Natural Asset Register: Data Portal

Project Report

RESAS1.4.1 [O1.4.1aD14: Document the NAR: DP]

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Contents

Executive Summary 2
1. Purpose and Project Background 3
2. Initial Investigations 4
2.1 Review of existing registers 5
2.2 Researcher workshop 6
2.3 ELSEG Presentation and Workshop (November 2016) 6
3. First Draft: Esri Geoportal 7
4. Second draft: CKAN 9
5. Accessibility Consultation 11
6. NAR: DP Vision Statement 12
7. Steering Group 14
8. NAR: DP for Mobile Devices 14
9. Current state (2020-21): CKAN 15
10. Continuing Activities to Improve NAR: DP 18
10.1 Populating the NAR: DP with geospatial data 18
10.2 NAR: DP Content & Application Programming Interface (API) 18
10.3 Link to Scottish Government Spatial Data Website 19
10.4 NAR: DP Site traffic though Google Analytics 19
11. Project Outputs and Activities 21
11.1 Metadata tool 21
11.2 Newsletters 22
11.3 Vocabularies, ontologies and metadata-standards 22
12. Discussion and Next Steps 22
References 24
Glossary and list of acronyms 25
Appendix 1. List of project outputs 26
Appendix 2. Email consultation, August 2017 28
Appendix 3. Listing of software used 29
Appendix 4. Listing of modified files 30
Appendix 5. List of resources available from NAR: DP 32

Executive Summary

Scottish Government provides funds to support research in Scotland via its Strategic Research Programme (SRP). In the 2016-21 SRP "Theme 1 – Natural Assets" included funding for a project to make accessible spatial data describing Scotland's natural environment. This project has produced a tool named Natural Asset Register: Data Portal (NAR: DP).

This document is a report that describes the activity and outputs of the project team in producing the NAR: DP and it includes web links so that the key documents produced may be viewed. The NAR: DP can be viewed at http://nar.hutton.ac.uk/

The provision of the NAR: DP and the spatial data that it includes addresses legal and institutional requirements to make data available.

A review of existing comparable platforms was conducted so that the project team was aware of the current state of development and approaches. The review found this was an area of significant and increasing interest. However the review also highlighted that there were diverse approaches to content, standards and purpose.

Initial work on the spatial data included in the NAR: DP was driven by data availability and the outcome of two workshops.

A Vision Statement was produced to clarify the aims and purpose of the NAR: DP. The primary audience for this document was the RESAS Science Advisor and Hutton colleagues.

A first draft NAR: DP was produced using a platform provided by the main supplier of proprietary spatial analysis and hosting software (Esri). However, it was decided that for several reasons this platform was not suitable. A second draft was built on a general purpose and more widely used information sharing platform (CKAN), and this has been used in all subsequent work.

A project Steering Group with representation from relevant bodies was formed. Regular meetings with this group provided vital input to the design and information included in the data portal.

Data results or outputs from SRP funded activities were obtained from the scientists responsible for the research and added to the NAR: DP. These NAR: DP resources were provided with information to facilitate viewing and searching of the NAR: DP by research organisation, data theme and other approaches.

The number of visitors to the site is tracked using standard web tools. Since Autumn 2019 the mean number of visitors to the site has been more than 50.

Work in the year 2021-22 will investigate options for continuing to provide access to the information included in the NAR: DP.

1. Purpose and Project Background

1.1. Purpose of this report

The purpose of this report is to provide a single comprehensive record of the work carried out at the James Hutton Institute to develop an online repository for geospatial data results generated from the Scottish Government funded Strategic Research Programme (SRP). This online research data repository is referred to as the Natural Asset Register: Data Portal (NAR: DP). This work was carried out within Research Deliverable 1.4.1 Natural Asset Inventory and Natural Capital Accounts (RD141) in Theme 1 - Natural Assets of the 2016-21 RESAS Strategic Research Programme. The overarching aim of this body of work was to "develop a comprehensive natural asset register that captures condition, assets 'at risk' and asset health/functioning as well as ecosystem service flows (and their values) that originate from the assets". The work described in this report covers the reviewing of related initiatives, exploring and testing software options for implementing the NAR: DP, populating the NAR: DP with geospatial research datasets, and its improvement guided by stakeholder input (Table 1). These geospatial datasets relate to Scotland's natural assets e.g. soils and in the case of cultural ecosystem services datasets our interactions with these natural assets. The activities described here do not include the creation of these datasets, they were created through research projects in other parts of the research programme, primarily in the following work packages: 1.1 Soils, 1.2 Water, 1.3 Biodiversity and 1.4 Integrated land use.

All stages of this project were carried out in close collaboration with research and non-research stakeholders. Further details of working closely with non-research stakeholders are set out in Sections 6 and 7.

1.2 Overview of developing NAR: DP's objectives

The NAR: DP was designed to address a number of legal and institutional requirements. These included the Scottish Government's guidance to INSPIRE (Scotland) Regulations, 2009 which states that the regulations apply to third party organisations. The culture of researchers and institutional best practices related to sharing research outputs varies from instances of rapid and open sharing to often slow or non-sharing of research outputs. The NAR: DP was thought to be perfectly placed to help coordinate publishing and making accessible these outputs and also to assist researchers in creating compliant metadata for uploading to Scotland's catalogue of spatial data (SpatialData.gov.scot[1]). The outputs to be included in the NAR: DP would be restricted to publishable results and would not include the input data nor models used in producing research outputs.

The Data Management Plan for the SRP stated that data should be made openly and freely available and that the data management will operate in accordance with best practice (including INSPIRE, Scotland's Open Data Strategy etc.). The NAR: DP team suggested this could be facilitated by creating web mapping services (when needed) and supplying a single location from which all geospatial research data could be accessed.

The purpose and content of the NAR: DP evolved during the project in response to feedback and guidance from Scottish Government RESAS representatives and a wider Steering Group, established in 2018 (Section 7), technological developments and improving understanding of tools and user

[1] https://spatialdata.gov.scot/geonetwork/srv/eng/catalog.search#/home

requirements. The updated vision for the NAR: DP was encapsulated in a vision statement (Section 6) that was co-produced with RESAS colleagues and through wider consultation.

The NAR: DP went through a series of stages of development, these are set out in Table 1. Early in the project there was uncertainty about exactly what the NAR: DP would contain and what it would provide and to whom. As the project evolved, and thanks in large part to the Steering Group and the work in producing the Vision Statement (Section 6), these aspects of the NAR: DP were made clear and explicit. The website tool which is the primary output of this project was initially referred to as the Natural Asset Register or NAR. However, following an Ecosystems and Land Use Policy Exchange Group (ELPEG) meeting in September 2017 and during subsequent discussions it became clear that this name did not accurately describe the kind of tool that was being created in the project. In a vision statement drafted late in 2017 and finalised in January 2018 (Section6) and shared with the RESAS Science Adviser the tool being created in this project was presented as a Natural Asset Register Data Portal or NAR: DP (Table 1).

Table 1 Key stages in the development of the NAR: DP project.

Date	What happened?	Impact on NAR: DP
Apr 2016	Project started and initial research of existing registers	
Aug 2016	Produced and shared a review of existing related initiatives	Helped provide options for the focus
Oct 2016	Researcher workshop (Aberdeen)	Engaging research stakeholders on their needs and views for NAR: DP
Nov 2016	Ecosystems and Land Use Stakeholder Group presentation	Improved awareness amongst target audience
Aug 2017	External consultation with stakeholders and other researchers	16 sets of written comments.
Sep 2017	ELPEG meeting involving stakeholders included discussion on name and focus	Started co-production of a vision with main RESAS contact
Nov-Dev 2017	Vision Statement co-produced	Clarified purpose of NAR: DP
Feb 2018	Accessibility Consultation shared with stakeholders	
Jun 2018	Established Steering Group	Steering Group six monthly meetings with representative from Scottish Government, SEPA, NatureScot, SEWeb, and SEFARI institutes.
Oct 2018	Mobile NAR: DP option research briefing	
Nov 2018	Presented poster at Land Use Conference	Improved awareness amongst target audience

2. Initial Investigations

The project to create the NAR: DP was started in April 2016 and this section describes the project team's first activities, including the reviewing of existing registers.

2.1 Review of existing registers

A review of the state of development of natural capital asset registers and their drivers was conducted and a report written[2]. The aim of this review was to inform the development of the current NAR: DP. In the review we mainly focussed on Scottish and wider UK practical initiatives with a view to understanding how comprehensively and in what ways information was being made available. A total of 19 initiatives of various types were reviewed and were summarised and described in detail in the report.

2.1.1 General findings

The review found there was significant interest in natural asset register and the level of activity in formulating natural asset registers was rapidly increasing (2014-16), reflecting policy and social needs to assess natural capital assets and innovations in the technological capability to meet those needs. Relevant initiatives could be grouped into initiatives that primarily assessed natural capital and its services and valuations, and a second group focussed on the provision of environmental information. Standards were found to be important with a range of standards those governing the electronic publication of data to ecosystem service classification. All of the assessed initiatives utilised standards to varying degrees. We found that the development of these initiatives was being accelerated, and their implementation simplified and made less resource intensive through the use of established standards and by free to use templates and software. There was little overlap between projects assessing assets and those which make environmental data accessible. We did not find a single project which provided a comprehensive assessment of a broad range of terrestrial natural assets and which made that assessment accessible.

2.1.2 Initiatives primarily providing assessment functionality

There has been more emphasis on the quantity of natural capital than on assessing the quality of those assets. However, ecosystem service provision can only be accurately assessed when both the quality and quantity of natural capital are known. In addition to the requirement for qualitative assessment of assets there is a need to ensure that information is captured which takes account of how natural assets change over time. There is a need for time series data that measures the flow of assets or services. The valuation of natural capital and services is rapidly developing. However, there remain significant challenges to monetisation and non-monetary valuations of services. A systematic evaluation of the Scottish Natural Capital Asset Index found a low percentage of indicators were fit for purpose, and those few reflected changes in flows or the resilience of the resource.

2.1.3 Initiatives primarily providing environmental data

There is currently a lot of activity in producing new spatial data sharing websites and in updating existing sites. This is particularly the case in Scotland. These sites cover a diverse range of data types, purposes and intended audiences. This range of approaches is a response to a number of factors, including the diversity of information being presented, but also editorial decision making. Sites which offer flexible user interaction but also fixed pre-defined outputs appear to offer more successful solutions. Web Mapping Services (WMS) are a key component in the reviewed sites. However, the use of WMS presents significant cartographical challenges unless there is significant collaboration among providers. EU regulations give guidance on the best approach to data access. However, there are technical requirements that can mandate specific data holdings. A range of

[2] http://www.hutton.ac.uk/sites/default/files/files/research/srp2016-21/RESAS_srp141_D1_ReviewNaturalAssetRegister_v1_0_FINAL.pdf

solutions has been observed and these have been governed by the functions provided by the sites. There are trade-offs between level of site functionality and the resource required to support it.

2.1.4 Developing the scope, focus and requirements of the NAR: DP

There were references to the Natural Asset Register across all three SRP Themes, with particular emphasis in Theme 1. The diversity of the research deliverables referencing the Natural Asset Register required that significant flexibility be incorporated into its design. There was currently significant capacity in the supply of environmental data in Scotland. However, the SRP Natural Asset Register will avoid duplication in being unique in adhering to CICES and in focussing on natural assets, ecosystem services and valuations. It will also provide access to SRP geospatial outputs which were missing from other online natural asset register initiatives.

2.2 Researcher workshop

A workshop was held on 5th October 2016 with over 20 Hutton colleagues in attendance to discuss the next steps in developing the Natural Asset Register with a selection of both those who will be the data providers to the NAR: DP and those who may wish to be a scientific end user of the NAR: DP. An outcome of the workshop was an answer to the question "Where does the SRP Natural Asset Register fit in relation to the initiatives reviewed?" (referring to the initiatives reviewed in the task described in section 2.1). The workshop found that the NAR: DP could avoid duplicating existing initiatives by:

- Adhering to Common International Classification of Ecosystem Services (CICES)
- Focussing on natural assets, ecosystem services and valuations
- Providing access to SRP spatial outputs

The workshop produced a series of questions and recommendations to assist in developing the scope of the NAR: DP:

- Is it a strategically relevant research tool or aimed at the general public, or government and agencies?
- Choose a topic around which to build the draft NAR: DP
- Is the NAR: DP to be positioned as **the** trusted source of natural asset/ES data, or just one of several?
- Is existing published data from other sources to be included, e.g. EUNIS? Or only MRP outputs on asset condition, assets at risk, ES flows and valuations?
- Distil a set of key principles

The workshop produced a set of candidate issues for the initial focus of the NAR: DP:

- Improve Scottish Rural Development Programme (SRDP) targeting
- Support Ecosystem Health Indicators (EHI)
- Support Natural Capital Asset Index (NCAI)

2.3 ELSEG Presentation and Workshop (November 2016)

The authors gave a presentation on the NAR: DP on 14th November 2016 to the Ecosystems and Land Use Stakeholder Group. The presentation described the key findings of the review of existing natural asset registers which had been completed earlier (section 2.1), highlighting the increase in the

number of such initiatives. We engaged with stakeholders in a breakout workshop at the event, with 14 attendees from a wide range of organisations present. In the breakout group the presenters took forward the views from the October researcher workshop (section 2.2).

The breakout group discussion found that there was interest in the Natural Asset Register from a range of representatives from organisations: Natural England, NatureScot (Scottish Natural Heritage), Scottish Land and Estates, Scottish Wildlife Trust and Ecosystem Knowledge Network. It was also found that there was a need for clarity in who the non-researcher users of the NAR: DP would be, which groups may find this information useful now, and in the future. It was suggested that it would be beneficial to have the NAR: DP located on Scotland's Environment website where other related datasets and tools could be found. However the intended focus of the NAR: DP (as described in the Vision Statement, Section 6) would consist of research outputs from the strategic research programme, a related but distinctly different set of data to that which can be discovered on Scotland's Environment website.

As a result of the workshop and subsequent discussions it was decided that an initial thematic focus of the NAR: DP was required as a starting point for populating the tool with data. It was decided that a suitable focus was to have datasets to assist with SRDP targeting and to this end a dialog with Hutton's lead researcher in this theme was established. This led to the collation of relevant datasets and the publishing of web mapping services and their inclusion on the NAR: DP[3].

As an outcome of this initial stage of research the project team understood that it was clear that there was a lot of interest in natural asset registers including increased provision of geospatial data online, and there were differing understandings in what the NAR: DP could provide and to whom.

3. First Draft: Esri Geoportal

The first prototype data portal was made following the decision to use the Esri Geoportal software in January 2017. This decision was informed by the Review (section 2.1). Also supporting the choice of Esri Geoportal were its availability at zero cost and its known compatibility with other Hutton computing infrastructure. This prototype was not made publicly accessible but was reviewed in internally by the project team and a number of experienced colleagues. Following installation and evaluation and the researchers gaining a better understanding of the platform it was discarded as being unsuitable for further use. It was observed that the development platform lacked configuration flexibility and responsive web design (so its usability on mobile devices was not optimal) and it also had a dependency on the "Flash" technology which was then deprecated and has since been retired. In addition, the Esri Geoportal user interface was considered to be rather dated and not suitable for users who were not spatial data specialists as can be seen in Figure 1 to Figure 3 below.

[3] http://nar.hutton.ac.uk/dataset?tags=SRDP

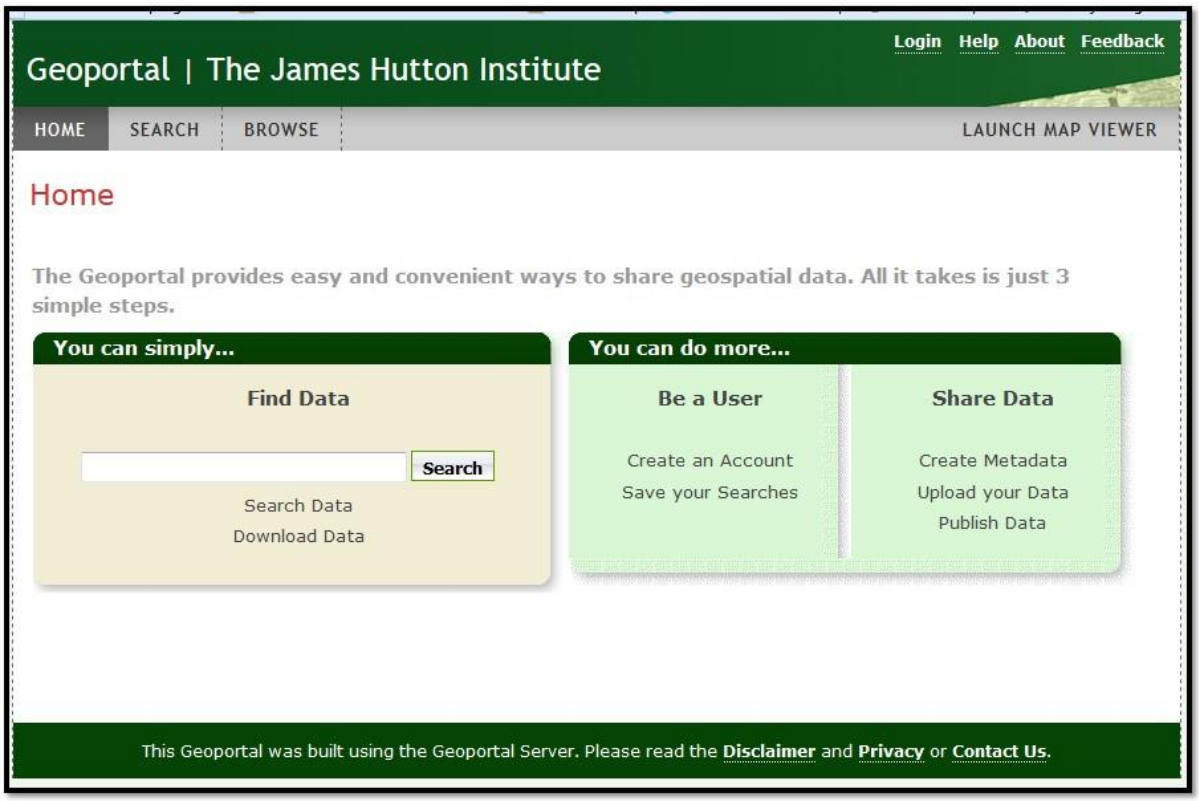

Figure 1 Esri Geoportal NAR: DP – Front page

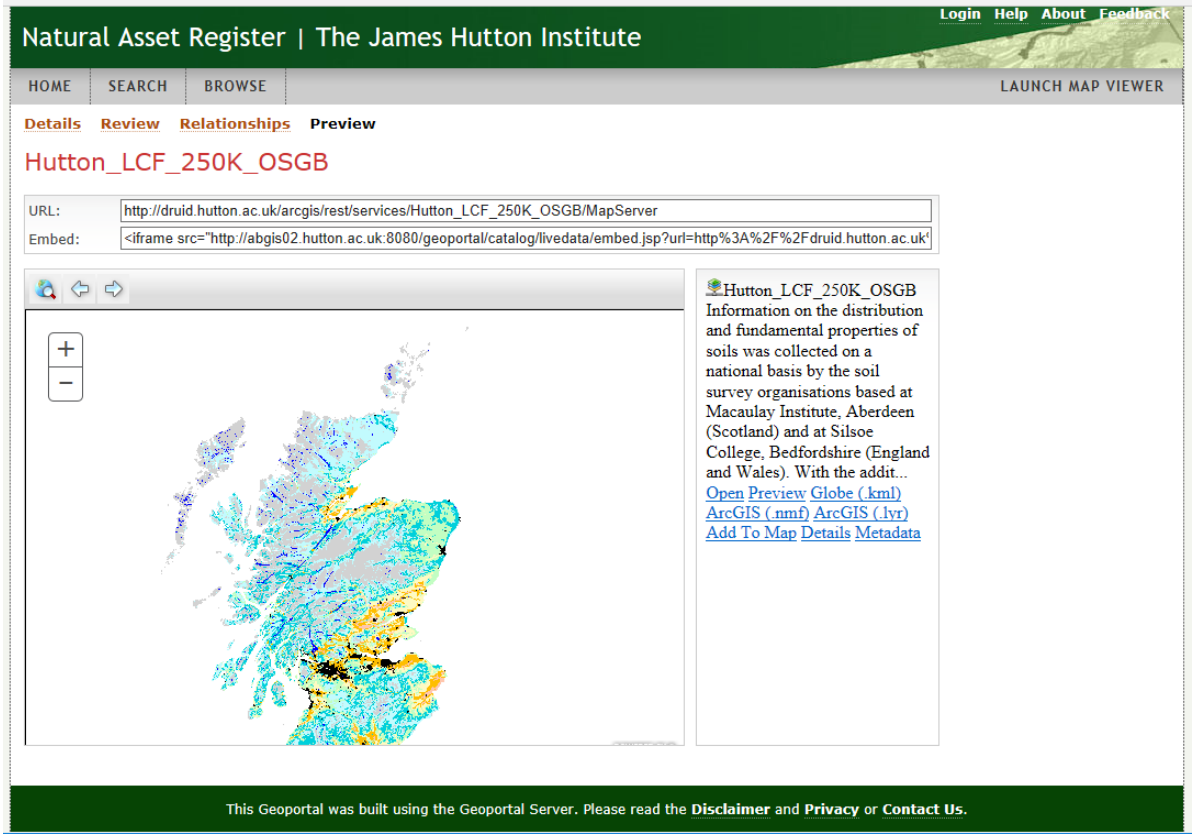

Figure 2 Esri Geoportal NAR: DP – Example webmap

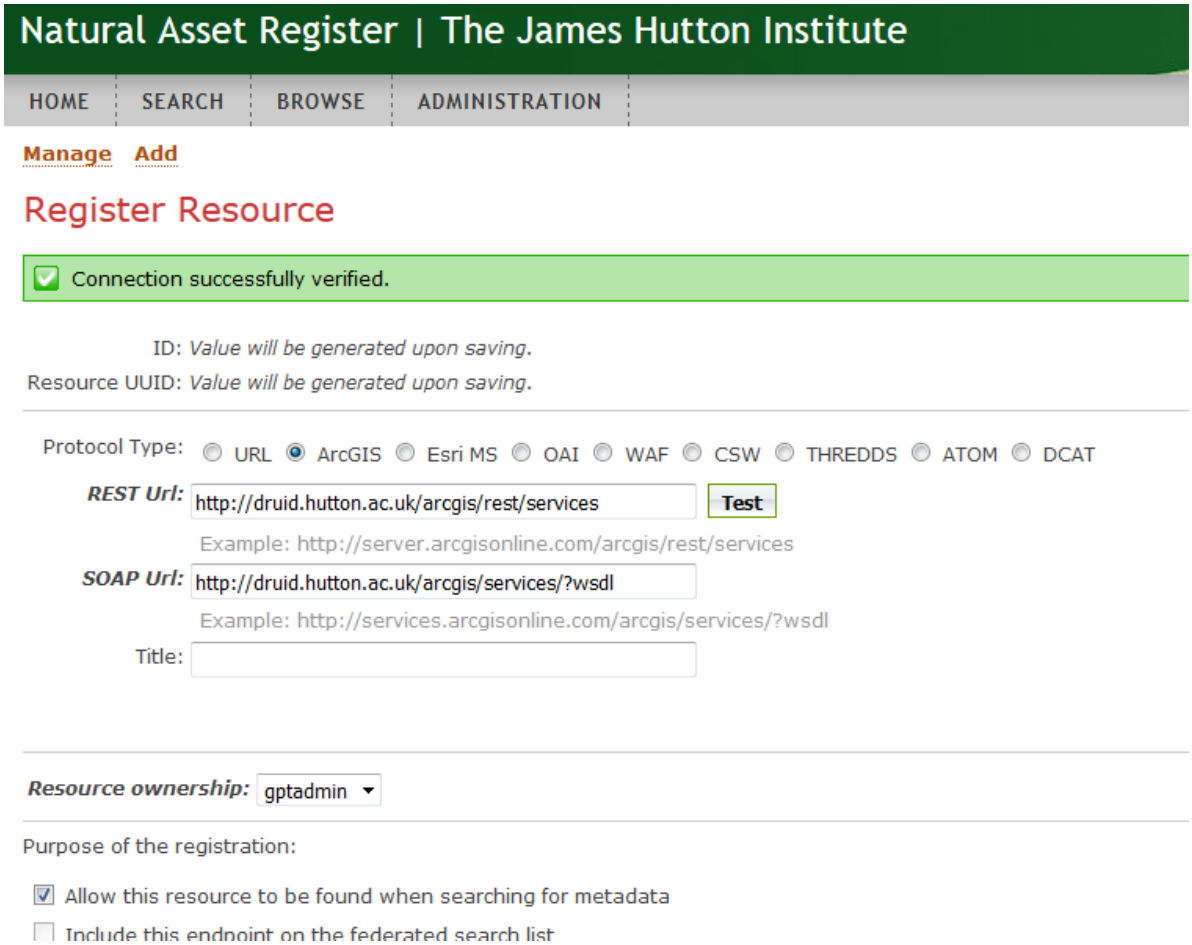

Figure 3 Esri Geoportal NAR: DP – Example resource

4. Second draft: CKAN

In April 2017 a decision was made to adopt the CKAN[4] platform for the NAR: DP. CKAN is a free to use tool for making open data websites. It had been noted that the UK government data portal[5] had adopted CKAN and that it had a wide range of installed uses[6], from cities and universities to the EU and departments of governments of Australia, Canada and the USA. It was considered that such widespread uptake was a convincing argument for its adoption for the NAR: DP as user familiarity with this type of site could already be fairly high and its interface would be suitable for a more general audience than that of the Esri Geoportal. It was additionally noted that CKAN has a much fresher, more modern user interface, it didn't use the deprecated Flash website plugin, and it was actively supported, whereas Esri Geoportal appeared to be largely unsupported by the software supplier.

A draft CKAN site was produced and this formed the basis of the Accessibility Consultation in August 2017 (Section 5). Figure 4 illustrates the front page of the NAR: DP at the time of the consultation.

[4] https://ckan.org/
[5] data.gov.uk
[6] https://ckan.org/instances/

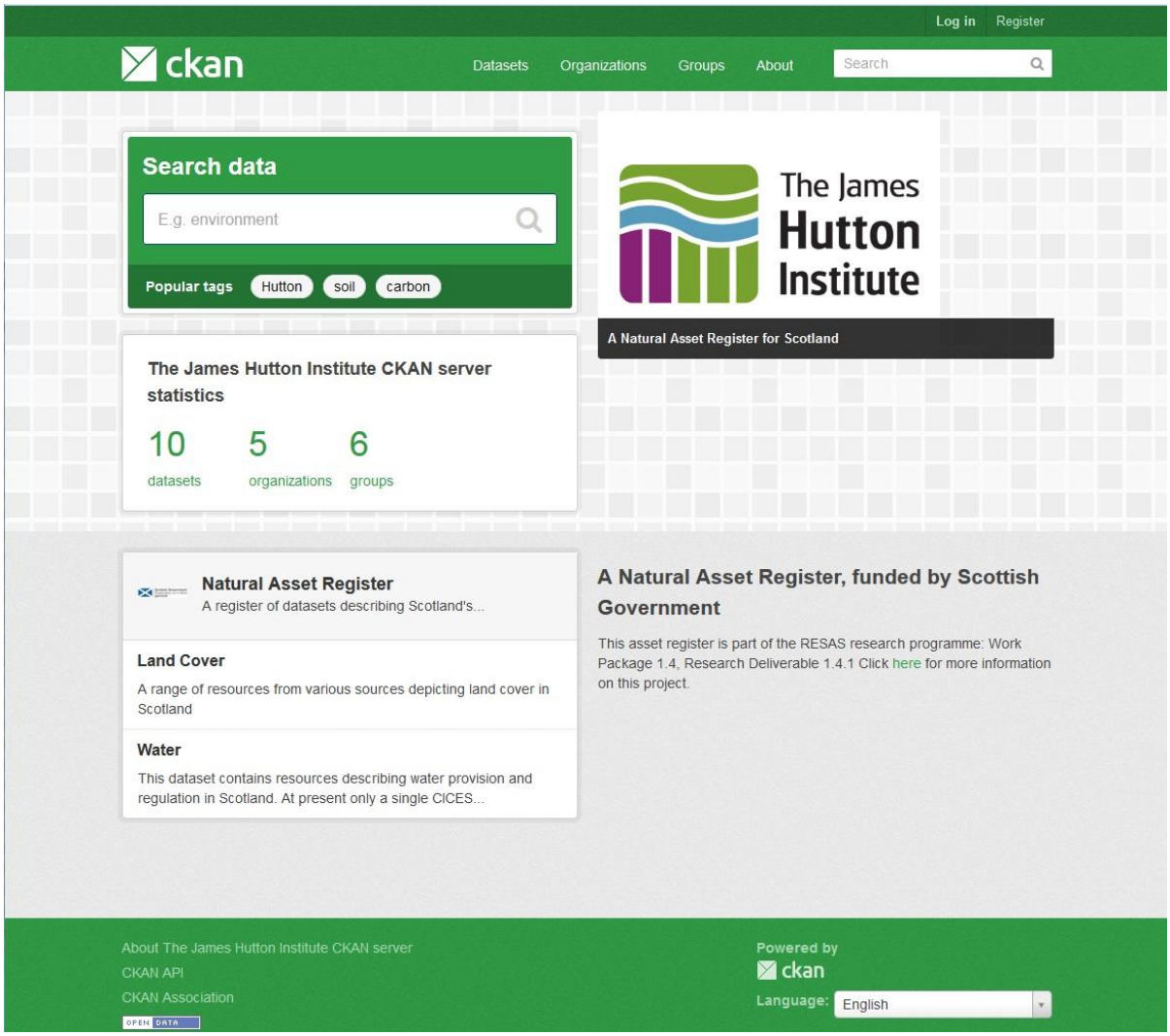

Figure 4 CKAN NAR: DP – Front page

It was noted in August 2018 that the Irish government's https://data.gov.ie website had made the same transition from Esri Geoportal software to a CKAN tool that the NAR: DP project team had followed.

CKAN provides several ways in which users can navigate the site to either find specific data resources or to browse the site. This flexibility helps to enable new users to find items of interest quickly and without frustration. In addition, CKAN provides sets of filters so that user can find resources by selecting an organisation or a theme or other tag applied to the data.

After selecting a dataset (by clicking on the title which is a web link) the user is presented with a view containing a title, a brief description and buttons to view or download data, as shown below in Figure 5.

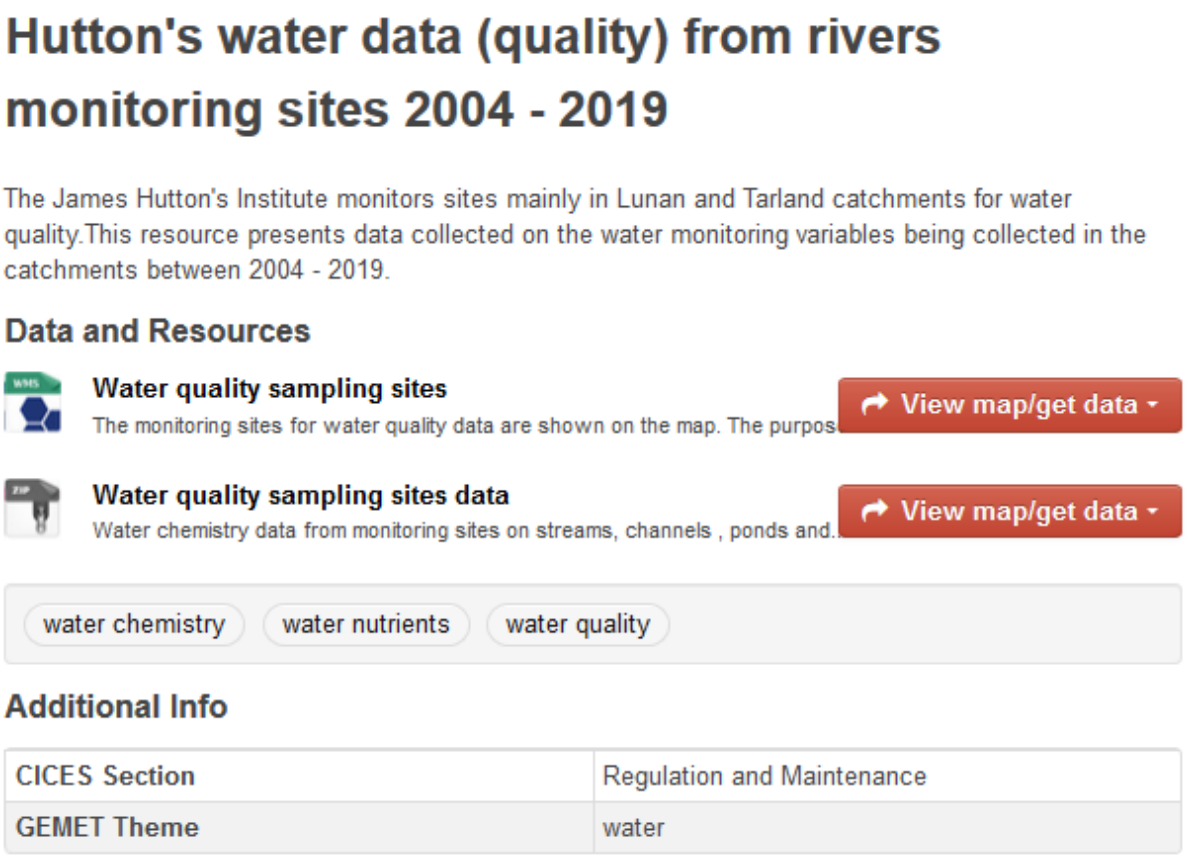

Figure 5 CKAN NAR: DP – Sample dataset and two resources

The NAR: DP contains links direct to the data, users do not need to visit another website or register as a user to access the data. This is one of the key differences between the NAR: DP and other similar resources, the NAR: DP is designed and intended to provide unobstructed access to the data. However, as a consequence of not requiring users to register or declare a purpose or intended use of the data, information on any subsequent use is absent. Standard Google Analytics tracking is enabled on the site and described in Appendix 7.

5. Accessibility Consultation

An email consultation on a prototype Natural Asset Register covering its content, how the data was structured, and the functionality of the web application and the user experience of the interface was conducted from 22nd August to the 8th September 2017. A wide range of external stakeholders were contacted e.g. Scottish Environment Protection Agency, Scottish Government, Scottish Natural Heritage, and related initiatives e.g. Scotland's Environment Web (SEWeb) and Scotland's catalogue of spatial data (SpatialData.gov.scot); as well as 22 key James Hutton Institute and Biomathematics & Statistics Scotland colleagues spanning Strategic Research Programme Theme 1, Hutton Executive, Scottish Environment, Food and Agriculture Research Institutes (SEFARI) and other relevant individuals. A copy of the text sent in the email is included in Appendix 2. Email consultation, August 2017.

The consultation exercise was based around a series of questions and screenshots of a prototype Natural Asset Register Data Portal. The consultees were invited to explore the prototype and reply with their feedback. In addition to summarising the consultation exercise, we provided background

on key steps in the development of the Natural Asset Register Data Portal over the previous 18 months. Following early feedback from Scottish Government we drafted a vision of future development of the Natural Asset Register and shared this with Scottish Government colleagues (Section 6).

During the consultation we received 16 sets of written comments along with valuable feedback from two meetings with key external stakeholders. The comments were split into those focussing on the purpose of the Natural Asset Register Data Portal and its linkages to related initiatives e.g. SEWeb; and those related to its content, structure, functionality, and user experience of the prototype's interface. The main themes related to its purpose were wide-spread support for the prototype, the need for additional potential requirements, ambiguity of the prototype's earlier name (natural asset register), and inclusion of a wider set of SEFARI datasets. In relation to linkages with existing web-based initiatives, the main themes were its relationship to SEWeb and Scotland's catalogue of spatial data (SpatialData.gov.scot), and connections with other web and data initiatives. In this report we set out how we will address the specific comments on the content, structure, functionality and interface of the prototype.

The development of the Natural Asset Register data portal benefited greatly from the consultation responses. The suggestions in the consultation responses were reflected in the improvements to the web application which were implemented before its public launch in the Spring of 2018.

The report on the Consultation on Access is available for download[7].

6. NAR: DP Vision Statement

During the consultation on access to the NAR: DP (Section 5) it became clear that producing a vision statement to guide the development of the NAR: DP would be a valuable activity. The task of creating this document would force the project team to clarify the purpose of the project to themselves and to stakeholders and produce an output that would both explain the project to stakeholders and form a key component of the project archive. This document effectively renamed the tool which until then had been called the 'Natural Asset Register' to the 'Natural Asset Register: Data Portal (NAR: DP)', emphasising that the tool was intended to provide access to research geospatial data sets describing Scotland's natural assets.

The overarching aim of the NAR: DP project in the vision statement was to:

> create an accessible and easy to use online resource for a wide range of users including CAMERAS stakeholders and the wider public to access outputs from SEFARI research (and from other data providers if agreed).

Figure 6 shows how research guided by stakeholders leads to production of information on Scotland's natural assets, and the use of this information by a wider range of people and organisations. The NAR: DP data portal was dependent on the research projects that supply the data on Scotland's natural assets.

[7] https://www.hutton.ac.uk/sites/default/files/files/research/srp2016-21/rd141/RD141_NAR_AccessibilityConsultationReport.pdf

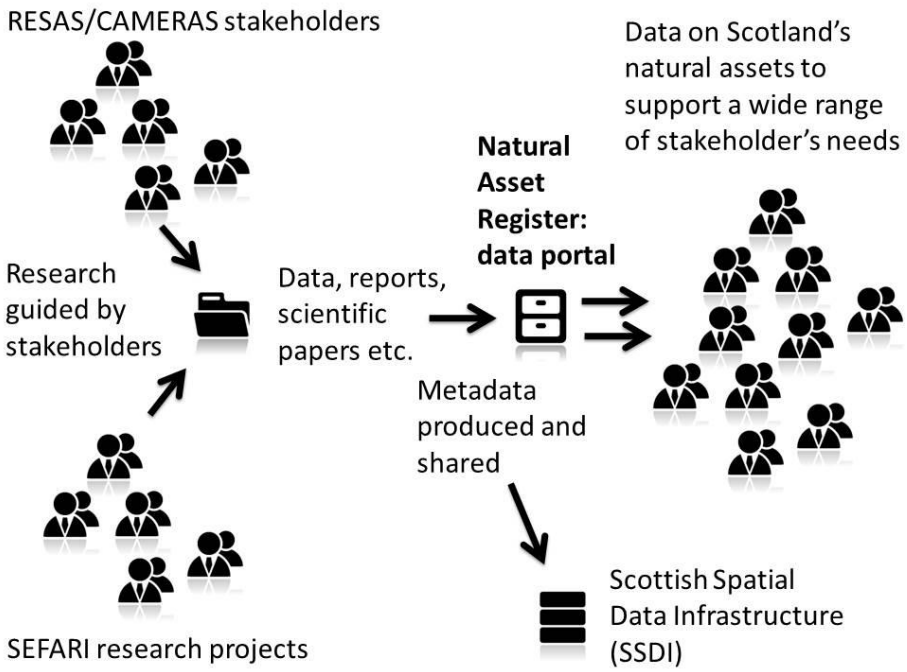

Figure 6 The pipeline from stakeholders to the Natural Asset Register and its users

The vision statement highlighted that natural asset information produced under the Scottish Government's SRP was currently not readily available to CAMERAS stakeholders, other SEFARI researchers or the wider public. The vision statement also identified a need for a small steering group to guide future development work, so that the NAR: DP would meet the needs of non-researchers as well as SEFARI researchers. The vision statement defined the spatial data to be included in the NAR: DP as consisting of research outputs from the strategic research programme (SRP) and that other existing published datasets would be included where appropriate. It described the information to be presented in the NAR: DP as being maps of the data (where appropriate), downloads and supporting information for spatial data on natural assets.

However, the vision statement also noted that at that time there was limited suitable content available from research in the current SRP and that a delay could be expected from the completion of research activity to the publishing of data resources from within the NAR: DP. The result of this would be that number of datasets in the NAR: DP could be expected to be low in the first few years but to expand significantly in the latter years of the SRP.

It is important to note that the vision statement stated that only research outputs would be included in the NAR: DP and that input datasets and models would not be included unless at the specific research of the researcher responsible for the outputs. The datasets in the NAR: DP would include context setting social-economic research spatial outputs as well as biophysical datasets. This content would make the NAR: DP a unique source of information in Scotland. Having this material in a single portal, providing a one-stop shop with signposting to and from other sites e.g. SEWeb, would thereby increase the impact of the SRP.

A review of the research deliverables framework revealed that more than 80 deliverables in years 1-3 were expected to produce outputs suitable for inclusion in the NAR: DP. A delay was to be anticipated between datasets being produced and their inclusion in the NAR: DP in order to allow researchers to publish their data in leading journals; and protect their competitive advantage in

funding applications. It was to be expected that the number of datasets in the NAR: DP would increase towards the end of the current SRP.

7. Steering Group

Following discussions with colleagues and RESAS and as discussed above in the Vision Statement, a Steering Group was created in April – June 2018. The aim was that this group would guide future development of the NAR: DP and assist in liaising with researchers at other institutions to elicit spatial data outputs. The members of the Steering Group represent Scottish Government, SRUC, Moredun, RBGE, NatureScot (Scottish Natural Heritage), SEPA and Scotland's Environment website. At the instruction of the RESAS Science Advisor the Scottish Government was represented on the Steering Group by a member of the government's Geographical Information and Spatial Analysis team.

From 2018 until 2021 Steering Group meetings have been held biannually. The contributions of the members of the group have been particularly helpful in identifying areas of the NAR: DP user interface requiring improvement. These included but are not limited to the following: informing users of likely difficulties that could be experienced by users of older web browsers (as required at some stakeholder sites); improving linkages to Scotland's Environment Web (SEWeb); improving linkages to Scotland's catalogue of spatial data (SpatialData.gov.scot); improving guidance on how users may use the NAR: DP tool. In addition, Steering Group members were able to provide access to research output for inclusion in the NAR: DP and to explain that it was unlikely that suitable data would be available from some organisations (e.g. Moredun). The Steering Group also provided many useful comments on how individual entries were either incomplete (e.g. a map lacked a legend) or could benefit from improved clarity (e.g. the meaning of the symbology used for the mapping layer was unclear). In addition, Steering Group meetings were used to decide on and agree solutions to problems such as that of deciding on whether or not work on creating a NAR: DP for mobile devices was appropriate and worthwhile (Section 8).

The Steering Group has also provided very useful guidance on raising the profile and awareness of NAR: DP. As the work on the NAR: DP progresses into its final year (i.e. the sixth year) of the SRP this is expected to be one of the key project activities.

8. NAR: DP for Mobile Devices

A Steering Group meeting was held on November 15th, 2018. The meeting was primarily to discuss progress on NAR: DP and in particular to discuss options for mobile device apps. This followed on from the writing of a report on a review of the performance of the NAR: DP on mobile devices, available to download[8].

The review found that the two main uses of the NAR: DP were (1) viewing metadata and visualising the data on desktop devices and (2) downloading of the data. Due to the trend towards mobile devices part of the review focussed on assessing the performance of the NAR: DP on these devices. The review found that the CKAN implementation of web responsive design[9] was very effective so

[8] https://www.hutton.ac.uk/sites/default/files/files/research/srp2016-21/rd141/ResearchBriefing_NAR-DP_MobileOptions_vFinal_Corrected.pdf
[9] https://en.wikipedia.org/wiki/Responsive_web_design

that it displayed effectively on smaller devices. The reviews main suggestion for improving user experience was on providing a more interactive geospatial data visualization, in addition to or as an alternative to the current CKAN map viewer. It found that users of the NAR: DP are interested in viewing the spatial datasets and that currently a map with very limited interactivity is provided, i.e. only zooming and panning of the display. The review proposal consisted of two options to enable more interactive viewing of the NAR: DP data. The first option was to develop a relatively simple native mobile app in the Android and Apple operating systems. The second option was to extend the CKAN application itself by writing a new web mapping display page. This would over-ride the default mapping display and implement the Esri webmapping libraries. The second option was the review's preferred option, based on balancing resources required for development and testing, with the benefits gained by colleagues who use the NAR: DP.

The outcome of the Steering Group meeting was that it was decided that efforts would be more effectively spent on guiding the user through the current NAR: DP; in improving linkages to Scotland's Environment Web and Scotland's Spatial Data Infrastructure; and in developing an improved mapping interface rather than standalone mobile device apps.

9. Current state (2020-21): CKAN

A second protype was developed using the CKAN Open Source data portal platform in 2017. This is the basis for the current production version of the NAR: DP and its development continues. The site is http://nar.hutton.ac.uk

The interface was updated through several iterations, responding to feedback from the Steering Group. Site branding was changed from Hutton to SEFARI, using a custom version of the SEFARI logo, permission for which was granted by SEFARI. This branding was intended to emphasise that that the NAR: DP is not the output of solely Hutton staff. The logos and identities of contributing and partner organisations are included in the "Organization" section of the NAR: DP[10]. However, to date there has been limited contribution of spatial data outputs from researchers at SEFARI organisations other than the Hutton.

The datasets added to the NAR: DP are allocated to a theme (e.g. biodiversity, water or cultural heritage), marked as relating to the organisation by which the scientist is employed or the funder (e.g. Hutton, CREW, SRUC) and given one or more thematic tag (e.g. water quality, carbon, soil). The CKAN software is very flexible in the way that datasets may be viewed so that a theme, an organisation or a metadata tag may be selected and all related datasets will be listed for the viewer. This flexibility allows a user to develop their own method for navigating the site and is a convenient means of discovering hitherto unknown datasets.

The interface as of February 2021 is as shown in Figure 7.

[10] http://nar.hutton.ac.uk/organization

Figure 7 CKAN NAR: DP – Front page, final version

Within the CKAN infrastructure and naming convention a dataset is a theme for storing data resources. So for example the NAR: DP contains a data set “Soil Risk Maps (partial cover)” but this contains (as of February 2021) five zipped spatial data sets available to download plus five viewable interactive webmaps, so a total of 10 resources as shown in Figure 8. At present (February ‘21) there

are more than 100 resources of data included in the NAR: DP, consisting of zipped spatial data sets or Web Mapping Services.

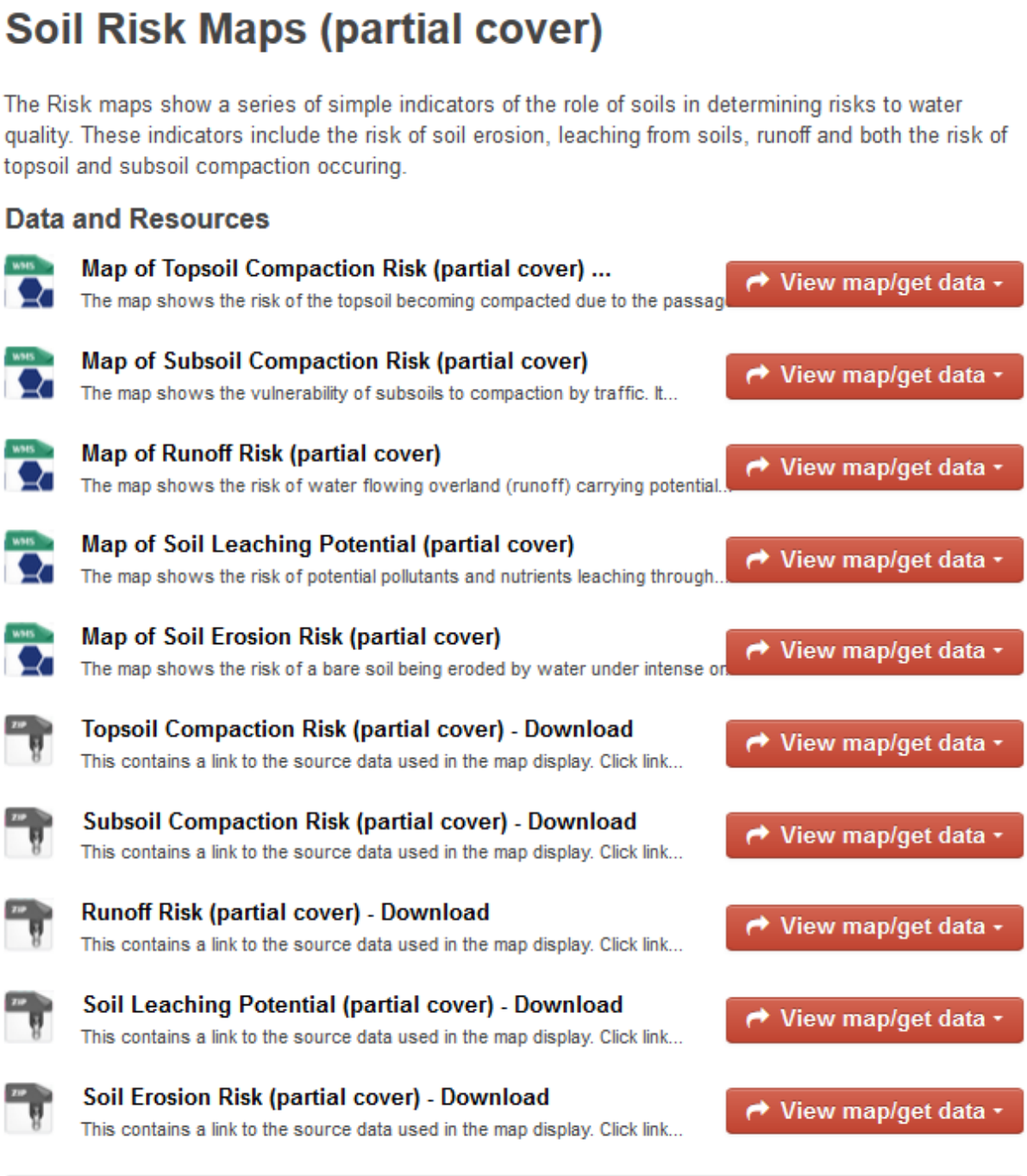

Figure 8 CKAN NAR: DP – Sample dataset and 10 resources

As recommended by the Steering Group and the in the review of mobile devices (Section 8), the options for improving the map view to make it more interactive were investigated. The default map view allows for switching on and off the mapping layers and zooming in and out. It doesn't enable interaction with the spatial data displayed such as clicking to view attributes and there are no search tools or the ability to modify opacity of a layer.

Options for improving this view were investigated but no existing solution that could be implemented in the NAR: DP was discovered. It was accepted that it would be possible to extend the functionality of the mapping view by writing a new extension to the software but this would require a significant software writing resource which was not available to the project without compromising the delivery of other aspects of the project. For this reason the improvement of the mapping interface was not undertaken.

10. Continuing Activities to Improve NAR: DP

10.1 Populating the NAR: DP with geospatial data

The scientists working on relevant parts of the RESAS programme were periodically contacted to encourage them to make their geospatial data results available to the NAR: DP. The RESAS delivery reporting tool was routinely reviewed to discover if any tasks have been completed with appropriate data as an output that may be added to NAR: DP. In addition, fellow scientists are increasingly using Zenodo[11] to obtain Data Object Identifiers for their research outputs. The project team undertook regular searches of relevant Zenodo records to try to ensure that no opportunities to add outputs to the NAR: DP were missed.

In addition to producing and maintaining the NAR: DP website the project played an active and important part in making the spatial data outputs from the SRP more widely available. This is provided as a service to those researchers who are not spatial data specialists and the activity consists of some or all of the following tasks.

On receipt of notification of the completion of a geospatial data output the project team will ensure that the Excel metadata template has been completed with all the required information. A map will be configured with the spatial data using a symbology designed by or in collaboration with the researcher. This map will be created (or shared) using Esri ArcMap or ArcGIS Pro and will be published as a Web Mapping Service and REST service using ArcGIS Server. This mapping service will include the metadata provided in the Excel metadata. The directory of services is at https://druid.hutton.ac.uk/arcgis/rest/services/NAR .

On completion of the creation of the Web Mapping Service a new record (either dataset or resource, as appropriate) will be added to the NAR: DP using the information provided in the Excel metadata. The resource will be configured as a link to the service endpoint (e.g. https://druid.hutton.ac.uk/arcgis/services/quantity_data_sites/MapServer/WMSServer) and the CKAN format assigned as “WMS”. By default this will allow the resource to be opened in a map viewer. In addition the spatial data, its symbology, metadata and licence will be zipped and uploaded to a Hutton server. A resource linking to this download and an image file of the map legend will be added to the NAR: DP. On completion the researcher who provided the data will be informed so that they may confirm that the entry in the NAR: DP is complete and accurate.

10.2 NAR: DP Content & Application Programming Interface (API)

The contents of the NAR: DP may be readily assessed by clicking on the buttons or by using the search buttons. However, additional tools which are primarily intended for machine-to-machine communications are available. This application programming interface (API) provides comprehensive

[11] https://zenodo.org/

access to the NAR: DP content although it is challenging to implement. For example, to display all the datasets and their child resources with all of their associated information the following link may be entered into a browser:
http://nar.hutton.ac.uk/api/3/action/current_package_list_with_resources?limit=100 More information on the CKAN API is available[12]. It is the intention of the project team that this interface will be used ongoing work on metadata (Section 10.3).

10.3 Link to Scottish Government Spatial Data Website

Work is ongoing to add records to the Scottish Government's spatial data metadata portal[13]. At present the development of a software tool to translate outputs from the API (Section 10.2) so that they are in a form which is suitable for bulk insertion into the Scottish Government site. If the development of such software proves to be impractical then records will be manually added. It is intended that this activity will be completed in the year 2021-22.

10.4 NAR: DP Site traffic though Google Analytics

User activity on the NAR: DP site has been recorded using the Google Analytics website user activity recording tools since 1st October 2018. Between this date and 28th February 2021 the NAR: DP had 1,277 users and 14,276 page views. Since autumn 2019 the number of visitors has averaged more than 50 per month. A graph of the monthly number of users is shown in Figure 9.

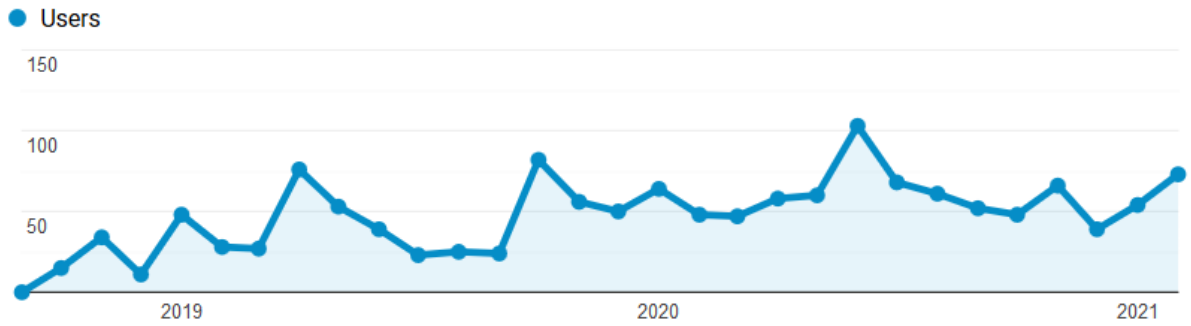

Figure 9 Monthly number of users

There is a significant increase in the number of users between September 2019 (24 users) and October 2019 (82 users). It is very likely that this increase was as a result of the blog[14] on the NAR: DP that was published on Scotland's Environment website and mentioned in the print edition of the Herald newspaper. There is a later peak in June 2020 and this may be a result of increased user interest due to a SEFARI pamphlet on soils data which included a section on the NAR: DP. We are not aware of any significant promotional activity which could have resulted in the increase in the number of users from 27 in March 2019 to 76 in April 2019 but we note that in April 33 users (42.9 % of total) are identified as being in Chicago and none were from that city in March so this is perhaps anomalous rather than representing actual increase in user activity. See below for further information on the location of users.

[12] https://docs.ckan.org/en/ckan-2.6.1/api/
[13] https://www.spatialdata.gov.scot/geonetwork/srv/eng/catalog.search#/home
[14] https://www.environment.gov.scot/news/scotlands-environment-blog/improving-access-to-spatial-data-from-scottish-government-funded-research/

Slightly more than half (57.9 %) of visitors were from UK IP addresses and a quarter (26.7 %) from the USA, and then followed by China (less than 2 %). In more fine detail, where the city is identified, Chicago is the most common (15.9 %). The reason for this isn't known by the authors and it is perhaps due to some anomaly of the Internet and user registrations. Aberdeen (10.0 %) is the second most commonly identified city of origin followed by Edinburgh (9.4 %), London (4.6 %), and Glasgow (3.4 %). More information is shown in Table 2.

CITY OF ORIGIN OF USERS	NUMBER OF USERS	PERCENTAGE OF TOTAL USERS
Not set	244	18.4 %
Chicago	210	15.9 %
Aberdeen	133	10.0 %
Edinburgh	124	9.4 %
London	61	4.6 %
Glasgow	45	3.4 %
Stirling	22	1.7 %
Dundee	21	1.6 %
Inverness	18	1.4 %
Perth	17	1.3 %

Table 2 City of origin of users of NAR: DP

Google Analytics also provides information on the flow of users through a website as shown in Figure 10.

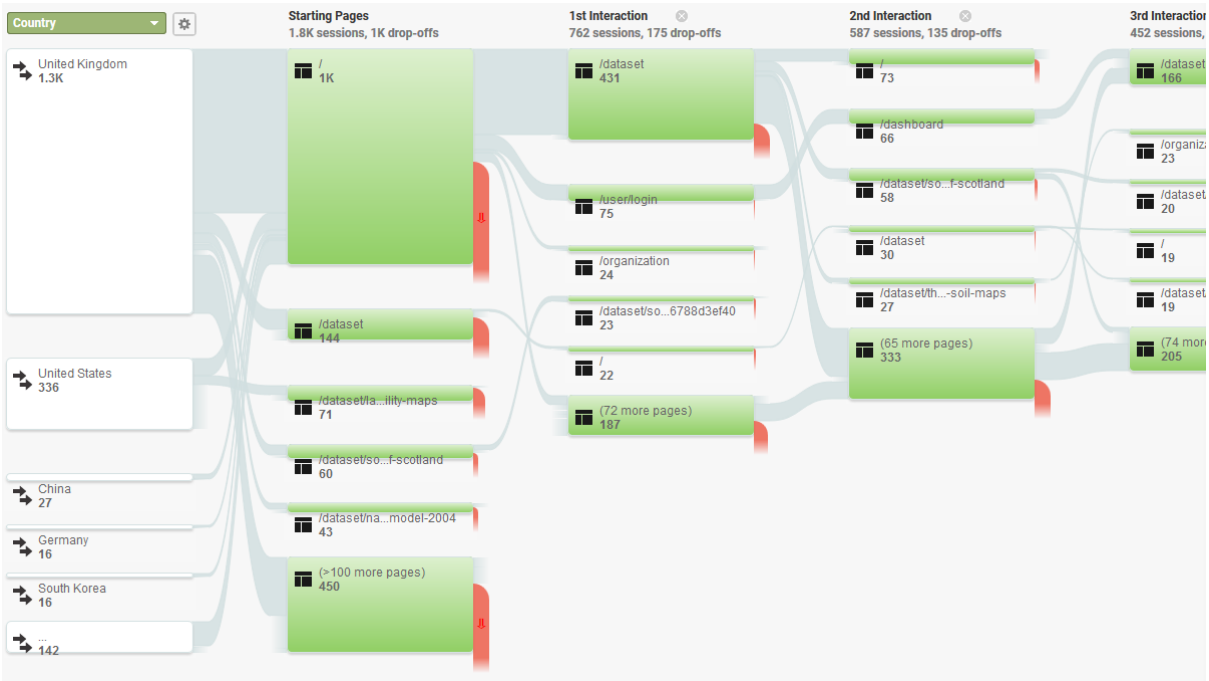

Figure 10 Google Analytics – site flow

This diagram shows that the majority of users of the site arrived at the home page (nar.hutton.ac.uk) and navigated to the "dataset" section. The most commonly viewed dataset during this period has been "Soil profile depth, bulk density and carbon stock of Scotland". It should be noted that the statistics listed above include traffic generated by those maintaining the site.

The Google Analytics information allow filtering and analysis of information by city of origin. Figure 11 shows the activity of users detected as being in Edinburgh.

Figure 11 Google Analytics traffic for Edinburgh users

This shows that the majority of users located in Edinburgh arrived at the home page then navigated to the datasets page and on to a wide range of pages. However, a significant portion bypassed the home page and navigated directly to the datasets page or to one of the pages of an individual page, perhaps in response to receiving a link shared by someone else.

11. Project Outputs and Activities

Key project outputs are described in the preceding sections of this report. A comprehensive list of all project outputs which have been produced in support of the activity of creating the NAR: DP is in Appendix 1. In addition, several outputs that supported or described project activities which are not described in the preceding sections are described in the sub-sections below.

11.1 Metadata tool

In the topic of spatial data metadata is the information that describes the data. The range of information which forms the metadata can be wide ranging and will include a description of the data, ownership and thematic information. There are several standards describing the structure of this metadata, one of which is that described by the EU INSPIRE directive which has been written into Scottish law and which remains in force (following appropriate alteration) following the exiting of the EU. The Scottish Government has adopted the UK GEMINI specification which defines a core set of metadata elements for UK geospatial data and is compatible with the INSPIRE requirements for metadata[15].

It was anticipated that spatial data which would be included in the NAR: DP would be produced by a number of researchers with limited experience in publishing spatial data. To aid the creation of metadata which would be required to meet UK GEMINI/INSPIRE requirements a spreadsheet in Excel format with guidance, samples and recommended inputs was created and shared with researchers.

[15] https://scottish-sdi-metadata-portal.readthedocs.io/en/3.10.x/UserDoc_Chap0_About.html#spatialdata-gov-scot

This enabled the creation of comprehensive metadata embedded in the spatial data by the NAR: DP team.

Work is currently proceeding to produce a piece of software to translate and transfer the information from the NAR: DP and metadata into the Scottish Government's catalogue of spatial data[16].

11.2 Newsletters

Contributions of information on the NAR: DP were made to the regular newsletters produced for the Ecosystems and Land Use Policy Engagement Group. These newsletters are an important means of sharing updates and progress with interested stakeholders. The newsletters are available to download[17].

11.3 Vocabularies, ontologies and metadata-standards

To inform the activity of the project team and improve its knowledge and understanding of the technical environment of data access and sharing a working paper on vocabularies was produced. This paper evaluated the approach of various organisations including SEPA, Scotland's local authority Improvement Service and many others. This report has not been published but is available on request.

12. Discussion and Next Steps

This report describes the activities funded by the significant investment in co-constructing the NAR: DP with research and non-research stakeholders. There are improvements that could be made, including greater levels of engagement with end users and publicising the NAR: DP and the inclusion of more outputs from the SRP.

When assessing what was done well and what could have been better, then three points stand out. There was a clear need for sharing geospatial research data produced from the SEFARI institutes that was unmet. We have partly met this by making over forty datasets available. There are more research datasets that could be added but this is primarily limited by SEFARI researcher's hesitation in openly sharing their data and the absence of a fully open data culture, as all data provided to the NAR: DP team has been included in the NAR: DP in a timely manner. This lack of engagement in sharing data is only found in a minority of researchers and it is reducing due to general community norms following the publication of the FAIR principles by Wilkinson et al 2016[18] and increased interest from the Scottish Government for open data approaches. Our second reflection is that an initiative like NAR: DP is dependent on identifying and engaging with end users. At the start of this project it was clear there were several potential use cases that NAR: DP could deliver and this led to ambiguity on its purpose and niche, we are extremely grateful to the input of our Steering Group for their help in resolving this to some extent. Thirdly, utilising tried and tested free and open source software such as CKAN has meant that we could focus on producing a refined and targeted user interface and sharing data and not engineering a bespoke solution, which would be a very large task and not a good use of funding.

While the number of visitors to the site appears to be fairly reassuring and broadly in line with expectations the project team must consider how to ensure that all those who could benefit from

[16] https://www.spatialdata.gov.scot/geonetwork/srv/eng/catalog.search#/home
[17] https://www.hutton.ac.uk/research/srp2016-21/elpeg-ecosystems-and-land-use-policy-engagement-group
[18] https://www.nature.com/articles/sdata201618

knowing of the NAR: DP are aware of it. A lack of impact (such as awareness amongst colleagues or uncertainty in the purpose of NAR: DP) has been highlighted by members of the Steering Group and it must be addressed. The Steering Group has also provided very useful guidance on raising the profile and awareness of NAR: DP. It is not enough to produce a data discovery tool the project output must itself be a *discoverable* and known data discovery tool. As the work on the NAR: DP progresses into its final year of the SRP this should and will be one of the key activities.

The information content of the NAR: DP is driven by and dependent on what is produced in the SRP. We have attempted to go beyond this by including previously created outputs that were relevant and related to existing content on the NAR: DP but not otherwise available. We have also contacted CREW to propose that appropriate results from their commissioned work is included in the NAR: DP and that has been done for one dataset and the authors will engage with CREW to include others.

Funding for work on NAR: DP continues for the financial year 2021-22. For this year we have proposed to continue populating the NAR: DP with research data outputs as they are made available and also to continue to engage with the Steering Group (subject to their individual agreement to this). The project team has also proposed to evaluate options to ensure that the spatial data resources made accessible via NAR: DP continue to be accessible after the end of the funding of the current SRP. Options which will be evaluated for this include applying for continued support of the NAR: DP via funding in future rounds of SRP funding and the transfer of the information to other portals. A report on this work will be produced early in 2022.

At present it is unclear if the NAR: DP will be supported in future SRP funding or if its functionality will be fully replicated by other repositories. In the past five years wider community research repositories like Zenodo have gained greater prominence and the use of using existing infrastructure to continue to share the resources in the NAR: DP must be considered. There are several initiatives in this area e.g. Research Data Alliance[19] (the primary international organisation related to sharing research data) and the European Open Science Cloud[20]. This is a field of continuing and intensive development and it is also a matter of increased interest for the funders of scientific research. The only satisfactory outcome of the activity in developing the NAR: DP is that the outputs from Scottish Government funded research will continue to be available, and it is the earnest hope and intention of the project team that this will be the case.

The project team is grateful to Scottish Government and RESAS for funding this work.

[19] https://www.rd-alliance.org/
[20] https://eosc-portal.eu/

References

References are included as footnotes through the report.

Glossary and list of acronyms

A glossary of terms used in the report.

CKAN: Comprehensive Knowledge Archive Network - a tool for making open data websites. It helps users manage and publish collections of data. It is used by national and local governments, research institutions, and other organizations which collect a lot of data. https://ckan.org/

CREW: A Scottish Government funded partnership between the James Hutton Institute and Scottish Universities to provide a centre of expertise in waters. https://www.crew.ac.uk/

MRP: Main Research Providers. Five research organisations involved in the SRP and including the James Hutton Institute.

NAR: DP: The Natural Asset Register: Data Portal. The tool described in this report, available at http://nar.hutton.ac.uk

Natural Capital: Defined by the Scottish Forum on Natural Capital[21] as "the stocks of natural assets which include geology, soil, air, water and all living things."

SRP: Strategic Research Programme. The body of work funded by Scottish Government via RESAS under which the NAR: DP work is done.

RESAS: Rural and Environment Science and Analytical Services Division

SEWeb: Scotland's Environment Website: Scotland's environment web, managed by the Scottish Environment Protection Agency (SEPA), is delivering a shared hub for environmental information and data. Underpinned by a multi-agency partnership, Scotland's environment web is committed to sharing data and skills and exploiting web-based digital opportunities.
https://www.environment.gov.scot

[21] https://naturalcapitalscotland.com/about/natural-capital/

Appendix 1. List of project outputs

The table below lists and briefly describes the outputs produced during the activities that were required to create the NAR: DP. Download links are provided.

Date	Document/ Output	Link	Comment
01.08.2016	Review of existing natural asset registers and literature	Review existing natural asset registers and literature	Existing inventories, databases and registers will be reviewed to understand the possible structures, content and interfaces available, and to understand the benefits and challenges of different approaches (D1: Asset registers review due m4, delivering M1).
05.10.2016	Workshop for MRP researchers		Workshop attended by 20 researchers. Workshop summary now available as part of overall ELSEG report. Agenda is available.
14.11.2016	ELSEG presentation	Available on request	This is a link to the file I emailed Rob Brooker before the presentation
31.10.2017	WP1.4 Annual Meeting 2017.	Available on request	
22.11.2017	Hutton Symposium 2017.	Available on request	A presentation given at the Hutton's annual research symposium with the intention of raising the profile of the NAR: DP and to encourage feedback and submissions.
18.01.2018	The NAR: DP Vision document	NAR: DP Vision document	Our updated vision statement, this arose out of a need for clarification of purpose.
01.02.2018	Report on stakeholder consultation	Development of a Natural Asset Register Data Portal: Access Consultation Report	Macleod, C.J.A. and Donnelly, D. (2018). Development of a Natural Asset Register Data Portal: Access Consultation Report, James Hutton Institute, 18 pages. This report summarises an email consultation on a prototype Natural Asset Register Data Portal: covering its content, how the data was structured, and the functionality of the web application and the user experience of the interface.
01.06.2018	Establish steering group		Following discussions on the membership of the steering group invitations were sent to the proposed members. Following discussions with a number of the invitees the initial membership is now set and includes the WP1.4 RESAS Science Advisor and members of staff representing Scottish Government's Geographical Information

			and Spatial Analysis team, SRUC, Moredun, RBGE, SNH, SEPA and SEWeb. Names are available on request.
25.07.2018	Steering Group Briefing Note	Available on request	
30.09.2018	Poster for Land Use Conference	Available on request	
01.10.2018	Report on review of performance of NAR: DP on mobile devices	Reviewing CKAN Natural Asset Register-Data Portal (NAR: DP) performance on mobile devices and suggested improvements	Macleod, C.J.A. and D. Donnelly (2018) Reviewing CKAN Natural Asset Register-Data Portal (NAR: DP) performance on mobile devices and suggested improvements. The James Hutton Institute.
01.11.2018	Metadata template		Creation of an Excel format metadata table to facilitate capture of INSPIRE compatible metadata
15.11.2018	Steering Group Meeting		Meeting was primarily to discuss progress and in particular to discuss options for mobile device apps. It was decided that efforts would be better spent on guiding the user through the current NAR: DP; in improving linkages to SEWeb and Scotland's Spatial Data Infrastructure; and in developing an improved mapping interface rather than standalone mobile device apps. This broadly follows the view of the mobile device review.
04.10.2019	SEWeb Blog	https://www.environment.gov.scot/news/scotlands-environment-blog/improving-access-to-spatial-data-from-scottish-government-funded-research/	To improve sharing and reuse of spatial data from the Scottish Government's funded research on natural assets (that is not available anywhere else), partners created a web app and established a steering group to aid continuous improvement of the NAR: DP, gradually adding datasets related to Scotland's soils, land, biodiversity, water and cultural heritage. *This was also mentioned in the print edition of The Herald.*
01.06.2020	Contribution to a report on soils at the institutes in the SEFARI group.	SEFARI Soils pamphlet	

Appendix 2. Email consultation, August 2017

This is the text sent to stakeholders as part of a consultation which is described in Section 5.

Dear XXX,

Under the Scottish Government's Strategic Research Programme (SRP) we are developing an online tool to provide access to research datasets on Scotland's natural assets. In addition to the results of the current programme (2016-21), our ambition is to make available the results of previous rounds of Scottish Government funding. Where licensing and resources permit we will also include research outputs created with funding from other bodies.

We now have a prototype register ready to hold these natural asset datasets and with this email we are seeking some feedback from those working in this and related fields on the potential usefulness of our approach. The current draft of the site may be visited by clicking HERE. Please note that the site is being made accessible for the purpose of this consultation only between today, **22nd August** and **Tuesday 5th September**. We would welcome any comments that you are able to give by **8th September**.

I have attached a PDF with annotated screen shots which explains some aspects of the structure and could help with your initial viewing of the site. Our current approach is outlined below:

Content

At present the content is limited to a few published data sets, primarily Hutton, but also including some SNH data. These are provided to show how the tool could work. The aim is to include as many outputs from research as we can as these are rarely accessible elsewhere.

Structure

A number of thematic structures has been proposed such as the four SRP themes of soil/water/biodiversity/integrated land use and a structure based on CICES (Common International Classification of Ecosystem Services). These would appear under the 'Groups' tab in the tool.

Functionality

The CKAN software underpinning the tool permits the display of mapped data, tables and reports. We anticipate that each dataset will be accompanied by a short abstract and links to existing web sites, plus any relevant reports that may be included. Mapped datasets will be shown with a map view (produced using Web Mapping Services) and include a link to the location from which the data may be downloaded. Higher functionality such as spatial analysis will not be included.

Interfaces

At present the tool hasn't been set up with any detailed design, but it is likely that it will be required to follow guidelines and branding set down by SEFARI (Scottish Environment, Food and Agriculture Research Institutes), so flexibility may be restricted.

If more information is required please do get in touch by phone or email.

If you have a colleague with a particular interest in this area then we would be grateful if you could forward this email.

Appendix 3. Listing of software used

The NAR: DP uses CKAN[22] version 2.6.2.

This version of CKAN uses Python 2.7.

Our installation of CKAN runs on an Apache2 web server.

The web mapping services displayed on the NAR: DP were created using Esri ArcMap or ArcGIS Pro and are published/served using ArcGIS Server. The mapping service directory may be viewed at https://druid.hutton.ac.uk/arcgis/rest/services/NAR

The maps displayed on NAR: DP uses a custom Mapbox[23] basemap.

The spatial data made available is provided as zipped Esri shapefiles and where appropriate a symbology file is included.

[22] https://ckan.org/
[23] https://www.mapbox.com/

Appendix 4. Listing of modified files

CKAN is a feature-rich application and it has extensive documentation. However, identifying the file or resource that must be modified to achieve an aim in the design of a portal can be challenging. This appendix contains a list of the files modified by the Hutton team for the CKAN installation used in the NAR: DP and the reason for the modification. This table thereby provides a guide on how to approach the modification of a base installation of CKAN to get to what we have achieved with the NAR: DP. We will consider any requests to provide more information on a case by case basis. Note that these modifications include a range of file types and languages including plain text, CSS, JavaScript, Python and Jinja2.

File	Reason for or effect of change
/usr/lib/ckan/default/src/ckanext-extrafields/ckanext/extrafields/ templates/package/snippets/additional_info.html	This controls the information displayed on the Dataset information page
/usr/lib/ckan/default/src/ckan/ckan/templates/ organization/snippets/organization_item.html	This controls the information displayed on the Organisation information page
/usr/lib/ckan/default/src/ckan/ckan/templates/ footer.html	Modified to include link to Hutton standard terms and conditions webpage.
/usr/lib/ckan/default/src/ckan/ckan/templates/ package/resource_read.html	This ensures that a Web Mapping Service resource is properly displayed as an item to be viewed, not downloaded.
/usr/lib/ckan/default/src/ckan/ckan/templates/ package/snippets/resource_item.html	This is also required to ensure that a Web Mapping Service resource is properly displayed as an item to be viewed, not downloaded.
/usr/lib/ckan/default/src/ckanext-NAR_theme/ckanext/NAR_theme/templates/ home/layout2.html	This contains the home page information describing the purpose of the NAR: DP and its funding by Scottish Government
/usr/lib/ckan/default/lib/python2.7/site-packages/ckanext/geoview/public/js/vendor/ol-helpers/ ol-helpers.js	Modifies the default settings for the map so that Shetland is not obscured by the legend and to improve the display of maps of small extent
/etc/ckan/default/production.ini	Modifications to base configuration including title, logo, a change to use a custom base map,
/usr/lib/ckan/default/src/ckanext-NAR_theme/ckanext/NAR_theme/public/ NAR_theme.css	Main settings for font, colour scheme, and other style elements etc. Includes, headers, footers and sub-pages
/usr/lib/ckan/default/src/ckanext-NAR_theme/ckanext/NAR_theme/templates/ base.html	Modified to include a Google Analytics tag so that it records activity on all pages
/usr/lib/ckan/default/src/ckan/ckan/templates/ home/snippets/search.html	Settings for the prompt in the search widget
/usr/lib/ckan/default/src/ckan/ckan/templates/ home/snippets/stats.html	Setting to show “Datasets currently loaded” on home page
/usr/lib/ckan/default/src/ckanext-extrafields/ckanext/extrafields/plugins.py	This section includes the code to generate the forms so that additional tags (CICES, GEMET) are available to be added in the application and includes the controlled vocabulary.

/usr/lib/ckan/default/src/ckanext-extrafields/ckanext/extrafields/templates/package/snippets/package_metadata_fields.html	Controls display of tags that have been added in plugins.py
/usr/lib/ckan/default/src/ckanext-extrafields/ckanext/extrafields/templates/package/snippets/package_basic_fields.html	Supports display of tags that have been added in plugins.py

Appendix 5. List of resources available from NAR: DP

For a list of the spatial data resources available from the NAR: DP please visit: http://nar.hutton.ac.uk/dataset .

Alternatively, to display a JavaScript Object Notation (JSON) listing of the NAR: DP contents the following link may be entered into a browser: http://nar.hutton.ac.uk/api/3/action/current_package_list_with_resources?limit=100