Part IV

Integrating Aspects for Soil Ecology in Antarctic Coastal Landscapes

Preface

Soil ecology is defined as the interaction between the organisms in and on soil as well as their interactions with soil properties (e.g. Working Group Soil Ecology 1995). For this reason, the first four chapters of Part IV point out (1) the significance of soils and their properties for organisms and (2) the opposite point of view, i.e. the influence of organisms on soils. Parts I–III provided detailed information on soil properties, their distribution patterns, and the basic state for life on and in soils. It is now the aim to focus more on interacting items and to see the soil in its role as a host for flora and fauna (Chap. 17). To some extent, new concepts on ecological niches and habitats can be defined (Chap. 18) which can help to classify the environment, and to establish a common view on habitats.

The question about soil formation, as already dealt with in earlier chapters, will be taken into consideration again (Chaps. 19 and 20) and it will be reviewed from the viewpoint of soil formation by biological factors. For temperate climate regimes the importance of the biology factor (ø) in the CLORPT equation (cf. Preface, Part II) is well known for the first steps in soil formation: humus accumulation, bioturbation, root penetration and water and air dynamics etc. (Jenny 1986), but only little is known about the environments of Antarctica. Here, only a very limited number of vascular plants and invertebrates can survive (Part III). This suggests a much greater impact of microbes, algae, lichens and mosses on soil formation. It is obvious that under the climatic regime of Antarctica many processes of soil development work slowly. On the other hand, climatic gradients act on small local scales and thus make processes visible which are often hidden or unrecognisable in temperate regions. More detailed descriptions of various profiles from individual climatic regions as provided in overviews by Claridge and Campbell (1987), Blume et al. (1997), Bölter et al. (1999), or in detail from King George Island (Kuhn 1997) and the Windmill Islands (Beyer and Bölter 1999) provoke discussions about their role in this ecosystem.

As already mentioned in the Preface to Part II, the original CLORPT equation from Jenny (1986) nowadays has to be extended by taking human factors into consideration (Amundsen et al. 1994). Soil formation is influenced to a great extent by humans, up to the total destruction of whole soil landscapes.

Stonehouse (1999) has made an attempt to bring these ideas together with emphasis on disturbance, damage and remediation, i.e. anthropogenic effects on polar environments. Bölter (1996) focused on soil processes which are stimulated by climatic changes in those regions. Although the latter paper refers mainly to the Arctic, parallels to the Antarctic can be drawn, even though many problems act at different time scales (Chap. 21). Growth patterns of microbes, plants, or soil animals are only barely on the scale of climatic change, soil development or man-made disturbance factors. Hence, the authors of this book cannot make a final statement about the state of the art of science, nature or Antarctic politics, but hope to warm people's heart to consider this part of the globe as a mirror for their own efforts in science and politics, and of global history.

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