

Decision Support System Web Directory Project

Final Report

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Envirolink Tools Project No: R7-3

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Envirolink Tools Final Report – Signature Page

Project Title: Development of web-based directory of spatial and other decision support systems(DSS)

Contract Number: R7-3

Research Organisation: Massey Universtiy / EERNZ

Regional Council: Tasman District Council, Waikato Regional Council

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Hendrik Stouten, as a researcher at EERNZ undertook the initial gathering of much of the metadata for the directory and provided some robust questioning of the metadata and database structure during development.

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The website and database design has been provided by Mark Huser. His 'can do' approach and openness to incremental adjustments has been greatly appreciated.

We would also like to thank those potential end users who took their time to contribute input to the development of this website directory – the output is better for your contribution.

1 Background

In their work on the environment and its regional management, regional councils (including unitary authorities) are key users of a variety of both spatial and non-spatial models, assessment frameworks and other tools described as Decision Support Systems (DSS).

A number of specific computer-based spatial simulation modelling tools already exist and have been developed for and are available to regional councils. However, there is limited up-take. Barriers for uptake include¹:

1. Inability to assess whether the model is useful and misunderstanding of purpose and potential use (e.g. lack of case studies, applied examples);
2. Lack of access and availability;
3. Cost of models – data requirements, design and build, operational;
4. Lack of in-house capacity and capability to make use of Decision Support Systems.

There is also a need to assist the transfer of models developed for one region to enable their application in other regions. In addition, there is a range of non-spatial system analysis and evaluation tools for use in supporting environmental management policy decision-making, particularly in the context of the need to assess policy options and to evaluate the effectiveness of policies under sections 32 and 35 of the RMA.

The aim of this Envirolink Tools funded project was to address some of these barriers by producing a searchable web-based directory of existing computer spatial simulation models and other non-spatial DSS that can be used in environmental and resource management strategic or policy decision-making by regional councils.

The directory provides standardised key information (metadata) for each DSS and also includes examples (case studies) of how the DSS has been used and applied by regional councils or other agencies. The directory has been designed to allow for the required flexibility to regularly review, update and add new DSS.

This project builds upon work undertaken by Ecological Economics Research NZ (Sustainable Pathway 2 FRST Project)¹ and by Landcare Research (Envirolink Workshops July - 2009² and Envirolink Workshop - 15 Sept 2010³). One of the recommendations of the latter workshop was to *“expand the directory of decision support systems started in this project and make it web-based. The current situation is undesirable, a better approach must be developed that will increase the use and application of existing integrated decision support systems and foster coordinated development and delivery of future integrated DSS for the benefit of all of New Zealand”*. This is what this project aimed to achieve.

¹ van den Belt, Marjan, Vicky Forgie, Scott Bremer, Garry McDonald, Oscar Montes de Oca, Mike Joy. 2011, Modelling tools for integrated, adaptive management: a case study of New Zealand Regional Authorities, EERNZ Research Monograph Series 1. (<http://www.sp2.org.nz/assets/Uploads/Modelling-tools-for-integrated-adaptive-management-a-case-study-if-New-Zealand-Regional-Authorities2.pdf>)

² Fenton, T. and Lilburne, L. 2009: Overview of Catchment Scale Nutrient Modelling in New Zealand, Landcare Research, Envirolink Report #769 (www.envirolink.govt.nz/PageFiles/80/769-HBRC113.pdf)

³ Rutledge, D., Fenton, T., Wedderburn, L. 2011: Integrated Decision Support Systems Workshop: Summary and Recommendations, Landcare Research, Envirolink Project #892 (<http://www.envirolink.govt.nz/PageFiles/638/892-HBRC136-Integrated%20DSS%20Workshop.pdf>)

2 Purpose of this Report

This report provides a record of the key processes and decisions made during the development of the directory. It also provides commentary on the effectiveness of processes, outlines ongoing maintenance and management procedures and makes recommendations for future development.

This report should assist and direct the on-going maintenance, updates and future development of the directory.

3 Review of Web Directory Development

The initial development of the directory included four main steps:

1. Defining an initial template of the key metadata fields that could be collected for each DSS
2. Collating an initial list of DSS's that could be included in the directory
3. Seeking end user feedback about their requirements and the draft metadata template, DSS list and any case studies, and then
4. Define a draft structure/architecture for the website.

After this the draft website and directory were created. Further end user feedback and testing of the directory was then sought. An overview of each of these steps is provided in the following sections.

3.1 Defining Metadata Template

An initial metadata template for the web directory was included in the funding proposal. This proposed list of standardised descriptions (metadata) was based on European Environmental Agency technical report⁴. Further input and refinement of this list has occurred based on input from the project team and end users.

During the review and refinement of the DSS directory metadata list discussions were held with the Interoperable Freshwater Models project⁵ which was also collating metadata for a range of freshwater models. These discussions considered options for sharing and coordinating data sets. However, due to differences in database structures and timing of project outputs, coordination of datasets was not feasible. The initial metadata template for the DSS directory was reviewed against the established metadata fields in the IFM project to ensure maximum commonality.

Input on the metadata template was provided by Landcare Research geospatial experts. This input was aimed at providing maximum commonality of metadata terms used with standard metadata protocols such as Dublin Core and OGC/ISO19100. There was a tension in trying to get good alignment across the range of metadata fields as the metadata standards are designed for use in technical management of datasets (processing, relationships, sharing) whereas this DSS directory is 'DSS end user' focused as opposed to 'technical' or 'systems management' and therefore a number of the metadata field that have been used are not well aligned with standard metadata

⁴ European Environmental Agency 2008. Modelling environmental change in Europe: towards a model inventory (SEIS/Forward). EEA Technical Report No.11/2008 (http://www.eea.europa.eu/publications/technical_report_2008_11).

⁵ In this project a computer-based model framework for freshwater models is being designed and tested to proof-of-concept stage. The framework will allow a number of existing mathematical models for freshwater quality and quantity to interoperate by sharing data, communicating to each other, and making use of visualisation or mapping tools. <https://teamwork.niwa.co.nz/display/IFM/Framework+for+Interoperable+Freshwater+Models>

terms (i.e. ease of use, use in policy process, users forum). However, where possible the metadata fields have been mapped with standard terms.

The alignment of metadata fields with the ANZLIC metadata profile has also been considered – the ANZLIC profile is directed at geospatial data sets and other resources (maps, charts, textural documents and non-geographic resources). The DSS directory is presenting metadata on a range of models and tools and therefore options for alignment are minimal. However, those fields that are common do align (i.e. contact name, organisation).

The final metadata template used is provided in Appendix 8.1. The list of metadata in the template was seen to meet the current and foreseeable needs of end users and yet provide enough flexibility to support the wide range of DSS's that might be loaded into the database (spatial, non-spatial, computer based, techniques/frameworks)

3.2 Initial DSS list

The initial list of DSS's to be considered for inclusion of this project was drawn from a list created at a DSS workshop in 2011 (LCR, 2011⁶).

Additional DSS's and case studies were also suggested by members of the project team. End users were also asked to review the draft list and make any further suggestions.

The current list of identified DSS's including the status of each (i.e. included now, or identified for future consideration) is presented in Appendix 8.2. This list has been divided into 1) spatial computer models; 2) non-spatial computer models; and 3) analytical techniques/frameworks in line with the concepts in Figure 1.

Under this conceptual structure at the simplest level there are the key analytical techniques that can underpin a DSS (e.g. Multi Criteria Analysis, Bayesian Belief Network) or a framework (i.e. deliberation process). In some cases these can be used directly by end users to assist them in decision making or problem solving processes. Often however these analytical techniques are incorporated into a computer based model to form a specific DSS product. These computer models can be either spatial or non-spatial. They can range in complexity from a single model based on one analytical technique (e.g. Overseer - Input/Output model) to several interlinked models within an integrated DSS which incorporates several analytical techniques (e.g WISE - Input/Output, Spatial dynamic, GIS).

The initial list was predominantly environmentally focused with some economic DSS's. Also the domain focus was predominantly on land and water management primarily at a catchment scale. This reflects both the historical roles of regional councils and also research effort by main Crown research institutes.

The management domains defined for the Directory are:

- Air Quality
- Biodiversity
- Biosecurity
- Coastal
- Community
- Ecosystem Services

⁶ LCR 2011: Rutledge, D., Fenton, T., Wedderburn, L. 2011: Integrated Decision Support Systems Workshop: Summary and Recommendations, Landcare Research, Envirolink Project #892 (<http://www.envirolink.govt.nz/PageFiles/638/892-HBRC136-Integrated%20DSS%20Workshop.pdf>).

- Freshwater
- Land
- Natural Hazards
- Urban systems
- Waste

Types of Decision Support Systems

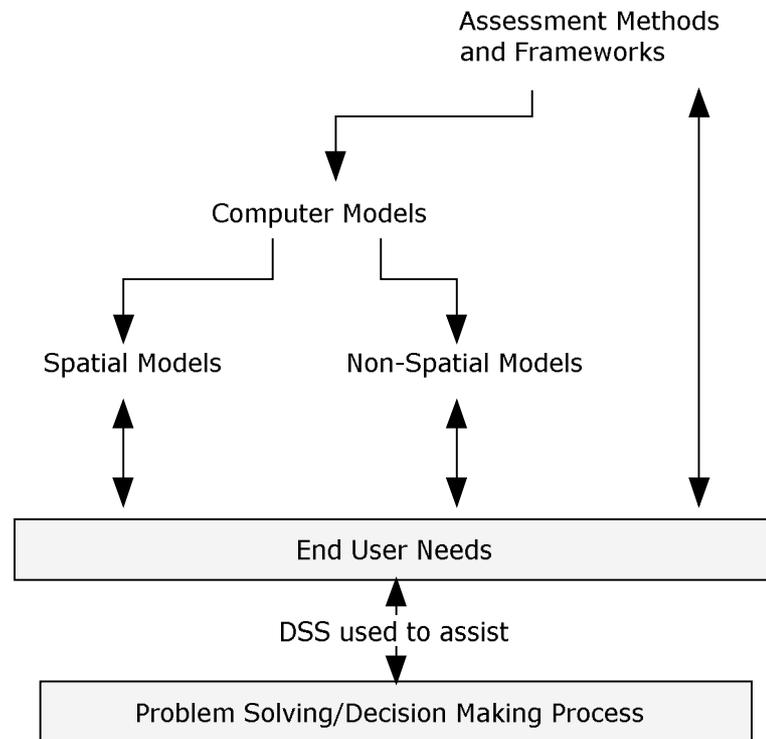


Figure 1: Types and linkages between decision support systems

For some management domains there seemed to be very few DSS's available. Hence, there are only a few DSS's loaded for domains such as air quality, coastal, hazards, waste, community and urban systems. Future development should be directed to add more into these areas if they are available. Priority would also be given to DSS's that integrate across domains thereby assisting the needs for more complex decision making.

In addition to the initial list developed by the project team only limited suggestions for other DSS to include in the directory were provided by end users (see Section 3.3.1) during the development of the directory. It is hoped that now that users can see the scope of the DSS directory they will make more suggestions and provide new ideas for DSS's to include in future updates. Equally, DSS providers may suggest to include existing and/or newly developed DSS to add to the Directory.

Potential case studies that were relevant for the directories purpose were identified with the initial list of DSS's. Further case studies were sought out or identified during the end users input and testing phase.

3.3 Gathering End User Feedback

During the project feedback was sought from end users at two stages. Firstly, at the beginning of the project to identify the exact needs and possible content for the directory. Secondly, when the draft directory had been created to fine tune its development.

3.3.1 Initial end user feedback

At the start of the project the first source of end user input was from a workshop with the Regional Council Policy special interest group on 28th October 2011. Discussions at this workshop focused on four aspects:

1. Providing an overview of project aims
2. Discuss councils 'decision environment' and initial list of DSS's
3. Explore their views on end user needs for the directory.
4. Identify members for wider end user group for further feedback.

The main outcomes from this meeting were:

- Better to at least list all known models at some level of detail – look to fill in details in future. As opposed to having just well-known ones with a lot of data/case studies
- Key metadata requirements were identified
- Preferences for the structure and design of the site were identified –e.g.:
 - Different users might enter usage of any DSS in different ways – i.e. from Plan vs Do points in policy cycle
 - Provide multi-search criteria – options to link into via “plan cycle tree” or by management area.
 - Ability in future to easily load new case study examples or new tools
 - Give options of where to go for more information – links to other sources
 - Help user to orientate themselves on site – provide some structural context
- The scope of system for DSS's should include full breadth of regional council needs including:
 - Air quality
 - Coastal systems
 - Freshwater and land (catchment) management
 - Natural hazards
 - Waste/hazardous substances
 - Built systems – urban, settlement, infrastructure
 - Economics
 - Aesthetic/cultural/social outcomes assessment
 - Transport
 - Biosecurity
 - Ecosystem Services
- Some other DSS ideas were suggested for inclusion. Limited suggestions were provided about people to involve in further end user input aside from the view that it should include a mix of policy, consent, operational, monitoring and investigation practitioners.

The second step in sourcing initial end user input was to approach the Regional Council Special Interest Group (SIG) conveners and ask them to suggest key people who could provide feedback for the project. Most of the SIG conveners were spoken to individually and then sent an email with the following request to distribute to key people or their whole SIG membership:

“Thank you for offering to have some input to this project. This request for input is for an Envirolink project that is developing a models/DSS directory - for an overview see

<http://www.envirolink.govt.nz/PageFiles/31/Web-based%20directory%20DSS%20progress%20report%20December%202011.pdf>

Feel free to distribute this request to other members of your Council network or colleagues who you think could add value.

As a potential user of this directory we are wanting you feedback to help us:

- develop the structure and usability of the directory*
- and also to populate it with useful information (suggestions to add to directory, and scope of information to include)*
- test the proto-type directory*

Over the following 6 months we will:

- Seeking this initial round of feedback from users*
- Sourcing information on the proposed models and DSS to include*
- Seeking any further clarification from potential users*
- Developing up the proto-type directory*
- User Testing of Directory*

We have set up a web based forum for you to directly add your input.

Please look at the information that is presented, comments added by others, and then add any further information you like.”

An interactive area was established on the Alchemists Ltd Website with the draft list of DSS and end user needs to allow easy contribution of ideas and also to see what others had suggested to help focus feedback.

The level of feedback was disappointing with only a handful (< 5) people contributing any comment onto the website.

The reason for this lack of end user input is difficult to determine. Considerable time and effort was invested in discussing the project and needs for feedback with SIG conveners and to establish an area for feedback. It can only be assumed that Regional Council staff are very busy and requests such as this are not seen as a priority and just ‘drop of the radar’.

3.3.2 End user testing of draft website directory

Once the draft website structure was created, a suitable range of DSS metadata loaded into the database and internal testing had taken place further feedback was sought from end users.

A second request was made of SIG conveners to elicit feedback from suitable end users:

“I was in touch with you back in February about this Envirolink project – We are developing a web based directory of decision support systems that are of potential relevance when councils are undertaking their business.

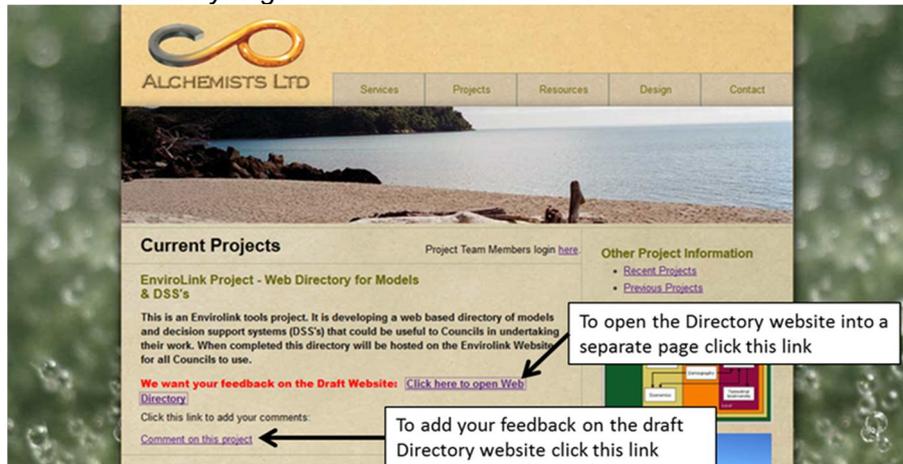
This project is now at the stage where we have a draft database on a website and are looking for feedback from SIG representatives.

We would appreciate your feedback as someone who might want to use such a library of information in future to assist in understanding/selecting tools that can help in supporting decision making. If you are able to provide some feedback by 13th July it would be appreciated.

Note: We are still looking to adding some more DSS's and case studies to the database before it goes live and any suggestions are welcome.

If you have any further questions then please get back to me, otherwise please follow this link to access the draft DSS Directory and to add your feedback:

Instructions once you get to this link are as follows:



Given the low level of feedback from the first round this request was also sent to another 15 regional council staff directly as personal contacts in an attempt to increase the level of input. The response was however still limited.

A summary of end user feedback on the draft website was:

- “this is cool”, “ could be useful”, “like the management domains, easy to navigate and sub-groups made sense”, “A worthy project and interesting to see the range of the DSS's that are out there”, “The directory met all my expectations”
- Use Air Quality and not Air Shed and sub section – air emissions inventories, air quality monitoring, modelling – other air quality models suggested Ausplum, AEROMOD, VEPM
- Wording in overview area is quite technical (Analytical techniques section) – would be good to have examples and plain English summary
- Include case studies or tools that support different decision making approaches – consultative, collaborative
- More economic tools as decision making is strongly driven by economic consequences
- When looking at the Catchment/land page it would help if there was text to show just what page was being viewed.
- Around catchment and land management. Does it make sense to separate these?
- Add Waste under the Domains?
- A frustrating lack of detail at this stage with so many "greyed out" links but I guess it is early days yet. Clearly some are public information, but I suspect some are not. It would be good to have this tagged
- What is the process for capturing all the DSS and ensuring that any new ones are captured
- More detail under case studies where links/references are not provided
- Include a how to use directory, and more explanation of options for using the tools during the policy process.
- Other models to include – broader context than land and water, Waikato Regional Transport Model, MyLand,

As many as possible of the issues raised have been addressed through the remainder of the project.

3.4 Website and Database Design

The initial feedback from end users was used to guide the development of the website database structure and design of the web pages.

This initial database design was structured to accommodate the range of metadata required to meet end users expectations and accommodate the range of DSS types that would be included in the directory.

The website and database has been set up using Silverstripe⁷ which is an open source software tool for website development and content management. The MySQL database used is relational, in that distinct objects are created (an object includes metadata presets as well as the overarching DSS object and Case Studies objects) and linked together in a fashion that allows updating of individual objects while retaining their relationships to others.

This allows for maximum maintainability as well as ease of data movements, export, and management. Furthermore, existing data objects in the DSS Directory can be mapped in future to other systems to ensure interoperability and adherence to any standards in metadata descriptions or names. A table has been created to 'map' the terminology of end user relevant metadata terms to standard terminology (i.e. Dublin Core).

3.5 Status of the DSS Directory

At the conclusion of the project the status of the DSS Directory is:

- The web directory is a sub-domain of the Envirolink website (<http://tools.envirolink.govt.nz/>)
- The contract Envirolink Contract required the project to collate metadata for at least 30 DSSs – At the end of the project we managed to load data for at least 40 DSS's and 30 case studies
- Within the funding available - we aimed to get at least one or more DSS for each management domain
- Home page is designed to provide easy access to the DSS's and Case studies
- 3 areas are dedicated to allow quick access to DSS database
- The Home page also provides an area to highlight new or key case studies and access to supporting information in an 'About' section

4 Strategies for uptake of directory

4.1 Promotion opportunities

The promotion of the DSS directory will need to rely on utilizing existing networks and available opportunities to make potential end users aware of this new resource. There is no promotion budget to formally advertise the site so a range of ideas are outlined below for the project team and particularly the Regional Council Champions to follow through on in the next few months and further into the year.

⁷ Silverstripe has recently secured the contract to provide a single web platform for New Zealand government agencies. The platform will serve as the base for developing government websites, web assets and web applications, <http://www.silverstripe.org/>

- Project team members send a promotional email and link to all relevant contacts in their networks
- Site is promoted by project team or other Regional Council champions at suitable meetings, workshops or symposium
- All Regional Council SIG conveners are informed of completion of the 1st stage of directory and asked to distribute to their members
- Site is promoted on the Regional Council SIG forum sites
- Regional Council Resource Managers Group (RMG) is given a presentation on the completion of the first stage of the directory and presented a business case for on-going support to maintain and update the directory in future.
- Site is promoted to other sectors with interests in environmental and resource management research and decision-making, such as Crown research institutes, universities, government departments and ministries and environmental consultancies.

A general PowerPoint presentation has been prepared for project team members and other champions to use for promoting the directory

(<http://tools.envirolink.govt.nz/assets/assets/General-DSS-Directory-Presentation.pptx>)

4.2 Key sites that could link to directory

Getting links from other relevant websites to the directory is seen as both a way of making the resource more available but also as a way of increasing its profile and potentially creating future data sharing opportunities between directories.

The following sites have been identified as good candidates to approach for links to the directory:

Website to link with	Status
Envirolink Tools page	Requested a higher profile link or tab/button at top of page
Creating Futures	Completed
Sustainable Pathways 2 and Integrated Freshwater Solutions at Ecological Economics Research New Zealand at Massey University	Completed
Waikato Regional Council	Completed
Tasman District Council	Steve Markham to follow up
Other Regional Councils	Tony Fenton to follow up
MfE/Quality Planning	Steve Markham to follow up
LGNZ	Beat Huser to follow up
Land and Water NZ	Tony Fenton to follow up
National Land Resources Centre	Request made by email
NZ Association of Resource Management	Tony Fenton to follow up
NZ Planning Institute	Steve Markham to follow up
CRI's – NIWA, LCR, AgResearch, Scion,	Tony Fenton to follow up
Motu Research	Tony Fenton to follow up
MBIE	Bill Dyck to continue follow up
Interoperable Freshwater Models project	Request made

5 Further maintenance and development of directory

There are several aspects to the management, maintenance and updates and any further development of the DSS Directory. The proposed approaches for these are outlined in the following sections.

5.1 Development of a Service Agreement

There is a need for ongoing update and maintenance to keep the directory current and relevant to the key end users. The project required the design of a draft proposal for on-going update and maintenance of the directory and the establishment of service agreements for the update hosting, and administration of the directory.

A plan for establishing a longer term service agreement has been developed and this includes:

- A work brief including possible roles, responsibilities, projected work programme and budgets for maintaining, updating and improving the directory has been drafted (see Appendix 8.3.2 for details).
- A paper is being developed, including the above work brief, to be presented to the Regional Councils Resource Managers Group (RMG) meeting in June 2013 for their consideration and approval. The development of this paper will include further discussions with other potential supporters of the directory (MfE, MBIE, MPI, LINZ)
- The Regional Council Champions for the directory will also apply for a small advice grant in April 2013. If successful this will kick off the start of the next phase for the directory by allowing further DSS's to be loaded into the directory – a list of current suggestions is provided in Section 5.4.

It is expected that by following these steps a broader level of support could be created for the directory, the specific requirements for maintenance and updates can be refined, and therefore indications of other support and the clear requirements for a work programme can be provided to the RMG meeting in June 2013.

The following parts of the service agreement needs have been established:⁸

- Costs for hosting the DSS directory will be met by Envirolink – this cost will include some limited phone support (3 hours per annum) for the Administrator from the host provider (M Huser).
- The Envirolink Coordinator will take the 'Administrator' role for the DSS directory – although in the long term this role could sit elsewhere.
- Any relevant future Envirolink tools projects will be required to load their metadata directly into the DSS directory database as part of their funding arrangement. A similar arrangement for other government funded tools has been requested through the Ministry of Business, Innovation and Employment (MBIE)⁹.

⁸ See Appendix 8.3.1 for further details

⁹ The key steps in achieving this progressive updating could be:

- o When a research project which delivers a model/DSS, is funded, the directory Administrator is informed by MBIE (a record of the project and completion date is noted).
- o It is included in the funding contract that they are required to enter the metadata for their model/DSS at completion of the project
- o Towards the end of the project the Administrator sets up a record in the directory database for the tool and send out an editing link to the appropriate researcher.
- o Post project when the metadata has been loaded – Administrator informs Envirolink or MBIE that this contract requirement is met.

5.2 Management of the DSS Directory

The main management activities with keeping the DSS Directory functioning are outlined.

Role of Administrator

The roles of Administrator with respect to management of the directory would be:

- First point of contact for enquiries about directory
- Troubleshoot any operational issues
- Control access to database for addition of metadata
- Manages responses to suggestions from site users about website improvements
- Oversee updates and revisions of website
- Website tracking and reporting results to Regional Council Champions

The Administrator role would initially be undertaken by the Envirolink coordinator until an alternative arrangement is made during the refinement of the service agreement, in consultation with the RMG. The role of Administrator would need the continued support of the Regional Council Champions to promote the directory and direct any ongoing maintenance and updates. If other funding is made available for additional support to undertake periodic updates and maintenance this could support/share some of the administrative workload during such updates.

Hosting and Access to Database

The directory is hosted on a separate server from the main Envirolink website. This hosting arrangement and technical support is currently being provided by Mark Huser. The cost for this hosting and support (\$660/yr) is being paid through the Envirolink coordinator.

SilverStripe, the website content management system (CMS) enables the Administrator is able to set up records for metadata of new DSS's or case studies and to send access links out to parties allowing them to add/edit metadata within the draft database. The Administrator can activate or deactivate these links to manage access.

If for some reason access was required to the database, say to move it to another server hosting provider then this would require the current host to undertake a number of steps:

1. Output web files, including all templates and PHP (scripting) files, and a copy of the MySQL Database which backs the whole directory
2. The new host/provider unpacks files and imports the Database on their servers, which will need to adhere to the following requirements:
<http://www.silverstripe.org/system-requirements/>
3. DNS at the the Envirolink end will then need to be updated to point tools.envirolink.govt.nz to the new server.

Website Tracking and Reporting on Directory Use

Google Analytics has been set up to provide the user data for the DSS Directory. With it, the numbers of returning and new visitors can be tracked, as well as specific pathways of data access. The key metrics will be:

- Number of visitors to the site as a whole
- Entry points (whether users access the homepage first or land deep within the site from a bookmark, link, or search engine result)
- Referrals (sources of visitors: e.g. direct, search engine, or from envirolink.govt.nz)
- Time spent on the site
- Geographic location of users
- Number of users creating content, and which DSSs are updated more frequently

Role of Suggestion Box

A Suggestion Box area has been set up on the web area to allow external parties to make suggestion about new or additional DSS's or Case Studies that could be added to the directory, or any other improvements. Links to the Suggestion Box are provided from several points in the directory to assist this gathering of additional material.

The Suggestion Box is available for any emissions or errors to be highlighted and corrected. It also provides a method for capturing any ideas for improving the content and functionality of the DSS Directory. Currently the suggestions provided are sent via email to the Administrator for action/attention.

Adding a new model/DSS to directory

The process of adding a new model/DSS to directory would follow these steps:

1. A request is made to the administrator to include a model/DSS into the directory
2. If seen as appropriate the administrator would set up a new page in the database for the DSS and sent the 'edit' link from the Content Management Systems (CMS) (Figure 2) to researcher/developer to populate the metadata and any case study content.



Figure 2: Link for allowing external parties to edit metadata – note box needs to be ticked for it to allow external access.

3. When completed the Administrator would check the metadata and case study material. If there are any gaps or quality issues this would be addressed with the provider.
4. When the Administrator is happy with the metadata, any case studies, and any links to other sites/material the page would be migrated to the live database for the directory.

Note: To provide access to someone to update metadata then must tick box at top of CMS first screen.

Updating Existing DSS Metadata or Case Studies

If as a result of input, via the suggestion box or directly to the Administrator, there is a need to correct or update DSS metadata or case study material this could either be

undertaken by Administrator as required or done as a batch of edits/updates by a support role. The processes that could be followed for this are:

1. Administrator/Support Role undertakes the update
 - a. For quick fixes and where correct/additional information has been provided the Administrator can add the content via the CMS.
 - b. The Administrator could keep a file of logged 'suggestions' which could be addressed as part of an annual review/update process
 - c. For more substantive additions or multiple edits/additions such as an annual review/update process an additional support role could be used if funding allowed.
2. External researcher/Developer/End User provides update content
 - a. If an external party is willing to provide the new/additional content then the Administrator could send the 'edit' link to researcher/developer to add the additional/new content.
 - b. When completed the Administrator would check the metadata or case study material. If there are any gaps or quality issues this would be addressed with the provider.
 - c. When the Administrator is happy with the metadata, any case studies, and any links to other sites/material the page would be migrated to the live database for the directory.

5.3 Other DSS's/models to include

There are still several models in the initial list that could be loaded into the directory. The details of these are contained in Appendix 8.2. In summary other DSS's currently suggested that could be loaded into the directory are:

Assessment Methods/Frameworks

- Choice Experiment
- Issues Mapping
- Risk assessment process framework and methodologies
- Infer – Investment framework for environmental resources

Spatial DSS's

- AERMOD
- AusPlume
- BEPM (Bus Emissions Prediction Model)
- Forecaster: Maximising Forest Investment
- Forest Calculators
- Geomaster:
- LUCI – Land utilization and Capability Indicator GIS toolbox
- My-Land: Land Use Decision Tool
- NPLAS
- RiCOM – River and Coastal Model
- Riparian Management Classification
- Riskscape
- River Environment Classification
- VEMP (vehicle Emissions Prediction Model)
- Vital Sites
- WATYIELD: Water Yield Prediction Tool
- WRENZ – Water Resources Explorer NZ

Before further models are loaded into the directory there should be further suggestions sought from users across the management domains which are underrepresented and then an assessment of relevance and availability of supporting case studies made.

5.4 Future development of the DSS directory

The first stage of creating a searchable directory of DSS's for Regional Councils has been achieved. The second stage of development for the directory should aim to increase the breadth of DSS across management domains and to respond to any suggestions from end users after the first round of promoting the directory.

This second phase of development could also look to continue adding more case study material to the directory to keep it current with the use of DSS's. The proposed service agreement, defined in Section 5.1 and Appendix 8.3.2 aims to achieve this further development whilst also maintaining the existing content of the directory. It is expected that this would occur through a series of updates overtime where additional DSS's were added to the directory and any issues with usability and functionality improved.

The design and structure of the website has some built in flexibility to meet future needs and this could include adding new management domains such as ecosystem services.

Any options for further development, such as improving Interoperability with other databases and developing criteria to prioritise DSSs would need to be considered and would be subject to sourcing additional funding that may be required.

6 Key Learnings from the Project

6.1 Directory Structure and Functionality

- Sourcing, collating and checking metadata is time consuming and it is difficult to get consistent levels of information. Documentation on the DSS's can be variable and some of the metadata field that are of interest to the end user are subjective and difficult to define readily (i.e. ease of use, prerequisites for use).
- Providing consistent and meaningful summaries of case studies is difficult given the wide range of DSS's considered. To be useful the following key points were used in collating case studies:
 - Reason for Using DSS - Underlying science /policy question(s) being investigated
 - Overview of implementation process
 - Outputs or Findings
 - Recommendations/learning's
- Getting a common understanding of the types of DSS's is important for communicating between groups as a range of language can be used to describe such tools. Figure 1 is an attempt to provide some clarity on this.
- Providing several methods to access data was seen as important and creating a flexible Home Page that provides options which can be altered was seen as important
- The metadata field used in the directory were driven primarily by end user needs and this made it difficult to maps many of these to standard metadata terms.

6.2 Engagement of End Users

- It is difficult to get substantial feedback from end users. It is assumed that this is the result of busy schedules and input to this type of project is low on list of priorities. It may be a better approach to use a smaller focused end user group rather than trying to connect across a wider group of SIG networks.
- Future Envirolink projects that rely heavily on end user input from across staff at regional councils should consider if their project expectations are realistic and if proposed methods of engagement are most efficient and likely to be effective.
- There was a demand from users for general information on tool use and selection. However, this educational need was not an objective of this project.
- Creating a method for ongoing feedback and input from users is needed to fix any issues that might emerge and to keep the site current.

7 Recommendations for Future Management

In summary the following recommendation for future management of the web based DSS Directory are made:

- The support arrangements necessary for an effective service agreement, with required resources (such as an annual funding requirement) and underlying assumptions should be defined by the research providers/funders (MBIE) and regional council champions to the project in collaboration with the Envirolink Co-ordinator and in consultation with the regional CEOs and the RMG.
- The directory should now be promoted as widely and repeatedly as possible within limited resources available. A PowerPoint Presentation is available on the Directory website, explaining the directory.
- Further feedback should be sought from end users to assist with directing the next round of updates and creating further improvements to the site.
- The next round of updates should aim to broaden the range of DSS's provided across the management domains the councils work within.
- The Directory should function as a platform to enable End-Users to request increasingly integrated approaches and collaboration among providers of DSS platforms.
- Further discussion and advocacy should be undertaken with government agencies that have an interest in and potentially benefit from the DSS Directory (i.e. MBIE, MfE, MPI, LINZ) to ensure that opportunities to assist in updating and promoting the directory are captured, and that future linkages and development opportunities can be identified

8 Appendix

8.1 Metadata Fields for DSS Web Directory

FIELD	Details	Req. as Model or Non model field
Title of model/DSS	{Title} & {Abbreviation}	ALL
Purpose	{Purpose}	ALL
Description	{Description}	ALL
Type	(1) Spatial computer model (2) Non-spatial computer model (3) Not a computer model.	ALL
Latest version	{Description}	S & NS
State of development	Spatial computer model & non-spatial computer model (1) Unknown (2) Pre-alpha (3) Alpha (4) Open Beta (5) Closed beta (6) Released and updated (7) Released and final (8) Other, please specify: {Text} Not a computer model (1) Unknown (2) Under development (3) Released and updated (4) Released and final (5) Other, please specify: {Text}	Show the relevant ones for each
Current development activity	{Text} Describe the development activities	ALL
Main developers (allow multiple select)	{List of organisations} ability to add new organisations	ALL
Contact	{Name of contact person} {Name of organisation} {Address} {Direct phone number} {Email}	ALL
Scope:		
Outcome area (allow multiple select)	(1) Economic (2) Environmental (3) Social (4) Cultural	ALL
Management domain (allow multiple select)	(1) Air Quality (2) Land (3) Coastal (4) Urban systems (5) Natural Hazards (6) Biosecurity (7) Biodiversity (8) Community (9) Waste (10) Freshwater (11) Other, please specify: {Text}	ALL

FIELD	Details	Req. as Model or Non model field
<p>Sub domain</p> <p>(Allow multiple select)</p>	<ul style="list-style-type: none"> (1) Air Quality <ul style="list-style-type: none"> a. Air emissions inventories b. Air quality monitoring c. Air quality modeling (2) Land <ul style="list-style-type: none"> a. Contaminant losses b. water yield c. Erosion/sediment d. Ecosystem /habitat e. Crop/farm system (3) Coastal <ul style="list-style-type: none"> a. Coast – physical b. Fishing Aquiculture c. Water quality d. Ecosystems/habitat (4) Urban systems <ul style="list-style-type: none"> a. Storm water b. Transport c. Education d. Health e. Land use (5) Natural Hazards <ul style="list-style-type: none"> a. Hazards b. Flooding (6) Biosecurity (7) Biodiversity (8) Community <ul style="list-style-type: none"> a. Demographics b. Engagement (9) Waste (10) Freshwater <ul style="list-style-type: none"> a. Water quality b. Water quantity/flows c. River Management d. Lakes e. Ecosystems/habitat 	ALL
Intended end-users	<ul style="list-style-type: none"> (1) Researcher (2) Regional Council Scientist (3) Policy Analyst (4) General Usability (5) Implementation Staff 	ALL
Spatial resolution (Grid Size)	<ul style="list-style-type: none"> (1) Unknown (2) Point (3) 10-100m (4) 100-500m (5) 500-1000m (6) Km +'s 	Computer S
<p>Spatial extent</p> <p>(allow multiple selection)</p>	<ul style="list-style-type: none"> (1) Unknown (2) Land or Business Unit (3) Local (i.e catchment or district) (4) Regional (5) National (6) International (7) Other, Specify: {Text} 	Computer S
Spatial dimensions	<ul style="list-style-type: none"> (1) Unknown (2) 1D (3) 2D (4) 3D (5) Not applicable 	Computer S
<p>Temporal resolution</p> <p>(allow multiple Select)</p>	<ul style="list-style-type: none"> (1) Unknown (2) Seconds (3) Minutes (4) Hours (5) Days (6) Months 	Computer S & NS

FIELD	Details	Req. as Model or Non model field
	(7) Years (8) Decades (9) Centuries (10) Millenniums (11) Not applicable (12) Other, specify: {Text}	
Temporal extent	(1) Unknown (2) Seconds (3) Minutes (4) Hours (5) Days (6) Months (7) Years (8) Decades (9) Centuries (10) Millenniums (11) Not applicable (12) Other, please specify: {Text}	S & NS
Steady state or dynamic	(1) Unknown (2) Steady State (3) Dynamic	Computer S & NS
Level of integration	(1) Unknown (2) Economic (3) Environmental (4) Social (5) Cultural (6) Others, please specify: {Text}	ALL
Input and output data:		
Key Input data (allow multiple select)	(1) Economic a. Mico-economic data b. Macro-economic data (2) Environmental a. Land Use b. Land Cover c. Rainfall d. Runoff e. Drainage f. Temperature g. Potential Evaporation (3) Social a. Population cohorts b. Migration c. Fertility d. Deprivation index (4) Cultural (5) Others, Please specify	Computer S & NS
Input data formats	(1) XLS(X) (2) CSV (3) ASCI (4) GIS compatible files (5) Text file(s) (6) Others, please specify: {Text}	Computer S & NS
Key output data (allow multiple select)	(1) Economic a. Mico-economic data b. Macro-economic data (2) Environmental a. Land use b. Water quality c. Nutrient loads d. Sediment loads e. Water quantity	Computer S & NS

FIELD	Details	Req. as Model or Non model field
	(3) Social a. Demographics (4) Cultural (5) Other , please specify	
Output data formats (allow multiple select)	(1) XLS(X) (2) CSV (3) ASCI (4) PDF (5) Image file(s) (6) Animations/video (7) GIS compatible files (8) Text file(s) (9) Others, please specify: {Text}	Computer S & NS
Accessibility		
Open/Closed Source	(1) Unknown (2) Open Source (3) Closed Source	Computer S & NS
Licence type	(1) {Enter Licence type} (2) No Licence (3) Unknown	Computer S & NS
Licence cost for non-commercial use	(1) {Number in NZD} (2) Price negotiable (3) Not available for non-commercial use (4) Unknown	Computer S & NS
Licence cost for commercial use	(1) {Number in NZD} (2) Price negotiable (3) Not available for commercial use (4) Unknown	Computer S & NS
Licence purchase contact	{Name of contact person} {Name of organisation} {Address} {Direct phone number} {Email}	Computer S & NS
Other IP constraints on use	{Text}	Computer S & NS
User information		
Operating system / platforms	(1) Unknown (2) MS Windows (3) Mac OS X (4) Linux (5) Other, Please specify: {text}	Computer S & NS
Software needed	(1) Unknown (2) ArcView (3) ArcGIS (4) Matlab (5) Excel (6) Stella/Ithink (7) Vensim (8) Other, please specify: {Text}	Computer S & NS
Prerequisites for use	{Describe these prerequisites}	ALL
User Interface	(1) Unknown (2) Graphical desktop (3) No user interface	Computer S & NS

FIELD	Details	Req. as Model or Non model field
	(4) Other, please specify: {Text}	
Ease of use (Insert a box when one is ticked and ask reasons for selection to provide context – ie high data needs or requires expert input)	(1) Unknown (2) Easy (3) Moderate (4) Difficult	ALL
	{text} Explanation for choice of Ease of Use	
Use in Policy process	(1) Plan (Policy Formulation) (2) Do (Policy Implementation) (3) Check (Policy Evaluation) (4) Review (Issue Identification)	ALL
User documentation/manuals	{text and/or URL link}	ALL
Available support	{text and/or URL link}	ALL
Users Forum	{text and/or URL link}	ALL
Technical considerations		
Programming Language used	(1) {Name of language} (2) Unknown (3) Other, please specify: {Text}	Computer S & NS
Methods included for calibration, and validation	{Text}	Computer S & NS
Methods included for managing uncertainty	{Text}	Computer S & NS
Analytical techniques	(1) Input/output (2) GIS (3) Computer General Equilibrium (4) Agent Based Modelling (5) System dynamics (6) Mediated Modelling (7) Bayesian Belief Network (8) Multiple Criteria Decision Analysis (9) Scenario Planning (10) Other, please specify: {Text}	ALL
Model Structure (diagram)	{Diagram}	Computer S & NS
Model Structure	{Text}	Computer S & NS
Other information		
Keywords	{text} – List of keywords	ALL
Linkages to other models	{List of other models already loaded – ability to multi select}	S & NS
Links (URL)	{text and/or URL link}	ALL
Key References	{text and/or URL link}	ALL
Applications – Case Studies		
Location	{Location}	
Organisations	{List of organisations}	

FIELD	Details	Req. as Model or Non model field
Management domain	As defined above	
Sub domain	As defined above	
Description	{text, diagrams} Ask that contributors try to add content under these main heading areas: <ul style="list-style-type: none"> - Reason for Use – Underlying science /policy question(s) being investigated - Overview of implementation - Outputs or Findings - Recommendations/learning's 	
Links (URL)	{text and/or URL link}	
Key References	{text and/or URL link}	

8.2 List DSS's and Case Studies

The following tables outline the range of DSS's that are:

- Completed and loaded into the live database; or
- In a draft state with some metadata prepared for the DSS; or
- Suggested DSS's that can be considered as options for future additions to the directory

Assessment Methods/Frameworks

Loaded in Live Directory Database

Type / Method	Case studies/examples – Creator	Info
Agent Based Modelling	MASC – Multi Agent Simulation model of a catchment	Chris Drake –Agresearch
Bayesian Belief Networks	Bog Burn and Oreti River – Southland – NIWA Case study loaded	Quinn, J.M.; Monaghan, R.M.; Wilcock, R.J. (2010). “Linking farm and waterway values – the Bog Burn catchment.”
Mediated Modelling	Massey University/EERNZ Manawatu Catchment, Wellington	EERNZ/SP2 website
Multi Criteria Analysis (MCA)	Refs provided but could have some case studies	

For Future Consideration

Type / Method	Case studies/examples – Creator	Info
Choice Experiment		
Issues Mapping		
Risk assessment methodologies		Ex AS/NZS ISO 31K:2009 as applied to content areas as environmental risk
INFFER – Investment framework for environmental resources	http://www.inffer.org/	INFFER™ is a tool for developing and prioritising projects to address environmental issues such as reduced water quality, biodiversity, environmental pests and land degradation.

Spatial DSS's

Loaded in Live Directory Database

Name	Owner/ developer	Case studies/examples
AquiferSim	Integrated Research for Aquifer Protection (IRAP)	Mataura Valley - Southland
CALPUFF	USEPA	SO2 at Kinleith Tokoroa
C-CALM: Catchment Contaminant Annual Loads Model	NIWA/ Landcare Research	Some case study references provided
CLUES: Catchment Land Use	MAF/NIWA/Landcare/AgRese	Case studies for Waikato and

Name	Owner/ developer	Case studies/examples
for Environmental Sustainability	arch/ HortResearch/Lincoln Environmental/Aqualinc/Harris Consulting	southland
DYRESM – CAEDYM (DYnamic REservoir Simulation Model Computational Aquatic Ecosystem DYnamics Model)	Developed by University of Western Australia Contact David Hamilton at the University of Waikato	Ohau channel Rotorua - references for others provided (See if get coastal example?)
GLEAMS (Groundwater Loading Effects of Agricultural Management Systems)	USDA-ARS (Knisel 1993)	Waiarohia catchment
Highly Erodible Land Model – (HEL) Landslide Risk	Developed by Landcare Research	Highly Erodable land of the Manawatu Whanganui region
IDEAS: Integrated Dynamic Environmental Assessment System	Landcare Research/ Tasman District Council/ Cawthron Institute	Motueka Catchment
LURNZ: Land Use in Rural New Zealand	Motu	On emissions trading
N-Manager	Motu	Lake Rotorua catchment
NZEEM – New Zealand Empirical Erosion Model	Developed by Landcare Research	Erosion carbon study (could add another land management one)
NZ-FARM	Landcare Research	Huriniui catchment
Overseer©	AgResearch/Fert Research	Link to external case studies
River Values Assessment System (RiVAS)	NIWA/ECan/EW	Valuing Water - Tasman
ROTAN: Rotorua and Taupo Nitrogen Model	NIWA/Motu/BOPRC	N loads to Lake Rotorua
Soil Vulnerability Modelling (formerly EnSus)	Developed by Allan Hewitt, Peter Stephens, Robert Gibb at Landcare Research	
SPASMO: Soil Plant Atmosphere System Model	Plant and Food Research Contact Brent Clothier or Steve Green	3 case studies loaded – need review
SPARROW	Developed by U.S. Geological Survey and applied by NIWA	
Suspended Sediment Yield Estimator (SSYE)	NIWA	Transmission Gully, Estm yield from NZ rivers
SWAT (Soil and Water Assessment Tool)	http://swatmodel.tamu.edu/	ICM - Motueka
Threatened Environment Classification	Landcare Research/ MfE/DoC	West Coast, and recent loss of indigenous cover
TopNet	NIWA	National water accounts
WAIORA (Water Allocation Impacts on River Attributes)	NIWA	Case study – Horizons in stream flow assessment
WISE: Waikato Integrated Scenario Explorer LIFE AND FINAL	Waikato Regional Council	Urban growth case study

Loaded in Draft Directory Database (not currently complete or live)

Name	Owner/ developer	Case studies/examples
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Name	Owner/ developer	Case studies/examples
ARDEEM: Auckland Regional Dynamic Environmental-Economy Model DRAFT	Market economics/Auckland Council	Auckland and Waikato (WRDEEM)
BNZ – Basin NZ DRAFT	Developed by NIWA www.niwa.co.nz Contact Sandy Elliott (s.elliott@niwa.co.nz)	
FarmSim	Developed by IRAP and Lincoln ventures Ltd www.irap.org.nz www.lvl.co.nz	

For Future Consideration

Name	Owner/ developer	Case studies/examples
AERMOD	USEPA	developed by USEPA to address some inherent issues with earlier dispersion models
AusPlume		
BEPM (Bus Emissions Prediction Model)	Keith Jones – Auckland Uniservices	
Forecaster: Maximising Forest Investment	Scion, Future Forest Research	
Forest Calculators	Scion/ Future Forest Research	For Radiata pine, Douglas fir, Cypresses, Redwood, Eucalyptus
Geomaster:	Scion	Land Use Records in Space and Time
LUCI	Plant and food research Contact Rob Zyskowski at Plant and Food Research	LUCI is a daily time-step process-based model framework for simulating plant growth and soil processes, such as water and N balances, with different land uses and management systems.
My-Land: Land Use Decision Tool	Scion/AgResearch – Graham West @ Scion	Rotorua Lake Catchment – BOPRC
NPLAS	NIWA	
Planning New Zealand's cities and settlements to sustain environmental, economic, social and cultural values of urban water bodies	NIWA	
RiCOM – River and Coastal Model	Developed by Roy Walters at NIWA www.niwa.co.nz Contact James Goff (j.goff@niwa.co.nz)	Could be a good coastal example
Riparian Management Classification		Piako, Canterbury, Waitao, Ohariu, Auckland http://www.niwa.co.nz/our-science/freshwater/tools/riparian-management-classification
Riskscape	Developed by Roy Walters at NIWA www.niwa.co.nz Contact James Goff (j.goff@niwa.co.nz)	http://www.riskscape.org.nz/ Two end-user workshops have been held, but no clear statements found of practical application.
River Environment		

Name	Owner/ developer	Case studies/examples
Classification		
VEMP (vehicle Emissions Prediction Model)	Keith Jones – Auckland Uniservices	
Vital Sites	Landcare Research/DOC	
WRENZ – Water Resources Explorer NZ	NIWA	
WATYIELD: Water Yield Prediction Tool	Landcare Research/ Tasman District Council	

Non-Spatial DSS's

Loaded in Live Directory Database

Type / Method	Name	Owner/ Developer/	Case studies/examples - Creator
Deliberation Matrix	KerBabel		(Need a case study) See - Waikato Farmers - AgResearch
	Vertebrate Pest Control DSS	Landcare Research	(Case study would be helpful)

For Future Consideration

Type / Method	Name	Owner/ Developer/	Case studies/examples - Creator
Choice Experiment			
Issues Mapping			
Risk assessment methodologies			Ex AS/NZS ISO 31K:2009 as applied to content areas as environmental risk
	Inffer – Investment framework for environmental resources		www.inffer.org INFFER™ is a tool for developing and prioritising projects to address environmental issues
	Sedimentation DSS for Estuaries	Developed by NIWA contact Malcolm Green (m.green@niwa.co.nz)	Sedimentation DSS is an estuary sedimentation risk tool that can predict sediment movement and deposition in an estuary and includes a DSS to predict various aspects of risk with regard to estuarine damage www.niwa.cri.nz/ncwr/tools/sed-risk
	Kaitiaki Tools	NIWA	http://www.niwa.co.nz/our-science/freshwater/tools/kaitiaki_tools
	Lake sediment phosphorus release DSS	NIWA	Okaro – Rotorua lakes Hickey, C.W.; Gibbs, M. (2009). Lake sediment phosphorus release management - Decision support and risk assessment

Type / Method	Name	Owner/ Developer/	Case studies/examples - Creator
			framework. <i>New Zealand Journal of Marine and Freshwater Research</i> 43 (3): 819-856.
	Marine Habitat Assessment DSS	Enviro tools	http://www.envirolink.govt.nz/PageFiles/31/Marine%20Habitat%20Assessment%20Decision%20Support%20Tool%20-%20background%20and%20operating%20instructions.pdf
	Periphyton BNN model	Enviro tools	http://www.envirolink.govt.nz/PageFiles/31/Review%20of%20the%20NZ%20instream%20plant%20and%20nutrient%20guidelines%20and%20development%20of%20an%20extended%20decision%20making%20framework.pdf
	Sea water intrusion assessment tool	Enviro tools	http://www.envirolink.govt.nz/PageFiles/31/420-NLRC50%20Guidelines%20for%20the%20monitoring%20and%20management%20of%20sea%20water%20intrusion%20risks%20on%20groundwater.pdf

8.3 Service Agreements

8.3.1 Hosting and Administration Agreement

The initial hosting and administrative requirements for the directory have been agreed with the Envirolink coordinator

Email of arrangement withheld

Additional support for keeping the directory updated from new research has been sought from MBIE

8.3.2 Business case for on-going administration, maintenance and update of directory

Value and Need

The value of the DSS directory is its support for improving practices in council decision-making across the spectrum of functions and issues faced. The future operating environment for councils demands ongoing improvement in decision-making. This in turn demands ongoing effort in improving the directory's practice support value, by tuning and updating the information on DSSs as experience grows with the use of tools.

The potential value of ongoing updating of this directory is not capable of precise quantification. But in concept it will serve to narrow the gap between demand for improved council practice and the tangible information technology and heuristic resource the directory represents, to support a growing span of decision-making areas.

Roles

The on-going management of the DSS directory is seen to require four specific roles – Directory Administrator, Technical Support, End User Champions, and Content Update Support. The role description for each of these is defined:

1. Directory administrator – to provide day-to-day management of the web-based directory. The key tasks are seen as:
 - a. First point of contact for enquiries about directory
 - b. Troubleshoot any operational issues
 - c. Control access to database for addition of metadata
 - d. Manage responses to suggestions from site users about website improvements
 - e. Oversee updates and revisions of website
 - f. Website tracking and reporting results to Regional Council Champions
 - g. Liaising with End User Champions on future development and maintenance needs.
2. Technical support – provide timely technical advice and solutions to the Directory Administrator as required. Limited technical support is provided as part of the current hosting arrangement. The key tasks are seen as:
 - a. Providing as required phone support to the Directory Administrator (as defined in Hosting agreement)
 - b. Undertaking any required technical changes to the website, as requested by the Administrator.

- c. Providing agreed support to the Content update support role when updates and reviews are being undertaken.
3. End user champions – These can be one or more Council staff members whose role is to champion the use, maintenance, and further updates and development of this directory. The key tasks are seen as:
 - a. On-going promotion of directory
 - b. Seeking end user feedback and directing content updates and future developments.
 - c. Advocacy with local and central government agencies for ongoing support and use of directory.
 - d. Liaising with Directory Administrator to ensure that funding support and management of directory is maintained.
4. Content update support – This role would be an intermittent and temporary role with the sole purpose of collating and loading metadata for additional DSS's/ case studies that have been agreed under any 'update' funding to be added to the directory. The key tasks are seen as:
 - a. Undertaking a specific update and/or maintenance work on the directory content as agreed with the Directory Administrator and End User Champions.
 - b. Source DSS metadata and case studies and load into Directory database.
 - c. Check and validate metadata before making live on the directory.
 - d. Liaise with Directory Administrator and Technical Support to achieve agreed update/maintenance work.

Work Programme

The following outlines the proposed tasks and resourcing that could be required to host, maintain and update the directory at a level that would ensure that it maintains its currency and usefulness as a resource.

Task	Responsibility	Frequency
Responding to request/queries via 'Suggestion Box'	Administrator	As required
Trouble shoot operational issues	Administrator / Technical Support	As required
Providing access to external parties to load their metadata	Administrator	As required
Collating list of suggested improvement/ additional DSS's or case studies	Administrator	As required or for annual update process
Deciding priorities for annual update programme of work	Administrator / End user champions	Annually
Implementing maintenance needs	Administrator for urgent needs Content update support for 'batched' needs	As required Annually
Annual updates to source and incorporate additional DSS's and case studies	Content update support	Annually
Promotion of Directory via networks	End user champions/ Administrator	To take advantage of available opportunities

Budget Estimates

Annual estimate of budget to undertake the work program outlined above are outlined.

Activity	Budget estimate (excl GST)
Web server hosting of directory	\$660
Technical Support	\$300 (3 hours/yr – hands on support)
Directory Administrator tasks	\$5000 (~3-4hrs/ month)
Annual content update/maintenance improvements	\$8000 (~1.5-2 weeks work to undertake collated list of maintenance needs and source/load ~10 DSS's and 5 case studies)
Directory promotion	\$500 cash (\$2000 in-kind)
Annual estimated budget requirement	\$14,460

Extent of Existing Support

Currently Envirolink is supporting the hosting and basic administrative costs for the directory.

There is a continuing commitment from the two regional council champions to support the next phase of the directories development.

An application for a small advice grant is to be made to undertake an initial update of the directory to increase the scope of DSS content in the Directory.

Further expressions of support are being sought from MFE, LGNZ