

## **Complex Erosion Preventing Program in the Sokoró Pannonhalma Region – Western Hungary**

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The natural relations of Sokoró Region are ideal for a sustainable region: the hills are thickly covered with quaternary loess, the luvisol is a perfect base for forestry and agriculture. The only barrier of development is erosion. More than 60% of the land is used as agriculture fields and vineyards. Due to antropogen effects the hills and the valleys are strongly hurted by erosion. While at some places complete hillsides are becoming barren, the lowlands are covered with silt. The active farmers were educated in the time of co-operatives, so the big fields, wheat-corn based plant structures are dominating, the land-use structure is quite outworn. The Rural Development Centre of the small region together with UNESCO experts initiated a complex program to moderate erosion and to reflate extensive farming on the hillsides. With the new Biosphere Zone System (core-buffer-transition) it is much more easier to synchronize the different interests of nature protection, agriculture and tourism.

La terre du pays de collines de Sokoró est idéale pour faire de l'agriculture et de la sylviculture. La proportion des surfaces agraires et des vignobles est sur 60%. Les pentes des collines sont gravement labourées par l'érosion par suite de l'influence humaine. Certaines lieux sont totalement déchaussés alors que les zones situées plus bas sont couvertes des apports. L'association pour le développement de la région a élaboré un programme complexe contre l'érosion pour les agriculteurs qui pratiquent la technique de la grande culture. Le programme est basé sur la culture extensive des pentes des collines et sur la conception d'une nouvellement formée réserve biosphérique.

### **Introduction**

The Sokoró-Pannonhalma region is part of the Western Hungarian Mountains mesoregion, ranging from Bakony hills until the southern part of Kisalföld (Smaller-Lowlands). The region has ideal makings for agriculture: the hills are thickly covered with quaternary loess, the luvisol is a perfect base for forestry and agriculture. The strongest barrier of agrarian-development is erosion (Enyingi 2002). Up to now the big-fields and wheat-corn-based plant structure is dominating. During the vegetation time plants provide a protective

cover on the land and prevent soil erosion. On plant-covered lands water is slowed down, the roots hold the soil on the land. When the plants on big fields are cut or burnt down the soil becomes easily vulnerable by wind or water. If this method couples with over-cultivation or compaction, the soil becomes absolutely unstructured and defenseless (Centeri and Malatinszky 2004).

Water and wind carry soil from the hillsides down into the streams and lakes. This soil carries pollutants such as chemicals, fertilizers, animal wastes and bacteria, which threaten the water quality. The yearly replacement of the soil nutrients – carried into the water – has an outstandingly high cost (Barczy and Centeri 1999). The loss of soil from a construction site results in loss of topsoil, minerals and nutrients, and it causes ugly cuts in the landscape. The amount of eroded soil is influenced by two related factors:

- speed of wind and water: the faster either moves, the more soil it can erode;
- plant cover: they protect the soil from wind and water

On the fields erosion removes the top-soil first. The loss of the most nutritive layer causes large throw-back in crop-production. At some places the extreme strength of erosion led to the desertification of the agricultural lands. As the traditional lands became less and less productive, the farmers progressively start using the surrounded (grassy, forest-covered) fields.

## **Materials and methods**

Slopes with different vegetation cover were chosen for investigation, near Pannonhalma. It is covered by different vegetation. The slope angle is in the category of 10-16% on the lower slope and in the category of 17-25% in the upper slope (Vona and Falusi 2004).

Soils were examined in situ with core samples and in soil profiles, too. Samples were taken from the profiles in order to examine its basic parameters. Soil examinations were done by the Pürckhauer type soil core sampler (Finnern 1994) and by full soil profile descriptions (Stefanovits 1992). The core sampling gave possibility to examine the depth of layers, pH, color, soil physical type, carbonate content, soil type. After all it is possible to prepare the erosion map of the Sokoró region.

In the measurement of erosion we use different techniques:

- Simple viewing of the fields, looking for various signs or indicators
- Direct measurements (collecting deposited materials, weight measurements, correlations etc)
- Indirect measurements (natural benchmarks, erosion pins)

For the higher acceptance of our goals it was necessary to include the local farmers, NGOs and politicians etc. in the examinations (surveys, formal and informal forums etc.) With their partnership we can measure year by year the cost of different fertilizers and nutrients, they used on the fields.

## **Results**

Soil erosion is a natural process. It becomes a problem when human activity causes it to occur much faster than under natural conditions. While nature slowly wears away land,

human activities increase the rate of erosion hundred times that amount. When the vegetation is removed we expose soil to the action of wind and water and increase its chances of eroding.

Examination of the soil cover of Sokoró-Pannonhalma region villages showed that they previously had been under intensive use. These areas give home for valuable, protected plant species and very shallow soils. Sometimes the soil cover is only 5-10 centimeters thick and the loess material is mixed with the humic layer. When the area has no plant cover (arable lands), the effect of erosion can easily be detected with the lighter, yellowish color appearing on the surface. Some fields are extremely eroded. On these fields almost no original genetic soil layer has been left (Malatinszky and Centeri and Vona 2005).

To reduce soil erosion first we have to inform the farmers, politicians and all the inhabitants of the region. (Especially in the overcrowded areas.) The Regional Development Centre of the region started to make a brochure for farmers, which shortly summarize the sustainable way of land-use. It offers a number of solutions for preventing or to limiting soil erosion. The most important is to ensure residue regular plant cover. On the longest and steepness slopes terraces also reduce the energy of running water and its ability to carry soil away. An other effective way in prevention is crop rotation. The dense plant- and root structure protects soil from rain and runoff. Contour farming is also useful (Enyingi 2002).

It is also very important to avoid desertation, so the soil must be always covered by plants and have to be rich in nutrients. (The organic parts play quite an important part in preventing erosion.)

## **Discussion and conclusions**

The industrial way of agriculture (overstocking, mono-cropping etc) has led to soil erosion and desertification in the Sokoró-Pannonhalma region. Unfortunately these practices were supported by the formal Hungarian government, so the subsidies made the short-term approach profitable. After the change of the regime (1989) the big co-operatives were replaced by small-scale farms. Parallel to the political and economical changes the technical possibilities and the environmental-approach of farmers also changed.

The Rural Development Centre of the small region initiated a complex program to moderate erosion and to reflate extensive farming on the hillsides. Our goal is to propagate the technical changes, including the use of contour farming and wind breaks.

We have to make a sustainable land-use program to avoid overgrazing or the over-use of crop lands. The higher biological diversity we have on the fields the easier is to prevent erosion.

The Rural Development Centre of the region plans to establish a new Biosphere Zone System (core-buffer-transition), which would help to synchronize the different interests of nature protection, agriculture and tourism.

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