

# What factors influence forest development in the Asia-Pacific region?

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## Background

This paper identifies and describes some factors that influence the effective establishment, use and management of forests in national development in the Asia-Pacific region. It is written from the author's personal perspective as a forester who has worked for much of the past 30 years in several Asian and Pacific countries.

Forests have been and continue to be important in all developing countries, notably as a source of wood for building and trade, as well as of food and water, for maintaining the stability of sloping land, for fuelwood for cooking and heating, and historically for industrial fuel. Equally important is the role of forests for soil and water conservation and as a basis of biological diversity.

These factors were no less important in New Zealand as a young developing country in the 19th and 20th centuries than they are in many parts of Asia and the Pacific today. Large areas of our indigenous forests were cleared to make way for farming and for sawmilling to produce the timber needed for building towns and cities. Extensive land use changes followed and over time the effect was widespread losses of indigenous forests and awareness in the early 20th century that new policies, practices and investment were needed to ensure wood supplies could be secured for the future.

Far-reaching changes in forest policy and practices followed the 1913 Royal Commission on Forestry, reviewed recently by Michael Roche (2013), who concluded that it was '... an important episode in the forest history of New Zealand, one that was significant for the course of both indigenous and exotic forestry.' The lessons learned from this experience over the last 100 years have helped establish a forestry sector that has a well-deserved reputation for excellence. They have also shaped the knowledge and experience of New Zealand foresters who have provided a strong technical and managerial basis for making a meaningful contribution towards forestry sector development in the Asia-Pacific region.

## Deforestation

About 31 per cent of the world's total area, just over four billion hectares, is occupied by forests, 93 per cent of which is natural forest. However a major issue confronting forestry sector development in many countries is deforestation (FAO, 2010a), mainly the conversion of tropical forests to agricultural land. It appears to be decreasing in several countries, but continues at a disturbingly high rate in others. About 13 million hectares of forest were converted to other uses or

lost through natural causes, such as fires, each year in the 2000 to 2010 decade compared to 16 million annually in the previous decade (FAO, 2010a). Afforestation and the natural expansion of forests in some countries has reduced the net loss of forest area significantly at the global level.

The net change in forest area globally in the period 2000 to 2010 is estimated at a loss of 5.2 million hectares annually, down from a loss of 8.3 million hectares in the period 1990 to 2000. The reasons for deforestation vary but include:

- Low-cost access to forests for logging
- Ineffective forest policies and legislation for achieving long-term forest management and forest protection
- Little or no regulation of logging, and negligible regard for sustainability of future wood supplies
- A demand for using land for food and oil palm production, for fuelwood collection, forest losses through warfare, and corrupt forest and land administration. Where rural poverty continues to be widespread, this factor alone contributes towards the loss and degradation of natural forests because land needed for food production is almost always more important than its use for forest conservation.

Deforestation in the Asia-Pacific region appears to be steady, at less than 600,000 hectares annually for the last 20 years, a lower rate than in Europe, the Americas or Africa. In Asia deforestation is now most widespread in Indonesia, estimated to exceed 500,000 hectares annually. Deforestation has been sharply reversed in China because of extensive and effective afforestation and reforestation programmes over the past 20 years (FAO, 2010).

What are the consequences of deforestation? The impacts on local or regional communities include:

- Loss of long-term wood supplies linked to loss of employment as well as of long-term income to local communities from sustainable wood production
- Soil erosion
- A diminished ability to grow food sustainably
- Loss of biodiversity and of the potential for improved landscape management and tourism
- Loss of a globally and regionally important carbon sink
- Interruption to water supplies.

Deforestation constrains to a greater or lesser extent the ability of local and national governments to gradually manage their way out of poverty. This is an underlying policy challenge for all developing countries and a primary aim of the UN Development Programme, the World Bank, the Asian Development Bank and other development agencies.

## Asian examples

The following examples illustrate deforestation and forest degradation in three countries in Asia.

### Tajikistan

Less than 0.5 per cent of Tajikistan now has a forest cover, one of the lowest in Asia. This was caused by uncontrolled logging in the early 20th century, widespread cutting of wood fuel for cooking and heating for upland farming during a brutal civil war in the early 1990s, extensive and severe over-grazing by sheep and goats, continuing harvesting of wood fuel by rural communities, and poorly unenforced policies and regulations for forest protection.

Widespread soil erosion has followed and is now a major watershed management issue that will affect agriculture for many years to come. Several indigenous species that are important fruit trees are planted in villages and include apricot (*Prunus armeniaca*), almond (*P. amygdalus*), pistachio (*Pistacia vera*) and apple (*Malus sieversii* and varieties).

The first photo shows a treeless over-grazed mountain landscape in Faizabad Province in Tajikistan where conifer-broadleaved forests once grew – now only scattered juniper shrubs remain. Several indigenous poplar species, notably *Populus tadshikistanica* and *P. alba*, are grown on lower slopes for shelter on farms for producing building poles, timber and fuelwood.

### Timor Leste

About 20 per cent of the national land area has a forest cover, but much of it is severely degraded and continues to be lost. Logging is less prominent than it was before independence in 2002. However continuing

forest losses are caused by widespread cutting of wood fuel by rural communities for whom it is a major source of energy, poorly regulated logging of sawlogs and poles, shifting cultivation, periodic wildfires, and increasingly drought. Forest degradation has also been caused by unregulated cutting of sandalwood (*Santalum album*), suren/toona (*Toona sureni*) and nara (*Pterocarpus indicus*), all valuable species.

The second photo shows roadside fuelwood stacks of *Eucalyptus urophylla* and *E. alba*, both indigenous species that have been cut illegally from badly degraded forests near Dili, Timor Leste. Building poles are also cut from the same forests.

### North Korea (DPR Korea)

Many forests are severely degraded or have been lost altogether in much of North Korea, but reliable information is not available. Forests are widely and regularly cut for fuelwood by many rural communities where most of the population live. This in place of coal that was the main fuel source before the collapse of the Soviet Union in 1989 – many coal mines are now flooded and are unusable. Electricity is scarce and fuelwood is the only source of energy for cooking or heating for most rural communities during the bitterly cold winters. Erosion of relatively infertile and shallow mountainland soils is now a widespread and prominent watershed management concern. The East Asian chestnut (*Castanea crenata*) is however protected, often surviving as large branchy trees on otherwise barren hillsides.

The third photo shows a typical severely degraded and substantially deforested mountain slope that is regularly cut for fuelwood by local rural communities in North Hwanghae Province in North Korea. The small bushy trees are *Pinus densiflora*, an indigenous species. Soil erosion is now widespread in many places and is often severe. The fourth photo shows a villager carrying a load of fuelwood cut from small bushy oak and pine trees.

## A strategic approach to addressing deforestation

What can be done to address deforestation and develop the forestry sector in Asian and Pacific







countries, how can this best be achieved, and by whom? Approaches vary depending on local or national circumstances, but many of these countries have either developed or are developing workable practical strategies for coping with deforestation that include several important components as a part of a medium to long-term programme of forestry sector development.

These components, set out in the sub-sections below, may seem to be straightforward to many New Zealand foresters. However the various actions being introduced through international development assistance programmes, and also by national investment in some countries, are often unclear to inexperienced forestry personnel and officials and customary landowners who often know little or nothing about forestry.

### Forest policy

An essential element of forest development strategy in Asia-Pacific countries is the formulation, or revision, and approval by the government of a comprehensive and balanced forest policy that sets out a common vision and goal for a nation's forests and an outline of the action needed to achieve it. The Food and Agriculture Organization of the UN (FAO) asserts that in the Asia-Pacific region forest policy needs to express:

- The way in which a government wishes to use institutional and legal means for carrying out forestry programmes
- Activities that are aimed at achieving the country's chosen long-term objectives concerning forests and includes relationships with communities, maintenance of land stability, wood and water supplies, and biodiversity conservation issues (FAO, 2010).

Most countries now have a forest policy and are increasingly aware of the direction or orientation it provides for the choice and implementation of government activities that affect land in all ownerships – be it state, private or community-owned. Policies are mostly supported by legislation, although the two may

not always be consistent. Of the 143 countries that have a forest policy, 76 have issued or updated their policies since 2000. Of the 156 countries that have a specific forest law, 69 countries – primarily in Europe and Africa – have reported that their current forest law has been enacted or amended since 2005 (FAO, 2010a). Policies need to be formulated by countries, very often with international development assistance, and should involve stakeholder participation.

As an example, a recently revised and expanded forest policy for Timor Leste illustrates the benefits to this young country of a practical and balanced policy that is relevant to national development and is understood and accepted by landowners as well as by politicians and officials. It sets out in the Preamble, 'A key feature of this forest policy will be ... sustainable forest resources management ... aimed at achieving an appropriate balance between conservation and environmental protection, the production of wood and non-wood forest products for national economic development and meeting the needs of poor and vulnerable people who depend on forests for survival.' The Timor Leste forest policy has six objectives centred on a goal of sustainable management of forest resources (FAO, 2005).

The Timor Leste forest policy is comprehensive, based on practical knowledge, is relevant to the nation's needs and is supported by politicians. It provides 'the framework for maximising the economic, environmental and societal benefits and the contribution they can make to the other objectives of the country', a statement that was also identified recently as being applicable and needed for New Zealand (McEwen, 2013).

### Afforestation and reforestation

All foresters will appreciate that afforestation and reforestation of bare or degraded land is a positive and practical approach for dealing with deforestation. These operations are well established and widespread in much of the Asia-Pacific region and both have a significant impact on reducing losses of forest area through

deforestation. The annual global planting rate is presently about five million hectares, 90 per cent in Asia (mostly in China), also in South America, and makes up an estimated seven per cent of the total global forest area of about 264 million hectares (FAO, 2010). About 75 per cent of planted forests comprise indigenous species and approximately 25 per cent are exotics.

Afforestation objectives and the commitment of governments, landowners and investors vary and depend on land ownership, customary and cultural interests in forests, management objectives, regional development goals, the technical knowledge and experience of local communities and the government officials who are involved. In contrast to New Zealand, most afforestation and reforestation in Asia and the Pacific, irrespective of management objectives, is on land that is in state or communal ownership. Private ownership is uncommon, and this has a large bearing on the management objectives and practices and the success and continuity of forest management programmes.

By far the most ambitious and extensive afforestation and reforestation programmes in Asia, and indeed in the world since about 1980, are in China. Extensive deforestation occurred in the mid to late 20th century over much of the country in the quest to expand arable agriculture to increase food production. It was also to use logs from clear-cut forests as a fuel source for industrial use, mainly for steel production during the chaotic and socially convulsive Great Leap Forward and Cultural Revolution periods. Widespread soil erosion followed in many provinces that was particularly severe on the extensive mountainous loess landscapes of northern China. Agriculture failed or was greatly weakened, and linked to droughts between 1959 and 1961 that were a major cause of widespread food shortages (Richardson, 1966).

The forest cover in China has increased substantially since 1980. For example, in 2011 it was reported as 209.6 million hectares, an increase of more than 50 million hectares in the 20 years from 1991 (World Bank, 2014). Afforestation and reforestation commenced in 1978 on the Three-North Shelter Forest Programme with the aim of establishing forests over about 400 million hectares by 2050, extending about 4,500 kilometres across northern China to form a broad 'shelterbelt' that is intended to protect cities and cropland from floods and expansion of the Gobi Desert. Some of these forests will also provide large volumes of logs for industrial use by the mid-21st century.

Despite numerous technical and managerial setbacks that have led to forest losses or to a decline of forest quality, it is now evident that afforestation is an outstandingly successful part of the national forest development strategy. Key features that have led to these achievements are:

- A long-term national policy for forestry development
- A determination by the government, supported by financial resources, to implement the programme over a long time period

- The ability to mobilise people to undertake the work in the thousands of villages where it is being applied
- The use of many indigenous tree species that are ecologically well adapted to a range of sites and are well known to local communities and the wood industry.

The fifth photo shows an example of reforestation of eroded land in Sichuan Province in China. It is a vigorous five-year-old stand of Mason pine (*Pinus massoniana*), with two times three metre spacing using potted seedlings achieving over 90 per cent survival.



## Forest protection

Forest protection is a fundamentally important aspect of forest policy and management and an essential part of the strategy for addressing deforestation in Asia and the Pacific. Afforestation and sustainable forest management is either impossible, or at best difficult, without effective long-term forest protection including from wildfire. How is this being achieved? Legally established protected areas now cover an estimated 13 per cent of the world's forests which include national parks and wilderness areas. However in the Asia and the Pacific the area has increased sharply since 2000 and is now about 24 per cent of the total forest area (FAO, 2010).

Although not always effective for various reasons, the formation of protected areas is nonetheless 'making a difference', especially for the conservation of biological diversity, the protection of soil and water resources, and the conservation of cultural heritage and landscape values. Protection of increasingly valuable production forests and of some protected areas is achieved by active patrolling by forest guards, sometimes armed as in Vietnam, or by forest owners who act as rangers and share the work on rosters – day and night – in some places.

Having a regular and visible presence in the forest is an essential part of forest protection but is not always effective, and nor are fire protection arrangements,



especially where fire is used as a tool for forest clearing in ecologically destructive shifting cultivation to create weed-free sites, such as to grow upland rice crops in Laos and Vietnam.

### Participation of local communities

There is an increasing trend, especially by governments in China and Vietnam, to provide local communities with long-term rights to use state forest land for forestry and food production. This approach appears to be effective in providing ownership rights to families and descendants and is positive for helping to secure forest protection.

An essential and accepted element of forest development strategy in the Asia-Pacific region is the active engagement of local communities in decision-making on the use of land over which families have long-term land use rights for forestry and agriculture management. Community participation in forest and land use planning – often termed participatory land use planning – is now well established on millions of hectares in China, Laos, Vietnam and elsewhere.

It is used as a process for providing men and women in local communities with a firm and enduring sense of forest ownership and management. It is also increasingly considered to be a key feature of successful forest development where land is in state or communal ownership – about 80 per cent of forest land in Asia. The participatory process has a valuable training dimension, providing opportunities for families to learn and understand about the values and benefits of forests to local communities and to themselves.

The sixth photo shows an example of participatory land and forest use planning by a women's group in Faizabad Province in Tajikistan. They are discussing future community forestry plans and land use options, including for agroforestry.

### Multiple use management of forest land

An important and well understood component of forest development strategy in many Asia-Pacific countries is a recognition and the practice of the multiple use values and benefits of forests. It is defined as 'the deliberate management of a particular forest area in a particular time period for various goods and services' (FAO, 2013). Multiple use considerations usually build on long-held customary interests in forests as a source of wood for building and trade, cooking and heating, food collection from non-wood forest products (plants and animals), and soil and water conservation, amongst other benefits. Multiple uses of forests is promoted, especially in the tropics, as one of the potential conservation and development alternatives to simultaneously satisfy forest stakeholders, for raising local incomes, and curbing environmental degradation, despite difficulties sometimes encountered in applying the concept in practice (García-Fernández et al., 2008).

Two examples of multiple use where food production and forest establishment are integrated are first in the classical 'taungya' agroforestry system applied to the establishment of teak (*Tectona grandis*) in Myanmar. The second, carried out by rural communities in Laos to help counter shifting cultivation, is for growing ngan (*Styrax tonkinensis*) tree crops for the production of benzoin resin, used for incense-making and in cosmetics manufacture. Soil and water conservation is also important in both cases.

The seventh photo shows an example of the multiple use of forests involving agroforestry. This is the establishment of ngan trees (*Styrax tonkinensis*) to produce benzoin resin in conjunction with growing upland rice on hilly land in Houaphanh Province in Laos. Sub-tropical forest is cleared and burned by shifting cultivation. The cleared land was formerly cultivated for two years and allowed to regenerate into



secondary forest for 10 or more years before being cut and cultivated once again, but the establishment of ngn crops now leads to more permanent forest.

## Training

At all levels – from local communities where knowledge of the value and practice of forestry is limited to senior forestry officials – there is a compelling need for education and training as a component of forestry sector development. Training of people living in rural communities in forest establishment, agroforestry, protection and sustainability is an essential part of capacity building in many forest development programmes and projects supported by the United Nations Development Programme and other United Nations agencies.

A balanced approach is needed. Helping to improve the quality of education in forestry colleges is equally important, especially to introduce ideas and knowledge from other countries that are not available locally. No less important are short courses and on-the-job training of people in local communities who have long-term land and forest use rights and who need to know what is involved in forestry operations and other aspects of management.

## Sustainable forest management

The introduction and practice of a sustainable basis of forest management has been never been as important as it is today. Increasing demands continue to be made by expanding populations who depend on forests for maintaining the stability of mountainous land, providing clear water for domestic use, agriculture and industry, wood for building construction, as well as for energy and recreation. There is a compelling need and even a sense of urgency for Asia-Pacific countries to manage their forests in a sustainable manner, and this aspect of the strategy complements the extensive afforestation/reforestation and protection efforts that have been and continue to be made.

Long-term forest management plans are by far most widely applied in Europe – on more than 900 million hectares – but it is Asia where rapid progress is now being made (FAO, 2010a). In the 2000 to 2010 decade nearly 300 million hectares of forests are reported to be under management plan, almost double the area of 20 years earlier. Some plans may not always be effective, but many are and they are strengthening the basis for sustainable management of natural forests and plantations for the long-term benefit of rural communities and investors.

Considerable progress is now being made with long-term forest management planning in several provinces in China supported by German government development loan funding. Having established and protected large areas of pine, cypress and Chinese fir (*Cunninghamia lanceolata*) forests since the 1980s – through the Three-North Shelter Forest Programme

described earlier – Chinese foresters are now asking what do we do now? How can these forests be managed sustainably? The questions are prompted by silvicultural considerations, particularly an awareness that these forests need to be thinned to maintain good health and stand stability, and also to cut the increasingly large volumes of wood that can be harvested for community and industrial use.

The introduction of 10-year forest management plans on forests owned by rural families having long-term forest ownership rights, and also on several state forest farms, is now well advanced in several provinces in central and western China. The aim is sustainable production of logs through future tree crop selection and harvesting to form ecologically stable mixed species forests patterned on selection forest management principles that are widely practised in German forests. Forest management plans are now applied to more than 100,000 hectares of planted forests and the area is steadily increasing.

During the 21st century the expectation is that the productivity and value of Chinese forests will steadily increase. Currently the average standing volume of many pine and cypress forests is about 70 cubic metres per hectare and the average annual increment is 3.5 cubic metres per hectare, both markedly lower than in many mixed species European forests – 270 cubic metres per hectare and 5.3 cubic metres per hectare, respectively. In 2011, 81 million cubic metres of logs are reported to have been produced from 209 million hectares of forest in China, all of planted origin, an average productivity of 2.6 cubic metres per hectare (ChinaAg, 2012). China now ranks in the top eight producers in the world of all categories of forest products, a position it is likely to hold for many decades to come.

The eighth photo shows a view of a typical 30-year-old Mason pine stand originally planted for soil conservation in Sichuan Province in China where forest management plans are now being applied. It was





thinned at age 22, and stocking was reduced from 2,000 to about 750 stems per hectare. Thinnings are sold by forest-owning families as small sawlogs and for medium density fibreboard manufacture.

### What are the lessons for NZ forest policy and practice?

What lessons can be learned from current Asia-Pacific forest development experience that might be relevant to forest policy and practices in New Zealand during the 21st century? In the author's view two issues stand out:

- The formulation and political acceptance of a balanced and comprehensive policy concerning all New Zealand forests would strengthen the technical basis for long-term sustainable forest management. It needs to be realistic, based on good science and practical.
- An acceptance of the multiple use values of all forests in order to more fully recognise the values of soil and water conservation, biodiversity, recreation and wood production. The author suggests that we can ill afford to disregard this important consideration if a balanced approach towards sustainable forest management is to be achieved.

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