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Agroforestry for the transition towards sustainability and bioeconomy

Agroforestry: New perspectives for water conservation/development and regional added value in rural economy

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Agroforestry for the transition towards sustainability and bioeconomy
Abstract
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Agroforestry: New perspectives for water conservation/management and rural economy growth

In line with the main issues addressed by the EU Water Framework Directive (EU WFD) concerning the protection of inland water surfaces, transitional water and groundwater, multi-use agroforestry systems can prevent further aquatic ecosystem deterioration, counteracting air and underground pollution as well as contributing to mitigation of the effects of floods and droughts. Besides, it results in an overall improvement of local biotope network and biodiversity.

Within this framework and through the cooperation of municipalities and farmers, the project WERTvoll aims to establish renaturation measures that combine agriculture, water bodies conservation, economic growth and regional added value creation diversifying the use of land. Hence, agricultural systems are supported and maintained towards a multifunctional and complementary land use structuring approach.

The Federal Ministry of Education and Research (BMBF) funds the project with the intention to improve the urban-rural partnership between Leipzig (Germany) and the surrounding rural municipalities. In this abstract, the work for the development of solutions for natural and economically feasible water renaturations is described.

The project's renaturation concept focuses on the professional ecological restoration of water bodies and the establishment of an unspoilt wood strip in direct proximity to water bodies. Adjacent to the strip, high-yielding agricultural trees such as poplars are planted and managed ecologically (agroforestry system). Modern management approach is based on old practices such as central forests, coppice forests and short rotation coppice forests. The resulting agroforestry systems are not only a source of wood

material but through the implementation of new value chain strategies, it can provide new economic benefits in terms of climate-friendly regional added value sources. As far as the functional element and the available space are concerned, 2 to 5 rows of trees are placed on each side of the water basins and harvested at different intervals (between 10-30 years). The trees are chosen taking into consideration their composition, plant density and harvesting periods. As a result, the total origin of wood has a width of 38 m and therefore, approx. 30 m can be used for agricultural purposes (approx. 79 %).

With regard to the binding water renaturation, the implementation of these multi-use agroforestry systems makes the cooperation with farmers more profitable for the municipalities. A classic water renaturation without any use of the trees costs the municipality about 2,000 € per hectare and year. If most of the land used for water body restoration remains in agricultural use, the municipality only pays the farmers the costs of abandoning the regionally customary crop rotation (about 500 € per hectare and year).

Various modules are comprised in the project ensuring that they that can be combined according to local requirements and financing instruments. The selection of tree species determines the economic efficiency of biomass production and can be adapted locally. New value chains and therefore rural areas' economic growth can be achieved through associated financing instruments such as production-integrated compensation or voluntary climate protection services.

If the municipality combines water renaturation and long-term agricultural wood use with a municipal heat sink, a number of other regional value-added effects can be created. The biomass produced can, for example, be fed into a local heating network in the form of wood chips, thus reducing the costs of providing gas and oil. Consequently, water renaturation with use is far more attractive for the community than an unused variant.

From the agricultural point of view, it is particularly important that the land used for the renaturation of water bodies remains predominantly in agricultural use and could be used again as arable land after the cessation of agricultural wood production. From the environmental point of view, wind and water erosion protection on both water bodies and fields are provided and biotope networks are established increasing biodiversity.

As a result, the farmers will receive support from the municipality and therefore will be more encouraged to implement agroforestry multi-use approaches that combine economic growth, ecosystem services, water protection and effective use of nutrients.

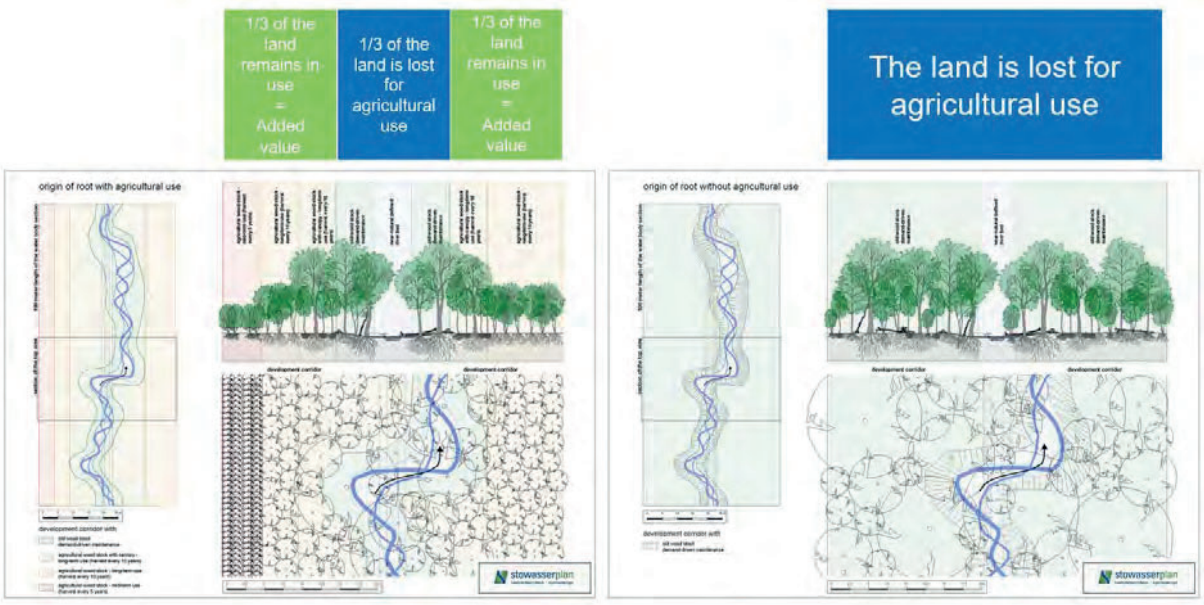

Figure 1: Water body renaturation with agroforestry in agricultural use compared to natural water body renaturation without any use of the trees (from Stowasserplan GmbH & Co. KG 2019).