

Farm Woodland Forum Newsletter July 2007



Trees for Farm and Community – Post Decoupling

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This newsletter includes a report on the Farm Woodland Forum's Annual Meeting in 2007. The meeting entitled "Trees for Farm & Community – Post Decoupling" was held at the Rural College and Derrynoid Centre, near Draperstown in Northern Ireland. It was organised for the Farm Woodland Forum by Professor Jim McAdam of the Agri-Food and Biosciences Institute and Queen's University, Belfast.

The presentations, field visits and discussion highlighted how decoupling of agricultural support away from production created opportunities for trees to play a more central role in land management.



Tuesday 26th June

The meeting was opened by Shane Campbell, Director of the Rural College, and Dr Mike Camlin, Deputy CEO of the Agri-Food and BioSciences Institute. The afternoon of the first day comprised four talks, followed by the Forum dinner and some traditional Irish music.

Space for nature - engaging the rural community

Patrick Clegg, The Woodland Trust
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Patrick described the Woodland Trust's ambitious plans for Northern Ireland to motivate a whole generation to plant trees. Throughout the UK the Trust aims to plant 12 million trees, with children playing a major role. This aim has special significance to Northern Ireland, which currently ranks as one of the least wooded regions in Europe. Patrick described several activities including:

- *Back on the map* - The Woodland Trust's project to create the first ever record of ancient woodland in Northern Ireland.
- *Woods in focus* - The Woodland Trust cares for 52 woods in Northern Ireland, ranging from small community woods to ancient woodland.
- *Calling all schools and youth groups* - The Woodland Trust is offering schools and youth groups in Northern Ireland a special, free pack of 30 native trees.
- *New acquisition* - The Londonderry landscape is set for a transformation, thanks to the Woodland Trust's purchase of land at Ervey, south-east of the city.
- *Politicians put down roots at Stormont* - Local politicians have helped the Woodland Trust to plant trees on the Stormont Estate.
- *Carnmoney Hill* - This green oasis on the outskirts of Belfast has recently been declared a Local Nature Reserve.
- *Drumlamph Wood*, near Maghera - the first ancient woodland to be acquired by the Trust in Northern Ireland. The wood is rich in both history and wildlife, and is home to some rare inhabitants including the Irish hare.

Measuring synergies and tensions in the use of community woodlands

Paul Burgess, Olivia Agbenyega, and Matthew Cook
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Paul described community woodlands as "areas of trees with free public access close to a significant population centre", and explained that are of interest to a range of people and groups. The presentation, based in part on Olivia's PhD thesis, addressed three questions:

- What services, provided by community woodlands, are valued by these groups?
- What relative value do these groups place on these services?
- What are the similarities and tensions?

The research focused on three case studies: a poplar wood and two mixed-broadleaf woodlands planted in Bedfordshire between 1993 and 1998. The functions and uses of community woodlands were examined using De Groot's framework of ecosystem functions and uses. Following semi-structured pilot interviews, a self-administered structured questionnaire was completed by 84 local residents, the three woodland owners, two local conservation groups, and three representatives from government departments and agencies.

Each respondent group recognised the "regulating", "habitat", "provisioning" and "information" functions of community woodlands. In addition most respondents recognised that community woodlands may have "negative" effects, and it was helpful to include this in the analysis. The different groups generally gave similar relative valuations to the five functions, indicating that there is substantial scope for the groups to work together. However there were also differences: the greatest weightings for the "habitat", "provisioning" and "information" functions were identified by the conservation trust owner, the private owner, and government agencies respectively. The private owner also placed the greatest relative weighting on "negative" functions.

Each respondent was also asked to identify specific uses arising from the functions. Across the three sites, local respondents placed the greatest relative value on the use of woodlands in providing a habitat for wild plants and animals (14%) and landscape beauty (12%). The private woodland owner placed a higher value on the use of the woodland for timber (14%) than other groups (1-5%). Each group allocated between 10 and 20% of the overall value of the woodland to providing regulating services showing the potential importance of this function.

A European perspective on silvopasture and waste nutrient management

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Rosa described the land management systems incorporating trees which exist in Spain. She explained that complex systems which integrate pasture and trees were extensive in Mediterranean countries where both tree and pasture growth capacity are usually low.

Tree-pasture interactions have been studied less in wetter "Atlantic" bio-geographical regions including Galicia, where potential productivity is higher. Fertilisation is an important aspect of the management of silvopastoral systems as it contributes to improved pasture production, the main economic resource of silvopastoral land before tree harvesting. This talk highlighted important aspects of the tree-pasture interaction within the Atlantic biogeographic region of Europe.

Capacity of willow to consume effluents and sludges

Michael Doran, Rural Generation Ltd
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Michael felt that, in the current economic climate in the UK, the production of short rotation coppice willow was marginally profitable. However as the options for municipal sludge disposal were diminishing under pressure from food retailers, opportunities had been created for using willow coppice as a recycling route for sludge. Yields could be increased using the sludge as a fertiliser and the gate fee for receiving the sludge added value to the economics of the energy crop.

However there were risks associated with the application of sludge to willow, including:

- Nutrient loading
- Nutrient run-off
- Application of Potentially Toxic Metals to the soil (PTEs)
- Chemical composition of ash resulting from the combustion of willow that has been subject to sludge application

Michael's presentation assessed these risks and attempted to quantify them in relation to the current legislative and environmental circumstances in Northern Ireland.

Wednesday 27th June

The second day started with five morning presentations, before a series of field visits in the afternoon.



Figure 1. Some of the speakers (left to right – Rosa Mosquera, Gerry Lawson, Paul Burgess, Lindsay Easson, Geraldine O'Sullivan, and Ruth Ruddell)

Trends in European timber and fuelwood markets and implications for the UK

Gerry Lawson, Research Councils UK
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Gerry described a report commissioned by the UK Land Use Policy Group to examine the present and future relationship between the UK and the world timber trade. The report had been co-authored by Gerry on behalf of the Farm Woodland Forum. It explored the extent to which international factors affected UK woodland conservation and ways to counter possible adverse impacts.

The effect of globalisation on the economic viability of European Forestry is an important driver of UK softwood timber markets. At present there are strong links between Russia and Europe for imports and exports, however the increasing demand for timber in China is partially being met by Russia. Hence many wood supplies are being influenced by the Russia/China connection including Europe, which is the biggest net importer.

Hardwood timber was considered separately. As hardwoods supplies from developing countries become exhausted, there may be a future gap for UK hardwood exports. Unfortunately UK hardwood harvesting has been in decline and value has decreased significantly. Standing timber is still poorly priced and under managed. However the value of forested private land is increasing. Overall world prices of softwood were equilibrating; UK prices had been decreasing but countries such as Latvia and Estonia had seen an increase in prices.

Technological developments and the use of forest habitats also play a role in global trends. Improvements to silvicultural practices and a greater focus on productive areas had resulted in a rise in productivity within forest stands. Climate change had also helped to increase the productivity of temperate forests. As more timber came on the market the role of industrial plantations would increase compared to tropical forest timber. The value of non-timber goods and services has also attracted attention over the past several years (See the earlier presentation by Paul Burgess). The UK and other nations were increasingly recognising the potential markets and the value of forest in terms of recreation and other public use.

Energy generation was a main concern of many national governments. In recognition of climate change and energy security issues, the UK Government had set bold targets for renewables. Biomass production in the UK has been increasing. However current capacity was unknown and therefore the potential to reach the government targets might not be achievable.

The multi-functionality of woodland use requires joined up planning if the UK government and the EU are to achieve their goals and targets. Although there had been increased rate of broadleaf planting in the UK, a reduced rate of conifer planting, had led to overall reduced rates of planting compared to the middle of the twentieth century. Harvesting of timber will therefore decrease around 2040. In other EU countries trees are encroaching on agricultural land and grants are being paid to remove this regeneration. Policies and grant incentives throughout the EU are contradictory and the timber situation needs to be viewed on a larger scale. Agroforestry could promote joined up thinking and promoting a mix of trees and agriculture may be the answer for many member states. The prime objective remains a sustainable forestry sector through increased planting, improved silviculture and a practical approach to land use integration.

The report is available on http://www.forestryhorizons.eu/documents/World_timber_trade_LawsonHemery_revised08.pdf

Farm forestry, wood energy and the future

Geraldine O'Sullivan, South Western Forestry Services

Geraldine indicated that SWS Forestry Services was formed in 1986 by five local co-operatives. It is now one of Ireland's leading forestry contracting companies, managing over 19,000 hectares. SWS are looking to woodfuel as a relevant new market.

In recent decades, the Irish forest estate has changed drastically, with a net move from state to private ownership. Many recently-established forests were planted to "mine" grant income and have not been actively managed. With changing attitudes towards forest management (including certification) and an increasing array of market options, thinning is becoming more prevalent. SWS have begun stockpiling pulpwood from thinnings and harvesting to provide a quality product for the woodfuel market.

In Ireland 95% of woodland establishment is undertaken by farmers. This is resulting in a steady rate of current afforestation but is not reaching the Government's target (17%). Production rates within the private sector will probably be lower than originally forecast due to a number of factors including establishment failure.

Access is one of the main issues constraining the harvesting of private forests. There is little to no infrastructure and the forest estate is fragmented. Also there is a lack of operators with experience in private harvesting (i.e. on a smaller scale) and the machinery required for thinning is not readily available. Pulpmill placement means that transporting pulp would cost more than selling therefore the reason for stockpiling and waiting for biomass boilers.

Current SWS practice means that first thinnings occur at 15-20 years or when the trees are approximately 12 m tall. After that a plantation is thinned every five years, depending on wind hazard risks. As the infrastructure is then in place an income can then be gained from the thinnings. Depending on the yield class many woodlands produce 45-55 m³ per hectare from thinning which will be used for stake, pallet or pulp wood or may be used for woodfuel. One owner (with all roads grant aided to 80%) made 290 Euros per hectare from the first thinning.

Geraldine informed the meeting that Ireland has the lowest use of biomass in Europe. Private owners may never make a lot of money but woodfuel provides an outlet for pulp and provides a return even if it is minimal.

Ireland also imports 90% of its energy requirements; this costs the economy 20 million Euros per day. Fuel prices are increasing and there are more policy drivers and increased incentives for renewables, making this an attractive option.

SWS is aiming for a quality woodchip product. Due to Ireland's climate the main issue is the moisture content of the chips. SWS currently uses a natural drying system of stacking timber at roadside and are considering the option of chipping first and drying later. This drying process takes two years. There was discussion on the merits of using forest brush and the argument of nutrient and matt use versus applying fertiliser to the site or bailing the brush after the needles have dried and fallen. These arguments would be site specific and would depend on harvesting methods. Management of the resource is also important and a consistent supply of woodchip to clients is crucial. Therefore security of supply means having a buffer capacity in place.

Geraldine considered that the industry required a change in thinking; woodfuel cannot continue to be sold on a comparative basis with oil, instead woodfuel needs to be viewed as a commodity in its own right

Wood biomass crops for energy and agriculture

Lindsay Easson, AFBINI

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Lindsay felt it had been proven that biomass crops can deliver significant carbon savings, the challenge is to find ways of incorporating these into farming enterprises in a way that is technically feasible, environmentally sustainable, economically viable, and can be integrated into farming systems whilst complying with all regulations.

Farmers have a variety of choices for renewable energy production including biomass, liquid biofuels and biogas. Biomass itself can be used for combustion, anaerobic digestion and second generation biofuels (ligno-cellulosic materials). Double uses of biomass are required in the UK as energy production from crops was barely economic whereas annual biomass crops in continental Europe were profitable because farmers received higher prices for electricity.

Farmers have a number of factors to consider before entering the renewable energy market. These include available technologies (is slow pyrolysis the best new

technology?), bio-remediation and nutrient management. Also the rising price of grain was affecting the decision as to whether to give over land to dedicated biomass crops such as short rotation coppice (SRC). In 2000 it was reported that willow would be planted on marginal land however willow coppice had displaced cereals on some of the best land. This begs the question "Are these forward thinking farmers or not?!"

Miscanthus can be considered as a woody biomass crop and it is supported under the same scheme as SRC willow in England. Already grown quite extensively in the south of England it is attracting attention in Ireland as it is seen as a possible fuel for a power station currently running on peat. After taking several years to come to peak production the rhizomatous grass gives an annual harvest of dry woody material which can be handled with conventional farm machinery.

New biomass crops are being sought as a way of recovering 'waste' material. Is there potential for perennial dock? Generally, farmers must consider i) the problems and ii) the opportunities for added value when it comes to biomass for energy and agriculture. Problems included long term commitment before return, poor cash flow, the difficulty of returning land to conventional agriculture, and the need for specialists. The added value included forming an energy service company, developing a supply chain to build confidence in the market, forming partnerships, undertaking to supply a service (heat), and identifying potential end users with high demands for heat and electricity

Role of FWAG in promoting farm woodlands

Ruth Ruddell, FWAG

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Ruth indicated that the Farming and Wildlife Advisory Group (FWAG) has been providing conservation advice to farmers in Northern Ireland since 2003. A national independent charity, FWAG advisors have a wide range of farm conservation experience including the establishment and management of farm woodlands.

FWAG promotes on-farm conservation through direct contact with farmers including meetings, events and shows, farm walks and responding to telephone queries. FWAG also produces technical information sheets and prepares planting plans and grant applications for farmers. Farmers can also obtain biodiversity action plans for their farms and good practice advice that is delivered through FWAG newsletters and articles.

Hedgerow trees are one of the main forms of trees on farms and are promoted by FWAG throughout the UK. The importance of riparian woodlands and small farm woodlands are also encouraged on farms. Coppice woodlands are also encouraged as they have a high biodiversity value and do not incur planting costs (if already occurring). FWAG wish to strike a balance between conservation and agriculture and see silvopastoral systems as a means to achieving this. Woodland grazing is currently being promoted in Scotland and FWAG would like to extend this focus to Northern Ireland.

Agroforestry research at Loughgall

On the second afternoon, the conference delegates were able to visit the agroforestry unit at Loughgall. This included a visit to the Northern Irish silvopastoral trials of ash and sycamore planted at agroforestry spacing of 5 m (400 trees per hectare) (Figure 2) and conventional spacing of 2 m (2500 trees per hectare) in 1989. After 18 years the ash was particularly impressive, with girth growth still greater than in the conventional density trial, and at least 10 years of undiminished pasture production.



*Figure 2. Ash planted at 400 trees/ha in 1989. Plots were grazed by sheep during the first 13 years (February to November with set grazing regimes). The ash has been thinned three times leaving approximately 320 trees per hectare. Nets are necessary to prevent damage from sheep grazing. Grass growth is good in the spring, but recently *Lolium perenne* has been partially replaced by the shade tolerant *Poa trivialis*. Both sheep and cattle enjoy eating leaf litter and prunings. (Photo: P. Burgess).*

The open parkland 'feel' of the plots (Figure 2) was appreciated by all visitors and Jim McAdam, Head of the Agroforestry Unit at AFBI, and the field station at Loughgall, was extremely pleased with the €300 per cubic metre gained from selling ash butts for hurley sticks. The buyer reckoned that the form of the sweeping butts combined with strength and flexibility of the wood produced hurley sticks second to none. Tests carried out on the timber showed that it had half the stiffness of forestry timber and two-thirds the hardness.

Participants also visited a silvoarable plot with poplar and spring barley. Four hybrids of poplar (in groups of six) were planted in 1998 (Figure 3). There had been no yield reduction in the barley since the trees were planted, but when this happened the system would be converted to silvopasture. Next year it was possible that a local farmer would be allowed to grow leeks between the trees. Other sites had cattle grazing beneath apple, poplar and ash trees (Figure 4).



Figure 3. Poplar clones underplanted with barley (Photo: P. Burgess).



Figure 4. Cattle grazing beneath apple, poplar and clonal ash trees (Photo: P. Burgess).

CAFRE, Loughry

Moving to the Loughry Campus of the College of Agriculture, Food and Rural Enterprise (CAFRE) participants heard a thorough presentation from Nigel Moore, Renewable Energy Technologist (Figure 5).



Figure 5. Nigel Moore explaining the economics of coppice and rape oil for fuel and feed (Photo P. Burgess).

We visited a food industry project designed to investigate the potential of Short Rotation Coppice (SRC) willow for the bioremediation and biofiltration of food industry waste. Four hectares of willows (in two 2 ha blocks) were planted at Loughry, three years ago, by the Londonderry based firm Rural Generation. The willow from this project will be harvested, chipped and dried as a fuel to provide heat for buildings on campus. The site will also be used to run training courses on growing SRC willow covering planting, harvesting and economics.

Stem sections are planted with a modified step planter, cut to ground level, and sprayed with herbicide after planting. After one years growth the stems are cut again to encourage coppicing and the field is sprayed a second time with herbicide. The cost of establishment was approximately £2000 per hectare, with rabbit fencing proving essential. The initial aim was to harvest the willow every three years. However, because willow was growing so well on the site, harvesting was now planned to take place on a two-year cycle in alternate blocks. The best time for harvesting was between January and March. To date in N Ireland most willows have been harvested using a standard self-propelled forage harvester with a modified head. The willow chips are dried in a grain drier using heat from a willow chip boiler. To be economic this drier needs to be within 20 miles of the plantation, and to achieve a moisture

content of 20% the drying process costs £12 per tonne. Willow chips are worth about £65 per tonne, and around 10 tonnes per hectare can be produced annually. Ten tonnes of willow chip can replace the equivalent of £1500 of fuel oil (5000 l), so the process appears economic in the long term. However it takes quite a few years before the establishment costs are recovered. It is therefore preferable to have access to payments for disposal of partially treated sewage sludge – i.e. ‘bioremediation. This can generate up to £250 per hectare.

Other methods of harvesting and drying were being investigated including rod harvesting and billet harvesting. The rods and billets would be dried naturally and then chipped, although billets had been shown to be difficult to chip.

Nigel Moore also talked to participants about non-woody biofuels, describing trials of *Miscanthus* at AFBI Hillsborough. He highlighted how farmers growing oilseeds could add value to their crops rather than selling the oilseed as a commodity. From a relatively small investment in cold oil pressing technology, rape oil could be converted to biodiesel increasing output to around £1000 per hectare. However, with insurance costs, taxes and the bonding issue, the economics of producing biodiesel for sale are small. The margins are much higher if specific high value lubricant oils or high quality cooking oils are produced rather than biodiesel. Examples included a mould release oil produced from rape seed which had an output of £2500 per hectare, and a very high quality rape seed oil produced as an alternative to virgin olive oil which gave an output of £8000 per hectare. Hemp oil produced for the health food industry as a diet supplement had an output of £15,000 per hectare.

Cookstown District Council

The next stop took participants to Cookstown District Council where Derek Duncan described the biomass boiler being installed at Cookstown Leisure Centre. Planning for this started in 2003 with the aim of increasing local employment and providing local farmers with an alternative income. Funding amounting to £197,000 had been obtained from various sources including the EU. A 500 kW wood fuelled boiler (Fröling Turbomat 500) had been purchased and would require around 900 tonnes of willow chip (at 20% moisture content) per annum. The boiler would be operational from January 2008, and 90 hectares of SRC willow had been planted within 5 miles of Cookstown by a group of local farmers (Northern Bioenergy Ltd).

Thursday 28th June

Renewable Energy Centre, Derry

On the Thursday morning, the group visited the Brook Hall Estate of John Gilliland in Londonderry and received detailed information on all aspects of willow coppice growing and energy generation from Michael Doran of Rural Generation Limited. Michael Doran (Figure 6) showed the clones and techniques being tested and gave visitors a chance to see the planting machinery, chippers and boilers being used to heat buildings around the farm.



Figure 1. Multi-clonal willow coppice being demonstrated by Michael Doran of Rural Generation Ltd (Photo: P. Burgess).

The Estate uses four boilers ranging from a 100 kW KWB boiler from Austria with an efficiency of 90-92% with computer control and SMS text message notification of faults (Figure 7) to a modified big bale boiler with an efficiency of only 70%, but greater versatility in the quality of feedstock accepted (Figure 8).



Figure 7. 100 kW Boiler from KWB GmbH (Photo: P. Burgess).



Figure 8: Farmstore big bale boiler installed in 1999 running on straw or waste wood loaded through the front door, beside a smaller boiler loaded with chips or pellets by a screw auger. (Photo: P. Burgess).

We also visited an Energy Cabin, which is a self-contained unit with boiler, chip store and solar panel installed together. This can be delivered on the back of a lorry and sited next to individual houses for an installed cost of around £20,000 (Figure 9).



Figure 9. The Energy Cabin for supply of domestic hot water (solar) and biomass heating (Photo: P. Burgess).

The meeting concluded at about midday on Thursday, and the participants returned home after a very interesting and productive conference.