

The ecology of recently - deglaciaded terrain, a geocological approach to glacier forelands and primary succession

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J. Feltwell

The author is from the Department of Geology at the University of Wales College of Cardiff (UWCC), and this book represents years of research on the subject and includes the fruits of 20 Jotunheimen Research Expeditions to the glacier forelands of southern Norway, and lots more. Just about everything else on the subject is here too, so it will always stand as a key reference. The style and readability of the book is 100% academic with no concessions for other scientists or nonacademics, i.e. it is a little hard-going, but it is packed with data, models, graphs and so on, only for the dedicated expert. Don't expect anything substantial on succession after ice-melt from global warming; this is a book about everything there is to know about succession at glacier foreland habitats. No stone has been left untouched in this quest to encompass the world. Even the old literature is trauced comprehensively lest worthy work is forgotten, which is to be much applauded. The main new thrust in this book is the geological approach which embraces a consideration of the vegetation and soil in relation to such parameters as the landscape, topography and climate. There are seven chapters in the book with major ones on "Soil Development", "Patterns and environmental factors" and "Processes and models" in plant succession. Clearly it will become a classic.

R. Šoltés

In the section "Plant succession: Patterns and environmental factors" a survey is made of the patterns of plant colonization and community succession in recently deglaciaded terrain. Methodological consideration may be used not only for investigation of such terrain, but, also for investigation of other types of vegetation chronosequences of high-mountain areas. Critical testing approaches, e. g. detrended correspondence analysis used for evaluation of vegetation change of permanent plots over a 12-year period; or technique of multiple discriminant analysis summarizing the modern pollen spectra from the various moraines and providing graphical representation of the similarities between sites, are techniques of concern for every ecologist.

The author identified general trends in the pat-

terns of successional change inferred from vegetational chronosequences on recently deglaciaded terrain and distinguished three successional pathways dependent on local environmental factors. A wide range of physical environmental factors combined with biological controls are responsible for vegetation patchiness.

The author submitted to analysis the horizontal and vertical structure of vegetation cover, their biomass and species diversity. The study indicated an increase in the number of species with increasing terrain age, the biomass increase during succession as plant size, cover and stratification increase.

Research workers, who have carried out investigations on the ecology of recently-deglaciaded terrain recognized successional stages based on species composition. The author identified nine species groups with similar distributions in relation to terrain age, that is, various species are inferred to enter and leave the succession at approximately similar times. Species groups are defined by two-way indicator species analysis and displayed in relation to ordination axes from detrended correspondence analysis.

A special section deals with environmental controls on successional sequences. Physical environmental factors like substrate characteristics, topography and climate are the most frequently cited factors in this context. Vegetation and environmental factors are analysed within the chronosequence at a sub-set of 108 permanent plots. Twelve environmental variables, including terrain age, were measured and these are related to four vegetation gradients defined by detrended correspondence analysis.

In the chapter "Plant succession: processes and models" the main emphasis is set to the explanation of successional patterns and to the mechanisms of change. A variety of methods have been used, most of them could find use in investigation of colonization of other degraded habitats. In the section "Models" the approach adopted is partly historical and partly systematic, involving mechanistic models. Attentive readers recognize that many of the models discussed are extremely simple, based on one dominant concept or a process. The author offers at least three attempts to produce comprehensive frameworks for understanding succession. These concentrate on the idea that succession is the result of process interactions.

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