified 418 studies measuring the environmental impact of diets - the median number of environmental markers measured per study was 1.4, which reflects that most (54%) of the studies only used one metric to estimate the environmental impact of human diets, with 80% of the studies using GHGE. Most studies evaluated the consumption of diets, with primary data sourced mostly from a national (survey) dataset (e.g., NDNS). Such data capture food frequency, amounts, and composition, but do not capture characteristics relevant to environmental sustainability (geographical area of produce, organic vs non-organic, food transport/refrigeration, etc). LCA data are retrieved from various databases, with sometimes obscure provenance of data, or limited granularity for similar food products that are produced in different ways. We concluded that agreement on how the environmental impacts of diets are measured, and more comprehensive and accurate data on the environmental impact of single foods, is essential to better understand what changes in food systems are needed, at a consumer and policy level, to make a well-meaning change towards a more sustainable diet.

iii. We produced a **roundtable report**, reflecting on the discussions and outcomes of a **roundtable event** in May 2023 that gathered academic and non-academic stakeholders to discuss and debate how we can accelerate change, and how we can ensure that policies implemented to guide a transition to a more healthy and sustainable food systems for consumers are just and fair. The main outcomes of this event can be summarised as follows: i) Considering the level of dietary transformation required, there was a *general feeling that the Government needs to do more in terms of interventions and regulations, and needs to act faster*. The Good Food Nation Plans could play a significant role in promoting and supporting healthy and sustainable diets, but these will need to contain tangible actions, and we need ways to monitor the outcomes; ii) *Our food choice may or may not change as we move towards 2045*. Whilst there is a need to strengthen local supply chains, and vertical farms could play an important role in this, we will continue to be dependent on global food supplies for choice, so we will need to choose our food trading partners wisely in order to build a resilient food system; iii) *Innovative power will play an important role in how and when we reach Net Zero*. Pro-active engagement between academia, food and drink businesses, retailers, and (cross-Department) Government, including the transfer of knowledge, ideas and people, will allow the development of practical approaches to deliver impact for Scotland – most notably the introduction of methodologies to measure and monitor climate and health impacts and benefits across sectors; and iv) From a consumer perspective, *everyone can make a difference by eating less ruminant meat*. There is an urgent need to make the consumer more knowledgeable about the concept of climate-smart foods and diets, and more receptive of new initiatives such as carbon-taxation.

iv. A **research protocol for a survey** aiming to identify how cultural and individual life stage, socio-economical, demographical, and geographical factors are associated with a 'readiness-to-change' to consumption of more environmentally sustainable meal and food options in Scottish adults, was developed and approved by the Human Studies Management Committee, the Rowett Ethics Panel and the Scottish Government Social Research Ethics committee.

v. We produced a Qualtrics **survey report** providing insights into how cultural factors and factors like life stage, socio-economical background, demographical and geographical factors are associated with a 'readiness-to-change' to more environmentally sustainable food choices in the Scottish population. We found that age group is the most relevant determinant of the

readiness to change towards a more sustainable diet, with those in the older groups being more reluctant to change. We are currently in the process of finalising a second **academic paper** to disseminate the results of the survey to the research community.

Project Insights

The original 1-year project was ambitious with wide-ranging activities, and we had one year to deliver the milestones. We had to shift some of the delivery timelines due to a maternity leave period which meant that activities started running in parallel rather than in sequence. This required a rather 'flexible approach' from the project team to deliver the project in a timely fashion.

The short project duration meant that we delivered the milestones in quick succession towards the end of the project. This was hectic, but also motivating as the scope for dissemination became significant.

Good practice recommendations for future projects:

- Especially for a short-term project, it is helpful to make quick progress with the preparation of all activities, even if some are not scheduled until later on in the project. This means it will be easier to cope with 'changing timelines' due to unforeseen circumstances as the project progresses.
- Whilst we had prepared a KE and dissemination plan at the start, we found that a more fluid approach towards dissemination, exploiting opportunities to present at events, and working with an expanding network of stakeholders as the project developed, was more helpful.
- We tremendously benefited from the expertise and advise of an experienced facilitator who helped us with the design and execution of the roundtable discussion, which maximised the output of the roundtable discussions.

Next Steps/ Future Plans

The work in this project formed the basis for participation as a panel member in the 'thriving biodiversity session' at the RESAS Science conference in May 2023. Being the only panel member highlighting the role of the consumer in our biodiversity challenge, this led to interesting and unique new insights as part of the discussions.

The narrative review revealed a novel approach to measure food biodiversity - Dietary Species Richness (DSR) is a novel and simple candidate metric for the simultaneous measurement of food biodiversity between and within food groups, and nutritional quality of human our diets, capturing both agricultural and wild food biodiversity. With newly acquired industry funding we are now further exploring Dietary Species Richness in UK diets.

We are also exploring further funding opportunities to consolidate regional data and knowledge on GHGE reduction potential across agricultural production and food consumption to provide sustainable and healthy diets.