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THE SIGNIFICANCE OF ARCHAEOLOGICAL RESEARCH

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Arguments in favour of archaeological site protection have tended to stress the value of archaeological sites as part of our cultural heritage; that by studying the evidence of archaeology, it is possible to learn about the people who lived in the past, to learn of their achievements, their failures, and their pursuits. This line of argument is incomplete in two ways. First, it emphasises the cultural aspects of archaeological sites, without explicit reference to the wide variety of environmental data archaeological sites contain, and second, it fails to relate the study of prehistory to our own immediate future.

The following argument is premised on the belief that the events of the past are a guide to the events of the future: that an understanding of the events and changes which have occurred in the New Zealand landscape during the past 2,000 years, is relevant to the management of our present environment, and will eventually enable us to predict the consequences of events likely to occur during the next few hundred years.

In this view, archaeological sites become important for two reasons. First, as a source of environmental information, they contain the remains of plants and animals brought to the site as food, landsnails attracted to rubbish heaps by decaying vegetation, pollen, charcoal, and buried soils. Second, they are a direct indication of prehistoric man's activities, which have included the removal of considerable areas of forest in both the North and South Islands, and the extinction of more than 20 species of animal. Man must therefore be considered a major factor affecting ecological change.

The possibility that an understanding of changes in the prehistoric environment may affect the management of our present environment can be illustrated by considering the relationship between moas, forests, and deer. In many stands of the New Zealand species of conifer, which include rimu, matai, and kaikawaka, there is an apparent predominance

of over-mature and mature trees, and a corresponding paucity of seedlings, saplings, and young trees. This scarcity of young plants is called the regeneration gap. The lowest rate of regeneration seems to have occurred about 300 years ago, but in the last 100 years, seems to have recovered.

The regeneration gap has been attributed to a variety of causes, including climate change, change in forest succession, diseases introduced by the Maori, and to the extinction of the moa. The argument for this last-mentioned cause is that the moa, as a forest browsing animal, kept the forest relatively free of undergrowth, allowing light to penetrate and the seedlings to grow. With the extinction of the moa, 300 to 600 years ago, the undergrowth, composed largely of broadleaf species, would have thickened. Light, which is essential to the growth of conifers, was then excluded and they ceased to regenerate until, with the introduction of deer, the forest floor was again cleared by browsing.

It is not intended to argue a case for this hypothesis, but to use it to illustrate a point. To understand the cause of the regeneration gap would seem relevant to the management of our remaining native forests. If this hypothesis is correct, then since our native forests evolved under a browsing fauna, the introduction and proper management of deer in the remaining forested areas may, in the long run, be more beneficial to the state of the forests than attempting to exterminate the animal. To test this hypothesis, however, requires data relating, among other things, to the pattern of moa extinction. It scarcely needs pointing out that the most abundant source of this information lies in the undisturbed sites of its main predator, Man.

The information, that an archaeological site can produce, relating to its environmental history, and the problem of distinguishing between man and nature, as the cause of events, can be demonstrated by the results from excavations carried out at an archaeological site near Foxton in the Manawatu. The site was occupied about 600 years ago, and again about 400 years ago. It was characterised by well-stratified soil horizons and shell midden deposits which yielded first-class information on sand dune movements, drainage conditions, and vegetation, indicating a progressive rise in the groundwater table in response to coastal progradation during the past 2,000 years.

Two thousand years ago the site was moving sand. Fifteen hundred years later the sand had consolidated, a shallow lagoon had formed nearby, and the site was surrounded by a well-developed coastal forest.

Four hundred years ago the site had to be abandoned when the lagoon rose and it was flooded. The vegetation at this time was approaching that of a semi-swamp forest. At the time of European settlement the site was under four feet of water and the forest had retreated inland, due partly to the rise in the groundwater table, and due partly to burning-off in Maori times. It had been replaced by manuka scrub and bracken fern.

The most impressive change, however, was noted in the rate of coastal progradation. The period between the Taupo eruption 2,000 years ago and the arrival of man about 700 years ago, was characterised by a rate of coastal progradation averaging about 0.5 metres per year. As expected, this increased slightly after Polynesian settlement, to about 1.4 metres per year, probably due to erosion induced by bush clearance for kumara agriculture. Most surprising, however, was the massive increase to eight metres per year, between 400 and 500 years ago. This was the start of the Waitarere sand dune movement, originally thought to have begun when the dunes were stocked with European cattle, but now, quite clearly, a much earlier feature. By 300 years ago the rate of coastal progradation had dropped to about three metres per year, and since European settlement, has stabilised at about one metre per year.

Although this example has illustrated the type of information which an archaeological site can yield, if properly handled, it is the causes of events, such as the Waitarere sand dune movement, which must be understood if their implications are to be fully appreciated. To do this it is necessary to distinguish between cultural causes resulting from man's interference with the environment, and those which are natural.

Considered on its own, it may be argued that the Waitarere dune movement began as a result of cultural interference. Indeed, the removal of vegetation by the early Polynesians was the original explanation for the Motuiti dune movement, the predecessor of the Waitarere, and evidence for bush clearance prior to the Waitarere movement has been recovered. But when the Waitarere movement is considered in the context of erosion and sediment deposition over the southern half of the North Island, it is seen to be a local example of a much broader pattern. This pattern has left its mark along the east coast of the North Island, Palliser Bay, parts of the North Island west coast, and on D'Urville Island. The characteristic features of this erosion are first that it occurred between 400 and 500 years ago, and second, that in magnitude, measured by sediment accumulation around the North Island coast, it was greater than at any

other time during the past 2,000 years, including the period since European settlement. The problem is to explain its cause.

On the present evidence, the two most likely causes are climate change and vegetation clearance over large areas of landscape. Evidence for a climatic cooling, with increased rainfall, between 300 and 500 years ago, has been found in other parts of the world and in New Zealand. Whether the change was sufficient to greatly affect the New Zealand environment, for example by lowering the timberline and by exposing greater areas of hillside to erosion by freeze and thaw action, is not known. On the other hand, large scale clearance of lower altitude vegetation by the Maori is known to have occurred over large areas of the country, and this may have reached a stage where the remaining vegetation was no longer sufficient to protect the soil.

A combination of both causes seems most likely, however, the effects of climate change being magnified by the removal of vegetation. It would seem, nevertheless, a matter of some interest to establish the relative importance of each contributing factor since, in view of the amount of bush clearance in European times, the consequences of future climatic deterioration could be quite catastrophic.

The lines of research are quite clear. On the one hand, an investigation into the economic activities of the prehistoric Maori and the effect he had on the landscape, on the other hand, the collection of data relating to climate change, particularly its magnitude, during the prehistoric period. Much of this information is lying in undisturbed archaeological sites, and the task of its recovery will be much simpler if the sites remain undisturbed until they can be properly investigated.

(The information on which this article is based has been gathered in the course of Ph.D. research into Ecological Changes in the North Island during Prehistory, and will be made available shortly.)