

## **A Question of Forestry Phrases and a concept of Soil Reserves draft 13**

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When hearing that down the Millennia some ancient civilisations have worshipped Mother Earth. My reaction, and perhaps that of many others, was that today we would immediately think of Planet Earth.

Naturally, meanings of words and phrases have changed throughout time and with generations. Therefore, since I come from a background of Natural History and spend as much time as possible in the company of foresters, it is perhaps worth exploring some of the phrases used in forestry today.

In the not too distant past the word “Recycle” became an everyday word in many languages across the world. Individuals, organisations and their governments reacted in positive ways and rose to the challenge. Now in recent times we have the word “Sustainable” being used whenever possible in our plans for the future. In forestry the words “Renewable” and “Restore” too could also be added to make a quartet of positive action words.

But to the natural world, forestry and agriculture, what does this quartet mean? How do they fit in with our every day perception of how these words work?

In the Dictionary the definitions are:

Sustain(able) - to keep up, to maintain; keep going continuously

Renew(able) – restore to original state, revive.

Regenerate – make (as good as) new. I would add “make as good as original state”.

Restore – bring back to original state.

“Thin to waste” is a forestry term that has been around a long time and used in everyday woodland management. It is perhaps a pivotal phrase in this discussion. The dictionary defines waste as superfluous, refuse, no longer serving a purpose, left over after use. However, what remains in woodland after forestry operations in biological terms can never ever be described as “no longer serving a purpose”. Quite the opposite, it’s fundamental in natural systems to provide a continuity of resource for the soil inhabiting parts of any woodland ecosystem. It could be termed the sustainable part of forestry operations. In fact all tree material that remains will eventually play its part in being broken down and absorbed back into what might remain of the natural system that supports our trees as food (fertilizer). The myriad of fungi, bacteria, nematodes, insects and other micro-organisms is part of an extremely complex ecosystem that could be termed the bio-engine and will break down the dead material and return the minerals and nutrients locked up in the wood to Mother Earth.

### **Restore and Recycle**

Restore and Recycle is obviously very difficult in some forestry operations especially disrupting and compacting the soil with giant machinery that can eliminate the essential mycorrhizal fungi and other micro-organisms that are the agents of nutrient release and provision for all plant growth. For example, In many cases, French, German and Swiss woodlands are being managed to produce quality timber in the long term by winching whole trees to rides or very wide extraction tracks. Thereby, soil damage caused by the movement of heavy machinery is reduced to a minimum.

However, if the trees are removed, so are the nutritional resources they provide for their own support organisms that enabled the trees to grow in the first place. Where will these minerals

continue to come from? You can't restore them by recycling when there's nothing there to recycle. Whilst annual leaf and twig fall obviously will provide limited amounts of nutrients in the upper soils even at a greater depth minerals and nutrients are depleted. Therefore roots and their partner mycorrhizal fungi can only acquire whatever nutrient stocks remain after millennia of exploitation by other plants or their removal by man (harvesting) or leaching by weather. Accepting that today some mycorrhizal fungi are suspected of being major agents in weathering rock and breaking down soils to obtain minerals for their partners plants. If they are damaged in anyway or destroyed of course it will have knock on effects.

What if one tries to combine some of these words? For example: "Sustainable Renewables" or "Sustainable Recyclables" or "Sustainable Restoration"?

These word combinations might be used when describing future actions when the natural tree and woodland ecological processes are considered a significant part of any management plan for the renewal of products produced by the trees. By taking entire ecosystems into account and accepting that trees constitute only part of the whole, whilst continuing to be a removable product, then logically due consideration of exploitative production should follow. Has the time arrived for accepting that the final crop from any woodland operation now should be reduced to 80% of the original forecast? Sustain, renew, regenerate, restore are bedrock phrases of continuous cover forestry and many of the foresters practising this silviculture could argue that they are ticking all the boxes. There is no question there is a very good chance that by perpetuating a diverse age class of tree species there is a more secure future for a large part of the essential mycorrhizal and other soil community inhabitants.

### **Sustainable, structural, successional supply of deadwood**

Ideally in natural woodland it would be 'A succession; structural; sustainable; supply of decaying wood from acorn to ancient. In other words the continuing death of trees and limbs at all ages of growth usually from competition provides a continuing supply of decaying wood essential in providing again recyclable minerals and nutrients to the living plant and soil community At Windsor, to study this natural ecosystem, a grove of seventy 80-year-old Beech surrounded by a hundred and twenty 30-year-old Beech in a plantation adjoining the original forest reserve will be left to grow into perpetuity. This stand of maturing Beech will remain unthinned, providing we hope, useful information for future forestry.

Logically maximum exploitation will lead to many problems, especially with the loss of ecological continuity in the soil. Mineral and nutrient depletion and soil degradation naturally follows the disappearance of the essential biodiversity to woodlands: the millions of micro-organisms living in the soil. We ignore them at our peril. A good example of lack of awareness in Forestry is the Tit family, other hole nesting birds and Bats that work for the benefit of Foresters for 365 days a year and yet today it is not appreciated and we still do not automatically provide homes for as little as five weeks for them to breed.

### **Sustain and renew**

At least in the last century, many foresters had to "take the long view", knowing full well that they would seldom, if ever, see the results of their vision, insights, experience and labour. "Sustain and Renew" may well have been in their minds. These "Gentlemen of the Forests" (my name for them), with the results of their labours surrounding us today, produced fine trees and woodlands with the knowledge and experience of their day. However, science and our knowledge do not stand still. There is an excellent example of a Forester "Jock" Lindsey (then Head Forester of the Crown Estates at Windsor) and his Forest Manager, Jack Lewis, who foresaw that science would 'catch up' one day. They created a "Forest Reserve" at Windsor, which one could say conserved material for future research.

In collaboration with what was then the Nature Conservancy Council (now Natural England), in 1956 18 hectares of Old Beech and younger Oak woodland were designated ‘minimum intervention woodland’ to remain thus in perpetuity. To this day the area remains a site of European importance for fungi insects, and other micro-organisms connected to old trees.

However, even before Jock Lindsay’s and Jjack Lewis’s action there are many examples of other areas at Windsor, The New Forest, Sherwood, Sevenack and Grovely Wood, to mention just a few, where veteran and ancient trees still remain in commercial plantations. It’s incredible to think of those Foresters centuries ago, left aging and old trees when planting. Whether with vision or by default they have left the UK tree world with an exceptional legacy of biological continuity, an insight into our cultural history unparalleled anywhere in the rest of Europe.

Today many foresters recognise the importance of these old trees remaining in plantations and are “haloing” by removing any surrounding younger competition in plantations and from natural regeneration. We believe this practice was started perhaps twenty years ago by the Forestry Commission at Sherwood and Castle Hill, Duncombe as well as by the National Trust at Calke Abbey.

### **Regenerate and restore**

“Regenerate and Restore” could certainly be used to describe our experience during a recent visit to Turkey. We were taken to the large organic tree nursery of the region’s Forestry Department. The word ‘organic’ is used because no fertilisers, pesticides or herbicides are ever used. In these conditions obviously the Foresters are mimicking near natural seed germination and young growth conditions as closely as possible. By their not using inorganic chemicals it is reasonable to assume young trees will be colonised by at least some of their natural mycorrhizal fungal partners. Naturally early fungal colonization leads to far better transplant establishment and far less chance of early infestation by soil borne pathogens such as our native and the newly arrived phytophthoras, which are now becoming established in plant nurseries, gardens and in the wild. For all we know it may take decades to detect their presence in older trees and determine their impact. Young mycorrhizal roots will have either a fungal sheath, resembling a glove, which can function Or an internal barrier against other #####potential colonisers, which would include pathogens. This could be considered to be a natural biological defence system.

Of course, in the past all tree nurseries would have been organic - often quite near individual trees or tree plantations. Presumably seedlings growing in such close proximity to established trees could be guaranteed early colonisation by mycorrhizal fungi. Across the UK the results from these foresters’ practices can be seen today, especially in the fine trees in our broadleaved woodlands and older conifer plantations. However, what we really see is only the above ground responses of trees to below ground activity. Hopefully, future scientists will make below ground comparisons in organic and non-organic planted woodlands.

In nature nothing is ever black and white and there are many examples of trees performing perfectly well in many different circumstances. Higher concentrations of atmospheric CO<sub>2</sub> and of nitrogen fallout are thought to increase growth rates. However, higher nitrogen usually means less mycorrhizal activity so that depleted associations with trees could mean poorer tree performance in the long-term, especially in times of stress. Stress brought on, for example, by a prolonged drought, could lead to a higher susceptibility to pests and diseases. The question remains: do these increased levels of pollution aid plant growth rates, counterbalancing soil mineral depletion and reduced biodiversity. Interestingly both John White {recently retired Forestry Commission Dendrologist} and I independently have both come to

the conclusion that there is very little evidence that we will ever see in the near future old trees reaching the giant dimensions in girth of the remaining ancients that grace our shores.

At the beginning of the 21st century, the UK is at last about to declare Marine Reserves and the EU is about to published an excellent Soil Directive. Why not soil reserves? With this in mind John Deakin, Head Forester of the Crown Estate at Windsor, has suggested designating the 18-hectare forest reserve as a Forest Soil reserve. Hopefully this initiative will encourage other forest managers with the insight and vision of their predecessors to get together to discuss the whys and wherefores of such designations. Kew, for example, is in the process of conserving seeds as a precautionary principle – why not soil banks?

One day when I was ‘waxing’ lyrical on the value of decaying wood - which is a positive phrase rather than the negative dead wood – an old lady said to me “well my son, decaying wood is the woodland soil of tomorrow”.

Perhaps today those wise foresters who following the insightful ways of those past ‘old gentlemen of the forest’ might also heed that old lady’s comments, whilst also using the words of our ancient ancestors “Mother Earth”. In other words look after the soil and the soil will look after you.

And DON’T TREAT SOIL LIKE DIRT!