

GIS utilization in the site selection of a new fruit plantation

Kollányi L.

Szent István University,
Department of Landscape Planning and Regional Development
35-43 Villányi St., Budapest, Hungary
Phone/Fax +36-1-372-6280, E-mail: kollanyi@omega.kee.hu

INTERNATIONAL
JOURNAL OF
HORTICULTURAL
SCIENCE

AGROINFORM
Publishing House, Hungary



Geographical Information systems (GIS) is a new, but rapidly growing area of information technologies. The usage of GIS in environmental related professions (forestry, geology, agriculture, landscape architecture) has also started very early in the 60th. It is often said that 80% of all the information can be directly "geocoded", that means can be represented on a map. [1] The resulted digital map is called as an "intelligent map", where graphics of the map (e. g. land use boundaries, soil type regions) and the attached description (e. g. land use types, soil parameters) can be jointly analyzed.

Supposing the above statement, 80% of the data which is available in agriculture or horticulture can also be analyzed and mapped (e. g. soil types, land use, plot boundaries, yields, etc.).

In Hungary the usage of GIS in agriculture has started in the early 70th. The first projects connected to the agro-eco potential work of Pest county [2]. In spite of the fact, that GIS proved very successful, there was no example of usage in the horticulture. The last couple years changes in Hungarian agriculture has resulted the significant cost increasing of agricultural products meanwhile the gap between agricultural and industrial products is growing continuously. Cost of chemicals and fertilizers are also growing and the usage of them are decreasing. The efficiently used GIS can also help to reduce this cost by the "precision farming" technologies. [3]

The pilot project in Kisvejké Region

Kisvejké Region is one of the 150 NUT4 level administrative region [4] of Hungary. The area is located in

Tolna county 40 km west to Szekszárd and 20 km east to Dombóvár cities. The administrative region includes of seven villages namely Kisdorog, Kisvejké, Lengyel, Mucsfa, Mucsi, Tevel and Závod. The region has faced significant problems after political changes in the 90th. The neighboring towns industry, which has engaged the labor of the of the villages has tightened or collapsed, meanwhile the commutation cost has increased dramatically. The results of this fact that young skilled labor moved to the towns and the unemployment rate went high in this villages. In this undeveloped, remote areas the agriculture and horticulture is the only chance to overtake the crisis. (The 1 and 2 figures shows the growing importance of orchards and the decreasing areas of vineyards.)

Fruit plantations area change

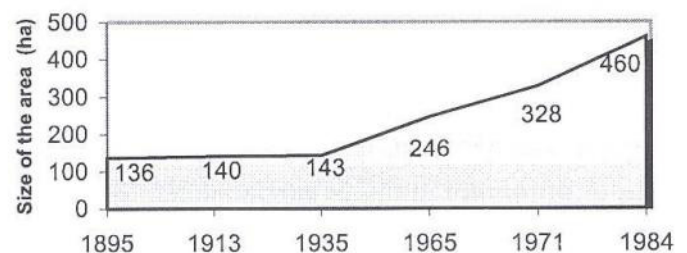


Figure 1 Land use data (fruit plantations) (source: KSH) in the Kisvejké region

Vineyards area change

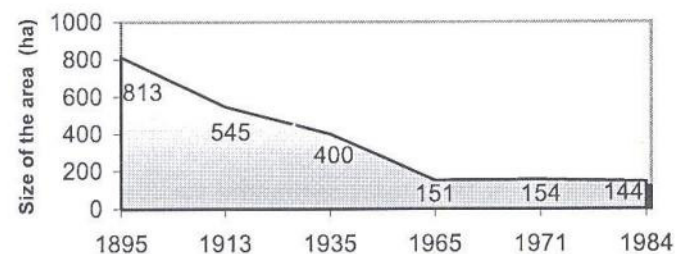


Figure 2 Land use data (vineyards) (source: KSH) in the Kisvejké region

The hilly landscape, the mild climate, the middle valuable but productive land the undeveloped region is very suitable for growing fruits. The available local labor supplies enough handwork for horticulture. The leaders of the local municipalities has recognized the development possibilities in horticulture, so eight years ago the Kisvejké Fruit Growing Joining was established to help the plantation, cultivation and marketing work of the farmers. (Each farmer owns 0.5 or 1.0 ha property in the orchard). The plantation was commonly planted, cultivated, the harvest was done separately by the owners. The idea proved so successful, that after the first plantations the claim has emerged to involve new areas for plantations. Ministry of Agriculture and Rural Development has announced tenders for the agricultural investments and for the realization of new fruit plantations [5]. The CAP, agricultural policy of EU supports the rural

developments [6], and the new SAPARD program is also opened resources for the rural planning. [7].

In the frame of a pilot study GIS technology was hired to build a local database and the goal was to help to find the suitable areas for new plantations.

The project was accomplished in three steps. First step was to setup the methodology for the research to decide what data is needed what is already available, and what will be the scenario of the work.

The following datasets were collected and used: topographical map [8] (*Figure 3*), cadastral maps [9], historical military survey map from the 19th century (*Figure 4.*), [10],

Géczy soil utilization map (*Figure 5*). [11]., Historical Statistical Land use data [12] and the fruit inventory of Fruit and Ornamental Plants Research Station (*Figure 5*). [13].

In the second step we produced the digital layers of the maps, and as a derived data, slope and aspect maps was produced from contour lines map.

Digital base map was produced on the 1:10 000 scale.

Data of fruit inventory [13] were joined to the cadastral map showing areas selected for plantations by the research institution. Unfortunately, this inventory has not covered the total area (*Figure 5*). In the next step the two composite map was produced.

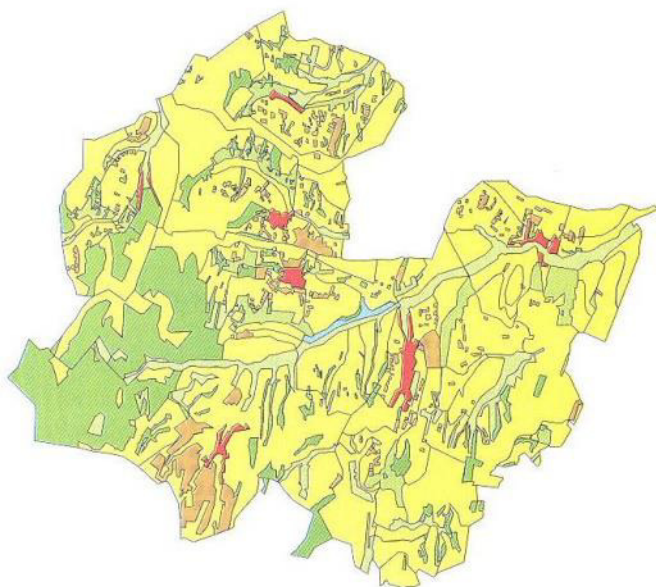


Figure 3 Land use map (1960)



Figure 5 Orchards and vineyards on the Géczy soil utilization map (1960)

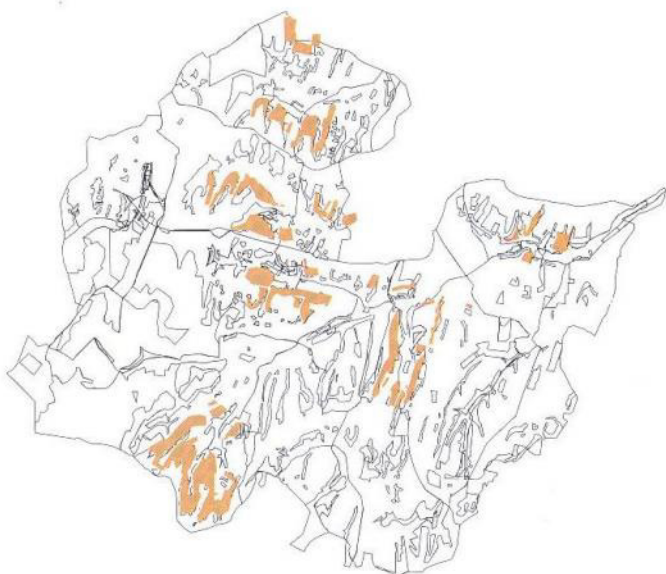


Figure 4 Orchards and vineyards on the Second General Military Survey Map (1840)



Figure 6 Present vineyards and orchards (1999)



Figure 7 Fruit Plantation Availability Inventory of orchards and vineyards [13]. Source: Érd Research Station, 1999

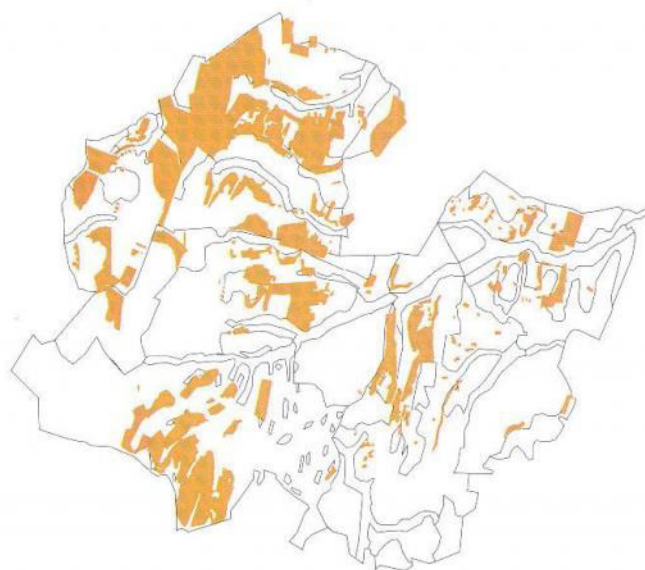


Figure 8 Soil types and total expanded area of orchards and vineyards

One of them showed the total extended area of former vineyards and orchards. This map was important to bound all the available areas for plantations. The other map showed the stable, non-changing land uses. The total area map was later refined by the soil, slope and aspect maps (*Figure 8*).

The results of the pilot project was the followings:

GIS proved an useful tool for planning, it helped to combine and analyze the different land use maps. As a common platform it could integrate different kind of environmental datasets. It helped to produce a suitability map which can be a base of later fruit plantation development. Digital base maps can be used also as inventories to collect data, related to plantation.

Literature

[1] Maguire, D. J. (1993): Geographical Information Systems Principles and applications, Longman p153-158

[2] Petrasovits I. (1984): Pest county agro-eco potential analysis (manuscript)

[3] AgriTrak Professional software handbook

[4] Országos Területfejlesztési Konceptió, 1998, VÁTI

[5] Az agrártámogatások igénybevételének általános feltételeiről szóló 237/1998.(XII.30) Korm. rendelettel módosított 237/1997. (XII.22) rendelet.

[6] Common Agricultural Policy (CAP) 2078/1992 EEC

[7] Official Journal of the European Communities C 10172 EN 1241999 p71

[8] Topographical map sheets (1989) FÖMI, (1:10 000)

[9] Cadastral maps of Tolna county (1999),(1:10 000)

[10] First and Second Military Survey Map (1840, 1872) (1: 14 400)

[11] Géczy soil utilization map (manuscript), (1: 25 000)

[12] Historical Statistical Handbook. (1982), KSH

[13] Fruit Plantation Availability Inventory 1999, Érd Research Station