LANDSCAPE LOGIC
LINKING LAND AND WATER MANAGEMENT TO RESOURCE CONDITION TARGETS

Fact sheet for managers and policy-makers #9

June 2010

End of catchment annual nutrient loads and nutrient generation rates for different land uses in Tasmania

What we found

Nutrient loads

In Tasmanian agricultural catchments, the highest catchment nutrient loads come from intensive land uses which typically occur in flatter landscapes with high rainfall/runoff (northwest) (Figure 1). East coast catchments with low rainfall/runoff and less intense land use have the lowest nutrient loads.

Table 1. Nutrient generation rates for total Nitrogen (TN) and total Phosphorus (TP) in Tasmania.

Land use*	TN generation rate (kg/ha/yr)	TP generation rate (kg/ha/yr)
Dairy pastures	27.1	11.1
Irrigated cropping	5.67	0.39
Grazing modified pastures	1.00	0.24
Native grassland	1.02	0.04
Plantations	5.49	0.14
Native forest	2.68	0.06
Production forestry	0.89	0.03
Urban and industrial	14.00	2.23

* Modified from Bureau of Rural Sciences

Nutrient generation rates

The major driver of sediment and nutrient delivery to surface waters at the catchment scale is intensive land use, in particular the most intensive land uses of dairy production and cropping (Figure 2). The more intense the land use in terms of nutrient inputs such as fertilisers, the greater the nutrient enrichment in waterways. The land uses of 'grazing modified pastures' (dryland grazing), 'cropping' and 'dairy pastures' generate the most nutrients at catchment outlets. Grazing modified pastures contributed because of the extent of this land use in Tasmanian catchments, whilst dairy pastures and cropping contributed because of high rates of loss.

Nutrient generation rates of 27 kg/ha/yr of total Nitrogen and 11 kg/

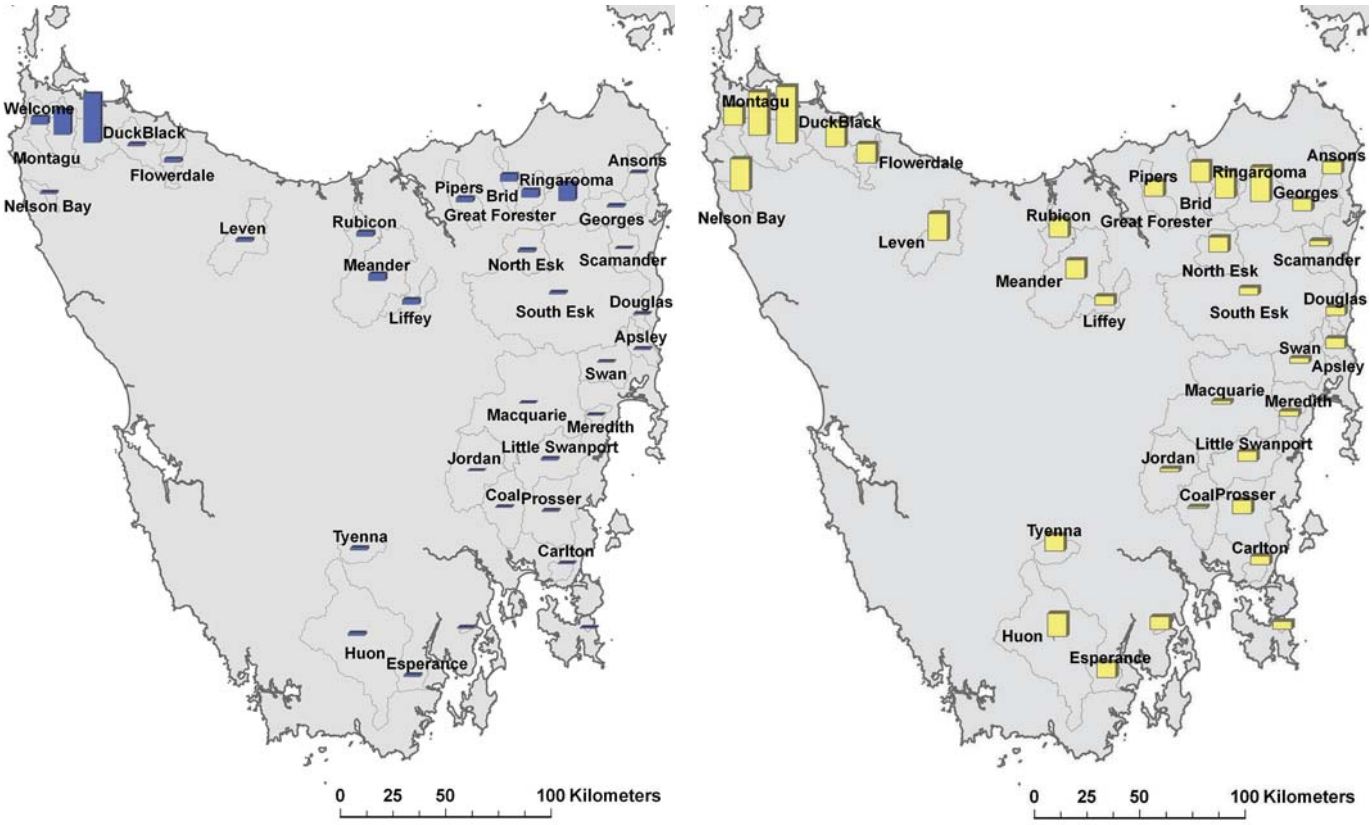

Figure 1. Estimated relative annual per hectare losses for total phosphorus (left) and total nitrogen (right).

ha/yr of total Phosphorus from dairy pastures into surface waters are at the higher end of those reported in Australian studies.

The results for total nitrogen were found to be more consistent across all Tasmanian catchments than those of total phosphorus indicating that different processes of generation and attenuation were involved for each nutrient

Implications for natural resource managers and policy makers

The impact of land use at the catchment scale is an important driver of nutrient loads in surface waters. Hence nutrient management interventions should focus on reducing nutrient sources and transport at the landscape scale rather than solely relying on abatement in riparian zones. Changes in the way farmers manage and apply fertilisers over whole farms are likely to reduce the loads of nutrients in surface waters. Riparian rehabilitation could play a role in reducing the impact of nutrients in surface waters, but its effects are not always immediate and tend to be localised.

Land management practices are important to reduce the total nutrient delivery to rivers and estuaries, but even where best management practices are adopted, nutrients resulting from intensification of land use will still be delivered at higher than natural rates.

One of the consequences of more intense land uses producing greater nutrient enrichment in waterways, is that further intensification of land use in Tasmania associated with irrigation developments, is likely to result in greater surface water nutrient loads.

How we did it

All available water quality data collected by the Department of Primary Industries, Parks, Water and Environment for the 'State of Rivers' reports (1992–2003) plus data from the Baseline Water Quality Monitoring Program (since 2003) in 34 catchments was used as this provided the greatest data density for Tasmanian catchments. Areas of different land uses in each catchment were obtained using spatial data constructed for this project. The two data sets were analysed using a statistical method of modelling, known as Bayesian modelling, to find the ''best fit'' nutrient generation rates for each land use across the 34 catchments simultaneously. The model was run many times with successive refinements to improve the fit of data. Using this methodology creates figures that are a good starting point for other modelling of Tasmanian annual nutrient loads. However, as cropping is under represented in the catchments studied, the cropping generation rates are likely to be much greater and should be used with caution.

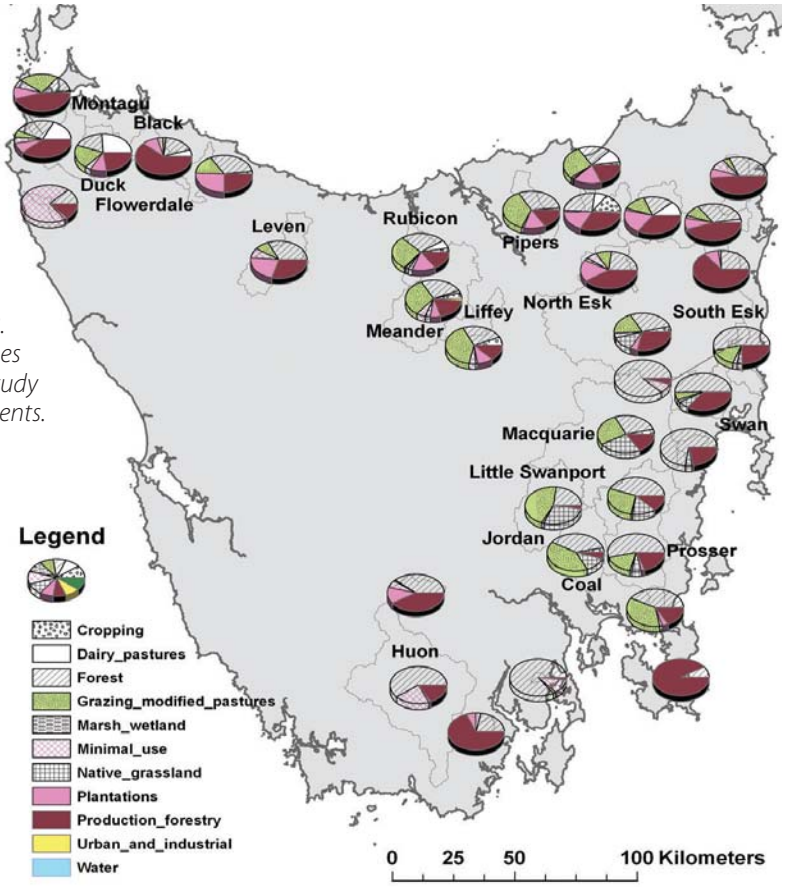

Figure 2. Land uses in the study catchments.

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Landscape Logic is a research hub under the Commonwealth Environmental Research Facilities scheme, managed by the Department of Environment, Water Heritage and the Arts. It is a partnership between:
six regional organisations – the North Central, North East and Goulburn–Broken Catchment Management Authorities in Victoria and the North, South and Cradle Coast Natural Resource Management organisations in Tasmania;
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