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REMNANT NATIVE VEGETATION AND SUSTAINABLE AGRICULTURAL SYSTEMS

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Summary

In agricultural areas of Western Australia the goals of conservation of biodiversity and achievement of sustainable agriculture are closely linked. Remnant areas of native vegetation make a valuable contribution to fulfilling both goals.

This paper examines the role of remnant vegetation in achieving sustainable agriculture, particularly from the viewpoint of the individual farm manager. Important values range from direct on-farm products, such as firewood and seeds for revegetation, through to genetic banks for the development of new commodities.

However, these values won't be available unless remnant vegetation is protected. Therefore the means of protecting remnants are also examined. These include avenues for making protection of remnants easier, cheaper, and compulsory. Other issues discussed include the continuing need for change in community values.

Introduction

Land degradation as a result of clearing native vegetation and agriculture is well documented for the south-west of Western Australia (Nulsen 1993). Various means of redressing land degradation and making farming more sustainable have been proposed. These include changes in farming practice, revegetation, protection of remaining native vegetation, and landscape engineering (for example drainage and ground water pumping). The role of remnant native vegetation in sustainable agricultural systems is the focus of this paper.

Conserving remnants of native vegetation, including their fauna, for nature conservation has long been recognised as important. State conservation agencies have for several decades actively acquired remnants as nature reserves. In contrast, understanding the role that remnants and their diverse living inhabitants (biodiversity) play in sustainable agriculture has developed much more slowly.

While support for wildlife conservation in one form or another has existed for centuries, the value of conserving wildlife in Western productive systems wasn't clearly stated for a wide audience until this century. One of the first writers to describe the importance of a broader, more ecological approach to land management for commercial production was Aldo Leopold (Leopold 1949). It is sobering to read his work and discover how little our thinking has advanced and how little we have put into practice.

However, thinking and practice are changing. Recently Lefroy *et al.* (1993) proposed that sustainable land use in the south-west will be achieved through a perennial polyculture where "the productive component of the landscape more closely approximates the structure and function of the remaining islands of native vegetation". At the same time, Main (1981, 1993) has argued that species diversity is a means by which systems may be made more resilient and thus better able to persist in the face of changing circumstances.

In the south-west, change as a result of land clearing will continue for many years, and we may face major shifts in our climate. Therefore it is crucial that our land systems are resilient and diverse so that we are in the best position to meet and adapt to these and other, yet unforeseen, changes.

Conservation of biodiversity and the achievement of sustainable agriculture are inextricably linked in the south-west. Given that most biodiversity in agricultural areas lives within remnants of native vegetation, these remnants are important to achieving sustainable agriculture as well as the conservation of biodiversity.

What specific roles, then, do remnants of native vegetation play, and how might they be conserved? These two questions are addressed in the remainder of this paper.

Discussion

Role of Remnant Vegetation in Sustainable Agricultural Systems

In describing the role of remnant vegetation, it is assumed that:

- achievement of sustainable agriculture and conservation of biodiversity are, in agricultural areas, closely linked and mutually beneficial.
- sustainable agriculture will be based on a wider range of commercial products than is currently the case.
- better land management decisions will be made if the history of land and its processes (for example the water cycle) are understood.
- healthy people will make better decisions and be better land managers.

In the following discussion values of remnant vegetation are considered purely from the viewpoint of a person wishing to establish sustainable agriculture. Consequently some values of remnant native vegetation, such as the conservation of biodiversity for its own sake, are not considered. Broader community values of remnants, except as they may favour individual farmers, are also not considered.

The values of remnants are discussed below. Each of the values listed will either:

- increase the toughness (resilience) of agricultural systems;
- increase the value of agriculture per unit of energy input or cost input;
- provide new economic opportunities; or
- improve decision-making regarding land use.

Some of the values listed will achieve two or more of these.

Remnants and Meat / Cereal / Wool Production

The benefits of vegetation in providing shelter for stock and crops are well established. Revegetation will increasingly complement remnant vegetation in this capacity, but remnants will have a crucial role for the foreseeable future. The value of remnants in providing models for developing self-sustaining shelter belts will exist as long as agriculture persists.

However, if you graze remnants, there will be a penalty depending on management objectives and practice. These issues are discussed in some detail in Hussey and Wallace (1993).

Direct Production from Remnants

Many people use their remnants for direct production, for example as a source of fencing material, struts, honey, cut flowers, firewood and so on. More recently, the development of farmstays and other forms of tourism and recreation have begun to use remnant vegetation as an important attraction.

Again, however, using remnants for production will affect other values and, if sufficiently intensive, will detrimentally affect the survival of remnant vegetation. Clear objectives and informed management practice are essential.

Effects on Hydrology

Changes in the water cycle as a result of clearing and agriculture are well summarised by McFarlane *et al.* (1993). While they conclude that the location and amount of high water-use plants required to improve catchments is unclear, they cite cases where woody plants have been used to dry saline seeps. Remnants located on such sites, or in places which help to reduce the spread of surface salinity or waterlogging, contribute to sustainable agriculture.

At a broader scale there is a point at which some combination of changed farming practice, remnant protection and revegetation will have a significant effect on controlling the rising water table. However, the necessary combination has not yet been determined at a catchment scale for agricultural areas.

Wetland remnants also play an important role in the water cycle. In the United States, the value of wetlands for flood control on the Charles River has been estimated at $13 500 per hectare a year (Hollis *et al.* 1988). There is a strong case for researching the value of our wetland remnants and evaluating their function at the farm and catchment level in controlling erosion and flooding. This is particularly urgent given the growing interest in drainage.

Soil Stabilisation

Remnants on rocky or sandy hills prone to erosion, or growing along drainage lines or fringing salt lakes, play a part in protecting agricultural lands. Many remnants in the wheatbelt occur on these locations and thus their protection is important.

We should also learn from soil conservation experience elsewhere. For example, Fry and Main (1993) cite a case where a Norwegian policy of grading ravine landscapes to gentler slopes resulted in erosion problems, and now farmers are being encouraged to re-open buried streams and revegetate the landscape!

Genetic Capital for New Products

Basing agriculture on a greater diversity of products may benefit both our environment and economy if products are based on local, native species. Despite our extremely rich flora and its adaptation to our nutrient poor soils and climatic conditions, we have been very slow to research the economic potential of local plants. This has been an Australian trait, and Spierre (1992) lists eight cases where commercial use of Australian species has been overshadowed by their prior, or better, development overseas.

Often we seem unable to recognise the value of our native wildlife unless someone from outside Australia shows interest. The recent press coverage following overseas attention to a native plant which contains a potential AIDS cure is a case in point. We must research and develop the economic potential of our unique flora - if we don't, others will.

Many of our rare plants occur in agricultural areas, and the wheatbelt contains part of the rich south-west flora. Remnants are a vital element for conserving this future store of products. For example, some of the plant populations being assessed for eucalyptus oil potential grow on wheatbelt remnants.

It should also be recognised that if we use our local species in economic or land conservation revegetation, then we are unlikely to have any problems with 'weedy' plants. The costs arising from the recent introduction of tumbleweed (*Kochia scoparia*) emphasise this message.

Natural Seed Orchards

Remnants provide a valuable seed source for those undertaking revegetation. However, people should be aware of the legislation and regulations relating to collection of native seed. There is no licence required for farmers taking seed from their own properties unless it is intended for sale.

Pest Control

We know that native animals consume a wide range of pests, but the level of control exercised has not been evaluated in south-western farming systems.

It would be expected, however, that the more predators, parasites and diseases that are available, the less likely it is that pest outbreaks will occur. Also, there is growing disenchantment with the costs of developing new pesticides as resistance evolves in target species. Biological control is increasingly a goal, and we would be wise to retain our natural predators, diseases and parasites as potential control agents.

Amenity Functions

Remnant vegetation is used to screen buildings, yards, and other facilities from sun and wind. Remnants are also used to enhance aesthetic views and to screen rubbish dumps and other "eyesores". These amenity and aesthetic functions not only make our landscapes more pleasant and relaxing, in many cases they also reduce energy use and loss.

"Sinks" for Nutrients

Fry and Main (1993) point out that, in Europe, wetlands are increasingly recognised for their potential as nitrogen sinks and in preventing erosion. Locally the first signs of eutrophication in wheatbelt wetlands were first noticed in the 1970s (Sanders 1991). It is likely that eutrophication and the associated development of toxic water supplies will continue to increase.

Therefore, the value of remnant wetlands as areas where excess nutrients may be trapped and used by plants is increasing.

Dam Protection

Remnants are used by farmers to help protect farm dam catchments. They may also help decrease evaporation from dams, although this effect may be outweighed by the water use of trees, or by roots breaking the clay seal within dam floors or walls. Design is important if remnants are used for these functions.

Maintaining Ecosystem Functions

Many of the above cases demonstrate how remnant vegetation contributes to maintaining important environmental processes such as a "balanced" water cycle and a flow of nutrients which doesn't lead to local excesses in any one place in the agricultural system (and thus, for example, eutrophication).

In general, natural systems have many species which can perform a particular function, such as nitrogen fixation or pollination, so that if one species fails, there are others to take its place. Given our poor soils and the frequency of major events and changes, such as tornadoes, fire, droughts, and increasing surface soil salinity, we would be wise to retain as much diversity in our system as possible. The greater the diversity of the natural systems available to us, the greater our chance of "borrowing" a plant or animal, or copying a process design, to fill a gap in our agricultural systems.

Also, the greater the diversity of our agricultural system the more resilient it will be to change of whatever form. Farmers who deliberately retain a diverse operation have already accepted this approach to some degree, at least in the context of economics.

Management History Book

Remnant vegetation provides living statements of what the land was like, and how much it has changed. When I see the spinifex in the nature reserve north of Mukinbudin, I am reminded of how dry it has been within current agricultural areas, and I know that it could be that dry again. When I see the soft, friable soil within remnants, and compare it with the dusty, hard-packed paddocks, I know that things have changed. When within a short time after rain I see few puddles in the native bush but plenty in the paddock next door, I'm reminded of how much the water balance of our landscape has changed. When I see parrots are destroying grasstrees, I know they are out of balance with the bush as well as the farm landscape. When I see the erratic germination of plants, and the unpredictable response of the bush to fire in the wheatbelt, then I know that we shouldn't assume too much about the stability and predicability of our landscape.

In a very real sense, remnants are the history books of our country. They tell us about the past and provide us with lessons for our current management - if we are prepared to take the time to learn. Our remnants also provide benchmarks for researchers and managers to measure the changes in soil structure and other characteristics altered by farming practices.

Farmer Health

Those of us lucky enough to be brought up in the country probably had a patch of bush that was our playground, a place for adventures and fun where, by and large, we were left to our own devices. I was one of those children, and the smell of damp granite rocks and jam trees still evokes great pleasure and a feeling of well-being.

As adults, "going bush" also gives many people a psychological boost.

I believe most farmers - and I use that term to describe both partners - draw comfort from a landscape which is aesthetically attractive and identifiable from its remnants as their local patch. I also believe, but can't prove, that this in turn contributes to a happier, healthier lifestyle and better land management decisions.

Remnants as Building Blocks for Revegetation

In all the above cases revegetation will enhance the values of remnant vegetation by either protecting remnants or extending their values across the landscape. Revegetation may be expected to out-perform remnants in specific roles, for example protection of cereal crops. However, remnants provide the models and species on which to base revegetation design. This is one of many functions which revegetation can never replace.

Furthermore, woody vegetation on private properties consists mostly of remnant vegetation. At current rates of tree planting, it will be many years before revegetation equals the area of remnants in the agricultural landscape.

Protecting Remnant Vegetation in Sustainable Agricultural Systems

Given the values listed above, remnant vegetation contributes greatly to sustainable agricultural systems. But this is not, and is unlikely to be, a unanimously accepted truth. There will always be competing land uses for both freehold and Crown remnants. If remnants are to be maintained into the future, then they must be protected and managed.

Management of remnant vegetation from the viewpoint of the individual landowner has been well summarised elsewhere (Hussey and Wallace 1993). However, it is useful to consider here some of the broader issues involved in protecting remnants.

There are six ways of better protecting remnants on freehold land.

Change Social and Cultural Values

If people deeply believe, for whatever reason, that protection and management of remnant bushland is in their best interests, then such protection and management will be immediate. Some of the issues related to this are explored in Burbidge and Wallace (in Press). Unfortunately, our culture has developed neither a deep understanding of the land nor a full appreciation of our dependence on its fragile values. For our long term benefit, it is essential that our culture change to one which is far more sympathetic to the land.

Make it Economic

Landowners will better protect and manage remnant vegetation as economic returns from them increase and management costs decrease. Means for achieving this include:

- researching and extending productive uses of remnants.
- increasing government assistance through schemes such as the Remnant Vegetation Protection Scheme (State) and "Save the Bush" (Federal).
- attracting more private enterprise assistance to remnant managers.
- providing economic incentives, for example special tax concessions.

Make It Compulsory

There are many means for protecting remnant vegetation through legislation and regulation. Some are used already in Western Australia through the Soil Conservation Act. If the arguments of Bradsen (1992) are accepted, then legislation is a necessary adjunct to a favourable land ethic if land conservation goals are to be achieved. While the most obvious means of achieving remnant protection is through land clearing controls, there are many other legislative mechanisms which could be considered.

Make It Easier

If it is easier to manage and protect remnants, then this will encourage effective management. Some of the many ways this could be achieved include:

- provide better information on how to manage remnants.
- educate people in remnant management.
- undertake technical and other research to improve our knowledge of remnant management.
- develop better tools for land management decisions, particularly with regard to integrating different land values.

Provide Non-economic Incentives

There are non-economic incentives which might be used to reward people for protecting remnants. Most obvious are the awarding of prizes and similar forms of special recognition.

Another approach is to make covenants, memorials and related means of protecting bush more available and relevant to individual needs. This could also be considered as a way of "making it easier".

Provide Leadership / Peer Group Pressure

If key players in the rural community emphasise the values of remnants and promote their protection and management of remnant vegetation, then this will, over time, undoubtedly increase remnant protection. This is closely related to the previous point.

In summary, each of the six mechanisims listed will contribute to the protection and management of remnant vegetation. While each can be pursued seperately, more effective remnant protection and management would be achieved by combining actions in all the area listed, particularly the first three which are crucial.

It is imperative that we act quickly irrespective of the courses of action chosen. The longer we delay effective protection and management of remnant vegetation, the more its value for conservation of biodiversity and sustainable agriculture will decrease.

Conclusions

On the evidence provided above our remnant vegetation provides an important mechanism for achieving sustainable agriculture in the south-west of Western Australia. From the viewpoint of our children, failure to protect the biological resources and opportunities represented in our remnants will at best be considered prodigal, and more likely criminal.

It must be stressed that we have only one opportunity to protect our remnants of native vegetation and their biodiversity - there are no second chances.

Six general approaches are suggested for protecting and managing remnant vegetation - the challenge to achieve this must be accepted at both the community and individual level.

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References

Bradsen, J. (1992). A review of soil conservation legislation in Australia. *In*: 'Proceedings of the 5th Australian Soil Conservation Conference', Volume 1, Central Conference. (Eds. G.J. Hamilton, K.M. Howes, and R. Attwater.) pp. 21-35. Dept. of Agriculture, Perth.

Burbidge, A.A. and Wallace. K.J. (in press), Practical methods for conserving biodiversity.

Fry, G. and Main, A.R. (1993). Restoring seemingly natural communities on agricultural land. *In*: 'Nature Conservation 3: Reconstruction of Fragmented Ecosystems - Global and Regional Perspectives'. (Eds. D.A. Saunders, R.J. Hobbs, and P.R. Ehrlich.) pp. 225-41. Surrey Beatty & Sons, Chipping Norton.

Hollis, G.E., Holland, M.M. Maltby, E. and Larson, J.S. (1988). Wise use of wetlands. *Nature and Resources* **24** (1): 2-13.

Hussey, B.J.M. and Wallace, K.J. (1993). Managing Your Bushland. Department of Conservation and Land Management, Perth.

Lefroy, E.C., Hobbs, R.J. and Scheltema, M. (1993). Reconciling agriculture and nature conservation: toward a restoration strategy for the Western Australian Wheatbelt. *In*: 'Nature Conservation 3: Reconstruction of Fragmented Ecosystems - Global and Regional Perspectives'. (Eds. D.A. Saunders, R.J., Hobbs, and P.R. Ehrlich.) pp. 243-57. Surrey Beatty & Sons, Chipping Norton.

Leopold, A. (1949). A Sand Country Almanac and Sketches Here and There. Oxford University Press, New York.

McFarlane, D.J., George, R.J., and Farrington, P. (1993). Changes in the hydrologic cycle. *In*: 'Reintegrating Fragmented Landscapes: Towards Sustainable Production and Nature Conservation'. (Eds. R.J. Hobbs and D.A. Saunders.) pp. 146-186. Springer - Verlag, New York.

Main, A.R. (1981). Ecosystem theory and management. *Journal of the Royal Society of Western Australia*. **64:** 1-4.

Main, A.R. (1993). Landscape reintegration: problem definition. *In*: 'Reintegrating Fragmented Landscapes: Towards Sustainable Production and Nature Conservation'. (Eds. R.J. Hobbs and D.A. Saunders.) pp. 189-208. Springer-Verlag, New York.

Nulsen, R.A. (1993). Changes in soil properties. *In*: 'Reintegrating Fragmented Landscapes: Towards Sustainable Production and Nature Conservation'. (Eds. R.J. Hobbs and D.A. Saunders.) pp. 107-45. Springer-Verlag, New York.

Sanders, A. (1991), Oral Histories Documenting Changes in Wheatbelt Wetlands. Occasional Paper 2/91. CALM Perth

Spierre, R. (1992), Can we make farming sustainable? *Australian Farm Journal* **1**: 18-19.

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