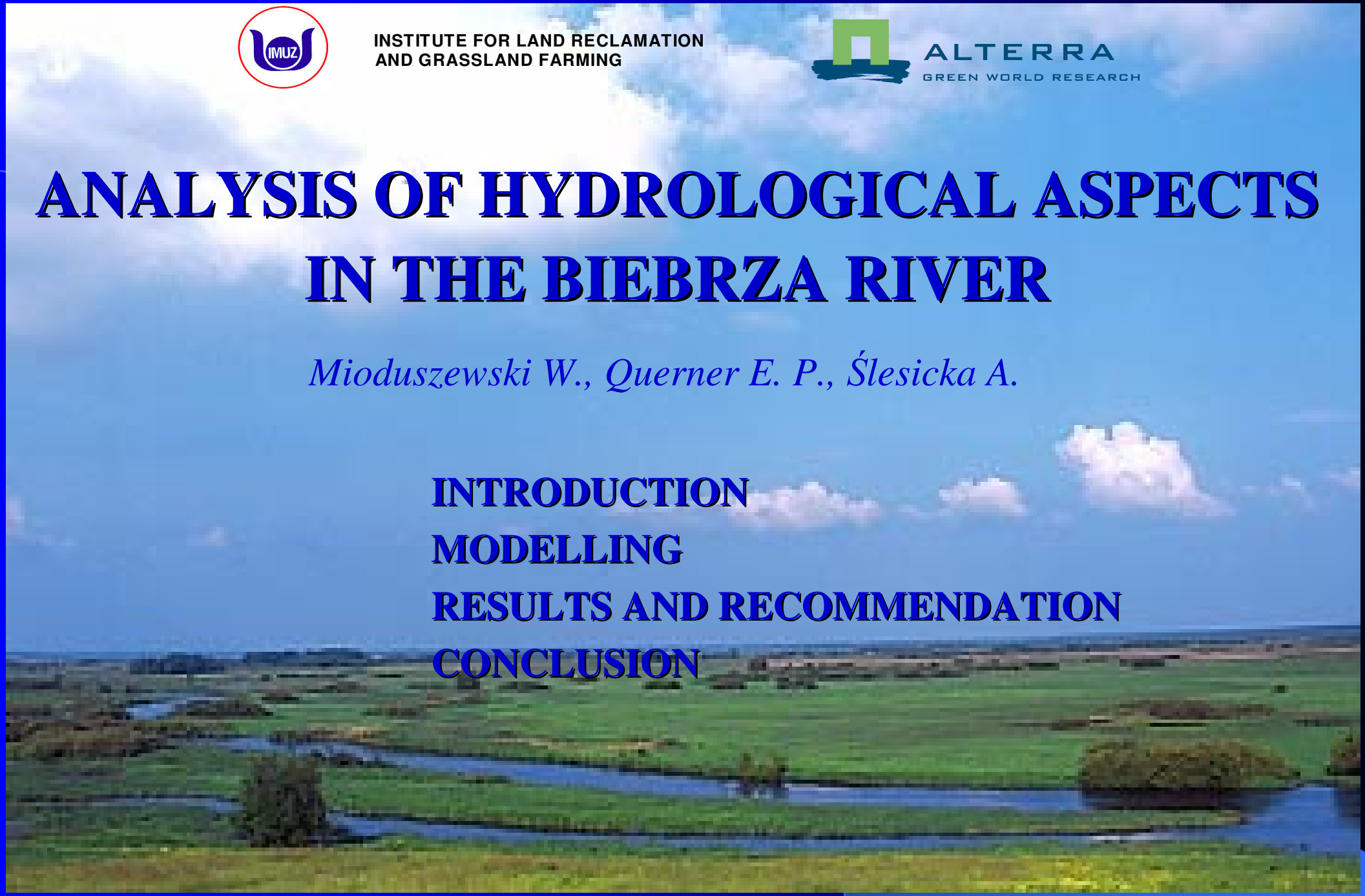


ANALYSIS OF HYDROLOGICAL ASPECTS IN THE BIEBRZA RIVER

Mioduszewski W., Querner E. P., Ślesicka A.

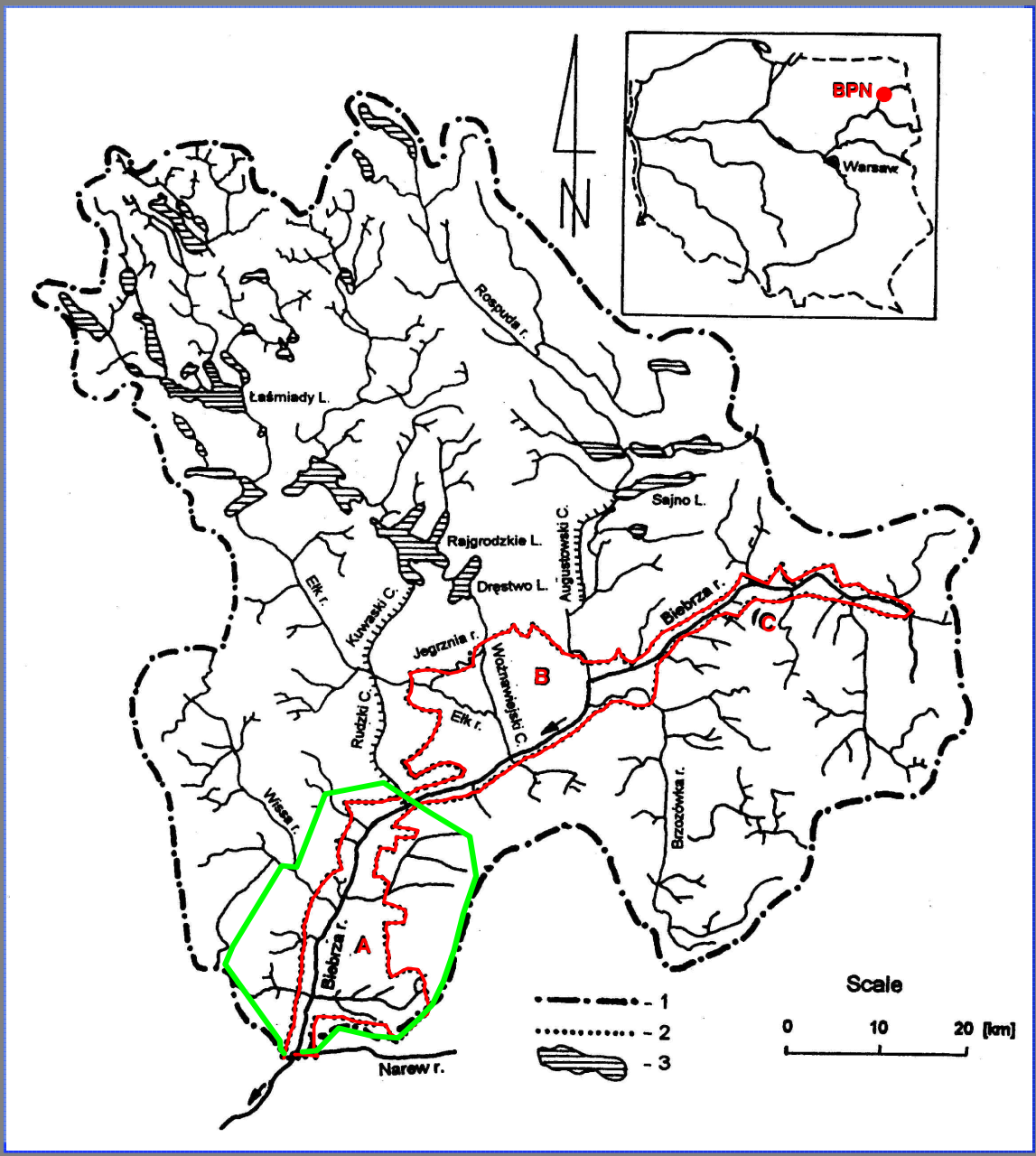
INTRODUCTION

MODELLING

RESULTS AND RECOMMENDATION

CONCLUSION

CATCHMENT OF THE BIEBRZA RIVER



1 – catchment border,

2 – borders of the Biebrza National Park,

3 – lakes,

A – lower basin

B – middle basin,

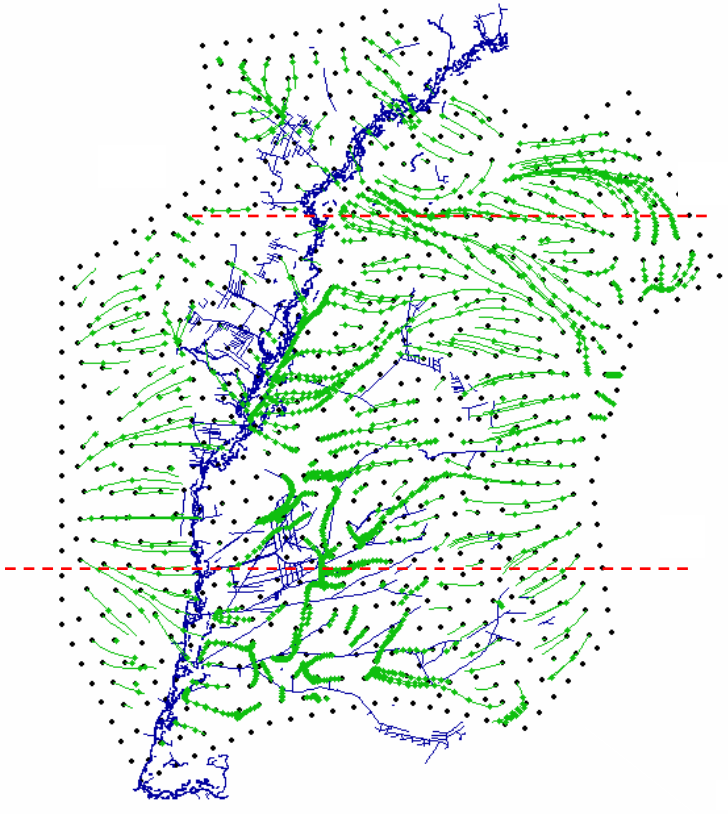
C – upper basin

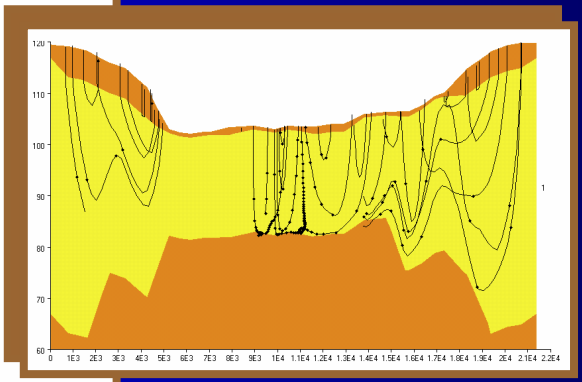
MODELLING

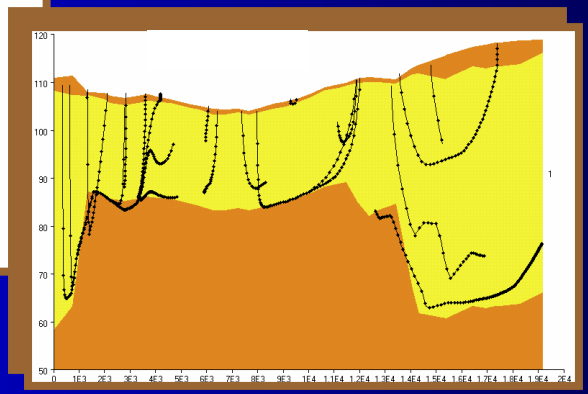
- regional model SIMGRO, which enables to calculate groundwater flow in the saturated and unsaturated zone with the consideration of the land use and to determine the origin of waters flowing into the valley.

- dimensional model FLOTRANS, which allowed to perform calculations of groundwater flow in saturated zone in the cross section perpendicular to the river valley.

GROUNDWATER SYSTEM IN THE BIEBRZA LOWER BASIN

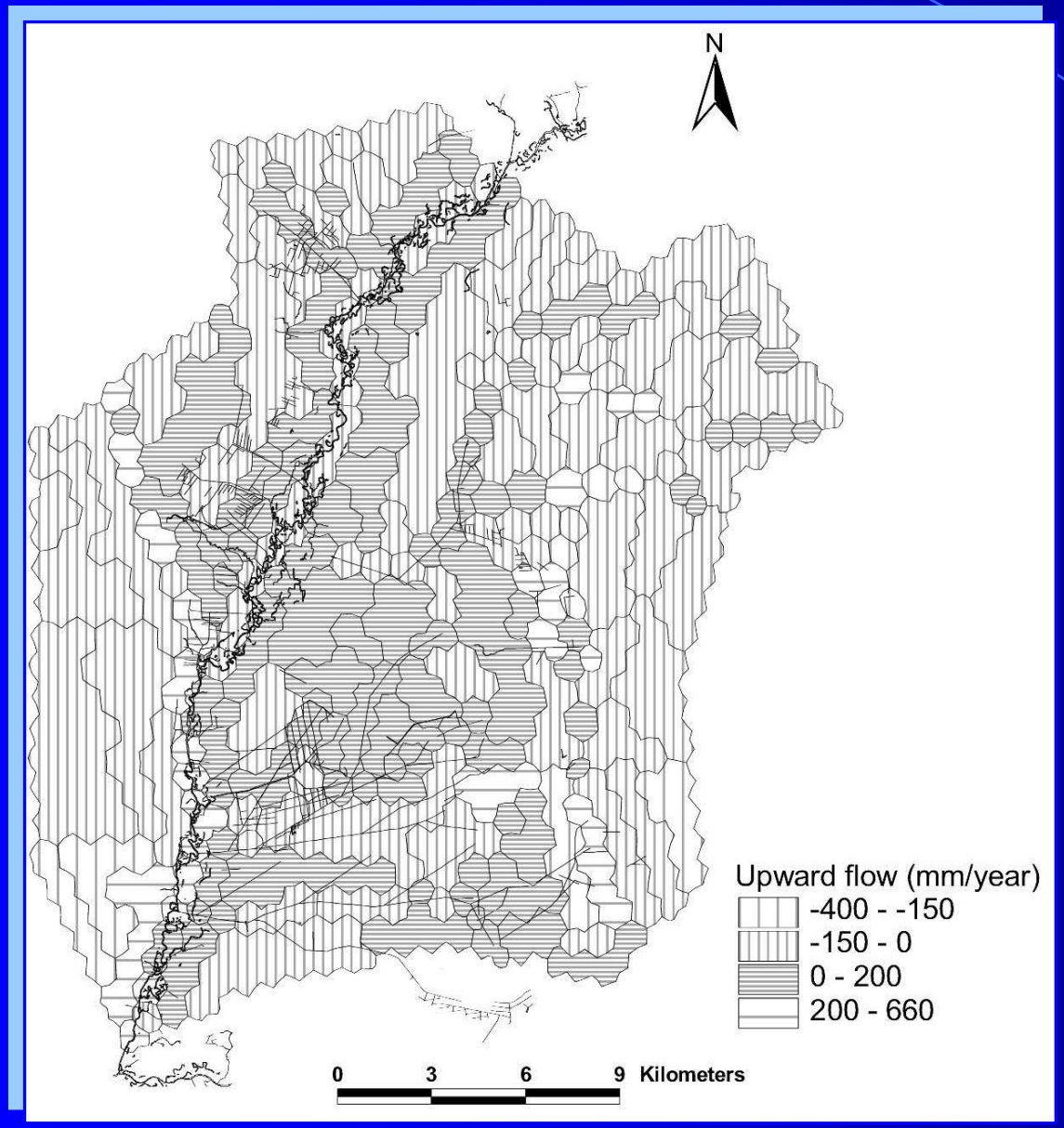






1 – flowlines,
2 – peat,
3 – sand,
4 – clay,
I,IV – cross-sectons

DISCHARGE AND RECHARGE AREAS



ZONING OF THE VALLEY

I – a zone immediately adjacent to the river The zone is under a strong impact of the Biebrza River.

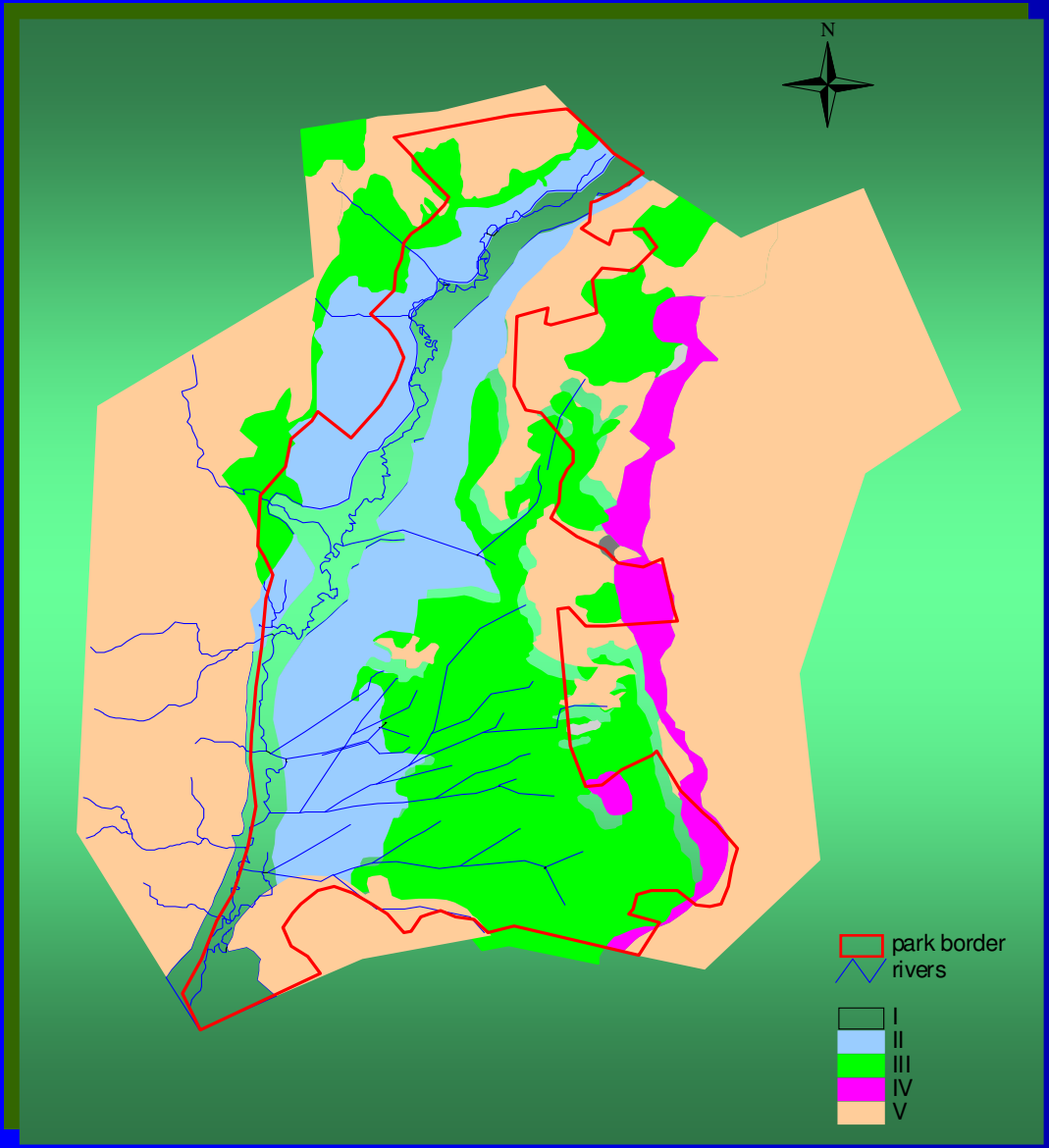
II – the central part of the valley and the moisture conditions in the topsoil, depends largely on spring floods. During growing season after flood period the ground water table depth depends mainly on evapotranspiration and on precipitation.

III – flood occur very rarely. Some inflow of groundwaters from the upland is observed.

IV – a zone stretching along the base of the upland escarpment. Zone fed mainly by groundwater flowing from the upland or dunes. Spring peat is present in some places and groundwater under pressure.

V – a zone of moraine upland and dunes. Groundwater is fed by rainfall. Zone V is of great importance for natural values of the Biebrza valley since water inflow from there is important for water content in zone III and IV and partly also in zone II.

THE ZONES OF DIFFERENT RECHARGES OF LOWER BIEBRZA VALLEY



RECOMMENDATIONS

- maintaining possibly high water stages in summer and long lasting floods in spring. Fulfilment of this condition depends largely on land management in the whole Biebrza catchment. Practically all water resources carried by the river come from outside of the Biebrza National Park,

  - restricting the outflow of water from spring floods by filling in or blocking the existing ditches and channels wherever it is possible and that it does not interfere with the present agricultural use in the area. Weirs could have a constant crest situated at a height of the surrounding grounds. These remarks refer to the outflow of both flood water resulting from high river stages and melt and rainfall water,

    - maintaining a maximum groundwater flow from the upland. The main prerequisite is to preserve present extensive farming on the upland. Afforestation of the area, plant cultures of higher water demand (higher evapotranspiration) or increased ground water uptake could possibly result in a decreased recharge of the aquifer and consequently, in a decline of the ground water table and water input to the Biebrza valley.

CONCLUSIONS

Water condition of the valley area depends on several natural factors, as follow:

- the magnitude of water flow in the river, very much connected to the regional spring–floods; the capacity and disposal of atmospheric precipitation;
- groundwater supply from the nearby uplands (moraine) or dunes but also depends on several antrophogenic factors as for instance the land use of lowland and upland;
- the water quality, existing hydrotechnical infrastructures etc.

THANK YOU

FOR YOUR ATTENTION