



Spatial Environmental Datasets

Summary

A list of potentially available spatial environmental datasets was compiled in the initial stages of a task within the Forests and Environment programme that is focussed on guiding the positioning future forests in the landscape on the basis of a set of environmental characteristics. The datasets are listed and briefly described here, and an outline of the intended approach to be used is also given.

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Introduction

Work within the 'positioning future forests' task will involve defining and mapping areas that could benefit from forest plantings and the associated environmental services (functions) they provide at a national scale. In addition to timber production, the benefits of new forests could include enhanced biodiversity, erosion prevention, flood control, bio-fuel production, carbon sequestration, or some combination of these. Future forest functions are likely to be driven by environmental conditions, with different conditions warranting a different response from the forest planting. Areas prone to various environmental extremes such as soil water deficits and erosion are likely to be most in need of some type of forest cover. The type of forest cover should be designed to best meet the specific needs of the site. For example, a site where erosion is a significant issue could benefit from all of the aforementioned forest functions. However, very steep upland areas may be too steep and cold for timber production forests, and so the primary forest function in those areas might be biodiversity conservation, stream-flow moderation, and perhaps also long-term carbon sequestration. A database of national spatial datasets will support the outcomes of this work.

Overview of Datasets

A range of spatial datasets are potentially available for delineating sites that could benefit from forests and forest ecosystem services. The type of national extent datasets and surfaces currently available include the land cover database (LCDB2), forest productivity surfaces (300 Index and Site Index) for *Pinus radiata* (Palmer et al., in review) (other species are currently being modelled and may potentially

become available for this task), primary and secondary terrain attributes (Palmer et al., 2008), SWatBal soil water balance surfaces (Palmer et al. 2009), and climate surfaces (Mitchell, 1991; Leathwick et al., 2002; Tait 2006).

Models potentially available for assessing sites at risk of erosion and the impact of forest cover on catchment flooding might include Landcare Research's erosion model (NZeem) and NIWA's hydrological model (Topnet).

The surfaces, datasets, and models that are potentially available for use in the 'positioning future forests' task are listed and very briefly described:

- **LCDB2** – Land cover database for New Zealand (Land Information NZ),
- **TANZ** – A set of comprehensive national-scale surfaces representing primary and secondary terrain attributes for New Zealand (e.g. slope, aspect, and wetness index) derived from a hydrologically-sound digital elevation model at 25 m resolution (Palmer et al., 2008),
- **SWatBal** – A soil water balance model for New Zealand that provides monthly and annual fractional available root-zone water storage at 100 m resolution (Palmer et al., 2009),
- **Climate surfaces** – Monthly and annual averages for rainfall and temperature at 100-1000 m resolution (Mitchell, 1991; Leathwick et al., 2002; Tait 2006),
- **300 Index surface** – Mean annual increment for *Pinus radiata* ($\text{m}^3 \text{ha}^{-1} \text{yr}^{-1}$) as a spatial surface at 100 m resolution (Palmer et al., in review),
- **Site index surface** – Mean top height (m) of *Pinus radiata* at 20 years as a spatial surface at 100 m resolution (Palmer et al., in review),
- **NZeem model** – A national-extent erosion model (Landcare Research),



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- **Topnet model** – A hydrological model for the investigation of land use change impacts such as afforestation and deforestation (NIWA).

Another potentially available spatial dataset might include Scion's loss-of-habitat work (Höck and Brockerhoff, 2005).

Outline of Approach

- Use LCDB2 to identify areas suitable for afforestation or reforestation.
- Identify the thresholds and criteria defined for assessing the need for forest cover.
 - Based on defined thresholds and criteria, use the surfaces described here to delineate area thresholds. For example, sites where water balance restricts the productive capacity of production forests, or where steep slopes limit the use for bio-energy or timber production. Conversely, these sites may be suitable for carbon sequestration or biodiversity services.
- Use the NZeem model (if available) to identify areas susceptible to erosion as a subset of the total area suitable for afforestation or reforestation — erosion prevention is likely to be a primary forest function of these areas.
- Identify catchments at risk of flooding and that could benefit from forest cover for the mitigation of flooding using a model such as Topnet (NIWA), if available.
- Produce maps that delineate the sites across New Zealand that could benefit from a forest cover, and, more specifically, that indicate the type of forest function required.
- Report on the outcomes of this analysis.

References

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