**Areas suggested by COFORD Council Working Groups**

**for consideration by DAFM for inclusion in**

**calls for research proposals**

**I Forest Genetic Resources**

A number of areas for potential forest research calls have been included in the draft COFORD Forest Genetic Resources Strategy document circulated to the council for input and comment. Once adopted, the strategy is available for reference by DAFM in seeking forest research proposals.

**II Forests, Climate Change Mitigation and Adaption**

*Forest products and their role in climate change mitigation*

The timber harvest is forecasted to double and annual output is forecast to increase up to 7 or possibly 8 million m3, depending on how successful private mobilisation will be.

Future investment will be needed if the sector is to react appropriately to this increased supply. The working assumption is that 60 - 75% of private supply will mobilise, Irish forest policy will continue to support commercial forestry, the contracting base will increase to meet demand and that Irish sawmills will continue to invest in capacity to process all larger sawlog.

In this assumed scenario there will be a surplus of pulp from forest harvesting operations of sawlog and a surplus of woodchip from sawmills due to increased sawlog processing. In both cases there is currently no planned demand for these materials.

Our research efforts should focus on finding a value-add home for small diameter material so the likes of CLT are not applicable here as this is made from large log.

Yes bioenergy will take up a small portion of this extra volume but we need real R&D to identify other possibilities for its use.

These products must be capable of using small diameter wood fibre (pulp and/or wood chip) in raw or processed form (chipped, crushed, shredded, shaved, torrefied, heated etc)

to form the main ingredient or as a blend to produce a product. Examples worth exploring (but not limited to) could include timber frame components, off-site and prefabricated components, engineered wood products (eg. Parallel Strand Lumber , Laminated Strand Lumber, Laminated Veneer Lumber, Stressed Skins, Scrimber, I-joists, Microllam and panel products (eg. combi-boards, lightweight strand board) or as an additive in textiles, insulation or cementitious products or to make paper or maybe plywood etc... Obviously advanced bio-products should be in the mix also.

The climate action plan 2019 highlights forestry as an important resource in the fight against climate change. In addition to the benefits in terms of carbon sequestration and storage, the plan also discusses the importance of wood products on the wider bioeconomy, specifically stating that they “can act as a less carbon-intensive substitution for other materials in construction...”. As a result, the following research areas/topics are suggested:

• The role of Irish wood products in climate mitigation

• Investigating the potential environmental benefits of increased use of timber and mass timber construction methods in construction and how this might help Ireland achieve carbon neutrality by 2050 (as stated in the climate action plan)

• Comparative studies between the main current construction methods and timber frame/mass timber construction options considering environmental and economic aspects.

*Adaptation to climate change*

Tree species/breeding/genetics

* Continued research to identify alternatives species and provenances and better understand the genetic basis of resilience of a range of tree species, including establishing more trial plots.
* Ongoing empirical research and new trial to testing of material on climate matching (species/provenances) which incorporate areas with increased warming of growing season
* Empirical assessment of criteria such as biotic and abiotic risks, including in combination effects across species/provenance.

Forest design

* Combining complementary tree species within stands and using mosaics of different forest types at the landscape level.
* Review, develop and integrate appropriate decision support systems and resources to increase usability for practitioners and encourage uptake.

Management

* Provide assessments of the impacts, financial and otherwise of silvicultural choices that may be appropriate in the future
* Build understanding on the impacts of site condition and competition as forest crops mature
* Investigate opportunities to incorporate several ecosystem service indicators in an appropriate Forest Management Decision Support System that can deal with climate and dynamic timber markets and analyse the impact that intensified forest management, resulting from climate change scenarios

Protection/Ongoing monitoring

* Robust horizon scanning of potential forest pests arising from global changes and development of suitable early warning systems through appropriate pest risk analysis
* As policy will need to be adaptive and reactive to changes in real time, frequent and cost-effective monitoring methodologies will be required to achieve the following:
* Detect early onset of Impacts (pest, maladaptation, wind damage)
* Options for effective monitoring may include a combination of remote sensing combined with ground validation through new cost-effective ground survey methodologies coupled with an appropriate “citizen science” approach

Cross-sectoral Interdependencies

Further targeted research on climate change impacts for the agriculture, forest and seafood sector including examination of cross-sectoral interdependencies will be required to achieve the type of policy integration required for the development of cross-sectoral adaptation plans to make progress (DAFM 2019). This can facilitate appropriate cross-sectoral adaptation planning.

**III Promotion of Forestry and Afforestation**

The members of the PAW working group have identifies the following list of priority research areas that would contribute to providing information to support the objectives of the group. We would appreciate if they are considered for inclusion in the upcoming DAFM research call. The priorities focus on identifying research needs that the working group considers important in the context of promoting forestry and afforestation.

1. Investigate attitudes towards forestry in Ireland and what can be done to influence it. This should include assessing whether the DAFM promotional projects are influencing attitudes / behaviour. Ireland’s forests provide a range of benefits, including timber production and job creation, enhanced biodiversity, carbon sequestration etc. We need to identify what are the main concerns / issues regarding forestry and whether these are perceived or real. We need to develop an understanding of the reasons behind attitudes to forestry, whether it is a lack of education, awareness, understanding or information, or whether it is misinformation. This will inform the development of appropriate initiatives to help change attitudes. The study should consider if there are learnings from other countries and what is being done to increase levels of awareness and change attitudes and whether it is making a difference. It should then be assessed whether these actions are, or could be, implemented in Ireland.
2. Tree-breeding and selection – There is urgent need for a palate of tree species to deliver on the evolving needs of forest owner and society, particularly in context of resilience i.e. pests & diseases, climate change. This research will need to be on-going as issues develop and we need to have long-term structures in place to adapt our planting stock appropriately in an agile manner. This work can build on previous and existing research, for example the COFORD FitForests project.
3. Fertiliser requirements for class E sites. A significant quantity of land classed as productive is potentially availabile for afforestation but ruled out due to lack of information around fertiliser prescriptions. Uncertainty exists as to whether a split application of fertiliser may be more useful than single application strategies and what quantity may prove satisfactory for the nutritional requirements of trees. More research is required to determine the effects of single and split application of currently used fertilisrs and new fertiliser compounds which are temperature regulated and which may afford more sustainable strategies towards crop nutrition and may facilitate planting of additional suitable lands. This recommendation emenates from the COFORD Land Availability Working Group report.
4. Revision of the site classification for Sitka spruce and other species suitability.The current system of land classification for afforestation based on vegetation has proved useful for assessing productive capacity of lands. However the use of vegetation is more appropriate in delineating the productive capacity of peatland soils. More research is necessary to ensure that productive mineral soils are not ruled out of afforestation due to difficulties in this classification. Assessing the variability in R+N scores may indicate background levels of nutrition sufficient for most coniferous crops and some pioneer species and needs further investigation. Rather than looking at the averaged R+N score, variability in R+N scores or other options may be more robust. This would provide information on the level of available nutrients in mineral soils which may allow successful afforestation establishment and can be further facilitated by foliar analysis covering a range of crops planted on various soils to provide baseline data for these soils.
5. Agroforestry: We need to establish research sites (can also be used for demonstration) to provide/improve evidence in relation to various research question including configurations, environmental and economic:
	* + silvopasture
		+ silvoarable (including small fruiting trees, shrubs)
		+ windbreaks /shelterbelts
		+ forest grazing/ forest barns
		+ woody riparian zones
		+ investigation of existing agroforestry systems as a proxy for future systems e.g. using existing hedgerows and shelterbelts to investigate impacts on shelter / water infiltration / lamb survival / forage use / biodiversity / etc.
		+ investigate / monitor / baseline existing private sites established by pioneer landowners (e.g. silvoarable horticulture site, different silvopasture options/ NI sites).

This recommendation emanates from the COFORD Land Availability Working Group report.

1. Alternative forest designs to increase forest resilience and acceptance and support biodiversity. This research should focus on increasing forest resilience by reducing the economic and environmental impacts of e.g. ash dieback and future known and unknown potential threats, e.g. spruce bark beetle, to our forests posed by climate change. Strategies to minimise risk to Irish forests could include preventative and mitigation strategies and may include mixtures or other measures such as forest design, etc with a focus on supporting biodiversity and adapting to climate change. The social impact of such design on objectors to current forestry practices should also be assessed.

The study should generate templates for planting mixed species/aged forests in Ireland: for example, it could determine optimal ‘block’ sizes to ensure the forest is both economically viable and sustainable; recommended species combinations; how should the unplanted areas be linked throughout the forest to provide biodiversity corridors and support timber extraction (is 15% unplanted area enough in this type of forest?); what additional supports (financial, educational etc) might be needed to encourage landowners to plant this type of forest. The study should also provide a cost/benefit (including carbon sequestration) comparison with the current more typical forest design.

1. Establishment and management of mixtures including tree communications/signalling/ecophysiology leading to more sustainable establishment and management practices. This should be informed by the COFORD mixtures report and use recent technological developments to advance this knowledge.
2. Research on silviculture of poor-quality broadleaf stands (including those impacted by ash dieback). Many forest owners have been negatively impacted by external developments e.g. ash dieback. This has left many with a forest that has not achieved/performed as they had hoped. It is necessary for those who encouraged them to establish to support these owners by providing evidence-based advice and backup on how to manage them now that they are left with this dilemma. This included developing appropriate silvicultural and management protocols for their future management.
3. Continuous Cover Forestry: additional research is required in conifer, broadleaf and mixed stands to improve evidence and knowledge in the Irish context. In addition, the establishment of a national network of marteloscopes[[1]](#footnote-1) for research, information and training purposes will provide invaluable information and evidence. This will provide information and on how and where CCF can be implemented under Irish conditions.
4. Monitoring/management of deer and methods of control or techniques to facilitate tree establishment (planting and natural regeneration). Deer damage is becoming an increasingly significant issue in the successful establishment and management of our forests. Additional research is necessary to identify appropriate control measures, particularly as broadleaved forests are very vulnerable.
5. Research is needed into the timber properties of a range of tree species grown under Irish conditions and potential alternative markets for these timbers. A study is necessary (desk study?) to determine what additional investments are needed nationally to support a forest industry that maximises the value of a broader range of timbers. The current market demand is focussed primarily on Sitka spruce and additional markets and structures need to be developed if the economic value of alternative species is to be realised.

**IV Socio- economic Contribution of Irish Forests**

Economic and behavioural drivers of forestry impacts to encompass:

-          Contractor Economics building upon the survey being collected

-          Behavioural Drivers of Planting, Thinning and Harvesting – using behavioural economics

-          Value Chain Economics (to incorporate substituting timber for concrete in construction)

-          New policy designs to incorporate carbon in forest policy incentives.

**V Roundwood Forecasting and Wood Mobilisation**

Work in this group is focussed on the publication of an updated COFORD 20-year all island roundwood production forecast for the forest sector to cover the period 2021-2040, on examining wood supply/demand dynamics for the forecast period, and on identifying barriers to roundwood mobilisation, and ways to address them. A number of areas of forest research input to the work of the group and these have been covered in recent DAFM calls, and in areas referenced in this paper.

**VI Ecosystem Services, non-timber benefits of broadleaved woodlands**

Life cycle analysis of forestry in terms of carbon budget and water budgets (on different soils)

Study of ecosystem services flowing through different life cycle phases

Effects of different approaches on carbon, biodiversity and water (CCF v clearfell).

**VII Forest policy, monitoring and implementation**

Encourage research into the effects of climate change and adaptation measures.

Research and implement methods to monitor, review and evaluate the climate change adaptation options put in place.

Continue research on, and promotion of, better land management in light of projected climatic changes.

Continue with pest and disease surveillance, monitoring and research.

Investigate the requirement for small scale harvesting equipment through appropriate study/research.

**VII Silvicultural mixtures**

*Species Mixtures in Irish Forests – A Review*, published by COFORD, identified that some 47% of the forest estate consists of mixtures. However, very little is known about the contribution mixtures can make to timber production/yield, carbon sequestration, forest protection and silvicultural management.

Under various DAFM EU and Government policies have highlighted the challenge of climate adaptation and decline in biodiversity. Forest plantation mixtures can provide multiple solutions to these challenges, increasing biodiversity, forest protection and carbon sequestration. Indeed, with increasing interest in alternative silvicultural systems like CCF, little knowledge exists on planted mixed forests in this country.

An investigation is needed to take advantage of these attributes, reviewing established mixtures research plots in detail, compiling growth models incorporating mixtures and alternative silvicultural systems such as CCF building silvicultural knowledge through a programme of technology transfer with stakeholders.

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COFORD – National Council for Forest Research and Development

1. Marteloscopes are silvicultural training sites in which all trees are numbered, mapped and recorded. [↑](#footnote-ref-1)