LANDSCAPE LOGIC
LINKING LAND AND WATER MANAGEMENT TO RESOURCE CONDITION TARGETS
www.landscapelogic.org.au
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Reading the landscape

An overview of Landscape Logic research

Australia has an unfortunate history of environmental management. We hold the world record for mammal extinctions over the last 200 years (16 out of 245 species), and as the National Australian Audit Office has pointed out in four audits since 1997, they can account for the $4.2b from the sale of Telstra as kilometres of fences, millions of trees and hectares of restored wetlands but they cannot tell if this has made any material difference to the state of the environment.

There are lots of good reasons why. The scale of intervention is usually too small to make a difference. The long time lags between action and response mean we often can't expect to see change for decades. And our efforts are easily overwhelmed by changes in climate, markets and other forces outside our immediate influence. But there is a limit to how long we can keep trotting out these excuses.

One of the biggest challenges is the lack of long term data to tell us the state of the environment and the direction its heading. Without that information, we can't hope to tell if we are making any difference when we intervene.

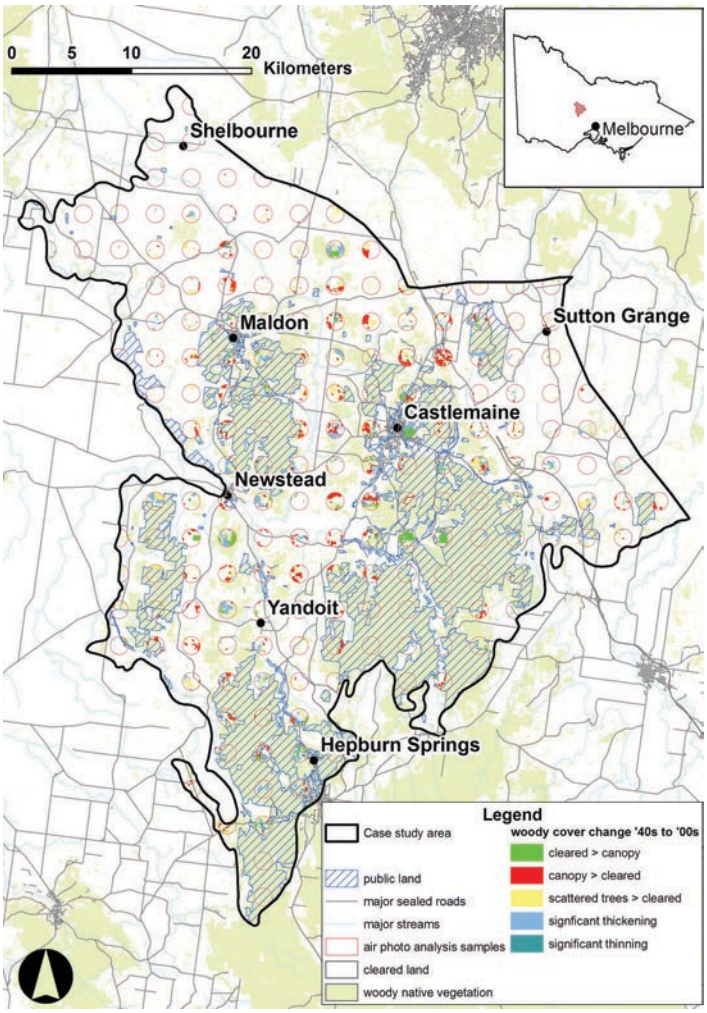

Figure 1. Map of the Muckleford study area in northern Victoria showing vegetation change mapping (circles).

Figure 2. Residents working with the Landscape Logic team lead by Digby Race (right rear) as they piece together the history of vegetation change in the Chiltern district, northern Victoria.

The Landscape Logic research partnership is using some creative alternatives to long term data sets to help us read the landscape. The aim is to extract signals of human and other influence in the past as a guide to effective remediation. This partnership of four universities, three state agencies and six natural resource management regions is applying these techniques to two environmental issues, water quality and vegetation condition.

One example is the use of oral history and old air photos to piece together the history of vegetation change. The team from Charles Sturt University, the Department of Sustainability and Environment in Victoria and the Australian National University started by systematically scanning air photos from 1947 and 2008 to plot change in vegetation cover in three areas of northern Victoria (Figure 1). Armed with their vegetation change maps, they held workshops with long term residents to test the accuracy of their mapping and tease out local explanations of change (Figure 2).

The team of Digby Race (CSU), Graeme Newell, Dave Duncan, Garreth Kyle, Libby Rumpf (DSE) and Wendy Merritt (ANU) soon found that family records and local history enabled them to trace the story of vegetation change back to the 1860s (Figure 3). The narrative that emerged from the workshops is now being tested through interviews with 60 landholders and historical sources. What they've found highlights the importance of both slow drivers of change and short sharp shocks. Some forces have acted gradually

over time (timber cutting after gold discovery, pasture development for sheep, introduction of rabbits, fire frequency) while others like the crash in wool prices in the 1990s and drought have had a more immediate impact. Whether we can detect the influence of Landcare and other rehabilitation efforts amongst these other drivers is one of the questions this research is attempting to answer.

The second example is a study of the major drivers of water quality in Tasmania. This is more challenging to reconstruct historically as water doesn't stand still long enough to be counted, mapped or photographed. The technique used here is 'space for time substitution'. Instead of following the changes that result from development in one place over a long period, sites are selected in geologically similar landscapes that cover the full range of disturbance from pristine to transformed.

This team is lead by Peter Davies from Freshwater Systems P/L and Steve Read from Forestry Tasmania, with field work and data analysis by Regina Magierowski, Nelli Horrigan and Tim Cole (UTAS/FT). Their starting point was to pull together all the data on aquatic biota and water quality they could find for Tasmanian rivers. Comparing data from over 700 sampling sites with land use upstream of the sampling point produced an interesting and very significant correlation. When the total area under grazing exceeded 42% there was a marked decline in the presence of sensitive aquatic invertebrates, and it was whole-of-catchment rather than the local sub-catchment that had the greater influence. To identify the causal relationships behind this, and determine which sort of land use and land management has most influence, an intensive survey of 40 sites is now underway across a gradient of land use and nutrient load (Figure 4). The results will provide disturbance thresholds and decision support for long term management of river health.

Figure 4. Regina Magierowksi and Tim Cole sampling the Great Forester River, north-east Tasmania.

Oral history, air photos and space for time substitution will never replace good environmental monitoring data, but they are valuable sources of readily available information that improve our ability to understand environmental history and better prepare us for the future. For more on landscape Logic, see **www.landscapelogic.org.au.**

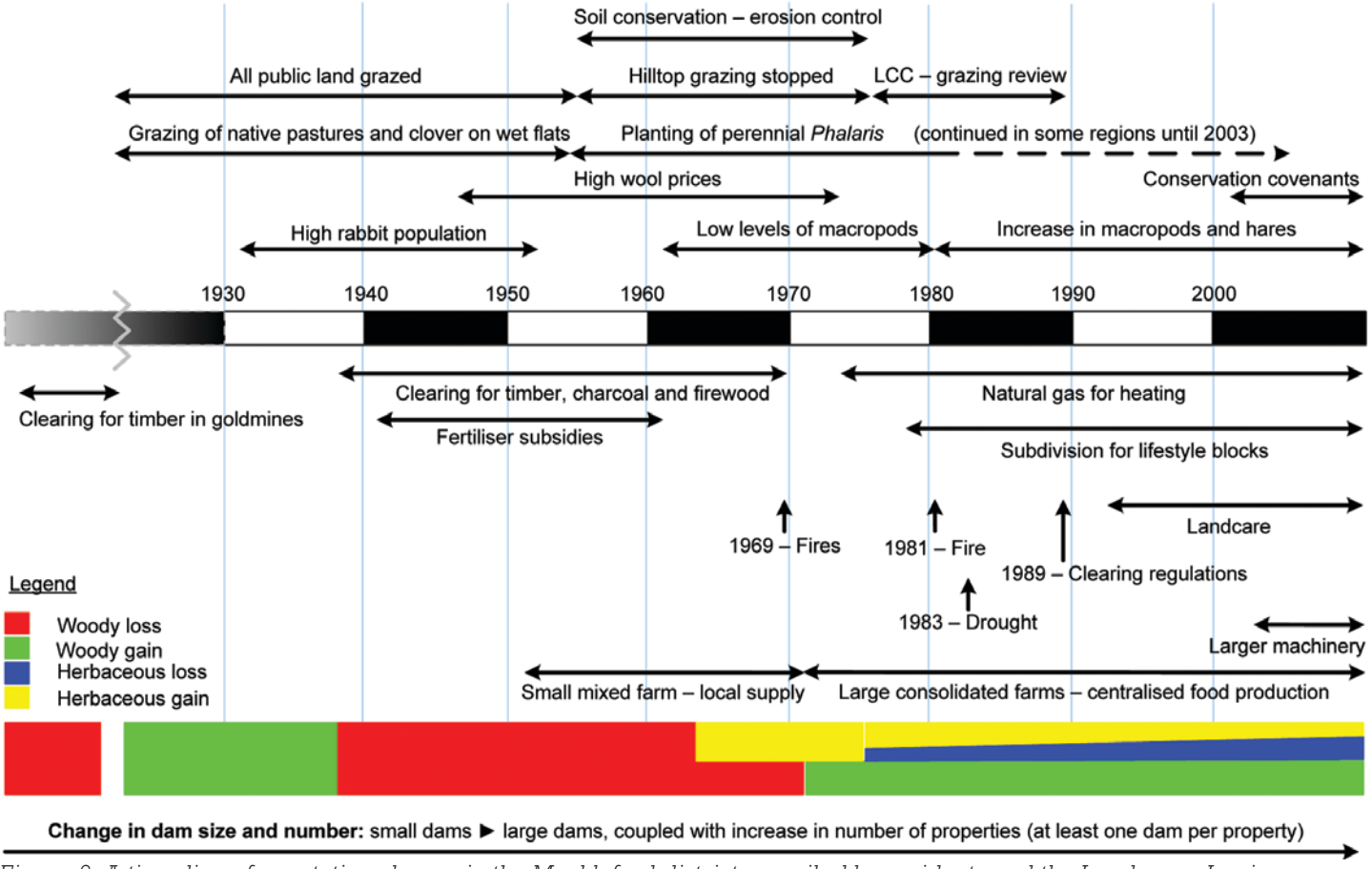

Figure 3. A time-line of vegetation change in the Muckleford district compiled by residents and the Landscape Logic research team.