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).

Take Auckland's North Shore scenic reserves as an example of progression of vegetational development with time. Until 80 – 100 years ago the scrubby land was burnt off frequently. The vegetation responded just as Australian scrubland would by resprouting from buried parts and undamaged seeds. It is no coincidence that these adapted fire-induced species – manuka, sedges, ferns and orchids have their counterparts in Australian genera. The vegetation became known as gumland scrub because kauri had grown there and left its gum in the soil. The gumland species, in fact, needed fire to remove taller competitors among them as much as for their own renewal. In the absence of burning, manuka took over but could not remain because it cast too much shade for its seedlings to grow beneath it. The taller kanuka with more shade tolerant seedlings came next. By the end of its 100 year cycle, the crowns of kauri, tanekaha and rimu were pushing through its thinning canopy. This is the dynamic element of conservation.

Oddity No. 3 (anomaly) is that fire can be a conservation tool to keep early-stage vegetation in occupation. Catastrophe is often a part of vegetation history as a rejuvenator. The milling and burning of the Waitakere range gave new vigorous forest and an enhanced bird habitat.

Much change in vegetation is driven by the resident plants and there is a degree of order imposed by them. Individuals come and go but not in a random way. Each species has its own particular requirements, and has tolerances. These factors, along with structure and life span, largely define their place in the vegetation. The combination of these I regard as the vital character of each species.

A species joins the vegetational succession where its vital character allows it to slot in, and it drops out when others with different, more adapted vital character make life too difficult for it. The sequence may start as bare ground with a few plants and , centuries later, become a complex, multi-layered forest. This dynamic principle underlies all kinds of vegetation but the phases may not be so distinct.

I see this forest example as a moving train powered by the plants acting as solar panels. There is no very predictable path or a certain destination. Some passengers come and go, and those providing the most energy influence the speed and direction. There may be disasters that deviate the train or cause it to slip back a bit but the path is ever onwards and upwards. How can such a mobile system be conserved ?

Oddity No. 4 (misconception) is the sentiment that causes native organisms to be considered to be the only ones worth studying and preserving. Too often native trees and shrubs are planted ahead of exotics in places where they are ecologically, aesthetically and structurally ill-suited on streets and in gardens. Plots of native shrubs too, may not do much for conservation when they are allowed to become leggy and ugly in close plantings. This is the parochial element of conservation.

Oddity No. 5 (misconception) is the belief that a native plant cannot be a weed. The five most troublesome plants in many Auckland gardens are natives. Some native trees can be unruly too. Totara is free-seeding and quick to establish where it is not wanted. Pohutukawa often establishes in places where it is undesirable. This is the purist element of conservation.

Oddity No. 6 (misconception) is the belief that everything is for ever. It is said that 99 per cent of all species that have ever arisen are now extinct. This is inevitable where organisms cannot adapt to natural changing world conditions. Where there is a reasonable possibility of maintaining a valuable habitat the challenge should be met. Sadly, the scientific assessment of vital character may move too slowly. Science is too often caught on the back foot because basic studies of the ecology of organisms has not been done. This is the salvage element of conservation.

Oddity No. 7 (anomaly) is the beneficial spin-off from other projects. Until the 1950's most building timber came from rimu and kauri trees. Radiata pine showed little promise until two DSIR scientists Ken Harrow and Don Spiller demonstrated that pine timber could be preserved. The process saved $1.6 m in 1964 alone, and who knows how many thousands of acres of native forest ? This is the stealth element of conservation.

Oddity No. 8 (misconception) is the possibility of overlooking special organisms worth preserving. Primitive New Zealand had few suitable pasture grasses, so many had to be imported. Among them was ryegrass with many variants, some more suitable than others for local conditions. An alert farmer, Trevor Ellett at Mangere, recognised patches of superior strains in his pastures and saved seed for re-sowing. From these stony paddocks came the ecotype (strain adapted to particular habitat) that is now used in temperate pastures around the world. This is the serendipity element of conservation. Obviously, while conservation may apply to landscapes, communities and species, it has relevance at the ecotype level too. Much of the value of this plant came from a particular fungus living entirely within the plant (an endophyte) conferring some resistance to insect pests.

A second lesson from this example Oddity No. 9 (misconception) is that some alien plants are worth conservation efforts too, even if just for the genes they contain.

It is assumed that organisms are best adapted to the conditions where they evolved Oddity No. 10 (misconception). However, when they enter a new country they have often left behind the hindrances of their native land and may flourish and become pests. It would seem then that an easy way to control them would be to introduce those limitations, often parasites, as well, Oddity No. 11 (misconception). Biological control has had many successes but, rather than elimination, has resulted in a balance between host and parasite. There is also the possibility of desirable organisms being within the range of targets.

It is also strange, Oddity No. 12 (misconception), that conservation has been separated so widely from science. For a long time scenery and sentiment determined the fate of left-over pieces of land not suitable for farming. Environmental conservation and science march shoulder by shoulder but did not blend until forced to for the scientific evaluation and management of scenic reserves. Originally scenic reserves were for scenery. Now they are scientific treasures not yet fully discovered. A reserve at Lynfield on the shore of Manukau harbour was examined by Willy Kuschel of DSIR for beetles. He found 752 species of native beetles, scores of them new to science, and 229 introduced species. This is just one of the science elements of conservation.

After all these misconceptions and anomalies are we any nearer a definition of conservation ? Consider first the attributes of science, its ally. Science is a systematic study of the nature of the world we live in. Conservation attempts to maintain the quality, quantity and function of all the components of the world.

Man's influence

Environmental conservation focuses on the living world but is part of a much bigger picture. In the last 200,000 years man had an increasing role in the way natural ecosystems work. We are exhorted to "be fruitful and multiply, and replenish the earth, and subdue it: and have domination over the fish of the sea, and over every living thing that moveth upon the earth". This does not sound like conservation talk. There has been wide influence without trying, inadvertently, unnecessarily and disastrously but we do not claim mastery or good management. The products of chemical laboratories, for instance, have become part of the bodies of animals from pole to pole and right round the globe. This is how it came about.

All the advanced forms of plants and animals were established when there arose among them superior beings walking upright on two feet, with hands with opposable thumbs that could grip, a high degree of intelligence, ability to communicate and to organise themselves into communities.

We can see where man's activities spilt over into the environment by following his stepping stones in land utilisation and industrialisation.

Land utilisation

While populations were low man's imprint was minimal and waste material filtered back into the environment for recycling. Quite soon many species of large mammals were eliminated as hunting skills developed. It took little skill to eliminate the moa because the eggs were vulnerable.

When wild products could not be gathered, the useful among them were promoted with care. As domestication got under way the inferior species became a nuisance and had to be subdued. So developed practices approaching monocultures. However, monocultures are anathema to nature. They are not self-sustaining and have to be fed and "sanitised" to ward off epidemics which could wipe out dense populations of related susceptible individuals.

Cropping in some circumstances could deplete nutrients and promote soil structure failure and instability. The utilisation of irrigation in warm countries has led to salination as evaporating water leaves behind its load of salt unless rejuvenated by silt brought in floods. Moving to other arable patches led to shifting agriculture which has left its mark on landscapes. There is no equivalent of extensive cultivation in nature but, with crop rotations, spelling and replenishment the outcomes are not all harmful. Mixed plantings and hedgerows promoting diversity of plants and animals with beneficial properties also help the balance.

Conservation of genetic material in agriculture and horticulture is required as genes of progenitors and earlier strains may be needed in breeding programmes for resistance, productivity and other features, or to maintain diversity in current crops.

The efforts to prevent genetically modified plants interbreeding with related crops and wild plants is now an aspect of conservation.

Working the land for crops extended a habitat for annual plants. Their seeds were unavoidably gathered with the crop. Seeds of others maturing earlier lay in the soil and had an early start with the next season's crop. In the days of empire building these weeds and prized garden ornamentals reached other countries. Eventually some less popular ornamentals were discarded while others escaped from cultivation. They threatened the nature of the native vegetation and challenged managers of productive land and parks. Their abundance and adaptability have created major conservation problems.

The use of water on land is becoming a major concern around the world. In arid countries water is the prime factor determining the continued occupation of whole regions. Though seemingly abundant elsewhere, there are diminishing amounts for generation of electricity, irrigation and drinking. Farming has had mostly adverse effects on water resources by releasing farm effluent and chemical products used on farm, gardens and orchards into groundwater and waterways.

Mechanisation

Maybe the first wheel was a short log with tapered ends. Whatever its origins, it is more likely to have been a development from prototypes than invented. Most innovations build on models and are refined as new methods and material become available. The turning motion must have initiated endless possibilities for the evolution of machinery.

Mechanisation and utilisation of energy resources developed together. Coal was plentiful around the world but little used because deep mining was a dangerous occupation until machines could deal with drainage and ventilation. Abstraction of coal was the boost that moved progress into the industrial age and changed the wealth of advanced nations and the lives of people as they left home industries to work in factories. They were not healthy or happy times for the workers or the environment. Coal burning very inefficiently fouled the atmosphere and released more carbon than any other fossil fuel. Some of these problems are being overcome in part, but at a cost. As oil supplies diminish, there will be renewed reliance on coal. It is abundant, easily prepared for use and can substitute for products made from other resources. However, it is unlikely that India and China will afford the luxury of clean air.

The use of coal for smelting metals opened avenues for the manufacture of machinery that pushed industrialisation ahead. No longer was it necessary to fell forests to prepare coke for heating the metal. This had a positive conservation value also. Metal substituted for wood for other purposes too for building and manufacturing.

Petroleum had some limited uses in the distant past as it was mainly available in small amounts in seepages. Like coal, it is a widespread resource but is not unlimited in supply. It is a messy industry destroying landscapes with site preparations, spillage and air pollution from combustion and the release of by-products into the atmosphere.

The availability of liquid fuel facilitated the development of the internal combustion engine for propulsion to partly replace the less versatile steam engine. With better means of moving goods and people there had to be more roads and rails. As some compensation for the lifeless strips of country they created there would have been margins to harbour remnants of native vegetation and wildlife.

Electricity is generated from fossil fuels, geothermal bores, moving water, solar panels, wind and nuclear power. The balance among them will change according to economics and conservation issues. Earth-sourced resources are blamed for contamination of air and water. Hydroelectric plants alter landscapes by flooding river systems but there are compensations in the creation of new scenery with aesthetic and recreational worth. Irrigation and flood control are adjuncts with benefits but flood plains downstream are deprived of coatings of silt that keep them productive. The influence of wind turbines on birds and other biota is not fully known and, like solar panels, deliver intermittent power. Nuclear generation has its virtues but there are uncertainty about safety and disposal of waste. From all forms of generation there may be effects on human health from high voltage transmission lines as well as the aesthetic issues.

Denaturing of the land surface has been superficial but substantial enough to cause concern about preservation of records of the earth's past. The most vulnerable have been the peat deposits with pollen bearing evidence of past vegetation and climates.

The forgotten part of conservation

Up to this point our concern has been with environmental matters which, in many minds, is where conservation begins and ends. Conservation also relates to human creations including music, art, literature, edifices and objects of utility and those related to cultures of human races. They demonstrate the progress of civilisation. Relics from the distant past tend to have more value because of their age and place in history. In effect, they are fossils of a different kind. Many were accidentally buried, discarded or secreted. Others are manifest above the ground as monuments to past engineering skill and effort. Those who seek to preserve these are conservators too. This is conservation of culture.

In the long run it seems that conservation is the effort to preserve or protect anything that we value, or should value.

Acknowledgement

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