Vegetation zonation and primary succession along the Porcupine River in interior Alaska

by ALJOS FARJON and PIETER BOGAERS, Utrecht

with 8 photos, 7 figures and 3 tables

Abstract. Primary succession of vegetation on the floodplain of the Porcupine River in interior Alaska is discussed. The authors describe three different seres leading to the climax vegetation, i.e. a moss-rich *Picea glauca* forest. The seres are determined by conditions created by the meandering river, these conditions are summarized and interactions with the vegetation are discussed.

Sere I occurs on broad sandbars, usually on inner curves of meanders, where there is rapid sedimentation and decreasing influence of the river. *Populus balsamifera* is present in a pioneer stage and dominates in a Balsam poplar wood, which is eventually invaded and replaced by White spruce (*Picea glauca*).

Sere II occurs in both thermokarst and oxbow lakes and is little influenced by the river. An aquatic vegetation develops into riparian types which are also replaced by White spruce.

Sere III occurs again on the banks of the river, here flooding is frequent and remains so through the sere. An open pioneer type is followed by a *Salix interior* facies and this in turn by a *Salix alaxensis* wood poor in species. *Populus balsamifera* is absent in this sere.

The floristic and structural composition of the seres is given in Tables 1, 2 and 3.

A new forest community, the *Salix alaxensis / Calamagrostis spp. / Equisetum arvense* community, is proposed for this region.

White spruce does not occur in it as long as this community remains under the influence of the river.

Introduction

The objective of this study was to investigate pattern and process of vegetation on the floodplain of the Porcupine River. To describe the patterns, samples of vegetation had to be studied in all physiognomic types of vegetation that could be recognized in the field. Studies to make recognition of such types in Alaska possible have been undertaken by HANSON (1953) for northwestern Alaska and by JOHNSON & VOGEL (1966) for the Yukon Flats Region. We also hoped to learn something of the processes in vegetation, i.e. the possible lines of succession in vegetation types on the river floodplain. Therefore, we should study the vegetation in transects through ecological gradients that were formed either by sedimentation on the shores of the river or by the zonation along the shores of gradually diminishing lakes. Relative age could then be inferred from the stages of sedimentation and ages of woody plants in the samples. We further supposed macro-environmental factors such as climate, geomorphology, soils, river dynamics