

Siberia has a very large forest resource but...

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The following article was prompted by two New Zealand news items.

This year Russian log volume is expected to be some 12–15% lower than in 2011. Increased investment in domestic sawmilling and increasing harvesting and logistics costs are behind this reduction.

From PF Olsen's *Wood Matters* 2012 issue 49 Dec 2012

...rising logging costs in Russia, with forests getting further from the border and further from infrastructure, thus cartage costs are increasing. The easily accessible forests are getting fewer and so more investment in infrastructure such as roads is needed to complete harvests.

From *Friday Offcuts* 21 Dec 2012

For many decades I have had an interest in the forest industry of the USSR now mainly Russia. About a quarter of my doctoral thesis was devoted to an evaluation of the USSR forest resource (Sutton 1975a). That analysis was later published (Sutton 1975b). My general conclusion in 1975 was that although some expansion in the Siberian wood harvest was possible, most of that wood would be required in the western USSR and that any exports would be expensive.

I have also been fortunate in actually visiting part of the Siberian forest. In 1989 as a senior executive of Fletcher Challenge's Tasman Forestry Limited, later to be renamed Fletcher Challenge Forests Limited, I was a member of a group invited to the Siberian republic of Sakha/Yakutia to evaluate forest investment opportunities.

The following is my interpretation of what has and might happen. My understanding is general and my experience is limited to the permafrost forests of the Russian republic of Sakha /Yakutia – a state nearly 12 times larger than that of New Zealand but with a population of less than a million. As the Siberia forest resource is huge and includes areas that have higher yields and are not on permafrost soils, I realise my interpretation could be misleading. However, the following is my understanding of what has and will happen to Siberian wood exports.

The Siberian forest resource

The forest resources of Siberia and the Russian far east, the Asia-Pacific region, are massive. The regions contain about a third of the standing volume of world's coniferous forest. In comparison North America's Douglas fir only accounts for a little over three per cent. Ignoring the harvesting problems and extraction costs

it is not surprising that the size of the Siberian and Russian far east forest attracted, especially in the 1970s, favourable and optimistic comments:

A 1972 cost benefit study by the UK Treasury claimed that the vast areas of virgin forest in the northern hemisphere most of which is in the USSR '...could more than meet the world's need for decades, if not centuries, to come without any need for restocking.' (H M Treasury 1972)

A past president of UK's TRADA claimed in 1974 that 'the vast unexploited forests... in... Northern Russia and Siberia... are extremely rich and consist primarily of high quality mature logs, substantial enough to totally satisfy the domestic requirements of the USSR and indeed open the possibility of expanding exports...' (Palmer 1974).



Endless Siberian forests

The forests of Siberia contain some Scots pine *Pinus silvestris* but are dominated by two species of larch. In western regions the Siberian larch *Larix siberica*, and in eastern Siberia and the Russian far east, Durian larch *L. gmelini*. Most of the larch in Sakha/Yakutia is either Durian larch or a hybrid of two larch species. Both larches are remarkable in their tolerance of drought and extreme cold but are intolerant of competition from other species.

Standing volumes of mature stands of both larch and pine are low – around 100 cubic metres per hectare or less with average annual increments of usually less than one cubic metre per hectare per year. Only about half the standing volume is usable. Fires from lightning strikes are not uncommon. If trees have not reached maturity they often are not killed but their stems may be left fire scared.



Stand of mature Durian larch or a hybrid with Siberian larch



Stand of mature Scots pine

Permafrost soils

Siberia experiences extreme temperatures. In the short summer the air temperature can be over 30°C while in the long winter the temperature can be -50° C or lower. Therefore much of Siberia is permafrost as is about 24 per cent of land in the northern hemisphere. Permafrost is the result of the average air temperature being below zero and the ground remains frozen throughout the year to a depth of 500 metres or more. Only the surface half a metre to a metre thaws during the short three to four month summer.

On our summer visit there I observed potatoes growing and asked about planting. The reply was '10th of June'. If planted earlier they might be killed by a late spring frost and if planted later they may be killed by an early autumn frost.

Permafrost poses unique problems not just for trees which have to be shallow rooted but also for the construction of roads, railways and buildings. Because the subsoil is permanently frozen there is no ground seepage so water runoff requires special attention. Roads, even if temporary, are constructed with a thick layer of rocks.



Road construction on permafrost soil

Railways require high embankments with ballast up to 12 metres or more to ensure lasting stability. In non-permafrost regions embankments and ballast need only be a minimum of about a metre. Houses and buildings must be constructed to ensure that the building heat does not melt the underlying permafrost soil.



An abandoned house with poor thermal ground insulation slowly melting into the permafrost ground

The photograph above shows an abandoned house on permafrost soil slowly melting into the frozen

ground because there was poor thermal insulation. High-rise buildings require special consideration. Piles for a new building must be driven into the permafrost and left for at least a season to become embedded in the frozen soil. When the high-rise building is completed the lowest floor is left open so heat from the building cannot heat the frozen soil.



Piles for a high rise building being left for a winter to freeze into the permafrost soil.

Permafrost also restricts community services water supply, sewerage and heating as these must be above ground and be insulated from the frozen soil. Given the problems and costs it is not surprising that there are very few roads in Siberia. There were however several gulags. These were 'prisons without walls' as there was little point in escaping.

The traditional method of log exports

Siberia has lots of mature and over-mature forests but there are almost no roads, no railways and no significant local wood processing industries. There was, however, a demand for logs in Japan and in Korea. River transport was the only option to supply these markets. The rivers of Siberia are very large. The Lena River is the tenth longest river in the world.

At Yakutsk, capital of the Sakha/Yakutia republic and the coldest city in the world, the Lena River is 450 kilometres from the river mouth and yet to be joined with its largest tributary, the Alden. But it is still a minimum of two kilometres across and in spring it can be as wide as 10 kilometres. At its river mouth the Lena can be 22 kilometres wide. Unfortunately the Siberian rivers flow north into the Arctic Ocean and the river mouth is only ice-free for the three summer months.

To prevent soil disturbance forest harvesting is generally restricted to the long period of frozen soil. Primary roads, which are formed during the summer months, are smoothed with compacted snow in winter. Temporary forest extraction tracks are made with a corduroy of small logs and again covered with compacted snow.

Logs are extracted to the riverbank. During the summer the logs are assembled into rafts with a mixture



A corduroy of small logs for log extraction

of larch and pine. This is done to ensure that larch logs, that may have a density greater than one, float.



Rafts of logs being towed to the mouth of the Lena River

The rafts are then towed to the river mouth before being loaded on to log ships that travel to Japan via the Arctic Ocean and the Bering Strait. A total distance not much greater than if the logs had been supplied from New Zealand.



Log rafts being assembled before being towed to the river mouth

To ensure prolific stand regeneration after harvesting, smaller seed trees are left on logging sites. Regeneration after harvesting appears to be universally successful. Any other kind of restocking is not even considered and anyway would be totally uneconomic.

In 1989 many of the accessible mature and over-mature stands within 10 kilometres of the rivers had already been harvested.

Change since our 1989 visit

The means of long distance haulage has changed along with the market. China has replaced Japan as the major market for logs and most of the logs are now supplied by rail. Since our 1989 visit the extensions to the BAM railway have been completed and further extensions have been planned and construction may have started. The BAM railway runs parallel to the trans-Siberian railway and extensions into the once inaccessible Siberian forests have meant that logs can now be sent to China by rail and not log ships.

The myth behind the BAM railway

The BAM railway was completed in 1974. The then USSR President, Leonid Brezhnev, described the railway as 'the construction project of the century'. The BAM or Baikalo Amurskaya Magistral railway runs parallel to, but around 800 kilometres north of, the trans-Siberian railway. The latter was western USSR's only land link with its eastern ports on the Pacific Ocean.

However the trans-Siberian railway runs very close to the border with China. The BAM railway was started in the 1930s but construction was later abandoned. Later still construction was restarted because of a fall-out between USSR's Premier Nikita Krushchev and China's Chairman Mao Zedong. Rumour has it that Chairman Mao claimed that the southern part of Siberia was actually Chinese territory. Mao threatened to assemble two million unarmed Chinese peasants on the banks of the Amur river which at times is the border between Russia and China. The peasants would walk across the river to claim what China claimed was Chinese territory.

Mao further threatened to invite the western press to witness the Chinese peasants being slaughtered by the superior armed Russia forces. As the loss of the trans-Siberian railway would eliminate access of western USSR to the Pacific, the USSR premier urgently revived plans for the completion of the BAM railway. As I have not been able to verify this account, it must remain a myth.

The BAM railway is a construction feat. As well as 4,200 bridges there are 21 tunnels with a total length of 47 kilometres. One of the most impressive features of the railway is that, unlike the trans-Siberian railway, most of the land it crosses is permafrost. Railway construction on permafrost is difficult. To ensure permanent stability, embankments have to be at least six metres above the permafrost ground.

Railway extensions will ensure further forest access but, as stands near the railway are exploited, the



BAM railway extension under construction with embankments three to four metres high

remaining mature stands are further away. Inevitably, there will be increasing supply limitations.

Conclusions

In 1975 I knew nothing about the BAM railway or its planned extensions. These may have given a boost to the further exploitation of the Siberian forests but any increase in the harvest is only temporary. My initial conclusions remain. Not only are the problems of harvesting in Siberia very considerable but forest extraction costs may eventually become prohibitive. So great are the problems that much of the Siberian forest may never be used.

Acknowledgements

A special thanks to the former Fletcher Challenge for selecting me to join the 1989 visit to Yakutia and a special thanks to the Government of the Republic of Sakha/Yakutia for arranging such an informative visit. Thanks also to Dennis Neilson for his comments on my original draft.

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