

New Method to Valuate Forests in Land Consolidations

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Key words: valuation, forest, land-consolidation, reallocation

SUMMARY

The valuation of forests in land-reallocation projects has to account for the value of the ground as well as the value of the stock. Until now, each tree had to be measured and its volume had to be calculated – an immense work. In a new approach, the value of a forest is estimated based on information from remote sensing and existing digital maps (e.g. property, vegetation). This new method is of almost equal accuracy as the old one. Costs, however, are reduced to 20% of the previous sum.

ZUSAMMENFASSUNG

Die Bewertung von Waldbeständen im Rahmen von Landumlegungen berücksichtigt sowohl den Bodenwert, wie auch den Bestandeswert. Bis heute wurde jeder Baum kluppiert und sein Volumen berechnet – eine aufwändige Arbeit. In einem neuen Ansatz wird der Wert der Bestände anhand von Luftbildern und bestehenden digitalen Karten, wie solche betreffend Eigentum, Vegetation usw. bestimmt. Die Genauigkeit ist nur unwesentlich geringer als im alten System. Die Kosten lassen sich aber auf 20% des früheren Wertes senken.

RÉSUMÉ

L'estimation des forêts dans les projets des remaniements parcellaires considère la valeur du sol bien que la valeur des arbres. Jusqu'à maintenant on a mesuré chaque arbre et on a calculé son volume – une tâche immense. Une nouvelle solution propose d'évaluer la valeur d'une forêt par photographies aériennes et avec des cartes digitales déjà existantes (comme celles de la propriété et de la végétation). Cette méthode est un peu moins précise, mais on peut réduire les coûts à 20% de la somme précédente.

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1. PROBLEM

In some countries in Central Europe, such as Austria, France, Germany or Switzerland, agricultural and forestal allotments are often still of an unfavourable structure as a consequence of former subdivision of realty following inheritance. One current goal in land settlement projects is to transform small and ill-shaped plots into larger, more easily cultivatable units. The allocation of new allotments should thereby guarantee that both new and old estates are of equal value.

In farmlands, the criteria for estimation of land value are based mostly on fertility of the soil. In woods, the value of the trees has to be considered also. Until now, valuation of any given tree involved calipering of its diameter and estimation of its height in order to allow for calculation of its volume in cubic meters. Depending on tree species and estimated cost of transportation of the log to a drivable road, the value of each tree was then determined. The whole process was extremely labour-, cost- and time-intensive. During the survey, nothing in the stock was to be changed which meant that cutting down trees was prohibited during about two years. Costs reached up to 500 Euro per hectare – a price which has been affordable during the past only because it was government-subsidized by as much as 90%. Introduction of a recent policy change by the Swiss government, however, has led to abolition of most of the subsidies for forest reallocations. So for the wood-owners, reallocation projects have become unaffordable. A new method to lower costs and save time was needed.

2. NEW APPROACH

A considerable amount of data has already been collected by the Swiss authorities today and only needs to be used appropriately. The following sources are decisive for the determination of the forest stand:

- Quality of the soil (possibility of vegetation) – the so called value of the local spot – mapped in Switzerland in most forests and stored digitally in the geographic information system (GIS).
- Development of trees and their density, surveyed by remote sensing. Photographs are taken every five years for revision of the cadaster.
- Tree species (pine, fir, beech) and naturalness, recorded by the local forest ranger during regular patrols.
- Inclination of the terrain surveyed for the digital height model.

Valuation of a forest-lot is carried out according to criteria from three categories. Each lot is given a maximum of 1000 points. 35% are given for the quality of the soil (local spot), 30% for the estimated stock and 35% for the possibility of cultivation (transport):

- Soil quality is rated on a four-level scale (from poor to excellent) with points ranging from 20 to 350.
- The stock is rated based on its degree of development (no trees up to trees with more than 50cm diameter), tree density (from blank or too dense up to normal), species distribution (needle or leaf trees) and naturality (maximum for a satisfying part of leaf trees).
- Possibility of cultivation takes into account inclination (from flat up to steeper than 70% where a rope crane is needed and points become negative), the distance to a drivable road, the condition of the wood (cultivation none up to regular) and the share of edges of forests.

Each allotment is evaluated according to the above criteria and the corresponding points per hectare are calculated. Big allotments with large variation in structure are evaluated in a differentiated way. The points are then totalised (max. 1000 points) and multiplied with the base of the allotment. A real value can be introduced by monetarising the points depending on the momentary market situation. At present, one point is worth 15 Euro.

Calculation is done with the help of an access data bank, where data of property and GIS are already stored. The criteria are listed for each allotment in a data sheet. Evaluation is carried out by a forest engineer or ranger. The rest of the process is fully automated. It includes a plausibility assessment and landowners have the possibility to check the results.

It goes without saying that the new method is a trade-off between accuracy and cost. While it is not as accurate as the old method, because measuring is replaced by estimation, the loss of accuracy is more than compensated by its low cost. The new method costs only 70 Euro per hectare and in times like today, when wood prices are low, affordability is clearly of higher interest than accuracy.

3. EXPERIENCES

A set of allotments previously valuated with the old method was reassessed with our newly developed method. Comparison of old and new results revealed only minor differences. In a pilot project in the hilly area of eastern Switzerland, the method was tested. The outcome was more than satisfactory. Only three of 150 owners initially doubted the valuation of their stock, but could later be convinced through detailed explications that results were, in fact, correct. The method clearly fulfils the expectations of all parties involved. Unfortunately, forest reallocations have somewhat lost importance in Switzerland due to a lack of subsidies and low market prices for wood.

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BIOGRAPHICAL NOTES

Alfred Bollinger, born 1949, Kulturingenieur ETH (rural engineer Swiss Federal Technical Institute), head of construction section of the agricultural division of the office for landscape and nature of canton of Zurich, Switzerland, member of geosuisse and president of the commission for land consolidation of the swiss offices for structural improvement

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