

Experiences with the German Soil Protection Act to Realise Best Management Practice-the Precaution Basis Against Soil Erosion

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Abstract: In Germany, two important activities currently address soil conservation issues and the sustainable use of soils. One is a proposal for a „Convention on Sustainable Use of Soils (Soil Convention)“ being entitled: „Preserving Soils for Life“, which is the result of the Tutzing Project on „Time Ecology“. The other activity is the „Act on Protection against Harmful Changes to Soil and on Rehabilitation of Contaminated Sites“ (Federal Soil Protection Act), which went into force in March 1st, 1999. The Soil Protection Act has two tasks: precaution and hazard prevention. The precaution against soil erosion and soil compaction will be realised through the principle of ‘Best Agricultural Practice’. To define the term of ‘Best Agricultural Practice’ for site-specific conditions, a group of experts was constituted that developed the so-called „Bund-Länder-Pier on Best Management Practice for Precautions against Soil Compaction and Soil Erosion“. The expert’s group involved scientists, members of agricultural and environmental bodies, farmers, extension services and others. The elaborated material contents different state examples and should be the basis for decision making on soil conservation issues according to the regionally specific conditions.

Keywords: soil erosion, soil conservation, soil protection act, indication system

1 Introduction

The sealing of soils for industrial and residential purposes creates an almost irreversible loss of the natural functions of the soil and is one of the most serious threats for soils in Europe. Despite the use of soils for economic and public purposes such as transport, building ground, provision and disposal, the soil has many other important functions. The soil is the upper layer of the earth's crust and derives its specific characteristics from the unique mixture of mineral components, liquid components (soil solution) and gaseous components (soil air). The soil performs natural functions as a basis for life and a habitat for people, animals, plants and soil organisms. The soil is part of natural cycling systems, especially by means of its water and nutrient cycles, it is a medium for decomposition, balance and restoration, which is a result of its filtering, buffering and substance-converting properties and which is of specific importance for groundwater protection. Additionally, the soil can be seen as an archive of natural and cultural history. Last but not least, the soil serves as a medium that holds deposits of raw materials, land for settlement and recreation, land for agricultural and silvicultural use. Soil loss means the loss of most of these functions. Besides the sealing of the soil, further sources for soil degradation are soil erosion risks and soil compaction risks (Frielinghaus *et al.*, 2000a and b, 2001a and b). More local problems are hazardous substances in the soil and waste application on the soil.

2 The soil protection act

As a result of the increasing public awareness of the serious threats to the soil, the preparation of a legal basis aiming at decreasing soil loss and soil degradation was initiated. The German Bundestag, by consent with the German Bundesrat (Federal Council), adopted the following Act: “Act on Protection against Harmful Changes to Soil and on Rehabilitation of Contaminated Sites” (Federal Soil Protection

Act), which went into force in March 1st 1999. The purpose of this Act is to protect or restore the functions of the soil on a permanent sustainable basis. This includes the prevention of harmful soil changes, rehabilitation of the soil, restoration of contaminated sites and of waters contaminated by such sites; and precautions against negative soil impacts. Where impacts are being made on the soil, disruptions of its natural functions and of its function as an archive of natural and cultural history should be avoided as far as possible.

The law is subdivided in 5 parts: (1): General Provisions; (2): Principles and Obligations; (3): Supplementary Provisions for Contaminated Sites; (4): Agricultural Soil Use; (5): Final Provision. Each of these five parts is subdivided into different articles. Since the introduction of the soil protection act, many regulations for the transformation of the Act had been passed. The individual federal states of Germany (Bundesländer) are responsible for the implementation of the act into practice.

3 What are the experiences of the implementation into practice?

The problem of land consumption through sealing is not soluble in the short run since immense conflicts exist between the different stakeholders. The regulations to prevent the soil against hazardous substances and waste disposal follow the concept of critical load and the polluter-pays-principle. The most important part of the Soil Protection Act with regard to the sustainability of the land is part four: Agricultural Soil Use. About 54 % of the land is agriculturally used in Germany. On agricultural land, the most important risks for soil degradation are soil erosion and soil compaction. In the German Soil Protection Act, the precaution against soil erosion and soil compaction are realised through the principle of “Best Agricultural Practice”, which is considered in Article 17 in the following way:

(1) In cases of agricultural soil use, the obligations to take precautions pursuant to Article 7 shall be fulfilled by “Best Agricultural Practice”. The responsible agricultural extension services and advising bodies should impart the principles of Best Agricultural Practice pursuant to paragraph (2) of this article and in agreement with the specific legislative regulations of the respective German federal states (Bundesländer).

(2) The principles of ‘Best Agricultural Practice’ imply the maintenance and permanent protection of the soil’s fertility and of the soil’s functional capacity as a natural resource. They include:

① In general, the soil shall be treated and tilled in a manner that is appropriate for the respective site, taking weather conditions into account.

② The soil structure shall be conserved or improved.

③ Soil compaction shall be avoided as far as possible, especially by taking the specific soil type and soil humidity into account when performing tillage operations, and by controlling the pressure exerted to the soil through tillage and management machinery.

④ Soil erosion shall be avoided wherever possible through site-adapted management considering the slope steepness; water and wind conditions as well as soil cover dynamics.

⑤ Natural and artificial structural field elements such as hedges, field shrubbery and trees, field boundaries and terraces being useful for soil conservation shall be preserved.

⑥ The biological activity of the soil shall be conserved or increased by means of appropriate crop rotations.

⑦ The site-specific humus content of the soil shall be conserved by means of adequate application of organic substances or through the reduction of the frequency and intensity of tillage operations.

In transferring the Soil Protection Act into practice, the following questions have to be answered for the case of soil erosion and soil compaction: what are the conditions to recommend precaution and what are the conditions to order hazard prevention? In Figure 1, the difference is demonstrated: precaution (§ 17) against soil erosion or soil compaction is demanded in the cases of potential risk, prevention of erosion or compaction hazards (§ 4) will be ordered for single events.

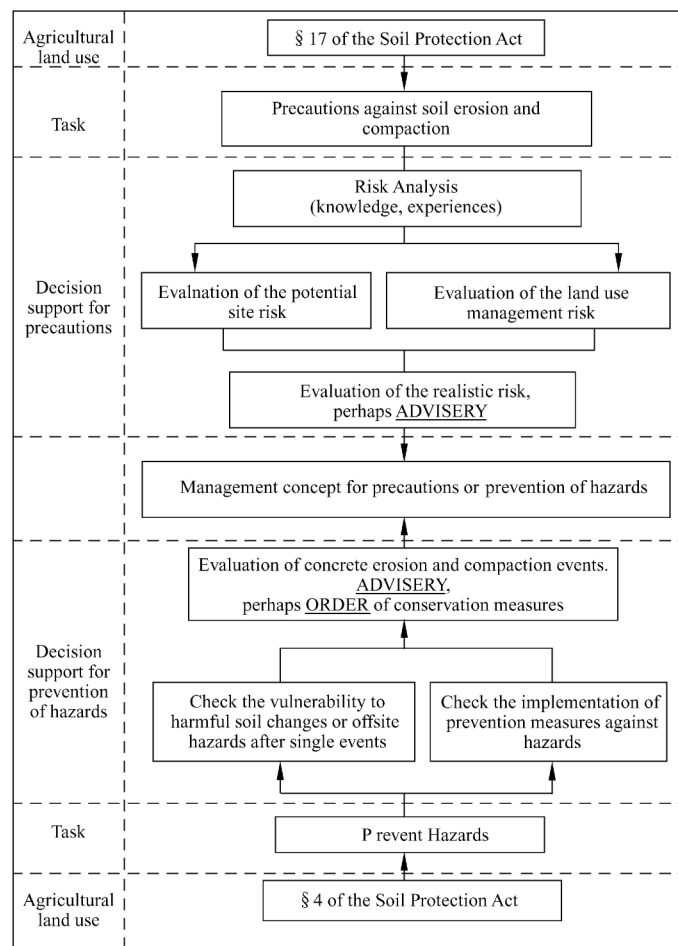


Fig.1 Soil protection act – the method of precaution and prevention principles

What is “Best Agricultural Practice”? To define the Best Agricultural Practice for site-specific conditions, an experts group was constituted and developed the so-called „Bund-Länder-Papier” on Best Management Practice for Precautions against Soil Compaction and Soil Erosion“ (Frielinghaus *et l.*, 2001b). The expert’s group involved scientists, members of agricultural and environmental bodies, farmers, extension services and others. The developed material contents different state examples of specific Best Agricultural Practice and should be the basis for regionally adapted and site-specific decisions on management practices and conservation measures as precaution against soil degradation.

The step-by-step decision-making methodology is demonstrated in Fig.2. Specific measures of Best Agricultural Practice and strategies of soil conservation are described in the Fig.3.

1. Step		
Evaluation of the site factors (soil erodibility, soil compactibility, texture, inclination, climate...) Potential Erosion or Compaction Risk [A]		
Low [A 1]	Medium [A 2]	High [A 3]
2. Step		
Evaluation of the land use factors (soil surface cover, machine pressure or wheeling) Land Management Risk [B]		
Low [A 1]	Medium [A 2]	High [A 3]
3. step		
Combination of [A] and [B] = Realistic Erosion or Compaction Risk [C]		
Low [A 1]	Medium [A 2]	High [A 3]
4. Step		
Diversion of Consequences for Soil Protection by Precautions, Based on Best Agricultural Practice		
precaution is guaranteed	precaution is not guaranteed continuously	precaution is not guaranteed
CASE 1	CASE 2	CASE 3
for example: Best Agricultural Practice is realised and guarantees optimal soil cover	for example: Best Agricultural Practice means an increased soil cover by changing the land use management	for example: Best Agricultural Practice includes special methods for increased soil cover and land structuring

Fig.2 Decision support system for the precaution principle

Measures to achieve soil conservation with “Best Management Practice” (Case 1).
 Selection of cover crops, planting of catch crops, under crops
 Site-dependent soil tillage and cultivation, changing plant production management
 Extensivation with set aside and rotation of fallows

Conservation tillage and special tillage to achieve soil conservation (Case 2).
 Design of crop rotation, conservation tillage, mulch seeding: - with seedbed preparation or without
 seedbed preparation, direct seeding / zero tillage, contour farming,
 Rough field surface

Infrastructure to reduce erosion by wind and water and soil compaction (Case 3).
 Arrangement/ rearrangement of the field shape, alteration of land use type,
 Construction of farm roads and country roads, filtering edges, shelter-belts and wind-breaks around
 endangered fields and at waters

Fig.3 Risk adequate soil management measures

4 Conclusions

The Soil Protection Act could be very helpful for a sustainable conservation of soil quality, the basis for sustainable land use and land development.

According to the AGENDA 2000, the European Union will change the allocation policy for agricultural subsidies. Two out of 13 agro-environmental indicator areas being the basis of subsidy allocation in future concern the soil. These are *soil quality / soil fertility* and *land conservation*. The existence of an agricultural extension service and an extensive database on soils are important pre-conditions for the realisation of new allocating systems. The soil quality has to be valuable, which requires the development of a soil indicator system integrated into an environmental indicator system. Indicators for the evaluation of the state of the soil, the land use intensity and the control of quality changes are part of this system.

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