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# Significance for Dummies: a case study from the southern end of Lake Taupo

**Rhys Gardner**

Question: How do you stop a botanist from doing field work?
Answer: Say you want to know the site's Significance too.

## Introduction

The Resource Management Act gives our Regional Councils responsibility for protecting "areas of significant indigenous vegetation and significant habitats of indigenous fauna", and states that such protection is "a matter of national importance". Does this mean then there might be non-significant areas of vegetation etc. the protection of which is not generally of national importance? If so, who should protect them? Or is 'significance' a concept to be applied in a scale: Local Significance, Ecological District Significance, Regional Significance, National Significance, etc.?

For a while I got relief from Venn Diagrams (Edwards 2004) but more to the point was an essay by versatile ex-Forest Service botanist Mark Smale (1994). This, together with his references, which included a primary statement by ex-DSIR Botany Division ecologist Geoff Kelly (1980), provided a theory-laden background for fieldwork I did in August on the shore of Lake Taupo, at a place which could soon be filled with new holiday homes. In this article I attempt to stand on the shoulders of these giants, in the hope of forging what might come to serve as a useful botanical thought-tool.

## Significance Explained

The Lake Taupo study area is essentially a broad streamside strip of kanuka (*Kunzea ericoides*) scrub by the Whareroa Stream**,** c. 15 km north of Tokaanu. The subdivision is to be placed on a terrace above the mouth of the stream on its northern side, where the streamside strip expands up along the terrace edge (Fig. 1).

How should one go about assessing the Significance of this at first sight not especially marvellous piece of habitat? Firstly, since the land is in Maori ownership, and it is these owners that are wanting to make the subdivision, one has to suppose that it has no great spiritual or historic significance. Nor are there any threatened plants here (see SPECIES LIST).

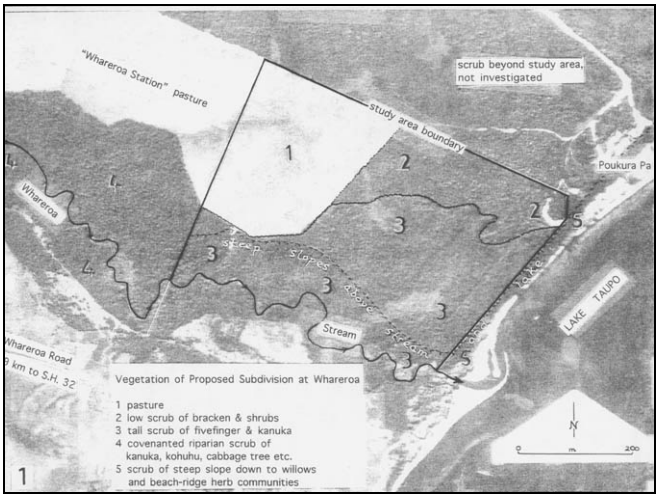


**Fig. 1. Whareroa Stream mouth, south-west shores of Lake Taupo. Vegetation and other features. Based on colour aerial photograph (NZ Aerial Mapping) flown 15 Oct 2002.**

Secondly, is it reasonable to try to assess Significance for just the study area alone? Would not this tend to lead to the court-feared Death by a Thousand Cuts (each small threatened part of a landscape being much less Significant than the unthreatened remainder ...)? A broader approach seems preferable, especially here where the study area has good-quality natural continuations along the lake and also upstream (this riparian kanuka scrub already being covenanted as trout-spawning habitat). But such an approach can also lead to absurdity - "everything is connected, man", or at least, impracticality — it is seldom feasible to survey the extended area when the client controls the budget.

I suggest the way off this dilemma is to concentrate on the study area (not entirely, of course), and assess its Significance as a function of three variables, expressed by the formula:

Significance = f(R, C, U) where R is Representativeness, C is Connectedness (including Buffering) and U is Unique Features.

Its Representativeness, that is, how comprehensive a sample the study area is of the vegetation (species diversity/habitat type) it is considered an example of, is, in the first place, likely to be proportional to its size. Additionally, its Representativeness will be greater the

more the study site vegetation type has been depleted from its "original" pre-human or pre-European level. That is, small reserves can be Highly Representative if they are the largest remaining ones of their kind. However, if a choice had to be made between two sites representing equally depleted vegetation types, it would be natural to prefer the larger one — it probably contains more species, whose populations would be less susceptible to extinction through fluctuation, and at the end of the day it is this area that would probably give a "better bang" for the "management buck". So crudely, "Representativeness" can be thought of as being proportional not just to the size of the site, but to size raised to some power.

In this country it may have been Geoff Kelly (1980) who first promoted the 10% Rule, that is, if a particular kind of vegetation, within a particular Region or Ecological District, now amounts to only 10% or so of the cover it had in pre-European times, then all reasonably good-quality and extensive remaining examples should be granted Significance through their having the attribute of Representativeness. To my surprise, this objective criterion gets only a passing mention in one of the two of the works relevant to the study area (Environment Waikato & Wildland Consultants, 2002), and no mention at all in the other (Whaley, Clarkson & Leathwick 1995). Is there "a feeling out there" that this threshold is too high?

With persons not especially conservation-aware the vegetation's appearance may determine whether they think even the remaining 10% worthy of Significance. This would be so for the study area. Western Lake Taupo's pre-European cover was predominantly a scrubby one, of kanuka, bracken, tutu, fivefinger and rewarewa (Figs. 2 & 3). This growth covered the rhyolitic domes, and also the terraces, where there is generally a fairly thick layer of Taupo Pumice deposited by the A.D. 130 eruption. With the exception of just above the lake, near Waihi and Pukawa, forest in this region in the nineteenth century was restricted to the hills further to the west, where it had survived the eruption and then the Maori-lit fires that would have continually reduced other areas of young scrub back to ashes. It might be reasonable to call this latter scrub as "secondary". But since no relics of a pre-Taupo Pumice forest cover are to be found in the region now occupied by "secondary vegetation on plateaux-Taupo Basin" (Leathwick et al. 1995) it is this scrubby vegetation, in default of any other, whose reduction must be assessed.

The West Taupo Farm Settlement and Development Block clearances of the 1960s made pasture out of what was an extensive cover of teatree and bracken etc. Housing subdivisions along the lake edge north of Waihi (Pukawa, Omori, Kuratau, and Whareroa on the south side of the stream mouth) have since depleted this scrub too. For the land nearest the study area, the current metric topographical sheet (T 13 Kuratau, 1st ed. 1984) shows that the amount of scrub remaining is now approximately 10% of the land area, and that most of what remains is on the rhyolitic domes and not on the terraced ground.

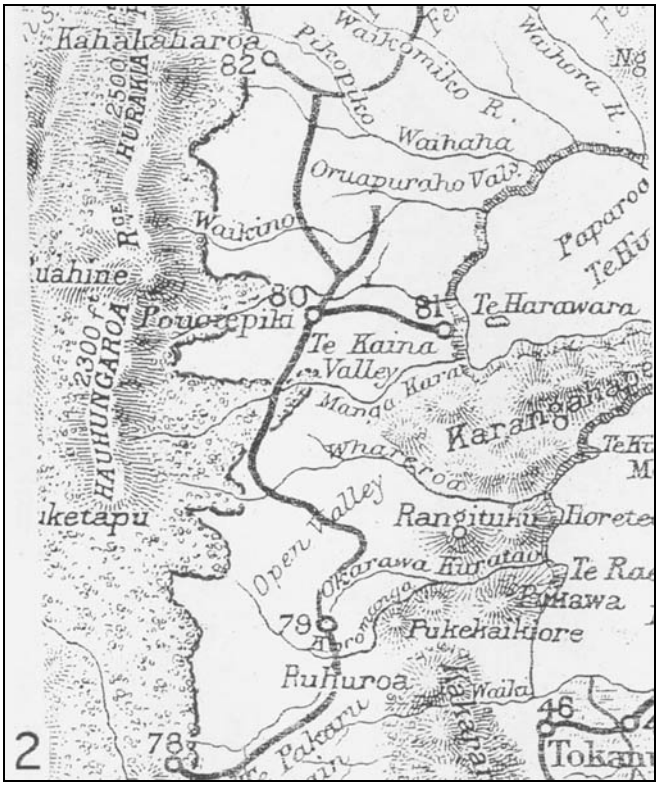


**Fig. 2. Enlargement of map in Kerry-Nicholls (1884), showing forest edges [retouched] on southwestern side of Lake Taupo.**

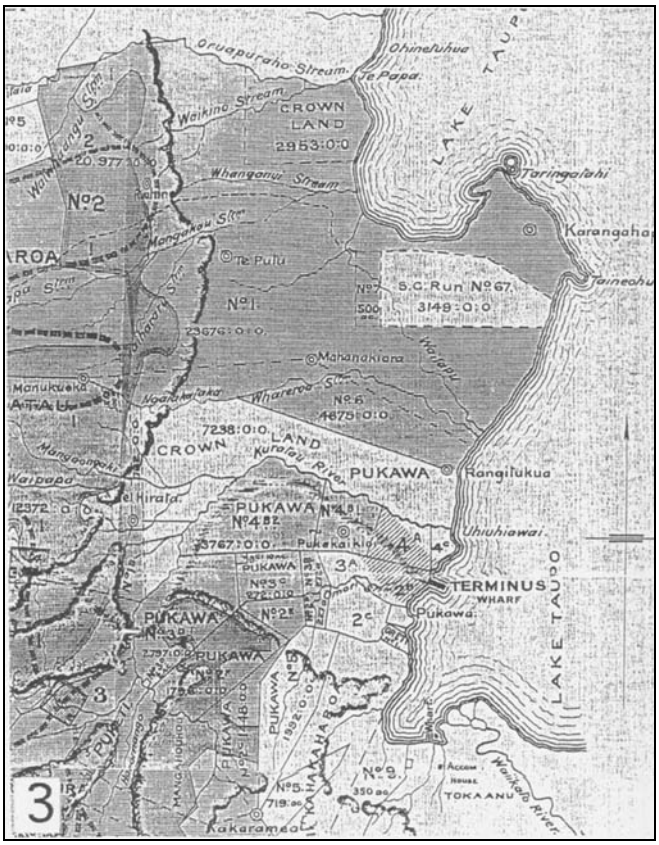


**Fig. 3. Enlargement of map "Tongariro Timber Company" (Anonymous. 1908), showing forest edges [retouched] on southwestern side of Lake Taupo.**

Going back to our Significance formula, the next variable to discuss is that of Connectedness, which I take here to include animate factors and also the inanimate ones often treated separately as Buffering. Usually, Connectedness can be considered as a good. Then, for a particular study area, Connectedness to another piece of natural landscape can be thought of as increasing in value with the size of the adjoining piece, and also, increasing (in a less easy to quantify way) with the degree of relevant biological or physical connection. Perhaps whether or not the adjoining area has legal conservation status should be factored in too. Anyway, one can easily think up some sort of formula relating the shapes and degrees of overlap of the study area and the one or more areas it is connected to.

Unfortunately for the formula, being connected is not always a good thing — one only has to think of our island sanctuaries. More generally, some plants and animals actually prefer physically marginal sites: native earthworms might not be able to cross a pasture-gap between two pieces of forest but birds and butterflies can, and often will utilize forest edges more intensely than deeper in. So diversity will sometimes be high just because the area is highly unconnected, with a high perimeter-to-area ratio. What is important in such cases is usually the degree to which the perimeter is deteriorating: is it being overwhelmed by climbing weeds, or invaded by Wandering Jew and the like? Or is the perimeter natural and stable; even, perhaps, expanding steadily. So preferring two large and strongly connected pieces of forest to a weakly connected patchwork can hardly be determined by formula, and the Connectedness variable probably should be viewed just as a reminder of the need to consider how the spatial patterns now existing might best be managed for any particular conservation purpose.

The third proposed variable, Uniqueness, would attempt to capture the more unusual physical and biological features of each Ecological District. Examples would be the occurrence of a species at its geographical limit, or the presence of limestone outliers or isolated mountains. Getting an objective set of subvariables for the assessment of Uniqueness is never going to be straightforward, let alone having the sets comparable from E.D. to E.D. However, if a large enough number of features can be accumulated in each E.D. then some sort of statistical summing-up can be made.

Ideally all the natural areas of an E.D. would be ranked for Significance in this or some other consistent way. Presumably the ranks would be normally distributed, so one could objectively describe those areas between the standard deviations as being "Regionally Significant" (that is, Significant in the E.D.). Flanking them on the lower side would be "Local Significance Only", and on the higher side, "Nationally or Internationally Significant".

Until one has such comprehensive and up-to-date information an expedient is required. I suggest that if a study area is at least as Significant as any similar-sized legally protected area elsewhere in the E.D. then it too deserves legal protection. Another natural way of dealing with the problem is what I suspect reasonable people do when forced to dig into a good-quality but finite resource, that is, use half and save half. Luckily with my Lake Taupo study area, the pasture and low-quality scrub (1 & 2 of Fig. 1) could provide enough house sites for the better half of this pretty and biologically interesting natural landscape to be reserved.

**Acknowledgements**

I am grateful to have had input from Mark Smale and feedback from Graham Don. Peter de Lange checked the species list; it no longer contains at least one self-propelled error.

I hope it is clear I have not been writing from a client-driven perspective; I personally would like to see the 10% minimum raised 1% per year until 50% is reached. But until then we just have to take comfort in knowing that lawyers don't try to trick ecologists with Latin nowadays — they're too busy exploring buffered corridors and active interfaces (these sometimes with sexually-operative vagrants), all the time keeping a confident look-out (sometimes through extended viewshafts provided by the thoughtful discipline of landscape architecture) for this elusive but undoubtedly important (to some degree) quality of Significance.

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**Species List**
77 native higher-plant species

**Ferns and fern-allies**

*Blechnum discolor*
*B. novae-zelandiae*
*B. vulcanicum*
*Ctenopteris heterophylla*
*Cyathea medullaris*
*Dicksonia fibrosa*
*D. squarrosa*
*Grammitis* sp.
*Histiopteris incisa*
*Hymenophyllum revolutum*
*H. sanguinolentum*
*H. scabrum*
*Lycopodium volubile*
*Paesia scaberula*
*Pellaea rotundifolia*
*Phymatosorus pustulatus*
*Pneumatopteris pennigera*
*Polystichum richardii* agg.
*Polystichum vestitum*
*Pteridium esculentum*
*Pteris tremula*
*Trichomanes reniforme*

**Gymnosperms**

*Podocarpus totara*

**Dicot tree, shrubs & climbers**

*Brachyglottis repanda*
*Clematis sp.*
*Coprosma lucida*
*Coriaria arborea*
*Cyathodes fasciculata*
*C. juniperina*
*Dracophyllum subulatum*
*Fuchsia excorticata*
*Gaultheria antipoda*
*G. paniculata*
*Geniostoma ligustrifolium*
*Hebe stricta*
*Hoheria sexstylosa*
*Knightia excelsa*
*Kunzea ericoides*
*Leptospermum scoparium*
*Melicytus ramiflorus*
*Myrsine australis*
*Olearia rani*
*Parsonsia capsularis*
*Pseudopanax arboreus*
*P. crassifolius*
*Weinmannia racemosa*

**Dicot herbs**

*Acaena anserinifolia*
*Crassula sinclairii*
*Epilobium cinereum*
*E. pallidiflorum*
*Geranium potentilloides*
*Gnaphalium sphaericum*
*Haloragis erecta*
*Hydrocotyle dissecta*
*Pelargonium inodorum*
*Ranunculus reflexus*
*Stellaria parviflora*
*Senecio ? minimus.*

**Monocots**

*Acianthus fornicatus*
*Astelia fragrans*
*Astelia solandri*
*Cordyline australis*
*Cortaderia fulvida*
*Deyeuxia avenoides*
*Dianella nigra*
*Luzula picta*
*Phormium tenax*
*Poa anceps*
*Uncinia distans*
*Uncinia uncinata*

# What is conservation?

**Alan E. Esler**

Much attention now focuses on conservation with the realisation that humanity is out of phase with the environment that nature has provided. At the poor end of the human condition there is a struggle for bare existence complicated often by overpopulation and climatic disasters. In more congenial environments individuals want more than adequacy, particularly more comfort. The result is a profligate and unsatisfied society with adverse consequences worldwide. The impacts of man are a large part of the substance of environmental conservation.

Man, as a superior being, is creative and has a sense of history. There developed an urge to preserve examples of his genius that contributed to the progress of civilisation. This is cultural conservation or heritage conservation.

A discourse such as this normally first defines the subject. However, in this case it is better to examine some of the oddities (misconceptions and anomalies) that interfere with easy definitions. Nothing in science is more complicated than the ecosystem that man is part of. As well there are aspects or elements of perceptions of conservation to ponder.

Then follows some of the impacts of civilisation on the world environment and comment on cultural conservation.

Environmental conservation

**A dozen oddities in conservation**

Notions of conservation are so full of irregularities that it is difficult to find words for a definition. A dozen of these oddities (misconceptions and anomalies) come to mind to illustrate this.

Many attempts at a definition will embody remedial actions such as planting trees or picking up rubbish because that is the way the subject is taught. This is the do-gooder element that tries to make situations better. Even the dictionary definition suggesting "keeping from change" has a storage element. This misses the mark when applied to biological systems. In fact, change is a natural phenomenon Oddity No I (anomaly).