

GUEST EDITORIAL

WHAT WILL WE USE THE FORESTS FOR?

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Since time immemorial, forests have provided a range of goods and services for humans. They have also been an impediment, as much of the land needed for agriculture, cities, infrastructure and other uses was once covered by forest and, at some time in the past has had to be cleared. Such clearance is still occurring today, although the *2010 Global Forest Resources Assessment* reveals that the majority of clearance is occurring in tropical countries, whereas the area of temperate and, to a lesser extent, boreal forests is increasing. Data on forest extent do not reflect changes in forest quality, although since the advent of the possibility of payments for reducing emissions from deforestation and forest degradation (REDD), there has been growing recognition the importance of ensuring that forests are not degraded.

Around the world, there are major differences in the way that we look at our forests. Many tropical countries still see forests as a barrier to development and continue to work with conversion policies. If the growing population of the world is to be fed, such conversions are inevitable unless major reforms occur in the agrarian sector. Many tropical forests also remain an important source of firewood and charcoal, and this is likely to continue, at least for the foreseeable future. In both cases, the economic value of goods and services that can be derived from forests is being greatly underutilised. This problem is also present in temperate and boreal forests, but an increasing amount of attention is now being paid to recovering some of that loss in value.

Within traditional modes of forest research, this loss of value is difficult to deal with, as it transcends a number of disciplines. While it might appear to be a problem for forest economics, economists continue to struggle

with the application of economic value to the intangible benefits of forests. Economists are also the wrong people to look at, for example, the potential use of different species for the development of new medicinal products. With a range of new uses for forests and their goods and services being developed, there is a whole array of scientists that needs to come together to determine how we might best use our forests in the future.

In 2011, an inter-disciplinary Task Force on ‘Resources for the Future’ was established by the International Union of Forest Research Organizations (IUFRO). It was given the objective of examining some of the ways that future forests might be utilised. As with other such Task Forces within IUFRO, a key element of its structure is to increase the linkages between scientists in different disciplines. Unlike some previous more academic exercises, the Task Force is also linking academia, government and industry, all of which have a major stake in the future of the world’s forests. The many other stakeholders in forests have not been forgotten, and their concerns and needs are also being addressed.

The Task Force was established to examine some of the future demands on forests. Its mission involves both examining these demands and analysing how they may be dealt with. The demands are exceptionally diverse; in most parts of the world, forests will continue to provide their traditional goods and services, but there will be an increasing array of new goods and services sought as we attempt to monetise more of the real value of our forests. It is only when such value begins to be materialised that it will become uneconomic to clear forests for other forms of landuse.

Given the importance of tropical forests for fuelwood, it is perhaps ironic that the northern countries are beginning (again) to

see the importance of forests as a source of sustainable energy. Much of the material that would formerly have been left in the forest is now being extracted for use as fuel, and a global industry in pellets has emerged in the last few years. The pellets are used in domestic and commercial boilers as a source of energy, replacing fossil fuels. This change has largely been induced by government policies, such as the European Union's goal to derive 20% of its energy from renewable sources by 2020. Wood is rightly considered to be a renewable source of energy, and its use is being encouraged through feed-in tariffs, subsidies and electricity premiums provided at a national level.

Although there is currently a great deal of interest in using forest-derived biomass as fuel, this represents a very small step up the value chain for forest goods and services. There are many more valuable products that are either already coming from forests, or could do so in the future. One example is nanocrystalline cellulose (NCC). This product is derived by milling cellulose from pulp and then dissolving the bonds that hold the chains of cellulose together. The crystallised regions within the chains are then separated and concentrated into a slurry and dried. The resulting product has a wide range of potential uses, including iridescent films and barriers such as pigment, coatings (such as paints and varnishes), composites and textiles. The original product was developed using acid to separate the cellulose, but other techniques have already been developed: one uses biomass steam fractionalisation and a proprietary process to develop a product known as carboxylated NCC, which is alleged to have a number of benefits over other forms of NCC. As with many inventions, it is quite possible that the greatest potential for this new product has not yet been identified.

The development of completely new products is expensive, and favourable government policies are essential. Such policies exist in many developed countries, but few developing countries are able to provide similar levels of support to their local industries. For example, in Canada, support has come from several government programmes including Transformative Technologies, Investments in Forest Industry Transformation, and the

Pulp and Paper Green Transformation. Much of the research around the world has concentrated on plantation species such as pines and eucalypts but is inevitable that there are many more high-value products waiting to be discovered amongst the diversity of our natural forests.

Such developments work best when three elements work in partnership: industry, government and academia. In Canada, government support has been helped by a commitment within the forest industry to introduce a significant amount of innovation to the sector. For example, one of the three goals expressed in the Forest Products Association of Canada's '2020 Vision' is to generate an additional \$20 billion in economic activity from new innovations and markets. The third element, academia, has been involved although the level of investment being devoted to university research is relatively small despite this being where the majority of expertise is concentrated. The universities themselves are partly at fault, since they have not been able to organise to the same extent as industry. While the forest industry consists primarily of a group of well-established companies (with occasional start-ups adding some interesting diversity), the academic sector consists of traditional forestry departments that are mostly ill-equipped to investigate these new products, which are mostly being developed elsewhere within universities. While it is possible for effective networks of scientists to develop (and this has happened in Canada), such networks may not involve traditional forestry departments and, as a result, many departments are suffering.

The goods from forests, it seems, deserve to be recognised as having more economic value than is currently the case. Is this also the case for the services? All indications suggest that this will be the case, despite the difficulties that we have had in operationalising valuation systems for forest services. This is clearly illustrated by the on-going debate over REDD+. Although payments have been made for carbon in the private sector, it remains rare in the public sector (with a few notable exceptions), and the global mechanisms that have been designed are still not operational. It remains to be seen whether the public sector will ever manage to achieve agreement; perhaps if the whole

issue was transferred to the private sector, agreement would quickly be attained.

Many other services are likely to both be increasingly valued and to increase in value. While intangible values such as cultural and religious services gain very little attention from economists, they may grow in importance. There is a surge in interest in such values and, as many traditional forest cultures are increasingly endangered, greater emphasis is being placed on their survival. This already appears to be happening in countries such as Brazil, where large areas of forest have been set aside for indigenous groups. The opportunity costs associated with such reserves provide one way of valuing the services.

One service provided by forests can be linked to human health, the subject of another IUFRO Task Force. There is a long tradition of humans obtaining health benefits from forests (witness the phenomenon of forest bathing, practised in China, the Republic of Korea and Japan). Although the benefits remain controversial, particularly amongst the more traditional medical community in North America, there is now so much evidence indicating beneficial health effects from forest exposure that the phenomenon can no longer be ignored. However, whether these effects are apparent in all types of forests remain to be shown. The hostility shown towards natural remedies in the North American health sector is curious and may be being driven by the competitive nature of the pharmaceutical industry. Yet evidence is mounting from many different sources about the multiple potential benefits of forests for human health, and with many governments facing rising health care costs, the possibility of 'free' benefits from forests should be intriguing for those governments.

With the potential for increased demands for goods and services from forests, good governance is likely to emerge as a key issue, and this is also being addressed by the IUFRO Task Force on Resources for the Future. The limits of international forest governance have been well illustrated over the past 20 years since the United Nations Conference on Environment and Development. It is unclear what future tools (if any) will emerge, but it seems likely

that the private sector may also play a role here. There has been a phenomenal increase in forest certification in developed countries over the past 20 years, an increase that has not been matched in tropical countries. Other private sector mechanisms may also come to play a much greater role than hitherto.

A potential governance problem is that as demands for goods and services increase, the capacity of the existing forest estate to deliver them may be reached. This will require some new thinking about the way we organise the delivery of these goods and services. For example, plantations may be better designed for the provision of goods, including non-timber forest products, enabling a greater concentration on natural forests for the delivery of services. Such a trend is already underway in some parts of the world. Enhanced breeding and, more controversially, genetic modification may offer further possibilities to enhance the production of plantations and some believe that the use of genetically-modified trees in plantations is inevitable, despite the current moratorium on their use in many parts of the world.

There is no easy answer to the question 'What will we use our forests for?' The issue is complex and the parameters forever changing. Uses will change faster in some parts of the world than in others, potentially leading to further inequalities between regions. Within the strict field of forestry, the academic community has been slow to recognise some of these changes, and as a result, scientists from other fields are increasingly working in what was once considered to be 'forestry'. This represents a major challenge for those involved with the management of research institutions, be they government agencies or university departments, as does the increasing involvement of the private sector. It would seem prudent for foresters, forest scientists and forest academics to pay more attention to the changes that are happening around us.

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