

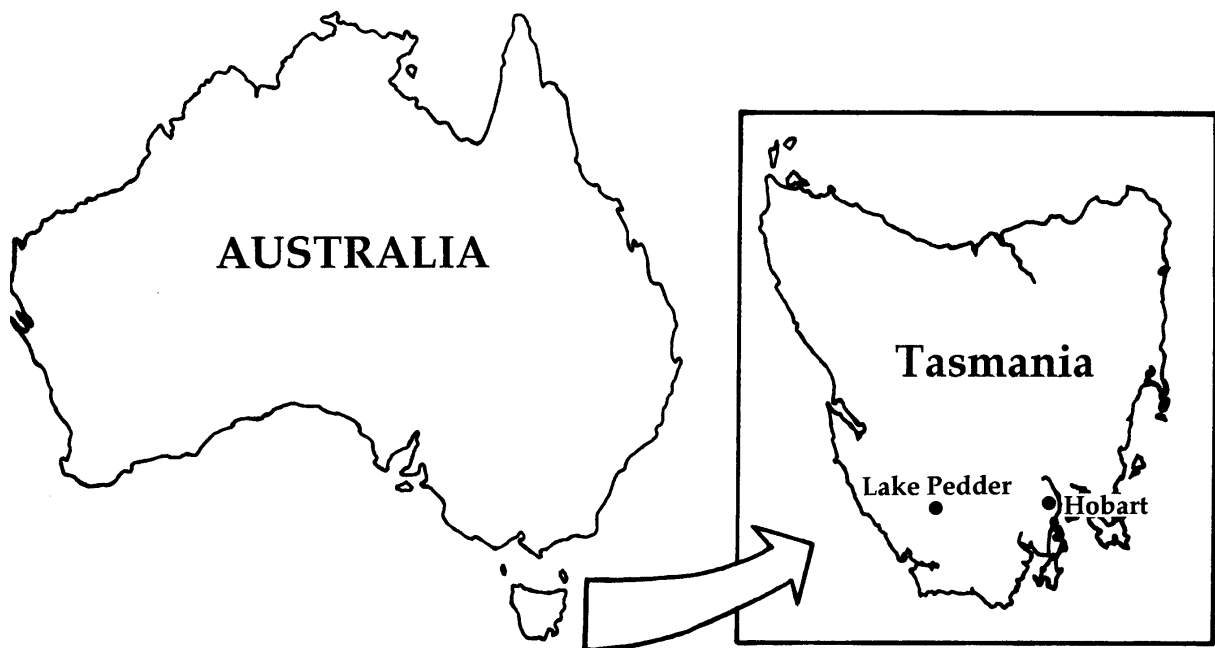
## INTRODUCTION AND OVERVIEW

### INTRODUCTION Chris Sharples<sup>1</sup>

The original Lake Pedder (Figures 1, 2) was a glacial lake of surpassing beauty and outstanding natural value, set in the geographical heart of what was, in the latter half of the twentieth century, one of only three substantial temperate wilderness areas remaining in the southern hemisphere (Neilson 1975). The full breadth and depth of Lake Pedder's nature conservation values have seldom been fully recognised, and one aim of this volume is to describe some of those values. However, the aesthetic and inspirational values of the lake and its surrounding mountainous regions have been illustrated and lyrically described by many of those fortunate enough to have visited the original lake (see for example Angus 1975, Neilson 1975, Southwell 1983, Brown *et al.* 1985).

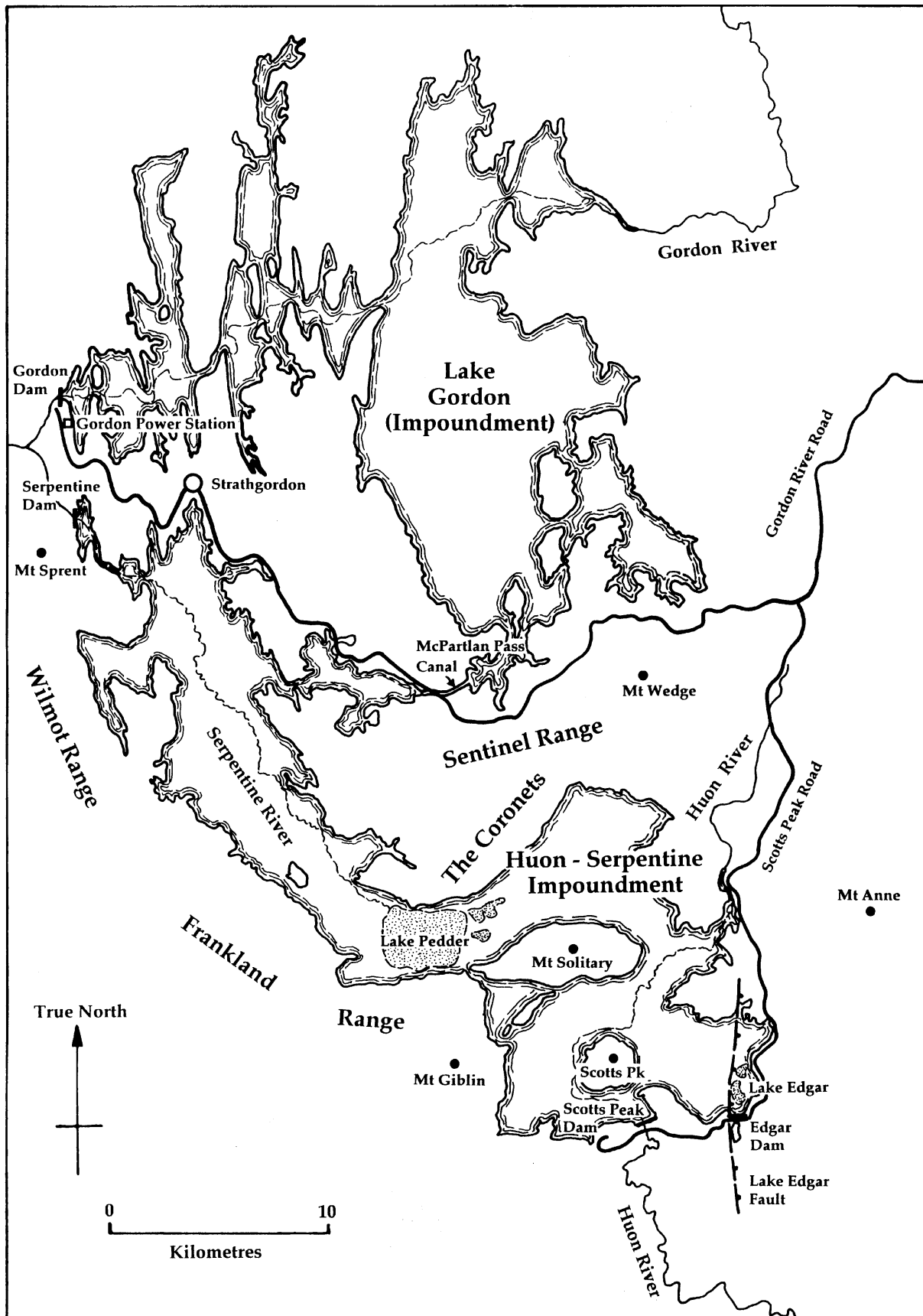
In 1972 Lake Pedder was flooded to create a new and larger artificial lake as part of the Middle Gordon hydro-electric power development. This flooding occurred in the face of a public outcry

which was, for an environmental issue, unprecedented in Australia's history, and that heralded the beginning of a new phase in Australian political history in which the environment became a pervasive political issue right up there alongside the economy and other traditional issues. Although environmental concerns had been expressed in Australian society long before this time and earlier political battles had been fought over environmental issues, few would disagree with the assertion that it was the flooding of Lake Pedder, more than any other single event, that irrevocably brought the environment into the general public consciousness in Australia and made it a mainstream political issue. It is noteworthy that it was an event at the periphery of the Australian political scene, rather than in the power centres of Melbourne and Sydney, which challenged the established order and wrought this profound change in the Australian political landscape (Pybus *in*: Pybus & Flanagan 1990, p. 11).



**Figure 1:** The location of Lake Pedder.

<sup>1</sup> Geoconservation consultant, Hobart, Tasmania.



**Figure 2:** The relationship between the original Lakes Pedder and Edgar, and the current Huon-Serpentine Impoundment.

There is no doubt that outrage at the thought of the destruction of such wild beauty as Lake Pedder's was the motivating force behind the campaign which arose to oppose the Hydro-Electric Commission's (HEC) plans for the lake. But I believe that in retrospect we can now see that this motive was supported and facilitated by social and cultural changes that were simultaneously affecting the whole western world. The proposal to flood Lake Pedder came at a singular time in the history of the twentieth century, and of Tasmania itself. The HEC engineers, accustomed to unquestioning acceptance of their plans by government and the public, could hardly have anticipated the national controversy they were about to unleash.

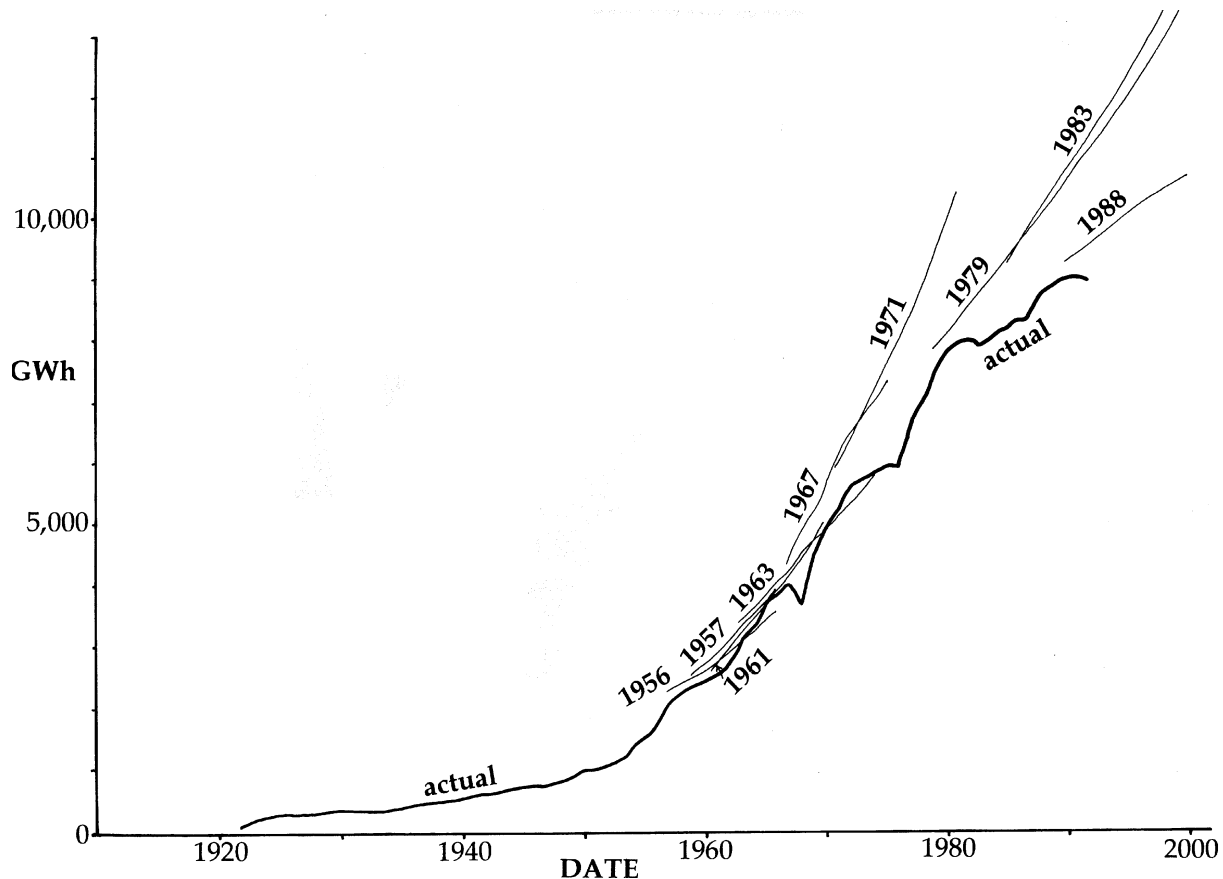
In Tasmania, along with much of the western world, the decades following World War II had been a time of reconstruction and booming industrial growth. The Hydro-Electric Commission had been the guiding light in Tasmania's post-war reconstruction boom. This was the time when "hydro-industrialisation" - the idea that big industries would be drawn to Tasmania if the state supplied abundant cheap power - was the prevailing philosophy behind Tasmania's economic development, and that philosophy was being seen to work. However by 1967, the year that the construction of the Middle Gordon Power Development was approved by Tasmania's parliament, the phase of accelerated post-war growth was rapidly coming to a close.

Examination of the Hydro-Electric Commission's own published power consumption and predicted power demand figures (Figure 3) show that, throughout the postwar period from the late 1940's to the middle 1960's, electricity consumption grew at an exponentially increasing rate, and the HEC's predictions of continued exponential growth in power demand proved accurate over this period. So it was with complete confidence that in 1967 the HEC presented the Tasmanian Parliament with its proposal for the Middle Gordon hydro-electric development scheme, backed up by predictions of continued exponential power growth that would require the new scheme to be built. With the effects of a recent extended drought that had caused water storage shortfalls and power rationing still fresh in people's minds (Lupton 2000), it was difficult to argue that Tasmania did not need all the new generating capacity it could build. But for the first time, the HEC got its power demand predictions significantly wrong - not that this would be obvious until some years after. However as the published figures now show (see Figure 3), 1967 was roughly (and ironically) the year in which Tasmania's power consumption growth finally began to depart from its post-war exponential growth trend and commenced the long plateauing-out phase that any sustainable growth pattern in the

real world must eventually show, lest it follow the alternative pattern of overshoot and collapse. The immediate reason that power consumption initially departed from its historic exponential trend was because of the 1967 drought and power rationing (Lupton 2000), so the HEC initially saw reduced power consumption as merely a temporary hiccup and continued to predict exponential power consumption growth. Further industrial expansion in 1969 gave the HEC reason to believe consumption was returning to its exponential growth trend, but as Figure 3 shows by 1972 the deviation was becoming a trend and beginning to embarrass the HEC. Nevertheless it was not until the late 1970's that the HEC finally began to publish lower predictions of power demand growth - and even then continued to over-estimate demand by a large margin (Figure 3).

This departure of reality from prediction can in retrospect be seen as the end of Tasmania's post-war boom phase. So it is intriguing to notice that it was the flooding of Lake Pedder at this very time which both catalysed and coincided with a major change in the Tasmanian and Australian public's attitude. Not only did the environment explode into public consciousness as a major issue, but this period also marked the end of a post-war phase of strong economic growth during which few middle class Australians had seriously questioned the wisdom of governments and government bureaucracies in Australia. As Crowley (2000, p. 66) has noted, in the 1950's there was in Tasmania a widespread conservative notion of government as being beyond the realm of the people. Throughout the post-war period up to the late 1960's, governments and their bureaucracies were often seen as wise experts who made big decisions on the public's behalf, and who always knew best. And indeed, so it must have seemed to many middle class Tasmanians as the economy grew and new industries set up in the state, drawn by the promise of cheap and abundant hydro-electric power. So entrenched was this paternalism that when a later generation of Tasmanians loudly questioned the HEC's plans for Tasmania, the then-Commissioner of the Hydro Electric Commission, Russell Ashton, was famously quoted as saying "If the parliament tries to work through popular decisions we're doomed in this State and doomed everywhere" (ABC TV *Nationwide* program, 19th June 1980).

However, throughout the western world the 1960's were a time in which people were increasingly questioning the values and policies of their governments and bureaucracies. This was a time which saw the rise of a 'counter-culture' which questioned the materialistic values of western society, and a time when massive opposition to the Vietnam War effort led many in Australia and elsewhere to question the wisdom of governments.



**Figure 3:** Actual electricity consumption in Tasmania and HEC predictions of demand (Total System Load GWh). The heavy line indicates actual consumption, and thin lines indicate demand predictions made in the years indicated. Actual consumption data from HEC Annual Reports 1916 - 1992, demand forecasts from HEC (1967, 1971, 1979, 1983, 1988), compiled by Porch & Sharples (1993). A simple exponential curve can be fitted to the data on actual consumption until 1967-68, and demand predictions made by the HEC in 1967 and 1971 follow roughly the same exponential trend. However, from 1967-68 to 1992, actual electricity consumption consistently fell below predicted demand, even when later predictions (1979, 1983, 1988) were moderated with respect to earlier assumptions of continued exponential growth.

In the midst of all this, in Tasmania the flooding of Lake Pedder was an early sign that something was amiss in the government's policies. Increasing numbers of people began to feel that the bureaucrats and politicians, acting on the advice of their engineers and economists, had made a big mistake. They had decided to flood something of immense value, and dissenters amongst the public had no genuine say in the matter.

One aspect of the planning process leading to Lake Pedder's flooding which has been repeatedly criticised is the degree to which the HEC failed to supply the public with information about their plans. Although planning for the Middle Gordon hydro-electric scheme had started at least as early as 1953, public requests for information about what was being planned were for years prior to 1967 deflected with platitudes. In 1961, when investigations of the Gordon River area were well under way, the HEC Commissioner stated "...the possibility of power development in this area in the foreseeable future is remote", and it was only as late as 1965 that the Tasmanian Premier, Eric

Reece, went so far as to admit that "...there would be some modification of the Lake Pedder National Park" (LPAC 1973, Southwell 1983, p. 20). The fact that Lake Pedder itself would be drowned did not become clear to the public until the Middle Gordon proposal was tabled in parliament in 1967, by which time it was already too late for any effective public input to the formal decision making process. Whilst it might have been argued in the 1960's that there was no point in releasing plans whilst investigations were incomplete and no final decision had been made, a more democratic view is that inviting public comment on the options under consideration at an early stage is precisely the approach which can allow rejection of the most unacceptable options at an early stage and avoid intense opposition to unpopular final decisions later on. Indeed, it is arguable that the increasing emphasis on public consultation and democratic accountability in recent decades may in part be traced to the Lake Pedder debacle (Crowley 2000).

In the wake of the closed decision-making process that flooded Lake Pedder, for many people the realisation began to dawn that while engineers might be good at building dams and power stations, they were not necessarily the right people to balance such goals against other values - less measurable but no less significant - which were also important parts of what has come to be known as the quality of life. As the 1970's passed into the 1980's it became increasingly obvious that technocrats whose professional careers had centred on the heroic post-war reconstruction and development mode of thinking which "hydro-industrialisation" represented, were not necessarily able to recognise the point at which that strategy had served its purpose, and should have given way to newer strategies more appropriate to changing times. Allied to this was the fact that the HEC's charter - that of providing abundant power at the economically cheapest cost - created an inexorable logic which did not permit non-economic values to be a real factor in the decision making process. In the end, it took over 15 years of public pressure - spear-headed by the conservation movement - and intervention by the Federal Government before non-economic conservation values played a genuine role in hydro development decisions.

In 1971 quick parliamentary political tactics allowed legislation for another major development, this time on the Pieman River system, to pass quickly and largely unchallenged. The shell-shocked conservation movement saw another major wilderness asset destroyed without challenge, despite incursion into the famed Cradle Mountain - Lake St Clair National Park.

Then, in the early 1980's, the debacle of Lake Pedder's flooding looked set to be repeated as the Hydro-Electric Commission moved ahead with its plans to flood the Franklin and Lower Gordon Rivers, still in accordance with the inexorable logic that its charter only allowed development decisions to be based on economic and engineering considerations, with conservation values now being paid lip service but not permitted to significantly change development plans. By this time, however, the change in public attitudes which had been triggered by Lake Pedder was in full swing, and as history records the HEC's authority was overridden by a nationwide tide of public protest, with Bob Hawke's new Federal Labor Government in 1983 outlawing the Lower Gordon River hydro-electric scheme as virtually its first act of government (Southwell 1983, Green 1984, Pybus & Flanagan 1990).

Although the Tasmanian Government immediately reacted by commencing the construction of alternative hydro - electric schemes, the Henty - Anthony and King River schemes, this was to be the last gasp of Tasmania's now - outdated hydro-

industrialisation policy. By the late 1980's, the HEC and the Tasmanian government finally accepted that they had reached the end of the dam construction road. Whereas in the past the government had been prepared to carry the high levels of state debt incurred by building hydro-electric schemes for the sake of encouraging industrialisation, this policy was no longer seen to be bringing the benefits it once did. After two decades of pressure from the conservation movement, there had emerged a widening public and political consensus that Tasmania's economic future lay in "clean green" skills- and information-based industries with relatively modest power requirements, rather than in large, heavy, high power-consumption industries.

Amidst this changing political environment, during the 1990's the HEC was first corporatised and then split into three different organisations - the Hydro-Electric Corporation, Transend and Aurora - to handle the generation, transmission and marketing of electricity respectively. There was even an attempt to privatise some of these new bodies. Today, Tasmania's electricity authorities are no longer a colossus bestriding the state's politics, but have been reined in to become more a servant of the public than its master.

Blakers (1994) has argued that the HEC's earlier over-estimated predictions of power demand growth in Tasmania caused the state to over-spend unnecessarily on the construction of hydro-electric schemes to an extent which exceeded the state's real needs, yet contributed significantly to high levels of state debt for Tasmania. Indeed, one of the most obvious implications of the earlier over-estimations of power demand growth by the HEC is that if Lake Pedder had not been flooded then the relatively small reduction in available electricity would not have caused any hardship to the Tasmanian economy, but rather would have reduced the level of state debt. What was needed was the wisdom to recognise that the post-war reconstruction phase was drawing to a close, that the accompanying exponential growth in power demand would not last forever, and the ability to allow that, in some cases such as that of Lake Pedder, values other than the purely economic should be allowed to prevail. The failure of many of Tasmania's politicians and bureaucrats of the 1960's and 1970's to exhibit such wisdom has arguably left the state substantially poorer than it could have been, in several senses of that word.

Tasmanian society - and indeed Australia as a whole - has arguably learnt many valuable lessons from the debacle of Lake Pedder and the events that followed it. In particular, not only is the protection of environmental and nature conservation values now widely recognised as a legitimate concern by government and planners -

even if some can still be suspected of paying only lip service to these values - but the importance of open decision making and community consultation on such matters as strategic state development directions are now widely held to be an important criterion of government accountability.

Yet, despite the profound impact that the flooding of Lake Pedder had on the growth of environmental awareness and politics in Australia, despite the evident economic costs to Tasmania from over-spending on dam construction, and despite the changes that the HEC itself ultimately underwent in response to the changing political directions that environmental politics had wrought by the 1990's, I still sense an attitude of denial in both the Tasmanian Government and the present day 'Hydro' about the impact that the conservationists who fought for Lake Pedder and later the Franklin River have had on Tasmanian politics. Perhaps it is the lingering pride of old institutions, too proud to acknowledge that a new set of values has superseded much of what they held to be most important. This sense of denial is perhaps nowhere more obvious than in the first Tasmanian State of the Environment report, published in 1996 (SDAC 1996). Notwithstanding that one aim of that first report was to review environmental issues which had affected Tasmania up to 1996, the section of the report dealing with the environmental impacts of energy production (SDAC 1996, p. 12.1 - 12.14) makes no direct reference to the controversy over the flooding of Lake Pedder, nor to the later Franklin River damming issue; indeed the only direct reference to the loss of environmental values resulting from flooding Lake Pedder comes in a separate section on geodiversity (SDAC 1996, p. 2.11), into which the Hydro had no input.

That a place of such immense natural value could be un-necessarily sacrificed for industrial development in 1972 seems almost unthinkable today. The fact that it could happen then speaks volumes for the changes that have occurred over the last three decades. Arguably, it was only the loss of Lake Pedder itself that finally made it clear that there are indeed circumstances in which the value of natural heritage can and should outweigh some industrial developments.

It is no exaggeration to say that the flooding of Lake Pedder was the greatest single loss that Tasmania's natural heritage - and thus Tasmania's people and future - have ever suffered, a mistake that ranks with the Glen Canyon Dam in the USA. So much so that the idea of restoring the lake was expressed as early as 1974 by Edward St John QC, who as a member of the Australian Government's Committee of Enquiry into the flooding of Lake Pedder, foreshadowed the restoration of the lake with the words "...if not we ourselves, the day will

come when our children will undo what we so foolishly have done" (LPCE 1974).

Whilst the idea of restoration had remained alive in many people's minds since the flooding of Lake Pedder (e.g., see Brown *et al.* 1985), it was only in 1994 that a proposal to restore the original lake was first raised seriously in public by the "Pedder 2000" Lake Pedder Restoration Committee.

The restoration proposal generated sufficient discussion and political credibility that the Commonwealth Government initiated a House of Representatives Standing Committee Inquiry into the proposal (Commonwealth of Australia 1995). Nevertheless the proposal was regarded in many circles as a radical and unrealistic one, and provoked a good deal more hysterical and "knee-jerk" reactions amongst politicians, the media and the public than it did rational consideration of the issues involved<sup>2</sup>. The nature and intellectual calibre of many reactions to the proposal showed that it is an idea whose time is still to come. Indeed, Crowley (1999) has argued that the character of reactions to the proposal to restore Lake Pedder showed that, whilst the years since Lake Pedder's flooding have seen the Tasmanian and Commonwealth governments grant concessions to environmental concerns for reasons of political expediency and utilitarian concern over the quality of the environment, the idea of seeing nature as a thing of value in itself, worth preserving and even restoring for its intrinsic value, has yet to find a compelling place in the concerns of either political or general public discussion. In this light, it is perhaps not surprising that the subsequent finding by the Commonwealth Inquiry was that restoration of Lake Pedder was technically feasible, but that it was not politically appropriate at the time (Commonwealth of Australia 1995).

The irony is that the end of the twentieth century has been a time when Tasmanian governments and the public have devoted considerable energy to the project of re-defining Tasmania's post-hydro-industrialisation direction in terms of a "clean, green and smart" future. There has been much doubt as to whether this new direction is genuine and heartfelt, or whether it is really little more than a new advertising ploy (e.g., see Crowley (1999) as noted above). If the Tasmanian community were to genuinely seek to redefine its future as a "clean green" one, a more inspiring and appropriate project than the restoration of Lake Pedder is hard to imagine. Such a project would send a very powerful signal to the rest of the world that Tasmania's "clean green" image is more than just empty advertising.

Partly as a result of the failure of the media and some others to examine the issues surrounding the Pedder restoration proposal in a sober and considered fashion, the present writer and others initiated the idea of holding a scientific symposium in which the scientific, technical and practical aspects of the restoration proposal could be examined without the hysteria and hyperbole which characterised examination of the issue in the media at the time. This volume constitutes the record of that symposium, and it is to be hoped will provide a basis for a more reasoned discussion of the issues in the future.

## THE SYMPOSIUM

The symposium was held as a one-day event at the University of Tasmania campus in Hobart on 8th April 1995, under the auspices of that University's Centre for Environmental Studies. Invited speakers presented the papers now collected into this volume. The broad purpose of the symposium was to examine the scientific and technical issues

involved in the proposal to restore Lake Pedder, a proposal which if undertaken would raise issues and possibilities for the rehabilitation or restoration of artificially disturbed ecosystems on a scale never before tackled in Tasmania or possibly the world. With this purpose in mind, the symposium had two specific aims:

- To assemble and present a current synthesis of available information on the physical, biological and cultural nature and values of the lake and its environs prior to flooding. Such a synthesis is essential to gauge the value of restoring the lake, and to provide baseline data against which to measure the likely feasibility and success of a restoration process.
- To identify technical issues and potential problems involved in the proposed restoration process, where possible to identify possible solutions to such problems, and to identify the priorities for research to assess unresolved problems.

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<sup>2</sup> A good example of the media response to the restoration proposal was demonstrated shortly before the symposium when evidence given to the House of Representatives Standing Committee by one of the contributors to this volume, Dr. Kevin Kiernan, was misrepresented in the media. On 1 April 1995 under a heading suggesting a "cover-up", the Hobart *Mercury* newspaper claimed that Dr. Kiernan had given evidence indicating that there had been no erosion of the Pedder dune, and that this was at variance with a letter written by him to a colleague as the reservoir was filling in 1972. The implication that misleading evidence had been presented to the Inquiry is clearly contradicted by the Hansard transcript of evidence, which reveals that in his opening comments he ensured the committee had received the consultancy reports he had prepared for the Lake Pedder Study Group, including the erosion report that formed the basis of his second contribution to this volume. He also refers to the erosion later in the Hansard record, and had publicly referred to it in other writings to which the Inquiry had access. In this respect the Mercury report was so seriously in error that it is difficult to believe its reporter could even have been in the room during Dr Kiernan's evidence. The ABC and some sections of the print media in other parts of Australia, to the detriment of Dr. Kiernan's professional reputation, repeated the story nationally. Further, on 4 April 1995 *The Mercury* repeated the claims in its April Fools Day article, this time including an HEC photograph of erosion on the dune face as the reservoir commenced to fill (see this volume, page 161) with a story implying it depicted the destruction of the dune.

The reported 1972 letter (vaguely recalled by Dr Kiernan, but never reproduced by the Mercury) was written at a time when he was a young bushwalker with no geomorphological training (his undergraduate degree was still 7 years away, yet *The Mercury* referred to it as written by "Hobart geomorphologist Kevin Kiernan"). It is likely to have reflected alarm at seeing the first

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symbolic signs of Pedder's drowning by an untrained person who lacked the scientific skills to assess those observations in context with natural processes. Even though he assessed the erosion at that time as likely to prove minor, he reportedly suggested that publicity might be unwise, reflecting a perception by Pedder campaigners that the pro-dam lobby would misrepresent the situation in the media. It is ludicrous to think Pedder campaigners of the day would have persisted if they had known draw down would have revealed the landscape and the credibility of the conservation movement to be in tatters. Similarly, it makes little sense to think that a professional geomorphologist in 1995 could risk destruction of his professional and personal reputation and livelihood by giving false evidence to a parliamentary committee (which would have constituted contempt of parliament) that was considering exposure of the site and, hence, revealing his own professional competence and honesty.

There are various issues raised by this saga that warrant community contemplation. They include: (1) the rigor of the factual information presented by some newspaper journalists; (2) the capacity of generalist (and especially political?) journalists to report on scientific topics with sufficient technical understanding and scientific detachment; (3) a common failure within the community to recognise that experienced professional scientists have to learn to set aside (or clearly signpost) their personal feelings in order to achieve scientific rigor, and to acknowledge that most do so; and (4) the common tendency for the media to impugn the integrity of individuals for the sake of an "angle", irrespective of the damage done to them. Despite a complaint by Dr Kiernan to the Australian Press Council, *The Mercury* refused to acknowledge the deficiencies in its report and to withdraw the smear. Faced with the need to incur legal expenses to proceed, Dr Kiernan did not pursue the matter because "there are better things to do with your life".

## AN OVERVIEW OF THE SYMPOSIUM OUTCOMES

Chris Sharples, Nick Sawyer<sup>3</sup>

The remainder of this introductory section attempts to provide a succinct summary of the major conclusions and issues that emerged from the symposium. It should be emphasised that the following summary records the major outcomes of the symposium as perceived by the above writers (CS and NS), based on the papers presented and upon audience discussion during and after the conference. Of course, some may differ in their interpretation of the material presented during the symposium; readers are therefore urged to read the papers published in full in this volume, in order to form their own conclusions about the issues involved in the restoration of Lake Pedder. In the following overview, names given in parentheses refer to authors in this volume whose papers address issues related to the points being made.

### *The potential for restoration*

That the original Lake Pedder and its environs was a place of immense nature conservation value in terms of its inspirational and aesthetic qualities, its unique landforms and geoheritage, its biota and its wilderness qualities, is a view with which it seems few would now disagree (see especially Kiernan, Tyler, Lake and Gee). It is generally regarded as virtually inconceivable that a scheme to flood such a place could proceed in the face of public opinion today.

In regard to the potential for restoring the lake to its former state, it was emphasised that there is an important distinction between fossil landforms - those formed by past processes and which cannot regenerate if damaged - and contemporary landforms, which are those formed by ongoing processes, and which can regenerate if damaged (Kiernan). It was demonstrated that the fossil landforms of Lake Pedder are little damaged and are recoverable (Tyler, Kiernan). It has been shown that the lake basin and its surrounds have not been buried by "metres of sediment" as has sometimes been suggested (Tyler). The most serious landform damage has been a line of erosion around the shore of the present impoundment, which is of minor geomorphic significance and does not relate to Lake Pedder itself (Kiernan). The visual impact of this damage is similar to the Scotts Peak Road, and would be mostly invisible from a restored Lake Pedder, although a restoration proposal would need to address the issue of the extent to which rehabilitation of this shoreline erosion should be actively encouraged (Duckett, Kiernan). Some wave erosion has also occurred on

the Lake Pedder dune, but this will be repaired naturally if the lake is restored since the dune is a contemporary landform subject to ongoing processes and was exposed to comparable natural erosion every winter (Kiernan).

The original biology of the Lake and its environs will not be fully recoverable: some species have disappeared from the area (and some may be extinct or nearly so), while other exotic species have been introduced to the new lake (e.g., trout) or have appeared, and both compete with original species and might not be removable themselves (Balmer & Corbett, Lake, Duckett, Sanger). Initial plant colonisation if the impoundment is drained will be by species able to adapt to the bare substrate - it may take a considerable period for successional processes to return the vegetation communities to something like those which were present prior to flooding (Pemberton, Balmer & Corbett, Duckett, Kiernan).

The full wilderness values of the original lake cannot be restored unless access is removed, which is unlikely. However, the aesthetic values of the original lake are certainly recoverable, and the physical cultural features are unlikely to be damaged (McConnell, Gee, Kiernan).

In judging whether restoration should proceed, we need to judge whether what *is* recoverable would make draining worthwhile. In this regard it is noteworthy that to many people the landforms were what "constituted" Lake Pedder, and these are clearly recoverable. However, achievement of natural-looking vegetation is also important (Kiernan, Tyler, Balmer & Corbett, Gee, Duckett). There is also a need to balance the values of a restored lake against those of the existing impoundment, e.g., its economic value for power generation and its use as a trout fishing resource, platypus habitat<sup>4</sup>, etc. An Environmental Impact Statement (or similar) would be an appropriate mechanism to examine the full range of issues involved in a restoration proposal.

### *Restoration techniques and problems*

The restoration of Lake Pedder would require neither the draining of the Lake Gordon impoundment to the north, nor the decommissioning of the Gordon Power Station. Only the Huon - Serpentine Impoundment, which diverts the Huon and Serpentine Rivers into Lake Gordon, would be lost from the Middle Gordon hydro-electric scheme, representing a reduction by approximately 40% of the water currently flowing into Lake Gordon (Livingston).

The existing dam outlets are insufficient to fully drain the impoundment, since winter inflows may be greater than the outflow capacity (Livingston).

<sup>3</sup> Natural Area Planner, Hobart, Tasmania.



Thus draining would probably require a siphon for initial drainage, followed by breaches in the dams to ensure that reflooding does not occur during prolonged periods of heavy rainfall. Whilst total removal of the dam structures would greatly inflate the costs of restoration, the point was made that actual dismantling of the dams and other infrastructure would not be necessary to achieve the goal of restoring Lake Pedder, and indeed from a cultural heritage perspective there might be an argument for retaining them (McConnell).

The main dune at Lake Pedder will be more vulnerable to erosion during draw down than the slopes surrounding the lake (Kiernan). Whilst it was noted that the dune is a contemporary landform which would self-repair following any erosion damage (Kiernan), it was suggested during discussions that a temporary floating barrage would protect dunes from wave damage, and that wave leverage on old dead dune trees could be reduced by cutting them off with underwater saws. The rates of draining will depend on weather patterns, and high rainfalls could result in temporary water level rises during draining (Livingston). This could cause water levels to fluctuate around particular levels long enough to cause serious erosion. It would be necessary to time draining phases for the best times of year to minimise this risk, for example by leaving the water level above the dunes until after winter to ensure rapid draw down through this critical zone.

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<sup>4</sup> A difficult issue of environmental ethics was raised in the Tasmanian media during the 1994-95 public debate over restoring Lake Pedder, but unfortunately was blatantly manipulated by certain politicians and others in the most simplistic and hysterical way, and was not satisfactorily addressed by proponents on either side of the restoration debate. A claim was made, based on scientific research by Professor Nigel Forteath into the platypus population in the Huon-Serpentine Impoundment, that restoration of the original Lake Pedder by draining the present impoundment would decimate a considerable platypus population which has become established in the impoundment (Professor Forteath presented a paper on his research at the restoration symposium, but declined to publish in these proceedings).

This issue relates to the fact that when we destroy one ecosystem (e.g., the original lake) we inevitably create, or transform it into, another (e.g., the present impoundment). If we subsequently transform the new ecosystem back to the old one through a draining and restoration process, then we will inevitably disadvantage and perhaps decimate certain (biological) species, in the same way that the original flooding disadvantaged certain other species. We therefore have to ask whether it is acceptable to disadvantage a present species population in order to return an artificially altered ecosystem to a former state (especially given that not all the species of the former ecosystem are likely to be restorable)?

Should draining proceed, the major problem will be ensuring that revegetation occurs rapidly enough to avoid soil drying out, breaking up and eroding, and to avoid enhanced runoff from the bare surfaces, resulting in both accelerated erosion and larger flood peaks (Pemberton, Balmer & Corbett, Lake, Duckett, Livingston, Kiernan). Rapid revegetation is possible but may require synthetic (i.e., human-assisted) methods, which will result in a financial cost (Balmer & Corbett, Duckett). There is considerable scope for research into the most efficient methods for revegetation of such a large area. Rapid revegetation (with a species mix that can eventually succeed towards a more natural vegetation) would be more important than immediately restoring the best possible approximation to what was there before (Pemberton, Balmer & Corbett, Duckett).

An existing seed bank in the drowned peat soils might resprout easily, but doubts were raised as to the existence of a large viable seed store in the drowned peats. An important immediate focus for research would be testing the viability of seed stored in the drowned peats, and obtaining samples

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In the writer's opinion, to resolve this ethical issue we must be clear about what values we consider most important. Thus, some argued that we should not disturb the present platypus population, despite the platypus being a common and widespread species that is not considered endangered, and despite the other considerable and unique natural values which draining the impoundment could restore. However, to be morally consistent it must follow that a similar level of paramount concern for non-endangered species would mean that we must not allow any disturbance of any species population anywhere, even a common species like the platypus. From this it would follow that no future developments that displace any common species habitats should be allowed anywhere - a proposal unlikely to be acceptable to most of those who chose to exploit the issue of the platypus during the restoration debate of 1994-95! It is difficult to miss the irony of those opposed to restoring Lake Pedder using the same arguments of biological loss for which conservationists have been routinely vilified in the past. Moreover, few if any of those who expressed concern for the platypus in the Huon - Serpentine Impoundment appear to have voiced any comparable concerns for the terrestrial biota that had died not long before (1991) as a consequence of the rising waters of the HEC's last impoundment, Lake Burbury in the King River Valley.

If on the other hand we consider the restoration of the original unique and outstanding landform assemblage and ecosystem at Lake Pedder to be of high significance, and note that no *further* rare or vulnerable species will be endangered (the introduced species in the new impoundment being common and widespread), then we may argue that the unique and highly significant values we are restoring are important enough to justify some disturbance of a non-endangered and widespread species.

of the peat for revegetation trials with a variety of treatments. Fertiliser might be needed to speed up initial revegetation to stabilise the soil surface. The effects of fertiliser in runoff waters are unknown. Synthetic rehabilitation could be implemented progressively at lesser immediate costs if water levels were dropped progressively. Weather patterns during revegetation would have a major effect on soils drying out or otherwise following exposure, although drainage through the complex of preserved stream channels may help to keep soils moist (Tyler, Pemberton, Balmer & Corbett, Lake, Duckett, Kiernan).

The chance of weed invasion during revegetation is relatively higher in the Pedder area than in many other parts of western Tasmania, due to more public access to the perimeter: most weed invasion danger is through people transporting weeds. However, large burnt areas in western Tasmania haven't had weed invasion problems during their revegetation and the potential for weed invasion is considerably less than in eastern Tasmania. Weeds are currently known in only a few spots around the impoundment, and the problem is of a manageable scale (Tyler, Balmer & Corbett, Duckett).

The symposium demonstrated a need for further research to establish with greater certainty the degree of human intervention that will be required for a successful restoration process. In this respect, major questions on which the economics of any restoration proposal hinge include whether:

- natural revegetation could occur sufficiently quickly from existing native seed sources with essentially no human intervention; or whether
- unassisted revegetation would occur quickly but would include many inappropriate species (weeds) - in this case erosion would not be a problem but massive human intervention may be required to restore a more natural vegetation; or whether
- revegetation would occur fast enough with just a little human intervention - e.g. aerial seeding or replanting in selected areas; or whether
- rapid revegetation would require massive human intervention such as replanting by hand over the entire area, which would carry an enormous financial cost and may never be practical.

### ***Future directions***

The symposium indicated that there is a general acceptance that restoration is feasible in principle; the real issues are the costs and desirability of restoration. Ideally, future debate should focus on

the best and most economical techniques for restoration. Research to resolve these issues would be of the highest priority in preparing any concrete proposals to restore Lake Pedder.

If and when the proposal to restore Lake Pedder is in the future adopted, two stages of planning will be required. Firstly, an Environmental Impact Statement addressing all of the issues relating to draining and rehabilitation - including those flagged in the overview above - will be necessary, leading to an Environmental Management Plan for the restoration process itself.

Secondly, a Management Plan to address management of the area during and after restoration will be essential. A significant start on identifying post-restoration management issues has already been made by Mosley (1995). Given that a restoration process would generate considerable scientific and general public interest, decisions would be necessary regarding the degree of public access to be provided both during and after restoration by means of roads and hardened walking tracks. The question of closure and rehabilitation of part of the Scotts Peak Road would need to be addressed, weighing up the fact that partial or complete closure of that road would add considerably to the wilderness values of the southwest, but conversely would have major implications for recreational access to Lake Pedder, the Arthur and Anne Ranges, and the Port Davey walking track. In effect, road closure would restore Lake Pedder to the position it held during the 1960's as a key starting point for many major southwest walks.

In general discussions during the symposium, it was noted that the restoration proposal that was raised publicly during 1994 had resulted in a flurry of new scientific work aimed at investigating the feasibility of restoration. This work is of value not only to the specific issue of restoring Lake Pedder, but also to issues of Restoration Ecology generally. Further research on restoration techniques should be encouraged, not only for Lake Pedder, but also because other forced drainings may be needed for a variety of reasons such as the ageing of dams or increased concern over the stability of features like the Lake Edgar Fault, and we would then need the knowledge of how to restore such places. Restoration (revegetation) of an area as large as the present impoundment would be a project on a scale that is globally unprecedented. Development of rehabilitation techniques would be an exportable expertise whose value could offset some of the costs of rehabilitation.

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**Figure 4:** Lake Pedder, 1971 (photo: C. Sharples)