Guidelines for bridging the gap between evidence and decision-making on small islands

South Atlantic Anchor Project

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Summary

This document sets out a series of guidelines for ways to bridge the gap between evidence and policy in the environment sector on small islands. These guidelines are based on the findings from the Anchor Project of the MOVE-ON South Atlantic Anchor Project – St. Helena (SAA St. Helena), which was delivered in the UK Overseas Territory of St Helena Island. This project trailed embedding a 'bridging' role focused on communicating to decision-makers about evidence that could be used to support their decisions and analysing this data in real-time. The guidelines reflect the SAA St. Helena's findings on the success of this role, as well as the importance of avoiding any barriers to data analysis and the usefulness of articulating a process for evidence use in decision-making. The guidelines are framed by 3 key elements: People, Data and Systems.

People:

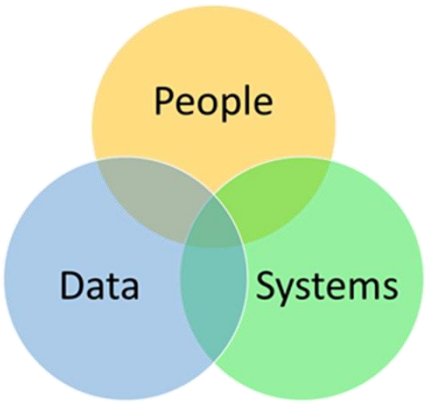
"People matter"

- Appoint an 'evidence bridger' role
- Know your stakeholders
- Establish a formal relationship with Island Government
- Establish an on-island entity with MAES data management and analysis capabilities
- Secure Independent technical advice
- People matter

Data:

it doesn't always need to be technically challenging to have an impact

- Data is available
- Data is well-managed
- Data is clean
- Explore a variety of techniques
- it doesn't always need to be technically challenging to have an impact



Systems:

"Find the Lightbulb moments or Lightbulb maps"

- Understand where the country sits within the MAES implementation framework.
- Policy screening
- Translate results into decision-makers language
- Deliver what the decision-makers request (with relevant caveats).
- Articulate a process for evidence use for decision-making
- Remove barriers to the use and availability of evidence
- Provide a platform for sharing technical expertise.

- Find the lightbulb moments or lightbulb maps.

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1 Introduction

1.1 Mapping and Assessment of Ecosystem Services (MAES) and MOVE ON.

"Ecosystem services" is a term used to describe any benefits that humans receive from ecosystems. These can be services that regulate the environment to humans' benefit (for example, a tree root system decreasing the risk of flooding), provide substances necessary to humans' survival (for example, food), or form important parts of human culture (for example, through providing recreational areas or places of cultural significance). Because of this linkage of both ecological conditions and human activities in the ecosystem services framework, it is seen as a valuable concept for advocating for the protection of nature and has been enshrined in the UN Aichi Targets and the EU Biodiversity Strategy for 2020 and 2030 (Maes, et al., 2012).

To reach these targets, a methodology for Mapping and Assessment of Ecosystems and their Services (MAES) has been developed and contributed to the EU Biodiversity Strategy for 2020. However, Europe's Outermost Regions (ORs) and Overseas Countries and Territories (OCTs) have often not been included in these assessments nor had a large uptake of the concept of Ecosystem Services (ES), despite hosting significant biodiversity that may be especially vulnerable to the impacts of climate change (Sieber, Borges, & Burkhard, 2018).

The MOVE-ON project seeks to address this gap through several methods, including implementing a series of Anchor Projects in the EU ORs and OCTs.

1.2 Small islands context.

Many of the EU ORs and OCTs are small islands. Small islands are often characterized by a high degree of endemism, limited natural resources, and often disproportionately high rates of biodiversity loss, with 61% of all extinct species and 37% of all critically endangered species having small island habitats (Tershy, et al. 2015). With limited natural resources, understanding what ES are provided is an important foundation for island growth including in areas such as sustainable development and spatial planning. When these small islands are inhabited, there are often challenges posed by having limited human resources due to small populations and frequent outward migration for employment opportunities elsewhere (Burt, Nuno, & Bunbury, 2021). On small remote islands, these issues are often amplified and compounded by additional factors arising from remoteness, including slow and/or expensive internet connections, long waits for deliveries, and sometimes limited opportunities to network or gain advice from other locations (Cvitanovic, et al. 2016). However, due to this limited size in both area and population, there may also be opportunities presented on small islands that are not possible elsewhere, such as the ability to collect more comprehensive and holistic data about the island and to engage more deeply with a wide range of stakeholders.

1.3 The gap between evidence and decision-making

In their systematic review on the topic, Bitoun et al. (2022) highlight that over 60 years after the development of the ES concept, a persistent gap remains between ES science and its use in management and policy. Their results showed that much of the published literature focuses on research recommendations (66.7%) with fewer (33.3%) focusing on Stakeholder participation.

The paper has four key recommendations that allude to the harmonisation of terminology to enable cross-sectoral frameworks, using ES maps both to support existing policies that require maps and to support sustainable urban planning, and building capacity to promote locally relevant policy-making.

Maps are an important tool in MAES decision-making and are often suggested to be essential for the proper management of ecosystems and their services (Hauck et al. 2013).

While the guidelines here have evolved from on-island learning from the South Atlantic MOVE ON Case study, they interestingly cover to some extent all of the 4 recommendations for 'bridging' recommended by Bitoun et al. (2022).

1.4 South Atlantic Anchor Project – St. Helena (SAA St. Helena).

The research question SAA St. Helena aimed to investigate was: "How can the gap between evidence and policy on small islands be bridged?" This question was investigated by trialling the use of an 'evidence bridger' role dedicated specifically to communicating to decision-makers about evidence that could be used to support their decisions and analysing it in real-time, this technique for bridging this gap has been suggested in the literature (Burt et al., 2021; Cvitanovic et al., 2016; Goodrich et al., 2020).

SAA St. Helena was implemented on St. Helena Island, in partnership with the St. Helena Government (SHG). There are several characteristics of St Helena's situation that are shared with other small islands, in particular small remote islands. It is biodiverse with very high rates of endemism, but much of this biodiversity is extremely vulnerable due to large-scale habitat loss, with only an estimated 3.5% of the island's land area covered by native habitat area (Lambdon & Cronk, 2020). Added to this is the fact that as a populated volcanic island with very few areas of flat land, there are often conflicting priorities for land use between residential, commercial, archaeological, and environmental considerations.

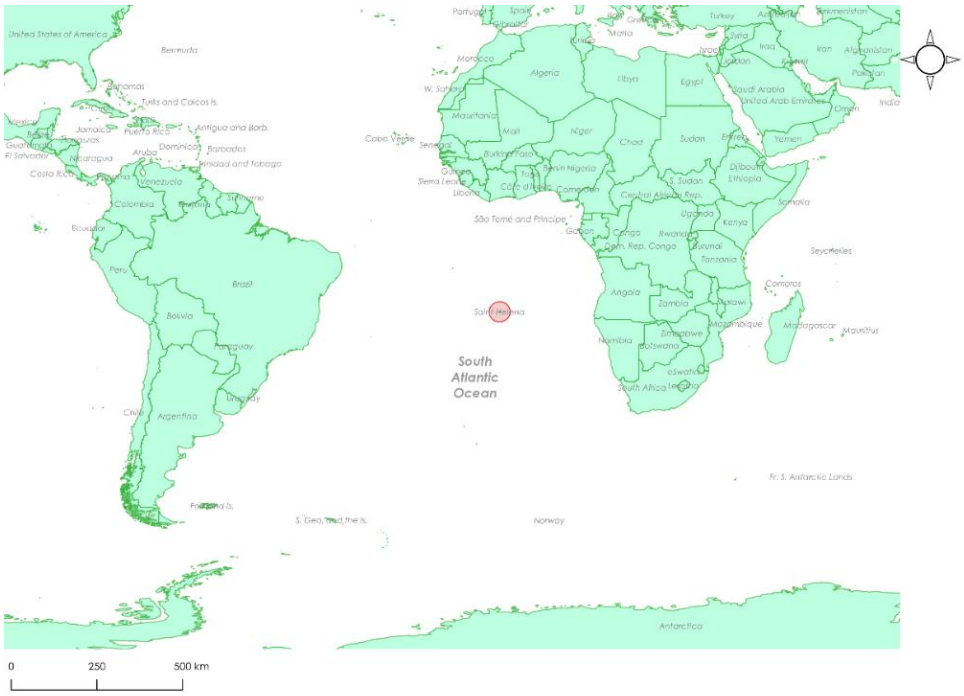


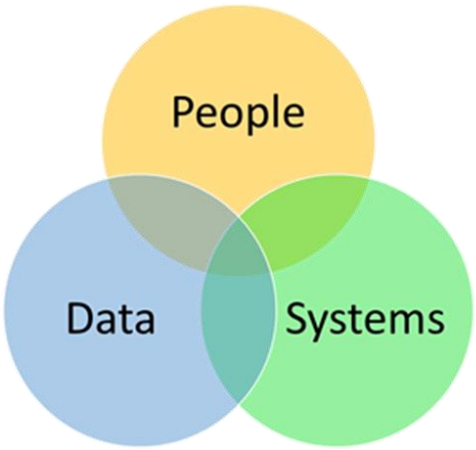
Figure 1: Location of St Helena with a 200km buffer around the Island in red.

However, thanks to previous projects, St Helena was also in an advanced stage of its implementation of MAES with a large variety of spatial data on ecosystems and their services kept in a standardised format by the SHG Geographic Information Systems (GIS) Office. An 'evidence-bridger' role was embedded in the SHG GIS Office, working with the GIS team to promote their services and develop their ability to support decision-making.

These guidelines are based on lessons learnt from the SAA St. Helena.

1.5 People, data, systems

Since 2013, SAERI has worked with a number of partners across the South Atlantic Islands and beyond to improve data management systems and increase GIS expertise in the region (Marengo et al. 2020). As part of this process, three key elements, namely People, Data, and Systems were described as forming the basis for a successful Information Management System (IMS) GIS.



This MOVE-ON project has used this same framework of People, Data and Systems, to produce these guidelines for bridging the gap between evidence and policy on small islands, based on the experiences of the SAA St. Helena implementation.

1.6 Guidelines: Context and caveats

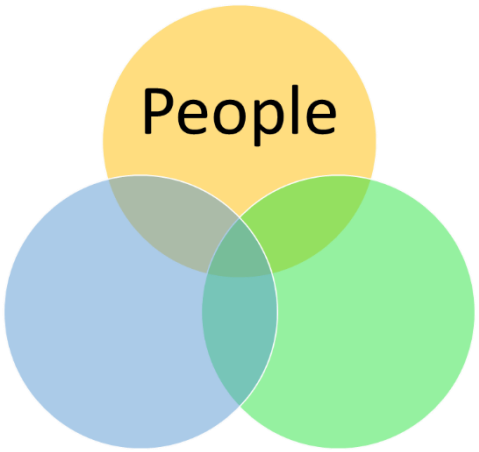
The conventional approach of undertaking a literature review, analysing the strengths and weaknesses of proposed models, followed by an application of a preferred model has not been followed. Instead, these guidelines are based on an innovative 'bottom-up' approach that works from the specific and is applied to the more general and academic rather than vice versa.

This means that the guidelines are based on the very specific experience of the MOVE-ON SAA St. Helena, and lessons learnt from that project are then expanded to form general guidelines for other small islands. A summary of the real-life application in St. Helena is included for each guideline as a live demonstration. In addition, each guideline has a key tip/s based on the lessons learnt from SAA St. Helena.

This approach, like others, has its limitations and caveats including the fact that there are potential gaps in areas of guidance e.g., in areas where specific scenarios were not encountered during the anchor project implementation. The very small scale and the specific case of St. Helena might mean that some of the lessons learnt and not scalable to significantly larger Islands.

However, if read with an open mind, this unconventional approach might lead to some new avenues of thought and understanding in the still unsolved challenge of how to ensure that MAES and other environmental evidence are used in policy and decision-making.

2 People:



"People matter"

- **Appoint an 'evidence bridger' role**
- **Know your stakeholders**
- **Establish a formal relationship with Island Government**
- **Establish an on-island entity with MAES data management and analysis capabilities**
- **Secure Independent technical advice**
- **Share skills and ideas across islands.**

People are key to the success of any MAES initiative, particularly when considering how to bridge the gap between evidence and decision-making. From the high-level decision-makers to the technical experts, it is important to understand everyone's perspective, and what drives their actions. This section looks at some of the key 'people' elements required to support the use of evidence in policy and decision-making.

2.1 Appoint an "evidence bridger" role

General: Appoint an 'evidence bridger' role. There must be a role assigned specifically to focus on the provision of evidence for decision-making. Resourcing in general is important, and is addressed seperately, but the 'evidence-bridger' role is pivotal to success and therefore needs to be described separately.

Key tip:

- **Ensure that the 'evidence bridger' has excellent communication and stakeholder engagement skills as well as spatial data analysis and MAES knowledge.**

SAA St. Helena. Results suggested that the technique of appointing an 'evidence bridger' dedicated to acting as the interface between evidence and decision-making in SHG was highly successful. A common barrier to the uptake of GIS methods and MAES data for evidence-based decision-making was simply a lack of familiarity with what capabilities

these methods and data have and their relevance for all portfolios, not just environmental. This was something that the role, and in particular the outreach activities associated with it, helped to overcome.

2.2 Know your stakeholders

General: Undertake a comprehensive stakeholder mapping and analysis exercise. Any preferred methodology can be used, but the Stakeholder Engagement Handbook (Durham, et al. 2014) is particularly comprehensive. Identify your key stakeholders and outline how you are going to engage with them. Make sure that the stakeholder engagement plan is an integral part of your implementation and receives as much (or more) focus on the activity as the technical spatial data analysis. The creation and implementation of this plan are pivotal to the uptake of evidence by decision-makers.

Key tips:

- **Use existing fora and regular meetings where possible, especially for high-level decision-makers.**
- **Try to have a physical presence across multiple government departments.**

SAA St. Helena: An in-depth Stakeholder Mapping was undertaken at the start of the project that defined stakeholders and methods of engagement for different groups (MOVE-ON project 2021). Here are some examples of key engagements on St. Helena:

- *Technical experts* were brought together to undertake skill-sharing and action-learning. The content focus of events was on the techniques and skills to avoid potential and real challenges around data sharing.
- The high-level engagement was targeted towards *securing a slot on the agenda of existing meetings* such as Info LEGCO (information sessions for the Legislative Council) or Central Management Team (CMT) weekly meetings (for the highest-level officials who lead the SHG portfolios of work).
- Another aspect that was key to the success of this Anchor Project was the fact that this role was not solely based out of the GIS Office but worked *embedded in different sections of government* according to a rotating schedule and so was physically present and therefore easily approachable. This type of arrangement could be particularly suitable for small islands, where it is usually not logistically complicated to move across different locations this way and one person can have a relatively large reach and impact through this type of working.

2.3 Establish a formal relationship with Island Government.

General: There must be buy-in and support from the island government, ideally resulting in a formal relationship established in writing through, for example a Memorandum of Understanding (MOU) or a letter of Intent (LOI) outlining a high-level willingness by the government to use MAES and other spatial data in policy and decision-making.

Key tip:

- **Where possible, build on existing positive relationships in government developed through previous collaborative working.**

SAA St. Helena: On St. Helena, prior to the start of on-the-ground implementation, SAERI and SHG signed an MOU establishing high-level commitments to work together and facilitate the inclusion of MAES and the 'evidence-bridger' role in SHG.

2.4 Establish an on-island entity with MAES data management and analysis capabilities

General: To implement, there needs to be an entity with a remit to deliver spatial and environmental evidence to the central government that is adequately resourced. If there is a lack of human and financial resources to carry out the analyses of evidence promoted by an 'evidence bridger', this could cause delays and backups in actually producing the outputs required. This would be very likely to result in less uptake of the service, meaning less use of evidence for decision-making.

Key tip:

- **Look across the government for transferrable skills. The technical skills and MAES understanding often do not sit within the Environment departments only.**

St Helena Anchor Project: The SHG GIS Office is a well-established entity that has been in place for over 15 years. It sits within the Infrastructure Department. It stored data in a standardized format alongside a variety of other spatial data relevant to decision-making. In addition, through various training initiatives from projects, the staff of the GIS Office were capable of applying this data in GIS techniques that can be used to support decisions, such as constraints mapping and Multi-Criteria Decision Analysis (MCDA). This meant that at the beginning of the SAA St. Helena, there was an established entity with the ability to access, manage, and use MAES data to support decisions.

2.5 Secure Independent technical advice

General: In addition to the 'evidence bridger' (2.1) and on-island entity (2.4) roles, a third technical support role adds significant value to the human resources available to ensure evidence is available to policy and decision-makers. This role can be either in the form of an individual or an entity that specializes in MAES and spatial data analysis and is available as 'call down' support for on-island organisations.

Key tip:

- **Independent technical advice, sourced sensitively, can reduce 'intellectual isolation' for on-island technical individuals/team.**

SAA St. Helena: As part of the wider MOVE-ON project and MOVE-ON consortium, the 'evidence bridger' was able to access a wide range of technical expertise from consortium partners to provide external advice and review of methods and approaches through Activities 3, 4 and 5.

2.6 Share skills and ideas across islands

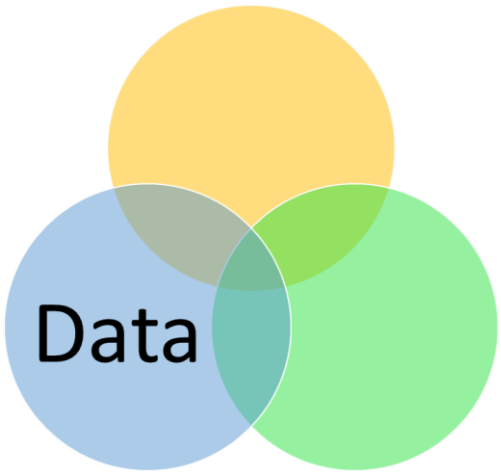
General: Cross-island/Cross Territory skill-sharing is another element that contributes to supporting the 'evidence bridger' and the on-island team.

Key tip:

- **Sharing experiences and learning across islands brings an understanding of how things work on an island scale.**

SAA St. Helena. The SHG GIS team has close connections with the SAERI data manager on the Falkland Islands, and there is a regular sharing of skills and ideas through monthly calls. Wider sharing of knowledge and ideas across islands is facilitated through an online platform. As an example, the data policy that is being developed on St. Helena is an adaptation of the one that has been implemented in the Falkland Islands.

3 Data:



'it doesn't always need to be technically challenging to have an impact'

- **Data is available**
- **Data is well-managed**
- **Data is clean**
- **Explore a variety of techniques**
- **It does not always need to be technically challenging to have an impact.**

3.1 Data is available.

General: To provide and analyse MAES and other data for decision-makers, the relevant baseline datasets need to be available. This includes **baseline habitat maps** and **ES maps**.

Key tips:

- **Where on-island data mining and collation haven't been undertaken, this is an important first step.**
- **Global datasets are often too coarse scale for island-level decisions.**

SAA St. Helena: As a result of previous projects, St Helena was in an advanced stage of its implementation of MAES with a large range of spatial data on ecosystems and their services kept in a standardised format by the SHG GIS Office. Much of the historic environment and conservation work carried out on St Helena had been focused on the preservation of its endemic biodiversity. Recently, there was an investigation into the ES provided, in particular the role of endemic species in capturing mist and therefore most of the island's freshwater (Sansom & Henry, 2019), stabilising soils and preventing erosion (Cairnswicks R., pers comm), and sequestering carbon (Ellick, 2015). Linking conservation efforts to ecosystem service provision has continued with for example the St Helena Cloud Forest Project focusing on water provisioning services and carried out in collaboration with Connect St Helena, the island's utility company. Two key projects capturing MAES data on St Helena were the Darwin Project "DPLUS052: Mapping St Helena's Biodiversity and Natural Environment" (Pike, et al. 2018) and the land-use model outputs created for the South Atlantic Natural Capital Assessment (McVittie, et al. 2019). Outputs from both of these projects are hosted on a WebGIS freely available for the public to view.

3.2 Data is well-managed

General: To provide and analyse MAES and other data for decision-makers, the data needs to be centralized and well-managed. All data sets need to be accompanied by metadata records so that the origin and reliability of the data are fully understood.

Key tip:

- **Where island-wide data management does not exist, implementing one is an important first step.**

SAA St. Helena: Because of previous projects, St Helena was in an advanced stage of its MAES data management, and all data and metadata was available through an online data portal. ES maps were available for viewing via an online WebGIS.

3.3 Data is clean

General: All data needs to be clean so that it can be used for analysis. Work with the GIS team at the start of a project to understand the best format for data collection to increase the number of datasets available to the GIS office to analyse.

Key tip:

- **Where clean data is not provided, encourage and where possible train data collectors and data providers in collecting and cleaning data to reduce the time burden on the 'evidence bridger'.**

SAA St. Helena: On St. Helena, some of the data received by the GIS team was not 'clean' and consequently a significant proportion of the time was allocated to cleaning data rather than to the analysis for decision-makers.

3.4 Explore a variety of techniques

General: There are a number of different techniques that can be used to analyse the evidence for decision-makers (See **Annexe 1** for examples). Presenting a variety of techniques using on-island data to demonstrate how analysed data might be able to inform policy and decisions can spark interest enabling the audience to independently apply, where relevant, to their sector, even though the demonstrations might not relate directly to existing policy topics.

SAA St. Helena: Where a technique such as constraints mapping or Multi-Criteria Decision Analysis (MCDA) was required, a standard process for defining these constraints in requests increased the ability of the GIS Office to rapidly respond to real-time decisions. For example, after the SAA St. Helena, there was increased awareness of decision support techniques such as constraints mapping and MCDA but not necessarily knowledge about the process used to create the final maps for these. As a result, requests would come in asking to see a constraints map without defining what the constraints would be, in topics that the GIS Office did not have the expertise or remit to make decisions on (e.g. buildings regulations or conservation) – basically asking the GIS Office to complete all of the steps in **Error! Reference source not found.**. This often meant there was a back-and-forth, again creating bottlenecks and increasing the time between the arrival of a request and the delivery of the actual analysis. If all the constraints are confirmed and identified with the request to the GIS Office, this would allow the team to turn around requests more quickly, decreasing the resources required per request and likely increasing uptake.

3.5 It does not always need to be technically challenging to have an impact.

General: Sometimes, the barrier to evidence use has a simple technical solution. Work closely with data providers, users and decision-makers to see what they would like to do with their data, and provide training or learning by doing, to develop skills in these areas.

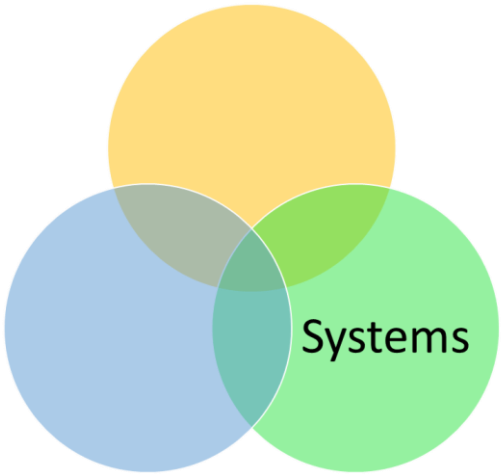
Key tip:

- **While training and skill transfer should always be the first option, sometimes the 'bridging role' needs to be a 'doing' role which acts and delivers on all requests that come in from government staff.**

St Helena Anchor Project: There were many requests from various SHG departments that were not technically challenging, however on delivery; they made an important contribution to improving the evidence base in a number of areas. For example: putting

the walking paths onto a satellite image for the Tourism department enabled them to provide visitors with a visualization of the walks; creating a spatial join for the agricultural department's data enabled them to view their data spatially in real-time and reduce their time doing this manually by over 4 weeks a year.

4 Systems:



"Find the Lightbulb moments or Lightbulb maps"

- **Understand where the country sits within the MAES implementation framework**
- **Policy screening**
- **Translate results into decision-makers language**
- **Deliver what the decision-makers request (with relevant caveats)**
- **Articulate a process for evidence use for decision-making**
- **Remove barriers to the use and availability of evidence**
- **Develop a process for sharing on-island technical expertise.**

4.1 Understand where the country sits within the MAES implementation framework.

General: Undertake a baseline assessment to establish where the country/entity sits within the context of the MAES implementation framework (Sieber et al. 2021).

SAA St. Helena: A key to the success of SAA St. Helena was that St Helena was in the "implementation" stage in the MAES process. This meant that a large amount of MAES had already been carried out. In addition, this information was searchable and accessible through online resources such as WebGIS and the St Helena Data Portal.

4.2 Policy and planning screening

General: Understand the Island Government policy landscape and the policy process. Screen existing and upcoming policies to identify where evidence could/should be used.

Find the policy and planning drivers for the decisions made by high-level Government officials and Politicians. In the context of government, these are often department plans.

Key tip:

- **Find the policy hooks within current or emerging policy where MAES and other environmental spatial data can assist decision-makers.**

SAA St. Helena: A policy screening was undertaken to create a list of high-level policies and identify where the implementation of objectives and goals within the policy could be strengthened by the analysis of existing evidence. For example, in the Islands Plan, there is an objective to increase honey production. MAES evidence was used to demonstrate which areas would need to be targeted to implement this objective to policy-makers.

4.3 Translate results into decision-makers language

General: Once key policies and plans that drive decisions have been identified (4.2) go through them in detail to see where there are 'hooks' for use of MAES and other environmental evidence. Create demonstrations of how this evidence could be used to facilitate decisions in the relevant are and reach out to relevant stakeholders (identified in 2.2) to showcase these demonstrations.

Key tip:

- **Translate the MAES and environmental language into that of the policy or plan that is driving decisions rather than vice versa.**

SAA St. Helena: A new government was elected during the project and they created a brand new vision and strategy for the island as a whole. The 'evidence bridger' analysed the new vision and strategy and used that as the framework for demonstrating how MAES and environmental evidence could assist the new government with decisions relating to the goals of the new strategy.

4.4 Deliver what the decision-makers request (with relevant caveats).

General: Following on from the various activities and approaches such as stakeholder engagement (2.2) and Policy screening and demonstrations (4.2), it is likely that there will be an increase in the number of requests for MAES and spatial data from the 'evidence bridger' and on-island team. Often these requests might not relate directly to MAES or environmental data, or the time required to address the request might be limiting. However, it is important to develop and maintain the interest that drove such a request, therefore all efforts should be made to deliver against this, with stated caveats about limitations where required.

Key tip:

- **Once interest is raised, it is important to deliver against requests even if the requests do not relate directly to MAES or environmental data.**

SAA St. Helena: A request was received that related to understanding the potential availability of land for housing based. While not directly related to MAES, working through the process of identifying constraints (both environmental, social and policy constraints) with the decision-maker, and providing the resultant map was pivotal to increasing understanding and awareness of the value of the provision of evidence in demonstrating objectivity and transparency in decision-making.

4.5 Articulate a process for evidence use for decision-making

General: Understand and map the policy process and other processes where decisions are made. Articulate and standardise a process for the inclusion of MAES and spatial environmental data within these existing government processes. This standardization could allow such a process to then be embedded as a requirement for any policy with a spatial dimension as a means to ensure evidence-based decision-making. This could include, for example, adding a check for MAES and environmental spatial data as a step in the policy process.

Key tip:

- **Try to insert MAES and environmental evidence into existing processes rather than creating a new process.**

SAA St. Helena: While not completed during the MOVE ON Project, the ultimate goal in terms of inclusion of MAES and Spatial data on St. Helena was to include it as a separate section– or as a sub-component of the environmental section within the papers that were sent to the Executive Council (EXCO) for the highest-level decisions on the island.

4.6 Address any barriers to data sharing and retention

General: A policy setting out principles for how data should be used, accessed and shared would help reduce this bottleneck a great deal. To increase public engagement and participation, it would be a strong recommendation for a principle that emphasises the importance of open data, for example by specifying that data collected using public funds be open access by default unless one or more from a list of criteria for sensitivity applies.

Key tip:

- **Understand data-sharing challenges as soon as possible.**

SAA St. Helena: In the case of St Helena, bottlenecks sometimes occurred due to the lack of a data policy. Causes for this were sometimes because of questions about data ethics and privacy, as well as sometimes due to a lack of formal agreements for data sharing between organisations where this would be extremely beneficial – for example between the government and the island's utility and telecommunications companies. Therefore, a draft St. Helena Data policy was further progressed to address this.

4.7 Develop a process for sharing on-island technical expertise.

General: There is often important technical expertise based on the island. However, due to the organisational hierarchy, the on-island technical experts do not always get given a

platform to share MAES and other environmental evidence and advice with high-level decision-makers. Use opportunities created through externally funded projects to highlight the on-island expertise.

Key tip:

- **For any external project, identify an on-island counterpart who is an integral part of the project technical and stakeholder engagement activities throughout the project duration.**

SAA St. Helena: Although the role of the GIS Office or a similar entity is focused on providing technical expertise rather than being high-level decision-makers themselves, it would be advisable to have some kind of consultation or line of communication at a strategic level. This would particularly apply when high-level decisions are made in areas that could affect their future work, such as wider decisions about IT in government.

4.8 Find the lightbulb moments or maps

General. Following on from the various approaches outlined above, the demonstration maps, if targeted well, might result in a 'lightbulb moment' or a 'lightbulb map' for a decision-maker. A slightly intuitive understanding of this moment can create an opportunity for opening the door to wider conversations and understanding of how to bridge the gap between evidence and decision-making.

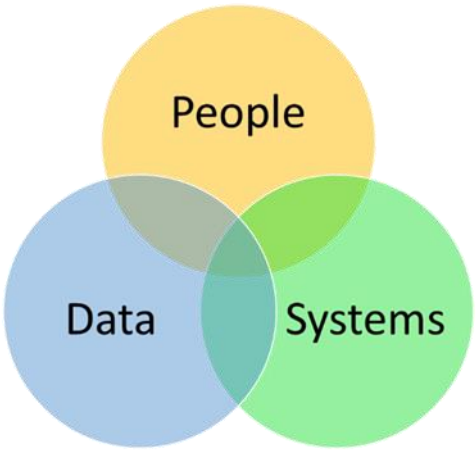
Key tip:

- **The lightbulb map for a decision-maker might not be of particular interest to MAES, but it creates an opportunity for developing understanding and conversation.**

SAA St. Helena: A participatory map that was produced because of the input of c. 100 primary school children illustrating their favourite place on the islands received much interest at a high level for a few reasons (1) the 2 areas that were highlighted were the island's only accessible beach, and the island's only sports field. These were not necessarily the areas that the decision-makers had thought about when considering young people's needs on the island. This visual articulation of the cultural service provided by the sea was a light bulb moment. (2) It introduced the idea of using the technique of participatory mapping as a tool for gathering opinions and ideas at a much wider scale than regular methods of public consultation such as public meetings.
There is little flat land on St. Helena, and the objectives and goals of many policies (e.g., expanding agricultural production, housing, honey production, renewable energy etc.) require flat land. The production of a map that demonstrated how little flat land there was, proved a 'lightbulb map' for many decision-makers across government departments.

5 SUMMARY

Understanding the three key elements of People, Data and Systems are key to bridging the gap between evidence and policy and decision-making.



The pivotal 'evidence bridger' role needs to be supported by an on-island entity that has a GIS remit, external technical support, and territory-to-territory skill sharing.

Another prerequisite is the existence and availability of MAES and environmental data that is well-managed and clean. A variety of spatial data analysis techniques should be explored to find the best ways of presenting the data for policy and decision-making, noting that it does not always need to be technically challenging to have an impact.

When developing systems and processes for bridging the gap between evidence and decision-making, it is important to understand where the country sits within the MAES implementation framework and to undertake a policy screening to understand the existing policy landscape and policy processes on the island. The evidence should then be 'translated' into the language used in these on-island policies. When interest has been galvanized, and decision-makers submit requests for evidence, all efforts should be made to deliver against these requests even if they do not relate directly to the topic of focus, as this is a pathway to opening opportunities and conversations around the inclusion of evidence in policy and decision-making. The articulation of a process can then formalize this inclusion. Any barriers to the availability and use of evidence – such as data sharing concerns, or paying for data, should be identified and addressed, and the process for enabling on-island experts to be recognized and included in decision-making should be established.

SAA St. Helena. Key to the project's success was the already existing data management system maintained by the GIS Office in St Helena. This ensured that there was a variety of spatial datasets on relevant topics for decision-making and that this data was kept in a standardised format with detailed metadata. The only notable barrier to evidence uses in decision-making relating to data was the lack of data policy, which the SAA St. Helena helped to create.

Additionally, there were key elements in the workforce at SHG that allowed the project to gather momentum quickly: the GIS team maintaining this data and being trained in its analysis, and the support of their work and the project from key high-level figures such as senior civil servants and politicians. The SAA St. Helena built on this base by having the

Spatial Data Analyst role regularly engaging relevant groups of stakeholders and facilitating the GIS Office's ability to respond to requests in real time for decision-making.

While the Anchor Project began to gather momentum for the third step identified this could be seen as the last stage needed to fully bridge the gap between evidence and policy on St Helena: systems that ensure regular engagement on data available and analysis possibilities, and the formal integration of evidence review through data analysis during relevant decision-making processes. The findings of the Anchor Project also suggest that the best outcomes would be achieved through acknowledgement of the interpersonal and societal dynamics of the local context, especially on small islands.

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Annexe 1: Examples of Spatial data analysis techniques that might be of interest to policy and decision-makers.

Constraints mapping (CM): Constraints Mapping is an approach in GIS analysis that utilises a set of criteria relevant to the study area to help identify potential suitable sites and disregard non-suitable sites (Malczewski, 2000).

Multi-criteria Decision Analysis (MCDA): Similar to constrains mapping, Multi-criteria Decision Analysis assigns a value to certain criteria to analyse complex decision problems. It breaks down a spatially-related problem into small, simple, and understandable parts in order for a result to be obtained (Sisman and Aydinoglu, 2020).

Participatory Mapping: Participatory Mapping is the process of deriving people's spatial knowledge in the form of 2D or 3D maps as a method of learning, discussion, and information exchange. It is a form of community engagement that allows different member's opinions to be represented (Chambers, 2017).

Spatial Joins: A Spatial Join is a commonly utilised method in GIS research that enables non-spatial data to be joined to another dataset that has a spatial characteristic. Often data lack geographic coordinates, but contain valuable information. GIS can assign this data to either specific locations or a generalised location, such as using a bounding polygon, or join the data based on a commonly shared value (Mamoulis, 2009).

Time Series: Time Series data is data that is collected at temporal intervals. It is used to assess the change in data records over time . In GIS, time series data is especially valuable for assessing spatial variation over a specific time period, such as land cover change in satellite imagery (Ayele et al., 2018).

Satellite Data: This imagery, obtained from earth-observation satellites has many uses, including aiding precision agriculture by identifying at-risk areas where water stress is high or vegetation health is poor – and adapting farming practices to match this. More recently, imagery from unmanned aerial vehicles has become more prevalent for even greater accuracy (Ayele et al., 2018).

Hotspot Analysis/Heatmaps: These techniques can help with the identification of areas where any types of incidents happen, such as car accidents, fire risks etc. Providing a spatial context to this data helps locate clusters of localised events (Prasannakumar et al., 2011).

Viewshed Analysis: Viewshed Analysis utilises the ability of GIS to calculate the intervisibility of two given points on a model of elevation (digital elevation model). It is closely related to cost-surface analysis, which uses algorithms to calculate the cumulative cost of travelling over the digital elevation model (Leusen, 1999)