

to the south-west of Nuwara Eliya, in an area where the north-east and south-west monsoons compete for influence. As such it is often a Scotsman's paradise of wind, fog and drizzle with leeches for savour; a microclimate unique in Sri Lanka. The significance of this was not realised when planting restarted.

The original planting was a mix of various eucalypts (chiefly *E. grandis* and *E. robusta*) with cypresses and *Acacia melanoxylon*. The cypress is a rough tree, often a hybrid of *macrocarpa* and *lusitanica*, a descendant of vast and ancient trees round Nuwara Eliya Town. *E. robusta* seldom exceeds a pole, and *E. grandis*, though of fair size and gun barrel straightness, is a sawmiller's despair. *A. melanoxylon* is considered "difficult" to saw.

In consequence there was a search for a new species and in the new plantings *E. microcarys* and *E. pilularis* predominated. They had done very well in the drier and slightly lower country to the east and saw and season easily. However, no sooner planted than a leaf fungus struck, not fatal but totally debili-

tating. After rough identification as a cylindrocladium, relief was attempted by spraying with Bavistan. This worked well with small trees but they soon grew beyond reach and were afflicted anew.

The solution therefore had to be a change of species, but what? *A. melanoxylon* and cypress are devoured by rabbits and deer and the form of the cypress requires much work on breeding and provenance. *E. grandis* was not too badly affected, but not welcomed by sawmillers. There appeared to be no suitable local species.

Trials, both old (there were several arboreta going back to the 1930s) and new, were checked for susceptibility, and all eucalypts were found to be infected to one degree or another. However there was found to be significant difference and favoured were those species from the colder and wetter areas of Australia, notably *E. fastigata*, *E. regnans*, and *E. saligna*. *E. globulus* proved a very fast starter until overtaken by infection and was dropped, but *E. nitens*, newly tried, appeared to have both vigour and resistance.

Conclusions

The master plan study was very successful in defining the problems facing Sri Lankan forests and wood use but it was less successful in getting them acknowledged. One local environmental group even went so far as to claim that the plan prescribed for the extinction of the forest by 2030 rather than describing the path if nothing was done to halt the rate of descent.

The main obstacle in the way of a solution is the extreme individuality stressed in the local cultures. Proposal of a solution in one quarter is but a demand for a dozen alternatives from others, each of whom will give nothing to any of the others.

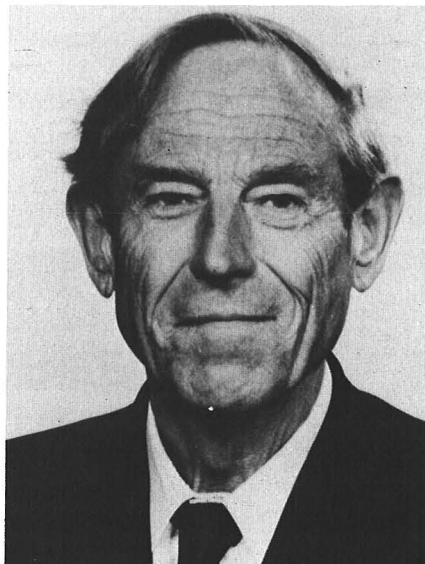
Regrettably it must be concluded that a solution is not likely to be agreed on. New Zealand forest economists should place Sri Lanka on their list of potential markets as a country which has foregone its forests. But it is a poor country and may not be able to buy. That, for the poorer 75% of the population, will be a tragedy. The others will continue to enjoy the luxury of argument.

Forestry beyond the rim

Dennis Richardson

Travellers in the less populated areas of the world soon discover that when hosts and guest have no common language, the ritual of the toast – in whatever hokunui is available – provides a means of communicating professional goodwill, and a protection against what can seem to be importunate curiosity. As time passes, the focus of the toast becomes more improbable and contrived (and less clearly recalled the next day). In June, 1985, in the remote village of Khugert in the People's Republic of Mongolia, the objectives of the NZ Institute of Forestry were acclaimed and linked with the exploits of Ghenghis Khan: in 1988, in Mozhuogongka – alongside the Lhasa river in the Tibetan Autonomous Region of China – solidarity with the legendary epic hero King Gesar was affirmed in like manner. The links are not without some inebriated logic. Ghenghis Khan, who in the 13th century controlled an empire more

extensive (as a percentage of the known world) than any ruler before or since, did so by means of a communications network staged along routes marked by planted trees; Gesar, reputedly sent to establish order and justice on earth, fought with the demons that gripped mankind and introduced juniper and walnut trees to Tibet (some believe he may return again if needed – as he most surely is at the present time).



Dr S.D. (Dennis) Richardson.

The author, Dennis Richardson, has held several prestigious positions in the forest industry, science and research and academia. He is currently a practising forestry adviser and amongst his present responsibilities are Director-at-Large, International Society of Tropical Foresters, USA and Governing Councillor, Commonwealth Forestry Association, UK. He is also an Honorary Member and an inaugural Fellow of this Institute.

Outer Mongolia and Tibet

Ecologically and culturally, Outer Mongolia (OM) and Tibet (TAR) have striking similarities (and some equally impressive differences). Though located in different latitudes (42°–52°N, and 27°–40°N respectively), longitudes, and altitudes, the high plateau countries have similar climates (harsh and intractable, with annual temperature ranges of 45°C and extremes from –47°C to +40°C, exposed to high winds and dust storms, but with very little precipitation). Their land areas and populations are of the same order (1.6 million km², supporting 1.7 million people in OM; and 1.25 million km²–2.00 million km², comprising 1.9 million – 3.0 million people, in Tibet, depending on whether the cartographer is Tibetan or Han Chinese).

There is little between them in economic development: there are extremes of poverty and conspicuous wealth. The TAR has the lowest rural household incomes and the highest urban per capita income in all China: it has the highest birth, illiteracy and mortality rates – and the highest social security expenditure. OM publishes no statistics but impressions are of similar levels. (A difference, perhaps, is that the conspicuousness of the wealth in TAR is in the non-produc-

tive and parasitic monasteries, while in OM it is in the ghettos of East European and Russian expatriate "advisers".) Both countries have long feudal histories and, in rural areas, support unique nomadic life-styles. They have extensive forest resources – in the wrong places. (TAR claims more than 15% of China's total growing stock – but the price of one m³ of firewood in Lhasa market exceeds the average annual per capita income; OM has the highest annual production potential of any country in the Asia – Pacific – 460 m³ per capita – but outside the capital city of Ulan Bator the predominant domestic fuel is dried dung!)

Forest Pattern

The major forests are northern coniferous formations – predominantly *Picea/Abies* in TAR and *Larix/Pinus* in OM – together with mixed broadleaved components – *Acer/Betula* in TAR, *Populus/Ulmus* in OM. The latter supports a large area of *Haloxylon ammodendron* (important as a potential fuel wood resource, but not in TAR), while Tibet takes in areas of evergreen-broadleaved forest in the spectacular "river gorge country" of the south-east. *Caragana* scrub is important in both countries for fuel wood and in mitigating soil erosion. In all forests, the genera – though not the species – are familiar to European foresters.

Both countries have extensive pastoral steppes and deserts, with characteristic hooved migratory fauna and many fur-bearing species. Of particular interest is the marmot, the killing of which has for decades been permitted by Buddhism, since it is believed to carry re-incarnated evil souls. In TAR it is a pest of new plantations and in OM a commercially important pelt species. The most important domestic animal is probably the yak, because of its multiple



Agroforestry in Tibet

uses as a draught animal, hair, hide and dairy producer (the pervasive stench of yak butter and human urine is a memorable feature of monasteries) but TAR can grow magnificent sheep and OM provides an unbelievable variety of fermented milk – from mares, goats, sheep, yaks and camels, the flavour varying with the animal mix and their diet prior to milking (which may take place up to five times a day in the case of mares).

Economic Development and Forestry

Approaches to economic development (and the roles of forestry) are different. OM, under USSR tutelage, has invested strongly in heavy industry (mining, cement, manufactures, and "defence") – requiring USSR technology, USSR technicians and USSR markets; it has

led to problems of urban drift to the satellite slums of Ulan Bator, disease and hygiene (open trench communal latrines hold few attractions during long nights at minus 25°C) and, increasingly, public drunkenness. Virtually all monasteries have been closed (one remains at Gandan to serve a tourist function) and the Mongolian language was (until recently) banned – resulting in educational regression, **growing** illiteracy and a much lamented loss of cultural control over lawlessness and violence. Rural "reform" has centred on enormous arable state farms, established with predictable results on arid, windswept, virgin grasslands. Erosion and desertification are rampant. Belts of trees have been planted but, in the absence of fertilisers, pesticides and proper tending, survival and growth are poor. Alongside water courses, growth is good but survival is patchy. A significant part of the reason is cultural – crop and livestock farmers (whether Russian or Mongolian) cannot accept trees as part of agriculture; trees belong in the mountains; they grow by themselves; they are not crops; why waste precious fertilisers or water on them?

Development in TAR, though equally under the control of an ethnic minority (Han Chinese), has been in a lower key. There is no mining, there are no railways (the nearest railhead is 1000 km from Lhasa, in Qinghai province) and few roads; electric power is still a curiosity. Agriculture – particularly through irrigation – has been stressed, religious autonomy tolerated and attempts made – not very successfully – to involve the monks in productive work. Rudimentary schools exist in most communities (teaching through Tibetan script and with inappropriate academic curricula); life-styles



Fuel wood from the high country. Lhasa Valley, Tibet.

have changed less in TAR than in OM. The writ of Beijing does not run strongly in Tibet and the market drive of Deng Xiaopeng's new China has not yet reached the TAR. There are fewer disincentives to pastoral conservation than in OM and the city lights are less attractive.

The potential roles of forestry, as in all less developed countries, are economic, social and political. The natural forests yield industrial raw materials – to be used mainly beyond their borders; in both there is a burgeoning need for domestic fuel wood which must be satisfied by plantations. The political role is twofold: to involve under-occupied armed forces in agriculture-based development and to counter urban drift.

There are striking differences in the methodology of technology transfer: and in the scope for bilateral and multi-lateral technical assistance. In both OM and TAR there is a perceived need for irrigated plantations – to shelter cultivated land, to yield animal fodder, to buffer the vagaries of pastoral production, and to supply vital fuel wood needs. But in OM, the lack of enthusiasm among foreign advisers for tree planting stands in contrast to the TAR – where high technology (clonal) plantations are expensively fenced and carefully tended. Many Han Chinese technicians have worked in the TAR for over 20 years, and are dedicated professionals; they come on a seven-year minimum contract and must be fluent in Tibetan; they live in villages and they share living standards. Russian technicians in OM, on the



Larch and pine forest, Orkoni Kurkre, Mongolia.

other hand, are domiciled in high-rise urban ghettos; they are able and work hard, but they could as well be working in Leningrad or Havana. The People's Liberation Army (PLA) does not integrate in the TAR, but is more heavily involved in non-military, economic, activities (agriculture, construction, manufactures, reforestation etc.) than are the foreign guests of OM. In China generally, the best forest management is in PLA schemes: it may be no less bureaucratic than civilian systems, but it is less prone to sectional squabbles (pecking-orders are more clear-cut) and inefficiency can be eliminated more quickly.

External Development Assistance

OM and the TAR are both heavily dependent upon external aid, but they illustrate stark contrasts in international assistance. In Ulan Bator, the UN agencies form their own mini-community – with their own brand of feudalism; they fund consultant studies, they provide some teachers and technicians; but, lacking an international language, Mongolians are ill-fitted to gain much from their endeavours. In Tibet – as in the rest of China – the most promising assistance projects in agriculture and forestry are those of the World Food Programme (WFP) in which, once the technical details have been agreed, implementation is left entirely to the local agency; and the "assistance" is food exchanged for labour. There are no expensive expatriate advisers, overseas study tours or foreign currency deductions from loan monies. The donated food helps to reduce world surpluses without upsetting the markets of the rich, and it directly benefits the people who labour on the projects.

All aid is tied – whether by chains or the lightest of threads – and every system can be abused. In China, some would argue that the use of WFP resources to dispossess and move poor farmers to non-traditional villages – in the supposed interests of impotent giant pandas – is an abuse of the system. But the WFP's endeavour in Tibet is *prima facie* more cost-effective than most international – or indeed bilateral – assistance.

Bai Bang Pulp and Paper Mill project, Vietnam

Maurice Williamson

Vietnam is currently undergoing change following a long period of post-war isolation. The supply of goods in the shops and markets is increasing rapidly, foreign investment in joint-ventures is being sought and tourism encouraged. With 65 million people there exists a large potential market and interest in investment is being shown, notably by the Japanese and Singaporeans. Private business is starting to flourish and more freedom to accumulate wealth and to criticise now exists.

Despite these encouraging signs, inflation is still very high and the country remains one of the four poorest nations

in the world. With an extremely high literacy rate, low wage structure and high unemployment, substantial natural resources are available and there exists a potential to develop quickly.

Located 120 km north-west of Hanoi, the Bai Bang Pulp and Paper Mill is responsible for about 30% of Vietnam's paper production. The project is a bilateral Swedish-Vietnamese development, sponsored by the Swedish International Development Authority. Scanmanagement, a consortium consisting of Jaakko Poyry, Sodra Skogsagarna, AF/Engergikonsult and Celpap, has been responsible for assisting the Vietnamese Ministry of Light Industry with the planning, construction and initial operations of the project.

The mill has a design capacity of 55,000 tonnes of kraft paper and became

operational in 1982, using imported pulp for the start up. From 1983 production has relied solely on domestic raw material and paper production has increased to a present level of 30,000 tonnes per year.

Wood Supply

The wood fibre for the mill consists of *Styrax tonkinensis*, a deciduous native hardwood of which 112,000 tonnes are needed for current annual production, and bamboo from natural forests at a current annual level of 48,000 tonnes. This material is drawn from an area of 1,200,000 ha, of which 700,000 ha are considered accessible. Plantations are usually small and scattered. Material is felled by axe and knife and then transported by buffalo to a landing. Here material is accumulated before being

The author, Maurice Williamson, is currently working in Vietnam for Scanmanagement of Sweden as Plantation Adviser to the Bai Bang Pulp and Paper Mill project.