Sheep Pen Creek

Evaluating the impact of vegetation pattern on the delivery of ecosystem services from the catchment of Sheep Pen Creek

Summary

In the future the catchment of Sheep Pen Creek, Goulburn Broken, Victoria will contain more native vegetation than it currently does. Vegetation enhancement is being driven by diverse objectives, including biodiversity, salinity control and farm forestry. How will this new pattern of vegetation perform as an ecosystem? This Ecosystem Services project identifies some of the services delivered by dryland agriculture and native vegetation and explores how the value of those services might change in the future.

Background to the area

Sheep Pen is typical of the dry mid-catchment areas of the Goulburn Broken Valley. Annual rainfall averages 560 mm, topographic relief is slight and slopes are generally less than six degrees. Remnant vegetation covers about eight percent of the catchment, with much of the vegetation on the higher slopes. There is some linkage to remnants outside the catchment with woodlands to the south and riverine plains to the north. Salinity and erosion control, water quality, declining biodiversity and soil health are seen by the catchment community as major threats to continuation of current agricultural systems.

Project components

The project has two major components.

Firstly, a scenario development process used catchment objectives and ecological principles to build maps of what future vegetation could look like. A range of vegetation extents were analysed to see whether efficiencies can be gained by revegetating to a specific target either globally or locally.

Secondly, these option maps were evaluated for their impacts on ecosystems services. A selection of tools were used including spatial and simulation modelling, empirical relationships and expert knowledge. The objective was not to provide a definitive analysis of any one ecosystem service, but to integrate several evaluation and scenario building techniques and apply them to services that are relevant to the local community.

1.1.1 Project outputs include

- estimates of changes in the flow of ecosystem services as the cover of native vegetation increases;
- a list of ecosystem service indicators and their relationships with catchment biophysical variables;
- a map of modelled current vegetation in Sheep Pen Creek Catchment;
- a list of rules for determining the most suitable locations for planting native vegetation to enhance biodiversity;
- maps of the suitability for native vegetation planting across the landscape; and
- maps of the options for future native vegetation enhancement at a range of cover targets.

Key observations from workshops and analyses are that

- potentially 164,000 T of carbon could be sequestered if the entire catchment was covered by native vegetation compared to 34,000T at a 15% native vegetation target and 66,000 T at a 40% target;
- gains in the spatial habitat value of native vegetation per unit area re-vegetated increase above a 30-40% native vegetation cover target;

- the total benefit from shelter belts peaks at 40% native vegetation target;
- erosion rates are much lower under native vegetation compared with agricultural vegetation types;
- reductions in bank erosion increase more rapidly in the lower reaches of the sub-catchment under increasing native vegetation cover, however this only represents 3 percent of the total length of creeks;
- yield to channel reduces more rapidly than loss to deep drainage as native vegetation cover increases;
- water yield to channel is slightly affected by the spatial configuration of vegetation; and
    - water yield to deep drainage is sensitive to the area of deep rooted perennials.

Key considerations are that

- many service indicators cannot or should not be expressed as dollar values;
- agricultural vegetation types do provide some ecosystem services but their contribution is relatively small compared with native vegetation;
- the ecosystem services 'maintenance and regeneration of habitat'; 'provision of shade and shelter'; 'water filtration and erosion control'; maintaining healthy waterways; and to a lesser degree 'regulation of ground water and river flows' are all dependent on the spatial arrangement of native vegetation in the landscape;
- some ecosystem services show thresholds and non-linear responses as native vegetation cover increases; investments in planning these will affect the returns to investment in revegetation;
- because gains in the spatial habitat value of native vegetation per unit area increase above a 30-40% native vegetation cover targets, it is better to concentrate funds for revegetation in several small areas rather than disperse it across the landscape;
- relatively simple methods such as the ones used in this case study are more transparent than complex integrated assessments, and they can be built relatively quickly for particular places and problems; and
- scenarios are an effective way of setting the scope for analysing ecosystem services.

Contact us

If you would like more information or an update on project progress please contact:

Art Langston

Phone: (02) 62421632

Email: Art.Langston@csiro.au

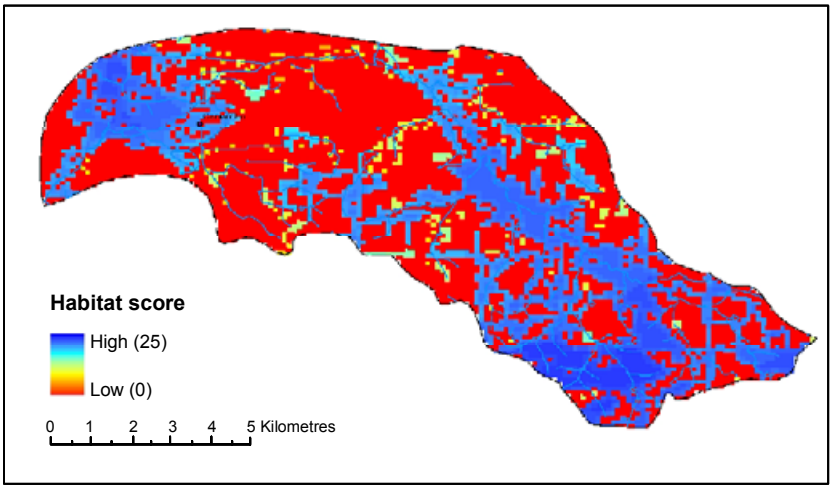
Mailing Address:

CSIRO Sustainable Ecosystems

GPO Box 284

Canberra, ACT 2601

Or visit us at: www.ecosystemservicesproject.org



Habitat value in terms of vegetation pattern under a 40 percent revegetation option for biodiversity enhancement.