

7 June 2000

To:

The Minister of Housing,  
Spatial Planning and the Environment  
PO Box 30945  
2500 GX The Hague

TCB S33(2000)

Subject: Recommendations on the role and significance of soil ecosystems in relation to the NEPP4 and the Fifth Policy Document on Spatial Planning

Minister,

In your letter of 30 March 2000, reference DBO/2000031932, you asked the Committee to draw up recommendations on the role and significance of soil ecosystems. These recommendations will be used in developing a position on the significance of ecological factors for different types of land use, in particular for the Fourth National Environmental Policy Plan (NEPP4) and the Fifth Policy Document on Spatial Planning. You asked the Committee to respond to a number of questions. Here we give, as you suggested, an initial response to these questions. In a supplementary document, these responses will be developed in greater detail.

*What is the significance of healthy soil ecosystems for the soil and for different forms of land use?*

Soil ecosystems have essential functions related to soil fertility, the retention and distribution or decomposition of substances in the soil, pest control, buffer capacity, groundwater storage, the sequestration of CO<sub>2</sub> and other greenhouse gases, capacity to support constructions, visual and general amenity characteristics. They thus help to regulate the material, nutrient and water cycles on our planet, as well as food production, the climate, etc.

Soil biota are essential for all these functions with the exception of carrying capacity. The Committee would stress the continuous nature of the soil ecosystem and the fact that the functions attributed to the ecosystem coexist in space and time. The importance of healthy soil ecosystems is self-evident in scientific terms: the soil is part of the ecosystem, simultaneously the product and the substrate of the ecosystem.

The soil ecosystem can therefore be regarded as a 'storehouse' of useful ecological functions. It is well known how some elements of the soil ecosystem contribute to its functions. The role of other elements is much less well understood, but this does not mean that these elements are unimportant. When society puts land to a particular use, one or more of its ecological functions is optimised, at the expense of others. The soil ecosystem has the ability to recover, returning to a more balanced state when a particular use is discontinued. This recovery is slow, however, compared with the rate at which society can optimise an ecological function for its own purposes.

To treat the soil responsibly, we must use its ecological functions sustainably. The Committee takes the view that the sustainable use of the soil ecosystem involves the following:

- The use of an ecological function must not lead to its depletion or destruction locally.
- The use of a given ecological function must as far as possible leave the other functions in that location intact.
- The recovery potential of the soil must remain intact. This means that functions which have been absent temporarily at a particular location must be capable of being restored, even if they have been absent for a long time. It follows that all the important organisms in the soil ecosystem must remain present.
- The speed of recovery must be commensurate with the speed at which the use changes. A recovery period of hundreds of years is inappropriate if land is typically put to a different use every 30 years, say.
- All ecological functions must be given enough space; this sets limits on the scale on which land can be used.
- The use of soil ecosystems must not impair nearby natural systems such as groundwater and nearby ecosystems.

The Committee recommends that the definition of sustainable use formulated above be explicitly adopted for the purposes of the NEPP4 and the Fifth Policy Document on Spatial Planning.

*How can this significance be impressed upon/communicated to the relevant actors?*

In the Committee's view, the importance of protecting healthy soil ecosystems is best illustrated by reference to the useful functions which soil ecosystems fulfil for humans and the environment. Terrestrial ecosystems are ubiquitous. We know that they are resilient in the face of human intervention, and that such intervention is also permissible. But at the same time it must be recognised that this intervention must not reach a point where the functionality of the ecosystems can no longer be preserved. Visual and general amenity aspects

associated with ecosystems could also be stressed. Publicising situations where human action has been shown to have damaged soil ecosystems can have a powerful impact. It can also be very effective to publicise cases where human action has clearly benefited soil ecosystems.

In the Committee's view, however, it is not sufficient just to protect those elements of soil ecosystems which are known to be useful to humans. This would also be at odds with the provisions of Section 1 of the Soil Protection Act and with the precautionary principle embodied in the Convention of Rio de Janeiro on Environment and Development. The Committee regards utility for humans as being primarily important for its publicity value. In any case, the symbiotic relationships between the various biotic and abiotic elements of ecosystems make it difficult to draw a sharp distinction between useful and non-useful elements.

*How can the state and possible development of soil ecosystems best be characterised, and is it possible to formulate explicit objectives for healthy ecosystems for different functions?*

The Committee regards the soil ecosystem as the totality of mineral components, dead organic matter, air, water, micro-organisms, soil fauna and flora, including plant roots. Within this system there are a host of interactions between the different organisms and between organisms and the abiotic elements. The system reacts to its surroundings. In managing the soil we must recognise the importance of the interaction between the soil ecosystem and elements of the wider system, such as above-ground flora and fauna and infiltrating water. In other words, protecting the soil means imposing requirements on the wider system, and vice versa.

In the past, soil quality tends to have been expressed in terms of its physico-chemical properties. This only gives a partial picture of soil quality, as it says nothing about the state of the soil biota. The quality of the soil biota is influenced by physico-chemical parameters, as well as the impact of the various relevant 'environmental policy themes' such as eutrophication, chemical pollution and disturbance, and the way in which the soil is managed. The Committee considers that far more attention needs to be paid to the quality of soil biota given their important role in maintaining the vital functions of the soil for humans and the environment, with particular reference to the protection and conservation of biodiversity. A description of the state of the soil and of the overall effects of the various environmental pressures on the soil will be of benefit to the integrated approach to environmental policy.

With this in mind, the Commission recommends that an inventory be made of the characteristics of representative soil ecosystems. This inventory should cover both the biotic

and abiotic characteristics of the ecosystems, so that the biological parameters can be linked to the physico-chemical characteristics of the soil. The succession stage, the material balances, the stability and the functional biodiversity of the system must be described. The inventory should distinguish between nature conservation areas, agricultural areas and living/working areas. The way in which the soil ecosystem is affected by land use can be indicated for comparison purposes. The inventory will provide information on the discriminatory power of the various parameters and ways of making a sound choice of indicators and reference soils. It can make use of ongoing research into the life support functions of the soil in relation to biodiversity. The Committee recommends that priority be given to carrying out this inventory.

*What current research/existing methodologies are useful, and what new research needs to take place?*

The time constraints under which this document was drafted made it impossible to thoroughly appraise current research and existing methodologies. The Committee will consider these questions in detail in a supplementary document. The Committee took the request for 'explicit objectives for healthy ecosystems' to be referring to indicators of the biological quality of the soil, as well as the desired states for these indicators. The indicators might for example be certain organisms or processes in the soil. The desired state would involve achieving certain absolute values for these indicators. A desired state is often based on reference situations which are regarded as 'good'; historical situations, for example. The Committee considers that the adoption of general objectives for soil ecosystems and for the use of these ecosystems at the micro level is not possible at the present time because of a lack of knowledge about:

- present values of specific soil ecosystem indicators;
- the values of these indicators which are to be deemed good or bad; these values are increasingly unclear as the spatial scale reduces;
- the type of measures necessary to achieve the desired situation.

The Committee will discuss how these gaps in knowledge can be filled in its supplementary document.

Yours faithfully,



W.C. Reij  
Chair, Soil Protection Technical Committee