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4th September 2014

The Panel
Biodiversity Legislation Review Panel
PO Box A290
Sydney South NSW 1232

Re: Submission for changes to native vegetation legislation

Dear Panel members,

The following submission details my suggestions for how the Native Vegetation Legislation in NSW should be amended in order that it be fairer for landholders, and more effectively deliver positive outcomes for the natural environment. In essence I propose a structural change in the way native vegetation is regulated. I propose that we move to an output-focused system of regulation in place of the current process-focused approach. Where possible I have cited evidence to support my argument, but I invite you to seek additional opinion and evidence to explore the arguments further. There are two key issues which I wish to draw to your attention; i) the obstacles the existing legislation place in front of landholders wanting to improve the ecological integrity of the landscape, and ii) the constitutionally questionable manner in which PVPs are currently administered by Government Departments. I will deal with these issues in turn.

Obstacles to improving the ecological integrity of the landscape
A fundamental problem in regulating the management of a biological system through legislation is that, inevitably, we lack the flexibility to cope effectively with the dynamic and diverse landscapes under our stewardship. Hence, we are currently left with a one-size-fits-all approach which is clearly inadequate. Further, as different aspects of land management are regulated by a host of different Government agencies the regulation of land is incohesive. At the risk of over-simplifying, staff at the OEH are focussed on trees, staff at the LLS are focussed on soil erosion or on animal pests, staff at the local council are focussed on weeds, staff at the Rural Fire Service are focussed on bushfire mitigation; the list goes on. However, an expert land manager needs to integrate all of these priority areas and others into a single management strategy for a given unit of land. I contend that it is not the employees of Government agencies who are expert land managers as they are usually only focused on one aspect of land management and not generally responsible for the consequences; instead it is the landholder that often knows the land better than anyone and who is forced to balance the different aspects of management to form one cohesive management strategy.

Regulation of land management through legislation poses two other key risks: i) It risks omitting key aspects of environmental management simply because it is difficult for legislation to cover everything, and ii) it assumes that we know all there is to know about responsible land management leaving no opportunity for continued learning. I believe soil acidity is a relevant example here and is discussed further below. In theory, it could be argued that when new knowledge comes to light the legislation can be amended accordingly. However, there are two problems with that theory. The first is that this would seem a highly inefficient process and the lag time associated with making this change would inevitably see some progressive land managers in breach of regulations simply because they are ahead of the curve. Secondly, the nature of acquisition of new knowledge in land management is incremental and as such often goes unnoticed until an issue is reviewed retrospectively. This type of knowledge change is unlikely to inspire regular reviews of legislation.

I contend the issue of soil acidity is an example of an environmental threat that was overlooked in the formation of the existing Native Vegetation Legislation despite its obvious and significant impacts on biodiversity. It is also an example of an issue where the Native Vegetation Legislation exacerbates degradation of the soil resource leading to poorer biodiversity outcomes. First, a brief background:

Soil acidity is arguably the most serious soil constraint facing landholders in SE Australia. In a survey of over 4700 soils from across southern NSW, Scott *et al*. (2007) showed that >80% were sufficiently acidic ($pH_{Ca} \leq 5.0$) to inhibit plant growth (Helyar *et al.* 1990). Soil acidification is a naturally occurring process; however, agricultural production systems have greatly exacerbated the problem. There are multiple causes of soil acidification but the key causes in Australian agricultural landscapes are from product removal, especially following practices such as hay production, and from the leaching of nitrates following nitrification (Helyar 1976; Singer and Munns 1996). The latter requires further explanation, so please accept the following layman's description: Nitrogen in the soil can be in various forms eg. nitrate (NO_3^-), ammonia (NH_3^+) or ammonium (NH_4^+), and chemical reactions continually occur in response to environmental conditions, changing the form in which soil nitrogen exists. The process of nitrification which sees NH_4^+ changed to NO_3^- is the key reaction relevant in the acidifying process. NO_3^- is highly mobile in the soil and following nitrification can be easily transported (leached) to below the plant root zone when the soil is moist. This leaves H^+ ions to accumulate in the soil surface increasing the acidity (reducing the pH) of the soil. The rate of acidification depends on a number of factors such as soil type (buffering capacity) and can vary widely from location to location.

From the 1950's, Australian farming systems underwent a wide-reaching transformation which saw acidification rates accelerate at a previously unprecedented level. In text books it is commonly referred to as 'the sub and super revolution' (or derivations thereof) and captures the introduction of two complimentary technologies; subterranean clover and superphosphate. This was to change agricultural landscapes in SE Australia forever. Superphosphate fertiliser, a source of phosphorus and sulphur in a form readily available to plants presented for the first time the opportunity to introduce exotic legume species on a broad scale. In SE Australia, the legume of choice was subterranean clover, an annual legume originating from the Mediterranean Basin with unsurpassed adaptation to acidic soils and to grazing by livestock. The combination of these two technologies in the post-war period following the lucrative 'wool-boom' period of the early 1950's dramatically increased agricultural productivity, and was promoted by Government agencies and industry alike. However, an unintended consequence of this revolution was the massive increase in nitrogen inputs into Australia's fragile soils with inadequate knowledge of how to utilise it, leading to chronic levels of acidification.

Despite a small number of pioneering studies on the topic (e.g. Williams and Donald 1957) landholders and Government agencies alike remained largely oblivious to the negative environmental consequences of the new annual-legume based farming system for two decades until the late 1960's/early 1970's when soil acidity started to become the focus of mainstream research. Over the ensuing decades acid soil research increased with lime ($CaCO_3$) applications to ameliorate acidity becoming more common in the 1980's (Horsnell 1985; Bromfield *et al.* 1987; Cregan *et al.* 1989). The enormity of the acid soil problem was recognised by the NSW State Government and other bodies in the 1990s who made a significant investment in a major research and development initiative to address the acid soil problem, 'Acid Soil Action' (e.g. Li *et al.* 2002). It was not until the mid-late 1990's that broadscale lime application really became commonplace in mixed farming enterprises, and is generally attributed to the introduction of canola into southern cropping systems.

It is difficult to predict the extent to which Australia's agricultural soils were acidified by the new farming practices of the 20th Century due to the fact that we have few reliable reference points with which to compare, and the fact that acidification rates would be highly site- and soil type-specific. However, Helyar *et al*. (1990) would suggest that a decline of >1 pH unit in the 60+ years since the sub and super revolution is highly likely and that subsurface acidity is now also likely to be substantially greater compared with pre-European settlement. On the logarithmic pH scale, it is important to note that a decline of 1 pH unit represents 10 times more intense acidity. Surface soils that are now 100 times more acidic than in their natural state (a shift of 2 pH units) would not be uncommon, particularly in higher-rainfall regions.

Research continues to better understand the impacts of soil acidity on ecosystem function, but there remains many knowledge gaps. It is well known that acidity changes the availability of nutrients in the soil surface. Reduced soil pH can induce toxicities of aluminium or manganese (Conyers *et al.* 1997), or can induce deficiencies in essential nutrients such as phosphorus, molybdenum (McLachlan 1980), or indirectly, nitrogen through reduced biological N_2-fixation (Evans *et al.* 1988). Plant species that are sensitive to low pH or to the changes in nutrient availability associated with acidification are often displaced on acidic soils due to competition from other species with a competitive advantage in that niche (Scott *et al.* 2000). Acidity is also known to impact population dynamics of micro-organisms. There is still much research necessary to understand the impact of changed microbial communities on ecosystem function. However, one known impact is the increase in water-repellent characteristics of certain soils due to a reduced breakdown of organic compounds at the soil surface (Roper 2005). Reduced infiltration of water due to water-repellency of the soil could be expected to increase surface run-off and to increase drought severity and frequency through reduced plant-available water in the soil. Perhaps the question of why micro organisms are not currently considered in the existing native vegetation legislation that seeks to preserve biodiversity is one to which the panel might also give some thought.

So, this very brief summary indicates that soil acidity has the capacity to impact soil chemistry, soil biology and soil physics and therefore will have a significant effect on biodiversity. Despite a wide range of native Australian species being generally tolerant to soil acidity, many are unlikely to be tolerant of the acute levels of acidity caused by previous farming practices and could reasonably be expected to be at a competitive disadvantage in some instances. For example, it could be postulated that valuable native species such as *Eucalyptus melliodora*, which are known to have a higher requirement for nutrients than other native species may be at a competitive disadvantage on acutely acidic soils due to either reduced root growth (where Al toxicity exists) limiting the capacity of the plant to explore the soil volume, or due to reduced nutrient availability. There has been almost no research done to understand the effect of acidic soils on population dynamics in native plant communities. Current best-practice management of soil acidity is the application of lime in conjunction with deep-rooted perennial species (Scott and Fisher 1989; Li *et al.* 2006). There currently exists very few practical management strategies to combat subsoil acidity (Li *et al.* 2010). It is therefore imperative that the soil acidity problem is addressed sooner rather than later to limit further degradation of our subsoils.

The existing Native Vegetation legislation serves to preserve in-perpetuity the soil degradation that occurred prior to 1990 on some landscapes, and on those landscapes ensures the ongoing intensification of soil degradation. In instances where land was farmed, but timber regrowth was unchecked pre-1990, there may be few practical options open to landholders to ameliorate soil acidity due to the inability to first remove the timber and apply lime. In these instances we can expect that acidity will continue to intensify over time as will subsoil acidity. We can expect many negative consequences as a result of the changes in soil chemical, physical and biological properties as a result of soil acidity. Some will have direct negative consequences on natural biodiversity (as in the *Eucalyptus melliodora* example cited above), with other negative consequences being indirectly associated with acidification, such as increased surface water run-off intensity and increased frequency of drought. I believe this outcome is not in line with the original intent of the Act. We know that Government officers currently policing the Act pay no attention to soil health characteristics. In my own personal experience where my land was inspected on suspicion of illegal clearing, the site was inspected by one botanist and two regulatory officers, but no one made any assessment of soil properties or of the need to remediate chronic (pH_{Ca} 3.9) soil acidity.

As stated at the outset, soil acidity is an example of the intrinsic limitations of the legislation. There may be other examples either now or in the future which either are not or can not be covered by regulations developed in 2014. For this reason I suggest that a structural change in the approach to regulating native vegetation is required because even if soil acidity is taken into account in revised legislation, we can be sure we have omitted something else.

Property Vegetation Plans

Property Vegetation Plans (PVPs) are a voluntary but legally binding agreement placing a caveat on land in perpetuity. They are a key tool used by Government agencies to manage clearing activities on freehold land. They represent a major impost on freehold title as the caveat greatly restricts available management options and potentially reduces land value. In my view, the way in which they are administered by Government Authorities is questionable under the Australian Constitution. In any other circumstance when a Government body places a caveat on freehold land, the landholder is remunerated to compensate for the loss of use of this land or its reduced value. For example, in 1967 when the State Government acquired access to my family's land for the installation of high voltage electricity lines for the benefit of the broader community, my family was remunerated with a modest sum. It is my understanding that this is a requirement of the Australian Constitution. However, no remuneration is paid on the signing of PVPs due to the fact that the landowner enters into a PVP voluntarily. My contention is that a landowner who wishes to clear land for any reason will routinely be invited to enter into a PVP. If he refuses, he is unlikely to be permitted to continue with the clearing activity even if that activity serves in the interest of better environmental outcomes. If he conducts the clearing activity regardless, he will likely be subject to a penalty notice. In this context, a PVP can hardly be considered voluntary as no alternative is offered. I suggest this could be a violation of the Australian Constitution.

Adding to the frustration further is the fact that a PVP often represents a poor strategy for managing land, ultimately leading to degradation of the natural environment rather than preserving it. A PVP will often require the creation of 'exclusion zones'; areas of land that will be fenced out and locked up for preservation purposes. However, there is little evidence that exclusion zones always lead to better environmental outcomes, and in many instances, excluding land can only lead to environmental problems. The problems caused are situation-dependant and may vary, but a common threat to many exclusion areas is the inevitable influx of exotic pests. In SE Australia, acute soil acidity may be another threat to land under PVPs as described above. My point here is simply that in addition to being constitutionally questionable in the way in which they are administered, PVP's will often not lead to best-practice management of land. Again I contend, the outcomes are contrary to the original intent of the Act.

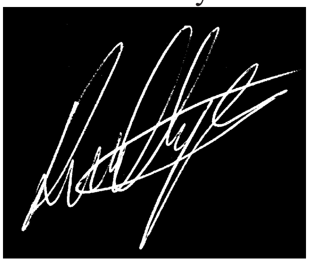
A new approach is needed

It is easy to find fault with regulations, but can be more challenging to offer a workable solution. However, in this instance I believe much simpler and more workable solutions are available. My preference is to opt for a self-assessable code of land management which functions upon the tenet that all land is required to be managed by landholders in such a way as to maintain or improve the ecological integrity of the landscape. This approach places the onus on all landholders to manage their land responsibly to deliver tangible environmental outcomes. It also provides the flexibility necessary to combat a variety of land management issues. Under such a system, the manager will have the freedom to manage land as they see fit so long as the ecological integrity of the land is not undermined. In such a system one can envisage that a landholder may need to show reasonable cause to justify an action perceived to undermine the ecological integrity of the landscape, such as the broadscale clearing of timber. Similarly, under such a system one can envisage that a landholder might be required under the Act to show reasonable cause why an issue that threatens the ecological integrity of the landscape has not been addressed. The most obvious example here would be a landholder that allows noxious weeds to proliferate on his land.

There are a number of benefits to the proposed approach. Firstly, it promotes innovation. Biological systems will always have to cope with new and emerging threats – that is the evolutionary process (Darwin 1900). However, a genuinely self-assessable code that simply prescribes outcomes rather than regulates process is one that would stimulate innovation and creativity of land managers to deal with new threats early and to fix old problems in new ways. Secondly, the proposed approach preserves the integrity of freehold title, an important foundation of Australian society. Thridly, (and most exciting of all) this approach – if explored to its full potential – has the promise of solving other land management issues such as noxious weed infestations. This review need not simply be another band-aid to fix poor legislation, but could instead be an exciting opportunity to revolutionise the way we collectively manage our land to achieve the multiple outcomes important to modern society.

I would be more than happy to help the panel explore these issues and opportunities further. Thank you for your consideration of this submission.

Yours Sincerely



Richard Hayes

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