

The forest industry beyond 2000

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Introduction

The topic which the President of the Society of Irish Foresters, Gerhardt Gallagher, originally proposed for my presentation was "The forest industry in 2050". Looking back a corresponding fifty-five years into the past, I realised the following.

- The second world war, with all its horrific implications, had only just begun.
- The microchip and its far-reaching ramifications for industry and society were unheard of.
- Much of rural Ireland had still to be electrified.
- The national forestry cover was only 1.5%, with the post-war afforestation programme yet to be conceived.
- MDF and OSB products, now one of the mainstays of our industry, had yet to be invented.

So what can be said about the forest industry in 2050? The answer is not a lot, except in the most general of terms. We know that forestry is a renewable natural resource capable of meeting a wide variety of basic needs such as energy, shelter, literacy, recreation and biodiversity. Most interesting is that it meets the needs of societies at radically different stages of development. In many parts of the world, the basic need is still for energy – half the world's wood is used for fuel. Meanwhile, in the most developed societies, literacy, recreation and biodiversity are the most important uses. It is very difficult to predict what society will be like in the year 2050. Will the green agenda dominate over economic development? Will climate change have become a reality? Will fundamental values have changed? What new applications for wood will have been invented? While I don't know the answers to these questions, I am certain that wood, being the highly versatile raw material that it is, will adapt to meet whatever needs of society which do emerge.

Much however will happen between now and the year 2050. From today's knowledge and perspective, it is possible to see what some of these developments might be. Firstly, if current planting levels can be maintained and the full forestry potential of suitable land realised, Ireland will be a major wood producer by that time. Secondly, sustainable development of resources is becoming a prerogative worldwide. Thirdly, genetics is still at a very early stage of development in forestry. Biotechnology will become a vital part of the forester's tool kit beyond 2000, with far reaching implications.

These seem to be the three major topics which will dominate the development of forestry beyond the year 2000 and about which we can say something realistic at this stage. Accordingly, my presentation has three parts, as follows.

1. To consider how the industry might develop in Ireland as the resource grows.
2. To analyse the implications of sustainability for the industry.
3. To foresee how genetic management and biotechnology might impact on forestry in the years ahead.

Timber supply and demand

The national timber supply will be approximately 3.8 million m³ by 2010, and, provided current planting levels are maintained, should increase to about 12.0 million m³, or six times its current level, by the year 2030. By 2050, if the national target of 30,000 ha per annum can be maintained, the potential sustainable timber supply could well reach over 15.0 million m³ per annum.

Ireland's forestry output will be expanding at a time when the worldwide supply and demand balance is undergoing fundamental change. Industry experts believe that the industry is moving from being predominantly supply driven to being demand driven. If this happens, it will lead to more stable prices and reductions in the notoriously cyclic nature of the industry. It is also expected that the change taking place in the supply and demand balance will lead to slightly higher prices for softwood, and that prices will increase in real terms by about 1.0% per annum – all good news for our fledgling industry. Overall, however, demand is expected to grow relatively slowly, and there is unlikely to be any overall shortage of softwood globally.

Industry development

Our current industry structure, including the new OSB and Masonite projects, is geared towards a total wood production of about 3.0 million m³ per annum. This level will be reached around the year 2000. Growth will be slow after that for at least five years, before resuming again to reach almost 4.0 million m³ by 2010. This means that, apart from necessary sawmilling restructuring, I do not see scope for substantial new capacity in either sawmilling or pulpwood processing until about the year 2005. It will, however, be necessary to start planning this new capacity from around 2000 onwards.

In Coillte, we have already given some thought to what the next industry might be. Our studies suggest that mechanical paper-making, such as lightweight coated or super-calendered newsprint, could be viable in Ireland. I believe that pulp paper should be the next stage of development, so as to provide a strategic balance with the current dependency on panel and sawn products.

In the longer term, if we continue to increase our forest resource as currently planned, we will have sufficient supplies to support a chemical pulpmill – a facility which requires approximately 2.0 million m³ for viability. Our long-fibre *Sika* spruce is an excellent pulping material and we will need a major outlet for pulpwood and residues to support the anticipated growth of production to over 10 million m³.

There are major environmental and economic implications in the development of a pulp paper industry, particularly if we move to chemical pulping. There are new developments, such as the emergence of chlorine-free pulps with closed loop systems, which reduce or eliminate the more negative environmental impacts of the pulp industry. Such plants will,

however, still carry major environmental considerations which will have to be properly resolved. It is not too soon to start planning for such industries now.

From the economic viewpoint, pulp paper projects are enormously capital intensive. An integrated mechanical papermill would cost in the region of £400 million, while a chemical pulpmill would cost closer to £1 billion. We need to monitor both the technological and economic developments of the industry to ensure that we get the optimum industry structure for Irish conditions. There are implications for forestry growers. For example, once the establishment of such industries is certain, growers have the option of growing short pulp-wood rotation crops. Consideration may also be given to growing short-fibre pulp species such as poplar or eucalyptus, to complement our excellent long-fibre Sitka spruce.

While I believe that the pulp paper industry will feature in our portfolio beyond the year 2000, there will also be changes in our more traditional product areas. Engineered wood products are becoming more and more significant and they allow for the potential to develop value-added products away from current commodity areas. We have already seen the dramatic development of MDF over the past 10 years. More recently, OSB is replacing plywood. The technologies associated with basic materials such as MDF and OSB are in turn creating a new range of end products made from reconstituted timber. The Masonite door skin project in Leitrim is a good example. Similarly, pallets could be produced from OSB material at a substantially lower cost than fabricated timber pallets. Products such as laminated veneer lumber (LVL) are growing in significance in the US, driven by a combination of developments in gluing technologies and a shortage of large section lumber. LVL could be made from palletwood, representing a better end use of this assortment. With LVL and OSB, laminated beams are possible – just one example of how engineered wood technologies offer us an opening to expand the application of our timber to create new business opportunities.

Industry structure

The biggest change in the structure of the industry in Ireland beyond 2000 will be the gradual emergence of a large private forestry sector, much of it farmer-owned. By 2010, private log production should reach approximately 300,000 m³, increasing quite rapidly thereafter. While this will involve fragmentation of the growing side of the industry, we welcome the emergence of a larger private forestry sector, in particular, the emergence of farmers as timber producers. We believe that substantial farmer participation is an essential prerequisite for the proper and more complete utilisation of the substantial land areas suitable for forestry. The emergence of these new smaller growers will bring its own issues to be resolved. Chief among these is how to maintain the quality of plantations, given that the experience elsewhere has shown that, for a variety of reasons, small plantations tend to fall short of their potential. Education and training for these new growers are vital. Another issue is the probable emergence of new log trading systems. In Coillte, we are developing a new log sales system under which log allocation and pricing will be determined by open competitive bidding. The system is being designed so that, over time, it could evolve into a form of exchange which might be of interest to new private growers.

While the growing side of the business will inevitably become more fragmented, there is also a need for greater integration and scale in the industry. We are not well equipped in

Ireland to capitalise on the higher added-value opportunities in the industry. The international industry is led by big international companies with long traditions in the business. They have been restructured into even bigger entities in response to fairly massive investment needs in the more lucrative parts of the business. Ireland currently has a very fragmented forest industry sector, with timber growing, sawmilling and pulpwood processing all independent of each other. This is not conducive to the long term strategic view of how the industry should be developed here. Nor is it conducive to the development of an internationally competitive industry. In particular, the long term and consistent market and product development needed to support the correct strategies is not being done. While the current fragmentation persists, the industry will continue to be opportunistic and short term in its decision making. Our joint venture with Louisiana Pacific is a first step towards integration. Beyond 2000, we will require a radically different industry structure if it is to be internationally competitive and still in Irish ownership. I believe that there is an important policy choice to be made at this stage which will determine whether or not our industry is Irish or overseas owned in the longer term. Integration and scale in the Irish part of the industry are required. Otherwise, the industry will be uncompetitive and will eventually end up in the control of some of the big overseas companies. Maybe that is what we want, but I believe that we can do much better by creating the kind of indigenous owned international companies which have already emerged in the Irish food sector.

Coillte is planning its strategic development around the issues which I identified earlier, namely the growth in timber supply, timber demand and prices, the structure of the industry internationally, the need for product and market development, and the need for scale in the Irish forest products sector. If our forest products sector is to be developed in Irish ownership – and that should be an imperative – it needs an Irish company with the scale and resources to operate internationally in a very competitive environment and in a sector dominated by strong resourceful companies. Accordingly, our objective is to develop Coillte into a broad based international scale forest products company. The steps we have taken to date, such as the efficiency improvements within the company, the joint venture with Louisiana Pacific and the development of a new market-based sales system, are all elements of a strategy to build Coillte into a company which can lead the development of the industry on the international stage. It will not be easy but there is no other Irish entity that can fulfill this role. The alternatives are a fragmented, uncompetitive industry sector or one which is dominated by overseas companies – neither of which would be in the best national interest.

Parallel developments in the Irish industry, such as the emergence of a new family of timber growers, the further integration into processing and the internationalisation of Coillte, will take place in a world which is undergoing rapid changes. The most fundamental of these is the notion of sustainable development. Currently, there is some very confused thinking about the role of forestry in relation to sustainability and the environment. Plantation forestry of the type which we practise in Ireland will, I believe, play a very fundamental role in enabling our planet to sustain itself in the face of the pressures arising from a variety of sources such as population growth and the depletion of non-renewable energy resources. This takes me on to the second major part of my presentation – sustainability.

Sustainability

The United Nations Conference on Environment and Development (UNCED), held in Rio in 1992, brought into focus concerns that the ever-increasing world population is creating impossible demands on the world's resources, including tree cover and timber. These pressures will be even more acute beyond 2000, due to further growth in population, ever-increasing living standards and the depletion of non-renewable resources. Forests in Ireland have always been managed according to the principles of sustained yield, whereby the rate of cutting is less than the annual increment. This is the cornerstone of good forestry and environmental practice. In Ireland, the principle of sustainability is enshrined in our Forestry Acts, with the felling of trees carrying with it a replanting obligation. The great international effort in forestry is to make the world's forests sustainable by encouraging developing countries to implement sound management practices in their own forests, whether natural forests or plantations.

Internationally, there are many contradictions in the debate on sustainability and the environment. Old growth forests and plantations are being confused. For example, many environmentalists are negative towards plantation forestry due to concerns about monoculture. Yet there are many examples of monoculture in nature – the forests in Scandinavia, Siberia and North America are predominantly monocultures, as are the eucalyptus forests of the Southern Hemisphere. Indeed, a recent Oxford study concluded, contrary to common perception, that the greatest invertebrate number in Britain per square metre is to be found on the canopy of conifer crops.

Plantation forests like ours are increasingly important in reducing pressure on natural forests globally. The world's population is growing and will continue to grow, and with it a demand for timber which cannot be met from natural forests, many of which are in developing countries and are not managed on a sustainable basis. In the temperate regions, well-managed and highly productive forestry plantations will increasingly be the means of meeting demands for wood fibre while occupying land which is marginal for agriculture. Foresters have a major task to ensure that the real environmental benefits of plantation forestry are fully understood by the public, who are inundated with contradictory and often inaccurate and biased information on the environmental aspects of this type of forestry.

The problem is that the really serious environmental issues are global while the focus of attention is invariably local. This is the kind of ambiguity and contradiction that practising foresters will have to live with more and more beyond 2000. The younger generation who are now coming into adulthood are much 'greener' in their thinking, and yet they also expect to enjoy the full benefits of economic development.

There is at present a very intense debate worldwide on the future role of forestry. As incomes grow, there is a greatly increased public awareness in the developed world of the wider benefits of forestry in terms of non-timber values such as wildlife habitats, biodiversity, aesthetics, recreation, wilderness areas and ecosystem protection. We need to be very careful in Ireland that environmental and sustainability issues which are relevant in old growth forests in areas such as Canada and Scandinavia are not transferred to Irish conditions which are quite different. We need to clearly articulate the issues relating to plantation forestry and to ensure that the inevitable increase in regulations governing forestry operations and product certification are appropriate to our somewhat unique Irish conditions.

We will not be immune from these international developments. Irish foresters also need to take account of and adapt to these changing values in the wider society, so that an acceptable balance between traditional timber values and the non-timber benefits is achieved. There is a real danger that the green agenda could be hijacked by fringe elements with political or other motivations informing an increasingly urban population on environmental matters. Foresters whose lives and work bring them into daily contact with such groups and who have an empathy with the environment need to re-establish their authority as educated and informed environmentalists.

Recent developments in Ireland are worrying. The most fundamental of these is the gradual transfer of the control and regulation of forestry away from professional foresters to local authorities who do not have the expertise or resources to assess forestry. There are new threshold limits for Environmental Impact Statements and provisions for further consultation with local authorities on forestry development. I believe that this is an issue which ought to concern the Society of Irish Foresters. In particular, if forestry is to be regulated through the local authority structure, the local authorities need to employ professional foresters. How else can forestry in Ireland be properly assessed or planned?

Sustainability is an issue which will have a major impact on forestry beyond 2000. The fundamental concerns regarding future life on our planet which were brought into focus in Rio might seem remote from the day-to-day activities of Irish foresters. They are however presenting an opportunity and a challenge to the profession. The opportunity is to ensure that the growth and development of the Irish forestry industry contributes towards creating a new sustainable supply of wood for the future. The challenge is to ensure that this is done in conformity with best forestry management principles. What is certain is that there will be many real issues regarding sustainability in the wider context for Irish foresters well into the next century. Foresters will need to communicate a great deal more into the depth and breadth of their contribution to the environment and to sustainability.

Genetics and biotechnology

The third major force which should have a fundamental impact on both the production and sustainable aspects of forestry over the next fifty years is technology, in particular, biotechnology. Tree genetics is in its infancy but a lot of basic work, including work in Coillte, has been done on genetic improvement of Sitka spruce and broadleaves. One of the privileges of my position is that I have ready access to the intelligence and knowledge of our Research Department. Accordingly, my contribution in this area is attributed largely to the expertise of Alistair Pfeifer and David Thompson.

The first big breakthrough in terms of production and improvement in timber quality is likely to come from new developments in propagation technology. New developments are starting to give us the means to overcome biological restrictions such as ageing effects, long reproduction cycles and periodicity of seed years. The sequence of development is likely to be as follows.

- Cost effective methods of producing superior genetic stock using conventional rooting techniques are being developed. Coillte already has a pilot project at its Aughrim Nursery to produce 300,000 genetically improved plants per annum in 1996, rising to one million by the year 2000. Refinements of micro-propagation techniques such as

photoautotropic technology promise to lessen some ageing limitations that occur with conventional cutting methods, while at the same time increasing propagation rates and reducing production costs.

- Later, a process known as somatic embryogenesis has the possibility of producing an unlimited number of seedlings of selected clones. This is a process in which multiple embryos are first grown in tanks of a nutrient solution under a controlled environment. The embryos are then encapsulated in a gel or other material to make an 'artificial seed', which can be sown in the nursery and grown in the usual way. A continuous supply of high quality genetic material would be available on demand – a situation which does not apply at present.

The twin problems of restrictions in mass propagation and continuity of supply of high genetic material will, in all probability, be solved by the middle of the next century. Many of the techniques which are currently considered as being novel will be standard practice within forest nurseries. This ability to solve the problem of mass propagation will in time lead to the wider development of clonal varieties for production forestry.

The second major development is likely to be that of clonal varieties of common tree species which will be available with greatly improved characteristics tailored for certain end uses. Clonal varieties are already common in many garden plants and in agriculture.

The development of clonal varieties of Sitka spruce, oak, ash and sycamore has already started in this country. Superior individuals have been selected in our forests and are being tested in field trials. As the propagation systems develop, foresters will be able to order from the nursery a variety of Sitka spruce which has superior wood density for chemical pulp production, or a variety of oak which has superior stem form and growth rate. Propagation techniques and cloning have the ability to greatly increase the productivity and quality of the timber we produce in our forests, by the capture and exploitation of existing varieties within wild tree populations. Additional variations will be possible through the recombination of genes using conventional breeding technologies.

The third major development in tree breeding is likely to be in the field of genetic engineering, which is presenting us with exciting possibilities for new genetic material. The identification, isolation and insertion of genes that confer specific characteristics into a different species is already a reality. For example, poplar clones containing the glyphosate resistance gene have already been developed. Such developments are likely to increase and accelerate. As more information on the genetic structure of our trees becomes known through molecular genetic studies, and as genetic engineering techniques are refined, a greater range of new transgenic species will arise. The new species will combine the best attributes of a number of natural species which, due to reproductive barriers, are not possible to create using conventional hybridisation techniques. We can therefore envisage a variety of spruce which combines the nitrogen fixing properties of alder with the growth of Sitka spruce and the late flushing properties of Norway spruce which would thrive on frosty sites of poor nutrient status.

The development of transgenic species is already underway in agriculture. Development with forest trees will not be as fast, due to the complexity of tree genomes and the long rotation cycles and testing periods required. They are however a real possibility in the next century. By the time they are developed, difficulties regarding their use will have been debated and resolved using models from agriculture.

The development of domesticated varieties of forest tree species is running contrary to the current European trend towards a more natural ecological approach to forest management. While the new varieties will certainly have a narrower genetic base than wild material, it will not be so restricted as to present a threat to the long term survival of our forests. Their use has great advantages, particularly in intensively managed production plantations where high inputs of labour and ground preparation are best invested on the culturing of high quality genetic stock, rather than on mediocre material. They will enable plantation forests to meet a wider variety of objectives including production, amenity and conservation. All objectives can be accommodated to a greater extent than at present. The skill of the forester will be to find the right balance for each particular site by choosing from a much wider palette of commercially viable species. His or her task will be much more complex, but all the more interesting for that.

The effect of domesticated varieties of crop plants has revolutionised the quality and quantity of agricultural production. It is conceivable that similar gains await us with improved forest tree varieties, although maybe over a longer period. If so, this third major development in forestry over the next fifty years will facilitate the other two of increased production and sustainability.

Conclusion

To conclude, the years to 2050 will see forestry and the forest products industry becoming an industry of major significance in Ireland. Most of the trees which will be felled over that period are already planted. This means that we can predict the quantity and quality of the supply, but not much more. From today's perspective, it seems likely that the pulp and paper industry and engineering timber products will be the important new industry developments over that period. Lessons from the past suggest, however, that new technology and new products could well change the picture radically.

Sustainability in its broadest sense will almost certainly become a major issue, and sustainability of forests will be seen to be a major element in ensuring that this planet can sustain itself in the face of population growth and other forces in the environment.

Finally, there are exciting developments in genetics and biotechnology which should come to fruition in forestry over the period. It has made little impact to date but advances in propagation technologies, genetic improvement of trees and in genetic engineering have the potential to radically alter the practice of forestry as it is known today. These advantages should make it possible for plantation forests to meet a wider range of uses by facilitating greater diversity while improving the overall productivity of the plantations.

We are privileged to work in an industry of such fundamental importance. We cannot predict what the sociological, environmental and technological changes will be over the next fifty-five years to 2050, but we can be sure that the forests and wood fibre which are being planted today will serve future generations well.