

## Background, state of knowledge and first results from the BioWild-Project

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Questions about the equilibrium between forest vegetation and ungulate populations (especially roe deer, red and fallow deer, mouflon and wild boar) have been investigated for about one year in a German project called „Biodiversity and ungulate management in managed forests“, or BioWild-Project for short. This is a collaboration between the Universities of Dresden, Gottingen and Munich and the German ProSilva Group, called Arbeitsgemeinschaft Naturgemäße Waldwirtschaft (ANW), which acts as the as lead partner.

Lasting for a six-year period from 2015 to 2021 the BioWild-Project will be funded with approximately 1,9 Mio Euros (1,6 Mio British Pounds) by the Federal Program for the Biological Diversity with resources from the Federal Agency for Nature Conservation (BfN) and with money from the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). Additional funds are provided by participating forest owners, forest administrations and NGO's. In total 2,5 million Euros (2,2 Mio British Pounds) are available to the project partners and the five pilot regions in Baden-Wurttemberg, Northrhine-Westphalia, Saxony-Anhalt, Thuringia and the Saarland, covering in total about 25.000 ha of forest and representing the most common forest types in Germany.



Severe climatic conditions, increased drought risk and mass outbreaks of forest insects, these are all factors that are nowadays an almost familiar part of climate change; our forests need to be prepared to withstand the impacts of these and other future challenges. Mixed species forests seem to be more suitable to sustain the delivery of social, ecological and economic ecosystem services than today's widespread even aged single species forests. The woodlands of tomorrow should therefore be biodiverse, close to nature, species rich and more adapted to climate change in order to meet the changing demands of society as well as the modified objectives of forest owners.

Figure 1: Distribution of the five BioWild pilot regions across Germany, representing together approximately 25.000 ha of forests. Source and more detailed information about each pilot region: <http://biowildprojekt.de/projektgebiete/>

In many German forests, large populations of game species are causing high browsing pressure, which is contributing to a reduction in the frequency of minor plant species, especially in natural and artificial forest regeneration. Therefore the aim of developing mixed species forests can be seriously affected or even prevented by these high ungulate populations.

### **Project aim and implementation strategy**

To ensure that forest ecosystems continue to meet - on a long-term basis - private and public requirements, the BioWild-Project will scientifically evaluate the state of vegetation in forests with and without the browsing pressure of ungulates. Based on this solid foundation, forest owners may decide for themselves how their forest should look like. Together with their hunting tenants, silvicultural and hunting solution statements could be developed to find individual ways to obtain a mixed species forest that is resilient to climate change impacts.

To reach these aims the BioWild-Project is structured into the following three sections:

- In 2015 and 2016: identification of the five pilot regions, establishment of 496 fenced and unfenced control plots as well as the completion of the first botanical inventory. Synchronization of hunting periods for all game species in those five regions and implementation of the continuous compilation of hunting data for all ungulates shot on 25.000 hectares until 2021.
- 2017 until 2020: annual botanical inventory of the forest vegetation on all plots, including measurements of horizontal and vertical cover as well as the evaluation of nutritional browse values for all counted plant species. Development of data interpretation techniques and forest growth modeling, based on the first and subsequent annual botanical inventories and all hunting data. Regular communication on the balance between forests and ungulate populations.
- 2021: final inventories, analysis and modeling. Synthesis of all knowledge and findings of the BioWild-Project and the provision of easily understandable information material for all stakeholders.

### **Current project status**

In the first project year 248 fenced control plots (12 x 12 m) - representative of the whole project area - have been constructed and another 248 unfenced plots have been permanently delineated. In late summer 2016 all 496 plots were inventoried for the first time.

To objectively select appropriate plots within our project area, covering about 25.000 hectares, the whole area was overlaid by a regular grid of 200 x 200 meters, using a geographic information system (GIS). This GIS was linked to forest inventory data as well as to climate and topographic information, to provide a separate dataset for each grid point. For all of those points a logistical regression model was used to predict the probability of natural regeneration. In the following step, all those predicted values were classified by their regeneration probability. At the end within each pilot region only the points with the highest regeneration probability were retained as places for potential control plots.

In the next step, all these potentially suitable points were evaluated on-site by researchers and only the most appropriate subset was finally retained to construct 12 x 12-meter fences, each representing - together with their unfenced control plots - approximately 100 hectares of woodlands.

The selection of the fenced and unfenced plots as well as the construction of those fences had been carried out nationwide, following the same scientifically founded criteria such as a unique structural design (all fences were built in the same way with the same materials), homogeneous soil conditions, topography, adequate light availability for the regeneration of the tree species present on those fenced and unfenced pairs of plots.

Each of the 496 fenced and unfenced plots contains exactly 100 square meters of forest vegetation which will be monitored annually until the end of 2021. Not only the ground vegetation will be measured but also the evolution of horizontal and vertical cover as well as the browsing intensity on all forage plant species found in those plots.

Parallel to the selection of the vegetation observation plots, demands for administrable waivers were handed in to local government to synchronize the hunting periods for all ungulates in special sub-sample areas of all five pilot regions until the end of the project in 2021. The main reason for changing the hunting regulations was to give the owners of the shooting rights (which means the proprietor of the forest) the possibility to reorganize hunting together with their hunters in a more modern and efficient way.

The main objective in all these areas was to synchronize all hunting activities in order to reach habitat adapted game populations within the project period to prevent further damage to forest vegetation - despite the at least four-month period without any hunting.

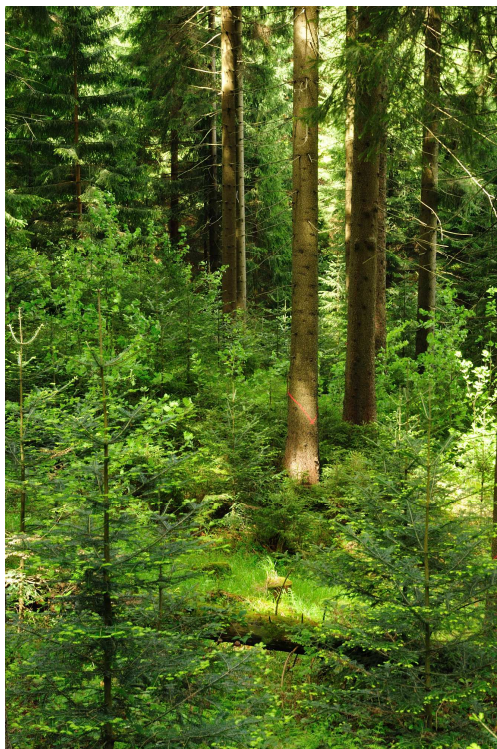


Figure 2: From a monoculture to mixed species forest: natural regeneration of silver fir, spruce, mountain ash, sycamore maple and beech underneath a spruce stand in Eibenstock, Saxony.

Photographer: Hans von der Goltz

This new hunting regime will be compared to two other contrasting hunting regimes, one with already low ungulate populations and another with remaining high game populations. The comparison of those three hunting regimes will allow the BioWild-Project partners to assess the impact of browsing on wooden and herbaceous forest vegetation. Under the two contrasting regimes hunting will be exercised as usual without any modification. On the whole project area, no living animal will be counted; even the selection of the hunting regime is based on the choice of each forest owner. In the BioWild-Project only the state of the vegetation (ungulates can run away, plants can't) will regularly be evaluated to test if the owner's desire to have low or high game populations is justified in reality.

Special advice is offered to all those forest owners and hunting tenants who want to reduce high ungulate populations; the advantages of driven hunts taking simultaneously place across several hunting districts are also pointed out. Another key objective, the communication between all local stakeholders will hopefully also be facilitated through the project.

To qualify and to quantify the wildlife habitat in terms of food supply and wildlife cover, additional hunting parameters are collected on the whole area via the participating hunters (of all three hunting regimes). If ungulates are shot within the pilot regions, the hunting tenants will automatically record different parameters like the exact place where the animal was shot, the species, their sex, weight, age, etc.. At a later stage in the project, these parameters will allow the researchers to better evaluate the effect of the hunting regimes as well as the overall health status of game populations.

To provide regular and easy access to information about the BioWild-Project to all stakeholders, the project homepage [www.biowildprojekt.de](http://www.biowildprojekt.de) was put online in 2016. Furthermore, 13 information events have been organized within the five pilot regions, as well as two at the national level. This communication strategy aims to inform local as well as national and hopefully international stakeholders about the main project objectives.

**Information box: Hunting legislation in Germany:**

- In Germany, the hunting law is inseparably linked to the ownership of property.
- The legal minimum size of a hunting district is mostly 70 ha (but the Federal states can determine another minimum size). If a property has the required minimum size in a single continuous unit, hunting can be exercised by the land lord him or herself. Alternatively, different landowners can combine their properties to make a common hunting district.
- Hunting is governed by a framework of national legislation and 16 local hunting laws, one for each Federal Land. This also means that the hunting periods for the same species can differ from Land to Land, sometimes making the hunting exercise rather complicated.



## First results and outlook

First outcomes have already been obtained by calculating the regeneration probability for all preselected plots, potentially suitable for the construction of fenced controls, using national forest inventory data to calibrate the initial model.

As we learned from the national inventory data, multilayer stands had a regeneration probability 18 times higher than was found in monolayer stands. In state forests, the overall regeneration probability is also about 30 % higher than in community or private forests.

The vegetation assessments in the pilot regions showed, that over 420 plant species had been found on the 496 experimental plots. The differences between different forests within the same pilot region in the abundance of regeneration as well as in the influence of browsing on forest vegetation are sometimes highly remarkable.

More initial results are expected in the near future.



Figure 2: The BioWild-Project team at the annual press conference in December 2016 in Kassel. **In the front** (left to right): Stefan Schneider and Hans von der Goltz (both ANW Deutschland); Horst Kolo and Prof. Dr. Thomas Knoke (both Technical University of Munich); **In the back** (left to right): Prof. Dr. Michael Müller and Claudia Jordan-Fragstein (both Technical University of Dresden), Prof. Dr. Christian Ammer and Dr. Torsten Vor (both University of Gottingen), Michael Weninger (Forest administration of Saxony-Anhalt) Franz-Josef Risse (Forest administration of Baden-Wurttemberg); **absent**: Gangolf Rammo (Ministry of the environment of the Saarland) and Hubertus Schroeter (Forest administration of Thuringen).

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