

VII. THE ECOLOGY AND FOREST TYPES OF THE
PEAT SWAMP FORESTS OF SARAWAK AND BRUNEI

The following is an author's summary of the (as yet unpublished) thesis by Dr. J. A. R. Anderson of Kuching, Sarawak (see III. Personal news). Both the author and botanical science are to be congratulated with the completion of this important work, which we hope before long to see in print.

The thesis embodies the results of botanical and ecological work on the coastal and deltaic peat swamp forests of Sarawak and Brunei undertaken intermittently over a period of ten years. Profiles of peat swamps have been prepared from the results of the level surveys and peat borings. A characteristic raised bog structure has been found in all swamps. A bog plain is usually present, and is most extensive on more inland swamps. The peat soils are markedly acidic and oligotrophic. Preliminary results from measurements of the stilted water table indicate that variations are more pronounced in the centre of swamps than near the margins. A comprehensive collection of botanical specimens of all flowering plants,

ferns and fern allies has been made; 242 tree species have been recorded, and it is considered that knowledge on the representation of the arboreal flora is virtually complete.

The ecology of the peat swamp forests has been investigated by a series of transects and fifty three half acre plots. The results show that a concentric zonation of vegetation occurs and that this is repeated in swamps in all localities. The term 'swamp catena' has been used to describe this zonation and six phasic communities are recognized in the catena. There is a tendency per unit area in the catena for the numbers of species to decline, the numbers of individuals to increase, and the average girth of a species to decrease. The catenary sequence is also accompanied by an almost complete floristic change. It is concluded that the catena mirrors conditions of increasing infertility. The six phasic communities are described in detail, and from the interpretation of the aerial photographs their distribution plotted on three maps. The unique *Dacrydium Casuarina* forest in peat swamps has been investigated and its relationship to the catena and phasic communities previously described is shown.

A relationship between certain phasic communities and the surface structure of the raised bogs has been found, and it is tentatively concluded that surface drainage, expressed by the gradient of the water table, is an important factor influencing the distribution of species, and that the depth of peat has little or no influence.

With the cooperation of the Brunei Shell Petroleum Company Limited the hydrosere has been investigated by pollen analysis. The results clearly indicate that the peat swamp originated over mangrove sediments and that the catenary sequence of phasic communities in fact represents the hydrosere. Radio carbon dating of peat samples shows that the rate of accumulation of peat is more rapid in the initial stage of the hydrosere. The phasic development of peat swamps is discussed and an explanation given for the characteristic biconvex structure of bogs.

Climatic damage and the decimation of *Shorea albida* forest by an unidentified insect have been investigated. The importance of lightning damage in the ecological cycle is indicated.

On the basis of the ecological results and observations the regeneration and silviculture of Mixed Swamp Forest (Phasic Community 1) and three phasic communities dominated by *Shorea albida* are discussed. Results of post exploitation regeneration surveys are included.