



2020

D+083 Soil Mapping Project Project Legacy Workshop

*Conceptualizing project ideas to follow on
from the Soil Mapping Project
linked to local Falkland Island stakeholder
requirements*



Stefanie Carter
Project Manager, SAERI

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Project Legacy Workshop Report

Location: Falklands College, Stanley, East Falkland

Date: 26 June 2020

Time: 9-12.00pm

Attending Project Partners

- Matt Aitkenhead (MA) (James Hutton Institute, via skype)
- Al Baylis (ABa) (SAERI)
- Paul Brickle (PB) (SAERI)
- Steffi Carter (SC) (SAERI)
- Anne Jungblut (AJ) (Natural History Museum, via skype)
- Jim McAdam (JMA) (UK Falkland Island Trust, via skype)
- Matthew McNee (MMN) (Department of Agriculture, Falkland Island Government)

Participants

- Andrew Bendall (ABe) (Sheep Management Advisor, Department of Agriculture, Falkland Island Government)
- Denise Blake (DB) (Environment Officer, Falkland Islands Government)
- Andrea Clausen (AC) (Director, Department of Natural Resources, Falkland Island Government)
- Neil Judd (NJ) (General Manager, Falkland Landholding Company)
- Tom McIntosh (TMI) (Senior Agricultural Adviser, Department of Agriculture, Falkland Island Government)
- Frin Ross (FR) (Falkland Conservation)
- Jo Turner (JT) (co-landowner, Weddell Island)

Programme of Events

Presentations

- Steffi Carter – What the Soil Mapping Project will be delivering, how the maps can be used for land management and what additional tools are available ([Figure 1](#))
- Jim McAdam (via skype) – Climate change merits of the soil maps ([Figure 2](#))
- Matt McNee – Agricultural Implications: Mapping Productive Soils ([Figure 3](#))

Group Discussions

Group 1: ABe, DB, AC, TMI, JT ([Figure 4](#))

Group 2: PB, SC, NJ, MMN, FR ([Figure 5](#))

Group 3 (Project Management Group via Skype): MA, AJ, ABa, JMA ([Figure 6](#))

The groups were asked to discuss issues, problems and questions that they are currently faced with in their respective field of work and how these can be addressed with the soil maps produced by the project. They were also asked to consider what further tools and information can be produced to tackle some of these issues.

Presentation Summaries

Steffi Carter – Soil map and online database as climate change mitigation tools

Steffi Carter started by providing a brief introduction to the Soil Mapping Project, which included aims and partner organizations involved in the project. She then explained how the soil maps were created through a combination of soil modelling, fieldwork and lab work. Subsequently, Steffi focussed on the maps produced by the project: she presented examples and list all the layers that will be available. She also used a case study from Port Howard, West Falkland, to explain how a layer for erosion risk will be created and how the map layers for chemical properties can be used for land management decisions. All of these layers can be further analysed with the freely available GIS software QGIS. Furthermore, Steffi also highlighted other webGIS tools available from previous projects, such as the [broad-scale habitat map](#), which would add additional information to the interpretation of the soil maps. Further information can be derived through the application of satellite imagery, some of which is freely available.

Steffi emphasised that a lot of work can be done in respect of land management with the tools available but that it is essential to know first what questions the stakeholders would like to address so that follow-on projects utilising these maps are taken in the right direction. The purpose of this workshop was to obtain ideas for follow-on project involving the soil maps.

Jim McAdam – Climate change merits of the soil maps

Jim McAdam outlined the background to the Soil Mapping Project. He summarised the climate change predictions for the Falklands and how the impacts on soils had been highlighted (by the EU-Best funded TEFRA project) as a key risk. More specifically, the risks were - evapotranspiration leading to soil moisture deficit, soil carbon retention and erosion risk. The TEFRA project had also highlighted the need for a soil and peatland map to address the issues of *climate change mitigation* and *climate change adaptation*. In relation to the former, he stressed that soils are the biggest store of carbon on the Falklands; we have local and global commitments and duty to protect the resource and to ensure that soils remain a carbon sink rather than a carbon source. Jim emphasized that soil maps could be a resource to help landowners best manage their soils for productive, sustainable agriculture in the face of global climate change. He also suggested that the overall aim must be to develop climate resilient land management systems- i.e. those which can be put in place, which will best cope with the direction, unpredictability and risk associated with climate change.

Finally, Jim gave some examples of plant species vulnerable to climate change and equated this to soil vulnerability. Combining these and using the information generated from the soil maps will be a powerful tool for land owners in the future. Future projects to help manage Falklands soils could use the soil maps to:-*Maintain vegetation cover-grazing strategies etc; reduce fire and erosion risk; introduce more productive forages to select areas.*

Matt McNee – Agricultural Implications: Mapping Productive Soils

Matt McNee's presentation summarised some of the agricultural implications of soil conditions present in the Falkland Islands. Grass forage production potential was estimated in relation to different levels of plant available soil nitrogen. That analysis was used to illustrate the effect that low subsoil pH was having on forage yields i.e. the yield gap. The associated financial loss due to forgone wool production was presented. To address this issue and guide investment in soil quality improvement, a land-value framework was proposed. Measurement tools, like the digital soil map used in combination with satellite imagery and GPS tracking data, could be used to quantify key animal production components [time on land, gain in value, number of animals]. The framework would quantify the increase or decrease in value of different land types over time, inform strategic decision making and demonstrate sustainability of the grazing system. Finally, this presentation listed on-farm experiments that were proposed by land-holders to increase knowledge of soil-related issues. These on-farm activities are an opportunity to demonstrate the utility of available measurement tools in rangeland farming systems.

Group Discussions

I. Issues and questions in relation to land management that the participants are currently faced with:

- How to inform and optimise grazing rotation?
- Labour availability
- Managing expectations on productivity
- Low/negative profitability / return on investment
- How to make the most of profitability?
- Are farms carbon neutral?
- Overall knowledge gaps in relation to farming
- Range in technical skills of the community
- Process of erosion and interaction with land management
- How to best inform farmers / decision making tools
- Support that aligns with policy requirements
- Lack of continuity with contracted skilled staff

II. Future projects that could be developed from outputs created by the Soil Mapping Project.

Project 1: Optimising land management

Application of the soil maps to identify different land types from an agricultural point of view and associated potential productivity. This could optimise decision making on stock rotation, re-seeding and overall land management. In the long run this is likely to increase yield and product quality.

Project 2: Carbon accounting

A project on carbon accounting for the Falkland Islands could involve using the available data to determine the carbon stock for each landowner, engage with individual landowners on safeguarding carbon stocks through sustainable land management and set targets for carbon gains.

Project 3: Habitat restoration

The maps can be used to drive restoration planning in respect of plant and soil distribution. From the [TEFRA project](#) it is known which plant species native in the Falkland Islands are vulnerable and resilient to climate change. Overlaying the soil maps with plant distribution maps would help determine suitable locations for resilient plants for future habitat restoration projects. Areas with high conservation value and restoration potential could be identified and linked to support for production and landscape management in order to make restoration feasible.

Project 4: Using soil maps to target niche markets

The soil maps could be used as a way to demonstrate high stewardship on farms and thereby targeting niche markets through marketing schemes, which could increase return on investment. For instance, farms with high carbon stock or high erosion risk could demonstrate how their farm management sustainably addresses climate change risks.

III. Projects directly following on from the Soil Mapping Project to build on the maps in order to improve their application range and to further extend information on soil properties in the Falkland Islands.

Project 5: Long-term stakeholder engagement to develop bespoke farm-based planning

The production of a realistic interpretative farmer-friendly tool is required to help integrate the soil maps into day-to-day decision making on Falkland farms. This project:

- could be led by a member of staff at the Falkland Islands Government's Department of Agriculture dedicated solely to the practical application of the soil maps
- should include practical work with farmers on a 1:1 basis utilizing the soil maps
- should include open-minded engagement with local landowners in order to determine what their requirements are
- should add land use to the layers
- should include the concept of risk mitigation (both ecological and financial)
- could possibly start as a trial on a small scale
- should ensure long-term staff continuity for landowner engagement
- the project's long-term aim would be to underpin improved decision making

Project 6: Production of additional map layers

There are additional map layers stakeholders would like to have, which would provide further information on Falkland Island soil properties. This can include further analysis on the collected and dried soil samples and additional field measurements. The desired layers include:

- Saturated hydraulic conductivity
- Total nitrogen (as opposed to Nitrate-N, which is included in the Soil Mapping Project)
- Electrical conductivity

Project 7: Improvement of map accuracy

Whilst the maps are considered a great and highly relevant output, there is always room for improvement. A follow-up project could cover additional field survey points to improve the overall accuracy of the maps, whilst additional soil modelling could increase the resolution from the current 30 m to 10 m. Furthermore, additional work would also produce greater accuracy on soil carbon stocks beyond top soil depth.

Project 8: Long-term monitoring of baselines

There should be a project for long-term monitoring of the baselines covered by the Soil Mapping Project in order to determine change in time through climate change. This could involve a follow-on project every 10 or 20 years to determine changes in peat extent, carbon stock and erosion extent. At the same time, this could also involve developing a tool for on-going tracking of land condition over time.

IV. Other projects required to address issues and questions that cannot be addressed by the existing tools alone and for which new tools may have to be developed.

Project 9: The relationship between soil nutrient quality and the nutritional status of plants

Little is known about the relationship between soil nutrient quality and the nutritional status of plants in the Falkland Islands but this is highly relevant from an animal nutrition perspective. Further work should investigate this relationship and could develop plant nutrient / animal nutrition maps based on the soil maps.

Project 10: Integrated study - social scientist & land management

An integrated study of social scientists looking at farmer behaviour alongside soil surveying would integrate social science with biophysical research. This would gather much more information about what stakeholders need, and how to translate the findings into something useful for them. This could be a separate project or be part of Project 3.

Project 11: Tool development to capture farm activities

Farm activities such as stock rotation and farm management decisions such as sheering dates are currently not captured on a farm level and integrated into wider productivity assessments. If this information was centralised, analyses could optimise timings for farm activities and reveal which approaches are successful. In order to achieve this, there should be a tool available to easily record farm activities, which could be in the form of a mobile phone app.

Project 12: Productivity tracking over time

There is data stored at the Department of Agriculture for a time span of 20+ years on annual farm productivity. This data has never been analysed but would generate valuable insights into farm-based and possibly camp-based productivity over time. This could make a good student dissertation project.

Project 13: Turnover of nutrients in soil organic matter

A significant proportion of the soil nutrients are locked away in organic matter and are only made available through oxidation and decomposition. The rate of decomposition and its associated nutrient turnover needs to be researched in order to determine which nutrients are likely to be available at which level over a given time period. This can be in the form of seasonal availability or any other meaningful breakdown.

Summary

The feedback from the participants during the workshop made it clear that the soil maps generated from this project will provide a crucial baseline that is required for more productive and sustainable farm management. The availability of the maps will improve farm-based planning and decision making.

At the same time the discussions made it evident that the soil maps as a stand-alone tool would be too technical for many land owners and would probably not be utilised to their full extent unless a dedicated follow on project (#5) provides the necessary stakeholder engagement and map interpretation. The group discussions have singled this out as the most pressing project to follow on from the current Soil Mapping Project.

Furthermore, the long list of projects under header IV, highlights that the work is far from being completed. There is a distinct paucity of research on soils from the Falklands. There are still a lot of unknown factors, which need to be investigated to optimise land management sustainably in the Falkland Islands. Additionally, evaluation of past and current productivity alongside farm activities would reveal further insights into successful land management strategies.

Appendix – Workshop images

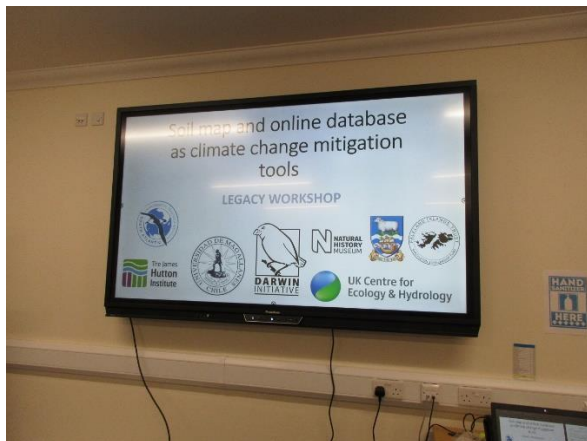


Figure 1: Introductory talk by the project manager Steffi Carter.

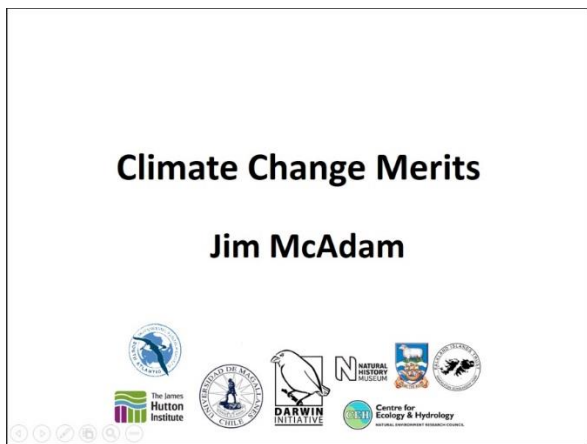


Figure 2: Project partner Jim McAdam's presentation.



Figure 3: Project partner Matt McNee's presentation.



Figure 4: Group 1 discussing their ideas.



Figure 5: Group 2 discussing their ideas.



Figure 6: Al Baylis presenting the outcomes of the discussion from Group 3.