

Introduction to the Symposium on "Stressed Ecosystems and Soil Resilience"

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Parallel with the development of environmental issues and with the acceleration of intensive production the soil cover of the world demands more and more attention. It is particularly important to estimate the increasing load on the soils resulting from natural soil forming processes on the one hand and human activities on the other hand. It has been recognized that the carrying capacity of the soil as well as its tolerance for disturbances are finite. In spite of the fact that the soil is a very complex entity, and its resilience counterbalances, on many occasions, disturbances, and its renewability often enables the toleration of sometimes serious adverse effects, there is a real hazard of exhausting and deteriorating the soil which is an irreplaceable natural resource (ARNOLD et al., 1990).

Although attention is increasingly focused on soil resilience, we are still lacking not only a precise definition of this term but also the methods of its measuring, as well as the description of its processes, significance and development.

In the autumn of 1992 a Symposium on Soil Resilience and Sustainable Land Use was organized in Budapest by the Hungarian Academy of Sciences (HAS), CAB International (CABI), and the International Society of Soil Science (ISSS), with participation of nearly twenty governmental and non-governmental organizations. This meeting was the first devoted particularly to soil resilience.

The presented papers and the discussions of the Symposium as well as the two volumes of its Proceedings containing these papers and the poster materials, respectively, have promoted a better knowledge and practical application of our experiences on soil resilience. However several questions remained open, including the uniform interpretation of soil resilience.

There are two different approaches in this respect:

1. Soil resilience is a specific attribute of the soil which is a capability of behaving in this or that way in the face of certain more or less defined agents, forces or effects (SZABOLCS, 1992).

2. The other approach which appeared in the documents of the above mentioned Symposium was to define soil resilience in connection with adverse processes, mainly soil degradation, and understands soil resilience as the ability of soil to recover after degradation (GREENLAND & SZABOLCS, 1992).

The two approaches are not antagonistic, but clearly show that there is a lot to be done in relation to the further study of soil resilience in order to apply this attribute and the process of its development both in environmental and agronomical problems.

The present Symposium is a very useful follow-up dealing with stressed ecosystems and soil resilience, and focusing on those processes which influence the soils in ecosystems under stress and challenge its finite resilience.

In the following a few remarks will be made which are, in my opinion, closely related to the subject and to its future study.

1. Soil resilience is an attribute of all soils which includes several processes and properties, among them

- a) soil buffering capacity (physical, chemical, and biological);
- b) soil transforming ability, (including decomposition and synthesis of organic matters, detoxication, etc.);
- c) in close association with (a) and (b), renewability, including natural and anthropogenic processes which make soil a specific natural entity, conditionally renewable (i.e. not similar to coal, petrol or other minerals, which can be completely exhausted on the one side, but also different from e.g. water, on the other side, which is a fully renewable natural resource).

2. The part processes composing the resilience of soil have different rates and structure. In Figure 1 a scheme is given of the rate and time scale of three important processes in the soil, composing soil resilience. It can be clearly seen in Figure 1 that all three capacities are finite and sooner or later will diminish and finally cease to be if the stress on the soil increases or continues.

3. If we try to define or characterize soil resilience correctly, it is necessary to pose the question "Against what?" because in general the term "soil resilience" gives little guide to answer practical questions. We have to study the resilience in the face of certain more or less defined agents, forces, and effects. The precondition of characterizing the resilience of a soil is the definition of these agents, effects, and forces.

4. The study of soil resilience in stressed ecosystems, based on the above described, should be also target oriented. From the point of view of present environmental issues both on global and local scale the resilience of soil

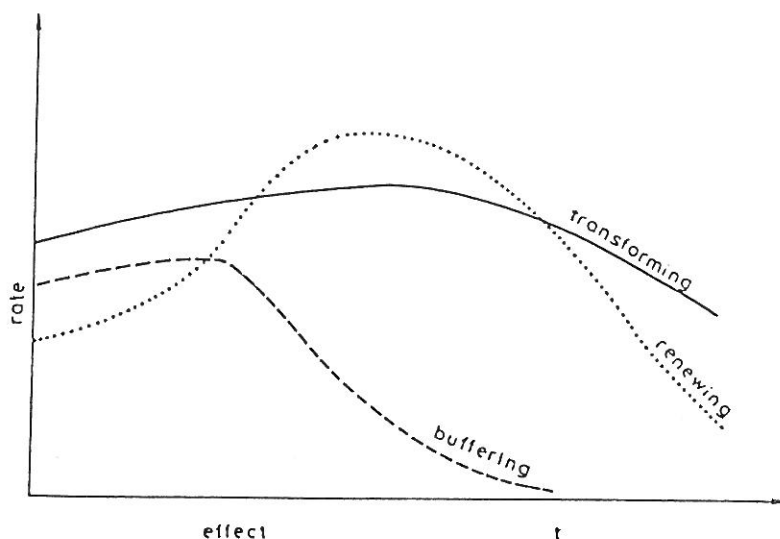


Figure 1

Scheme of the rate of three part processes composing soil resilience

should be not only taken into consideration but also optimally utilized during any use of ecosystems which are stressed, caused either by natural or anthropogenic factors.

5. It is particularly important to study and to measure soil resilience and its limits, e.g. in the ecosystems stressed by the development of agriculture and irrigation. It is also essential in ecosystems stressed by deforestation, overgrazing, and particularly by desertification. It is also important to estimate the resilience of the soil in ecosystems affected by changing climate or by changing the recent patterns of watersheds and river basins.

One of the aims of the present Symposium is to make a step forward on the road to disclosing the essence as well as the exact description and measuring of the resilience of soil and to search the way for application of results in characterizing soil resilience for the better utilization and better conservation of our environment as the watchword of the 15th International Congress of Soil Science goes: Soil Utilization in Harmony with Nature.

References

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