

## ***The Patterned peatlands of Minnesota***

Edited by H. E. Wright, Jr., Barbara A. Coffin, and Norman E. Aaseng, published by the University of Minnesota Press in 1992, 327 pages, ISBN 0-8166-1917-4.

### **Review by Christopher G. Kendall**

This book is beautifully illustrated with both color, and black and white photographs, numerous sketches, maps, cross-sections, and profiles which record the result of a variety of analyses, etc. It is probably one of the most complete contemporary books to be published on peatlands. It records the character of a specific kind of peatland common to the northern hemisphere, in some detail. Descriptions include the vegetation, fauna, hydrology, ecological development, and various influences on the development of particular depositional settings. The editors have recognized the importance of human influence on the evolution of this unique eco-system and have listed reasonable recommendations on the best ways to handle its resources so peatlands can continue to be developed but yet will maintain much of their unique character.

The book is written for those with an interest in the development and exploitation of peatlands. It will be a particular interest to earth scientists, geographers, biologists, members of the legal professions, and government officials who need an insight into the character and preservation of peatlands. The book is professionally put together and tightly written.

The text consists of 19 papers by a variety of authors and is divided into five parts. These subdivisions are entitled vegetation, fauna, hydrology, two studies of ecological development, and human influences. The first paper is on peat landforms in Minnesota and addresses the development of irregular mosaics of forest, meadow, and thicket on the symmetrically vegetated patterns of the peatlands. As recorded here, particularly significant to this area of peatlands is the resemblance between the vegetation of peatlands to geological landforms including river channels, islands, and ripple marks. The author compares the "islands of trees" to ships that have rounded bows and trailing wakes that interrupt the wavelike patterns of the ridges and troughs in a surrounding "ocean" of meadows. The author goes on to explain that this distribution of pattern is related to regional and local controls which include the movement of groundwater that influences the proportion of fen versus bog in the peatlands. This surface character is also related to the underlying sand deposits marking the crests of water sheds enabling the discharge of alkaline groundwater to check the advance of bog while maintaining fen vegetation in the water tracks. The morphology of the basic landform, namely raised bog, water track, spring fen channels, is remarkably uniform across northern Minnesota, suggesting an autogenetic feedback system which is related to an interaction between the vegetation and water chemistry. Many of the papers in this book focuses on this interaction and describes in fairly general and, sometimes, specific terms the relationship between these forms.

The next chapter is on vegetation and water chemistry and focuses on the relationship between old lake beach ridges, swamp forest, spring-fen forest, spring-fen channels, featureless water tracks, patterned water tracks, raised bogs, spring-fen mounds. The paper discusses the vegetation and its relationships to concentrations of calcium in the water system and the scarceness of or more intense cover of this flora. The paper notes that each type of landform in the peatland is characterized by distinctive species assemblages and a subtle variation in water chemistry.

Next is a paper on the ecological development of patterned peatlands which discusses how the

surface runoff and its chemistry controls and interacts with vegetation. The paper remarks on the hydrologic conductivity of various peats and illustrates how various primary bog islands develop in the peatlands. This paper is beautifully illustrated by diagrams that show the various patterned peatland shape development. The author notes that the sharp discontinuities seen in the eco-system are related to simple feedback mechanism that control the development of occurrence of the dominant species along the chemical and moisture gradient.

Next is an article entitled "Bryophytes" which deals with the primitive land plants, mosses, and bog mosses of the area, listing the various species and genera found in different bogs. This paper is illustrated with a variety of very exciting color photographs which show the patterned grounds extremely well, their patterns matching those that one might expect to be generated by a modern artist reconstructing what the earth surface might look like. These photographs include a mixture of normal aerial shots, oblique photographs, and ground shots showing details of material seen in the high altitude pictures. Also included is a collection of well drawn line drawings of the commonly occurring species of bog mosses. This is followed by a paper on rare vascular plants of the bog illustrating these with line drawings and maps which show their distribution.

The second part of the book deals with fauna of the peatlands and has section on the large mammals including deer, caribou, elk, moose, coyote, wolf, red fox, bobcat, lynx, cougar. Also listed and discussed are weasels, skunk, badger, wolverine, mink, river otter, fish, also bears, raccoons, beavers, muskrats, and porcupines. This paper focuses on the distribution in these different animals in the patterned lands.

Then is a paper on small mammals, with very long lists and some illustrations, showing the distribution of different types of shrews, including masked shrews, pigmy shrews, water shrews, short-tailed shrews, star-nosed moles, etc. This paper is accompanied by some clear maps of the distribution of these animals and their relationship to the patterned grounds.

There follows a paper on bird populations, illustrated with line drawing of a few of the common species. The paper discusses their distribution in the various patterned areas accompanied by comprehensive lists of this distribution. Amphibians and reptiles are then described with similar maps and diagrams showing the distribution of their various genera.

Next is the section on the hydrology of the peatlands including papers on surface and groundwater hydrology, the impact of ditching and road construction on the hydrology of the area. This later paper discusses water table drawdown near the ditches; seasonal fluctuation of the peat responding to the water table movement; peat subsidence; growth response in black spruce to drainage and climatic change; and various other hydrologic effects produced by manmade drainage systems.

Part IV of the book includes two studies of ecological development of the area, namely a raised bog complex with a discussion of the various organisms involved in the peat of the raised bog and a paper on the Myrtle Lake of peatlands. Both papers use pollen distribution diagrams to trace the evolution of these two very different areas. The raised bog is associated with the development of sphagnum peat, sphagnum sedge peat, forest peat, sedge peat, with the lake sediments are related to forest peat, sedge peat and lake sediment. In the raised bog complex there is a discussion of rich fen, versus Alder Carr, versus sedge meadow, versus limnic sediment, mineral substrate, and oligotrophic fen and various peats with significant amount of wood. The author illustrates how the runoff from forested crests moves across the non-forested sphagnum lawn to the circular forested islands, driving the development of the

raised bogs.

The final section of the book deals with human influences and includes a series of paper entitled "the Archaeological and Ethnohistoric Evidence for Prehistoric Occupation." and a paper entitled "the Red Lake Ojibwe." The latter describes the activities of the Ojibwe, a group of Indians that live near Red Lake. The paper explains how the native Indians have exploited the area, describing their migrations, the effect of the expanding market economy on their activities, and a campaign to protect Red Lake resources. This is followed by a chapter on ditching of Red Lake Peatland during the homestead era, with photographs of this, and copies of clippings taken from the Bemidji Pioneer and other local newspapers. It is clear from this article that homesteading was responsible for many of the drainage projects that this part of Minnesota has seen. Such projects meet with less success today, as recorded by a description of an attempt by the local farmers to improve drainage of their land. In this case it was recognized that the improvement of the drainage would require the other local land owners along the ditch to contribute financially to the project. The proposed ditch system improvement did not take place since the general consensus of the land owners was not interested in spending their money to do this.

Next is an article which deals with the management of Minnesota's peatlands and their economic uses. It has helpful listings of the ways on which the peat from the area has been used, namely timber farming, agricultural uses, bio-energy crops, horticultural products, fuel peat, industrial chemicals, etc. The article concludes that even the pressure of economic development of last decade has not resulted in exploitation of many additional acres. Apparently economic conditions are simply not favorable. The concluding article deals with peatland protection and describes various attempts to protect the peatland area of Minnesota, listing the protected areas.

I recommend this book to you and I am glad to have it on my shelfe. It contains a wealth of information on the Minnesota peatlands, which can be applied to other areas of raised bogs, and patterned peats. Those who have interest in environmental protection and environmental exploitation of peatlands will find this text a help in understanding the results that exploitation of peats produce and what mechanisms which can be employed to help in the protection of these and other peatlands.