

Local wood supply chains support employment in the rural economy

For small-scale wood-using enterprises to flourish and maximise their contribution to the local economy they need reliable access to quality timber in appropriately sized lots. At present, sales strategies for much commercial forestry precludes small scale standing sales as most lots are for larger areas and discourage consortium bids which could be used to split the logs between several enterprises.

This case study describes one small-scale standing sale for which careful records were kept of log sales from 0.5 ha of mature conifer woodland. The logs went into a tight knit community of wood users operating supply chains that reached into several different timber and fuelwood markets and provided a cascade of benefits to the local rural economy. Although only one example, this case study shows that standing sales into local timber markets can be an effective means of supporting wood-using enterprises and contribute to the Welsh Government well-being and sustainable management goals.

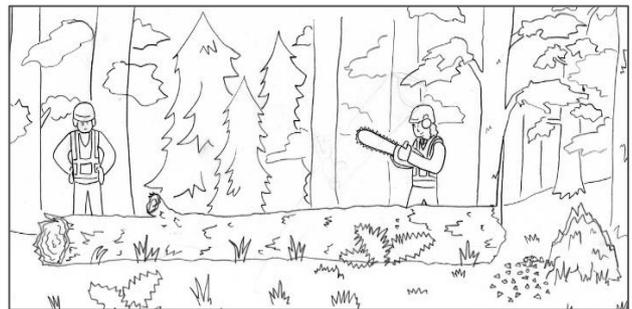
Two recommendations flow from this case study:

- 1) that more is done to facilitate access to small lots of standing timber for local markets**
- 2) further work is required to develop a means of accounting for the benefits accrued by small scale timber sales.**

ELWY WORKING WOODS is a worker's co-operative committed to managing the woodland surrounding the picturesque Elwy valley¹. The coop is a fluctuating group of 25 people who operate a social enterprise ranging across saw-milling, traditional timber framing, basket making, charcoal burning and

firewood, tree planting and forestry. In mid-2019, EWW negotiated access to fell and replant a small area (0.5 ha) of mature conifer forest.

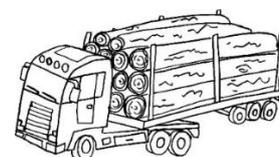
The area felled was two small blocks either side of an access track from a compartment planted in 1956 with Douglas fir (DF) as the main species (estimated yield class of 22 m³ ha⁻¹ yr⁻¹) with Norway spruce (NS), Corsican pine (CP) and Ash as secondary species. The conifers were harvested and the area subsequently deer fenced and restocked with broadleaves.



Log sales

The logs were sorted into lots to suit the seven buyers as listed in Table 1. This sorting into lots for specialist end-uses is termed 'niche marketing' and increases cost in the time required to organise sales and sorting and handling the logs.

The sale of logs was organised through local contacts with the distances logs were hauled as shown in **Error! Reference source not found.** Just over half of the logs were delivered within 5 miles, just under 70% within 10 miles with 25% making the longest haul to a sawmill just over the border in England.

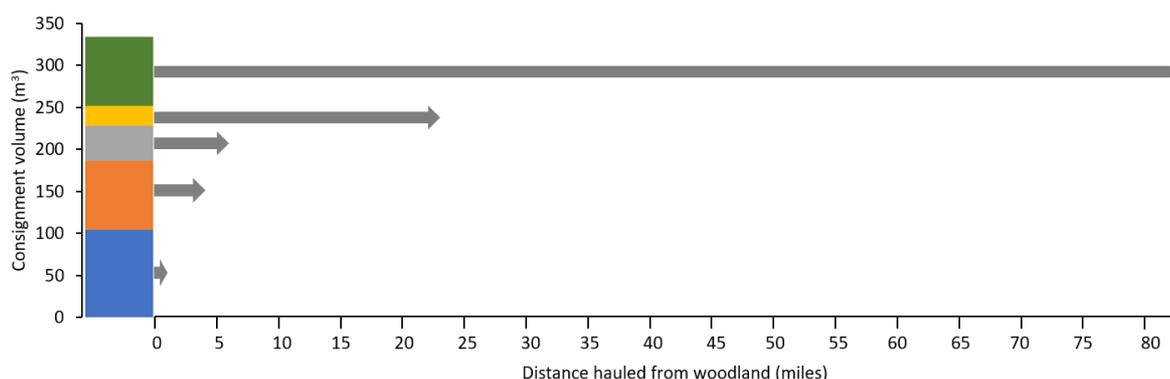


¹ <https://www.facebook.com/elwyworkingwoods/>

Table 1: Species and log assortments

Lot	Species	Top diameter (cm)	Volume (m ³)	Log grade	Purchaser	Use
1	DF	35-50	94.5	Including over-sized and curved logs in long lengths	EWW	Timber-framing, sapwood as stakes, larger offcuts firewood, shavings & sawdust for animal bedding and composted
2	DF	30-35	23.0	Straight sawlogs	Carpentry workshop	Outdoor signage and furniture, waste as firewood or briquettes
3	NS, DF	25-35	82.5	Straight sawlogs in lengths 2.2 to 3.7 m in length	Sawmill	Sawmill - fencing and sawn timber, waste to chipboard and biofuel plants.
4	CP	30-40	42.0	Straight sawlogs in long lengths	Axemen	Axe racing, competition sawing then firewood
5	Mixed	-	61.0	Poor form, damaged logs, short lengths, branches etc.	Householder	Chipped for use in biomass heating
6	Mixed	-	21.0		Firewood merchant	Firewood for sale to local customers
7	Mixed	-	10.0		Householder	Firewood

Figure 1: Distance logs hauled from woodland



The price for the sawlogs averaged £65 per m³ while the chip logs went for £40 per m³. These are comparable to the average prices given in the Forestry Journal market report for summer 2019² of £70 for sawlogs and £50 for chip and exceed the average softwood sawlog price for the six months to 30 Sep 2019 of £54.54 given in the Forestry Commission Timber Price Indices.

As expected, prices varied with species, size and quality. Demand for DF meant that it fetched up to £65 m³ while CP went for £52 m³ and NS for £43 m³. Preparing separate lots for niche customers increased returns. This was most obvious in the case of the oversized and curved DF logs taken by

EWW for which they paid the highest prices which otherwise have mostly likely gone as low grade, low value chip logs. Sales of firewood were at very low prices which barely covered the cost of delivery – this was likely for social reasons i.e. to be neighbourly or support a local firewood business and was wood that would most likely have been left in the forest by a larger scale operator.

In order to compare the EWW operation with what we might consider ‘business as usual’ (BAU) an alternative scenario which parceling of the timber into the minimum number of lots for sale was devised. This BAU scenario was based on the assumption that all suitable logs (14 to 46 cm

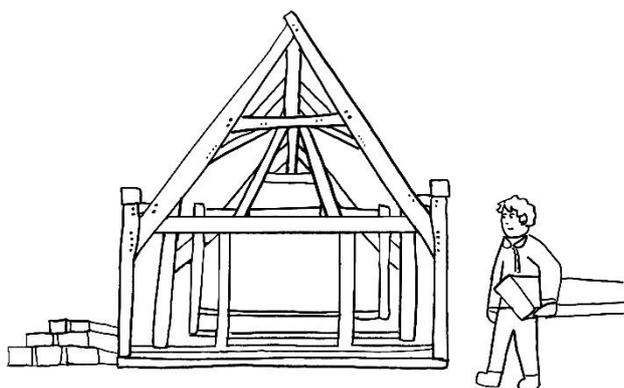
²
<https://www.forestryjournal.co.uk/business/17833698.market-report-summer-2019-balancing-act/>

diameter and 2.2 to 3.7 m long) would go to the sawmill (which took lot 3) with outsize and curved logs going for chip (as in lot 5) with small material e.g. branch wood left in the forest. This gave 147.5 m³ going to the sawmill 83 miles away in England and 155.5 m³ to local chip and 31 m³ left in forest.

This suggests the EWW operations increased utilisation of the logs and decreased the travel distances and thus the carbon embedded in processing of the logs. The overall return from log sales was £16,250 which is 30% more than estimated returns under BAU. It is clear that niche marketing gives a margin over BAU that likely justifies the higher costs of log handling and organising the greater number of sales.

Value-addition to rural economy

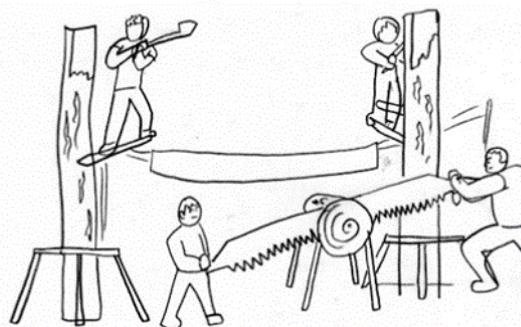
In terms of supporting the local rural economy, with the exception on one lot that went to England, all value-addition activity was in Wales and supported employment in five small to micro-scale rural enterprises (contractor, haulier, timber-frame co-operative, signs workshop and firewood merchant). Of these the timber-framers, signs workshop and firewood merchant added value by processing to a greater or lesser extent. The most striking example being the crafting of the large DF logs into a 15 tonne timber-frame for a house in Preston which was priced at £40,500 which covered the cost of timber, labour and transport.



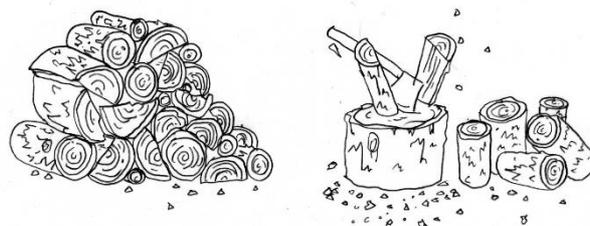
Thus, logs costing just under £2,000 provided work for five people worth something like £30,000. Likewise crafting wood into durable signs and outdoor furniture will add considerable value to the timber. These Welsh enterprises together employed around 16 people and this sale would have contributed to their job security in 2019.

The CP logs went to the local Axemen which includes at least 10 team members who participate

in a strenuous and highly skilled sport and provide demonstrations at outdoor events as well as competing in national events.

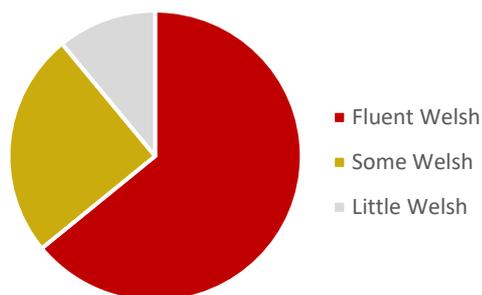


Value-addition on the CP by the axemen is very difficult to determine in monetary terms – maybe they were able to use this as a paid-for display but this would likely only help cover costs as the axemen are doing this as a sporting activity and not for income. The value added in this case should be more properly measured against well-being indicators.



There were also several individuals who bought small lots of firewood who benefited by obtaining local and in some cases cheap source of heating for their homes. This can help offset the high cost of heating in rural areas without access to main gas. In this case study, allowing wood to flow into the local wood supply chains directly benefited at least 28 local people. An estimated 70% of these people are first language or fluent Welsh speakers and only 20% have little or no Welsh (**Error! Reference source not found.**).

Figure 2: Language skills in local supply chain



In BAU there would have been few opportunities for local employment and little or no opportunity for value-addition in Wales. Nevertheless, it is worth pointing that even in this case study that 25% of the wood was sold to a large sawmill employing 100 people in England so the amounts required to support Welsh enterprise and benefits are really quite small. It is the opportunity to access wood and to place this in small quantities into niche markets which is the key to increasing Welsh value-addition with likely little detriment to current timber flows to larger sawmills.

Carbon budgets

Climate change and associated carbon budgets are increasing concerns especially since the declaration of ‘climate emergency’ by the Welsh Government in April 2019. As they grow trees capture CO₂ from the air and transform it into wood. When the tree dies the wood rots and the carbon is released back into the atmosphere or enters the soil carbon store. When trees are felled the carbon can be stored in the form of durable products such as buildings and furniture or burnt and released into the air. Storage is carbon negative as it takes carbon out of circulation, burning should be carbon neutral over time if replaced by new trees and can be carbon negative if it replaces fossil fuel heating e.g. mains gas or heating oil.

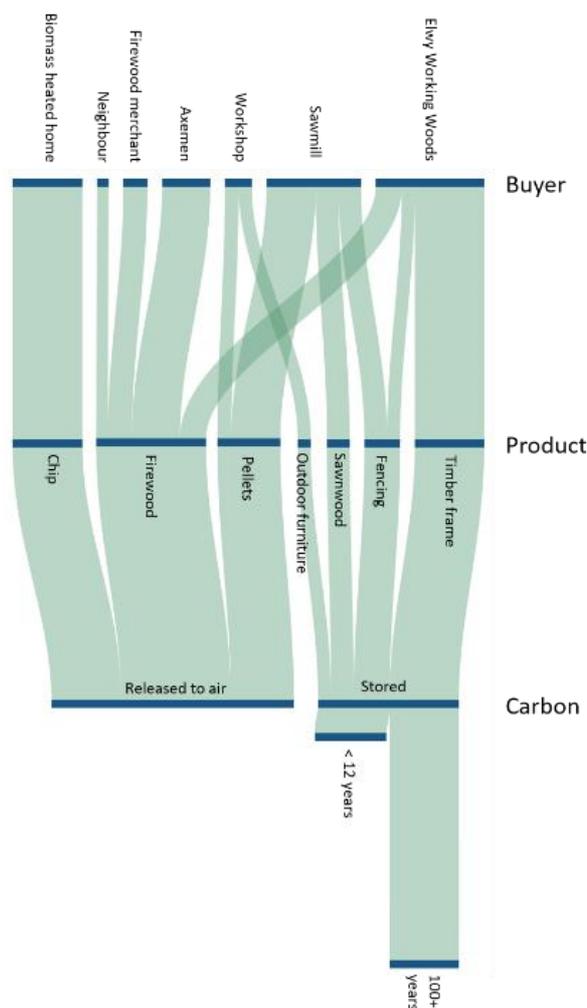
In this case study there is insufficient detail to do anything like a full accounts of carbon flows arising from the different processes and uses and in any case the numbers are quite small. However, the results of some simple calculations (see Appendix for details) reveals some interesting findings (Figure 3).

Unsurprisingly, the majority (65%) of the carbon locked in the harvested logs was released to the atmosphere by burning in the form of firewood, chip, briquettes and pellets within a very short period of time. Around 35% was stored for at least some time. The fencing, sawnwood and outdoor furniture all has a short life and is not likely to last more than 12 years. The most significant contribution to carbon sequestration was the 18% which went into the timber frame house which should have a life in excess of 100 years.

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Figure 3: Presumed fate of carbon within wood removed from woodland



In the BAU only 21% of the carbon would have been stored and this for less than 12 years with 9% left in the forest to rot.

What is most striking is that the case study makes a contribution to carbon budgets in the form of 18% of the carbon being sequestered for more than 100 years and this from wood which would otherwise have been chipped.

Policy benefits of small-scale local timber sales

The Welsh Government has established policies which are relevant to utilisation of natural resources ranging from the Woodland for Wales strategy, the Environment Act (2016) and the Well-being of Future Generations Act (2015). These all

highlight the need to balance the needs of biodiversity, sustainable use of natural resources and the economy. In order to examine the contribution that could be made to these goals by development of short, local log supply chains the benefits arising from the EWW case study were set against the seven well-being goals established by the Well-being of Future Generations Act and presented in Table 3.

Table 2: Achievement of well-being goals

Well-being goals	Contribution arising from case study
 <p>A prosperous Wales</p>	<p>The use of locally-grown wood contributed to prosperity based on efficient use of natural resources. Specifically, the case study:</p> <ul style="list-style-type: none"> (a) safeguarded 16 skilled jobs in the rural economy, (b) created a long-term carbon store and (c) provided woodfuel as a source of renewable heat which offset the use of fossil fuels. <p>Innovation to take advantage of available wood resources at a scale appropriate to small enterprises is a good basis for development of skills and secure employment opportunities in the rural economy. In the case study this took the form of skills in artisanal timber framing and high-tech laser cutting in the carpentry workshop.</p>
 <p>A resilient Wales</p>	<p>In the case study 0.5 ha of conifer was replanted to broadleaves which will enhance biodiversity and increase ecological resilience. Managed well these trees should provide high quality timber for future markets and contribute to long-term economic sustainability. Small-scale felling and re-planting can be used to re-structure forests to create diversity in species and ages which is inherently more resilient than large scale monoculture managed under clear-fell.</p>
 <p>A more equal Wales</p>	<p>Allowed people to take advantage of employment opportunities arising from local resources. Without this they might need to leave area for work or give up interest in work in the forestry and timber sector.</p> <p>Local supplies of firewood can help ameliorate fuel poverty in areas which are not on mains gas (most rural properties). In the case study 53% of the wood was made available as fuelwood to local people in Wales.</p>
 <p>A healthier Wales</p>	<p>Secure employment along with outdoor work and recreation contributes to physical and mental well-being. The case study contributed to job security and supported outdoor sport (axemen).</p>
 <p>A Wales of cohesive communities</p>	<p>The sales were organised through local networks and helped strengthen local supply chains and cement bonds within the community of forestry and wood-based enterprises in North Wales.</p>
 <p>A Wales of vibrant culture & thriving Welsh language</p>	<p>About 60% of the people employed in enterprises in the case study were first language Welsh speakers. Directing flows of resources to local enterprises enables people to remain close to their roots and consolidate Welsh culture.</p> <p>The case study contributed to the active forest culture of Wales – through Axeman competitions and displays at WoodFest and similar shows</p>
 <p>A globally responsible Wales</p>	<p>Use of local wood will offset imports of potentially unsustainably sourced wood and minimise the transport and associated carbon.</p>

The Area Statements are an important strategic planning tool derived from the Environment Act. This case study falls within the North West Wales Area statement and provides evidence to support several of the opportunities identified under the “Encouraging a sustainable economy” theme³ such as:

- Better understanding the role of agriculture and other rural enterprises in underpinning the rural economy;
- Developing sustainable local timber markets e.g. developing local tree nurseries and establishing the right quality of woodlands to meet the demand of local housing markets.

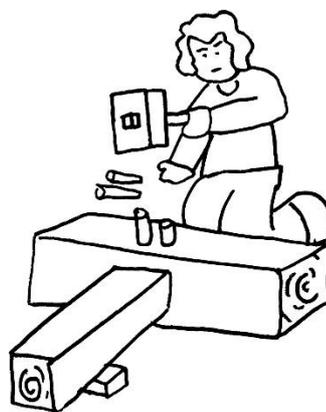
Generally, the Area Statement focusses on agriculture and tourism while the EWW experience makes a good case for a greater role for forestry and wood-using enterprises especially in light of demands for significant increase in woodland planting.

Observations and recommendations

Although this is only a single case study of one small standing sale of timber – it serves as an illustration of what can be achieved by allowing access to small scale lots including good quality timber and allowing a free rein for onwards sales and supply chain development.

The case study has shown significant gains for small-scale sales into local supply chains as opposed to business as usual with timber directed into a smaller number of larger scale sales. This has implications for the Welsh rural economy, culture, well-being and climate change which deserve greater recognition. Although this is effectively an anecdote it is sufficiently compelling to support two recommendations for consideration by NRW and Welsh Government:

- NRW should look again at procedures for making small standing lots available to the local markets – this needs to consider facilitation of onward sales and allow appropriate access to contracts by consortia of local operators and buyers.
- Welsh Government should consider supporting further work to develop useful economic multiplier for small scale sales and methods for quantifying community benefits⁴ arising from timber sector activity to facilitate more appropriate decision-making in access to the timber resource.



This case study has been compiled by Wild Resources Limited using information and records provided by Elwy Working Woods. It forms part of the Llais y Goedwig’ Enabling Natural Resources and Wellbeing project ‘Voice of the Woodlands’



³ <https://naturalresourceswales.gov.uk/about-us/area-statements/north-west-wales-area-statement/encouraging-a-sustainable-economy/?lang=en>



Appendix 1 – Fate of carbon in timber removed from forest

The figures presented in this case study are estimates based on alternative uses of the 334 m³ of round wood removed from the forest. The sawmill conversion rates are based on standard figures given in UNECE (2010), conversion rates for mass density from the TRADA wood species database (<https://www.trada.co.uk/wood-species>) and an estimate that carbon is 50% of the dry mass of wood (Lamlom & Savidge 2003). The half-life for harvested wood products taken from Valatin (2017). The best estimate of carbon flows in the case study are contrasted with the probable flows if the area was felled and sold as one lot to a large sawmill taking mixed conifers of 14-46 cm top diameter and in lengths from 2.2 to 3.7 m with all outsize and undersize logs going for chip and small and awkward material left in the forest.

Species	Log volume removed (m ³)	Mass density (kg m ⁻³)	Use	Conversion	Product volume (m ³)	Product mass (tonnes)	Half-life (C tonnes)		
							100+ yrs	12 yrs	Short < 2 yrs
DF	117.5	510	2 x Timber frame house	0.64	60.5	30.8	15.6		
			Outdoor signage	0.48	11.0	5.6		2.8	
			Stakes, firewood, chip	Residual	46.0	23.4			11.7
DF / NS	82.5	490	Fencing, sawnwood	0.48	39.6	19.4		9.7	
			Chip, pellets	Residual	42.9	21.0			10.5
CP	42.0	510	Axemen / Firewood	All	42.0	21.4			10.7
Mixed	92.0	490	Firewood, chip	All	92.0	45.7			22.8
Utilised carbon							15.6	12.5	55.8

Assumptions:

- 1) Timber framing uses green wood, heart wood and crooked pieces so conversion for rough green sawing without shrinkage was applied.
- 2) All businesses utilise sawdust, shavings and offcut as firewood, chip or in pellets – the amount going into this was taken as everything that didn't get into final product.

References:

- 1 <https://www.facebook.com/elwyworkingwoods/>
- 2 <https://www.forestryjournal.co.uk/business/17833698.market-report-summer-2019-balancing-act/>
3. <https://naturalresourceswales.gov.uk/about-us/area-statements/north-west-wales-area-statement/encouraging-a-sustainable-economy/?lang=en>
- 4 For example, monitoring against the Wales Procurement Policy Statement (WPPS) Principle 4 Community Benefits – delivery of social, economic and environmental benefit through effective application of Community Benefits

Lamlom S.H. and Savidge R.A. (2003) A reassessment of carbon content in wood: variation within and between 41 North American species. *Biomass and energy* 24: 318-388

UNECE (2010) Forest product conversion factors for the UNECE region. Geneva timber and forest discussion paper 49. ECE/TIM/DP/49. Geneva. <https://www.unece.org/fileadmin/DAM/timber/publications/DP-49.pdf>
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Valatin G. (2017) Harvested wood products and carbon substitution: approaches to incorporating them in market standards. Forest Research.