RESOURCE DEVELOPMENT BY COMALCO IN NEW ZEALAND AND AUSTRALIA

G. E. LITTLEWOOD*

I believe it to be an inescapable fact that maintaining, let alone improving, standards of living in countries like New Zealand requires continuing development of resources. This is not only necessary to provide what most people would consider to be necessities of life but also to underwrite and support increased investment in desirable areas such as education, social welfare and foreign aid.

I also believe that development of resources must have effects on the environment—thus making the goal of complete *preservation* impossible. The imperitative to develop must be weighed against the desire to preserve with the object of achieving proper and balanced use of resources—in other words conservation within its meaning of wise use.

Herein, of course, lies the nub of the problem. Views on what constitutes proper and balanced development diverge sharply, and it will be impossible to even approach proper and balanced development while people on both sides of the fence continue to shout past each other rather than enter into a dialogue.

It is all too easy, especially with the benefit of hindsight, to pontificate on the subject of development and to proclaim absolute and immutable rules which must not be broken if we are to tread the path of environmental righteousness.

If such rules existed one should be able to devise a formula to give the precise number of potential megawatts needed to justify the damming of one remote trout stream. Such rules are figments of the imagination, because we are dealing in an area requiring much subjective judgment. It is difficult, if not impossible, to make absolute judgments which can be applied to all cases.

A presupposition that absolute rules prevail implies that development of major resources takes place in a vacuum subject only to these rules. This is far from reality in most cases. Whether development of a resource can proceed at all—at any given point of time—usually depends upon a complex web of economic, political and social factors. Furthermore, by their very nature, large-scale projects to develop resources may take a long time to complete. They are often conceived against one historical backdrop and come to maturity against another. Attitudes may change over such a long period, but it is difficult to change the developments themselves in mid-course, especially if many millions of dollars have already been committed. Recognition of these two aspects of resource development:— firstly, that specific economic and technical criteria shape development plans; and secondly that there is an inherent time lag involved in bringing large projects to fruition, constitutes an essential prerequisite to meaningful dialogue between differing points of view on conservation.

RESOURCE DEVELOPMENT BY COMALCO

The creation by Comalco of an international aluminium industry, of which the Bluff smelter is an intergral part, has involved the development of two resources—the bauxite deposits at Weipa, in Northern Queensland, and the hydro-electric potential of lakes Manapouri and Te Anau. It is a task which has involved a total expenditure of more than $700 million and has taken more than 10 years so far.

These two resources are separated by more than just distance. They are located in entirely different climatic zones and their development required solution of vastly different economic, engineering and technical problems. The success of the Bluff project depends upon the combined development of Weipa and Manapouri—plus steadily expanding markets for aluminium.

* Manager, Wellington Office, Comalco.

THE WEIPA DEVELOPMENT

The Weipa bauxite reserve was discovered in 1955 by a New Zealand born geologist (Harry Evans). It is thought to be the largest single deposit in the world, containing perhaps 2000 million tons of high grade ore (50 percent by weight of alumina). Due to the small amount of overburden and the free-flowing nature of the bauxite pebbles the deposit is easy to mine. However, development of Weipa required establishment, from nothing, of mining, shipping and community facilities. To justify this costly development it had to be undertaken on a large scale. More than 80 million dollars has been spent in building facilities to mine and ship 10.5 million tons of bauxite each year making Weipa the largest bauxite mining centre in the world.

Open cut mining on such a large scale radically affects the local environment, if only temporarily. Those interested in preservation of native forest might lament the fact that we don't confine our activities to digging up a small area, mining it, replacing the top soil as quickly as possible and then moving on to another area.

Proper practice of conservation dictates otherwise. The company controls a very large but non-renewable resource and the principles of conservation require that its life be extended for as long as possible, consistent with meeting a standard of quality in terms of alumina content and other factors required by our customers.

The only way to accomplish this is to blend poor grades of ore with good grades. This requires mining various areas at the same time, and the company is using increasingly sophisticated techniques to enable it to prolong the life of the ore body in this way. An extensive geological survey is underway and thousands of samples from all over the deposit are being analysed. This information is being used to prepare several different computer-simulated mining programmes.

A second aspect of conservation at Weipa is the restoration of mined out areas. A condition of Comalco's lease with the Queensland Government is that mined-out areas be restored, at least to their former condition. Comalco recognises the need for this on æsthetic grounds and in the interests of conservation, but it goes much further. With the assistance of the Queensland Department of Forests and the Commonwealth Scientific and Industrial Research Organisation, Comalco has examined the problems of restoration. With the support of the company the Department of Forests has undertaken trial plantings of several species of trees. In order to offset transport costs the timber grown must be of high commercial value. This, and climate and soil factors, has limited experiments to trees such as mahogany, teak, cedar and Carribean pine.

The C.S.I.R.O. work has been concerned with pasture improvement on restored areas. Weipa topsoil has been studied under glasshouse conditions at the Tropical Pastures Division of C.S.I.R.O., and field tests of fertiliser response and adaptability of various pasture grasses and legumes to the combination of climate and soil conditions in backfilled areas have been undertaken. The experimental pastures thus established have been stocked with cattle, brahmin shorthorn hybrids, the growth of which is being measured on a regular basis.

Other conservation work at Weipa includes investigations into the use of trace elements contained in tailings and the possible development of a wood-chip industry, utilising native timbers cleared to allow removal of overburden.

DEVELOPMENT OF MANAPOURI

Establishment of an aluminium smelter to further process alumina refined from bauxite was one of Comalco's first objectives following discovery of the Weipa deposits. It is very difficult to enter the international aluminium market —which is extremely competitive—unless one can enjoy economies of scale and competitively priced electricity. A minimum initial capacity of about 100,000 tons of metal each year is needed, and it is necessary to plan for eventual capacities of at least double that amount. The reduction of alumina to aluminium requires about 17,000kWh of electricity per ton of metal and the supply

must be reliable and continuous. The nature of the aluminium production process is such that, once started, it cannot be stopped for more than a few hours without severe damage to equipment and loss of production for months.

Comalco's power needs for aluminium were thus very specific. A smelter of about 300,000 tons per annum eventual capacity would require about 600mW of power capacity. Operating continuously this capacity would generate more than 5000×10^6kWh of electricity each year (well over one-third of the total used in New Zealand in the year ended last March).

Comalco's power demands have an important bearing on my point that developments like Manapouri do not occur in a vacuum, but are shaped by economic and technical criteria. At the risk of over-simplification, the basic facts are these.

In search of a means of obtaining our specific power requirements, we were investigating potential schemes in Queensland and in Papua and New Guinea. The New Zealand Government brought Manapouri to our attention. Our investigations showed that the potential of the Manapouri resource (with the level of Lake Manapouri raised) matched our requirements very closely. In addition, the potential smelter's special pattern of power demand offered a minimum cost route for developing the full hydro-electric potential, which was not well suited for integration into the national grid, at least for the foreseeable future.

Why do I say ". . . with the level of the lake raised?" There are several factors but one of the principal reasons is assurance of continuity of power supply. The extra storage capacity gained by raising the lake could protect the smelter against economically unacceptable power cuts due to periods of low precipitation.

This short resume, of course, glosses over many questions which have been debated at great length: but one thing is certain—the complementary nature of Manapouri's potential and our specific power need provided the rationale, for both the Government and the company, for entering into the whole development. Lake raising was an integral and necessary part of the concept and was not, as is sometimes believed, in the nature of an "optional extra". This is why the concept was embodied in both agreements and why it has been translated into engineering realities at Manapouri.

For its part Comalco accepted, without question, that clearance of the shoreline before inundation was necessary and agreed that the cost of doing so should be reflected fully in its power charges.

The company has retained its own consultants, the King Ranch Incorporated, a U.S. based land-clearing company, to advise it on this important matter. The King Ranch has cleared more than a million acres of land in various parts of the world, under widely varying conditions of climate and terrain. It is also a design consultant to major manufacturers of earthmoving equipment. After a detailed inspection of Manapouri, King Ranch recommended adoption of very specialised mechanical methods, which it has used successfully in other places. We endorse the adoption of these methods, which we are confident will result in a higher standard of clearance than provided for in the agreement.

CONCLUSION

Thus, Weipa and Manapouri demonstrate the complex nature of resource development projects (which makes the application of absolute rules difficult) and that resource projects proceed against a changing historical background. However, in advancing this argument I do not seek to deny the justification of setting high ideals for protection of the environment and of striving to meet them.