

Peter Wardle, ONZM, PhD (Cantab.), MSc (NZ), FRSNZ

14 February 1931 – 6 December 2008



Peter Wardle passed away suddenly on 6 December 2008 while crossing the Waimakariri River with his wife Margaret and friends on a tramping trip. His death marked the end of a scientific career lasting more than 50 years during which he explored, thought, wrote and debated about the plants and vegetation of New Zealand. Part of a gifted generation of natural scientists who took advantage of educational opportunities opening up during the 1950s in New Zealand and overseas, Peter, through his sustained output of scientific, technical, and popular publications, provided insights into the ecology of New Zealand vegetation that have influenced several generations of researchers.

Peter's childhood, aside from a brief spell of three years in England, was spent at Hawea in Central Otago with his mother and younger brother John on his grandparent's small holding on the flat. Peter's grandfather, Albert J. Butterfield, had broad interests in rural land use –including irrigation for orchards and economic development of tussock grasslands. He had moved from Dunedin to Cromwell to manage the 'Cromwell Development Scheme', and through this work got to know Leonard Cockayne, pioneer New Zealand ecologist, collaborating with him in 1920 in setting up the well-known Cockayne Exclosure Plots in Central Otago. Cockayne visited the family on several occasions when they lived at Cromwell, and was remembered by Peter's mother Margaret as being a rather grumpy fellow. Two of Peter's uncles had farms in Hawea and Peter and his brother worked with them during school holidays. While still at primary school, Peter began to explore the tussock and scrub country bordering the rugged hinterland of the Southern Alps, beginning a botanical collection of dried specimens. (In the early 1990s when brother John revisited the family home, the owners drew his attention to what they called 'little bits of plants stuck on pieces of paper' which they had discovered in a cupboard, and had somewhat puzzled them.) His growing botanical knowledge led him to state that Cockayne's magisterial *Vegetation of New Zealand* was 'not right about everything'. He decided at this early age that he would, when the opportunity arose, do something about this.

Peter attended Waitaki Boys High School and in his final year was runner-up for Dux. In 1949 he began his studies at Otago University gaining an MSc with 1st Class Honours in 1954 on the vegetation and climate of the Dunedin region. This work was the basis for his first publication, co-authored with Allan Mark, a fellow MSc student. In his summer vacations he had a variety of jobs including working for the Otago Rabbit Board, vegetation survey for the Otago Catchment Board and, most significantly for his future career, as a field worker on the Forest Service National Forest Survey, which greatly broadened his experience of New Zealand vegetation. He won a University scholarship to undertake a PhD at the University of Cambridge (1954–1957), graduating with a thesis on the autecology of *Fraxinus excelsior* supervised by A.S. Watt, one of the founders of modern ecology.

On returning to New Zealand in 1957 he joined the New Zealand Forest Service Forest and Range Experimental Station at Ashley Forest. Jack Holloway, who had led the South Island component of the highly influential National Forest Survey, had gathered a small group of scientists to investigate the ecology of high altitude southern forests. Peter's first projects were botanical surveys of the upland forests and shrublands of the South Island to assess the potential risk of rising deer numbers to forest canopy cover and thus mountainland erosion.

In 1960 Peter was recruited by Eric Godley for Botany Division, Department of Scientific and Industrial Research (DSIR). The rest of his career was spent with Botany Division (and from 1992, with its successor, the Crown Research Institute, Landcare Research). Having the freedom to work on all aspects of the vegetation of New Zealand, and not just those of direct economic interest, doubtlessly spurred this move. Nevertheless, he always retained strong links with foresters and farmers alike, and had a pragmatic attitude towards what was politically feasible when forestry, farming and conservation collided, as they increasingly did from the 1970s onwards.

In his new role he rapidly became one of the most influential conservation scientists in the country. He led Botany Division's ecology, vegetation survey and conservation section for most of that time and, although he was Assistant Director from 1980 to 1988, he did not aspire to or enjoy administration. He managed a diverse group of scientists, based at Lincoln and at substations throughout the country. This group undertook botanical surveys of national parks, assessments of scenic and scientific reserves, made recommendations for the acquisition of new reserves, and advised on the environmental impacts of major developments such as hydroelectric dams, agriculture and forestry. This work, often done to tight deadlines, was mainly carried out on behalf of the Department of Lands and Survey and the Forest Service and, in later years, the Department of Conservation.

Peter's group provided critical ecological advice with regard to the major environmental issues of the 1960s–80s such as the Manapouri and Clutha hydroelectric development schemes, irrigation in dryland regions, and the north Westland – Nelson beech-milling proposals. Peter himself was fully involved, undertaking extensive fieldwork, writing numerous reports, assessments, and recommendations, and serving on advisory boards and panels. An astounding amount of work was carried out by him and his staff (never amounting to more than 15 scientists). For example over 18 months (July 1983 – December 1984) Botany Division made 107 submissions – 1.5 a week – on environmental impact reports, assessments and related matters. As Peter wryly stated, "However, the mills of

State grind slowly in matters of conservation: investigating and actioning reserve proposals demand a large commitment of time..." (Botany Division 1976–78 Triennial Report, 1980, p. 55).

Peter believed passionately in providing sound, defensible ecological data without fear or favour. In the 1970s and 80s he came under pressure from conservation groups, and even from some of his staff, who favoured a more aggressively pro-conservation perspective. In an address to the New Zealand Ecological Society (Wardle 1972 p. 3) Peter thoughtfully articulated his approach and commitment to environmentalism: "In pleading for nature conservation, ecologists are sometimes accused of rather selfishly wishing to preserve objects because we have become scientifically interested in them...Worse still, it is even said that we sometimes base our arguments on emotion rather than scientific facts. Is this really such a damning accusation? It is surely reasonable to believe that the biological diversity of our environment is a no less precious part of our heritage than the monuments of man. Also, I have never been able to understand why emotion is so suspect in this context. Most scientists have chosen their employment because of the emotional satisfaction it gives them. Even economic arguments boil down to the nice secure feeling that is induced by lots of money."

Peter was well aware of the dangers for both staff and quality of work of an excessive focus on short-duration botanical survey and assessment, and a scientific output mainly consisting of unpublished reports. He strongly encouraged long-term research as a basis for understanding species and communities. As he wrote, "In any research organization that is responsive to what are perceived as the pressures of the time, there is a tendency for research effort to be deflected from long-term projects, which are liable to be shelved indefinitely. Botany Division is aware that to lose sight of its long-term ecological projects, such as surveys of national parks, would be to waste much of a scientist's life endeavour, and to deprive the nation of valuable information" (Botany Division 1979–81 Triennial Report, 1982, p. 39).

Peter wanted Botany Division advice to be based on adequate information and credible science rather than advocacy alone. He himself set very high standards, publishing scientific papers in international and local journals alike, numerous technical reports, and frequent popular accounts. He was also committed to helping conservation managers. For instance, he took advantage of his membership of the Westland National Park Board to produce an authoritative account of the vegetation of the Park (Wardle 1977).

Peter undertook extensive fundamental work on the plants and vegetation of New Zealand. A Fulbright exchange fellowship at the University of Colorado in Boulder in 1962–63 to investigate factors controlling the altitudinal limits of Englemann spruce initiated a long-term interest in treelines worldwide. He was internationally recognised for his pioneering comparative and experimental work on treelines, and for investigation of freezing resistance in shoots and seedlings. Peter used novel transplant experiments and standardised foliar frost resistance measurements which revealed the relatively poor frost tolerance of indigenous trees (Sakai et al., 1981). This feature he believed was in part, an explanation for New Zealand's unusually low treelines. He conclusively demonstrated that hardy subalpine trees from elsewhere in the world (his first transplant experiments began in 1959) could thrive hundreds of metres above the limit to growth of New Zealand natives (Wardle 1985b). Peter argued

that lower elevation treelines in New Zealand created a high altitude forest-free zone (the penalpine) that had opened a major niche for herb and shrub adaptive radiations. In 1990–91 he set up a series of altitudinal transects to measure changes in the upper distribution of forest species in response to greenhouse warming (Wardle & Coleman 1992). Several years ago his remeasurements demonstrated the changes in altitudinal limits that had occurred since (Wardle et al. 2005). He was awarded a Marsden Fund grant in the mid-90s to undertake comparative investigations of *Nothofagus* treelines in Argentina, Chile and New Zealand, and to explore ancient links between the floras (Wardle et al. 2001). Fittingly, New Zealand treelines formed the topic of his last scientific paper, published in 2008 (Wardle 2008).

Peter made important contributions to our understanding of the biogeography and history of the New Zealand flora. He wrote extensively about the impact of ancient geographic, edaphic and climatic changes on the evolution of the New Zealand flora. His early association with Jack Holloway – who had written the controversial paper 'Forests and climates in the South Island of New Zealand' (Holloway 1954) arguing for the strong imprint of recent climate change on our forests – and his familiarity with the forests that had inspired that paper led to a career-long exploration of these issues. In particular, he developed stimulating ideas about how the extreme cold of the last Ice Age, which ended about 18 000 years ago, has continued to affect the distribution of the current vegetation. The apparent failure of podocarp trees to regenerate during the cool conditions of the Little Ice Age of the 16th to 18th century was a topic in which he took a particular interest. His contention that cooling climates left a demographic gap in present-day mid-slope conifer was controversial (Wardle 1963), but stimulated numerous studies on the regeneration strategies of conifers, and the role of tectonic disturbances in landscape-level forest dynamics. In exploring this topic he progressed the study of recent New Zealand climate change impacts. Through a combination of old photographs, ring-count dating of trees, and radiocarbon measurements he developed a chronology for recent ice advances and retreats of the glaciers of Westland National Park (Wardle 1973), providing a basis for further work, including recent fundamental studies led by his nephew David (Wardle et al. 2004) on how soil age and nutrient loss affect plant communities.

Peter was also aware of human impacts on vegetation and he was the first to suggest that the demise of the moa shortly after Māori arrival may have had important long-term consequences for forest regeneration (Wardle 1985a). His historical interests led to him acquiring skills in soil charcoal analysis, and he used this evidence to help reconstruct the past distribution of forests across the South Island, revealing the different forest types that once grew in areas that were reduced to tussock grassland by Māori and later fires (Wardle 2001).

Perhaps his most exceptional and enduring achievement was the publication of *Vegetation of New Zealand* in 1991 (Wardle 1991), the first modern comprehensive treatment of the diverse vegetation of this country. Modelled on Cockayne's book from the early 20th century (Cockayne 1928), Peter undertook intensive fieldwork throughout New Zealand to get new data and fresh insights, and compiled an extensive bibliography summarising half a century of vegetation science. The book exemplifies many of Peter's qualities, including the ability to write clear and concise prose, and to describe in a few carefully chosen words critical insights on the evolutionary and ecological processes that shaped our biota. His accounts of the

vegetation of New Zealand are unlikely to be surpassed.

This brief account does not exhaust the range of topics on which Peter worked. He had an intense interest in anything to do with New Zealand plants and made contributions to their classification, growth forms, floral biology, fossil history, biogeography, and physiology. He made several contributions to the taxonomy of New Zealand trees and shrubs, pollination and flower biology, discussed the growth and phenology of trees and shrubs in a number of papers, and instituted the *New Zealand Journal of Botany* series 'The Biological Flora of New Zealand', to which he contributed four papers.

Peter served the scientific community at many levels. He was President of the New Zealand Ecological Society (1970–72), served on its council, and was made an honorary life member in 2000. He was made a Fellow of the Royal Society of New Zealand in 1977, served on its council (1990–93), and was Cockayne Memorial Lecturer (1986). He was a staunch member of the Canterbury Botanical Society, served as its president (1999–2002) and edited its journal (2004–05). His recognitions included the Royal Society Hector Medal (1990), Director-General's Award, DSIR (1991), and he was made an Officer of the New Zealand Order of Merit for services to plant ecology in the Queen's Birthday Honours (2006). Peter was also committed to the concept of wilderness both at work and at leisure. He was a keen skier, a lifelong member of the Broken River Ski Club, and derived much pleasure in recent years skiing at Mt Hutt on a reduced-fee senior citizen pass.

Peter was a delightful field companion, where he was perhaps most comfortable, and always agreeable to explore new places. It was a privilege to go on field trips with him, usually into the remote parts of Canterbury, Westland and Fiordland. Excursions were characterised by vigorous discussions on vegetation patterns and plant distributions, punctuated with frequent questions about the colour of soils or plants as he was unable to distinguish red from green. Disconcertingly, Peter often emerged in his denim shorts from scrub bashing looking as though he was in serious need of medical attention, a consequence of his fragile skin, but this never stopped him from venturing out whenever he was able.

For colleagues and friends in botanical and ecological circles, Peter will long be remembered as a wise, kind, and approachable person, generous with ideas, and with an incredible knowledge of our flora and vegetation. Determined and focused, his field observations were jotted in an ever-present notebook that eventually joined others in a long file on a shelf in his office. Manuscripts sent to him for comment, no matter how naïve or tentative, would be rapidly returned with helpful but blunt comments in his barely readable scrawl. He had a delightful sense of humour, relishing the paradoxical nature of human affairs, and maintained deeply held convictions as to respect and fairness for both the natural world and humans alike, which drove both his scientific work and his long-standing commitment to Amnesty International.

Peter's family were an important part of his life and his wife Margaret was an ideal companion and source of great strength. She shared his passion for the outdoors and accompanied him on numerous trips both within New Zealand and overseas. He is survived by his wife, brother John (also an ecologist), his children Robert and Penny Wardle, and four grandchildren.

For ecologists, Peter leaves a rich legacy of published papers and his magnum opus *Vegetation of New Zealand*, not to mention the many recollections of times, places, and discussions. These will ensure that he is affectionately remembered and appreciated. We conclude with a poem written

by Peter Johnson and read at Peter's funeral:

From red-headed inaka
to grey scrub
your wisdom led us.

From treelines
to snowlines
your knowledge – shared –
gained new heights.

From dust to loess,
via charcoal and around campfire ashes
your warm spirit merged our past
your present
everyone's future.

May your glaciers never completely melt
your moraines ever remain young
your boots never dry out.

Matt McGlone and Bill Lee
Landcare Research

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