KASZÓ-LIFE PROJECT

LIFE12 NAT/HU/000593

Restoration and conservation of Alluvial forests with Alnus glutinosa and Fraxinus excelsior in the Kaszó area

The project is carried out with the support of the European Union's **LIFE+ programme.**

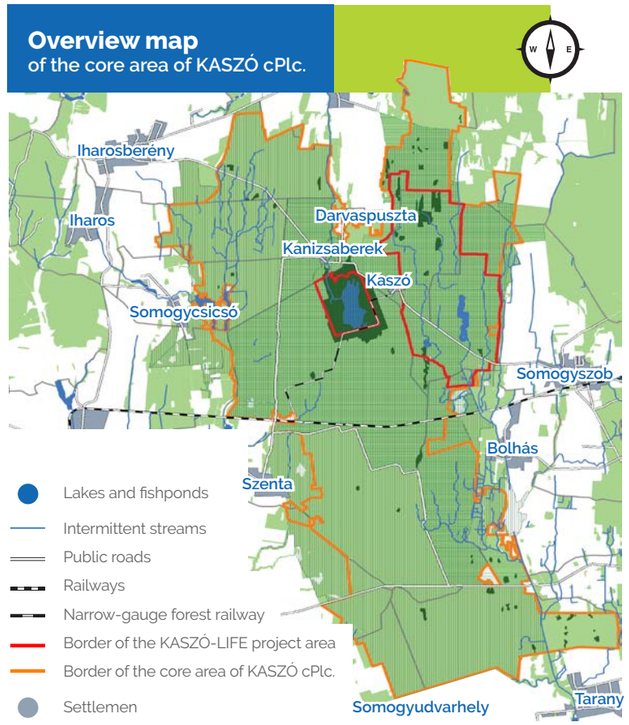
Project **details**

Title: Restoration and conservation of Alluvial forests with Alnus glutinosa and Fraxinus excelsior in the Kaszó area
Identification number of the project: LIFE12 NAT/HU/000593
Total costs: 1,327,189 €
Contribution of the European Union (75%): 994,126 €
Time span: 1st September 2013 – 31st December 2018.
Project area: Kaszó, Inner Somogy sandy area, Somogy County, Hungary
Consortium members: KASZÓ Ltd.,
National Agricultural Research and Innovation Centre Forest Research Institute

The project was implemented within the 2100 hectare project area from the nearly 15.000 hectare total area of KASZÓ Ltd, the coordinating beneficiary of the KASZÓ-LIFE project. KASZÓ Ltd. is one of the 22 Hungarian public forestry companies. Its headquarters are to be found in Kaszó, a village in Somogy County in Hungary.

The forestry company's main species of trees are the common oak and the common alder but other species such as the Turkey oak and the scots pine are of significant importance. A mixture of other species of trees is also present. Among them the silver birch and the European hornbeam can be found in greatest numbers. Besides forestry, hunting plays an important role. Game population with outstanding genetic features lives the 23.700 hectares hunting ground. The red deer stag population has a significant importance.

The project's partner associate is the Forest Research Institute which operates within the National Agricultural Research and Innovation Centre. The Institute's main task is to study and analyse the forest's internal patterns: ecological conditions, development and growth in order to maintain a sustainable forest management. Monitoring works and experiments are carried out in "forest laboratories", a nationwide pilot network that incorporates hundreds of areas and five locations with ecological and genetic laboratories.



The importance and aim of nature conservation

Adequate water supply is essential to forests. However, the former human intervention (elimination of watercourse bends, building of drainage ditches) and the uneven rainfall pattern, which is more and more common nowadays, resulted in lower ground water levels and unfavourable circumstances came up that had a negative effect on the flora.

The lower ground water levels and the drier environment had a negative effect on the fauna of forests and moors. Their general health condition is deteriorating and even their long-term survival is in danger. Alluvial forests with common alder and European ash are diminishing as a result of their higher water demand. These unfavourable conditions give way to other habitats which are less valuable from ecological perspective. The dry trends can easily result in the appearance and spread of non-native invasive species and the damage caused by insect species that are undesirable from the angle of forestry can become more significant (cockchafer larvae *(Melolontha sp.))*.

The project's objective is to compensate the results caused by the extreme weather. To enhance the general health condition of forests we need to keep the precipitation in the project area. In order to reach this goal, we create and regenerate lakes, take level control of watercourses. All the nature conservation elements of the project serve this end. The inhibition of invasive alien species in the project area is also of high importance in order to prevent their spread.

Actions were taken in certain locations of the project area but they had an impact in the whole area.

Wetland habitats affected by the project

Most of the core area of KASZÓ Ltd. is part of the Natura 2000 network. The project area belongs to the "Szentai-erdő" Special Area of Conservation (HUDD20063) and the "Belső-Somogy" Special Protection Area (HUDD 10008). Besides that, the Lake Baláta is a protected area and forest reserve of national importance. Indicator habitats cover 44% of the project area, including 13% alder groves and alder bogs of exceptional importance.

Natural dystrophic lakes and ponds (3160), transition mires and quaking-bogs (7140), alluvial forests *(Alno-Padion, Alnion incanae, Salicion albae)* with of black alder *(Alnus glutinosa)* and common ash *(Fraxinus excelsior)* (91E0*), Illiryan oak-hornbeam forests *(Erythronion-Carpinion)* (91L0) and Pannonian-Balcanic turkey oak-sessile oak forests (91M0) are present in the project area.

Establishment of **the Lake Bükk**

The “Szentai-erdő” is characterised by various water levels, bogs, moor pools that play a key role in the biotic communities of forests providing water for animals and plants. The Lake Bükk functions as a natural water reservoir that provides habitat for various water-related species. It helps increasing the diversity of species that are important from the perspective of environmental protection. It provides habitat for various amphibian species such as the moor frog, agile frog *(Rana arvalis, R.dalmatina)*, bird species like the ferruginous duck *(Aythya nyroca)*, and among others the protected marsh seedbox (*Ludwigia palustris)* and water violet *(Hottonia palustris)*.

Under the project we replaced an elevated dirt road with a 68 metre long dam. A central structure was built in the dam that provides adjustable water permeability under the dam. The shore was strengthened with planks in order to protect it from waves.

The dam during the construction of the structure.

The new reservoir can hold 1.900 m^3 water for the surrounding forests

Conservation of **Lake Baláta**

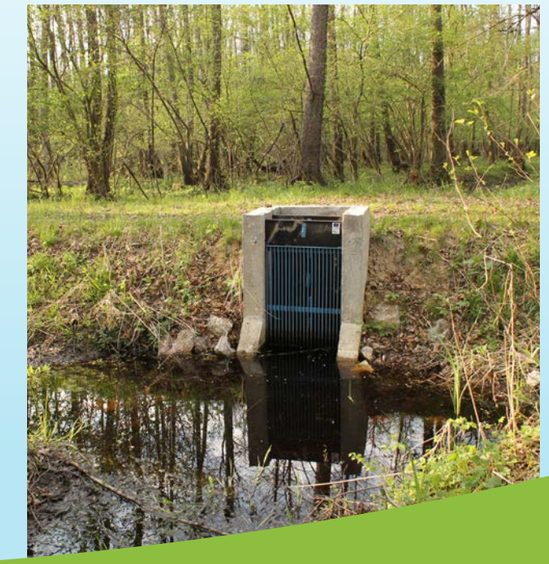
Lake Baláta has been protected since 1942. In 2008 it was recognised as a forest reserve. Its core area, which covers 100 hectares, is specifically protected. It holds various habitats from open water surfaces, forests, fens and bogs. It became specifically protected to preserve the protected animal and plant species and habitats and to observe the natural processes in forest that can help acquiring a natural forest management methods.

The greatest emphasis is on the protection of the insectivorous aldrovanda *(Aldrovanda vesiculosa)*, which is a vulnerable pondweed species threatened with extinction all over Europe. Other valuable species to be found here are the Parnassus water.plantain *(Caldesia parnassifolia)*, the purple marshlocks *(Comarum palustre)*, and animal species such as the black variant of the European viper *(Vipera berus var. prester)*. Asphodelo-Quercetum roboris and Carici pendulosae elongatae-Alnetum glutinosae associations are among the landscape level values of the area.

The only water supply to the lake comes from the rainfall, hence keeping the water and controlling the water's runoff is of high importance. To reach this objective we built in a drainage channel with back-flow preventing culvert which helps us keep the water in the area.

Lake Baláta provides home to relict species from the ice-age

The new back-flow preventing culvert makes water flow controllable



Immerse diversity of species flourishes in the lake

Restoration and extension of **the Lakes of Kűvölgy**

The Lakes Kűvölgy have been functioning as fish ponds for decades, besides the ambient forests provide spectacular surroundings for various events. They were artificially created using the water from Taranyi-Rinya. Initially, there were only two lakes which were expanded to a 4-lakes-system through the project.

Over the years sediment had evolved in the lakebeds, the shore protection was insufficient and damaged, also the lakebeds dried up in summers. In order to achieve a bigger water reservoir capacity 10.000 m^3 of alluvium was removed from the lake #2, the shore was raised, the valley barrier was strengthened and the spillway structure was changed under the project. The removed sediment was used to build dams and to build and enhance the quality of service roads.

The rehabilitated Lake Kűvölgy #1 and shore protection

Renovation of the dams around the Lake Kűvölgy #2

The filled Lake Kűvölgy #2 after alluvial removal

To provide the existing lakes with adequate water supply we created two new lakes north from the two extant lakes. The spot where the third lake was created was a boggy area with various sedge species for example the lesser pond-sedge *(Carex acutiformis)* and upright sedge *(Carex sticta)* which plants the most typical aquatic plants to the area. These provided breeding grounds and habitat for numerous bird species (little grebe *(Tachybaptus ruficollis)*, mallard *(Anas platyrhynchos))*, and other water-relatad animals (yellow-bellied toad *(Bombina variegata)*, European pond turtle *(Emys orbicularis)*, Eurasian otter *(Lutra lutra))*. When managing the water levels of the lake #3 great emphasis must be taken to ensure that the lake can perform its functions. 118 metres of the dam line along the lake was risen and strengthen and the old structure was replaced.

The Lake Kűvölgy #3 acts as an ecological reservoir

Provides suitable habitat for animal and plant species

The lake #4 which lies northernmost was created in a wooded area. The trees along the bank of the stream that feeds the lake were cut down, then a 131 metre long valley barrier was built with a spillway and a valve. After collecting the water from the stream a new lake was created.

The place of the dam before the works

The new dam is under construction

The new lake was filled in winter 2017

The Lake Kűvölgy #4 can hold 19.000 m^3 of water and provides 3,5 hectares of wetland (feeding ground and resting place) for migratory water birds.

By the end of our operation in the area we turned the two lakes with 7 hectares of surface into a 4-lake-complex with a surface size of 16 hectares that can hold 135.000 m^3 of water. This complex can supply the surrounding forest with adequate and even groundwater levels. Besides, the evaporating water from the lakes creates a more favourable mezzo-climate to hornbeam, oak and beech forests

Increasing water storage capacity **by installing water wales** in ephemeral water courses

The forests of Inner-Somogy are intersected by shallow ephemeral water courses that dry up in summer. For more effective water drainage the beds were straightened and deepened at several locations in the past which resulted in a faster water-flow. As a consequence, the surrounding forests can utilize the water from the streams for a shorter period.

To keep the rainfall in the area for a longer period we built in water wales into the stream bed perpendicularly to the downstream of three streams. The concerned area is 15 km long. The wooden water wales were installed roughly 100 metres from each other. The water wales slow down the stream and slightly raise the water level that helps the water penetrate the ground better to supply ground water inventory. After a substantial rainfall the backwater can leave the streambed and provide surplus water on the slopes. The watercourse will remain permeable longitudinally so it can still function as an ecological corridor.

A water wale during operation

Inhibition of invasive species

We can come along invasive alien species all around in the forestry company's forests such as the black cherry *(Prunus serotina),* tree of heaven *(Alianthus altissima),* Manitoba maple *(Acer negundo)* and black locust *(Robinia pseudoacacia).* These plants grow faster than others and take the sunshine as well as the nutrients and water from the soil. The shortage of nutrients and water coupled with the less sunshine hinders the growth of native species. In the KASZÓ-LIFE project we carried out the clearing of invasive species with hand tools (scythe, sickle). This method is significantly more environmentally friendly; however, its efficiency is not satisfactory. These species have a higher sprout and growth ability which makes continuous clearing necessary.

Between 2014 and 2018 280 hectares of land was cleared. Since we had to return to the locations multiple times, altogether 790 hectares of land was cleared from these invasive alien species. For a satisfactory clearing performance chemical clearing was implemented in three spots in the project area.

The chemical clearing was time-consuming and expensive

The chemical clearing proved to be more effective if it was done thoroughly

Monitoring the effects of activities

The effects of the project were monitored by the Forest Research Institute. 18 observation spots were assigned at the beginning of the project's implementation in order to assess the impacts of our activity. 14 of these spots are to be found within the project area and 4 of them are in the surrounding alder and common oak forests. We carried out a health experiment on 100-100 uniquely marked trees in the project area. Coenological examinations were also carried out in a 20*20 metre botanical plot. The examinations were conducted through internationally accepted methods two times annually. Changes in the groundwater level were done by measuring the water level in ground monitoring wells. Furthermore, we regularly checked the growth of tree rings and carried out detailed habitat mapping.

Meteorological parameters were gauged in the inner zone of Kaszó with the help of an agrometeorological station. We placed particular attention to the input side of the water movement and its determinants.

Checking the monitoring well is a task to be done every week

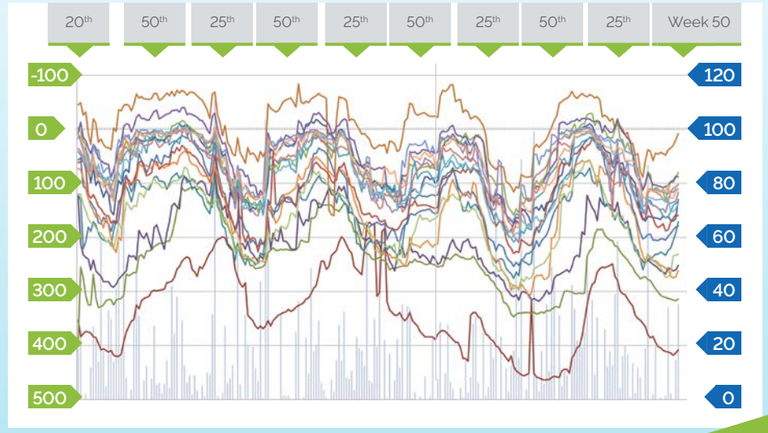
Sampling the tree rings for further examinations

The health of the marked trees are checked one-by-one

Results

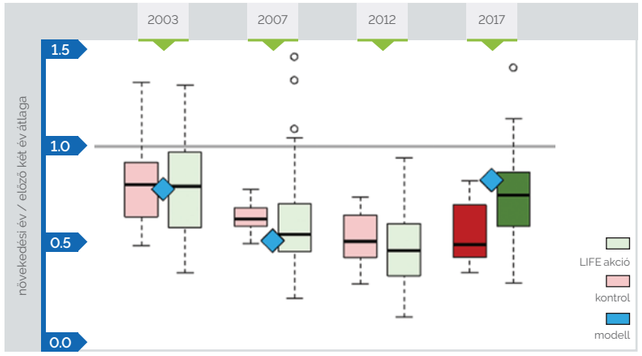
Based on the data provided by the monitoring system established in the frame of the KASZÓ-LIFE project, the beneficial effects of conservation actions in the project area have been demonstrated despite of the high environmental heterogeneity and the short monitoring period.

Regression analysis of cumulated groundwater levels showed a breakpoint in 2016. The change in groundwater trends appeared simultaneously with the accomplishment of the technical interventions. While there was no significant difference in the amount of annual precipitation in the area, the difference in the groundwater levels measured in the project and control areas showed a statistically significant improvement in 2017. Significant improvement in water supply was also observed for the two vegetation periods prior to and following the interventions near the lakes. In case of the intermittent water bodies, this effect is less articulated: ± 10 cm change was observed along the streams, which is far below the level of groundwater level drop in the control areas (– 40-80 cm).



The changes in the level of ground water in the light of the amount of precipitation between May 2014 and November 2018

The results of the leakage hydraulic investigations in the area of the Lakes Kűvölgy have shown that the effect of the increased water level is detectable in more than 300 meters from the lakes, and the contribution to the groundwater supply is effective and durable within the 200 m zone. Deceleration of water runoff with bottom thresholds is favorable but only temporarily effective, taking place during favorable water supply periods.

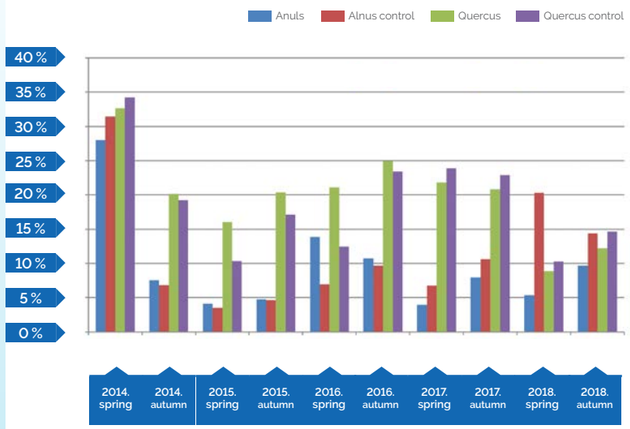


The results of the dendrochronological analysis carried out on a sample of 180 trees also pinpointed a trend change. In drought years, selected by the 6-month SPEI drought index and decrease in tree ring widths, decrease in radial growth of alders were significantly lower than at the control site in 2017, though a reverse tendency was observed during all the drought periods prior to the conservation actions.

Alder ring-widths during the selected four drought years comparing the project area and the control site. Relative growth decline compared to the previous 2 years, showing modeled values where available. 2017 already faced improved groundwater conditions owing to the LIFE actions

The experiments were carried out in the assigned observation spots in line with the (ICP Forest) methods which are commonly accepted throughout Europe. The changes in the health status of trees were measured two times annually. The results so far clearly prove that both oak and alder forests have shown some improvement since 2017 in comparison to the control area. This improvement continued in 2018 in two respects: defoliation and the death of the branches.

Defoliation 2014-2018.



The most common form of impairment in alder forests is the defoliation by insects for which the alder leaf beetle *(Agelastica alni)* is responsible. The prevalence of this species is more significant year by year overshadowing other forms of damage. In some particular years the heavy winds and late frosts resulted in the defoliation of alder forests, while other illnesses that caused dieback have decreased in comparison to previous years. Other impairments that derive from supressed status –which can be seen as a natural phenomenon–, have slightly decreased to previous years.

Various forms of impairment will definitely be present in our forests in the future, although their decreased intensity clearly demonstrates how successful our project is. However, it can only be proved by conducting long-term future experiments.

The results of the coenological observations showed minor shifts in the herbaceous layer of black alder stands. The increased duration of water cover resulted in a decrease in species number and in the total coverage. The maximum of species diversity is detected in sites with no more than 12 days of water cover and average groundwater depth of 50-70 cm. Ten protected plant species were detected in botanical quadrants of the monitoring sites.

Communication tasks

The above mentioned tasks and results were accessible and communicated. To fulfil our communicative obligations we organised community meetings, published newspaper articles and videos. We made it possible for people living nearby to gain insight into our project. Guided tours were organised for visitors, student groups and of course, for professionals (hunters, foresters) to make them acquainted with the project. Within the project we established the "Erdőkerülő" education trail. Walking along it, interested people can collect more information about our mission also can get closer to forestry and the everyday life of foresters.

Educating children about environmental protection is a top priority

Professionals were listening the presentation on the project with interest

We organised guided tours to multiple audiences

We sent newsletters to almost every European country where similar projects were being implemented. Our webpage can be accessed to anybody interested. We took part and visited various events, made presentations in conferences, besides visited LIFE project in 4 countries in order to build new relations. We hosted an international conference where we had the opportunity to report on the completed work and our results.

Networking with a Spain project

Presenters and interested people arrived to Kaszó from 5 countries

Further information:
www.kaszo-life.hu • www.kaszo-life.eu
info@kaszo-life.hu

Edited by:
Kaszó Ltd.
National Agricultural Research and Innovation Centre
Forest Research Institute

Photos, diagrams:
László Nagy
András Koltay
Kitti Szalai