

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.

loaded onto tractor-drawn self-loading Rottne trailers for transport to lower landings at the riverside. Here rafts are constructed and the material floated down river to the port which is adjacent to the mill. A journey of three to seven days. Some wood is also transported by truck and rail.

With the passage of time it has become increasingly apparent that the wood supply situation was not as good as first thought. Several reasons exist for this, the most important being the lack of basic inventory data in the early 1970s, when design work commenced. Other contributing reasons have been the loss of large areas of bamboo through flowering and shifting cultivation, lower yields/ha of *Styrax* than expected, losses of wood along the supply chain, a high demand for fuel wood and a large outflow of wood to Hanoi and other areas of the country.

Plantation and Soil Conservation Project

To improve the medium and long-term wood supply situation, a new agreement was made between Vietnam and Sweden on support to a Plantation and Soil Conservation Project. This agreement covers the period from July 1986 to June 1990 and has the following objectives:

- Create an additional wood resource, capable of stable long-term production.
- Increase production of fuel wood for local needs.
- Contribute to improve the ecological 'balance'.
- Engage the local population in tree growing.

This project has taken over from more limited, earlier Swedish silviculture support, which was largely concerned with research and nursery development. The agreement calls for 16,000 ha of forest to be created over the four-year period. About half of this is to be *Styrax* with the balance being *Acacia*, *Eucalyptus* and pines.

Indigenous species

Styrax has a number of interesting features. It is fast-growing and can be cut at age ten years, is a pioneering species native to the area, has a high reproductive capacity and no major health problems. It is established by the direct sowing of seeds into prepared patches of soil. Negative features of the species include its moderate wood productivity (about 10 m³/ha/year), a high wood to pulp ratio (8.6 m³/tonne), susceptibility to defoliators at a young age and the requirement for two thinnings. Despite the less favourable characteristics, *Styrax* will continue to be a major part of the reforestation programme.

Bamboo will continue to form the long fibre supply for the foreseeable future. About 20 species are found in the raw material supply area, of which three – nua, dien and vau – are commonly cut for the mill. While some of this comes from home gardens, the majority comes from natural stand. After cutting of dip-terocarp forest, dense stands of bamboo may develop. These stands can be thinned every three years. Yields are very dependent on species and time since last harvesting and stocking, but are within the range of 2 to 12 tonnes dry weight/ha/year.

Introduced species

Much of the early research effort was concentrated on pines on the assumption that they would form the future long-term supply of long fibre to the mill. The programme is not considered to have been successful for a number of reasons.

1. Protection from browsing animals has been very difficult.
2. The high humidity and rainfall in parts of the raw material supply area have led to a brown needle problem. This title covers attacks by several species of fungi.
3. Pine shoot moth, which heavily infests all pine species and defoliator attacks (*Dendrolimus punctatus*), which can be expected every two years.
4. Heavy weed competition in the northern half of the raw material supply area.

The lack of a short-term solution to this combination of problems has led to the pine programme being substantially reduced and emphasis shifted to exotic hardwoods – *Eucalyptus* and *Acacia*. These are well accepted by the local people, as yet have no major health problems and *Eucalyptus* are not browsed by animals. Provided soils are reasonable, they can be moderately and even very productive. To date most planting of these genera has been with *E. camaldulensis* and *A. mangium*. *E. urophylla* looks very promising on the better soils and planting of this species will be substantially increased. Selection of species and provenances for a large planting programme has been made particularly difficult by the demanding climate of the area, which has hot, wet summers and cool, cloudy winters.

Establishment

On the more difficult laterite soils in the southern half of the raw material supply area, cultivation is necessary and ripping and mounding is carried out with D85 Komatsu tractors. All tree stock is raised in plastic tubes 6cm x 11cm and planted into prepared pits at a stocking of 1100 s/

ha. Hand fertilisation is carried out, using imported NPK, but there are plans to switch to domestic pelletised superphosphate, apatite and Russian sourced urea in 1989. Disc harrowing with a Valmet tractor has also been introduced for weeding and large growth responses have been obtained.

On the steeper country to the north, soils are better and rainfall is higher, but the topography is mostly unsuited for machine operations. In these areas *Styrax*, *Acacia* and *E. urophylla* are being established by manual methods. This involves clearing 1m wide bands on the contour by hoeing, preparing pits and planting about 1650 s/ha. Weeding operations are necessary for up to three years.

Social Forestry

Support in the form of seed, nursery consumables and some equipment is also given outside the industrial programme to promote development of fuel wood plantations. About four million seedlings are grown each year under this programme with co-operatives raising trees in their own nurseries for planting along dykes, roadsides and in home gardens. In some districts this programme has been very successful. The concept is likely to be extended in future under a United Nations funded programme.

Future Prospects

Since the project started, about 5000 foreigners, mostly Swedish people, have been employed on the project. At the construction peak in 1981 over 600 people were living in the project camps. Today this number has reduced to 124 and will continue to fall, as sub-projects are completed and withdrawal continues to the completion date in June 1990. The continuance of Swedish aid to the area after that date is dependent upon the withdrawal of Vietnamese troops from Kampuchea. It seems likely that this will occur and discussion is currently underway on the subject of future projects, which locally could include forestry and social welfare support to improve living conditions.

Problems the Vietnamese are facing up to now are how to fund needed spare parts and a re-investment programme for the mill. The country has very little reserve of hard currency and to obtain these funds export paper is produced. This will have to continue at a level of 25% of total production. A shortage of local currency is also a major problem in ensuring adequate living standards in the face of very high inflation and funding re-establishment work at necessary levels.