

Analogue forestry: a sustainable production system

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Introduction

Commercial forestry in Australia has focused on producing timber products at minimal cost and in the shortest time possible. This has led to monoculture plantations of a few highly productive species (e.g. Tasmanian Blue Gum). Despite the widespread use of these “industrial” techniques, other tree-based production systems (e.g. Permaculture and Analogue Forestry) are recognised globally. Analogue Forestry moves beyond most forestry practices since it includes an explicit focus on the identification and incorporation of biological diversity. In addition, Analogue Forestry identifies specific ecological functions and structures of the natural forest and models to meet with their needs. These models blend species that offer functional and/or commercial benefits to create mimicry of the naturally evolved forest (Senanayake and Jack 1998).

Many farm ecosystems are unbalanced and grossly dysfunctional (exhibiting salinity, acidification, erosion, nutrient depletion of soils etc.) principally due to the removal of the natural forest. The need for soil conservation and tree replacement is acknowledged by most land managers, yet few until recently have invested heavily in the reforestation of their properties. Analogue forestry is a means of re-establishing a forest (and its vital ecological functions) in a commercially productive system. Once established, Analogue Forestry can sustain the production of many commodities (from the herb, shrub and tree layers of the forest) and enhance stability due to the high biological diversity that is present. When this production system is built up in layers over successive years, the establishment costs for the next layer (e.g. shrub) can be offset by the sale of commodities from harvests of the previous layer (e.g. herb).

Analogue Forestry

Analogue forestry establishes a tree-dominated ecosystem that is analogous in structure and function to the original climax and sub-climax community. With time, the natural progression of any undisturbed forest community is to increase in diversity and stability until a highly complex ecosystem or Climax State is reached. When an ecosystem is designed to mimic the indigenous Climax State, the efficiency and dynamics of the natural processes can be replicated. Such forests are referred to as analogue forests. In addition to their ecological characteristics, analogue forests are designed to provide economic benefits. A broad range of commodities can be produced that may include: fruit, nuts, herbs, cut-flowers and cut-foliage, pharmaceuticals, timber. The commodities and values are weighted by the landholder and considered in the context of their culture. People are an integral part of the landscape and are considered by Analogue Forestry to be a major component of the forests’ ecology. The inclusion of species requires they contribute to the forest’s ecology and this imperative overrides all other factors. Thus, an analogue forest may be comprised of natural and exotic species in any proportion depending upon the landholder’s culture and the species relevance to the landscape. It is the blend of ecological, economic and sociological aspects that gives analogue forestry its inherent sustainability as a production system.

Sustainability of Analogue Forestry

To properly illustrate sustainability is difficult and it would be ill-considered to ascribe pure economic or ecological definitions because of their interdependence. Analogue forestry considers that the sustainability of any natural production system must be viewed in association with the health of the ecosystem that supports it. Without a healthy, functioning ecosystem, no on-going production of commodities is possible. For

this reason, the design of analogue forestry includes components that enhance the stability and health in the ecosystem. The deliberate inclusion of key species and the fostering of high biological diversity achieve high stability and health. Compared to the conventional farm, the greater diversity of animals and plants that is present in an analogue forest leads to improved vital functioning such as energy flow and nutrient cycling. Ecosystems that approach the complexity of climax communities promote high numbers of soil organisms (e.g. beetles, fungi and bacteria)

and the creation of topsoil. A state that is actively avoided by most forests managed for timber but encouraged in Permaculture and Analogue Forestry (Figure 1). Both the latter systems include exotic species to satisfy specific commodity needs, and in addition, Analogue Forestry includes species to provide for biological diversity. At this level, the design can allow substitution of non-keystone species with ones that are analogous in structure to the indigenous species, providing the vital processes are unaffected.

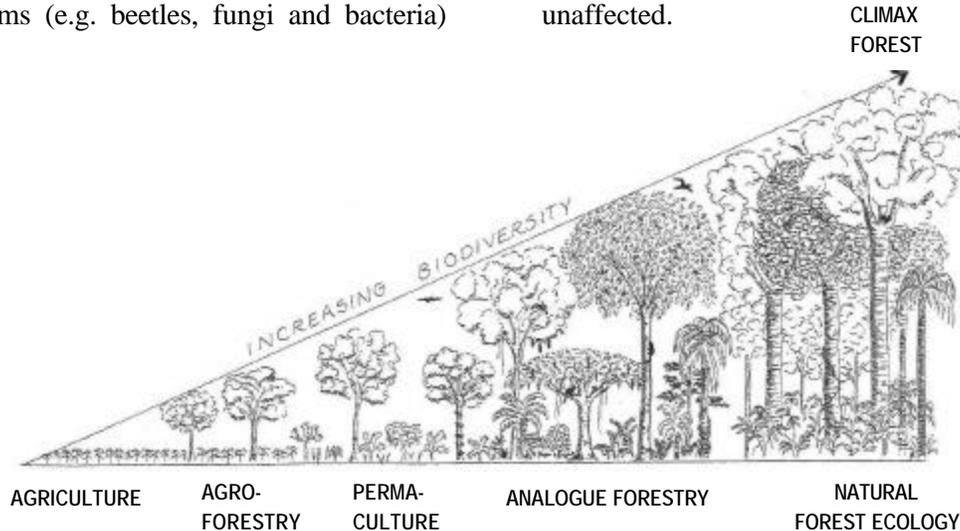


Figure 1 *The complexity of Analogue Forestry in relation to other forestry practices (after Mallet 1997)*

Analogue forestry is also sustainable at the cultural level. The design is specific to the land manager’s culture and by working within that view of the landscape, the model can have the best chance of success. Many of the commodities produced may be used in the local community or have relevance to the land manager so that the perceived value of these commodities is high. The focus on local markets reduces transport costs for the producer and boosts local economies. Analogue Forestry has a high requirement for manual labour, which increases local employment and redirects surplus capital from the cities to the local economy.

Analogue Forestry Production

Forest production for timber usually focuses on trees and limits itself to utilising only a fraction of the forests potential output. Only about 1% of forests biological diversity is represented by the tree component and many non-timber commodities can be profitably harvested from the forest’s herb and shrub layers. The herb and shrub layers of the forest can produce a wide range of commodities such as cut-flowers and cut-foilage,

fruits, nuts, spices, herbs, pharmaceuticals and oils. Modern forestry considers these products the domain of horticulture, niche agriculture or the cottage industry and as a result many markets for alternative forest commodities are poorly developed. Despite this, demand for many of these commodities has grown to a level whereby small-scale production is commercially viable. Analogue Forestry fosters a polyculture system that spreads the risk of crop failure and market dependency for the individual farmer. This polyculture can be developed over several years with successive early crops offsetting the establishment costs of later ones. Markets for some organic 5-star quality herbs, cut-flowers and native foods are growing rapidly and can be a source of revenue during the early stages of forest establishment. Despite the high demand for these commodities, the selection and incorporation of early development crops into the design needs careful consideration. Some herb growers have suffered financially due to inappropriate choice and selection of crops and the decision to incorporate species for commodities must be strongly market driven. In addition to the potentially lower establishment costs, the

formation of cooperatives between a number of growers in the same area can greatly reduce the harvesting, processing, marketing and transport

costs that would normally limit the commercial viability of some low volume commodities.

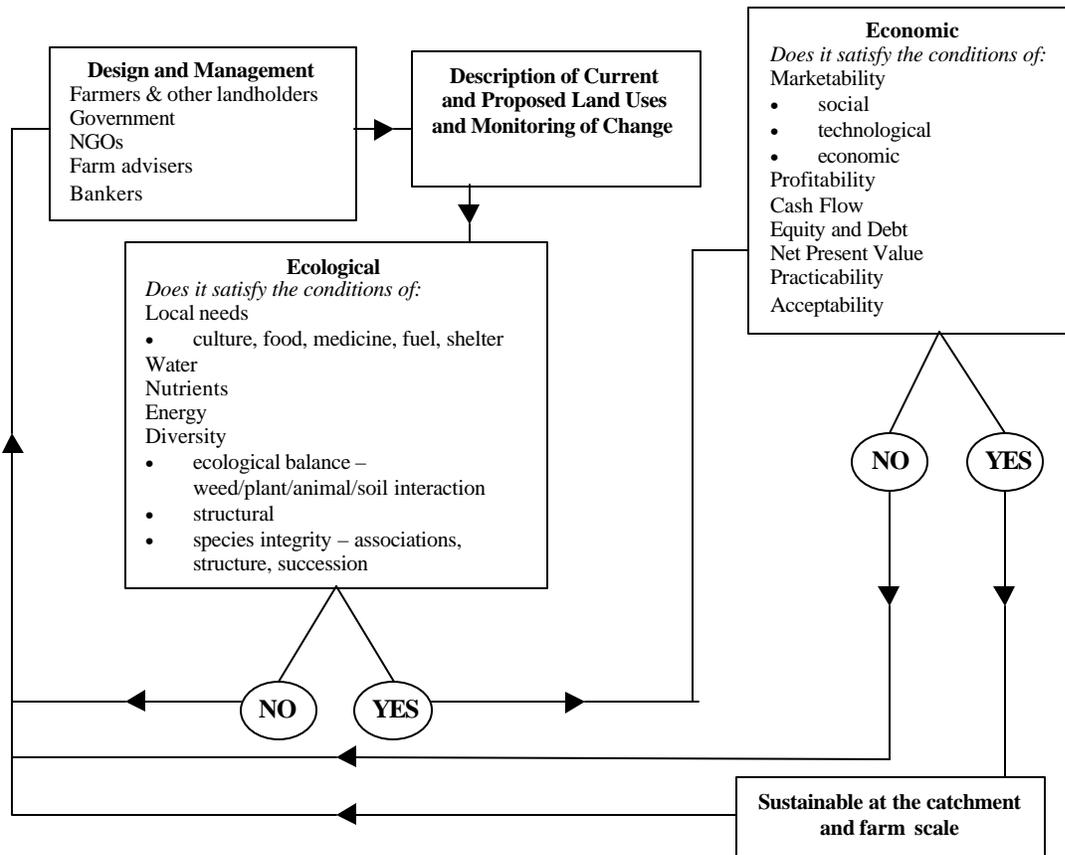


Figure 2 Analogue Forestry decision model (Senanayake and Jack 1998)

Commercial viability of low volume operations will also be enhanced by the incorporation of recognised international production standards.

Design Requirements

The design of an analogue forest model incorporates input from a large number of people including financiers, government and non-government experts and most importantly, the land owners and villagers. During the design process, the current and proposed land uses are discussed as to whether they satisfy firstly; ecological conditions, and later economic conditions (Figure 2). The acceptance of each land use is dependent upon its sustainability at the local landscape level. This is best achieved by the incorporation of indigenous species so long as the environmental characteristics of the area have not changed. However, many regions have undergone great environmental change that means a revaluation and the inclusion of exotic species may be more appropriate locally than the

inclusion of many indigenous species. Land managers wishing to implement Analogue Forestry can undertake the following steps to facilitate the design process.

- 1 Obtain details of the history of the site to be considered. What land use has occurred on it and how has it changed over time.
- 2 Detail the indigenous species for the area and their environmental requirements.
- 3 Profile the type of forest community that is indigenous to the site (use Part 2 of this Revegetation Guide).
- 4 Nominate the land use goals and specific ecological, economic and sociologic aims for the site.
- 5 Identify species that directly contribute to the nominated goals and aims.
- 6 Initiate the decision model described below with input from specialists in ecology, economics and marketing. Start the analysis with suitable indigenous species, next use

native species and then exotics. Seek advice of weed status before incorporating any species into the design. Depending on the weed's invasiveness, the species may be incorporated into the design with appropriate ongoing management.

The design process has been undertaken for several regions in Victoria but not the Goulburn Broken Catchment. An Analogue Forestry design has been described for a property near Jindera, NSW (Dufty 1998), and would prove useful for readers wishing to further investigate the technique. The development of an analogue forestry design requires considerable work and its complexity necessitates the involvement of a large number of people from wide-ranging backgrounds. This requirement may limit its application and Analogue Forestry has yet to be widely adopted in Australia, despite its use in

many other countries around the world.

References and further reading

- Dufty, A.C. (1998) Analogue Forestry. In Stelling, F. (ed.) *From little things, big things grow ... Revegetation guide for the South West Slopes*. Department of Land and Water Conservation, New South Wales.
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