Options for Coordinating Soil Resource Information for the West Coast, South Island, New Zealand

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	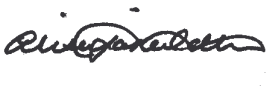
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Summary

Project and Client

Landcare Research reviewed options for coordinating the rationalisation of published and unpublished soil resource information for the West Coast Regional Council in December 2006.

Objectives

- Identify options for coordinating published and unpublished soil resource information for the West Coast.
- Fine-tune output criteria from a proposed regional soils database and soil fact sheet generator.

Methods

Discussions were undertaken on 8 December 2006 between Landcare Research (Soil Scientists Craig Ross and Ian Lynn) and West Coast Regional Council staff (Simon Moran and Les Gibbs) on the availability of written and spatial soil resources on the West Coast. Discussion centred on:

- availability of soil information to the council and the public
- accuracy of data registration to the NZMS260 grid and landscape
- soil information accessibility
- the degree of regional rationalisation that could be readily undertaken
- interpretation of soil information for resource management (particularly humping and hollowing, flipping, slope failure that generates suspended sediments, and septic tanks).

Results

- It was agreed that Landcare Research assess the inputs required (including time and costs) to electronically capture the published and unpublished spatial soil data, review its registration quality, and convert to a common scale of 1:50 000 on the NZMS grid, in ArcInfo format.
- Consultation and tailoring of the soil fact sheet outputs to the specific needs of the West Coast region require further discussion.
- Regional soil correlation and rationalisation, compiling attributes of correlated soil database, and the implementation of the soil fact sheet generator for the West Coast lowland soils would provide improved access to soil information.

Conclusions

- To improve compliance and consent decisions by council, and to improve management decisions by landholders and researchers, access to soil spatial and profile characterisation data needs to be improved.
- Correlated digital soil maps of the lowland regions of the West Coast could be made accessible over the Web.
- A soil database and online fact sheet generator for the West Coast lowlands could be established.

Recommendations

- Undertake a series of projects to georeference, digitise or scan published and unpublished soil maps held only in paper form.
- Undertake a programme of soil correlation, soil database attribute compilation, and soil profile image acquisition, and implement a soil fact sheet generator and database for the lowland West Coast soils.
- That this work be pursued in a series of Envirolink Medium Grant applications.
- Prioritise and package subregions into suitable blocks for Envirolink funding application once quality assessment of soil map unit registration has been completed.

1. Introduction

Options for coordinating the rationalisation of published and unpublished soil resource information were reviewed by Landcare Research for the West Coast Regional Council in December 2006. This report was prepared as part of the commitments for Envirolink small advice grant WCRC 21.

2. Background

A number of 1:50 000 and 1:63 360 scale soil maps have been published for selected areas of the West Coast Region, and several unpublished detailed maps also exist (see Appendix 1).

Although some map data have been digitised, this is not readily available, and its registration and quality needs to be reviewed and assessed. Detailed soil information in the form of profile descriptions and physical and chemical characterisation has been documented in accompanying reports, although it also remains largely inaccessible to local authority staff, landholders and researchers.

To improve public access to this information, collation, upgrading and electronic capture of the soil map data and establishing a user-friendly online soil database and soil fact sheet generator for the West Coast lowlands is proposed. Ready access to this information would enable more accurate and timely environmental decisions to be made by local authority staff and landholders, e.g. hydrologic responses to humping-hollowing or flipping, effluent management, septic tank suitability, potential for slope failure that generates suspended sediments, etc.

Modern soil correlation and rationalisation of the soil series depicted on the array of soil maps would also enable a regionally consistent soil legend to be established.

A soil fact sheet generator based on the successful and operational growOTAGO / S-map template could deliver soil fact sheets over the Web. See http://www.cityofdunedin.com/city/?page=searchtools_gis to access a soil information sheet from a digital soil map, or http://soils.landcareresearch.co.nz/orc/ to demonstrate the generation of a soil fact sheet ‘on-the-fly’.

Soil fact sheets tailored to the specific needs of the West Coast Region for those soils identified on the more detailed lowland soil maps could be generated from a database held on a server at Landcare Research, Lincoln. This centrally held database can be continuously upgraded as new or additional data become available, ensuring the fact sheets are always up to date, and are compiled from the latest information and models.

3. Objectives

- Identify options for coordinating published and unpublished soil resource information for the West Coast.
- Fine-tune output criteria from a proposed regional soils database and soil fact sheet generator.

4. Methods

In response to a request for informal verbal consultation as per Environlink Small Advice Grant WCRC 21, discussions were undertaken on 8 December 2006 between Landcare Research and West Coast Regional Council staff with respect to the availability of written and spatial soil resources on the West Coast. Discussion centred on the availability of soil information to the council and the public, accuracy of data registration to the NZMS260 grid and landscape, soil information accessibility, and the degree of regional rationalisation that could be readily undertaken.

Staff involved were Simon Moran, Planning and Environmental Manager; and Les Gibbs, Information Technology Specialist from the West Coast Regional Council, Greymouth; and Craig Ross and Ian Lynn, soil scientists, from Landcare Research Palmerston North and Lincoln.

5. Results

Proposed future developments resulting from the discussions are outlined below.

5.1 Soil map capture

It was agreed that Landcare Research undertake an assessment of the inputs required (including estimates of time and cost) to electronically capture the published and unpublished spatial soil data, review its registration quality, and convert to a common scale of 1:50 000 on the NZMS grid, in ArcInfo format (see Table 1).

As some of these regions contain significant areas of steepland terrain where the soil mapping is of lesser precision, the merits of restricting map unit capture to only the lowlands, valley floor and rolling land will also be considered.

The resulting standard-scale rectified soil maps could be made available over the Web through the regional and district councils' sites, as well as through Landcare Research's soil web portal.

5.2 Soil fact sheet parameters

Consultation and tailoring of the soil fact sheet outputs to the specific needs of the West Coast Region were discussed.

A range of growOTAGO / S-map soil fact sheets were discussed and left with regional council staff for further assessment and feedback. The selection of additional parameters specifically applicable to the West Coast still requires further discussion with regional and district council staff, landholders and researchers currently working in the area.

Fact sheets produced for growOTAGO lowland soils include a two-page detailed *Overview* of the soil, and stand-alone *Soil attributes for horticultural development and management* and *Irrigation design and management information* sheets. The soil *Overview* fact sheet includes an image of the soil profile where available. The list of attributes included on each of the growOTAGO fact sheets is listed in Appendix 2. Soil attributes more suitable for the West Coast Region could emphasise soil physical properties: drainage characteristics, suitability for hump-and-hollow construction or flipping, suitability for septic tanks, potential for slope failure with generation of suspended sediments in waterways, etc.

5.3 Establishing a regional soil legend

Regional soil correlation and rationalisation, populating the soil database, and implementation of the soil fact sheet generator for the West Coast lowland soils would provide improved access to soil information.

Regional soil correlation and rationalisation of soil map units would be followed by implementation of the soil fact sheet generator and parameters for soil series, by:

- Correlating unpublished and published soil profile data in terms of the New Zealand Soil Classification (NZSC), in a regional context
- Compiling database attributes of the correlated soils through trawling all available published and unpublished data sources
- Sourcing suitable profile photographs for illustration.

Regional soil correlation is likely to significantly reduce the number of unique soils for which soil attributes need to be sourced, and for which fact sheets will need to be generated.

Table 1 Published and unpublished soil map data available for the West Coast (excluding commercial reports)

Author	Year	Title	Scale	Data capture	Soil map TIF available	NZMS sheets	Time & cost	Notes
Published Surveys								
Mew G, Webb TH, Ross CW, Adams JA	1975	Soils of Inangahua Depression, South Island, New Zealand. NZ Soil Survey Report 17. NZSB Map 147	1:63 360	Nil, scan or digitise line work, convert to 1:50 000 on NZMG	Yes, convert image to JPEG overlay on NZMS260 grid?	Prt L29, L30	To come	Soil polygon line work needs to be redrawn or adjusted to NZMG grid and captured electronically
Laffan MD	1980	Soils of the Charleston-Punakaiki region, South Island, New Zealand. NZ Soil Survey Report 47. NZSB Map 179	1:50 000	Nil, scan or digitise line work	Yes, convert image to JPEG overlay on NZMS260	Prt K29, K30	To come	Check registration & accuracy of soil polygon line work fit to NZMG topography, adjust or redraw, capture electronically
Mew G	1980	Soils, forestry and agriculture of the Grey Valley, South Island, New Zealand. NZ Soil Survey Report 46. NZSB Map 173 [Sheets 1&2]	1:50 000	Timberlands area digitised, format? Scan or digitise whole or balance of line work	Yes, convert image to JPEG overlay on NZMS260	Prt K30, K31, K32, L31, L32	To come	Convert to ArcInfo, check registration & accuracy of soil polygon line work fit to NZMG topography, adjust or redraw, capture electronically
Mew G	1980	Soils of Greymouth–Hokitika region, South Island, New Zealand. NZ Soil Survey Report 58. NZSB Map 172 [Sheets 1&2]	1:50 000	Nil, scan or digitise line work	Yes, convert image to JPEG overlay on NZMS260	Prt J31, J32, K32	To come	Check registration & accuracy of soil polygon line work fit to NZMG topography, adjust or redraw, capture electronically
Heine JC, Mew G	1981	Soils of the Mokihiniu-Orikaka region, South Island, New Zealand. NZ Soil Survey Report 59. NZSB Map 195	1:50 000	Nil, scan or digitise line work	Yes, convert image to JPEG overlay on NZMS260	Prt K29, K30, L28, L29	To come	Check registration & accuracy of soil polygon line work fit to NZMG topography, adjust or redraw, capture electronically
Mew G, Ross CW	1991	Soils, agriculture and forestry of the Westport Region, West Coast, South Island New Zealand. DSIR Land Resources Scientific Report No. 1. DSIR Land Resources Map 301	1:50 000	Line work captured	Yes	Prt K29	To come	Check registration & accuracy of soil polygon line work fit to NZMG topography, adjust or redraw

Author	Year	Title	Scale	Data capture	Soil map TIF available	NZMS sheets	Time & cost	Notes
New Zealand Soil Bureau	1970	Soil maps of Westland. NZSB Map 91/1, 2	1:126 720	Nil, line work at inappropriate scale to capture	Yes	Many	To come	Use data to map and recompile at 1:50 000 if resourced
Unpublished surveys								
O'Byrne TN.	1981	Interim report on suitability of soils in the Karamea district for kiwifruit and other horticultural crops. NZ Soil Bureau District Office Report NS15.	1:63 360	Captured, convert to 1:50 000 on NZMG	No	Prt L27, L28	To come	Check registration & accuracy of soil polygon line work fit to NZMG topography, adjust or redraw

6. Conclusions

- To improve compliance and consent decisions by council, and to improve management decisions by landholders and researchers, access to soil spatial and profile characterisation data needs to be improved.
- Correlated digital soil maps of the lowland regions of the West Coast could be made accessible over the Web.
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7. Recommendations

- Undertake a series of projects to georeference, digitise or scan published and unpublished soil maps held only in paper form.
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- That this work be pursued in a series of Envirolink Medium Grant applications.
- Prioritise and package subregions into suitable blocks for Envirolink funding application once quality assessment of soil map unit registration has been completed.

Appendix 1 West Coast spatial soil data

A. Published bulletins and soils reports

Heine JC, Mew G 1981. Soils of the Mokihiniu–Orikaka region, South Island, New Zealand. NZ Soil Survey Report 59 [includes 1:50 000 scale map].

Laffan MD 1980. Soils of the Charleston–Punakaiki region, South Island, New Zealand. NZ Soil Survey Report 47 [includes 1:50 000 scale map].

Mew G 1980a. Soils forestry, and agriculture of the Grey Valley, South Island, New Zealand. NZ Soil Survey Report 46 [includes 1:50 000 scale map].

Mew G 1980b. Soils of Greymouth–Hokitika region, South Island, New Zealand. NZ Soil Survey Report 58 [includes 1:50 000 scale map].

Mew G, Ross CW 1991. Soils, agriculture and forestry of the Westport Region, West Coast, South Island New Zealand. DSIR Land Resources Scientific Report No. 1.

Mew G, Webb TH, Ross CW, Adams JA 1975. Soils of Inangahua Depression, South Island, New Zealand. NZ Soil Survey Report 17 [includes 1:63 360 scale map].

New Zealand Soil Bureau 1970. Soil maps of Westland SBP 559 (map 91/1, 2,) [1:126 720]

B. Unpublished District Office reports

Almond P, Doyle R, Grealish G, Wilson A, Giltrap D 1984. The soils of Ianthe State Forest. Unpublished NZ Soil Bureau Report.

Doyle R, Grealish G, Almond P 1985. The soils of Makawhio State Forest. Unpublished NZ Soil Bureau Report.

Mew G 1981a. Interim report on soils of Mahinapua State Forest, Westland. NZ Soil Bureau District Office Report NS 7.

Mew G 1981b. Interim report on advanced reconnaissance of soils of Wanganui, Ianthe, and part Karapotahi state forests, South Westland. NZ Soil Bureau District Office Report NS 9.

Mew G, Ross CW 1981a. Soils of Western Ngahere area, Grey Valley, South Island. NZ Soil Bureau District Office Report NS6.

Mew G, Ross CW 1981b. Soils of the lower Mikonui valley, Ross, Westland. NZ Soil Bureau District Office Report NS14.

O'Byrne TN 1981. Interim report on suitability of soils in the Karamea district for kiwifruit and other horticultural crops. NZ Soil Bureau District Office Report NS15.

Smith SM, Lee WG. 1982. Soils and vegetation of the Haast Range, South Westland. NZ Soil Bureau District Office Report DN11.

C. Commercial reports that would need clearance to use

Mew G, Ross CW 1992. Soils and land use of Globe-Progress project area, Reefton. Landcare Research Contract Report LC9293/013, prepared for Macraes Mining Co.

Ross CW 1997. Soils of the Upper Waimangaroa area, Buller region. Landcare Research Contract Report LC9697/076, prepared for Kingett Mitchell and Associates and Solid Energy.

D. Private Reports that would need clearance to use

Wilms T 1985. Soils of Barrytown Flat, Westland, New Zealand. A report prepared for Grampian Mining Co. (that no longer exists so we would only need permission for use from Theo Stephens?).

Appendix 2 List of attributes included on each of the example growOTAGO fact sheets

Soil *Overview* factsheet
Landform
Slopes
Parent material
Soil classification
Rock class of stones/rocks
Rock class of fine earth
Parent material origin
Topsoil textural class
Profile textural group
Topsoil clay range
Old names for the same soil

Key physical properties
Potential rooting depth
Rooting barrier
Topsoil stoniness
Depth to stony layer class
Drainage class
Aeration in root zone
Permeability profile
Depth to slowly permeable horizon
Permeability of slowest horizon
Profile total available water 0–1000 mm
Profile readily available water 0–1000 mm
Total available water 0–300 mm
Readily available water 0–300 mm
Fine earth dry bulk density, topsoil
Fine earth dry bulk density, subsoil
Depth to hard rock
Depth to soft rock
Structural vulnerability

Key chemical properties
Topsoil organic matter
Topsoil organic carbon
Top soil P retention
Inherent fertility class
Likelihood of salinity

Irrigation design and management information factsheet

Key properties for irrigation
Slopes
Potential rooting depth
Rooting barrier
Topsoil stoniness

Depth to stony layer class
Drainage class
Permeability profile
Depth to slowly permeable horizon
Permeability of slowest horizon
Profile total available water 0–1000 mm
Profile readily available water 0–1000 mm
Total available water 0–300 mm
Readily available water 0–300 mm

Factors to consider in choice of irrigation method and management
Slow infiltration vulnerability
Water logging vulnerability – irrigated

Horticultural development and management factsheet

Key properties relevant to horticulture
Slopes
Soil texture
Potential rooting depth
Rooting barrier
Topsoil stoniness
Depth to stony layer class
Drainage class
Permeability profile
Profile total available water 0–1000 mm
Profile readily available water 0–1000 mm
Total available water 0–300 mm
Readily available water 0–300 mm

Factors to consider in choice of crop and management practices
Erosion vulnerability
Water logging vulnerability – irrigated
Structural vulnerability
Drought vulnerability – non irrigated
Topsoil stoniness