Karwendel Alpen Park

The area around Eng is an extraordinary valley, steep sided to the south and then opening out to a 220ha flat area with extremely steep sides. The flat land was probably the bottom of a lake or sea at some stage and the soil is very gravelly but also very loamy and rich in places, usually under the gravel.

View of Karwendel with visitors (left)
One of the *A. pseudoplatanus* (right)

80% of the park belongs to Austria and 20% to Germany. There is no vehicular access to the rest of Austria without going through Germany (and it is perhaps 50 km over the mountains to the nearest Austrian village, shop and school). Unusually for Austria, the land is owned by the farmers but the trees are owned by the Federal State. People live in the valley in the summer but no one stays over winter as it is too unsafe. The higher pastures seem to be the older ones and have names indicating their Austrian descent. It is probable that the farmers used to bring their animals over the mountain tops and into the top of the valley. The lower areas were not accessible and only used as pasture more recently, they tend to have names suggesting a German origin.

In the flat valley bottom are approximately 2000 *Acer pseudoplatanus* trees, some probably around 500-600 years old. Cattle graze during the summer months and it is also a popular place for people to visit so the feel was like a 19th century English landscaped park!

It is thought that on the valley bottom the *Picea abies* trees were cleared at some stage to create pasture and the *Acer pseudoplatanus* were left, along with occasional *Fagus sylvatica*. Most of the clearance was done several centuries ago but there was more in the 1960's. There are also areas of *Picea abies* dominated woodland with occasional *Acer pseudoplatanus* trees showing what the area was probably like before clearance.

None of the trees were pollarded but many of the trees had been damaged by snow and landslides. The valley sides are loose and avalanches are common during the winter. It seems that the *Acer pseudoplatanus* trees can withstand avalanches much better than the spruce trees. The latter are usually killed whereas the *Acer pseudoplatanus* often survive. The *A. pseudoplatanus* also survive and hold back

deep snow, Dieter has seen situations where a tree has been scoured by snow up to 5m in height, removing all mosses from the trunk, and the tree has survived. Many of the trees near Eng are also buried in gravels to a depth of perhaps 2m. These trees are still growing and just appear to have rather low crowns and short trunks. The depth of gravel is known from excavations done around some trees. Dieter has also seen an extreme version of this elsewhere where the crown of the tree really started at ground level. Because of the soil structure and being buried in gravel these trees can have root systems that form several separate horizons.

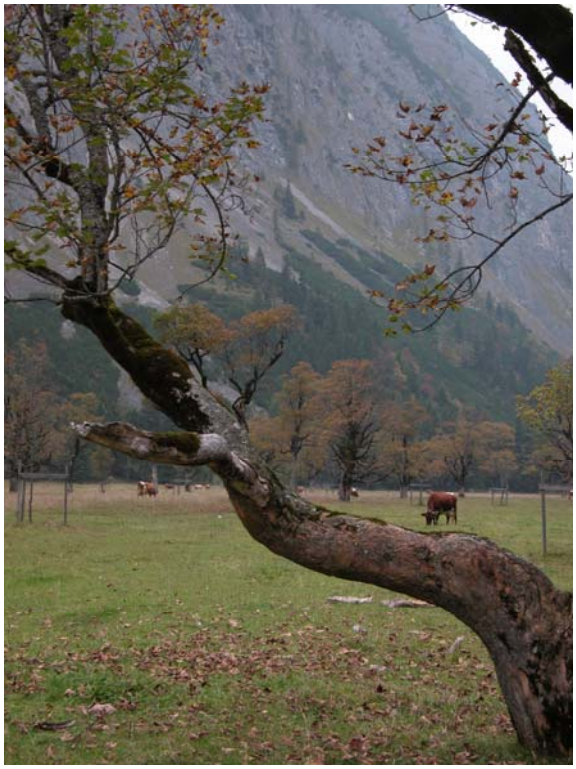
***Acer pseudoplataus* buried in the gravel (left)**

Trees buried in the gravel and cattle grazing (above right)

Some of the trees are estimated to be around 500 years old, this was calculated on the basis of trees that have died and been solid enough to count rings and then extrapolating to the biggest trees. Many of the bigger trees are hollow so ring counting of these would be difficult. A fairly typical large tree was 4.6m in girth.

Some of the older trees (left & right)

The trees are not evenly distributed thoughout the valley and occur in clumps. There are also areas with few or no trees. The areas with no trees often correspond to those where avalanches regularly occur. Some planting was done in these areas in the past but it will not be continued as the long term viability of the trees is lower here. Other areas where trees do not occur are where there are frost hollows or wet places, which tend to be rather colder.



Old tree (left) newly planted and protected trees (right) and also showing the steep valley sides

A few *Fagus sylvatica* trees were growing amongst the *A. pseudoplatanus* but there were many more on the hillsides. Probably the valley floor is too cold for them

The older trees are probably older at least partly because of the effects of avalanches and snow. Most showed some signs of damage to the branches that resulted in regrowth. Many of the older trees also were hollowing and had cavities in them.

The area around the trees is managed as summer pasture, grazed by dairy cattle. Traditional breeds used to climb up the hillsides to graze but now the animals used are much heavier and cannot climb up the steep slopes. As a consequence the *Fagus* is starting to grow on the former pasture of the lower slopes. However, the number of cows grazed is rising each year. Milk produced here is outside the normal quota system so the farmers want to produce as much as they can. The combination of more cows and less agile ones has increased the grazing pressure on the valley floor. This year there was over 400 livestock units grazing in the valley. The trees did not seem to be adversely affected by this except one young one that was bark chewed (but this was a maple and not sycamore).

Cattle damaged *Acer platanoides* (left)
Cow rubbing against a tree (right)

Other notable species:
Some entomological survey work has been carried out by a previous park manager.

Recent management/survey work:
Concern about the losses of the older trees has resulted in some planting of trees grown from local seed. The trees are planted out as large whips and protected from the cattle by wooden cages. It has been found that the trees stand the best chance of survival when they are planted into very large holes that have been filled with loamy soils. If this is not done they grow well for several years with their roots in the gravel and then decline due to lack of nutrients and/or lack of water due to the well drained nature of the gravel. The older trees have their roots in the loam under the gravel.

The trees have been counted and their survival rate plotted by using aerial photographs from the 1950's and 1990's. From this the intention is to try to replant as many trees as needed to keep the population stable but there are concerns about the viability of the older trees. The trees do produce seed and there are plans to try a grazing exclusion area to encourage natural regeneration.

The visitors probably do not cause significant problems for the trees. The majority walk on a well made up path and only the occasional tree is the subject of intense trampling. The visitor numbers however can be very high in the autumn when the trees are (normally) lovely colours and this can cause traffic jams and significant problems lower down in the valley. Various solutions have been discussed to try to deal with this but as the surrounding land belongs to Germany there are greater problems than if it were within the same country.

The management seemed to be genuinely concerned about the trees and taking them into consideration. The work done to ensure continuity of trees by planting and

considering natural regeneration is testament to this. There is probably nothing that could really be done on the older trees themselves to ensure that they live longer as their age is partly due to regular damage by snow and rocks. Some will just grow old naturally without damage as open grown trees. If a generation gap does become a problem then consideration might be given to causing artificial damage to the trees to retain the continuity of habitat for invertebrates etc. but there seemed to be a reasonable age distribution so I would not have though this was necessary. It would be better and perhaps less work to obtain natural regeneration rather than having to plant trees so the result of the first experiment to encourage this should be interesting.

There did not appear to be very much dead wood on the ground or as standing dead trees (although there was some of each). It has only been the policy to retain it for the last couple of years so hopefully this will increase as time progresses.
Concern was expressed over the grazing pressure. This could become a problem and needs to be watched, especially if an increase in animals does result in increasing manuring and therefore increasing nutrients that might affect both the ground vegetation and potentially the tree mychorrizae. Increasing grazing pressure might increase the incidences of damage to the bark of the trees by chewing and also damage to the roots by trampling under 'favoured' trees. Both these need to be watched out for. The ground flora was very pasture dominated and was completely lacking in shrubs. One consequence of leaving more dead wood, especially fallen dead trees in their entirety might be that more shrubby growth might develop around the branches where the cattle cannot get in to graze. This in turn might also encourage some natural regeneration of the trees. This process would also be speeded up by a reduction in grazing pressure. Of course the consequence of this would be that the aspect of the whole area would change from being open 'formal parkland' with trees to be more of a 'natural' wood pasture. This would probably benefit some of the invertebrates and birds. It would also change in many people's eyes from being tidy to being untidy! It would be interesting to look at the list of invertebrates recorded and see if there are any particular requirements that they have that are not well met.

Summary of Austria

Pollarding was probably quite widespread in the past, at least at certain altitudes where the winter feed needed to be supplemented with leaves and where it was not too high for ash to grow. Pollarding seems to have been done almost entirely for the dried leaves as fodder but, unlike Scandinavia the leaves were removed from the branches at the time of cutting and the cutting was done very close to leaf fall. It is also different because the trees were cut every year but not all the branches removed. Subsidiary reasons for pollarding were to prevent excess shading to the meadow/pasture and to help stabilise steep slopes.

The key species pollarded was *Fraxinus excelsior*, however it seems likely that other tree species were also cut occasionally, such as *Tilia* and *Ulnus* (and one lapsed *Tilia* pollard was seen).

Pollarding is no longer widespread and very few farmers are still doing it in any form. Even fewer are probably using the leaves. It is now largely being considered as a

traditional management technique that is being perpetuated for its cultural interest. An additional reason for doing it is that the *Fraxinus* trees are helpful in stabilising the soil and are planted for this reason, however they then cast a lot of shade so pollarding can be used as a method of reducing this. (Probably this is not disimilar to the traditional reasons for pollarding!)

The sites with pollards are not protected and are largely on land owned by farmers. As many of the trees are quite young they may not have such a high biodiversity value as pollards in other countries.

There are two potential types of threat to the pollards:

1. The practice of pollarding is very restricted and is very little known. There obviously are methods of getting subsidies but most farmers are probably not inclined to do it even if they knew more about it.
2. Lapsed pollards probably do exist in more places than the Zillertal valley but the localities are not known or recognised. The one small site with lapsed pollards that was visited would have benefited from a small amount of clearance of competing vegetation and then the *Fraxinus* trees could probably have been cut again. The current lapse on these trees was not many years but the longer such trees are left the more difficult any restoration work would be. Of course trees like this need to be located first!

Pollarding terms used in Austria

Laub – leaf
Lauben – leafing – pollarding
Schneiteln – shredding of spruce branches
Schneitleschen (also schnoatleschen in tirol dialect) – Literally ‘shredding of ash trees’ – term used to describe the ‘pollarding’ of the ash trees

I feel that my visit has helped raise awareness of pollards in Austria, a country with pollards that no one in England seemed aware of.

Cow wearing ceremonial bell (left)
Cow head dresses (below)

The cattle having the head dresses put on (left) and parading through the streets (right) – traditionally this was when they were brought down from the high pastures in autumn

Additional notes

Dieter also told me about: Tirol larch wooded meadows where the trees were well spaced and fallen branches were collected in the spring. The trees were cut occasionally when they reached about 200 years old and used for building cow sheds or fencing. These wooded meadows were fertilised occasionally and were typical to the Tirol.

In the E. Alps are *Carpinus* coppice that must, by law be cut with an axe not a saw (as thought better for regrowth).

Recently pollarded *Fraxinus* tree