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By email only

Submission to:

LANDSCAPE OR MULTI-FARM VEGETATION PLAN REVIEW

Conducted by:

Natural Resources Commission

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The attached response addresses the invitation to the public by the Natural Resources Commission to comment on the applicability of proposals to extend individual farm based assessments of vegetation clearing to multiple farms to provide a landscape based assessment. The assessments are conducted under the NSW Native Vegetation Act 2003.

This response was prepared by Brian Tunstall on behalf of ERIC and specifically addresses the terms of reference. All quoted material is presented in italics.

We would be pleased to provide further information considered desirable.

Brian Tunstall

Director

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TERMS OF REFERENCE

The specifics of the terms of reference given for the review of Landscape or Multi-farm Vegetation Plan are:

For this task the Commission will provide advice on:

> *1. The scientific and economic viability of multi-farm Landscape Vegetation Plans, commenting specifically on the general issues and any case studies with regard to:*
>
> > *a) biophysical characteristics and environmental assets;*
> >
> > *b) potential threats to environmental assets;*
> >
> > *c) sustainability of potential land management systems; and*
> >
> > *d) anticipated economic benefits and potential risks of the approach over single farm property vegetation plans.*
>
> *2. A robust 'landscape design' for sustainable management of a project area, commenting specifically on general issues and any case studies with regard to:*
>
> > *a) landscape and property scale actions necessary to manage threats which will improve or maintain environmental outcomes; and*
> >
> > *b) management options which would increase productivity and would be sustainable over the longer term.*
>
> *3. Any improvements that should be made to the Environmental Outcomes Assessment Methodology, PVP Developer and CMA procedures to facilitate landscape scale Property Vegetation Plans consistent with the Native Vegetation Act 2003.*

The terms of reference are specified in relation to the implementation of the Native Vegetation Act 2003 (NV Act) to properties / landholdings. The issues have therefore to be addressed in relation to the way the Act is currently being implemented. Other documents central to its implementation are the Native Vegetation Regulation 2005 (NV Regulation) and the Environmental Outcomes Assessment Methodology. All are available on the web via:

http://www.nativevegetation.nsw.gov.au/index.html

CONTEXT BY WAY OF PROPERTY VEGETATION PLANS

Regulations

In providing context the Environmental Outcomes Assessment Methodology report identifies that:

> *The Native Vegetation Reform Implementation Group Report identified that:*
>
> *"New South Wales needs a sound approach to the management of our native vegetation that:*
>
> - *is built on a shared commitment to develop the world's leading agricultural production systems that utilise maximum water efficiency and sustainable farming practices;*
> - *is capable of sustaining regional development with secure access to natural resources;*
> - *protects the environment by restoring and maintaining the quality of our water, soil and biodiversity; and*
> - *is based on mutual trust between farmers, environmentalists, governments, and the wider community."*
>
> *In December 2003 the Natural Resources Commission Act 2003, Catchment Management Authorities Act 2003 and the Native Vegetation Act 2003 were passed to deliver this framework.*

The objects of the NV Act are given as:

> a. *to provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and*
> b. *to prevent broadscale clearing unless it improves or maintains environmental outcomes, and*
> c. *to protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation, and*
> d. *to improve the condition of existing native vegetation, particularly where it has high conservation value, and*
> e. *to encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation,*
>
> *in accordance with the principles of ecologically sustainable development.*

The general issue that arises with these objectives relates to the use of the management of native vegetation to:

- *develop the world's leading agricultural production systems that utilise maximum water efficiency and sustainable farming practices and*
- *provide for, encourage and promote the management of native vegetation on a regional basis in th*e *social, economic and environmental interests of the State.*

While these identify an intent and objective to address agricultural production, sustainable farming practices and the social and economic interests of the State the implementations only address environmental improvements that are suggested to arise from increasing the condition and extent of native vegetation.

The situation is illustrated by Section 8 of the NV Regulation.

8 Draft PVPs

1. *The form and content of a draft PVP must comply with the requirements of clause 9 for PVPs.*
2. *A draft PVP may also provide information regarding the social and economic impacts (including on-farm impacts, impacts on the regional community and implications for any socio-economic targets established by the NRC or the relevant catchment management authority) of any matters provided for in the draft PVP, such as clearing proposals, proposed natural resource management activities, or proposals relating to the continuation of existing farming or other rural practices.*

Note. *While this information is not to be used in assessing whether proposed broadscale clearing improves or maintains environmental outcomes, it may be used for other purposes, including the following purposes:*
(a) assessing whether management of native vegetation is promoting the social, economic and environmental interests of the State in accordance with the principles of ecologically sustainable development,
(b) providing the NRC with social and economic information to which it can have regard when preparing recommendations and advice.

That is, implementation of the NV Act does not address social, economic, farming or other such interests as identified in the intent and objectives. An objective of the NV Act is specifically excluded by the NV Regulation and therefore from the implementation.

A similarly misleading situation arises with the use of the term broadscale clearing. The definition of broadscale clearing given in Section 8 of the NV Act is:

8 Meaning of broadscale clearing

For the purposes of this Act, ***broadscale clearing*** *of native vegetation means the clearing of any remnant native vegetation or protected regrowth.*

In the English language broadscale equates with large area. With the definition used in the NV Act broadscale has no defined scale and can relate to a point as well as an area. The use of the term broadscale in the NV Act and Regulation is invalid and misleading.

Use of the term broadscale is redundant because the definition of *broadscale clearing* has no scale and this raises a critical issue of why it was used. The reference is always to broadscale clearing rather than clearing or vegetation clearing. It is not necessary to employ the term broadscale clearing in the sense of widespread, as is done once in the Environmental Outcomes Assessment Methodology report, as the scope of the NV Act and Regulation is defined by the extent of the State. An inability to identify such a logical deficiency is significant but intent to create perceptions of extensive clearing to produce an emotive response in support of the NV Act is of greater consequence.

Given the definition of broadscale clearing the purpose of the NV Act is to eliminate all clearing of native vegetation. While several factors contribute to this situation a key one is that the NV Act is designed to meet an Australian Government objective of no net clearing of native vegetation where this is linked to funding. Any clearing has therefore to be matched by revegetation. The purpose of procedures identified in the NV Regulations is therefore to assess tradeoffs where this is done by reference to suggested impacts on water quality, salinity and soils, and the conservation of plant and animal species and vegetation.

Implementation

The implementation of the NV Regulation is conducted by Catchment Management Authorities (CMAs) established under specific legislation. Implementation is addressed by way of Property Vegetation Plans (PVPs) that are developed and assessed using the proscribed Environmental Outcomes Assessment Methodology. Software named PVP Developer has been developed for this purpose and is applied by the Catchment Management Authorities. This assessment methodology uses the databases identified below as the reference.

- *threatened species profiles database;*
- *vegetation benchmarks database;*
- *overcleared landscapes database;*
- *overcleared vegetation types database;*
- *major rivers database;*
- *important wetlands database;*
- *soil subregions database; and*
- *invasive native scrub species database.*

While the databases do not provide all of the information required for assessment they are identified as being detailed. The databases can only be changed through an extended administrative process and so will slowly evolve. There will not be any dramatic or rapid improvement in the quality of the available information in the current circumstances.

The guidelines for the Environmental Outcomes Assessment Methodology identifies that:

> *it may be possible to utilise more appropriate local data if an **accredited expert** certifies that data is available that more accurately reflects local environmental conditions (compared to the data in the approved databases) in relation to:*
>
> - *vegetation density benchmarks;*
> - *whether threatened animal species are likely to occur on the land in that vegetation type or habit feature in the sub region; or*
> - *the estimated percentage increase in population that can be expected in response to a proposed management action, as measured by either an increase in the number of individuals, or habitat amount or key habitat feature.*
>
> *The Catchment Management Authority Board or General Manager (exercising power delegated by the Minister) may authorise the replacement of the approved data with data that the accredited expert advises is more appropriate.*

Procedures for the development of PVPs given in the reference material cited here identify the scope but do not identify all of the activities involved in developing a PVP. For example, a requirement for the on-farm mapping of the vegetation is not explicitly identified. While the existing mapped reference information is said to be detailed it does not provide all of the information needed for assessment.

The indications are that all of the on-farm mapping will be conducted by CMA personnel using ground inspection and visual interpretation of high spatial resolution satellite imagery (e.g. Section 9 of the NV Regulation). The mapping cannot be done by farmers because of the need to identify the type and condition of vegetation. Section 27 of the NV Regulation identifies that a variation to the Assessment Methodology is not allowable in respect of:

> *(a) riparian buffer distances or associated offset requirements,*

(b) classification of vegetation as likely habitat for threatened species,
(c) classification of a plant species as a threatened species or a component of an endangered ecological community,
(d) classification of the condition of vegetation,
(e) classification of the vegetation type or landscape type as overcleared,
(f) the assessment of the regional value of vegetation.

The classification of the vegetation is central to the assessment and determinations of the vegetation and its condition by the CMA and its status by agencies are absolute and final.

It appears that an **accredited expert** is a person trained in the application of the PVP Developer where this entails two weeks training followed by the production of 8 PVPs with an already **accredited expert**. One week of training is spent in Wellington understanding the package, its use, and some field work involving production of PVPs. It apparently includes opportunities to discuss the intent and operation of modules with the developers. Another is spent in the field in the region where the operator will work and involves implementing methods for characterising vegetation and developing an understanding of the basis to vegetation benchmarking.

From the available information the conclusions are that:

- All new mapping on landholdings will be done by **accredited experts** who will also do the assessments.
- All reference mapping will be as provided by agencies with a potential for slight changes based on the advice of the **accredited expert** doing the assessment.
- The **accredited experts** will be agency or CMA personnel.
- There is no scope for landholders to use independent experts to address any issues.

The Environmental Outcomes Assessment Methodology identifies that *the PVP Developer will be used by Catchment Management Authorities to assist farmers preparing property vegetation plans*. However, the process is completely controlled by the CMAs and agencies and landholders have no rights other than to decide which options presented are regarded as being suitable, if any.

This situation raises several issues, a regulatory one being that the NV Regulation have **accredited experts** being accredited by different Ministers with the jurisdictions of the Ministers being specified. Given that accreditation relates to application of the NVP Developer it is unclear why the need for different Ministers. At present it appears that all accreditations are procedural within the CMAs and therefore relate to the Minister for Natural Resources. Without arrangements between Ministers this accreditation would be restricted to salinity, soil and water quality. The accreditation would not cover threatened species and biodiversity, nor fish and marine. This reflects the situation whereby considerations addressed in the PVP Developer come under acts additional to the NV Act.

A procedural issue is that technically all the necessary information should be available in reference databases. Development of a PVP could then largely be a desk top exercise using the PVP Developer. However, the detailed information required for the development of a PVP is not provided by the databases and development of a PVP involves detailed field work, as with using transects to characterise the vegetation.

A social issue is that PVPs can only be produced by CMA and agency personnel and their decisions cannot be questioned. There is no right of redress even by way of the courts as it has been explicitly excluded. Trust us as we are the **accredited experts**.

The scientific issue is that personnel with greater relevant knowledge and experience are excluded from the process. Costly and ineffective procedures are being used and a status of absolute truth assigned to observations that can contain considerable deficiencies. Such considerations are suppressed by assigning the status of **accredited expert** to training in a proscriptive technical skill. Such control stifles the development of improvements and hence increases costs and degrades outcomes.

Scientific applicability

The process used in the PVP Developer is identified as being underpinned by science. This acknowledges that the PVP Developer is not scientific which applies if only because it does not incorporate basic elements of the scientific method. The PVP Developer method is also claimed to be objective. While the PVP Developer incorporates defined rules these rules represent subjective judgments. There is a defined structure but the assessments are subjective.

The basic precept with implementation using the PVP Developer is that the science is correct. All effort has therefore been expended in developing a practical tool. The PVP Developer is technology rather than science where there is no basis for evaluating the applicability or effectiveness of the technology in delivering the suggested benefits.

The basic design of the 'expert' system in the PVP Developer appears to represent a simple decision logic based on nested indices. There are rules of thumb built on rules of thumb that are combined in a largely arbitrary way with other rules of thumb to come up with something that some think they can rationally interpret. For example, water quality is addressed solely by the use of exclusion zones scaled according to stream order. The surrounding terrain, soils, and land use are not considered even though they are known to be of consequence. Water quality isn't addressed by way of water quality and the assessment is combined with other subjective assessments, such as a soil impact assessment based on general considerations such as land capability zones. Any objectivity disappears well before the information is assessed using the PVP Developer.

Numerical modeling is usually considered to be objective when predictive applications are usually descriptive. Words are simply replaced with numbers. Where numerical modeling is employed in developing 'information' the predictions do not provide an estimate of reliability. The result is adjusted to match expectation with the models being optimised, trimmed, tuned, calibrated and otherwise tailored to produce the desired results.

State wide databases are used in numerical models for predictions relating to individual landholdings where the data are unsuitable for this purpose. The soils database represents the best example where this has been interpreted from Soil Landscape maps where Soil Landscapes almost invariably contain a mixture of soils. The soil capability classes used to assess soil impacts, which for mapping are interpreted from Soil Landscapes, represent a very broad generalisation.

For detailed salinity predictions the soil information is meant to include hydraulic conductivity and salinity. Salinity is usually considerably more variable than other soil properties but hydraulic conductivity is much more so. While hydraulic conductivities are critical they are difficult to measure and are highly variable: they are seldom measured. This limitation is often accommodated by making the model insensitive to the variable.

Examination of the derivation of the information in the databases identifies that it was collected for broad planning purposes. It is now being used for evaluations on individual

landholdings where it has little if any applicability. The situation is analogous to statistical analyses where, even when the generalisations are valid, the results cannot be reliably applied to any particular or individual circumstance. Much of the information in the databases has little if any applicability to individual landholdings.

The approach used in the NVP Developer can be related to multivariate statistical analyses of spatial patterns of vegetation that were popular in the 1960s. The analyses always detected patterns but the patterns observed varied with the scale and range of observations as well as the type of vegetation. All analyses showed that patterns of vegetation are not random but there was no definitive answer or result hence the approach has effectively been abandoned in scientific research. More explicit attempts to statistically relate plant species with particular environments met with a low level of success ranging from around 15 to 70% for dominant species, averaging below 50%. The biodiversity assessments effectively use the same approach but the information base is very limiting compared with that used in the scientific research making the result much less reliable.

There is nothing in any of the estimates of the environmental value of native vegetation in the NVP Developer that can be said to have a sound foundation in science. The approach adopted is known to have low reliability. However, as there is no tangible objective specified other than to increase the extent of native vegetation, and as agency personnel have complete control of the implementation, the method can continue to be presented as improving environmental outcomes with little fear of there being contradictory evidence from anyone other than a few farmers that are affected.

Conclusions

Overall the process:

- Only addresses suggested environmental benefits of increasing native vegetation.
- Provides some suggested benefits that would not be questioned[1] but also promotes scientific disciplinary and administrative (personal) beliefs as to what is desirable.
- Ensures that agencies have full and unquestionable control over the criteria.
- Ensures that CMAs control the implementation without question.
- Does not evaluate whether the suggested environmental benefits are achieved.

In lacking tangible deliverables by way of environmental outcomes there is no basis for addressing the requirement for continuous improvement in performance other than in the implementation of process. Moreover, there is no basis for questioning anything. The process is highly bureaucratic to the point of being completely authoritarian.

This situation is diametrically opposed to the requirement given by The Native Vegetation Reform Implementation Group that the implementation should be based on *trust between farmers, environmentalists, governments, and the wider community*. Given the dictation and control there is no basis for the development or existence of trust. Farmers are being asked to trust agency personnel that are imposing restrictive regulations according to their assessments that cannot be questioned.

The addressing of environmental outcomes of land use through the protection of native vegetation could be seen as being perverse, pragmatic, or philanthropic. The philanthropic perception incorporates the unrealistic and invalid view that all environmental problems can be

[1] These relate to the conservation of species and plant communities which is addressed by National Parks and Wildlife Service via the Threatened Species Conservation Act 1995.

solved by restoring the native vegetation. Someone has to pay for the lost production and remediation thus those promoting this approach are being philanthropic but with other people's money.

The pragmatism arises through accepting that, compared with soils and water, changes to vegetation can be visually apparent even if they are poorly characterised and understood. People think they understand what the differences and changes in vegetation mean, and a sense of good feeling is promoted by the use of emotive comments such as 'eliminating broadscale clearing'. By addressing vegetation we can do something that promotes a warm feeling even if we can't show any tangible benefits other than having more native vegetation.

The perversity arises because most of the environmental impacts considered adverse by the community cannot be redressed simply by increasing the amount of native vegetation. The community depends upon agricultural production to survive and broad scale agriculture is where most environmental gains can be made. Most gains are to be made in improving the environmental outcomes of land use under agriculture where this involves improving production as well as the environment. Nibbling at the edges by penalising part of a minority group in farmers may appear to have low political risk but is environmentally invalid, scientifically absurd and socially unacceptable.

IMPLICATIONS FOR THE TERMS OF REFERENCE FOR THE LANDSCAPE VEGETATION PLANS

Case Studies

There are no assessments of outcomes from the NV Act other than assessments of clearing. Assessments of performance can therefore only address the change in vegetation and/or process of implementation which are unrelated to scientific status and have nothing to do with economic viability other than the ability of society to support unproductive activities by public agencies and landholders.

There are examples of farmers greatly improving environmental outcomes while also improving the sustainability of the productive use. These invariably involve improving the soil by maintaining a vegetative cover where the production and environmental benefits largely derive from changes to plant and soil water and nutrient relations. One such development involves establishing native pastures on previously ploughed land and direct drilling wheat into the grassland without ploughing. The environmental benefits include increased native vegetation and wildlife and a reduced need for chemical applications to address fertility, weeds and pathogens. Production is maintained and expenditures on inputs reduced. The potential for increasing profitability includes environmental considerations such as carbon sequestration in soils.

The potential for such developments and the applicable procedures vary with the characteristics of the natural resources. Such developments are promoted by the provision of detailed and reliable information on the natural resources as well as the development of the science and technologies.

There are examples of cost effective development of information for application in land management as well as planning. The methods used were designed to provide paddock level detail across regions and hence provide the context as well as detail needed for landscape based implementations. Outcomes are improved because of the provision of improved information that addresses all aspects of land use and is not restricted to addressing native vegetation. Costs are reduced by the ability to provide paddock level detail with regional coverage.

The development of such information should involve the community. The objective is not to dictate what people should do but to provide a diversity of options for people to select from. The advantages of community involvement include reduced costs, greater reliability, and improved acceptance and application of the results. The greater reliability arises through the use of local knowledge where this covers a much greater range of circumstances than can ever be implemented in a scientific study. Results have to accord with all observations and the science is deficient where they do not.

Few farmers have previously had access to detailed information on their natural resources hence the provision of detailed information using a map or report does not ensure its use. There is a need for support services in demonstrating how the information can be used to improve production and environmental outcomes.

It is not the role of Government to be directly involved in delivering such services. Indeed, the community knows from experience that it cannot afford to trust anyone that has absolute control, and that situation is common to all societies. There must be division of

responsibilities to provide checks and balances. Agencies involved in enforcing regulations should not be providing services because of the conflict of interest. That does not mean that Governments should not be involved, as they must if they are to fulfill their role. The issue is how best to support the community and minimise the need for repressive controls.

The Healthy Soils Australia initiative (healthysoils.com.au) provides an example of how government and industry can work to develop a system that addresses the broadscale environment in a cost effective and socially beneficial way.

Issue 1: The Scientific and Economic Viability of Multi-farm Landscape Vegetation Plans

The current information for implementing the NV Act depends on local evaluations obtained by walking the ground assessed against State-wide databases. This is costly because of time and travel and is ineffective because of the limited knowledge and experience of those doing the assessments. The expertise of the accredited experts lies in implementing a defined process rather than their level of knowledge and understanding of the development and functioning of native vegetation and its relationship to the environment. Given the power and control of the assessors the outcomes with the development of PVPs can reflect their training and transferred beliefs rather than objective scientific analysis.

The scientific status depends on the objectives. However, the basic considerations are that while outcomes depend critically on the management of individual landholdings the changes on one landholding can be affected by changes on others. An integrated landscape approach has the potential to provide benefits provided it is based on appropriate information and is not developed as a collection of piecemeal studies on individual landholdings.

Part a: biophysical characteristics and environmental assets

Extension of the current approach to larger areas can only exacerbate the situation identified in the above section (Task 1). This deficiency cannot be corrected by improving the spatial resolution of the methods used for the State wide surveys as many are intrinsically un-scalable. Increasing the spatial coverage using the NVP Developer field methods is costly and the piecemeal approach does not adequately address system function. Methods are required that embody sufficient scale independence to provide essential information at paddock level detail across regions. Appropriate methods exist, at least for soils and vegetation, but they are not within the expertise of those involved in the implementation of the NV Act.

The issue is illustrated by the aborted attempt of DIPNR to map the vegetation of NSW using visual interpretation of aerial photography. This was meant to provide an essential reference for the NV Act but the methods used were subjective and expensive and hence could never address the requirement. The method is equivalent to that being used in applying the PVP Developer. The main difference is the replacement of aerial photography with high spatial resolution satellite imagery but the only significant benefits this provides are the potential to improve the spatial accuracy of the mapping and lower the costs of incorporating the information into geographic information systems (GIS). The current method of visiting all landholdings eliminates embarrassing mapping errors but at high cost and the lack of a reliable reference for assessing conservation significance.

Part b: threats to environmental assets

A vegetation / species based approach

Previously with individual species a threat was sometimes only realised when it was is too late, hence a focus has developed on protecting individual species. However, from an environmental perspective most gains are achieved by addressing the broad requirements rather than focusing on something considered to have high value and this particularly applies when addressing vegetation. Most benefit can be obtained by taking a comprehensive and balanced approach.

A key scientific issue with the current approach is that vegetation is being treated in the same manner as species. That is, there are the notions that:

1. There are distinct forms of native vegetation represented by distinct plant communities.
2. The distinct forms of plant communities are essentially invariant over time.
3. A particular environment (site) naturally only supports one form of plant community.

The focus has been on protecting particular plant communities based on the premise that the current vegetation reflects that prior to 1770 and that the vegetation in the future should be the same as the guesstimate of the 1770 vegetation. The premise that the current vegetation resembles that prior to 1770 appears sometimes to be correct but often is not. In some situations the vegetation has dramatically changed with the nature of change mainly being an increase in the amount of woody vegetation. Many areas that were previously grasslands and open woodland are now variously shrublands, shrub woodlands and dense woodlands. The vegetation has changed and will continue to do so as change is an inevitable and essential part of natural systems, particularly biological systems.

The notion that there are distinct forms of plant communities has arisen because there are usually disjunct differences between plant communities with position in the landscape. These catenary sequences can often be readily recognised and they form the basis for the Land Systems and other approaches to vegetation and landscape mapping. However, the basic precept behind the Land Systems method has never been properly tested and the reliability of extrapolations from individual catenas to regions is largely unknown. Where this issue has been investigated the indications are that the vegetation changes according to conditions. The likely situation is that there is a continuum of vegetation with a continuum of the environment.

The occurrence of a continuum of vegetation with a continuum of the environment does not preclude the existence of locally distinct patterns of plant communities as these can arise because of environmental differences. The abrupt change between mangroves and adjacent terrestrial is an example. However, even within mangroves there are variations in the communities with variations in the environment. There are distinct forms of vegetation associated with distinct broad environments but within each broad environment the mixtures of plant species that comprise recognised communities effectively vary continuously, partly in relation to variations in the environment.

The above addresses effects due to spatial variations in the environment but there are also temporal variations arising from factors such as the life cycles of species. The approach to vegetation mapping used in NSW and generally elsewhere has been based on the Clementsian view that vegetation develops through seral states to a climax that reflects the maximal vegetation development for the particular environment. The climax is regarded as being stable, hence the view that there are distinct forms of vegetation that reflect environmental

differences and that these can be expected to remain constant over time. These precepts have been negated on many occasions in different ways. They were even negated by the proponents of the theory finding it necessary to identify variants such as post climax communities. While nodal forms of vegetation can be 'recognised' the recognition of distinct vegetation types has a deficient theoretical foundation and in practice is unreliable.

The identification of distinct forms of vegetation has caused difficulties in the mapping of vegetation across the State. Even with the strong tendency to shoehorn observations to fit existing notions of what should occur forms of vegetation continuously arise that don't accord with the proscribed framework thereby generating a need to identify variants to provide a reasonable characterisation. This is compounded by scaling issues when a set plot size is used to characterise the vegetation and this applies with transects as well as plots. The statistical analyses of spatial pattern in plant communities common during the 1960s identify large limitations with this approach.

The notion that a particular environment supports only one form of plant community is seldom stated as it can readily be negated through observation and theory. Given the number of factors that determine outcomes there are a number of optimal solutions represented by different plant assemblages. However, an assumed 1:1 correlation between plant communities and the environment is implicit in many interpretations, as in the assessment of significance of a characterisation of vegetation against a reference database. The vegetation that will develop on a site is inferred from a general consideration of the environment by way of soil and terrain and/or a broad extrapolation of spatial patterns of past vegetation from existing remnants.

While plant communities are usually defined in relation to the composition of component plant species the innate characteristics of plant communities and plant species are completely different. The approach to conserving vegetation should be very different to that used for species.

An environmental / ecological approach

An understanding is gradually developing of what the main environmental enemy really is, namely soil degradation, where this affects native as well as introduced species. Land use practices have largely destroyed the biology of the soil where the development of vegetation is intrinsically linked with the soil biology. Soil degradation degrades fertility where the occurrence and density of native species is strongly dependent on fertility. Soil degradation also has implications for salinity and the quality and persistence of stream flows. The water relations of the systems differ considerably from the 1770 condition with the greatest change almost inevitably being an increase in surface runoff and an associated decrease in percolation.

The issue of low soil fertility in Australia has historically been glibly ascribed to old weathered landscapes. It has been assumed that Australia was always infertile when examination of explorer's records and remnants of native vegetation suggest otherwise. While the parent materials for soils can impose severe limitations the low fertility of agricultural areas is largely due to adverse impacts of land use. There are therefore large opportunities for environmental and production gains.

An appreciable number of farmers have demonstrated improvements to productivity and the environment through practices that improve the soil, particularly the level of soil organic matter. As some involve direct drilling of crops into native pastures they are threatened by the current implementation of the NV Act.

Such achievements have arisen because of the recognition and acceptance that the development of vegetation is intrinsically linked with the soil biota. For example, virtually all plant nitrogen is naturally supplied by soil microbes via fixation of atmospheric nitrogen and the recycling of organic matter. Protecting native vegetation from clearing will not provide the projected environmental benefits if it does not redress the adverse impacts on soils. Moreover, redressing the adverse impacts on agricultural soils generally can provide much greater environmental gains than solely addressing native vegetation while also providing production and hence social benefits.

Additional issues in addressing native vegetation relate to the vegetation expected in particular environments (soils, terrain, climate) and change in the environments associated with land use. The management of fire and grazing are known to be of consequence. The objective should be to develop a diversity of naturally sustaining systems as this maintains future options. Diversity is better addressed at a landscape scale than in a piecemeal fashion on individual landholdings.

Part c: sustainability of potential land management systems

The current NV Act implementation process involves the development of public administration and the provision of incentives to landholders. It is inherently unsustainable as it depends on the continued provision of public funds where there is no financial return. A process that is funded by the benefits it provides to landholders is the only naturally sustainable system.

The best sustainable productive system is where the biological components of the system are self sustaining. To sustain the native vegetation it is necessary to replace lost nutrients where this naturally occurred through the activity of soil biota. A focus on native vegetation without regard to soils will provide little benefit and need not reverse the adverse environmental impacts said to be associated with vegetation clearing. Sustainability will only be achieved by addressing natural system function.

Part d: anticipated economic benefits and potential risks of the approach over single farm property vegetation plans.

The potential economic benefits relate to providing landholders with information that improves their production as well as environmental outcomes. The only significant risk appears to relate to diminished power of agencies. The risk is to personnel in the agencies and the scientists they fund rather than to the community, landholders or the environment.

Issue 2: A Robust 'Landscape Design'

Part a) Landscape and property scale actions necessary to manage threats which will improve or maintain environmental outcomes

The issues in addressing this requirement are that there are many actions that can improve environmental outcomes but most do not directly target native vegetation. The benefits that can be achieved by improving soils can provide improved productivity and profitability where some of this improvement can be translated into increasing the amount and condition of native vegetation. Moreover, improving degraded native vegetation invariably involves improvements to soils.

Many of the applicable methods are effective at paddock and landscape scales. However, the development of information needed for implementation is most cost effective when developed at regional scales. Implementation at landscape scale would provide considerable cost savings while increasing the benefits to landholders as well as the environment.

While implementations can be effective on individual farms it is common for adverse impacts on landholdings to be caused or exacerbated by activities or conditions elsewhere. Identifying the appropriate on farm actions depends on knowledge of the landscape. Landscape information is required for actions to be appropriately targeted and outcomes will be improved by an integrated landscape response.

It is not possible to specify a single landscape scale action or activity that is applicable to all situations because the constraints differ markedly across the State. There is no 'one size fits all'. The requirement is for detailed and reliable information so that the actions are applicable.

Part b) Management options which would increase productivity and would be sustainable over the longer term.

The only management options that are sustainable over the longer term are those that improve the viability of the land use. Logically and in practice the addressing of conservation issues, such as native vegetation, cannot be divorced from productive use of the land. There is sufficient information and experience to know that the desired gains can be achieved. However this would involve a cultural change whereby environmental issues are addressed by supporting the land users rather than by using control to dictate what landholders must do.

Addressing this requirement involves a cultural change for public administrators and scientists. However, the cultural change is no more than was expected and occurred with landholders accepting constraints on their activities where those activities affected others.

Soil improvement is the logical focus of activities directed at improving productivity and environmental outcomes. The required soil improvements arise through restoring the functionality of soils by restoring their biological activity. There are many way in which this can be achieved and the appropriate technologies vary with conditions such as the nature and condition of the natural resources, the climate and the options for productive land use. The requirement is to provide the information and technologies so that the landholders can select the options that best suite their circumstance.

Issue 3: Improvements

This issue addresses *improvements that should be made to the Environmental Outcomes Assessment Methodology, PVP Developer and CMA procedures to facilitate landscape scale Property Vegetation Plans consistent with the Native Vegetation Act 2003*.

Providing a solution to this issue is not simple as a system exists that has evolved to benefit those involved in its development and implementation, and their absolute control is guaranteed by legislation. Even if changes to the legislation were to remove the absolute control their continued participation will produce resistance to change. With these constraints suggestions for change are largely irrelevant except where they benefit those already involved.

The scientific approach to addressing such questions is to identify objectives and examine how they might best be achieved without regard to existing structures and constraints. This involves addressing the constraints or boundary conditions which is a fundamental scientific requirement. Application of this approach identifies that the PDV Developer likely represents

the best response that the establishment could produce when faced with the task of implementing a new Act, noting that compared with the NVC Act the NV Act greatly facilitates such control. The NV Act was structured to facilitate a highly proscriptive application by providing agencies with absolute and unquestionable control. While the NV Act was promoted with objectives and statements of intent to improve the environment, production and social outcomes these are explicitly excluded from the implementation by the NV Regulation.

The structure and function of the CMAs can also be seen to be a response to changed circumstances, in this instance the Australian Government attempting to direct State funds into directions they consider desirable (no net change in native vegetation) and the State attempting to maximise access to federal funds to meet existing overheads. The interests of farmers and the environment have been subverted to the interests of administrators and scientists.

Apart from the adverse impacts arising from the promotion of self interests of public administrators and scientists the bottom line is that the information currently used to make decisions on conservation, the environment and land use contains significant deficiencies. The information was developed for general (regional) land use planning and is now being used to dictate land management on individual landholdings. The information was developed for planning on the premise that responsibilities of the Government to supply information ceased at the farm gate when the implementation of the NV Act has taken agencies well and truly inside the farm gate.

The reliability of decisions depends on the applicability and reliability of the information as well as knowledge and understanding. Decisions are only as good as the information base, which is the same as identified early with the advent of computers: garbage in garbage out.

The increasing role of agencies in policing regulation has produced a conflict of interest in their providing services to landholders. The CMAs, which are a part of the State Government involved in implementing and policing regulations under the NV Act, are somehow expected to be accepted by landholders as working in their interest. The most reserved comment that can be made is that any such expectation is completely unrealistic.

There is a need for independence, objectivity and the like in addressing requirements such as the NV Act. This cannot be provided when those developing and policing regulations also provide services against them and proscribe the methods to the greatest level of detail they can to retain control. Farmers are in desperate need of independent environmental information and advice but this has been intentionally suppressed by established interests in public organisations that are solely intent on promoting the native biota.

The normal administrative response to this situation would be to form a committee, conduct public consultation and the like where this allows established interests to continue to control the agenda. The requirement is to provide landholders with an alternative to being dictated to by public administrators and scientists where this involves accepting a role for industry in the provision of environmental services. If meetings are needed the requirement is for those most affected to organise them and identify the needs, namely landholders.

The criteria by which the agencies will accredit experts have yet to formally materialise. The information on accreditation presented here represents personal comment and is not apparently provided in official documents, hence the covenant ‘it appears that’. It will be interesting to see the formal expression of this new means of controlling the agenda and suppressing alternatives to their providing environmental services, thereby maintaining absolute and unquestionable control over landholders.

This application of accreditation reflects the common use of standards to promote a position and suppress alternatives. While standards can be needed they should be specified by way of the minimum outcomes rather than the implementation of defined procedures as the latter allows manipulation and stifles development. Where proscriptive standards have been used, and there are many examples, they are ultimately either discarded completely or replaced by developments that better addresses the requirement. However, considerable damage is invariably done before there can be any substantive change.

Standards, like records, are made to be broken. The difficulty is that, if defined by way of an approved process as with the PVP Developer, they ultimately degrade outcomes and cause stagnation. Specification of requirements by way of outcomes is more difficult and reduces direct control but it is much more effective.

Example approach

The general requirements are taken as being to promote the development of native vegetation to benefit the environment, production and society. This is best achieved by providing information that improves decisions where the main current deficiencies are soils and vegetation. This information is used to identify options and to develop appropriate responses.

For landscape implementations the information should be developed at regional scales as this provides cost benefits. However, paddock level detail is required for implementation. Methods exist that have the required scale independence.

As this information is beneficial in addressing production its provision provides an incentive for farmers to participate. Incentives are provided by way of access to information to improve land management generally rather than by way of cash incentives that solely address native vegetation. This redirection of incentives addresses the requirement to address production and social outcomes as well as the environment.

An essential aspect of this approach is that it is supportive rather than regulatory. There is an essential need to separate the provision of support to farmers to produce desired environmental outcomes from control through regulation, especially where that control is absolute and unquestionable. The intent is to encouraged farmers to develop a stewardship stance with their properties where this is promoted by the provision of information and application of knowledge to suit their circumstances and needs. The proscriptive and dictatorial implementation of the PVP Developer is highly counterproductive to the achievement of such an outcome.

RELEVANT BIOGRAPHICAL DETAILS: BRIAN TUNSTALL

The PhD awarded in the early 1970s addressed the plant and community water relations of brigalow (Acacia harpophylla). This addressed effects of salinity on water availability as the concentration of salt in the subsoils was around 1.5 times that of seawater. Early work in CSIRO addressed shrub encroachments in semi-arid woodlands, primarily poplar or bimble box (Eucalyptus populnea), investigating the impacts of grazing and tree killing. Work was also conducted on fire effects on native vegetation. Research for Defence while in CSIRO involved the development of methods for:

- Mapping vegetation and land use impacts such as fire using satellite imagery
- Mapping soils using airborne gamma radiation data.
- Using catchment outflows to monitor land use impacts (15 experimental catchments in native vegetation monitored over 10 years)

The Defence work additionally involved production and review of all forms of environmental reports and representation for Defence at public meetings including a Commission of Inquiry. Additional to addressing other Defence training areas that were spread across Australia, this involved responsibility for providing management advice and producing environmental reports for a 3,000 km^2 training area that is all heritage listed, World, Australian or State.

Work within industry broadened to include climate analysis and plant response for land uses such as forestry and viticulture. Particularly relevant activities include:

- Mapping of vegetation clearing across NSW for DLWC on two occasions.
- Evaluation of the Australian Greenhouse method for mapping clearing and regeneration of native woody vegetation.
- Mapping of remnant grasslands across two regions for the NSW Parks and Wildlife Service.
- Salinity mapping (Groundwater Flow Systems) across NSW for DIPNR.
- Salinity constraints mapping in the Mallee region of NW Victoria.
- Provision of expert evidence in court addressing impacts to crops and clearing of native vegetation.

Current research addresses a diversity of topics ranging from the effects of structural changes to water to the development of effective land management plans but long term research interests centre on factors controlling the distribution and development of native vegetation. Recent relevant papers on the ERIC web site address tree recruitment in a poplar box woodland, competition between trees and grasses, competition between acacias and eucalypts, and plant and site adaptations to salinity. Soil specific work addresses the significance and mode of effect of soil organic matter in agricultural as well as natural systems.

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