

A new legal approach to the protection of species and habit

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Since the industrial age, the economic system that has been developed has not been determined by what is good for people, much less for nature, but rather by what is good for the growth of the economic system. In such a system, nature, our source and the sustenance of our existence, has been ignored and exploited. In our blindness, we have undermined the amazing abilities, the abundant nutrients and energy given us by Mother Earth to sustain both the Earth, in her regenerating capacity, as well as our human existence

Secretary General, United Nations General Assembly, 2011

Introduction

The title of this conference “Growing Green” and its by line, suggests transformative measures for primary productive industries with a view to securing gains for the environment and potentially for the industries as well. The need for transformation is clear. It is widely accepted that human activities in the environment require constraint in order to decrease the levels of unsustainable activity in terms of resource quality and quantity (United Nations General Assembly, 2011:16). There is acceptance of this position within industry, in many instances. However, the sticking point appears to be the level of constraint required and the methods to achieve the related gains for the environment. The topic assigned for this paper is a new legal approach to the protection of species and habitats, but arguably what this paper will do is affirm an existing approach that appears to be being swallowed by a high tide of mitigation and associated cumulative effects driven by pressure for economic growth. The focus will be upon threatened avian species in Aotearoa New Zealand. The underlying thesis of the paper runs against the dominant political mood of these times and advocates the exercise of precaution and detailed attention to those spaces where the impacts of industry and the needs of biodiversity collide.

The problem

Widespread agreement exists that the world is experiencing a biodiversity crisis of significant proportions, with human-centred approaches to resource use and modification being identified as a driving force for depletion and degradation (United Nations General Assembly, 2011:16, Kiesecker: 2011, 159, Rahbek, 2011, Barnosky, 2011, Boardman, 2008, Seabrook-Davison, 2010). Although species extinction is a natural process, (Stattersfield, 1998:15) the rate at which birds are being lost is higher than at any other time in the evolutionary history of the group (Norris, 2002:ix). Threats to birds are clearly various and pervasive. The greatest threats globally stem from human use of

biological resources, such as water and soil for agricultural purposes and vegetation for logging, with this extensive use edging out hunting and overkill as the predominant cause (Birdlife International, 2008, p.10). Damage from invasive species also ranks highly, although it becomes apparent that this force gathers momentum and lethality in particular landscapes, ecosystems and cultural constructs, as is evident in the New Zealand context. For many avian species in this country, the impact of introduced mammalian species is now established as the number one threat. (Innes, 2011:34, Wilson, 2008).

New Zealand is making some conservation gains indicated by the recent improvement in the conservation status of 19 species (Miskelly, 2008:118). Eradication of predators on off-shore islands and species management programmes are identified as contributing to the gains. However, it is acknowledged that native plants, animals and ecosystems continue to decline (Department of Conservation, 2011: 69). Despite improvement for some, the conservation status of another 13 taxa has deteriorated, with potential drivers of this change being identified as change in land use, changes in oceanic productivity linked to global warming and predation (Miskelly, 2008: 123). These pressures are compounded by significant emerging threats, such as, reduced genetic variability, human disturbance and pollution including radioactive fallout. Farming, forestry and fishing activities contribute to these pressures, in particular, through habitat destruction and modification such as clearance of indigenous vegetation and drainage of wetland, insufficient management of invasive predators and bycatch.

Responses

Inadequacy of legal and institutional responses to the deepening biodiversity crisis is a persistent theme which is reinforced by recent international scholarly research and analysis (Doremus, 2010, de Nooj, 2008, Trouwborst, 2009, Andresen, 2007, Macintosh, 2009). The New Zealand response, although characterised by several valiant and notable successes is dogged by reduced funding at Central government level, (Department of Conservation, 2012:9, Public Service Association, 2011) insufficient species data in some areas (Powlesland, 2009:49 and Green and Clarkson, 2006:204), a fragmented and aged legislative approach, (Waitangi Tribunal, 2010:299, Seabrook-Davison, 2010), disjuncture in policy and a lack of clarity in terms of functions and responsibilities, and standard of care.¹

¹ For discussion see Wallace, P. (2011). Integrated conservation management; spatial planning for the movement of species in the landscape. *New Zealand Journal of Environmental Law* 185 and Wallace, P. (2012). Responsibilities assumed, bestowed and abrogated? An examination of function, control and standard of care in the context of biodiversity protection in New Zealand, in press.

New Zealand has reflected global trends in terms of paradigms applied to the protection of avian fauna. Command and control mechanisms, including both species based and area-based conservation approaches (Sand, 2001:35) introduced prohibitions on species take, the creation of protective reserves, and more general habitat protection as the foundation of legal responses (Kennedy and Perkins, 2000: ch 17, van Roon and Knight, 2004, ch2 and ch 19, Nolan, 2011 ch 1 and ch 15). Yet despite such protections the underlying free market approach has tended to see avian species considered free goods, for which no accounting is required when their demise is as a result of indirect take. Governments have looked to the market and economic instruments (Nolan, 2011, 18) in an effort to enable the market to produce efficient allocation of resources, with some potential gains in terms of quality of the environment, but no sign of resounding gains for species. More recently, fiscally constrained Governments have seized upon collaboration with the community (including the business community) as the new way forward (Holley and others, 2012). In New Zealand, the Department of Conservation has constructed a strategic vision, whereby the conservation effort is allocated on a ratio that will eventually see the majority of conservation effort carried out by community and business (Department of Conservation, 2012:10). Part of the driving force for this vision is acceptance that the scale of the task is beyond the reach of a government of four million people.

Other proposals to counter the problem include calls for increased funding of conservation, (Seabrook-Davison, 2009) preparation of threatened species legislation (Seabrook-Davison, 2010) and intensive and socialised farming of threatened species (Round, 2011). Each of these options has merit in some form, and could be readily employed in conjunction, yet promotion of these approaches, tends to obscure or deflect from an underlying issue. As alluded to by the Secretary General of the United Nations, the fundamental issue is that in order to halt further decline of species and restore damaged populations, a shift in perspective is required. The thesis of this paper is that it is necessary to adjust conceptions of the relationships between species and human development and activity in the environment in order to adequately respond to the problem.

For some time now, global environmental policy has recognised the need for change and in doing so embraced the concept of sustainable development as the way forward (United Nations General Assembly, 2011: 16). Limits to development and the need for humans to make *painful choices* were tenets of this approach, and seen as underpinning implementation (WCED, 1987:9). Over the past 20 years or so, developed countries have wrestled with application of the notion, and it is arguable that New Zealand, despite statutory mandates built upon the premise of ensuring

development is sustainable, has ended up with more of the development and less of the sustainable. Further, the country would be hard pressed to identify choices made which could be characterised as painful.

To be sustainable in a true sense requires an approach to human activity and development which prevents species declines and enables species persistence. It has been argued that given the pressing uncertainty of the impacts of global climate change that humans should reconceive spatial configurations of use of the environment. Rather than animals being constrained to protected patches in the land and seascape, this vision could be reversed so that harmful human development and activity is restricted, at least until the full implications of climate change and other anthropogenic forces are understood (Doremus, 2010:232). To be effective in New Zealand would also entail similar limitation of mammalian predators, through intensive management of species.

There are many potential methods to restrain the impact of humans upon species, but the effect of these mechanisms turns largely upon one thing and that is the standard of care applied. A primary means of elevating levels of protection for both species and habitat is the adoption of a higher standard of care, in relation to the impact of harmful human activity upon threatened species. It is contended that the standard of *avoidance of impact* should be the preferred standard in terms of regulation of significant anthropogenic impacts and risks to threatened species.

Standard of care

Avoidance of impact on species is not a new concept, in fact in terms of threatened species and special conservation areas, there is apparent acceptance that this is the standard to reach.² Yet the failure to consistently achieve this actual standard, as exhibited by continued global decline of species, can partially be attributed to its definition. Avoidance tends to be embraced and obscured by the lesser protective standard of mitigation. Some jurisdictions enshrine avoidance within the definition of mitigation.³ However, a rising tide of cumulative effects, driven by the practice of mitigation of impacts, speaks of the need to separate the two concepts and promote a standard of avoidance.

² The direction to avoid or minimize significant adverse effects on biological diversity is contained in Article 13 of the 1992 Convention on Biological Diversity. UNEP/BioDiv/Conf 12 (1992).31 (2002). ILM.954, Article 6(2) of the Habitats Directive requires member states to avoid deterioration of habitats and disturbance of species - Council of the European Communities, "Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora" (OJ L 206, 22 July 1992), and s 5(2)(c) Resource Management Act 1991, requires that adverse effects of activities on the environment be avoided, remedied or mitigated. Refer also to the discussion on page 5 in relation to threatened species, irreversible damage and avoidance.

³ For example see definition of mitigation, Council of Environmental Quality, CEQ Regulations for Implementing NEPA 1978 Sec.1508.20

Avoid, as in “avoid like the plague” “avoid trouble”, “avoid insult” and “avoid war”, in common terms, means prevention of occurrence or contact. The Concise Oxford English Dictionary defines avoid as: *keep away or refrain from or prevent from happening* (Concise Oxford English Dictionary, 2008). When applied to the management of environmental effects, the term avoid is related to actions such as not proceeding with a project, or choosing alternative sites or methods which prevent the particular effect from arising (Glasson, 2005:149 and Wood, 2003:259). Avoidance is commonly seen as a high point in a continuum of options in a mitigation hierarchy. In policy, regulation and literature there is considerable support for avoidance to be given primacy in terms of selecting remedial actions, particularly where the impacts relate to threatened species and habitats and where effects could be irreversible (Morris & Therivel, 2009:347, Institute of Ecology and Environmental Management (IEEM), 2006:47, McKenney & Kiesecker, 2010:167, US Environmental Protection Agency & US Department of the Army (US EPA and DA), 1990: cl II (C), Norton, 2009:702, Wood, 2003:258, Treweek, 1999). However, where a regime ostensibly supports this approach, but enables mitigation as an alternative, without additional directive policy guidance, potential exists to weaken the standard of avoidance. In addition, in a regulatory environment where the policy of avoidance is to be secured through individual project consents, the potential need for avoidance of cumulative effects can be obscured by the ad hoc nature of the process.

Avoidance in the New Zealand context

The focus of this paper is upon constraints on human activity in the landscape, and will not tackle the significant threat of predation by invasive mammalian species. In addition the scope of this paper restricts a detailed analysis of the current position, and accordingly a brief summary ensues. Avoidance of significant impacts to threatened species is an issue which rumbles below the surface of the disparate legislation, which when pieced together, protects biodiversity in the New Zealand context. There is a range of legislation which provides species and habitat protection, with the Wildlife Act 1953, the Conservation Act 1987 and the Resource Management Act 1991 (RMA) offering the more significant protection to avian fauna.

Section 3 of the Wildlife Act 1953 provides for all wildlife subject to the Act to be absolutely protected, with exceptions set out in Schedules. The Schedules are the key to ascertaining relative values within and between classes of animals and are calibrated according to perceived value and or risk. The Act invokes the term *absolute protection*, yet in practice the protection provided is far from absolute. Absolute implies utter, unqualified and unconditional protection. However, the operation

of ss 68B (Defences) and 68AB (Mens rea and strict liability offences) serve to legitimise the incidental take of scores of absolutely protected seabirds (Richard, 2011), provided that the take was incidental and reporting obligations fulfilled⁴ or mens rea is absent and the defendant took reasonable steps to avoid the act the subject of the offence.⁵ In this way the absolute nature of the protection is compromised by the pragmatic dictates of the fishing industry to apply fishing methods which produce efficiencies of scale for that industry. Beyond the fishing industry, liability for incidental take through habitat destruction or modification is uncertain. The decision *Royal Forest and Bird Protection Society v Minister of Conservation* [2006] NZAR at paras 21-22, established that habitat destruction resulting in incidental killing may equate to a breach of the Act, as constituting hunting or killing as defined by s 2 of the Wildlife Act 1953. Whether this logic can be extended to cover killing as a result of the erection of structures, such as wind farms or dams, has yet to be decided by the Courts. Due to this uncertainty, incidental take represents a considerable limitation upon the protection provided by the “absolute” status of protection under the Wildlife Act 1953. The Department of Conservation will require permits under the Wildlife Act 1953 for incidental take, although this procedure does not appear to be implemented with particular rigour and tends to be subsumed by RMA consent processes.

In terms of managing the impacts of development upon threatened species, New Zealand lacks comprehensive threatened species legislation. Rather than focusing on the species, the New Zealand approach is characterised by a focus upon resource ownership or resource type. Such an approach has created inconsistency in terms of the approach and weakens protection for threatened species.⁶ Development on public conservation land is controlled through the grant of concessions under Part 3B Conservation Act 1987, together with Conservation General Policy. In making a decision on any application the Minister may decline the application if she considers that there are no adequate methods or no reasonable methods for remedying, avoiding, or mitigating the adverse effects of the activity, structure, or facility.⁷ Although the public estate standard falls short of requiring avoidance of effects, the standard is raised by s 17(U)(3) CA which requires that the Minister shall not grant an application for a concession if the proposed activity is contrary to the provisions of this Act or the purposes for which the land concerned is held. Conservation General Policy reinforces these approaches and exhorts maximising positive effects on natural resources.⁸

⁴ Section 68B(4)(a)&(b).

⁵ Section 68(AB)(3).

⁶ For further discussion see Wallace, P. (2012). Responsibilities assumed, bestowed and abrogated? An examination of function, control and standard of care in the context of biodiversity protection in New Zealand, in press.

⁷ Section 17(U)(2)(b) Conservation Act 1987.

⁸ Conservation General Policy 11.1 (b).

Pursuant to s 17P of the Conservation Act 1987 a concessionaire may also be required to obtain resource consents under the RMA for the activity on the public estate.

The RMA is the principal statute regulating the management of natural and physical resources on private land. In terms of a standard of avoidance of effects, the purpose of the Act as defined by s 5 requires, amongst other things, that the adverse effects of activities on the environment be avoided, remedied or mitigated. The use of the conjunction “or” enables remediation or mitigation as alternatives to avoidance, upon the exercise of the “overall broad judgment” when applying s 5 to any given factual situation. Whether the alternatives should be applied in a hierarchical fashion, giving initial preference to avoidance has been the subject of debate, with a Ministerial decision overriding a Board of Inquiry report which applied a hierarchical approach.⁹ A more recent Environment Court decision has held that the wording of s 5(2) (c) does not represent a continuum, rather the words “avoid, remedy or mitigate” are to be read conjunctively with equal importance.¹⁰ In relation to this debate Nolan (2011:122) concludes “While there may not be a strict hierarchy, it appears to be a reasonable and logical interpretation of the Act that, in general, adverse effects on the environment are to be avoided”. In relation to this debate Nolan cautions that practicality and cost would become issues in situations where conflict arises. Perhaps in recognition of these elements, recent case law has confirmed that mitigation, defined as lessening or reducing the severity of an effect, can be consistent with “protection” as used in ss 6 and 7 of the Act, as opposed to an absolute requirement for avoidance of effects.¹¹

In this context, however, few would dispute that where significant and/or irreversible effects challenge threatened species, that the appropriate response should be avoidance of effects. This position aligns with principles of precaution which are inherent in the RMA (Gillespie, 2011:375) and the position is also well established in New Zealand national policy through the operation of Policy 11 New Zealand Coastal Policy Statement prepared under the RMA. The Policy directs avoidance of effects of activities on specific groupings in the receiving coastal environment, including threatened or at risk taxa. Interestingly, and as noted in a separate articles exploring related matters (Wallace, 2011, [2.1.2.2.1.]), the recent draft NPS on Indigenous Biodiversity (NPSIB) does not apply the same standard. Arguably this arises due to deference to private property values, however, it results in an inconsistent standard being applied to development and threatened species based on spatial lines,

⁹ “Report of the Board of Inquiry on Air Discharge Permit for the Taranaki Combined Cycle Power Station”, February 1995, considered in Nolan, 2011 at 121.

¹⁰ *Adams Landscapes Ltd v Auckland City Council*, unreported, EC, (A108/2002) at [85] adopting *Winstone Aggregates Ltd v Papakura District Council*, unreported, EC, (A049/02).

¹¹ *Rational Transport Society Inc v New Zealand Transport Agency* HC WN CIV-2011-485-002259, 15 December 2011, [54-56].

as opposed to vulnerabilities and ecological prerequisites of a species. This is good news for species residing in the coastal environment, but arguably absurd for those whose habitat consists of both the terrestrial and the coastal, or the terrestrial alone. A tension also exists in terms of policy exhibiting deference to private property ownership, when the “property at risk” i.e. the wildlife, is actually the property of the Crown pursuant to s 53 Wildlife Act 1953. The preferred position should enable avoidance of all significant effects upon threatened species.

In this debate, the issue of real concern is the failure of the current system to arrest the decline of biodiversity. Ironically this paper argues that protection must be strengthened at a time when Government is considering reforms to the principles of the RMA which will considerably weaken protection for biodiversity, by placing it on a level playing field with development (MFETAG, 2012:10). Accepting that economic recession is very real, providing sufficient and strong protection for biodiversity whilst enabling development is vital to ensure species persistence and resilience, particularly at a time where the uncertainty of climate change casts a shadow over the prospects of the world and its inhabitants. Critics will argue that applying a standard of avoidance is unrealistic and unduly restrictive, but mechanisms exist to enable a careful and considered way forward, which will signpost development, to occur in appropriate places, at the same time protecting biodiversity by avoiding significant adverse effects. Careful spatial planning tied to the mitigation hierarchy and species occurrence provides a method to achieve this. Such an approach could be supported by enabling environmental compensation to a standard of net gain, in exceptional circumstances where avoidance is impossible. The standard could be incorporated in legislation, adopted in universal national policy and applied through spatial planning and decision making. An alternative approach would be to adopt dedicated threatened species legislation incorporating the standard.

Spatial planning and the mitigation hierarchy.

Spatial planning for the protection of species’ habitat is already evident and in some cases well advanced in the New Zealand context. In response to the exhortations of s 6 (c) of the RMA and related national policy, Regional Policy Statements, Regional Plans and District Plans contain various provisions and methods to protect areas of significant indigenous vegetation and significant habitats of indigenous fauna. The provisions vary, with some local authorities adopting criteria for assessment of significance and others using schedules and maps, an approach supported by the Environment Court.¹² In conjunction with this approach valuable species computer data layers are being generated which can be used to inform decision making. Examples include identification by

¹² *Friends of Shearer Swamp Inc v West Coast Regional Council* [2012] NZEnvC 6

Regional Councils of significant natural areas, the Land Environments of New Zealand database which classifies terrestrial environments and the Land Cover Database. Due to institutional boundaries and the divisions between the public and private estate, approaches are not necessarily uniform and in some circumstances data bases are deficient due to failure to transcend those divisions.

Partially in response to this issue the Department of Conservation has instituted the Natural Heritage Management System (NHMS) designed to produce greater effectiveness and efficiency in species management. The system will focus on inventory and monitoring and is intended to achieve national consistency and identify clear conservation priorities.

Collating a clear picture of the habitats of species, including identification of key connections and routes, is of primary importance in order to protect species. However, it is just the first step. The next step requires a detailed understanding of ecological form and function in order to ascertain the significance¹³ of any proposed development impact. In New Zealand this process currently takes place on a case by case basis by way of an Assessment of Environmental Effect prepared pursuant to s 88 RMA by the applicant in a resource consent process. Application of the mitigation hierarchy in the situation of standalone consents has been criticised due to the potential for lack of accounting of cumulative effects and also for the comparative vacuum created in terms of quantifying whether avoidance, remediation, mitigation or compensation is the appropriate technique. (Kiesecker, 2011:163). An alternative approach advocated by Kiesecker and others, in terms of planning for energy development, is four step framework coined “Energy by Design (EByD)” which involves the development of a landscape level conservation plan blended with the mitigation hierarchy to “identify situations where development plans and conservation outcomes may be in conflict” (Kiesecker, 2011:162). The architects of this approach consider that it provides distinct advantages over traditional project-by project approach as it:

- Considers the cumulative impacts of both current and projected development
- Provides regional context to better guide which step of the mitigation hierarchy should be applied (i.e. avoidance versus offsets)
- Offers increased flexibility for choosing offsets that can maximise conservation return by providing funding of the most threatened species.

¹³ The IEEM “Guidelines for Ecological Impact Assessment in the United Kingdom” (IEEM, 2006:37) recommend consideration ecological integrity and conservation status in determining significance of impact in an ecological assessment.

Aspects of landscape level conservation planning can be seen in spatial plans protecting significant natural areas drawn up under the RMA and those prepared to support and enhance the NHMS process. These plans locate and configure areas that can be managed to maintain viability of biodiversity and other natural features (Kiesecker, 2011:163). However, pursued to their full form, a conservation plan “is intended to clearly articulate a vision that incorporates the full range of biological features, their distribution, and the minimum needs of each to persist in the long term (Kiesecker, 2011:163 referring to Lovejoy, 1980, Ambruster and Lande 1993, Doncaster et al 1996). Such a concept in New Zealand terms could be represented by a blend of RMA plans and Department of Conservation species optimisation plans/inventory and conservation management strategies/plans.

The second step of the EByD process entails analysis of conservation plans in the context of future development. It militates against conflict between potential development and areas critical for biodiversity and provides structure for decision making in terms of the mitigation hierarchy (Kiesecker, 2011:164). *Traffic lights in the landscape* was an idea propounded to me some years ago by the New Zealand ecologist and avian expert Dr John Dowding and the EByD process carries these hallmarks. The recount of mitigation for the greater sage-grouse depicts black areas where risk must be avoided and negated, dark gray areas where damage can be avoided and offset and medium gray areas where impacts are restored and offset (Kiesecker, 2011:167). Applying a similar method in a different context, researchers prepared a bird sensitivity map to help plan onshore wind farms in Scotland. Motivated by rapidly increasing global exploitation of renewable energy resources, the researchers created at the landscape scale, a spatial model designed to predict areas of greatest sensitivity for birds (Bright and others, 2008).

It is accepted that the preparation of landscape level conservation plans corresponding to development and the mitigation hierarchy would be an intensive and data hungry exercise. It may be necessary to target specific industries to collaborate and participate in such an approach. Yet, the examples provided above are encouraging and the approach provides clear benefits in terms of certainty for development. Parallels can be drawn to the use of zones, overlays and categories of activities in district plans to indicate tolerances for activities, although in this instance, the exercise would be species focused. The method also defines a pathway for achieving avoidance of significant effects on threatened species. An additional bonus is that detailed landscape level conservation plans should indicate the most beneficial places for intensive pest management to occur, at the same time providing considered opportunities for environmental enhancement as part of the

mitigation hierarchy. Potential also exists to extend the concept of the mitigation hierarchy to the seascape (Donlan, 2008).

In New Zealand deficiency of data remains a problem. Species data is incomplete in some instances (Powlesland, 2009:49 and Green and Clarkson, 2006:204) and the method described above would necessitate reliance upon predictive models. Although a valuable tool, and often the only available tool, predictive models are only as reliable as the accuracy of the parameters of the model and validation processes applied (Bellard and others, 2012:375). As the rush of renewable energy developments enter operational phases and beyond, the limitations of prediction and hence the need to proceed with precaution in terms of significant or irreversible effects, can be revealed by operations, the effects of which fail to meet some of the predicted standards (see for example, Ferrer and others 2011, and *Palmerston North City Council v New Zealand Windfarms Ltd* [2012] NZEnvC 133). For many impacts, sensitivity of particular species to the specific impact is also a defining characteristic. The example of avian sensitivity to human disturbance in the landscape is instructive. The effect is widely acknowledged, but varies between species, and there is insufficient species specific evidence as to when it will be a serious problem and what levels might cause the problem (Liley, 2007:82). The issue has not been the subject of sustained research in New Zealand, and it is as with other effects, further compounded by time scales. Assessing effects upon species on a project by project basis militates against collation of historical evidence, mapping of trends and understanding of synergistic effects. Data deficiency alone reinforces the imperative of avoiding as opposed to mitigating significant impacts on threatened species.

Conclusion

This paper has argued that in view of the depth of the biodiversity crisis faced in this country and globally, and consistent with the precautionary principle, that consideration should be given to elevation of the standard of care applied to protecting threatened species, such that **avoidance** of significant impacts on threatened species is entrenched as the preferred standard. Currently avoidance is promoted as the preferred standard in the coastal environment alone, by virtue of the NZCPS. Such treatment creates anomalies in terms of protection, which are particularly evident for mobile species which transcend human created spatial divides. Universal application of this standard would optimise prospects for species and promote a consistent standard focused on endangerment and significance of effect as opposed to location.

In an effort to achieve this standard in a sustained and considered way, the paper advocates the adoption of a protective method whereby detailed conservation landscape planning is combined with analysis of development impacts and the mitigation hierarchy. The focus of the landscape planning would be upon species occurrence, persistence and resilience as opposed to location or resource ownership. Developing clear methods to spatially depict suitable areas for development, or “traffic lights in the landscape”, will provide greater certainty for industry when planning new development. In attaining this objective, the paper supports further collation of species data and investigation into those aspects of development where the effects on threatened species are unclear or unknown. Precaution is urged where likelihood of irreversible effects occurs, where limited timeframes may impact the quality of data collected and in terms of scrutinising the reliability of predictive models, in particular the rigour of validation processes applied.

Ban Ki-moon (United Nations, 2011:17) reminds us of the need to transform our society into one in which all forms of life are revered. He recognises that wealth, knowledge and technology make valuable contributions, but that they alone will not save humankind from its excesses and its deleterious impact on Earth. Applying a standard of avoidance of significant impacts on threatened species, backed up by landscape level conservation plans calibrated to that standard, are examples of transformative measures which would assist primary productive industries secure necessary environmental gains.

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