

AS CAUSE OF THE PRESENCE OF GRADIENT-VEGETATIONS

R.H. Kemmers

Institute for Land and Water Management Research (ICW),
Wageningen, The Netherlands

The central Dutch 'Gelderse Vallei', formerly established by fluvioglacial influences, has been filled up with cover sands in the postglacial period. In spite of this the region still is a valley and mainly consists of soils characterized by upward flowing seepage water. This groundwater, originally being rainwater, infiltrated the surrounding highlands of the 'Veluwe' massif on the eastern and the ice-pushed sand ridges on the western flank of the valley. The general flow direction of the groundwater is towards the central valley's main channel, which flows northward to the IJssellake.

In the aeolian valley landscape the presence of sand dunes causes infiltration of groundwater which results in an alternating pattern of soils characterized by downward and upward flowing groundwater and an establishment of local stream patterns of groundwater superpositioned on the regional stream pattern.

The nature reserve 'Groot Zandbrink', situated on the side of the valley which receives its seepage water from the 'Veluwe' massif, derives its character from its position on two interfering stream patterns, called hydrological fields.

Hydrological field properties between source (infiltration site) and sink (seepage site) are reflected in the hydrochemical characteristics of the groundwater. From the source, the calcium part of total major cations is growing to about 80% near the sink. Parallel with it the hydrocarbonate part of total major anions is growing (alkaline type of water). This phenomenon manifests itself in the hydrological field within the nature reserve on a very local scale.

In the presence of organic deposits in the subsoil, however, a predominance of the sulfate-ion (saline type of water) might occur. This saline groundwater can be considered to be the prevailing type of shallow groundwater in the region, as a consequence of the presence of large organic deposits of manure and sods resulting from age-old farming practices.

In the zone where the alkaline pole of the reserve's hydrological field interferes with the saline pole of the regional hydrological field, gradient rich vegetation types of the *Caricion davallianae* and *Cirsio-Molinietum* are present.

These differences in hydrochemical composition have an indirect significance rather than a direct operational one, as the saline/alkaline ratio regulates soil acidity, mineralization processes, nutrient availability, etc., which can result in a very differentiated operational environment.

Despite a drawdown of the mean groundwater level in the reserve of about 30 cm during the last 30 years, vegetational composition altered only slightly. It was concluded that this drawdown resulted in a change of the hydrological field interference, rather than in a lowered physiological availability of groundwater for the plant communities concerned.