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Analysis of EU support for managed succession of agricultural land in the Czech Republic

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ABSTRACT

The article presents a comparison of EAFRD support for afforestation of agricultural land (managed succession) in the years of 2007–2013 and model costs required to compensate for both operational inputs and agricultural income forgone when establishing woodland on agricultural land in the Czech Republic.

The aim was to investigate whether the blanket support rates for the afforestation of agricultural land are sufficient to cover the associated costs in a wide range of site conditions. Costs were calculated for 43 groups based on forest typology. The calculation was based on the comparison of present costs and present revenues (here: European fund support) with the discount rate of 3% and a 15-year evaluation period. The analysis demonstrated that input costs vary considerably in the different forest typologies; 44% of groups show higher present costs than the support rates currently available. In the most expensive group costs are 150% higher than even an increased support rate in less favoured areas available to agricultural entrepreneurs, and almost 200% in comparison with the basic support rate. In several cases – and always in case of pine management – the support payments are notably higher than the related input costs, and because of that the land owner might be strongly motivated to change the land use from agriculture to forestry.

The article points out the sensitivity of the results to the discount rate used and to the importance of the CZK/Euro exchange rate fluctuation.

The analysis' results lead us to strongly encourage a more substantial differentiation of the support rates for afforestation of agricultural, and other, land. This differentiation should be based on realistic input costs according to forest typology – the methodology of which might be relevant in several other EU countries.

Introduction

Reasons for afforestation – the overview

In the Czech Republic (CZ), there are approximately 3,50,000 ha of unregistered, abandoned land that fall within the scope of the agricultural land fund. This land is not permanently used for intensive agriculture; therefore it is eligible to be used for other purposes, e.g. afforestation (Podrázský, 2006). Afforestation of non-forest and agricultural land has two main goals – the improvement of ecology and economy. Economic analyses in this subject area have been scarce so far, while ecological aspects have been closely monitored and analysed, be it for soil, water, climate or biodiversity protection reasons.

Numerous analyses of changes in soils following afforestation have been published. Different land uses (wetlands, grasslands and afforestation) can change the soil structure and physico-chemical soil properties and, thus, directly or indirectly influence the geochemical position of metals bound to soils. Chrastný et al. (2012) stated that the 50 years of different landscape development (of the three above mentioned land uses) has led to small changes in the soil physico-chemical properties, but has substantially changed the retention of metals in the upper soil horizons due to changes in their geochemical positions. The greatest contrast was found between soils under forests and pasture. The proportions of non-residual and residual metal quantities were lower in the case of forest soils compared to pasture soils. The forest organic soil horizons (compared to pasture soils with a lower amount of solid soil organic matter (SOM)) are able to retain metals, e.g., Cr, Co, Ni, Cu, Zn, Tl and, to the greatest extent, Pb. The SOM is considered to be responsible for metal retention in soils and serves as an efficient metal trap when compared to the mineral soil horizon. The poorer pasture soils are able to retain metals to a lesser extent; therefore

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the leaching of metals to groundwater is more likely. In contrast to forest soils, the recently afforested pasture soils are therefore more vulnerable to possible anthropogenic contamination. According to Wall and Heiskanen (2003) the results for pasture soils and recently afforested pasture soils are similar because the properties of former agricultural soils differ considerably from pristine mineral forest soils and the forest soils studied were characterised by high SOM. The afforested agricultural soils have nevertheless physical properties that are rather uncommon in other mineral forest soils.

The accumulation of surface humus and characteristics of soil chemistry in forest localities, compared to agricultural land afforested 60 years ago, was analysed by Podrázský and Procházka (2009) who claim that the natural accumulation of surface humus on afforested soils is achieved approximately at the time of the first rotation (i.e. at the age of 100–120 years). This is roughly the time when the surface humus accumulation is approximately the same as the natural cycle of surface organic mass in commercial forests with an altered species composition. In natural forests, with natural species composition, the accumulation of surface humus might reach substantially lower values.

Land use change and afforestation are also frequently seen as the most appropriate means of reducing soil erosion risk (Porto et al., 2009).

Afforestation has also assumed importance in recent years because of the potential for carbon sequestration. One commonly used approach to reduce net carbon dioxide emissions is to employ offsets – such as sequestration projects, where a relatively promising offset strategy is afforestation (Winsten et al., 2011). Morris et al. (2007) describe the ecosystem carbon accumulations resulting from the planting of agricultural soils with deciduous trees. Greenhouse gas mitigation worldwide was analysed by Smith et al. (2008). For carbon, some studies indicate relatively large increases in surface soil C stocks (Schiffman and Johnson, 1989; Garten, 2002), while others have concluded that there is a very limited capacity for soil C accumulation (Richter et al., 1999). Several studies have analysed the carbon sequestration potential connected with costs resulting from changes in the use and management of agricultural land (Stavins, 1999; Plantinga et al., 1999). The relative importance of afforestation from a geographic point of view was analysed by Arora and Montenegro (2011) who stated that afforestation is not a substitute for reduced greenhouse-gas emissions and pointed out that warming reductions per unit of afforested area are likely to be around three times higher in the tropics than in the boreal and northern temperate regions.

The importance of afforestation for nature protection, and biodiversity conservation in particular, is not as clear as for other sectors. Afforestation of agricultural land is increasingly used to deliver environmental benefits, but the quantifiable effects on biodiversity remain poorly understood (Reino et al., 2010). On one hand, according to Stoate et al. (2009) or Cremene et al. (2005), afforestation can achieve positive benefits for water, soil and air protection, but the impact is negative for biodiversity associated with farmland. On the other hand, taxon-specific differences in the response to agricultural policies have been identified by Gottschalk et al. (2007) and Buscardo et al. (2009) also indicate that 5 years after afforestation, there were significant changes in richness, composition, and abundance of species.

As Hlaváč et al. (2006) sums up, the contemporary support policy stimulates interest in the afforestation of agricultural land. The main purposes of the support (declared as public interest) comprise the reduction of agricultural overproduction, the improvement of social and economic conditions in rural areas, the diversification of agricultural sector activities, the improvement of biodiversity and an improvement in the ecological stability of the landscape.

In practice we frequently see the situation where in one location there are several conflicting public interests, all of them protected by various laws or encouraged by a range of policies, (e.g. afforestation of erosion–threatened lands might be contrary to optimal organisation of agricultural soil fund, afforestation of arable land motivated by a generalised biodiversity improvement might conflict with the protection of highly valued soil quality etc.). Typically, the afforestation of agricultural land then focuses on sites which are insignificant for agricultural production (water-logged areas, meadows embedded in forest complexes etc.), i.e. sites which are potential candidates for formal protection, therefore afforestation is quite likely to be seen as having a potentially negative ecological impact as well as a positive one. It is absolutely necessary to politically define the enforcement of a range of public interests and their limits.

Land use change can also be moderated by potential policy goals, including afforestation (Rounsevell and Reay, 2009). The important message here is that it is no longer acceptable for policy makers to implement new sectoral policies that do not take account of their effects on other sectors. The Common Agricultural Policy (CAP) places emphasis on maintaining farmer livelihoods through rural development and underpinning European food security; goals which may not always be compatible with other goals (such as greenhouse gas mitigation, nature protection etc.).

Abandoned agricultural land can be afforested in two possible ways: by natural succession (regeneration of tree cover from naturally distributed seed) or by managed succession (regeneration of tree cover by planting seedlings). Natural succession is supported by strong beliefs that spontaneous afforestation from naturally distributed seed is in accordance with environmental aspects of strengthening the natural potential of landscape, nevertheless, the process is insufferably long (Křížová and Ujházy, 1997).

Gellrich et al. (2007) analysed economic reasons why people leave farming and let agricultural land naturally become forest. They concluded that forest re-growth took place where the cultivation costs were high and the yield potential low. It was found that non-linear relationships between steepness and soil stoniness and forest re-growth exist. Forest re-growth occurred alongside part-time farming, farm abandonment and immigration. The relationship with immigration was unexpected; as follows e.g. from MacDonald et al. (2000), land abandonment and forest re-growth are often related to rural depopulation. Gellrich et al. offers two possible explanations of the phenomenon. One explanation says that immigration is related to off-farm job opportunities. Off-farm job opportunities lead to higher opportunity costs of agricultural labour, which is one of the main determinants of land abandonment (Strijker, 2005). The other explanation is that immigration does not affect the demand for marginal agricultural land. The conclusion was made that immigration per se is not a driving factor of land abandonment and forest re-growth. Land abandonment and forest re-growth through natural regeneration seem rather to be the result of the relative decline of the agricultural income from marginal land. The alternative approach – purposeful afforestation by planting tree seedlings – is more convenient, though more expensive.

Support for afforestation

According to the OECD (2009) afforestation of agricultural land is promoted in several OECD countries. However, in terms of total land transferred, afforestation is of minor (or local) importance. In the Inventory ("The Inventory of policies addressing environmental issues in agriculture" developed by OECD in collaboration with member countries"), agri-environmental payments are classified in three broad categories based on implementation criteria: payments based on farming practices, payments based on farm fixed