Water Resuarces Departament

Institute for Land Reclamation and Grassland Farming
in Falenty

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# DIFFERENTIATION OF WATER RELATIONS IN THE NAREW VALLEY WITHIN THE NAREW NATIONAL PARK

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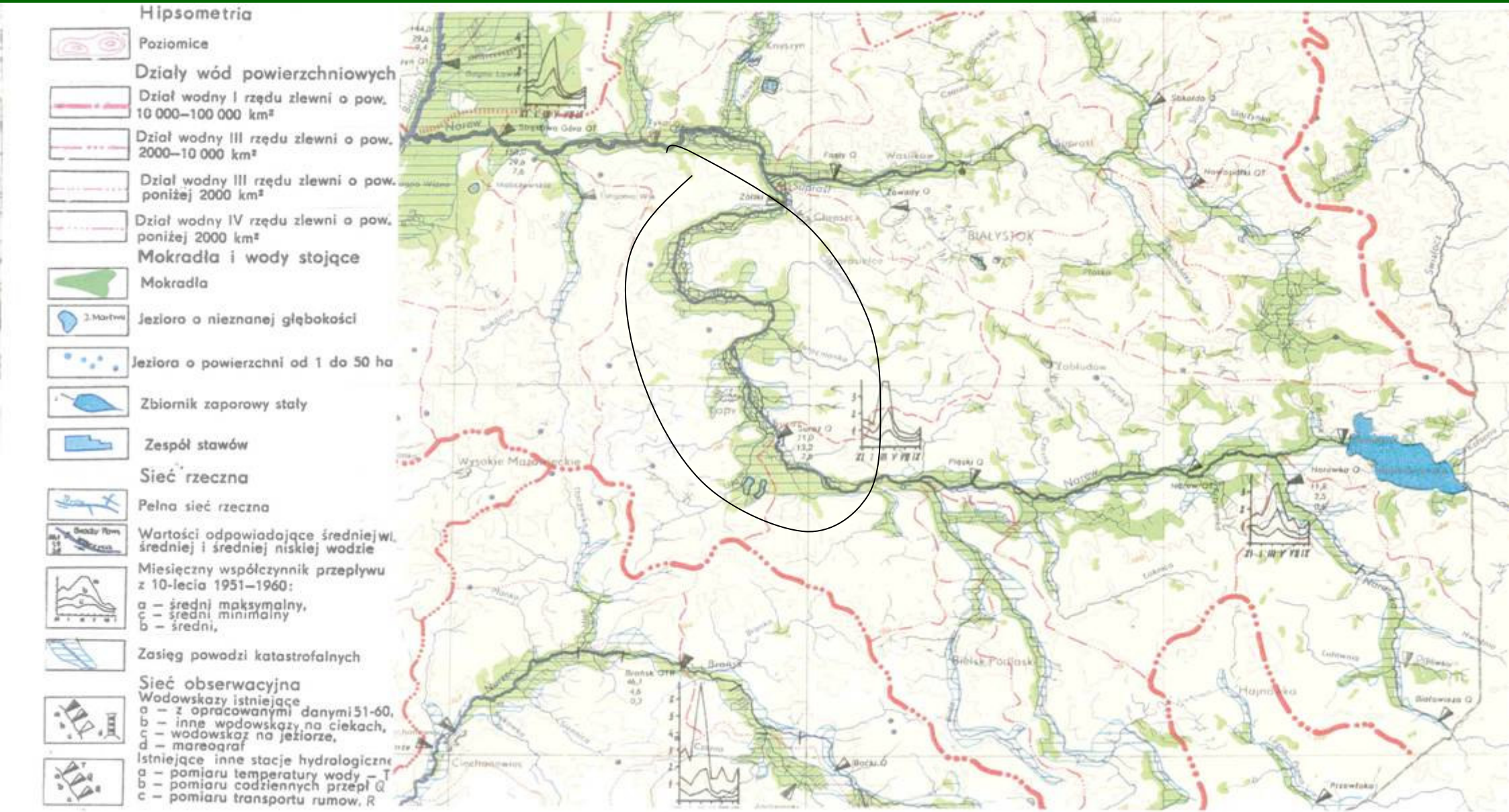
## 1. Introduction

Unfavourable transformations of organic soils and wetland vegetation which lead to the impoverishment of natural values of riparian sites is observed in many river valleys. These processes are usually associated with drying of soils due to decreased water flow in a river or a decline of surface and ground water levels resulting from various anthropogenic activities. Degradation of hydrogenic sites is observed in the Narew valley even in parts of river valleys where no draining measures have been undertaken.

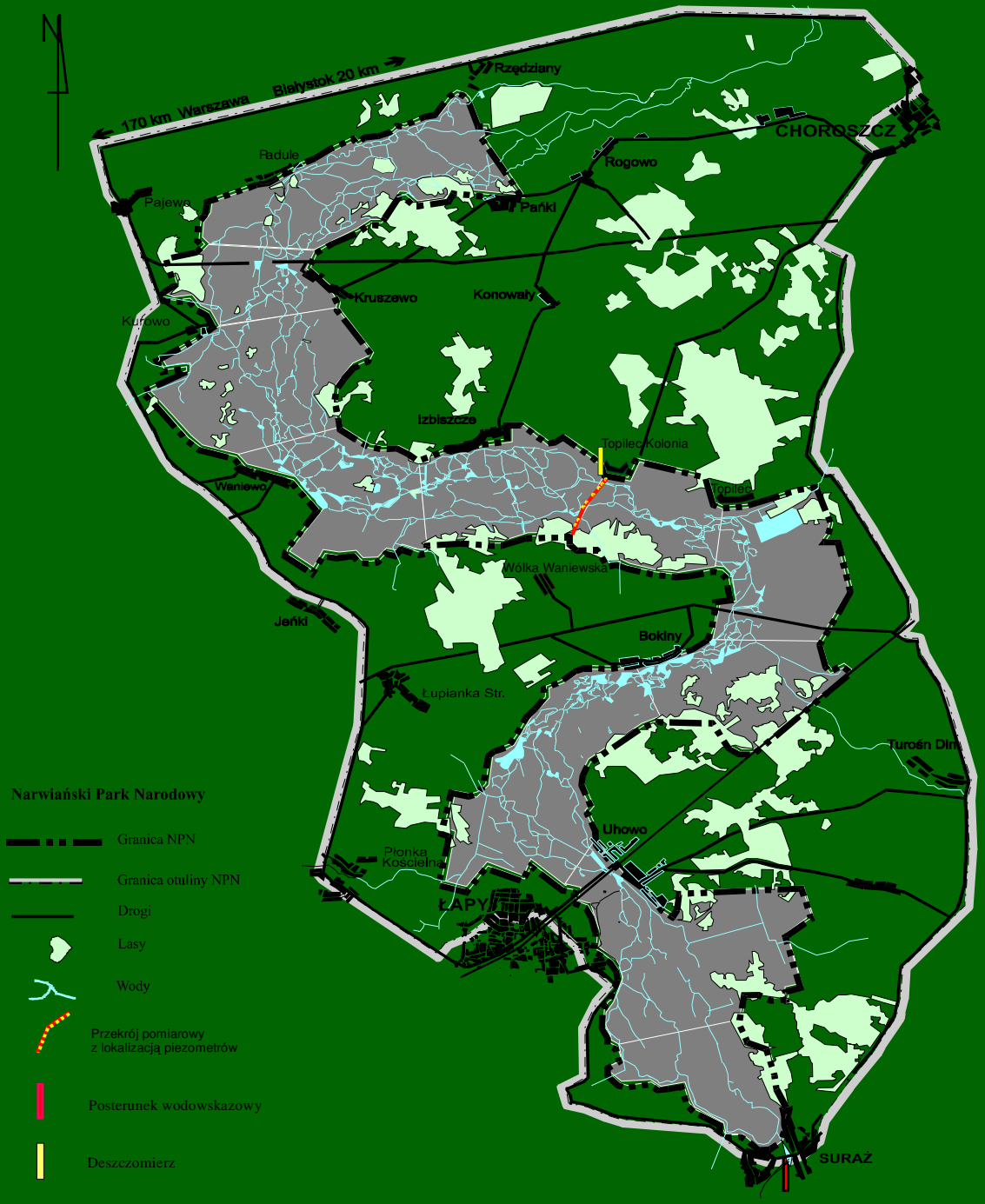
Some specialists associate it with changes in hydrologic regime caused by the construction of Siemianówka dam reservoir and by the Narew regulation downstream the Narew National Park. Results of hydrological analyses based on long term (since 1950) gauge measurements do not show stable trends of decreasing water flow nor the restriction of spring floods  On the contrary, some analyses show constant, observed since the seventies, increasing of low flows in rivers of north-eastern Poland .

The aim of the study was to analyse the changes in the water regime in the Narew river at the gauge Suraż

# 2. Characteristic of Narew valley and field experiment



The Narew valley




Rys.3.1. Odcinek Górnej Narwi Suraż - Rzędziany

## 3. The localization of the experiment cross-section

- Natural peatlends
- Decreasing of ground water
- Begining of mineralization of peat soil
- Some changes in the plant cover

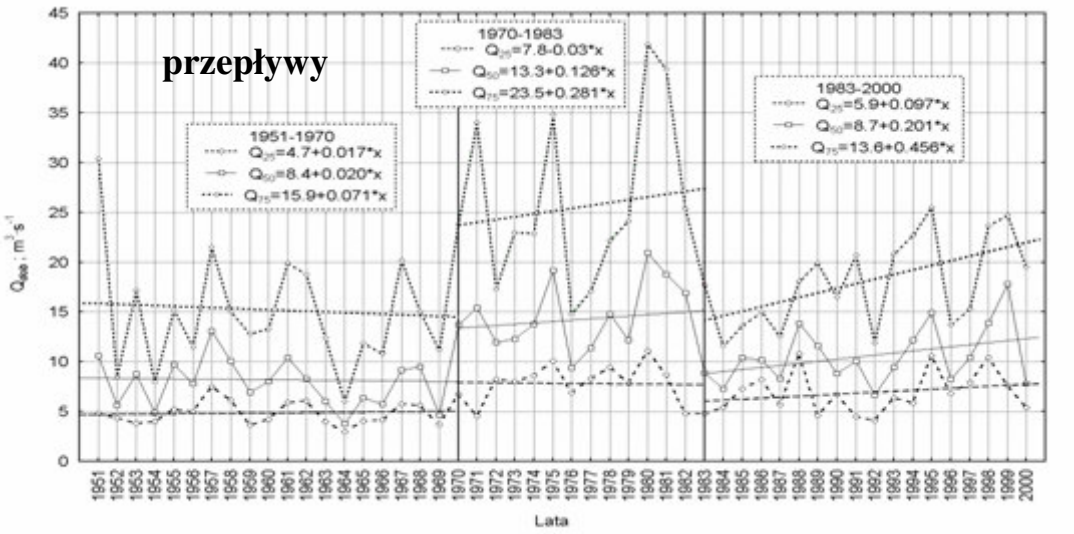
The cros-section in the Narew valley

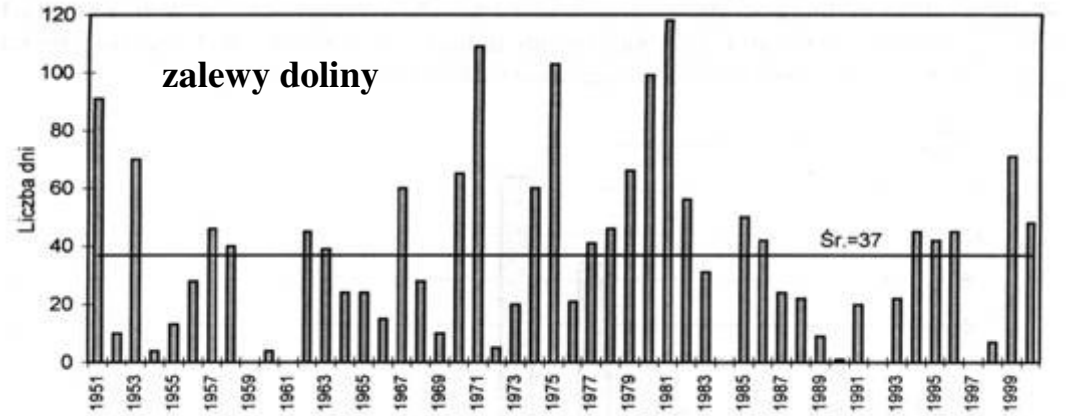
# 4. Analysis of river discharge

Analysis of water flow variability in the Narew is based on long term daily measurements of water stages at the water gauge Suraż (1951-2001)

1. Results of this analysis clearly show that, apart from maximum values, all analysed statistical characteristics of daily flows had an increasing tendency for the 50 years period
2. It is clearly visible that years 1969-1984 were extremely wet while recent period (1985-2000) was dry and similar to that of 1951-1964.
3. The number of days when flows are higher than the bankfull discharge for the channel cross-section at the Suraż gauge, were not changed during analysed period.

Analyses of water flow at the Suraż water gauge during the last 50 years do not allow to conclude on unfavourable long term trends in hydrological regime.

# 5. Climatic conditions

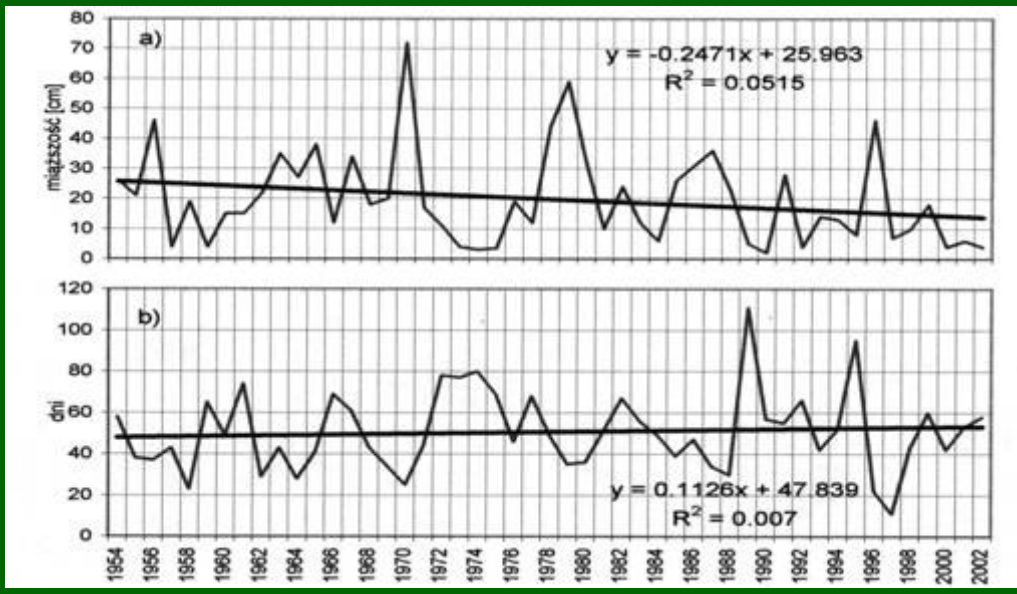
The thicknes of snow

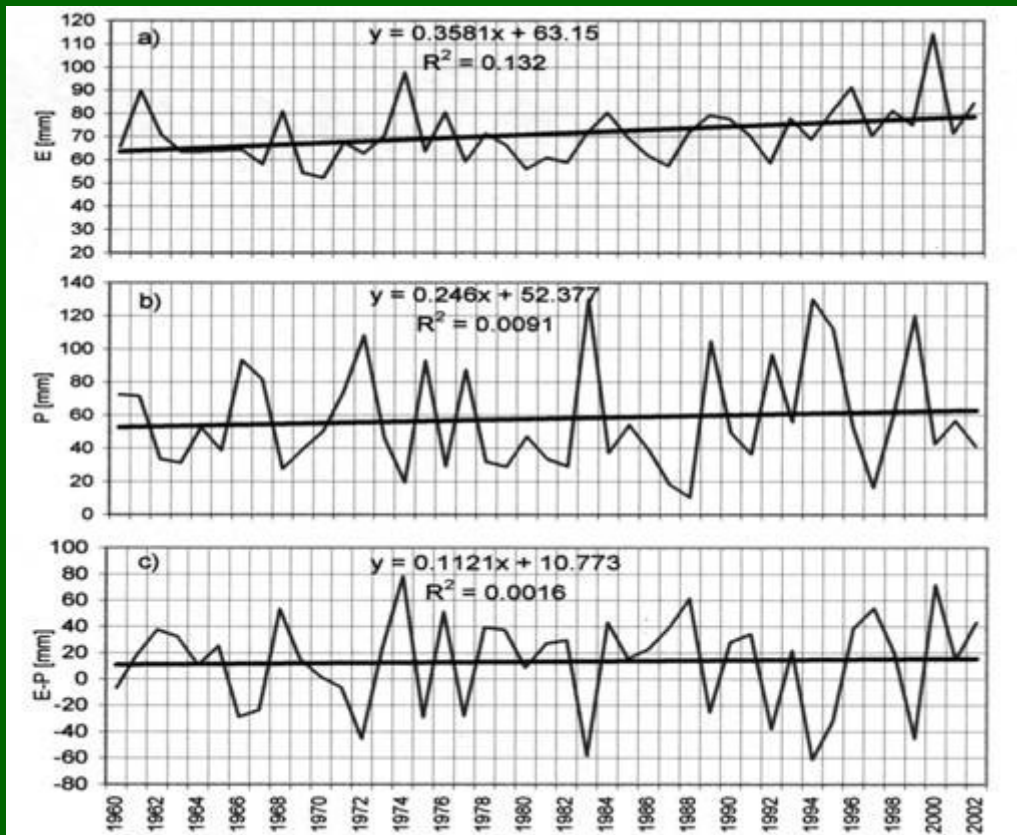
The number of days between the snow melt and the 1st of may

Calculated ewapotranspiration (E) in April

The rainfall (P) in April

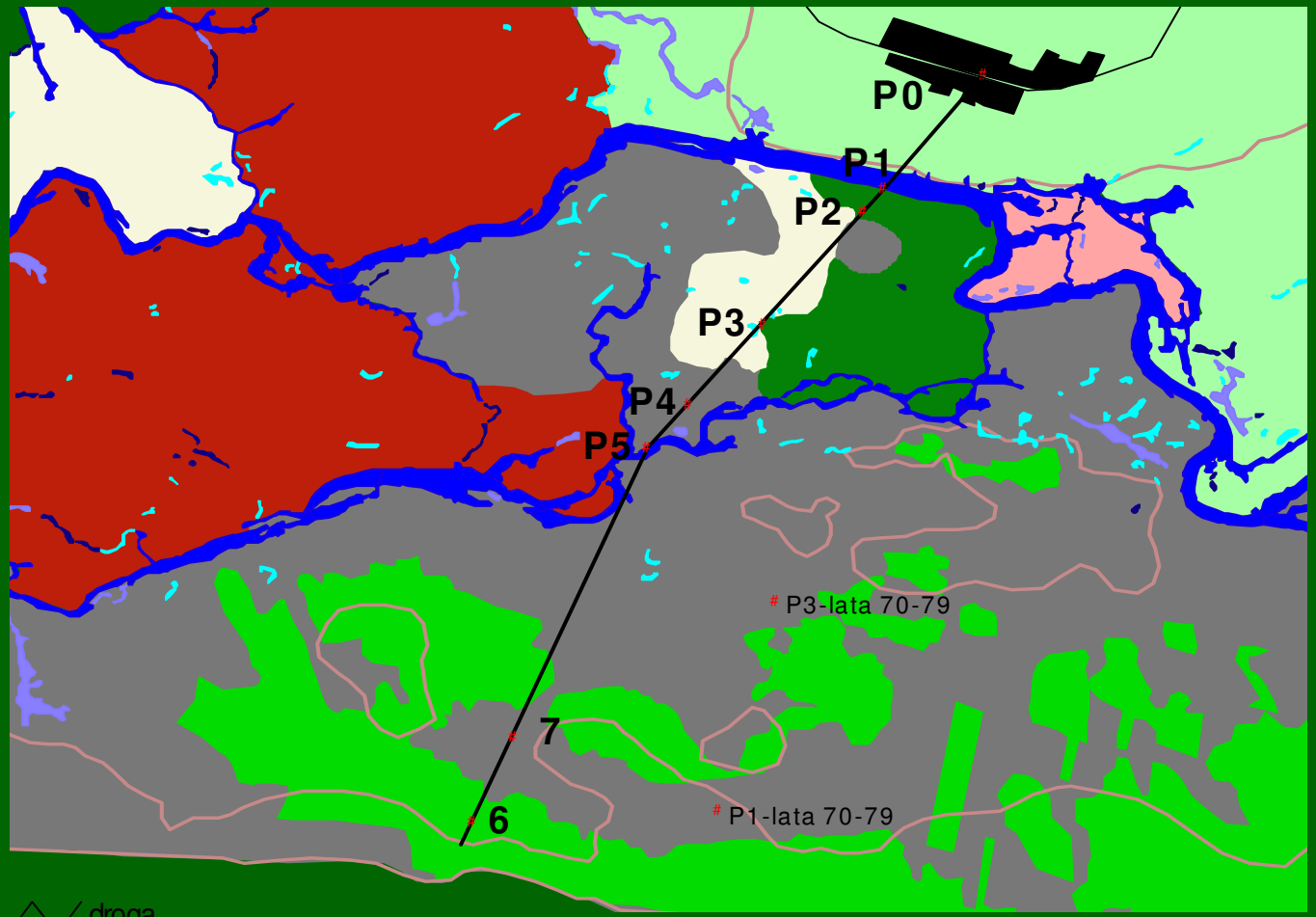
( E-P )



## 6. Fluctuation of groundwater level

**Detailed characteristics of the ground water variability in the valley is difficult because of a lack of long term measurements. The only periodical records of groundwater tables include those:**
**A - made by dr T. Churski (IMUZ) between 1969 and 1979 in several shallow wells twice a month during the whole year (including the period when the valley was flooded by spring waters);**
**B - made by the team of the Narew National Park since 2000 twice a month but only in the summer when the sampling point is accessible;**
**C - carried out during one and a half year in 2001-2002 with automatic pressure recording D-Diver station; records were taken four times a day, also during high flows.**




Rys.4.2. Zbiorowiska roślinne na przekroju pomiarowym Wólka Waniewska- Kolonia Topilec.

a prezentowanym przekroju odnotowano:

szuwar turzycy zaostrzonej *Caricetum gracilis*,

zbiorowiska turzycowe

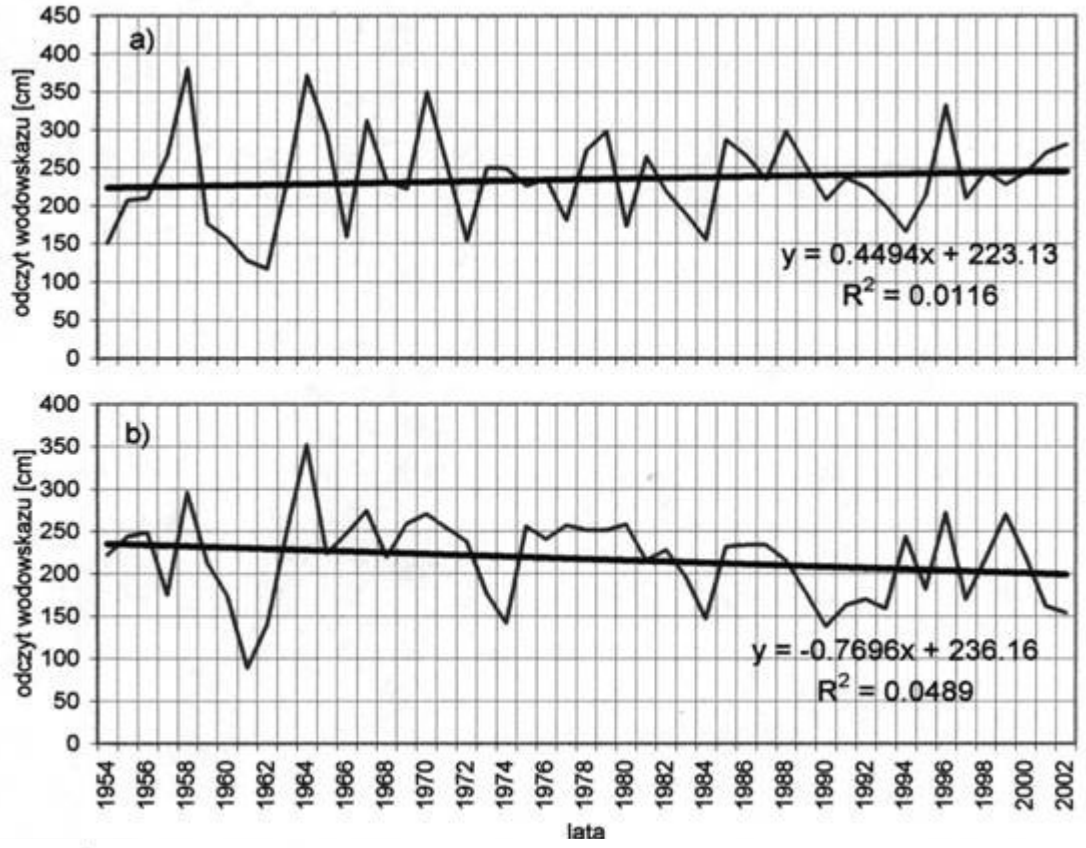
szuwar mozgi trzcinowatej

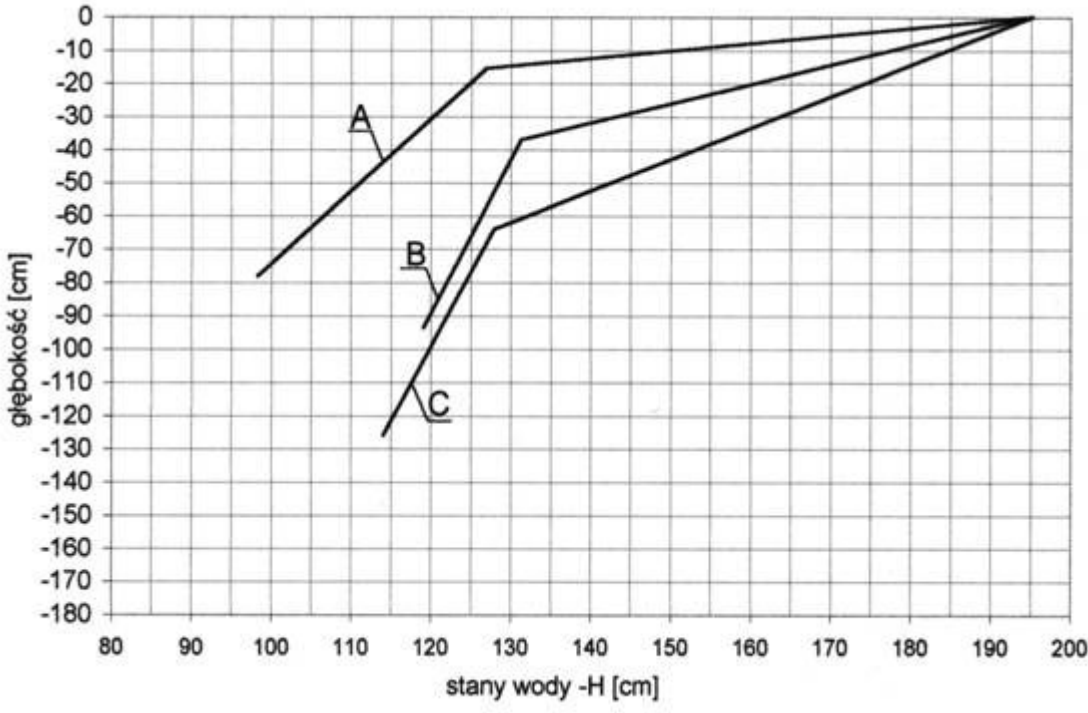
zbiorowiska z dominacją trzcinników,

The water level (Suraż gauge) at the day of snow disappearance

The water level in the first decade of May

The ralationship:
groundwater level vs the surface water level in the Narew river (Suraż)



## Conclusions

Observed transformations of vegetation and degradation of peat soils distinctly evidence for the proceeding dry up of the valley within the borders of the Narew National Park. Explaining the alteration of water relations is difficult since changes could have several reasons. Results of analyses demonstrate that water status of hydrogenic sites could be affected by:

- climatic changes in spring, particularly by the decrease of snow cover thickness and earlier disappearance of snow cover;
- increased evapotranspiration due to reed and shrub succession and greater soil fertility;
- decline of water level in the river due to limited growth of aquatic plants in the river channel that followed a decrease in water transparency;
- natural cyclic changes of water flows in the river (wet years 1969-1979), consequently water flows in the river were higher in those years and floods lasted longer than in the last 20 years or in years preceding the wet period.

River Narew during Spring


Pastures in the river valley (Topilec)