



Suggestion of areas for future research and training on St Helena Island

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Lead authors	Azra Gordy
Contributing authors	Tara Pelembe, Rebecca Cairns-Wicks
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FROM CASE STUDIES TO ANCHOR PROJECTS - SETTING THE GROUND TO ADVANCE MAES IN EUROPE'S OVERSEAS.

Summary

This document gives suggestions for future research questions and priorities for the island of St Helena. These suggestions are based on topics for spatial analysis that arose throughout the course of the MOVE-ON South Atlantic Anchor Project. Due to the nature of the project's integration throughout a variety of sectors of St Helena Government collecting and making use of data about St Helena's environment and ecosystem services, the topics and techniques mentioned here may be especially relevant to the priorities and concerns of St Helena Government.

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1. Introduction

This document is intended to provide a variety of suggestions for potential areas of spatial analysis and research related to St Helena's environment and ecosystem services. This is delivered as a final outcome of the South Atlantic Anchor Project's regular biweekly presence at the St Helena Research Institute (SHRI).

As part of the Anchor Project's stakeholder engagement, regular working locations for the Spatial Data Analyst were established on a two-week schedule, with three days of the working week spent at St Helena Government's GIS Office and the other days alternating between its Environment, Natural Resources and Planning Portfolio headquarters at Scotland Campus, the Sustainable Development Office, and the Central Support Service in addition to SHRI.

Due to this multi-location working and the nature of the South Atlantic Anchor Project in carrying out spatial analysis based on real-time requests from those working across these sectors of St Helena Government and more, the Spatial Data Analyst had a particularly comprehensive view of the common spatial questions arising as part of St Helena Government's day to day work and priorities for the future. Therefore, it was decided that this document would be provided to SHRI as an indicator for areas of research that might be especially valuable to investigate in the future.

1.1 Method for creating list of future research topics

Topics were added to a live document throughout the delivery of the South Atlantic Anchor Project (from approximately July 2021 to March 2022). The topics added were mostly based on:

- questions that were arose throughout the course of the MOVE-ON South Atlantic Anchor Project
- analyses that were conducted at a basic level for the MOVE-ON project but could be suitable for expanding into a comprehensive research project
- techniques and applications covered in conferences/webinars attended as part of the South Atlantic Anchor Project that were considered to be possibly suitable for applying to a St Helena context

As a result, the list of topics presented in this document do not necessarily reflect the full scope of areas for research, but provide a snapshot of which ones were noteworthy throughout this period. The list below is divided into three thematic areas: tracking changes over time, enduring questions related to evidence for nature conservation, and intersections between human society and the natural environment. These are then

presented in a table according to identified areas for future research and identified areas for future training opportunities.

2 Future research topics

2.1 Tracking change over time

Due to the nature of St Helena's remoteness and the project-based nature of most of the monitoring work that has been carried out, it is often difficult to get a full picture of how various factors of St Helena have changed over time. This makes it difficult to assess successes and areas for improvement in conservation as well as what the past and potential future impacts of climate change could be for St Helena. With the increased availability of remote sensing techniques and data, there is now more ability to analyse these and other factors in St Helena's recent past.

2.1.1 Remote sensing

There are several sources for satellite imagery of St Helena, with the NASA/USGS Landsat going the furthest back in time with images starting from the 1970s. Many of these images are free to download, such as Landsat and the EU's Sentinel imagery.

The DPLUS052 project "Mapping St Helena's Biodiversity and Natural Environment" (Pike, Medcalf, Naumann, Scullion, & Detheridge, 2018) created habitat maps based on IUCN categories for St Helena using Pléiades satellite imagery and field surveys (see [WebGIS](#)). The study was designed so that it would be possible to update the habitat map every 3-5 years using free satellite imagery and open source GIS software. The suggested method for doing this is detailed in the project's Technical Report (Pike & Medcalf, 2018). There may also be a possibility of applying this analysis to older satellite imagery, although ground truthing would not be possible in that case. A "living map" like this could be an extremely valuable tool for monitoring and analysing change on the island.

Remote sensing also has other applications that could be relevant to St Helena, including investigating urban heat island effects in Jamestown, monitoring and mapping droughts, and mapping the extent of wildfires. Further training in this area could allow for even more applications of the technique.

2.1.2 Climate

Climate modelling of the South Atlantic region appears to be uncommon at wider scales, let alone with a particular emphasis of potential impacts on small islands. Forecasting the probability of extreme events such as flooding, droughts, and storms in the future could be

particularly useful for planning about St Helena's future infrastructure and emergency services strategies. If St Helena continues with seeking Small Island Developing State status, this could possibly be used as a mechanism for creating partnerships on this topic.

Though cloud cover is often an issue in satellite images of St Helena, this might provide an opportunity to study seasonal patterns and long-term changes in cloud cover on the island to further understand the island's climate.

2.2 Conservation questions

2.2.1 Hybridisation of endemics

One of the mapping activities completed for the MOVE-ON project was deciding on distribution zones for two of the Special-Case species under the SHG Policy for Collection, Propagation and Distribution of Endemic/Native Plants, the St Helena gumwood and St Helena scrubwood. The zones were decided in consultation with EMD and SHRI staff using existing data on locations of the plant species of hybridisation concern and the postulated original vegetation zones on the island pre-discovery (see Figure 1).

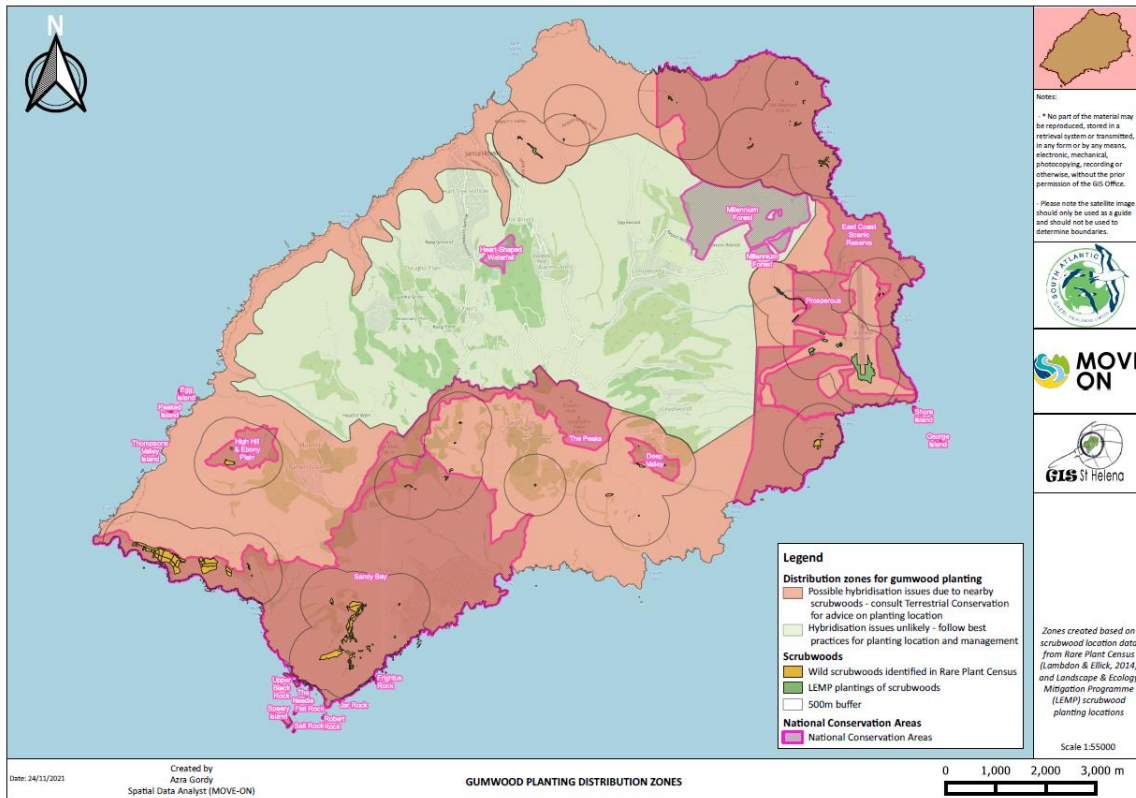


Figure 1: Map of policy distribution zones for St Helena gumwood (*Commidendrum robustum*), a “special-case” species with concern of hybridisation under the Policy for Collection, Propagation and Distribution of Endemic/Native Plants.

However, due to lack of research into the areas of pollination of endemic species, the estimated buffer relied on estimates based on experience instead of a more quantified value. So far, the only attempt for finding the perimeter of pollination for a St Helena endemic was carried out in the 1990s for dogwood (Percy & Cronk, 1997). Further research on this topic, especially for the gumwood and scrubwood, could allow for the zones created to be further refined according to the evidence.

2.2.2 Coastal ecosystem services

Previous mapping and assessment of ecosystem services conducted as part of St Helena’s Natural Capital Assessment had a focus on services that would be provided by the green central areas of the island erosion (McVittie, Hutchison, Marengo, & Smith, 2019, p. 1), as many of these are particularly relevant to SHG priorities such as forestry, agriculture, and conservation. However, this means that more focus on potential services provided by the island’s drier coastal areas could provide a more holistic picture of the state of ecosystem services on the island. This would be particularly relevant as there have been changes to the vegetation of the coastal areas, with many becoming gradually greener over the last few decades. In addition, further knowledge of ecosystem services in these

areas could allow for more evidence-based decision-making about land-use in these areas, in particular possibilities for housing.

2.2.3 Freshwater ecology

The 2021 review of the 2016 Marine Management Plan highlighted a need for further research into freshwater ecology on St Helena and creation of a freshwater ecology restoration plan. The Management Plan focuses particularly on investigation of the effect of increased runoff from streams into the ocean around St Helena on marine water quality and wildlife. In addition to the potential for future research to address knowledge gaps on this issue, it is worth highlighting existing data such as that shown in Figure 2 that could be further analysed and used to support management decisions.



Figure 2: Map showing risk of high sediment concentration for St Helena freshwater courses, available on St Helena WebGIS. This data was collected as part of the DPLUS052 project.

2.3 Human-nature interactions

2.3.1 Planning for resolving land-use conflicts

With St Helena's small area, it is inevitable that there will be situations of conflict between one or more uses of areas of land. However, thanks to the island's small area it could also be possible to conduct island-wide investigations into where these conflicts might be located in the future – for example, by mapping the spatial coverage of the

various SHG policies with a spatial element and whether overlapping policies are in synergy or conflicting with each other.

In addition, further research could investigate potential compromises between competing priorities for land use. For example, flat land on the island is rare (as can be seen in Figure 3) and human needs for housing and other building activities often conflict with providing suitable habitat for endemic wirebirds, which often prefer areas of flatter land. Since wirebirds are known to be sighted in populated and built-up areas, further research could look into what architectural and planning designs or vegetation might be best suited to wirebirds.

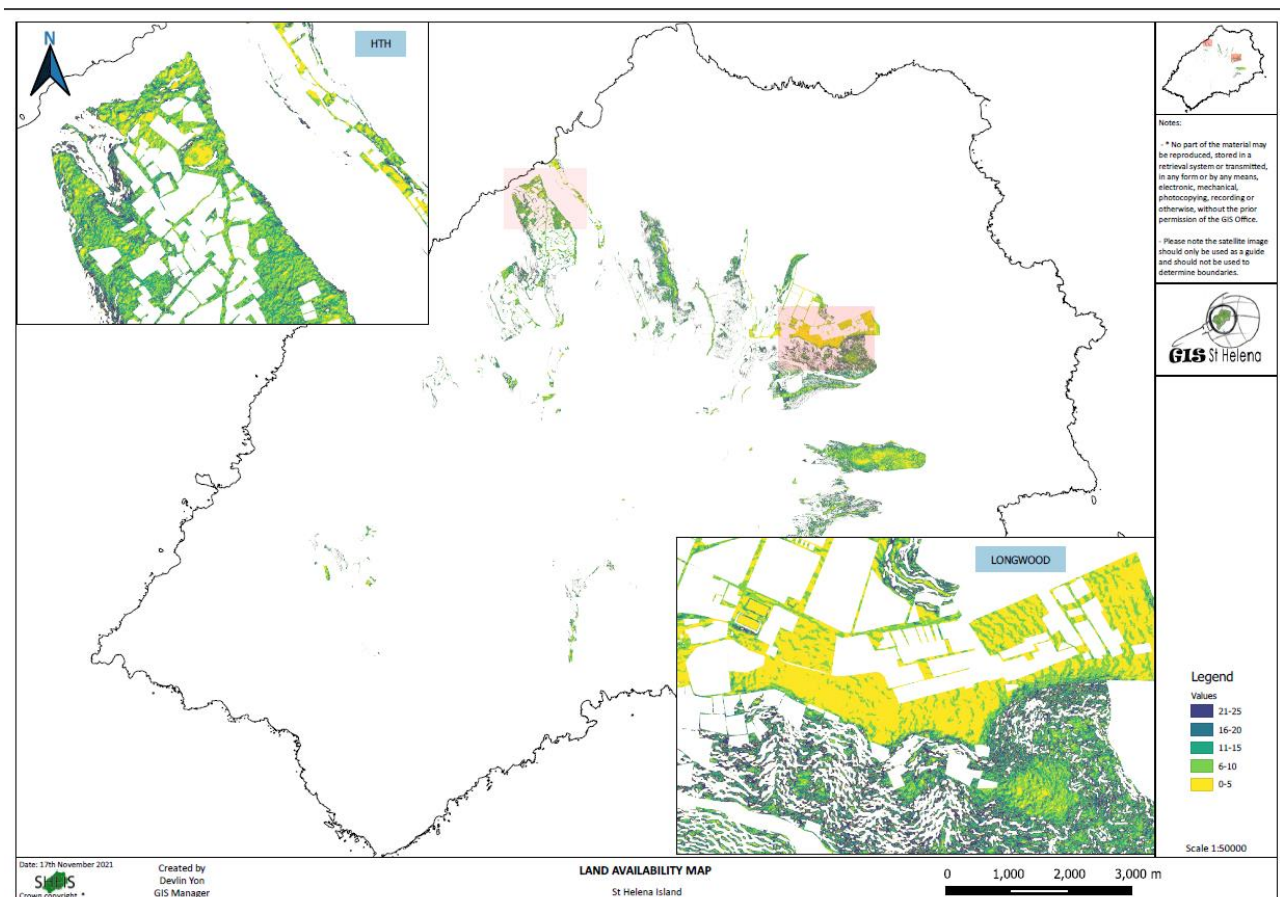


Figure 3: Map showing Crown Land that is in the Intermediate Zone with slope of less than 25 degrees (maximum slope recommended by Building Control for construction). Colours on the legend represent the slope of the land in degrees.

2.3.2 Human/cultural geography

An area that may add to the depth of knowledge about St Helena and aid decision-making is more human and cultural aspects of the island's geography. Investigations about senses of place and what residents value about their island would provide insights into

2.3.3 Honeybees and honey

St Helena's bees are unique in their lack of diseases currently threatening other bee species around the world. Because of this, honey has become a common idea for a potential export for the island and is identified in the Sustainable Economic Development Plan. However, bees are an introduced species to the island and there are several questions regarding their ecology on St Helena that have not been fully answered.

For example, evidence suggests that bees have been introduced and reintroduced to the island several times, suggesting that there may have been several times when the number of bees exceeded the island's carrying capacity and died off as a result. It is still unknown what this carrying capacity for the island could be, and this would be an important knowledge gap to address in advance of initiatives to expand the number of beehives on the island for economic development. In addition, there still has not been any research investigated the role of honeybees in St Helena's ecosystem as an introduced species rather than an agricultural commodity, and it may prove valuable to have some insight on the effect of bees on St Helena's endemic species and whether they might compete, pose a risk, or be compatible with endemic wildlife on St Helena.

3 Summary – Research and training suggestions table

Table 1 shows a summary of the research suggestions presented above. The Lifelong Learning Column extrapolates from the future research suggestions to identify areas of training that may prove useful according to this document.

Table 1: Summary of suggestions for areas of future research and training.

SHRI/Education Identified areas for further research	Lifelong Learning Identified areas for training priorities
Tracking change over time - Remote sensing - Climate Conservation questions - Hybridisation of endemics (pollination perimeters) - Coastal ecosystem services - Freshwater ecology	Training in remote sensing techniques Climate science/linkages with current conservation work Social science techniques Honey cultivation - not necessarily formal certificate but more education?

<p>Human-nature interactions</p> <ul style="list-style-type: none"> - Planning for resolving land-use conflicts - Human/cultural geography - Honeybees and honey 	<p>Sustainable planning courses?</p>
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