



Soil-friendly farm infrastructure elements

Farm infrastructure elements can help to achieve better protection of soil resources. Buffers (in their many forms) and terraces are discussed below.

Buffers

What are buffers and why are they useful?

Buffers are areas or strips of land maintained under permanent vegetation cover. They can be used along streams, lakes, contours, field borders, or even within fields. The following are examples of buffers.

- Grass strips are herbaceous areas used to trap sediment and pollutants from adjacent fields before they can reach waterways or sensitive areas.
- Hedgerows are strips of bush-like plants used to indicate property borders or provide a stock-proof fence. They may also play a role in filtering sediment and pollutants from adjacent fields or in preventing the drift of pesticides, particularly when spraying high crops.
- Grassed waterways are broad, shallow, saucer-shaped vegetated channels designed to move surface water across farmland without causing soil erosion. The herbaceous plants slow down the flow of water and protect the channel surface from rill and gully erosion, especially when the contributing watershed surface is relatively large.
- Windbreaks consist of rows of trees or shrubs. They aim at reducing wind speed and wind erosion, and thus protect young crops and control the drifting of snow and soil.
- Riparian buffers are zones of grass, trees or shrubs adjacent to watercourses that filter pollutants.



Buffer (hedgerow) along arable land (Somerset, United Kingdom) (Source: Geertrui Louwagie)

Implementation

Establishing buffers may involve planting grass strips, hedgerows or tree lines, or a combination of these. Maintenance is generally required in order to ensure filtering efficiency or limit excessive growth that could damage crop production. In some European countries, buffer strips are compulsory at the edges of croplands that border water bodies.

Benefits

Buffers may reduce the effects of water and wind erosion. Accordingly, they can significantly reduce the volume of sediment and nutrients transported by agricultural runoff to water bodies, or prevent the drift of pesticides from fields into water bodies, roads or other areas. Windbreaks, in particular, can halve the wind speed over a distance equal to twenty times the trees' height, and intercept the drift of aerial pollutants and soil particles. They thus help to reduce costs of cleaning operations (such as sediment removal). Buffers can alter the shape of landscape. They may evolve over time into semi-natural habitats, hosting a variety of wildlife on farmland, and creating a network of



Traditional hedgerow serving as a corridor for the movement of wildlife (County Sligo, Ireland) (Source: Geertrui Louwagie)

corridors for the movement of fauna and flora. They are most effective if planned as part of a comprehensive resources conservation system. Buffers may also provide useful commodities (fruits, wood, fodder, etc.), and thus contribute to a more diverse production on the farm.

Drawbacks

Under certain circumstances buffers can result in the loss of productive land. Plants in the buffer may compete with crops for available resources (especially in the case of tree windbreaks), and the available space for machinery to manoeuvre is reduced. Maintenance is required, so additional costs are incurred. Finally, buffers address the impact but not the cause of soil degradation; for example, they filter soil particles transported by run-off, but do not prevent erosion.

Success stories

Several types of buffers are common across Europe. Ireland and the UK have the densest network of hedgerows in the EU-27. Windbreaks are widespread in many of the extensive European plains, and grassed waterways are widely used in France.

Stone bench terraces with olive trees in Les Garrigues (Cataluña, Spain) (Source: Geertrui Louwagie)

Terracing

What is terracing and why is it useful?

Bench terraces consist of a series of level or nearly level platforms built along contour lines at suitable intervals, and generally sustained by stone walls. Terracing is generally used to allow agriculture on slopes, where the gradient and soil depth would normally prevent the cultivation of crops, and to limit run-off or increase the water-retention capacity of the soil.

Implementation

The slope is cut along the contour lines and soil is moved in order to form a level bench for cultivation. An embankment, generally made of stones, is constructed to support the terrace. As a large amount of cutting and filling is required per unit area, bench terraces may not be the optimum practice on soils that are easily eroded. Terracing was very much used in the past and is retained as part of the cultural heritage in some areas.

Benefits

Terracing facilitates cultivation on slopes, and leads to reduced run-off and improved water retention. More commonly, the maintenance of old terraces in good condition prevents erosion and ensures the continued existence of traditional landscapes.



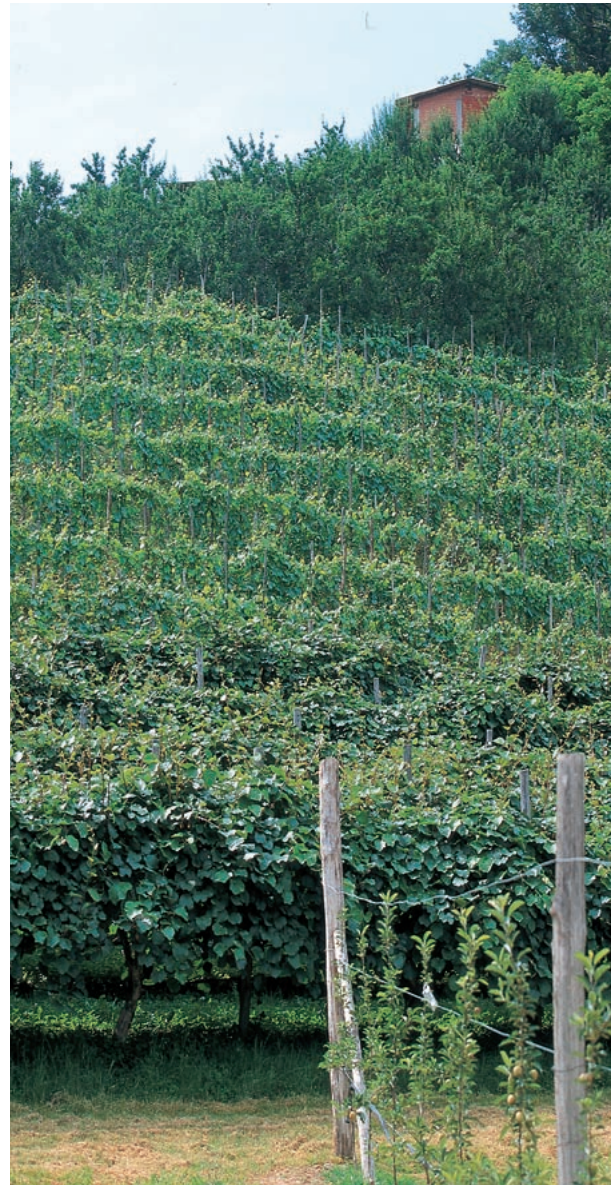
Drawbacks

Construction of new terraces requires a high input of labour and energy. It also involves the movement of a considerable amount of soil and thus impacts heavily on the landscape and the environment in general. Terraces require a high level of maintenance and, if abandoned, may be subject to erosion. Furthermore, they are often located in remote or inaccessible areas, from which a skilled workforce and the rural population in general have disappeared. Terracing is generally not suited to farming that uses large and heavy machinery.

Success stories

Terraces cover large areas in the Mediterranean region (Spain, Portugal, Greece, Italy, southern France, Cyprus, Malta), where they are generally used for vineyards and olive groves. Terraces are preserved as significant cultural heritage features in many national Rural Development Programmes.

Vineyard terraces (Source: Agripublications European Commission)



Further reading

<http://soco.jrc.ec.europa.eu>

Buffers

<http://www.fao.org/docrep/W2598E/W2598E00.htm>

Terracing

<http://www.fao.org/docrep/T0321E/T0321E00.htm>
<http://www.fao.org/docrep/T1765F/T1765F00.htm>



This fact sheet is based on the findings of the 'Sustainable agriculture and soil conservation' (SoCo) project. It is part of a package of ten sheets organised around the three main topics of the project. The sheets cover the following topics:

- Introduction:
 - Fact sheet no. 1: Linking soil degradation processes, soil-friendly farming practices and soil-relevant policy measures;
- Soil degradation processes:
 - Fact sheet no. 2: Water erosion and compaction;
 - Fact sheet no. 3: Organic matter decline;
 - Fact sheet no. 4: Salinisation and sodification;
- Soil-friendly farming systems and practices:
 - Fact sheet no. 5: Conservation agriculture;
 - Fact sheet no. 6: Soil-friendly tillage practices;
 - Fact sheet no. 7: Soil-friendly farm infrastructure elements;
- Soil-relevant policies:
 - Fact sheet no. 8: Requirement to keep land in good agricultural and environmental condition (GAEC);
 - Fact sheet no. 9: Agri-environment measures;
 - Fact sheet no. 10: Advisory services.

All SoCo fact sheets and project reports can be downloaded at: <http://soco.jrc.ec.europa.eu>.

