



Department of  
**Agriculture,  
Food and the Marine**  
An Roinn  
**Talmhaíochta,  
Bia agus Mara**



# Forest Research Ireland **FORI**

Meeting the needs of Ireland's forest sector to 2017  
and beyond, through research and innovation

Expansion  
of the Forest  
Resource

Productivity

Resource  
Utilisation

Adding  
Value

Forest  
Resource  
Protection

Ecosystem  
Services

Climate  
Change





## Minister's Foreword

The forest sector is now a major indigenous industry with a gross annual output of around €2.2 billion, exports worth close to €200 million per annum and around 12,000 people employed in sector. The sector has played a significant role in Ireland's export led economic recovery and can double output over the next fifteen years. I am determined, as Minister for Agriculture, Food and the Marine, to grow the sector to its fullest potential.

I am therefore pleased to introduce "*Forest Research Ireland – meeting the needs of Ireland's forest sector to 2017 through research and innovation*" co-ordinated by Research Division in my Department under the auspices of the sector-led COFORD Council Forest Research Working Group. As with food and other land based products, we need sound science and robust research so that Ireland can be ahead of the game in terms of forest research.

I believe that this Strategic Research Agenda, which aims to guide public investment in forest research, will provide the scientific knowledge required to underpin expansion, productivity, resource utilisation and adding value to processing and product, as well as ensuring the protection of our forest resource, delivery of appropriate ecosystem services from our forests and that we meet both the challenges and opportunities of climate change.

Despite current budgetary constraints, forest research and innovation continues to be resourced in order to continue existing research programmes and projects and address emerging issues especially in the area of forest health. Irish researchers also need to lever more funding from the EU research funding mechanisms. I am also keen to see further industry involvement in proposals funded under my Department's competitive research funding programme, CoFoRD. Collaboration at all levels is of crucial importance to ensure the taxpayer gets the best return on research investments.

I recognise the level of stakeholder consultation that has occurred in the development of *Forest Research Ireland*; it is through ongoing collaboration and partnership between growers, industry, regulatory authorities and academia, that these research objectives will be delivered for the benefit of our nation.

I thank the COFORD Council and all of the members of the COFORD Council Forest Research Working Group, and particularly the Chairman John Phelan, and staff in Research Division DAFM, for the hard work and commitment in bringing together this Strategic Research Agenda and Report and I look forward to seeing the ongoing impact of forest research investment.

**Minister Simon Coveney T.D.**  
**Minister for Agriculture Food and the Marine**



### COFORD Council Chairman's Foreword

The forest sector and industry deals with a renewable raw material over a long term sustainable life cycle. It is a key part of the green bioeconomy. Many important challenges facing the sector arise from competing demands on land use, for instance agriculture or fibre production, and if used as a renewable energy source the impact on supply for wood processing into valued added product. Changes in species composition in our forests also bring new challenges.

A concern is whether there will be enough wood in Europe to provide for renewable energy needs as well as for board and sawn wood products. While growth in forests in Europe still exceeds harvest, supply is tightening and measures to increase the wood supply base are taking place. Ireland is one of the few countries in Europe with the potential to expand the forest resource area. It can be achieved without impacting on agricultural production and in accordance with environmental requirements. We need to ensure that our forest owners – public and private - can deliver on national forecasts of wood production from sustainably managed woodlands. We also need to encourage high added value end uses for wood, substitute imports with home-made product and maintain and expand employment.

The forest sector has enormous potential in producing and processing a renewable, sustainably produced raw material. To reach its potential as part of the green economy an active forest policy founded on solid scientific knowledge is essential.

The COFORD Council sees research as a key component of delivering value, creating more employment and bringing best practice to all aspects of the forest sector. This will be achieved through building on existing, and where necessary, additional Irish competencies, interaction with other State agencies, further developing European and international linkages and technology transfer.

**Michael Lynn**  
Chairman COFORD Council



### COFORD Council Forest Research Working Group – (CCFRWG) Chairman’s Foreword

It is difficult to predict the future and especially in an economic sector affected by outside forces such as climate, political policy and public opinion as well as market forces.

What seems certain is that by 2050 the world will need 70% more food, and 45% more energy with dwindling fossil resources. This is in the context of increasing public demand, and legal requirement to protect, preserve and indeed enhance Europe’s and Ireland’s environment while addressing the urgent social needs reflected in high unemployment, especially in rural areas, in Europe and in Ireland.

Climate change is accepted as a reality, presenting opportunities and challenges for forestry. The threat from pests and disease, in part at least due to international trade, is a real and constant threat and risk mitigation strategy is now a core need.

What also seems certain is that decisions taken over the next few years on land use could have profound implications for decades, indeed generations.

There are a series of challenges:

- Balancing competing land needs (the “trilemma” of food, fibre/energy and environment);
- intensifying production on existing and additional forest land;
- preserving and enhancing the environment;
- being aware of potential threats;
- looking to provide meaningful employment and
- meeting market needs with a reasonable return.

Forestry is, and will be, a major Irish land use. In looking at extending our forest area from about 11% to 17 to 18% as envisaged in Government policy it is worth recalling the words of Theodore Woolsey from his *Studies in French Forestry* (1920) “*The well-nigh universal understanding of forestry on the parts of the French people is only to be expected in a nation so eminently wise. Moreover, a country with only 18.7% of forested land cannot afford to allow further deforestation. Only decadent nations have no considerable area of valuable forest either in public or private hands*”.

While we are hardly decadent, we have a major challenge, despite the availability of large areas of marginal agricultural land, in meeting the opportunity to expand our forest area to a level where it can deliver strategically, economically, socially and environmentally to our successors. Major policy actions, with potentially major consequences, need to be informed by research, supported by data. Appropriate land must be used productively and wisely to ensure the future of the rural economy. Research is an investment in that future.

There is an ever increasing onus to use timber resources efficiently and to deliver optimal value to all stakeholders. That requires best recovery and utilisation of materials and optimal location of industries. Again research can lead to appropriate decision support tools.

For processors of wood and wood residues, market knowledge about the timber resource, mobilisation issues and research on the use of Irish wood to closely replicate existing products is crucial.

Innovative ways of producing and recovering and productively utilising more biomass from our increasingly diverse forests will be a requirement for delivery on jobs and adding value (this assumes steady expansion of the resource area). Innovation is research put into action; investment in innovation will require supporting knowledge from research, and data.

Given both my own role in private forest management, where timber is the output that generates revenue, and the urgent economic and employment issues there would be a temptation, on my part, to want to focus the limited funding of forest research over the next few years almost exclusively on the growing of commercial forest crops and their valuable utilisation. I am very aware of the State contribution to overcoming market failures in the establishment of forests and forest infrastructure. I am also well aware that our (mainly plantation) forests deliver more than timber and that for the public – who fund afforestation – conservation and biodiversity rank highly as outputs. This is not new. To quote from the introduction to the Harvard (University) Forest Models, first published over seventy years ago in 1941 – *“today, people realise more than ever that forests are not mere producers of timber and other products. They have a favourable effect on microclimates, they absorb noise and glare, promote stable soil and watershed conditions, harbour a wide variety of wild creatures, and are pleasant to live in and enjoy recreation”*. That introduction went on to say that *“developing those and other values for a changing society calls for continued research in the developing field of forestry”*. True in 1941, it is even more the case

today – given, for instance, that the dynamics of macroclimate are better, if not fully, understood – that society looks for more from forests. We need to have the means to demonstrate, quantify and value what is delivered in public goods, and what opportunity cost may arise in that process – and how the public might value these ecosystem services and their costs. Research contributes this data or dispels myths.

There is a long tradition of research in forestry. I have A Treatise on Forestry first written in Danish about two hundred years ago by Lord Chancellor C. D. F. Reventlow. It is remarkable in its detailed investigations and observations, its reasoned conclusions and presentation of results and recommendations. In Ireland we have a long history of forest research, first conducted mainly within the State Forest Service, and more recently also Coillte Teoranta, and now increasingly through third level institutions and Teagasc. The private ownership of close on half of woodland area presents challenges as do funding structures and regulations. New commercial opportunities, but also emerging threats, will make considerable demands on both research funding and competencies. We are not alone; across Europe many similar issues are arising, although the issues around significant expansion of woodland area in Ireland are unique. Collaboration, drawing on published research, adaptation of published research to Irish conditions and cross sectoral research programmes will need to be features of further research – for instance land utilisation cannot be considered in isolation from agricultural, energy and environmental policies and subsidies.

Research thrives on data. There is a substantial amount of data in the Forest Service Database, IForIS and the National Inventory Records. Essential data could be consolidated from forest management records. Personally I would like to see an annual report of key statistics on commercial, social and environmental data which would assist strategic development and planning.

Transfer of research results into action through informed policy, innovation and improved practices is essential to justify investment. Right across research investment there is a need to leverage from results to deliver - particularly in the form of jobs, social, economic and environmental return.

Recent developments in the area of tree health highlight a need for flexible and sometimes rapid responses to emerging threats and perhaps, in other circumstances, opportunities.

The Irish forest research community is small and there is a challenge in ensuring that it can respond to demanding and diverse research calls and standards in a competitive environment. The high standards in food and agri research set a benchmark and strong linkages with policy and industry stakeholders are required to support and inform the forest research community in its delivery of a level of excellence consistent with national research prioritisation. Finally forest research has a unique dimension – the very long period, by current political, funding and even employment timeframes, over which some research needs to be conducted; we could be talking in decades in some cases. That highlights the need for continuity, more flexible funding models, good archiving of both subject material and data and, above all, a sense of focus on key factors that could determine land uses, yields and impacts for our lifetimes and beyond. I have formed the strong view that key forest research areas need a Programme rather than a Project approach to ensure best use of resources aligned to forest strategy. How to best achieve that in a competitive environment is beyond the scope of this Group. I hope that it is taken up as a challenge by DAFM and COFORD.

I thank the COFORD Council for the opportunity to chair a group of people most more expert than me in matters pertaining to forest research and I thank them, and especially those who gave voluntarily and generously of time, for bringing their knowledge to bear on this Research Agenda. This Report is due to their commitment and diligence and that

of various State staff in DAFM who made life easier for me in facilitating this process and guided me through the many strands that contribute to formulating a Research Agenda.

The future can be less uncertain with focussed research. The forestry future is already taking place. We are in a dynamic sector that is delivering energy and exports and maintaining vital employment at a difficult time for Ireland. We can expand, improve and employ it to the advantage of economy, employment and environment by benefitting from the implementation, through innovation, of the results of existing and future targeted, and, where appropriate, collaborative research.

**John Phelan,  
Galway.**



\* Since finalising this Report many owners have been impacted by Storm Darwin on 12 February 2014. It is far too early to assess whether that storm was an exceptional but not unusual storm or whether it reflects more fundamental climate change. Either way its impact may enable data to be assessed that could inform silvicultural decisions. Research is the tool to address the lessons that may be learned from this unfortunate event.

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## Executive Summary

The national forest estate is a versatile and multi-functional resource providing a broad range of goods and services, satisfying a diverse range of environmental, social and economic needs.

Forests provide the raw material for processing in sawmills, panel board mills, and other manufacturing outlets, producing construction and engineered wood products for the home and export markets. Forest products are increasingly used a source of energy with the potential to replace fossil fuels and contribute significantly to renewable energy generation.

Forestry contributes much to the health and diversity of Ireland's natural environment, waterways and water quality, habitats and ecosystems and forests are increasingly used for a wide variety of outdoor recreational activities, such as walking and mountain biking. Climate change impact, mitigation and adaptation will be very significant issues for forestry, with the mitigation potential of forests through carbon sequestration well recognised.

Forest research has a solid track record in Ireland, dating back to the 1950s. Knowledge of appropriate species and provenance selection, silviculture and forest management systems still in use today were largely developed as a result of research carried out over the past five decades. In recent years the scope of the forest research agenda has diversified in response to emerging policy and knowledge needs. The forest research agenda today embraces social and environmental forest functions, as well as management, production and utilisation aspects in support of the delivery of the multifunctional potential of forest estate, in the context of the sustainable management of the resource.

The purpose of the **Forest Research Ireland (FORI)** Report is to capture specific policy, knowledge and production focused research topics and ideas relevant to the needs of forest stakeholders. This process was initiated by the COFORD Council in 2012 and has been facilitated by The Department of Agriculture Food and the Marine (DAFM) Research & Codex Division with wide stakeholder involvement and which has also included public consultation.

It is primarily intended to guide the content of DAFM's competitive public good forest research programme (CoFoRD Programme) up to 2017, with the flexibility to be utilised and adapted in a dynamic environment, and also to be used to inform the nature of other publicly funded forest research. Implementation of FORI will be dependent on the availability of national and international funds for research and the quality of project proposals.

FORI identifies seven thematic areas within which the Strategic Research Agenda is set out. Research ideas are presented across seven broad thematic areas and are further divided into sub-themes within the seven thematic areas. Thus, a menu of research needs is presented which will allow funding bodies the flexibility to select research themes which are reflective of the dynamic nature of changing research needs of the sector.

These seven thematic research areas are:

**1**  
**Expansion of the Forest Resource** - sustainable increase in productive area

**2**  
**Productivity** – sustainable improvements in crop productivity and quality

**3**  
**Resource Utilisation** - stand modelling, recovery, supply chain, utilisation and optimisation

**4**  
**Adding Value** – wood processing and product development

**5**  
**Forest Resource Protection** – protecting the resource from biotic and abiotic threats

**6**  
**Ecosystem Services** – the benefits people obtain from forest ecosystems

**7**  
**Climate Change** - impact, adaptation and mitigation – responding to a changing climate

## Acronyms

CAP	Common Agricultural Policy	ITC	Irish Timber Council
CCFRWG	COFORD Council Forest Research Working Group	ITGA	Irish Timber Growers Association
CCLAWG	COFORD Council Land Availability Working Group	JPI	Joint Programming Initiatives
CHP	Combined Heat and Power	KBBE	Knowledge Based Bio-Economy
COFORD	Council for FOrest Research for Development	NHA	Natural Heritage Area
CoFoRD	Programme of Competitive Forest Research for Development	NRPE	National Research Prioritisation Exercise
DAFM	Department of Agriculture, Food and the Marine	NUIG	National University of Ireland Galway
DAHG	Department of Arts, Heritage and the Gaeltacht	NUIM	National University of Ireland Maynooth
DARD NI	Department of Agriculture and Rural Development – Northern Ireland	QUB	Queens University Belfast
DBH	Diameter at Breast Height	R&D	Research and Development
DJEI	Department of Jobs, Enterprise and Innovation	REFIT	Renewable Energy Feed in Tariff
EC	European Commission	ROI	Republic of Ireland
EI	Enterprise Ireland	RPO	Research performing Organisation.
EPA	Environment Protection Agency	RSF	Research Stimulus Fund
ERANET	European Research Area Network	SAC	Special Area of Conservation
FAFB	Food Agriculture Fisheries and Biotechnology	SEA	Strategic Environmental Assessment
FC	Forestry Commission	SEAI	Sustainable Energy Authority of Ireland
FIRM	Food Institutional Research Measure	SPA	Special Protected Area
FORI	FOrest Research Ireland	SRA	Strategic Research Agenda
FRM	Forest Reproductive Material	SSTI	Strategy for Science, Technology and Innovation
FS	Forest Service DAFM	TCD	Trinity College Dublin
FTP	Forest Based Sector Technology Platform	TTO	Technology Transfer Office.
GHG	Green House Gases	UCC	University College Cork
GDP	Gross Domestic Product	UCD	University College Dublin
ha	Hectare	UL	University of Limerick
IBEC	Irish Business and Employers Confederation	UNFCCC	United Nations Framework Convention on Climate Change
IFFPA	Irish Forestry and Forest Products Association	WBP	Wood Based Panels
IFoRIS	Integrated Forestry Information System	WFD	Water Framework Directive
IoT	Institute of Technology	WIT	Waterford Institute of Technology
IP	Intellectual Property		



# CHAPTER ONE FORESTRY IN IRELAND



## 1.1 Forest Area, Composition and Ownership

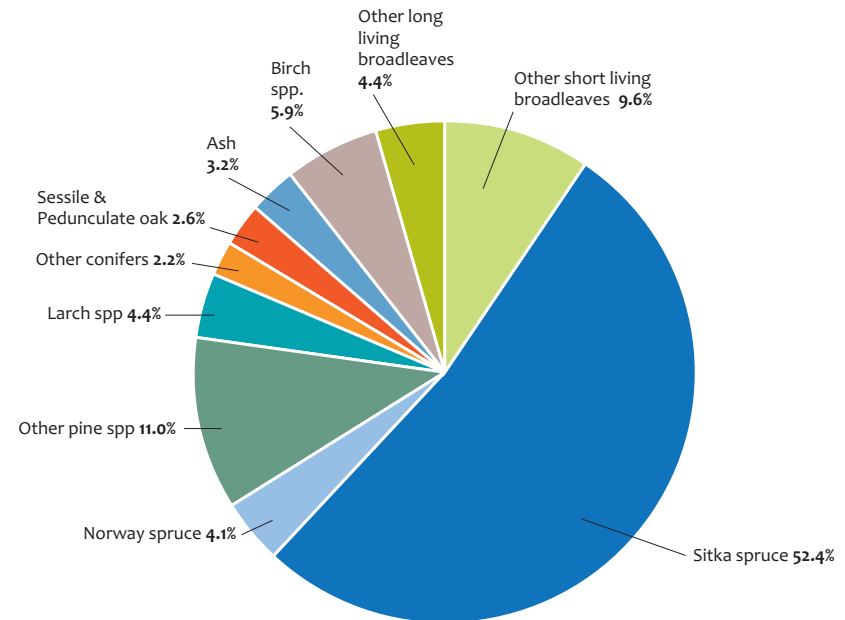
### 1.1.1 Forest Area

The national forest estate has increased from a modest 89,000 hectares (ha) in 1928 to over 731,650 ha in 2012, which represents 10.5% of the land of the country. The level of state afforestation increased significantly from the 1950s up to about the year 2000. Since the 1980s, private afforestation has increased substantially following the introduction of State/EU funded forestry grant and annual forest premium schemes. Annual afforestation reached a peak of 24,000 ha in the mid 1990s and today is in the region of 6,500 ha.

### 1.1.2 Forest Composition

Coniferous species planted in the early years of afforestation included Norway spruce, Scots pine, larch, Sitka spruce and lodgepole pine. Today Sitka spruce is the dominant species in the Irish forest estate – accounting for 52.4% of the forest area and provides the backbone of raw material supply to the timber processing industry.

From the mid 1990s a variety of broadleaved species have been widely used in the afforestation programme with oak and ash dominant species used and today over one quarter of the forest estate contains broadleaved species.



**Figure 1.** The National Forest Estate stocked main tree species 2012  
Source: Forest Service 2013.

### 1.1.3 Forest Ownership

The broad breakdown of forest ownership in Ireland is that older and more-mature forests are State owned and amount to nearly 54% of the forest area whereas the younger forest areas are mainly privately owned and grant aided account for 46% of the forest area. Forest owners classified as farmers account for 85% of the lands afforested since the 1980s and are thereby a new and significant forest stakeholder.

## 1.2 Forest Functions

### Overview

The forest resource has the potential to provide a broad range of goods and services to satisfy economic, environmental and social needs. Forests provide the raw material for processing in sawmills, panel board mills, and other manufacturing outlets, producing construction and engineered wood products for the home and export markets.

Forest products are increasingly used a source of energy – with the potential to replace fossil fuels and contribute significantly to renewable energy generation.

Forestry contributes much to the health and diversity of Ireland’s natural environment, waterways and water quality, habitats and ecosystems. Forests provide venues for a wide variety of outdoor recreational activities.

Climate change impact, mitigation and adaptation will be very significant issues for forestry, with the mitigation potential through carbon sequestration well recognised.

### 1.2.1 Roundwood Production Industry and Markets

Roundwood production from Irish forests is forecast to double from 3.2 million m<sup>3</sup> in 2010 to 6.4 million m<sup>3</sup> by 2028 with almost all of the increase expected to come from the private sector (COFORD 2011). That projected increase reflects the relatively young age of privately owned forests, with over 237,000 ha having been planted within the past twenty years.

The sawmilling sector is composed of a small number of medium to large sized mills and a large number of relatively small sawmills. An estimated

75% of all volume is processed by the five largest sawmills (Magner, 2004). Due to the downturn in the Irish housing and construction sector, sawmills have had to find new markets for their sawnwood products. There are also three panel board manufacturing mills in the Republic of Ireland (ROI), two of which SmartPly and Medite are owned by Coillte.

Since 2007, the trend (in value terms) has been for Ireland to become a net exporter of sawn timber, largely due to the collapse of the domestic construction market and increased levels of exports to the UK with the sterling euro exchange rate being a significant factor. In 2009, Ireland was the fourth largest supplier of sawn softwood to the UK (O’Driscoll 2010). In 2010, sawmills processed 1.7 million m<sup>3</sup> of roundwood, generating 0.8 million m<sup>3</sup> of sawn timber. While the domestic sawn timber market declined by 46% over the period 2008-2010, sawn timber exports grew by 60% (Knaggs and O’Driscoll, 2012).

In 2011, exports of forest products were valued at €308 million, unchanged on 2010. Wood based panels accounted for €173 million. The balance comprised paper and sawn timber exports. In 2010 Ireland became a net exporter of sawn timber in value terms for the first time since statistics were compiled since 1961. In 2011, 763,000 cubic metres of wood based panels (WBP) was produced from 1.34 million cubic metres of wood fibre with 84% or 616,000 cubic metres of WBP being exported (Knaggs and O’Driscoll, 2012).

### 1.2.2 Energy

After wind energy, wood fuels are the largest contributor to renewable energy generation in Ireland – contributing about 4.7 PJ<sup>1</sup> annually to energy use. The largest single use of wood for energy is within the forest products sector itself. There are three commercial wood fuelled biomass combined heat and power (CHP) plants in Ireland with a combined installed capacity of 7.7 MWe<sup>2</sup> (Phillips 2011). Wood fuel for domestic use is also an area of significant growth and development potential.

1 Peta joules

2 Megawatts of electricity

### 1.2.3 Forests and Public Goods – Ecosystem Services

Ecosystem services<sup>3</sup> can be thought of as the link between ecosystems and human wellbeing. Forests and their management have the potential to deliver a range of ecosystem services in relation to biodiversity conservation, water quality, and recreation as well as climate change mitigation.

#### Forests and Biodiversity

Biodiversity describes the variability among living organisms and the ecosystems of which they are part. Forest plantations can make a positive contribution to biodiversity in the landscape when appropriately planned and managed, but may impact negatively in the absence of appropriate management practices.

Appropriate forest planning and management and the interaction of forests and forest management with important habitats and species can contribute towards habitat and species protection, helping to contribute towards obligations under the Birds and Habitats Directives and wider obligations to protect habitats and species.

#### Water Quality and Hydrology

Forests can play a positive role in the maintenance and enhancement of water quality and hydrology, but can also impact negatively in the absence of appropriate management practices. Opportunities exist for forests to help in meeting obligations under the Water Framework Directive (WFD), by, for example, the restructuring of existing forests and the creation of new forests and woodlands including native riparian woodland.

### Forests and Recreation

Forests provide a venue for a wide variety of outdoor recreational activities both informal and organised. In this context, the contribution of forests both as a recreational resource in promoting national health and wellbeing and as a selling point for tourism and contributor to local economies is becoming increasingly appreciated and understood.

The monetary value of the recreational use of forests and trails has been examined in a number of studies. Bacon (2004) estimated the annual recreational value of forests as being of the order of €79 million based on an annual estimated 11 million forest visits. Fitzpatrick and Associates (2005) in their analysis of the Coillte estate estimated that annual visits were 18 million and provided a non-market value of €97 million annually. The total economic activity generated by domestic forest users is estimated at €268 million. Walking tourism, generally by overseas visitors, has a value of €138 million per annum.

### Climate Change

Climate change is considered as such an overarching issue that it merits particular attention. It presents both significant challenges for forestry in Ireland, in terms of potential climate change impact and adaptation and also presents significant opportunities through development of climate change mitigation potential of forests

#### Climate Change Impact and Adaptation

It is predicted that climate change will result in increased frequency of storms, rainfall, drought occurrences and insect and pathogen outbreaks in forests across Europe and forest policies and practices will be challenged to support adaptive forest management to combat these threats.

<sup>3</sup> Ecosystem services: benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth (source: *Millennium Ecosystem Assessment, 2001*)





Climate change is also likely to result in changes in forest species selection, forest health and growth potential, stand stability and even forest and forest product end use.

### Climate Change Mitigation

Forest ecosystems mitigate climate change through carbon storage in soils, tree stem and root biomass and ground litter. The removal of carbon dioxide from the atmosphere by Ireland's forests exceeds 6 million tonnes per annum, or 3.6 million tonnes net of carbon dioxide removed in roundwood harvest (Hendrick and Black, 2009). This is equivalent to almost 6% of Ireland's annual greenhouse gas (GHG) emissions. Kyoto forests – those established since 1990 – have sequestered over 14 million tonnes of carbon dioxide over the period 2008-2012. In addition, wood fuel use replaced fossil fuel derived carbon dioxide emissions of 0.4 million tonnes in 2008 and this is expected to increase significantly in coming years as more roundwood volume becomes available from the private sector.

In addition, forests also have the recognised potential to moderate flooding pressure anticipated from predicted increased frequency of storms and heavy rainfall events.

## 1.3 National Forest Strategy and Policy

### 1.3.1 National Forest Strategy

Ireland's forest policy has undergone a number of significant changes in emphasis since the founding of the State when forest cover represented approximately 1% of the land area. In the early years, the focus was on developing a strategic supply of home-grown timber with the proviso that afforestation did not compete with agriculture for land. As time progressed, the emphasis changed to include a social and employment dimension. The first Programme for Economic Recovery in 1959 and the second in 1964 confirmed the State planting of 25,000 acres (10,000 ha) per annum with a target of 1 million acres (400,000 ha), the social dimension around rural employment particularly in the western half of the country and the strategic aim of self sufficiency in timber. The 1 million acre target was reached in 1993.

The introduction of the Western Package Scheme supported by EU Funding in 1981 saw the first of many initiatives to support afforestation by the private sector and in particular by farmers. The scheme had limited success. However, in 1987 a scheme of compensatory allowances was introduced which provided annual payments. Premium schemes with payments of twenty years for farmers was introduced in 1993. Successive Governments have had ambitious annual planting targets. Afforestation and forest management is supported by a suite of environmental guidelines and other measures to ensure sustainable forest management. The 2011 Programme for Government includes an afforestation planting target of 14,700 hectares per annum.

Forest road schemes and thinning schemes have also been supported by Government to help mobilise the timber resource. Measures to promote private sector management and thinning also include the formation of forest producer groups, a key initiative pursued by Teagasc, supported by

DAFM, over the last number of years. Native Woodland and NeighbourWood schemes have been supported to promote biodiversity and recreation.

In 1989 the State's ownership role in relation to forests was transferred from the then Forest and Wildlife Service to Coillte Teoranta (The Irish Forestry Board Limited), which was established under the 1988 Forestry Act with a mandate to *carry on the business of forestry and related activities on a commercial basis and in accordance with efficient silvicultural practices.*

### 1.3.2 National Forest Policy Review

In March 2010 the then Government commissioned a National Forest Policy Review, as part of its commitments in its Programme for Government.

The Report (Forests, products and people - Ireland's forestry policy - a renewed vision) of that Group, of which the Chairman and some other members of the COFORD Council Forest Research Working Group (CCFRWG) were members, was published on 2 July 2014.

### 1.3.3 Food Harvest 2020

Food Harvest 2020 is a strategy for the medium-term development of the agri-food (including drinks), fisheries and forestry sector for the period to 2020. Published in 2010, the strategy outlines the key actions *needed to ensure that the sector contributes to the maximum possible extent to our export-led economic recovery and the full development of the smart economy.*

In Food Harvest 2020, there are specific research relevant recommendations which the CCFRWG considered as providing context for deliberations. These include:

#### Restoring Competitiveness

- DAFM and industry should further explore measures to bring about a significant increase in the annual afforestation level per annum to 2020. DAFM will continue to examine more efficient methods of increasing the planting level in view of its urgency. The Committee recommends the adoption of the target planting rates for afforestation to be agreed in the parallel Forestry Review.
- DAFM should continue to support the provision of the forest road network, while also evaluating new infrastructure systems.
- Supply chain mechanisms should be developed to ensure biomass crops are brought to market and full market returns realised.
- The relevant State agencies, growers and the timber-processing sector should collaborate to improve and develop the timber industry supply chain to reduce costs and increase efficiencies.

#### Environmental Issues

- DAFM and the relevant State agencies should continue to research the ability of forestry to sequester carbon and the extent to which it can help to reduce Ireland's greenhouse gas emissions from agriculture and the non emissions trading sector in general.

### Research and Development

- The timber processing industry should invest in R&D and innovation to assist product development and forest management.
- Teagasc should continue to research the potential of crops to provide energy and develop efficient production, harvesting and storage methods.
- DAFM, via the CoFoRD research programme, should continue to support sustainable and competitive forestry practices and policies that contribute to building and maintaining a knowledge economy and scientific research in a vibrant forestry sector.

## 1.4 Ireland's Forest Sector and its contribution to National recovery

### 1.4.1 Contribution to the economy

The forest sector has been one of the success stories in an otherwise depressing period in Irish economic history. Faced with a massive downturn in domestic construction demand, Irish sawmillers sought export markets and have made significant inroads in the UK and France. The gains from a highly efficient Irish sawmilling sector were essential to underpinning demand for Irish sawn timber. At the other end of the market, a growing awareness of wood fuel as a heating source, coupled with two hard winters, drove demand for first thinnings, leading to a significant investment in forest infrastructure. The increased use of domestic wood fuel, in pellet, chip and log forms, substituted for imported fossil fuels and ensured that a processing and market capability is being developed to meet future needs.

The total value to the economy in 2010 of the forest sector was €673 million and the total value to the economy in 2010 of the wood products

subsector (sawmills, panel board mills and other wood products) was €2.2 billion (Ní Dhubháin et al, 2012). Direct and induced employment was estimated by the same report to be just over 12,000 across the sector.

The forest sector is relatively young but is increasingly important in the national economy and has a vital role to play in the context of rural development. Over the past decade the importance of wood processing as a component of the sector has greatly increased, as levels of roundwood output have grown and the return on State and private investment in afforestation and related areas becomes more tangible. This trend will continue as the scope and emphasis of forest policy broadens, in the context of Ireland's comparative advantage in growing wood and focus on increasing competitiveness in wood processing and in developing indigenous and export wood markets.

### 1.4.2 Opportunities for the sector

There is scope, for example, to increase the supply from the existing forest resource, and a key issue for improved timber mobilisation is the willingness and capacity of private forest owners to thin their plantations. If greater scale emerged, it would be possible to increase supply through more intensive harvesting, using capital-intensive machinery. If the necessary investments do not take place, there may be a shortfall in supply in the period to 2020. A key issue is that in the event of full take-up of REFIT and other measures there will be a shortage of indigenous biomass fibre by 2020. From a policy perspective a key question is how can this be addressed.

Meeting this level of potential demand, in the short term, for wood from Ireland's forests depends on mobilising a range of actors in the forest sector, and national and local regulatory agencies, to bring this material to market.

## 1.5 The role of research in National Economic Recovery

### 1.5.1 Research Prioritisation

The context for forest research is cross-sectoral with no one owner of the agenda. Forest research can have a significant time dimension; priorities can change with economic or political circumstances or in response to new legislation, Directives and the acquisition of new knowledge. That private afforestation and some forest infrastructure are funded largely by the State, through grants, provides further context.

### 1.5.2 Research from a National Perspective

In addressing the context for developing a Strategic Research Agenda for forestry it is necessary to set out the context for research from the national perspective.

In 2010 the then Government set up a Research Prioritisation Steering Group which met between October 2010 and September 2011. The Group made recommendations to Government on areas of focus for the next phase of Ireland's Science, Technology and Innovation Strategy. In March 2012 the Minister for Jobs, Enterprise and Innovation, published the Report of the Research Prioritisation Steering Group. In his foreword he identified:

- the need to target future investment in areas that link directly to current and likely future economic and societal needs;
- the need to leverage what has been built by targeting public investment towards research based on potential for economic return, particularly in the form of jobs;
- that the Government had an ambitious agenda for Ireland to become the best small country in the world in which to do business, requiring transformation of all sectors of society and that the prioritised researched areas would have a key role to play in this transformation;

- that the Government recognised the critical role of research for policy making and the fundamental role of research knowledge. However it was stated that the majority of future investment in research, development and innovation should be targeted in order to ensure greatest economic return for investment by targeting areas most likely to create economic value and jobs.

Priority Area I in the Report is described as Sustainable Food Production and Processing (page 32+). The text clarifies that the focus of this priority area is on sustainable, competitive and efficient agri-food and marine food production and processing which it states to include, inter alia, **land-use optimisation, forestry and non-food crops** (emphases added).

Elsewhere the Report states that the greatest challenge faced by agriculture is to meet development and sustainability goals, while increasing production. Over the coming decades, there will be increased global competition for land use. This is the 'food, energy and environment trilemma', where increased demand for food and energy combine, pressure on land conversion is increased, leading to further climate change, which in turn may affect productivity and availability of land.

The Report notes that the reform of the Common Agricultural Policy (CAP) will drive further change in farming. It states (Page 64) that (emphasis added here) *forestry is an important part of a sustainable agricultural and food production system. As well as its direct economic contribution, it is key to meeting international climate change targets through carbon sequestration.*

# CHAPTER TWO

## MEETING THE NEEDS OF THE FOREST SECTOR THROUGH RESEARCH AND INNOVATION



## 2.1 Opportunities and Challenges for the Forest Sector

The forest-based sector is under strong competition from parts of the world where forests grow faster, production costs are lower and markets are expanding more rapidly. There are challenges due to increasing costs for energy in manufacturing, but the sector is also well placed to exploit opportunities in the bioeconomy and especially in the field of renewable energy. The following are some examples of opportunities and challenges:

- Domestic producers face particular challenges from the euro exchange rates with sterling. Capacity in processing exceeds supply, putting pressure on efficiencies and costs and giving urgency to the need to focus on timber mobilisation as well as ensuring optimal wood flows and conversion.
- Climate change will increase the risk of extreme events (drought, floods, fire). Risk of pest introduction and spread is also linked to climate change, as well as to increasing levels of trade.
- Climate change is likely to increase forest growth in various regions of Europe.
- The sector has the opportunity to greatly enhance its role in renewable energy provided the resource and supply chain logistics are developed and in place. The opportunity is there to sustainably develop this sector as well as for the development of new products and services, such as intelligent composites, environmental commodities and high tech forest services.

The forest-based sector needs to maintain and enhance its competitiveness in the face of global competition in order to continue to play an important role in Ireland's sustainable development. Research

is one of the most important tools to help maintain and grow competitiveness.

The Strategic Research Agenda (SRA) proposed in this report is not a national programme or an initiative from any State agency. It is a sector informed initiative addressing the needs of the sector and wider society as perceived by growers, foresters, industry and ecosystem experts in order to maintain and improve the competitiveness of the sector through expansion, better recovery and yield, development of innovative products and services and ensuring sustainability and the highest environmental standards of compliance.

Implementation of the SRA will help boost competitiveness across the forest sector by leading to more sustainable production, greater efficiencies and improved delivery - the results will benefit owners, businesses and the National Economy.

## 2.2 The Green Economy

The Government issued a policy statement in 2012 on *Growth and Employment in the Green Economy*. It recognised that key drivers of the growth of the Green Economy include greenhouse gas emission reduction targets, increasing fossil fuel prices, diminishing natural resources, the impact of climate change, environmental legislation and consumer preferences.

In the Chapter on Agriculture, Marine and Forestry it is headlined that *our vibrant Forestry industry has the potential to create jobs and growth through diversification into the new products and services that are being demanded in the emerging Green Economy*.

It affirms that the private sector will be a key partner in the expansion of the sector and the importance of wood as a source of renewable energy.



## 2.3 The Bioeconomy

The Bioeconomy encompasses the sustainable production of renewable biological resources and their conversion, and that of waste streams into feed, food and, in the case of wood, bio-based products such as bioplastics, biofuels and bioenergy.

Forestry has always been a bioeconomy, converting wood, a renewable biological material, into bio-based products and bioenergy.

The term bioeconomy has taken on added significance with the adoption in 2012 by the European Commission of the strategy *Innovating for Sustainable Growth: a Bioeconomy for Europe*. This proposes a comprehensive approach to address the ecological, environmental, energy, food supply and natural resource challenges that Europe and the world are facing. The strategy is led by European Commissioner for Research, Innovation and Science, Máire Geoghegan Quinn. The aim of the strategy is to focus Europe's common efforts in the right direction in this diverse and fast changing sector of the economy. Europe believes that a strong bioeconomy will help it to live within its limits. The sustainable production and exploitation of biological resources will allow the production of more from less, while limiting negative impacts on the environment and reducing the heavy dependency on fossil resources, mitigating climate change and moving Europe towards a post-petroleum society.

The Bioeconomy Strategy specifically addresses forestry.

It recognises the following:

- The EU has a total forest area of 177 million ha (around 40% of EU territory) with about 130 million ha available for wood supply and non wood goods and services such as cork, resins and hunting.
- Forests play a crucial role the global carbon cycle and the fight against climate change.
- The demand for wood, and for wood fuel in the context of increasing renewable energy demand, is a strong stimulus for increasing forest growth and productivity and for improving management practices.
- More wood and residues could be harvested and mobilised.
- Demand for forest products is growing for material and energy uses as a way to reduce carbon emissions by substituting for products that cause higher emissions.
- There is a need for speeding up production rates and developing forest based raw materials with new properties.
- Forests of the future will be increasingly dedicated to producing fibres, timber, energy or customised needs, which will have considerable impacts on the provisioning of a broad range of public goods.

The bioeconomy is not a new principle to forestry but the European Bioeconomy Strategy brings it centre stage as a driver of sustainable growth and presents a significant opportunity for forestry and forest research.

## 2.4 Forestry Research in Ireland – Building on our strengths

Forest research has a solid track record in Ireland, dating back to the 1950s. Knowledge of appropriate species and provenance selection, silviculture, forest management systems still in use today were largely developed as a result of research carried out over the past five decades. Forest research initially was mainly carried out in the State sector and is now to a greater degree carried out across a number of Universities, Institutes of Technology, Teagasc and a small number of private companies providing specialist research expertise.

In recent years the scope of forest research has expanded and diversified due mainly to a growing awareness of the environmental role and influence of forests to now include areas such as nutrient, water, energy and carbon cycles in forests in Ireland.

The value of multidisciplinary, inter-institutional collaboration and industry involvement are strongly recognised. Synergies in environmental and competitiveness aspects of forest research are apparent in forest policy and practice. Sustainable production of wood fuels, for example, is now a national priority, as Ireland takes on legally binding targets at national level, in order to comply with the Renewable Energy Directive (2009/28/EC) where wood products have taken on new importance.



## 2.5 Issues for Forestry Research

### 2.5.1 Funding Forestry Research – Long Term and Short Term

#### *The Nature of Forestry – Long Term Approach*

Forestry by its nature and relative to other land uses is a long term activity. Because of its long term and multi-functional nature, it can take time and complex analysis for research to identify and help the understanding of the full social, environmental and economic functions of forests. It follows that aspects of forest research which support and inform policy and practice should also have a significant long term dimension and as a consequence longer term funding mechanisms and commitment can be required.

#### *Funding Forestry Research*

The CoFoRD programme is DAFM's forestry research programme and is the primary national vehicle for publicly funded forestry research in Ireland. It currently operates on the basis of competitive calls launched periodically, generally funding projects of a relatively short duration, typically three to four years.

The CCFRWG recognises that, from a funding perspective, support for aspects of forest research requires a sustained and on-going national investment to address long term needs and ensure continuity. The benefit of a long term funding commitment to forest research is that it facilitates the long-term perspective which certain research themes, programmes and projects require.

Commitment to long term research raises the concern that it may appear to be anti-competitive where the current driver of a particular aspect of research could be best placed to compete for any continuation of this strand of work. In addition, commitment of finance on a long term basis where budgets are made available on a year on year basis could be problematic.



DAFM should examine its current commitment to forestry research projects and programmes to identify and prioritise themes and areas for continuation over a long term programme and propose a mechanism to facilitate funding for forest research projects and programmes over both the long and short term with adequate controls to ensure benchmarking. Regular progress reporting is also necessary to facilitate ongoing assessment and review.

### 2.5.2 Competitive Calls

An emerging issue is the efficacy of competitive calls to address the full scope of sector research needs in some areas where the number of potential applicants, both in terms of organisations and researchers, is small. The capacity to respond to significant calls is limited and it is important that strategic partnerships are encouraged that deliver the greatest synergy in terms of research needs (as opposed to partnerships that might align in pursuit of funding). This is a significant challenge in that there is clearly a need to achieve competitive and relevant research while also recognising the limited pool of available competencies. Strong linkages with policy and sector stakeholders are required to support and inform the forest research community in its delivery of a level of excellence consistent with national research prioritisation.

Call content should be balanced addressing fundamental research needs and research to inform policy, the validation of that research and research to support national reporting requirements.

### 2.5.3 Research – Private Sector Involvement

There is a lack of involvement and active participation by the private sector in the provision of certain support services especially in relation to education, training and research, notwithstanding all parts of the sector agreeing to a Strategic Research Agenda in 2006 and Ireland becoming a member of the European Forest-Based Sector Technology Platform in

2007. The State (which is still the largest single forest owner) continues to dominate the provision of support for forestry research.

While a significant proportion of the current investment in forest research and development is to address policy needs in areas such as water quality, biodiversity and climate change mitigation, areas such as forest management planning and silviculture must also be viewed in the overall context of innovation, which the Forfás report, Innovation Ireland - *The Smart Economy Report of the Innovation Taskforce* - elaborated upon.

Some consideration should be given to part-funding forest research directly from the sector. A number of models already exist, such as Skogforsk (the State applied forest research body in Sweden), who's income derives from a levy on roundwood sales.

#### Taxation

There is provision for prescribed research and development activities to be incentivised for companies by taxation provisions set out in the Finance Act, 2004 and subsequent amendments. Forestry is a prescribed R&D activity (S.I. 434/2004). There is potential scope for companies to avail of this tax incentive both for in-house activity and research subcontracted to a University or other Research agency. As with all tax matters there are detailed rules and regulations and professional guidance should be taken if considering a research / development project that might benefit from tax credits.

#### 2.5.4 Intellectual Property

A national Intellectual property (IP) Protocol has been published by the Department of Jobs, Enterprise and Innovation (DJEI). It sets out the Government's policies to encourage industry to benefit from collaborative research with Ireland's universities, Institutes of Technology and other publicly-funded research institutions, and describes practical arrangements for this to happen. The policies in the IP Protocol aim to support the building of relationships with industry that will support the sustainable flow of commercialised outputs and build networks of long term knowledge sharing.

The Protocol states that when research by a Research Performing Organisation (RPO) is wholly funded by the State (as is mainly the case with forest research), the RPO shall own any IP arising from the research and that it can grant licences to use the IP. The complete document is available from the DJEI.

The establishment of The National Technology Transfer System within Enterprise Ireland (in addition to TTO's in third level institutions) provides a system which facilitates the transfer of commercially valuable research outputs into industry.

The technology transfer system plays a vital role in ensuring that discoveries and outputs, which have commercial potential and could become the basis for new companies, or could be used by existing companies to develop new products and services and open up new markets become commercial realities.

##### **Forest Research - The European Context**

The forest industry in Ireland is a relatively small part of the economy, albeit a rapidly growing one. In a European context the forest industry is a very significant sector in real and relative terms and in this context it is critical that Irish forest research maintains close links with European partners in order to maximise collaborative and resource opportunities and avoid duplication.

Research strategy within the EU is changing direction with more emphasis now being placed on cooperation between Member States. An objective of **Horizon 2020** (the successor to the EU Framework Seven Programme (FP7)), is to facilitate cooperation through the networking of research activities, and in addition to this in the case of **Joint Programming Initiatives** the mutual opening of national and regional research programmes.

##### **Horizon 2020**

Horizon 2020 is the European Commission's new research funding instrument in Europe. The programme runs from 2014 to 2020 and has a budget of approximately €78bn. The programme is broken down into three main pillars:

1. **Excellent Science**
2. **Industrial Leadership**
3. **Societal Challenges**

Under Pillar 3, Societal Challenge 2 is one of 7 societal challenges and is the one of most interest to the agri-food, forestry and marine sector. It is entitled **Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy** and has an overall budget of €3.8bn.

The primary aim of the Societal Challenge 2 programme is to contribute to securing sufficient supplies of safe, healthy and high quality food and bio based products and transform Europe into a sustainable bioeconomy.

**The Societal Challenge 2 programme** covers an extremely broad remit and is built around three major activity areas:

- **1: Sustainable Food Security**
- **2: Blue Growth**
- **3: Innovative, Sustainable and Inclusive Bioeconomy**

Funding opportunities are published through Calls for proposals with set deadlines.

### **Joint Programming Initiatives (JPI)**

The JPI concept stems from the realisation that a more coordinated approach is needed to optimise the value of research conducted across the EU and that certain research is best conducted on a pan-European basis. Building on the more limited ERA-Net model, it is a new bottom-up approach aimed at combining the national research effort (and related funding) of interested EU Member and Associated States, on a voluntary variable geometry basis, to tackle major societal challenges.

### **2.5.5 Supporting Forest Research**

The current annual level of investment by the State in forest research and allied private-sector investment will need to be at least maintained in real terms over the coming decade. This is essential, given the dispersed nature of the forest resource, the need to build on a comparative advantage in growing wood fibre, the relatively high cost base of forest operations, and the need for competitiveness along the wood supply chain allied to the need to grow exports, and to provide a range of public goods.

National forest research competence also needs to be maintained and consolidated against the backdrop of issues including the complex policy and legislative framework and climate change in areas including forest genetic resources, sustainable forest management and land use planning, forest policy and economics, silviculture, ecosystem services and wood energy. Forestry by its nature is a long term activity and most of these key areas require national coordination, long term commitment and continuity to ensure value for money and development of expertise to contribute to achieving the full potential of the forest sector.

Dissemination of research findings through publications, seminars workshops and other media is vital enabling research outputs to be taken up in policy, products and practice. COFORD and Teagasc publications have provided a much needed source of authoritative information over the past decade and a half. Continuity of this commitment and investment in the latest communication technologies and media are also required.





# CHAPTER THREE

## STRATEGIC RESEARCH AGENDA



This Strategic Research Agenda (SRA) is the result of a prioritised assessment of a much larger list of research suggestions and ideas derived through public consultation and the deliberations of the CCFRWG and sub-Groups.

Research ideas are presented across seven broad thematic areas and are further divided into sub-themes within the seven thematic areas. Although given some consideration, the arising thematic research areas, sub-themes and ideas have not been further prioritised across or within thematic areas.

Thus, a menu of research needs is presented which will allow funding bodies the flexibility to select research themes which are reflective of the dynamic nature of changing research needs while taking cognisance of available competencies.

It should also be noted that, as well as identifying new research areas, this report also highlights research which may already be underway in a number of areas. This is done to acknowledge and recognise the value of this current work and to allow scope for its continuation where appropriate and desirable.



FORI identifies seven thematic areas within which the Strategic Research Agenda is set out. These seven areas are:

1. **Expansion of the Forest Resource** - sustainable increase in productive area

2. **Productivity** - sustainable improvements in crop productivity and quality

3. **Resource Utilisation** - stand modelling, recovery, supply chain, utilisation and optimisation

4. **Adding Value** - wood processing and product development

5. **Forest Resource Protection** - protecting the resource from biotic and abiotic threats

6. **Ecosystem Services** - the benefits people obtain from forest ecosystems

7. **Climate Change** - impact, adaptation and mitigation – responding to a changing climate

## Theme 3.1 Expansion of the Forest Resource



***Expansion of the forest area is vital to forest policy – it can put marginal agricultural land to productive use, generate rural employment and create a renewable resource delivering scale in sustainable supply of raw material in harmony with environmental legislation and best practice, while providing vital ecosystem services. Expansion of the forest area requires informed policy and informed options on species and provenance and potential optimal use, taking account of markets, as well as adapting to climate change.***

### 3.1.1 Forest expansion - Land Availability

Assess the impact of changes at EU, national and local level and examine the likelihood of farmers converting land from agriculture to forestry in the context of the increased agricultural production envisaged under Food Harvest 2020. Research should be conducted both from an economic and a behavioural perspective to give policy makers a deeper understanding of the drivers involved in the land-use change decision making process and to provide information on appropriate structures, incentives and alternatives to ensure that appropriate planting programmes are achieved.

Examine the need for an integration of all current information to characterise the nature and extent of land availability and suitability for afforestation and a quantification of the extent of various land use types, their potential suitability for forestry using soil and related spatial datasets particularly with a view to optimising productivity as well as efficient use of inputs.

Validate the suitability of different tree species, their productivity and the role of site classification systems, similar to the multifactor systems used in Canada and Britain and/or modify for use in Irish forestry taking account of current and future markets.

Address land use management planning including forestry at a landscape level to consider potential alternative uses of the land resource and propose integrated solutions for its optimised use to satisfy competing and complementary demands.

Assess the potential and impacts of a catchment-based approach to afforestation, forest management and reforestation on sensitive sites. There is a need to establish parameters to quantify critical loads arising from afforestation, afforestation type and reforestation options. The impact of the full forest life cycle is not fully understood and needs to be determined. Research in this area would also help to move towards a catchment-based approach, if appropriate, to address, for example, hen harrier sensitive sites and water issues.

### 3.1.2 Forest expansion – practice

Examine approaches to aid environmentally sound woodland establishment in sensitive areas (e.g. SACs, SPAs and NHAs). Issues which require research include woodland area thresholds, ground preparation, drainage, buffer zones, species choice, potential for wood harvest and related silvicultural management.

Examine approaches to agroforestry on a range of agricultural land uses. Research should focus on suitable species, stocking densities, sustainability issues and synergies between trees and agricultural crops, livestock and the environment.

Examine the potential of short rotation forestry (forests managed on say 8-15 years+ cycles) and its technical and economic potential to contribute to wood supply in order to meet renewable energy targets, including research on establishment and silvicultural practices, species choice and productivity, and sustainability issues.

Examine the ecology and ecological requirements of the main commercial tree species used in Irish forestry.

### 3.1.3 Forest expansion - Forest Genetic Resources and Tree Breeding

Identify and develop suitable Forest Reproductive Material (FRM) for key tree species in Ireland including new seed stands and set out how this material can be made available through evaluation, development and nursery production for potential inclusion in the planting programme.

Develop a national tree improvement and breeding capability suitable to the specific needs of Irish forests to support the productivity and resilience of species used, including the improvement of native species.





## Theme 3.2 Productivity



***Bringing forests into optimum production, improving quality and yield are challenges for both public and private forests. There is increasing demand on the forest resource to meet the requirements of international agreements and national policies including environmental regulatory requirements. Ensuring the sustainability of the resource, while meeting growing energy and product markets, presents new challenges.***

### **3.2.1 Productivity - Forest Establishment and Management**

Investigate forest resource data sources including the National Forest Inventory to review and evaluate current forestry practice and protocols in the context of Sustainable Forest Management.

Investigate, review and evaluate current forest establishment, management and harvesting practices and protocols with a view to proposing improvements which would enhance forest productivity and sustainability.

Investigate innovative fertiliser and/or vegetation controls and application methodologies for a range of soil, site and stand types. Research should focus on the development and/or application of innovative methodologies appropriate to site, slope, soil type and site sensitivity as well as crop requirements.

Investigate ground preparation and drainage methods for different soil types. This work could include research into methods of minimising sediment/nutrient movement during ground preparation operations prior to re-establishment.

Investigate new and existing methodologies and appraisal of benefits of Low Impact Silvicultural Systems in use in Ireland and the UK and examine the extent to which these practices are suitable and economically viable in Irish forestry.

Investigate silvicultural and forest management specifications for the main conifer, broadleaved and mixed species stands in Ireland.

Review forest management practices on environmentally sensitive sites in other countries and how these might be adopted under Irish conditions. The work should focus on gathering information from countries with similar climate and soil conditions to Ireland (e.g. Scotland).

Evaluate forest owners' attitude to and understanding of the developing role and value of private forest ownership in the context of the maturation of the private forest estate. The review could include an investigation of the value owners place on forest ownership; the level of owner involvement in plantation management; the level of owners' basic knowledge; access to forestry advice and factors influencing forest owners' decisions.

### 3.2.2 Productivity – Mobilisation and Transport

Investigate factors affecting the mobilisation of the private sector forest resource with a view to identifying opportunities for enhanced and sustainable biomass production and removal and the optimised use of biomass throughout the chain.

Identify, inter alia, optimal timber and wood product transport routes using logistics and transport research, incorporating GIS and other technologies and taking cognisance of the public road network and other related transport and technological issues.

### 3.2.3 Productivity – Harvesting

Assess the economics of small-scale harvesting equipment and whether equipment currently in agriculture or forestry use may be efficiently and safely used or adapted for small scale harvesting activities.

Investigate the applicability of new and emerging precision harvesting technology in Irish forestry.

Investigate mechanisms to mitigate phosphorus and sediment loss during clearfelling on deep peats and other sensitive site types.

Investigate felling systems (which may include whole-tree harvesting; brash and needle removal), including phased felling and coupe size, and the potential for use in continuous cover forestry (low impact silvicultural systems).

### 3.2.4 Productivity - Options following clearfelling on sensitive sites

Investigate alternatives to planting as a method of reforesting sites in sensitive areas.

Examine issues relating to clearfelled peatland forests including: options to prevent loss of nutrients to water from brash breakdown; re-seeding with native grasses immediately after harvesting to capture phosphorus; options for future management including the non-replanting of these areas; the occurrence / use of natural regeneration; rhododendron control and an economic evaluation of alternatives to reforestation.

### 3.2.5 Productivity - Christmas Tree Nutrition

Examine nutritional requirements of Nordmann fir and other Christmas tree species, and product quality issues such as needle loss and discolouration.



## Theme 3.3 Resource Utilisation



*The growth of energy and other wood product markets present opportunities and challenges. There will be conflicting needs and conflicting uses. Optimisation of recovery, efficiency in operations and logistics and optimal wood utilisation will be essential in a competitive marketplace. Research is required to support forest planning, growth modelling and forecasting systems.*

### 3.3.1 Resource Utilisation - Technology

Investigate the use of forest resource data sources including IFORIS and the National Forest Inventory to identify emerging forest resource trends, such as likely future wood supply, including evaluation of the likely supply of hardwoods and opportunities for increased timber mobilisation.

Assess the use of dynamic forest inventory, remote sensing and other technologies to provide inventory data to inform resource utilisation. This work should link to resource information emerging from current roundwood supply forecasting work and examine the potential to link to in-forest harvesting with end-use demand.

Investigate the use of technology including, inter alia, that used in stand level forest mapping and inventory assessment, with a view to identifying opportunities for resource optimisation and to improve on current systems.

### 3.3.2 Resource Utilisation – Optimisation

Develop economic modelling of different end-uses of wood in order to provide tools for optimum use of the wood resource.

Further develop dynamic yield model systems which will incorporate data from public and private sectors to be used in growth and yield assessment.

Investigate opportunities for enhanced and sustainable forest biomass production and opportunities for the optimised use of biomass, in particular for energy production.

Investigate the cascade use of roundwood from solid wood products through to energy recovery at end of service from national policy, economic and climate change mitigation perspectives; including economic modelling of various end uses for a constrained wood resource to optimise national benefit.

### 3.3.3 Resource Utilisation - Forests and the Bioeconomy

Assess the potential and opportunities for forestry in Ireland within a sustainable bioeconomy in Europe utilising renewable biological resources to satisfy consumer needs, industry demand and addressing climate change.

## Theme 3.4 Adding Value



***Much of the research requirement in this area is in wood processing systems and product development aimed both at home and export markets. Such research is mostly bottom-up, based on specific business needs, and co-funded primarily through Enterprise Ireland. National research is appropriate in areas such as life cycle research on wood products and their role in materials substitution and impact on emissions abatement, as well as research on raw material quality (including strength) and on wood based construction systems.***

### **3.4.1 Adding Value - Use of wood and wood fibre**

Carry out life cycle research on wood products and their role in materials substitution and impact on emissions abatement.

Develop a cross sectional study of mechanical strength properties of Sitka spruce with particular focus on the private estate resource, and building on previous research.

Address emerging supplies of hardwoods by considering new product development for small diameter hardwood and assess opportunities for solid wood products, energy wood products and other products.

Assess wood properties of main hardwood species to inform potential end use with a view to improved use of this resource.

Identify highly engineered timber construction opportunities to meet the requirements of standard or unusual architectural design within the context of the appropriateness and availability of the raw material from the Irish forest resource.

Explore the potential of home-grown Irish timber for use as structural timber composites (for example Engineered Wood Products, Glulam, Cross Laminated Timber and structural composites).

Evaluate state of the art drying methods for Irish softwood for the construction sector in Ireland and the UK in order to improve dimensional stability.

Assess the role of incising in improving the service life of Irish softwoods.

### **3.4.2 Adding Value – Development of new products from wood fibre**

Investigate the extraction and utilisation of wood and wood based derivatives to reduce waste streams, improve efficiency, and generate alternative wood-derived green products to replace synthetic products.

Assess the potential of chemical compounds derived from sustainable and renewable wood sources to provide adhesives, preservatives, liquid fuel and biomass.

## Theme 3.5 Forest Resource Protection



*Forest Protection encompasses threats of biotic (pests and diseases, deer and squirrel damage) and abiotic (primarily fire, wind and frost) origin. Since the Working Group came together forest protection has come into sharp focus, following the outbreak of *Chalara fraxinea* in 2012. Increasing international trade is a factor in the spread of pests and diseases, and climate change has also been implicated.*

*All of these threats require a response, informed by research to assist with identification control and adaptive measures.*

### 3.5.1 Forest Resource Protection – Abiotic threats

Investigate forest planning and design options to minimise forest fire risk including: the identification of factors which may render some forests and potential forest land as higher fire risk; prevention and mitigation measures including the improvement of forest fire protection through the identification of criteria and specifications for the construction and maintenance of fire breaks.

Evaluate windblow risk and mitigation factors such as forest design, thinning and clearfell options; identify factors that may render some forests and potential forest land as higher windblow risk.

### 3.5.2 Forest Resource Protection - Biotic Threats

Strategic forest pest and disease research is required to analyse emerging forest and tree health threats in climatically similar environments, incorporating climate and climate change analysis and evaluation of

potential pest introduction pathways. This should assist in the development of Pest Risk Analysis capability and provide an early warning system and capability to react to potential forest and tree pest and disease threats.

Following the detection of new and emerging forest pest and disease threats, specific pest and disease research is required to inform current knowledge and support optimum pest and disease control and site management strategies and options.

Investigate genetic resistance to specific tree diseases and the development of disease resistant planting stock.

Investigate the use of mixtures in reducing susceptibility to forest pest and disease threat and damage.

Investigate the potential of and techniques available for the use of bio-stimulants to enhance tree growth and improve vitality with particular focus on the potential to inoculate trees in order to reduce susceptibility to infection and disease and to prevent spread of disease from infected to non-infected trees.

Appraise current best practice and investigate alternative control methods for *Rhododendron* and other invasive species.

Review and evaluate current physical and biological tree protection, mammal control and management methods including forest design and species choice.

Review of national deer management to identify the key stakeholders, their information needs and their issues of concern in order to develop a pathway towards an integrated deer management strategy and informing deer centric silviculture.

Investigate improved methodologies in the application of cypermethrin for the control of pine weevil and the potential of alternative approaches such as fallowing and use of biological controls.

## Theme 3.6 Ecosystem Services



**Forests produce wood for the forest owner and for industry. For society, especially a society that pays to address market failures, forests are generally seen more from the wider benefits people obtain from forest ecosystems or their ecosystem services – including biodiversity, climate change mitigation and leisure values. Research can improve the delivery of ecosystem services, value them and help society make choices between sometimes conflicting outputs.**

### 3.6.1 Ecosystem Services- Evaluation

Estimate the value of ecosystem services provided by Irish forests in general and the afforestation programme in particular.

Compare the potential for the provision of forest ecosystem services of different forest management approaches (e.g. compare management approaches such as the clearfell system and low impact silvicultural systems).

Compare the potential for the provision of forest ecosystem services from different forest types and varying species composition (e.g. mixed native and non-native species).

Evaluate the ecosystem services impacts of clearfell, including cessation of forest cover on sensitive sites (including deep peats).

### 3.6.2 Ecosystem Services - Key Species and Biodiversity

Continued research into appropriate forest planning and management within key species habitats focussing on selected habitats and/or species protected by legislation or on a particular habitat types and/or species. Research should evaluate and address the interaction of forests and forest management with these habitats and/or species and identify opportunities and constraints for existing and/or future forest expansion and production.

Investigate and quantify the impact of forestry on raptors and devise mitigation measures if necessary related to planting, thinning and clearfelling and associated activities such as road building and maintenance, timber stockpiling and transport.

Examine the effect and interaction of forestry in a changing landscape shared with other uses including wind farm development and farming, on native flora and fauna, with particular emphasis on endangered species and habitats.

Investigate the management, restoration and sustainable use of native woodlands for both biodiversity and the production of quality timber.

Explore the influence of forest age, structure and size with regard to predator (e.g. fox, corvids and mustelids) numbers, distribution and their impact on ground nesting birds breeding in clearfelled and pre-thicket areas within the forest or in adjacent habitats.

### 3.6.3 Ecosystem Services - Forests and Water

Examine forest planning and design to maximise contribution to water quality and quantity, enhancement of aquatic ecosystems and regulation of stream flows, soil stabilisation, habitat creation, reduced surface water run-off and shading as potential benefits of forests.

Examine the reasons why there has been no detected increase in lake pH or a decrease in labile aluminium in forested catchments, notwithstanding the decline in sulphur emissions and concentrations in the atmosphere. The work could include examination of the role of forestry, marine sulphates and organic acids in the recovery of lakes from acidification.

Examine the effect of broadleaves, conifers and moorland vegetation on atmospheric deposition, leaching and acidification of waterways.

Examine the role of native woodland in peatland catchments including evaluation of its contribution to biodiversity, the effect of shading on watercourses and its potential in buffer zones to address issues including erosion and leaching of dissolved organic carbon, nutrients and suspended solids within the catchments.

Consider the role of trees in reducing infiltration of rainfall via evapo-transpiration and assess, with a view to guiding best practice, the role of forests and forest management, impacting on flow rates in catchments during dry spells or extreme rain events affecting water availability or flood risk.

Examine the effectiveness of the use of broadleaf plantations as buffer zones, planting in critical source areas or hotspots to minimise nutrient losses, particularly phosphorus loss. Consider the role of planting of tree belts on farms with the potential to provide this function and also contribute to the on-farm carbon balance.

Investigate the impact of larger scale (>10 ha) clearfells on a range of different sites. Research should focus on harvest practice and related water, nutrient and sediment movement and should include impact of road building.

### 3.6.4 Ecosystem Services - Forests and Recreation

The forest resource is widely used for public recreation. A review is required to identify new forest recreational concepts and activities to assess the associated demands on the resource and to identify opportunities for the Irish forest resource, including privately-owned forests, to meet and deliver on new opportunities. The role of forest recreation in public health and well-being should also be incorporated in this study.

Evaluate the economic impact of forest focused tourism activities on national, regional and local economies.

### 3.6.5 Ecosystem Services - Forests and the Landscape

Assess and evaluate the economic impact of forest landscape design measures and examine the potential to increase the landscape value provided by different forest types.

## Theme 3.7 Climate Change: Impact, Adaptation and Mitigation



*Climate and climate change are likely to be ever increasing influences on forests and forest management and research will be a critical element in informing our response to new and dynamic challenges. The influence of climate and climate change on forestry can be considered in terms of*

**Impact:** how changing CO<sub>2</sub> levels, temperatures, hydrological regimes and windiness will affect trees, forests and woodland ecosystems,

**Adaptation:** for example changing species choice and forest management regimes in response to a changing climate and

**Mitigation:** understanding the carbon and greenhouse gas balances of forests in Ireland and assessing the opportunities of and potential for climate change mitigation through forestry.

### 3.7.1 Climate Change Impact and Adaptation

Investigate the potential impacts of climate change and extreme weather events on existing and future forests, including the impacts of temperature change, increased CO<sub>2</sub> levels, increased windiness and changing hydrological balance.

- Assess how forest sustainability and productivity may be influenced by projected climate change.
- Develop advice and best practice on creating, developing and managing forests which are resilient to climate change.

Assess how forest protection may be influenced by projected climate change, including an examination of the risk of introducing harmful forest pests and diseases with a changing climate and potential for increased susceptibility to pest or disease attack. Develop guidance and best practice for policy makers and forest managers.

Identify the tree species and provenances which are most likely to be suited to anticipated climatic changes. Develop guidance on species and provenance selection.



### 3.7.2 Climate Change - Mitigation

To develop models of different afforestation and reforestation scenarios and management practices in relation to climate change mitigation (carbon sequestration) including the effect of different planting regimes on different soil types.

Assess the potential contribution of forests including farm forestry to carbon sequestration and mitigating greenhouse gas emissions. Carbon sequestration arising from afforestation together with the management and harvesting of farm forests needs to be analysed and modelled in the context of projected agricultural outputs and in light of the National Economic and Social Council Report that calls for carbon neutral agricultural production by 2050.

Examine the potential of agro-forestry and short rotation forestry to contribute to climate change mitigation, including research into suitable species, stocking densities and establishment techniques. This should include an assessment of the synergies between, and impacts of, trees on agricultural practices.

Investigate the use of forests to mitigate projected impacts of climate change, e.g. to moderate flooding pressure arising from increased heavy rainfall events and to reduce in-stream temperatures to protect fisheries.

Life cycle research is required on wood products and wood fuels, their role in material substitution and their potential to contribute to greenhouse gas emission reduction.





# CHAPTER FOUR

## NEXT STEPS



*The implementation of FORI will require ongoing interaction with various stakeholders; the building of collaborations between industry and academia, between institutions, nationally and internationally, and between funding initiatives of Government Departments and funding agencies. Knowledge transfer, together with programme and project monitoring and overview are also critical elements.*

#### 4.1 Key Actions

A number of key actions are required to support the publication of this document. These are:

- Stakeholder Involvement
- Collaboration
- Knowledge Transfer
- Measuring Success

#### 4.2 Stakeholder Involvement

This process has brought together major forestry stakeholders who have identified key research needs and the potential benefits from the outputs of publicly funded forest research. The research objectives have been informed by the expressed needs of both the forest sector and wider society. The successful delivery of this research agenda, which reflects the research needs of the time, will benefit from consultation with stakeholders in supporting and informing the forest sector's continuing contribution to society's needs.

#### 4.3 Collaboration

At a national level DAFM will continue to explore opportunities for joint funding initiatives with other funding bodies, in areas of common research interest. Internationally, Horizon 2020 will offer Irish RPOs the opportunity to avail of international research funding and to develop international relationships through trans-European project partnerships.

Among the issues for Research Performing Organisations (RPOs) - to develop and explore are the need to

- strengthen the collaboration and research base between RPOs and maximise the exploitation of research findings.
- enhance the opportunities and encourage the involvement of industry and other stakeholders as active project participants.
- encourage and facilitate collaboration with different jurisdictions to ensure maximum value is gained from investments.

Benefits could include the sharing of resources to maximise effort on topics of common interest and avoidance of duplication.

#### 4.4 Knowledge Transfer

Dissemination of research findings is an essential component of a research programme, in order to facilitate uptake of research outputs and findings in policy, products and practice.

Dissemination activities include seminars, field events and publications, both scientific and technically focused such as the COFORD Connects<sup>5</sup> series which has provided a much-needed source of authoritative information for foresters, forest owners, industry and wider stakeholders over the years. Latest media technology can help improve dissemination although this raises issues of ownership and ongoing support that are beyond the remit of this Group.

The CCFRWG recognises the critical importance of knowledge transfer and for the continuity of commitment and investment in this area. Not only will this ensure that research findings are made known and available to the appropriate research audience but also the value of research, through results, will help to inform funding support and ongoing and future research initiatives and programmes, which, as already described, need to take account of the longer timeframe for some aspects of forest research.

#### 4.5 Measuring Success

FORI can act as a roadmap for future competitive funding of forest research activities. It is intended to guide and inform State investment in forest research up to 2017. To ensure that it remains relevant to the needs of stakeholders, it is recommended that it be reviewed to ensure that the investments being made are reflective of the research objectives outlined herein or appropriately amended and are in line with funding initiatives.

On a project level, evaluation of research proposals and post award monitoring of research initiatives is normally the responsibility of the lead funding agency. Meaningful metrics should be developed and applied, which would capture relevant qualitative and quantitative data such as publications, events, numbers of researchers involved in projects, policy changes, in order to review and assess the impact of State investment in forest research.



# APPENDICES



## Appendix I. The Parties Involved. DAFM; COFORD Council and CCFRWG

### DAFM - Research Division & CODEX Division.

The mission of DAFM - Research & CODEX Division is to contribute to the Development of the Bio-Economy and Research and Innovation Policy in Agri-Food and Forestry and to co-ordinate Irish involvement in the work of the Codex Alimentarius.

Ireland is striving to create a world-class research system that drives innovation and economic success. DAFM and Research Division play an important role in this vision for the Agri-Food and Forestry sectors, via its publicly funded research programmes. The three primary public good research programmes run by DAFM Research Division are the:

- Food Institutional Research Measure (FIRM), the
- Research Stimulus Fund (RSF) and the programme of
- Programme of Competitive Forest Research for Development (CoFoRD).

DAFM facilitates Irish involvement in Horizon 2020 by providing a National Delegate and the National Contact Point. The National Delegate attends relevant Programme Committee meetings while the role of the National Contact Point is to increase Irish participation and success in the Horizon 2020 programme.

### COFORD Council

The COFORD Council for Forest Research and Development is a representative body from the Forest Sector in Ireland. The Council advises the Department of Agriculture Food and the Marine on research and developmental issues in the forest sector, such as wood supply and demand dynamics and related issues. The current Council was appointed in late 2011 for a three year period.

In 2009 the forest research functions of COFORD were merged with the Research, Food and CODEX Co-ordination Division of the Department of Agriculture, Food and the Marine. The COFORD Council continues to have an advisory role in relation to the national forest research programme and in addressing development issues.

The Forest Sector Development Division of the Department of Agriculture, Food and the Marine provides the secretariat for the Council and carries out work in forest policy, climate change, wood products and fuels and statistics.

In 2012 the COFORD Council convened working groups in the following areas:

- Land Availability
- Forest Management Planning
- Wood Mobilisation
- Forest Research (the subject of this Report)

The Groups are due to report over the course of 2013 - 2014.

### COFORD Council Forest Research Working Group (CCFRWG)

In 2012 the COFORD Council convened a working group to develop a National Strategic Research Agenda for the forest sector for the period 2013-2017. This Group facilitated by DAFM was named the COFORD Council Forest Research Working Group (CCFRWG).

Members included COFORD Council members and representatives from the Growing and Processing sector as well as relevant Government Departments and Agencies and individuals with extensive experience in the sector.



Members - those indicated with \* are members of the COFORD Council

Pearse Buckley <sup>2</sup>	Sustainable Energy Authority of Ireland <sup>2</sup>
Jhan Crane <sup>1</sup>	DAFM - Forest Service (Inspectorate)
Dr John Cross	Department of Arts, Heritage and the Gaeltacht
Niall Coulston <sup>4*</sup>	Enterprise Ireland
Seamus Dunne <sup>1*</sup>	Forest Service
Dr Nuala Ní Fhlatharta <sup>*</sup>	Teagasc
Sandy Greig	Sandwood Enterprise (ex FC UK)
Dr Eugene Hendrick <sup>*</sup>	DAFM - Forest Service - Development
Dr Ruth Little	Environmental Protection Agency
Tom McDonald <sup>1,3</sup>	DAFM - Forest Service / DAFM
Jim McNamara	Irish Timber Council (nominee)
Gerard Murphy <sup>*</sup>	Coillte Teoranta
Prof Maarten Nieuwenhuis	University College, Dublin
John Joe O'Boyle <sup>5*</sup>	DARD NI - Forest Service
John Phelan <sup>*</sup>	Woodland Managers Limited
Donal Whelan <sup>*</sup>	Irish Timber Growers Association
Dale Crammond <sup>3</sup>	DAFM – Research & Codex - Secretariat
Carol Howard	DAFM – Research & Codex - Division

<sup>1</sup> Seamus Dunne, Chief Inspector of the Forest Service, requested that he be replaced on sub-groups by Jhan Crane and Tom McDonald and this was agreed.

<sup>2</sup> Pearse Buckley left the Group in September 2012; he left SEAI to take up another position. SEAI did not nominate a replacement.

<sup>3</sup> Tom McDonald joined the Public Goods sub-group in his capacity as Forestry Inspector with responsibility for Environmental Compliance with the Forest Service. In December, 2012 he was appointed as Forestry Inspector in the Research and Codex Division of DAFM and took over on the Group from Dale Crammond.

<sup>4</sup> Niall Coulston replaced Willie Fitzgerald, following the latter's retirement from EI, on the COFORD Council in early 2012; due to existing and additional commitments in EI he was unable to attend CCFRWG meetings.

<sup>5</sup> Stuart Morwood represented John Joe O'Boyle at two meetings.

## Appendix II. Developing the Strategic Research Agenda.

### CCFRWG Terms of Reference

The Terms of Reference of the CCFRWG were set out in broad terms by the COFORD Council, drafted by the Chairperson in consultation with DAFM/Forest Service, then reviewed, amended and agreed by the CCFRWG members and reported to, and noted by, the COFORD Council. Following an interim update and discussion at a Council meeting, the Council requested that the Report also take on board two issues, namely the long term nature of some aspects of forest research and issues arising and the bioeconomy. Due to a combination of factors, including the *Chalara fraxinea* outbreak, awaiting the appointment of a Forest Research Officer in DAFM and the additional issues to be addressed in the Report, the original target completion date was extended into 2013.

### Development of a Strategic Agenda for Irish forest research by the COFORD Council Forest Research Working Group (CCFRWG)

#### Terms of Reference:

##### Primary Objective :

To develop a National Strategic Research Agenda for the forest sector for the period 2013-2017, in order to:

- deliver, from State investment in forestry research, sustainable economic return from the sector through enterprise development, growth of sustainable employment and improved competitiveness,
- ensure protection of our natural capital and address binding environmental requirements for climate change, water and other natural resource management, with reference to:
  - current national and EU forest policy, legislative, market and external environmental drivers, previous national and EU forest policy initiatives, previous and current COFORD and other forest research programmes, the work of the Forest Policy Review Group, Food Harvest 2020, the National Research Prioritisation Report and other relevant policies.

#### The work will include:

- Consideration of policy, legislative, market and environmental drivers and potential drivers that will influence research needs and priorities;
- Documentation of existing publicly funded (national and EU) forest research conducted in Ireland over recent years;
- Documentation of national forest related research capability and infrastructure;
- Documentation of funding modalities at national and European level;
- Identification and prioritisation of national research needs to address the stated drivers; and
- Recommendations to the COFORD Council, DAFM and other relevant Departments and/or Funding agencies on national research needs and related matters.

All items refer to the forest sector.

Output: The output is intended to be a Report – Forest Research Ireland (FORI) capturing the six main work areas.

### Proposed working arrangements and timeframes

#### Membership

Members of the CCFRWG are drawn from the Council, with others members drawn from the wider sector. The COFORD Council has agreed that John Phelan would chair the Group on behalf of the Council, The Group may wish to establish sub-groups, and this will be discussed at the first meeting. The Group and Sub-groups may decide to consult with others from outside the Council or Group membership.

The Group may also invite submissions and/or presentations to guide its work.

### Secretariat

DAFM Research and Codex Division will act as secretariat to convene and record the outcome of meetings, draft material for inclusion in the strategy, and preparation of final report. It is envisaged that most communication will be electronic.

**Meetings /Timeframe** the Group will aim to complete the Report by end 2012.

### Group Meetings

11 meetings were held, all at DAFM headquarters in Kildare Street, Dublin 2.

The first meeting on 29 March, 2012 was largely taken up with discussing the Terms of Reference and procedural issues.

After the Terms of Reference were agreed and after some initial deliberations the Group divided into three sub groups to assess Research needs on a structured basis. These thematic working groups had the working titles of;

- Inside the Gate
- Outside the Gate
- Policy and Public Goods – this sub group proposed that its area be referred to as Ecosystem Services.

In addition;

- It was agreed to seek submissions from sectoral interests which was done by circulation to various entities in 2012.
- It was also decided to seek details of competencies in Irish forest research and Universities, and other third level institutions.

- A presentation on the potential impacts of Climate Change on existing and potential forest and possible adaptive aspects of Climate Change was given to the Group by Dr Kevin Black, FERS Ltd.
- As the Enterprise Ireland (EI) representative was unable to attend meetings (see previous section) the Chairman discussed some issues directly with him and also consulted directly with a number of processors to ensure that market needs, as seen by them, were addressed. The DAFM Forest Research Officer also met the EI representative to ensure that organisation's views were represented.
- The Chairman and the DAFM Forest Research Officer also attended a Seminar on Managing Threats to Trees and Forest in Ireland (February 2013) and the Bioeconomy Conference in Dublin Castle, again in February 2013.
- The Groups used a template similar to that used in the SSAPRI Report for DAFM.

### Consultation

The CCFRWG organised a formal public consultation process. The following advertisement was placed on the DAFM website in May 2012.

15th May 2012

#### **Development of a Strategic Agenda for Irish Forest Research Request for Submissions to COFORD Research Working Group**

The COFORD Council has decided to set up a number of working groups in relation to different aspects of the sector.

One of these is to look at Research requirements for the period 2013 to 2017. The Terms of Reference are attached. I have been appointed as Chairman by the COFORD Council. The intention is to produce a Strategic Research Agenda by the end of 2012 for the COFORD Council and the Minister.

There are priority research areas that have been identified in the Report of the Research Prioritisation Steering Group approved by Government and published recently by the Minister for Jobs, Enterprise and Innovation - it is available at:  
[http://www.forfas.ie/media/ffs20120301-Research\\_Prioritisation\\_Exercise\\_Report.pdf](http://www.forfas.ie/media/ffs20120301-Research_Prioritisation_Exercise_Report.pdf)

I am confident that the Forest sector has many attributes that meet requirements for sustainable economic return through contribution to enterprise development, employment growth, job retention and tangible improvements in quality of life and I hope that with your input we will deliver an appropriate Strategic Research Agenda.

We have a Working Group that represents many strands within and related to the sector.

The Working Group has themed its approach around:

- **Inside the Forest Gate (establishment, management, harvesting and related issues)**
- **Outside the Forest Gate (processing, products and related issues)**
- **Policy and Public Goods (such as water, climate change, biodiversity, health and recreation)**

We have agreed to seek submissions within the sector and related areas.

**We request a brief submission of your priorities for forest research related to the above themes noting why those should be priorities.**

We particularly welcome “outside the box” innovative ideas given that Research is an investment in the future and could inform policy and business for many decades.

Please respond to [carol.howard@agriculture.gov.ie](mailto:carol.howard@agriculture.gov.ie) by **31st May, 2012**. If there is anyone else within your business or organisation who might contribute please circulate this straightaway.

A listing of submissions, and sources, may be included in the Report.

If you have any query, or observation, feel free to e-mail me at [john.phelan@woodland.ie](mailto:john.phelan@woodland.ie)  
Yours

John Phelan  
Woodland Managers Limited, Galway  
Chair of the COFORD Council Forest Research Working Group (CCFRWG)

The date was subsequently extended and reminders were issued.

**List of sources of submissions received.**

A request for submission of views on research needs was circulated on 5 May, 2012 with a reminder on 6 June. The request was for a brief submission of priorities for forest research related to the themes of Inside the Forest Gate, Outside the Forest Gate and Public Goods and noting why those should be priorities. The original request and the reminder were circulated widely within the sector.

Submissions were received from the following:

- Joe Barry (woodland owner)
- BioAtlantis Limited (Pierre Prouteau)
- Enda Coates (Waterford Institute of Technology)
- Coillte Teoranta (Research and Environment)
- Coillte Teoranta (District E2)
- Crataegus Limited
- Crann
- Forest Service – District Forestry Inspectors
- Forestry Services Limited
- Future Trees Trust
- Irish BioEnergy Association
- Irish Natural Forestry Foundation
- Irish Forest and Forest Products Association (IBEC)\*
- Vivian Kenny (woodland owner)
- Teagasc (Forestry Development Department)
- Tree Cover Working Group of the Environmental Pillar
- University of Limerick (via Competencies submission)
- University College Dublin
- Woodlands of Ireland

\*this was a copy of a document submitted jointly with the Irish Timber Growers Association (ITGA) to the National Research Prioritisation Group in September 2011 and, as such, focussed more on the sector than actual Research needs; it had a useful summary of Research Competencies.

In addition a submission was also received from another COFORD Council Working Group (COFORD Council Land Availability Working Group CCLAWG).

### CCFRWG – Development of Research Themes

During proceedings three sub groups were formed to address specific areas. These had the working titles of Inside the Gate; Outside the Gate and Policy and Public Goods (renamed to Ecosystem services). Membership of each group was as follows:

Inside the Gate	Outside the Gate	Ecosystem services
Jhan Crane	Pearse Buckley	John Cross
Nuala Ni Fhlatharta	Niall Coulston	Sandy Greig
Gerard Murphy	Eugene Hendrick	Ruth Little
Maarten Nieuwenhuis	Jim McNamara	Tom McDonald
Donal Whelan	John Joe O’Boyle	

Over a number of months, each group developed the SRA templates in each of the three broad areas drawing on the results of the consultation and the expertise of the individuals involved and their parent organisations.

This exercise resulted in the compilation of a large number of research ideas re-organised into seven thematic areas as follows:

1. **Expansion of the Forest Resource** - sustainable increase in productive area
2. **Productivity** – sustainable improvements in crop productivity and quality
3. **Resource Utilisation** - stand modelling, recovery, supply chain, utilisation and optimisation
4. **Adding Value** – wood processing and product development
5. **Forest Resource Protection** – protecting the resource from biotic and abiotic threats
6. **Ecosystem Services** – the benefits people obtain from forest ecosystems
7. **Climate Change** - Impact, adaptation and mitigation – responding to a changing climate

Having collated a wide list of research ideas, a prioritisation exercise was carried-out by the CCFRWG considering all research ideas within each thematic area in order to identify and agree on a shorter list of research ideas for inclusion in the final SRA. Chapter 3 of this report sets out this final list of research ideas across the seven themes. It should be noted that the final SRA does not further prioritise across or within themes in order to maximise the flexibility and longevity of the SRA.

## Appendix III National Forest Research

### Universities

There are seven **Universities** in Ireland; National Universities of Ireland Dublin, Cork, Galway and Maynooth plus University of Limerick, Trinity College Dublin, and Dublin City University. Collectively, under the Irish Universities Association, their aim is to develop and sustain a dynamic research environment. The seven universities pursue a common strategic policy and collaborate in research efforts. They offer state-of-the-art postgraduate level training through a broad range of taught courses and research. These universities are central in 'ensuring Ireland continues to advance and becomes a fully-fledged knowledge society'. The university network is supported by the Department of Education and Skills block grant and most have also benefited from the HEA PRTL programme to undertake successive capital investment projects.

The following outlines in general terms the areas of forest research interest and expertise:

- National University of Ireland, Galway - NUIG - forests and water, timber characterisation and engineering, adhesive bonding, durability testing, reinforcement and retrofit, wood science, forest protection, life cycle assessment.
- NUI Maynooth - biological pest control; effects of climate change on pests of trees in Ireland; Modelling future climate conditions in relation to forest pests.
- Queens University, Belfast – QUB – Land use, timber characteristics, design, engineering.
- Trinity College, Dublin - TCD - forest biodiversity assessment, conservation and enhancement, forest protection.
- University College, Cork - UCC - forest biodiversity assessment, conservation and enhancement, climate change and forest soils, forest protection, forests and water; forest economics.

- University College, Dublin – UCD – climate change mitigation and adaptation forest management planning, growth models, roundwood production forecasting, including geospatial aspects, IT and logistics in forest planning, harvesting and haulage, forest physiology and genetics, forest policy and economics; forest soils and water.
- University of Limerick - UL - timber engineering and wood science, wood products and materials, forest soils and carbon

### Institutes of Technology

There are **13 Institutes of Technology** (IoTs) in Ireland. Although historically not as actively involved, research now forms a core component of each of the institutes and they play an integral role in creating and developing Ireland's postgraduate research community. They are particularly effective at pre-commercial research and have strong links with industry. Some are very active in forestry research. For example:

- Waterford Institute of Technology – is involved in research in forest based biomass for energy use; supply chain logistics; forest vegetation management; and deer population assessments using molecular biology methods.

## Teagasc

**Teagasc** was established under the Agriculture (Research, Training and Advice) Act, 1988. Its mission is to provide science-based innovation support to the agriculture and food sectors. At Teagasc research centres located throughout Ireland, over 750 scientific researchers, technical staff and postgraduate students are working on innovative and cutting edge research projects.

Through its forest research Teagasc manages and hosts important field trials in various areas of tree breeding, species selection, conifer and broadleaf silviculture and forest management and ensures continuity in research and research findings. Teagasc has strong linkages with forest owners and potential forest owners through its forestry advisors. Teagasc has very close links with the forest industry with which it engages in a variety of technology transfer activities including dissemination, contract research technology licensing and technical services. These have been strengthened recently by the development of an SME technology transfer service. Teagasc also has expertise in GIS/mapping, remote sensing, economics, soils and environment.

## National Botanic Gardens

The DBN Plant Molecular laboratory has expertise in forest tree genomics projects and various molecular genetics projects on tree species. The species of current research interest include alder, oak, willow, aspen and poplar.

## Others

There are also a small number of specialist firms involved in research. They provide their key expertise and services in association with research performing organisations in the form of external assistance across a range of research areas.

## Sources of Funding for Forest Research – National

### DAFM – Background

Ireland is striving to create a world-class research system that drives innovation and economic success. DAFM plays an important role in this vision for the Agri-Food and Forestry sectors, via the publicly funded agri-food and forestry research programmes that are in place. The three primary public good research programmes run by DAFM are the Food Institutional Research Measure (FIRM), and the Research Stimulus Fund (RSF) and the programme of Competitive Forestry Research for Development (CoFoRD).

### DAFM Programme of Competitive Forestry Research for Development (CoFoRD)

The Programme of Competitive Forest Research for Development (CoFoRD) provides funding, on a competitive basis, to public research performing organisations and higher education institutes for ‘public good’ forestry research, with the aim of developing a scientific foundation and support for a sustainable, competitive, market orientated and innovative forest industry.



The Programme has the following overall objectives;

- Determine the nature of forest research needed to maintain the international competitiveness of the forestry sector, provide sustainable employment, encourage innovation and enhance environmental harmony;
- Contribute to building and maintaining a knowledge economy and a scientific research capability in the forest sector;
- Establish and strengthen inter-institutional links and foster links between public research institutes and industry;
- Evaluate progress on and disseminate the outputs of funded research to ensure maximum benefit;
- Build capability and capacity among Irish based forest researchers so as to enable them to compete for non-Exchequer funding such as under the EU Framework Programme.

#### DAFM Research Plus

Research Plus is an initiative that has been developed in response to the Irish Government's Strategy to ensure maximum value for money is gained from recent or current research investments. Research plus seeks to add value to previous investments made through the FIRM/RSF/CoFoRD programmes. This initiative provides an opportunity for those research projects, either recently completed or near completion, to further exploit the outputs of those projects to bring them to a point which will enable future commercialisation of the outputs. Research plus is designed to add value to these projects with an expectation that successful applicants will seek funding from Enterprise Ireland (EI) for the commercialisation of the research.

#### Objectives:

- To add value, through further research, to the outputs of recently completed or nearly completed projects;
- To encourage researchers to apply their research findings for commercial gain;
- To provide additional funding to get the research to a point where applicants are in a position to apply to Enterprise Ireland for future funding.

#### DAFM Core grant to Teagasc

Teagasc - Forestry Development Department

The Teagasc Forestry Development Department, supported by DAFM provides integrated forestry research, advisory and education services which allows for rapid and effective dissemination of research through knowledge transfer and educational initiatives. The objective of the forestry research and knowledge transfer programme is to develop forests and forest management systems that maximize the potential of farm forestry from economic, social and environmental perspectives.

#### Forest Research

- Among the areas of current Teagasc forest research focus are: site classification and productivity assessment; broadleaf tree improvement; broadleaf and coniferous silviculture; thinning, harvesting and management; agroforestry and short rotation coppice.

### Other funders of Primary Forestry and Forestry Related Research

The following are the other main Irish sources of funding for forestry research;

- Environmental Protection Agency
- Sustainable Energy Authority of Ireland
- Department of Arts, Heritage and the Gaeltacht - National Parks and Wildlife Service
- Science Foundation Ireland
- Enterprise Ireland
- Irish Research Council

**Forest Sector Development - DAFM/COFORD** develops projects and studies, advises on strategic research and development programmes and supports and maintains websites to provide information to the forest sector as follows:

**www.coford.ie** provides access to publications, including final report of forest research projects, reference texts on specialised subjects, the COFORD Connects series of practical information notes which started in 2003 ( and available at the above) and various articles and newsletters. The site also enables access to a number of management tools such as forest planning models.

**www.woodenergy.ie** has information on using wood biomass as a carbon neutral, renewable energy source. Information is given on wood fuel quality and all aspects of the wood fuel supply chain, such as harvesting, storage, transportation, handling, as well as aspects of health and safety for fuels origination from the forest or from short rotation coppice.

**www.woodspect.ie** is a guide to designing, detailing and specifying timber and reflects a growing confidence in wood usage and design in Ireland. Although aimed primarily at architects, engineers, designers, builders, planners, specifiers and students, Woodspect is designed to appeal to anybody with an interest in wood and wood working.

COFORD has published over 60 reports and books on forest practice and policy and over 100 COFORD Connects advisory notes and co-ordinated research activities with Coillte, EPA, Sustainable Energy Authority of Ireland (SEAI) and the Marine Institute.

## Appendix IV. European Forest Research

### Horizon 2020

Horizon 2020 is the European Commission's new research funding instrument in Europe. The programme runs from 2014 to 2020 and has a budget of approximately €78bn.

The programme is broken down into three main pillars:

- **Excellent Science**
- **Industrial Leadership**
- **Societal Challenges**

Under Pillar 3, Societal Challenge 2 is one of 7 societal challenges and is the one of most interest to the agri-food, forestry and marine sector. It is entitled **Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy** and has an overall budget of €3.8bn.

The primary aim of the Societal Challenge 2 programme is to contribute to securing sufficient supplies of safe, healthy and high quality food and bio based products and transform Europe into a sustainable bioeconomy.

**The Societal Challenge 2 programme** covers an extremely broad remit and is built around three major activity areas:

- **1: Sustainable Food Security**
- **2: Blue Growth**
- **3: Innovative, Sustainable and Inclusive Bioeconomy**

DAFM facilitates Irish involvement in Horizon 2020 by providing a National Delegate (Mr. Richard Howell) and the National Contact Point (Mr. Dale Crammond). The National Delegate attends relevant

Programme Committee meetings while the role of the National Contact Point is to increase Irish participation and success in the Horizon 2020 programme and includes the following activities:

- Identification and profiling of potential participants
- Provision of information, advise, financial support and training
- Assistance with partner search activities
- Pre-submission support
- Post call review, support and training
- Ongoing support on legal, contractual and IPR issues (for successful participants)
- Ongoing advice and support on next steps for successful and unsuccessful applicants.

The SC2 National Delegate and Contact Point are also members of the Enterprise Ireland led National Horizon 2020 Support Network where they work closely to promote Irish participation in Horizon 2020 across the other two pillars and other relevant Challenge areas of Pillar 3 in particular environment and health.

### EU Framework Seven Programme (FP7)

Under the EU Framework Seven Programme (FP7), Irish RPOs are involved in the following research programmes

#### WoodWisdom ERA NET

The 3rd Joint Call for Proposals of the WoodWisdom-Net Research Programme was closed on March 31, 2011. The call "Sustainable forest management and optimised use of lignocellulosic resources – Bridging gaps between research disciplines, producers, consumers and society" was a joint call together with the ERA-NET Bioenergy. Bodies from Ireland are partners to two projects under this call.

### WoodWisdom ERA NET+

The main approach in WW-Net+ is the substitution of non-renewable resources (e.g. materials or fossil fuels), by renewable forest-based solutions to reduce carbon emissions and waste. The joint trans-national call addressed the whole forest-based value chain in four areas as follows: 1) the sustainable management of forest resources through 2) their efficient utilisation in industrial processes to 3) value added products and 4) competitive customer solutions.

There are two Irish RPO's involved in a project funded under this ERANET+, which it is anticipated will commence in 2014.

### SUMFOREST

SUMFOREST is a new ERA-NET scheme, tackling the challenges in sustainable and multifunctional forestry through enhanced research coordination for policy decisions. The SUMFOREST project (2014-2017) aims to maximise the impact of research activities on Sustainable Forest Management and multifunctional forestry in Europe in the context of relevant policy, practice and legislative frameworks. It is anticipated that a call for project proposals under the SUMFOREST ERA-NET will be made in 2016.

### Joint Programming Initiatives (JPI)

The JPI concept stems from the realisation that a more coordinated approach is needed to optimise the value of research conducted across the EU and that certain research is best conducted on a pan-European basis. Building on the more limited ERA-Net model, it is a new bottom-up approach aimed at combining the national research effort (and related funding) of interested EU Member and Associated States, on a voluntary variable geometry basis, to tackle major societal challenges.

The "Agriculture, Food Security and Climate Change (FACCE)" JPI led by France and supported by a joint UK/French secretariat is of considerable relevance to agricultural production research. Ireland is a member and is represented on the Governing Board by both DAFM and Teagasc. The objective of the initiative, which currently comprises 20 member countries, is to co-ordinate research across Member States to address the major societal challenge of producing enough food while simultaneously addressing the challenge of reducing GHG emissions from the sector. Ireland may need to commit resources to this initiative in time.

### Forest-based Sector Technology Platform (FTP)

The Forest-based Sector Technology Platform (FTP) - a European partnership for research and development.

The forest-based sector includes all stakeholders with a major interest in forestry, forest-based materials and products. It also provides essential products and services for a more sustainable society. It accounts for 8% of manufacturing added value in the EU, using a renewable and continuously growing forest resource, counting 16 million private forest owners and providing nearly four million jobs.

FTP provides a forum for European forest owners, companies, researchers, regulators and financial institutions to work together in support of the development of new forest management schemes, products, services and business models.

To achieve significant breakthroughs through innovation, the sector needs access to financial capacity and basic scientific knowledge that is rarely available within one organisation or company. A critical mass of skills and resources is needed to break down barriers to innovation. Creating this critical mass is one of the prime purposes of the FTP.

In common with the Technology Platforms for other sectors, FTP is charged with defining a strategic Vision Document on behalf of the sector and agreeing on research priorities, set out in a Strategic Research and Innovation Agenda (SRA) which was launched in March 2013.  
[http://www.forestplatform.org/files/SRA\\_revision/Renewed\\_SRA\\_for\\_2020.pdf](http://www.forestplatform.org/files/SRA_revision/Renewed_SRA_for_2020.pdf)

### SCAR

The Standing Committee on Agricultural Research (SCAR) is an advisory committee charged with advising the European Commission and the Member States on the co-ordination of agricultural research across the European Research Area. SCAR has recently launched a Strategic Working Group (SWG) on Forest Research and Innovation, which brings together Member States forest research funding and policy organisations. DAFM represents Ireland on this SWG.

#### Expected outcomes:

The following are among the expected outcomes of the work of the SCAR (SWG) on Forest Research and Innovation:

- Shared information on research and innovation initiatives relevant for the sustainable growth of the economy in EU forest sector.
- Identification of areas and topics for joint programming and alignment of research activities.
- Bringing together experiences from present and former ERA-nets, relevant COST Actions, consultations with stakeholders Forest-based sector technology platform, Forest farmers CEPF, EUSTAFOR.
- Efficient use of forest trees and forest based ecosystem services as well as their contribution to the economy of farming.
- Connecting strategies for research promoting forest production and use of forest goods with the research strategy on sustainable biomass utilisation and processing in SWG Bioresources/ Bioeconomy.
- Supporting the Standing Forestry Committee in identifying common EU forest policies.

## COST

COST is an intergovernmental framework for European Cooperation in Science and Technology, allowing the coordination of nationally-funded research on a European level.

COST has a very specific mission and goal. It contributes to reducing the fragmentation in European research investments and opening the European Research Area to cooperation worldwide.

As a precursor of advanced multidisciplinary research, COST plays a very important role in building a European Research Area (ERA). It anticipates and complements the activities of the EU Framework Programmes, constituting a “bridge” towards the scientific communities of emerging countries. It also increases the mobility of researchers across Europe and fosters the establishment of scientific excellence in the nine key domains:

1. Biomedicine and Molecular Biosciences
2. Food and Agriculture
3. Forests, their Products and Services
4. Materials, Physics and Nanosciences
5. Chemistry and Molecular Sciences and Technologies
6. Earth System Science and Environmental Management
7. Information and Communication Technologies
8. Transport and Urban Development
9. Individuals, Societies, Cultures and Health

In addition, Trans-Domain Proposals allow for broad, multidisciplinary proposals to strike across the nine scientific domains.

**The following outlines aspects of research in the Forests, their products and Services Domain. The scope of the Domain is not, however, restricted only to these activities.**

Forestry Research supports activities aiming at meeting the economic, environmental and social needs of present and future generations in a sustainable way.

Forests and Environment research activities focus on the protection of forests from pollution, abiotic and biotic hazards (fires, storms, pests and diseases...) in order to maintain their full multiple values and the important roles of forests in climate change mitigation and adaptation.

Wood Technology research aims at an increase of knowledge necessary for an enhanced and broader use of wood as a sustainable, energy efficient and renewable resource in existing buildings, constructions and new applications.

Pulp and Paper research contributes to increased knowledge of the physical, chemical and biological characteristics of pulp and resulting products.

Bioenergy from forests research enhances our knowledge about how to use biomass from forests to meet the energy needs of present and future generations sustainably and without damaging the forest's ability to meet other needs. Biorefinery research develops the potential for the forest-based sector to extract higher value innovative products for changing markets and customer needs.

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