Introducing of Broadleaves to Mountain Coniferous Stands Under Harsh Environmental Conditions

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- The Jizerské hory Mts. (northern Bohemia) belonged among the most affected mountains in the region.

- More than 12 000 ha of the mountain forest were destroyed or heavily damaged by air pollution in the summit parts of the Jizerské hory Mts.

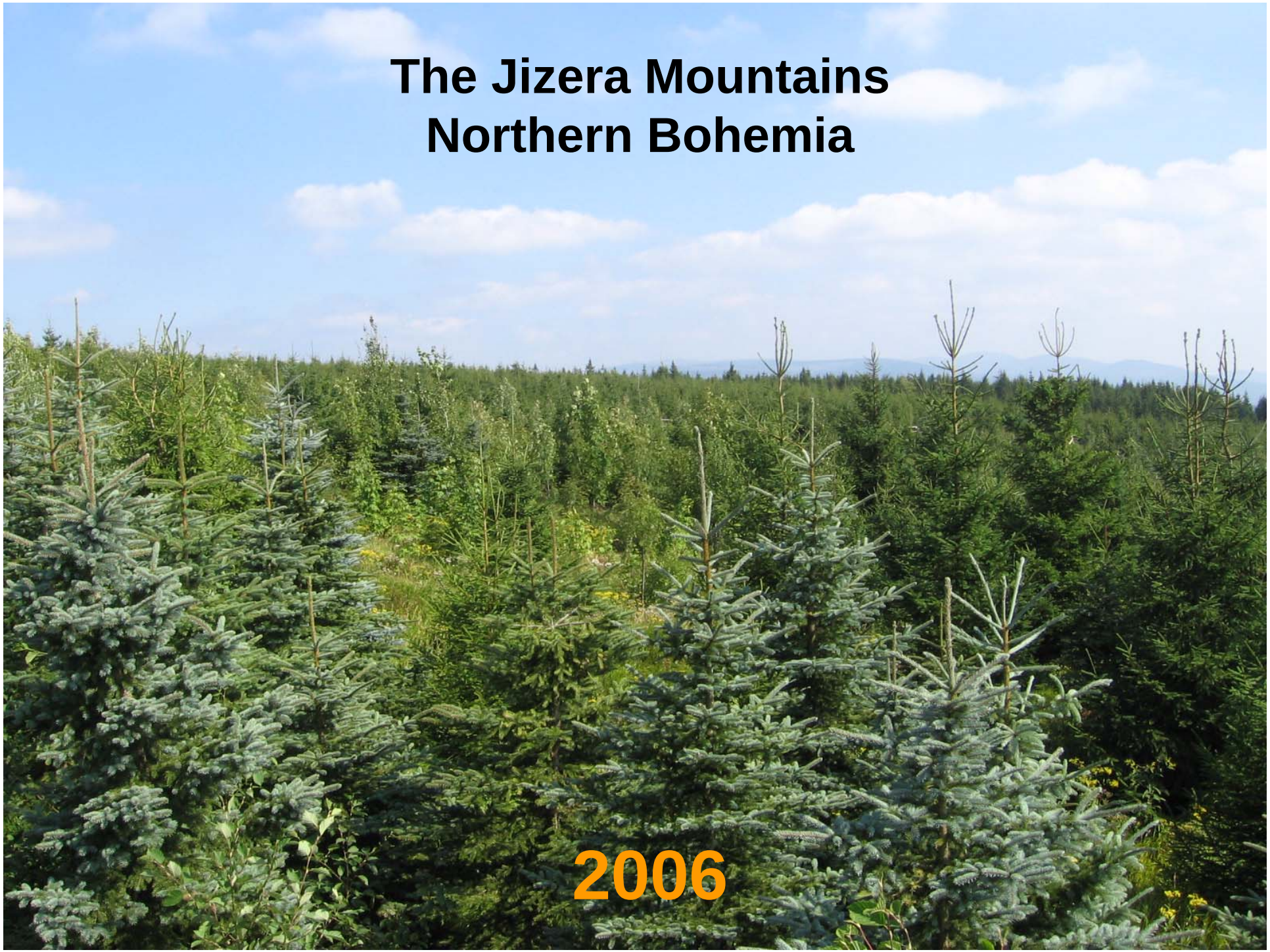

The Jizera Mountains
Northern Bohemia
1990


1990

Since 1990s, the situation has markedly improved (filtering equipments and desulphurisation technologies).

The emission rates of SO_2, NO_x, and NH_3 were 87%, 51%, and 44% lower, respectively, in 2000 than in 1985.

The improvement in pollution enabled replanting the clear-felled areas induced by air-pollution.


The Jizera Mountains
Northern Bohemia
2006

Tree species composition

- The forests established after air-pollution calamity are dominantly coniferous.
- A desirable admixture of broad-leaved trees is often missing

Jizerské hory Mts.

Young Norway spruce (*Picea abies*) stand planted in 1994.

Photograph by Kuneš (2008)

Blue spruce is allochthonous (non-native)

Photograph by Kuneš (2007)

Why were the plantations of conifers more successful compared to broad-leaved trees?

- Norway spruce and blue spruce are not as attractive for hoofed game (browsing) and mice (bark nibbling).

- European beech (*Fagus sylvatica*) and Sycamore maple (*Acer pseudoplatanus)* are considerably more sensitive to an extreme climate on the mountain clear-cut tracts.

- Beech and maple are more sensitive to soil chemistry and demand a better nutrient supply than spruce.

Frost damage to young beech transplant

(Photograph by Balcar 2005)

Why is the admixture of broad-leaved trees important?

- The admixture of broadleaved-trees makes the stands closer to natural state.
- Litter of broadleaves has a desirable influence on chemistry of surface humus layer and nutrient cycling in the ecosystem.
- Broadleaves are more tolerant to drought periods compared to Norway spruce.
- Mixed stands are generally more resistant to disturbances.

A pilot-scale project on reintroducing of broadleaves (coordinated by Faculty of Forestry and Wood Sciences) has been realised in the Jizerské hory Mts. since 2005.

Jizerské hory Mts. - Sycamore maple saplings (Photograph by Kuneš, 2006)

Specifity of the project

Except for conventional planting stock, saplings (large-sized transplants h>100 cm) with intensively-formed root system will be tested.

Apart from beech, maple and rowan, attention will be given to hitherto less cultivated species such as Carpathian birch (*Betula Carpatica*), aspen (*Populus tremula*) etc.

Using of reintroduction centres

Why saplings?

These large-sized transplants are high enough to be safe from weed competition.

The terminal leaders of the saplings are above the ground frost zone.

Beech saplings planted in the the Jizerské hory Mts. in 2005.

Purchase costs = 1.5 EUR per a tree

Photographs by Burda (2005).

Root system of a sapling (Elm - *Ulmus glabrata*)

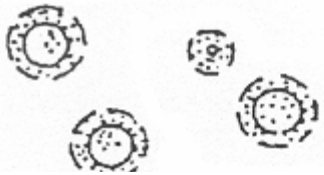
(Photograph by Burda, 2006)

a

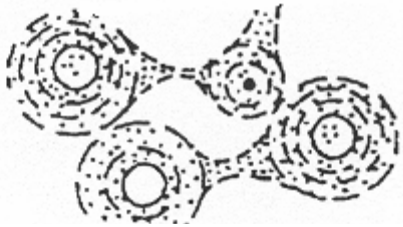
b)

a) and b) A web of interplanting cetres will be created.

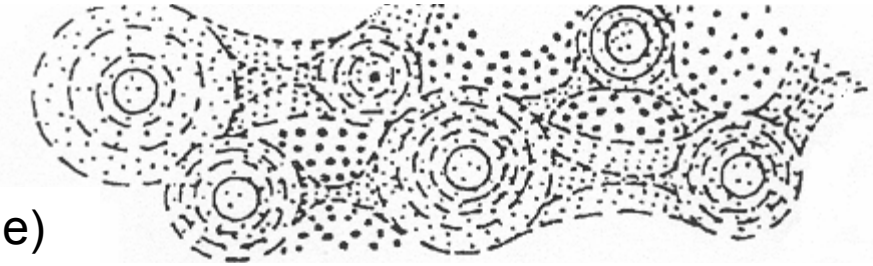
c)



d)



c) and d) When the broad-leaved admixture in the cetres is established and stabilised, the interplantings will expand.



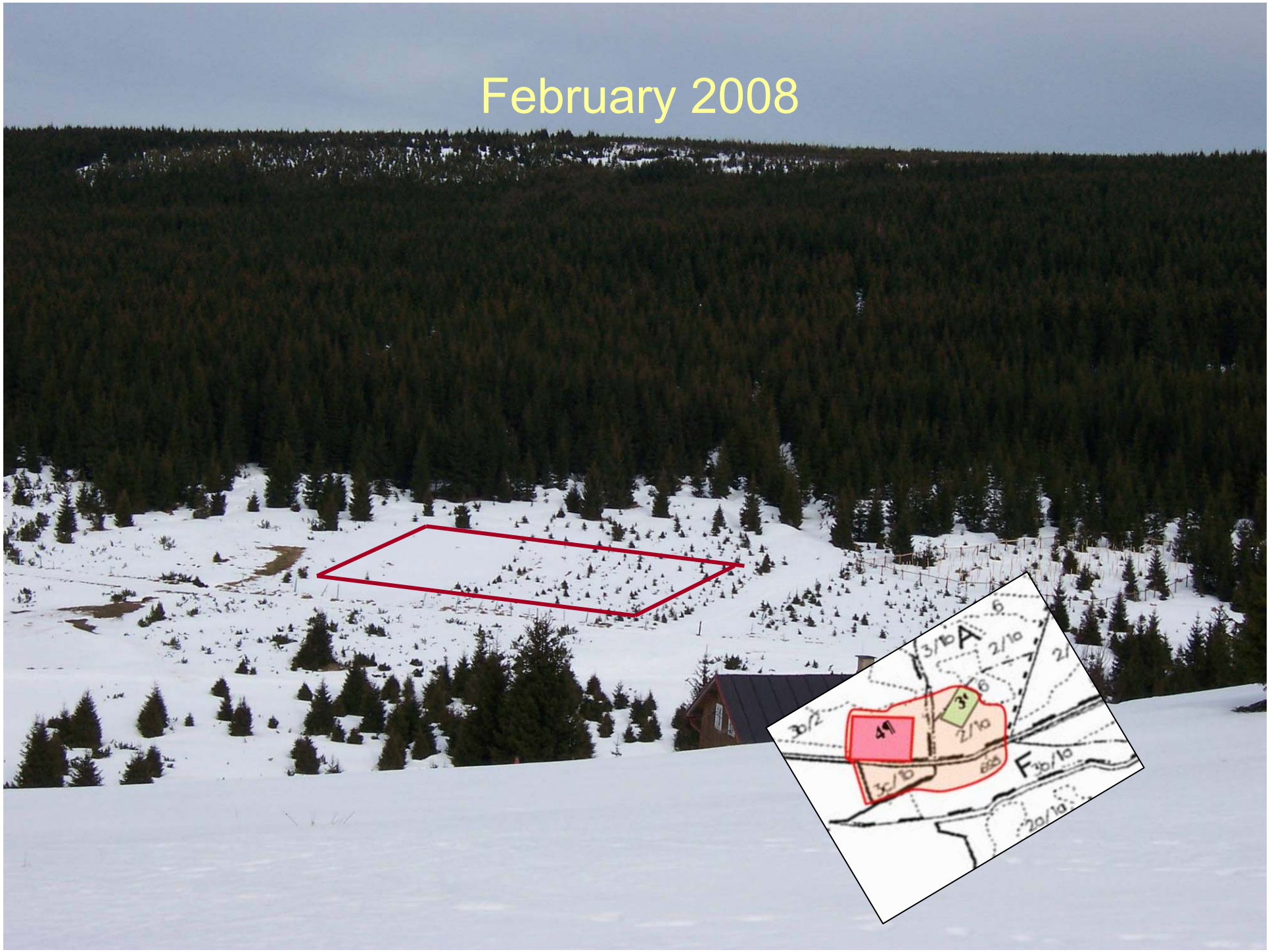
e)

e) Finally, the whole area of coniferous forest will be enriched with broadleaves.

Reintroduction of broadleaves will be realised on analogous principles as which were suggested to replant the clear-cut tracts in the Jizerské hory after air-pollution calamity. The picture by Pelc (1999) was modified for the use of the presented project.

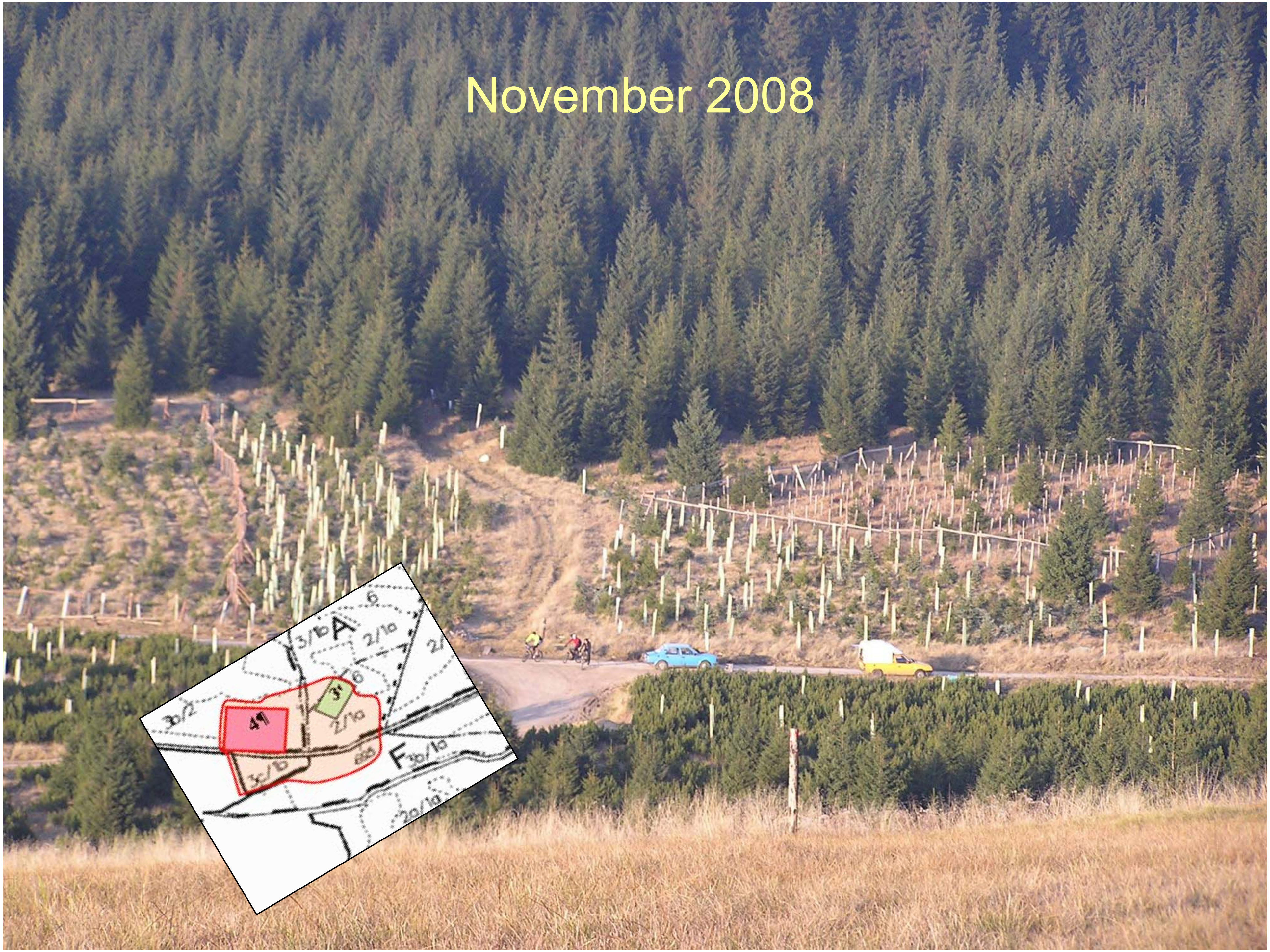
Realisation of the project

February 2008



November 2008

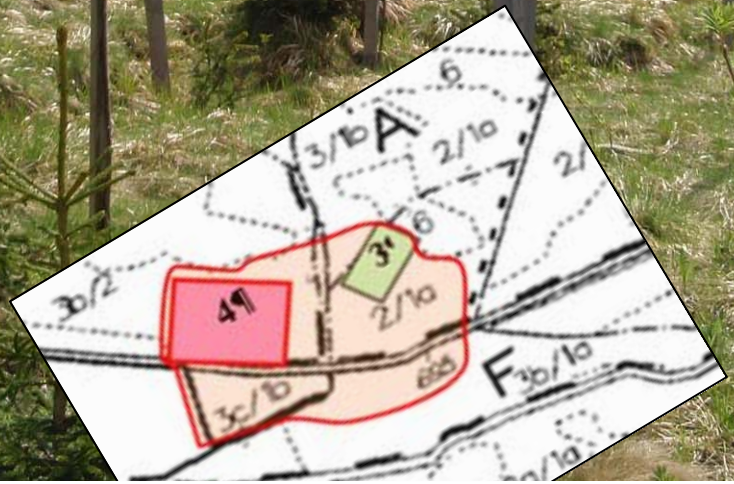

November 2008


November 2008
A
F

A completed enrichment centre April 2009

Foto: Baláš, 2009

May 2010



August 2009


Thank you for Attention !