

# Evaluation of climate changes impact on the hydrological behaviour of the peaty mediums

## Application to the Haute Lesse-Ourthe area (Belgium).

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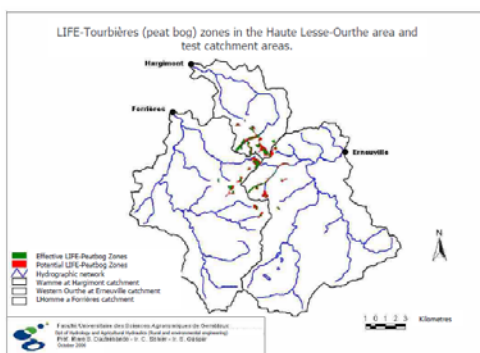


The peaty and wet mediums have a very important role to play in term of biodiversity conservation, hydrologic pattern regulation, fauna habitat and landscape value. In the Haute Lesse – Ourthe catchments (Saint-Hubert), numbers of these mediums were strongly modified by a drainage network. This drainage network was implemented to permit a forestry production focussed on the Spruce. It has severely disturbed the hydrological cycle.

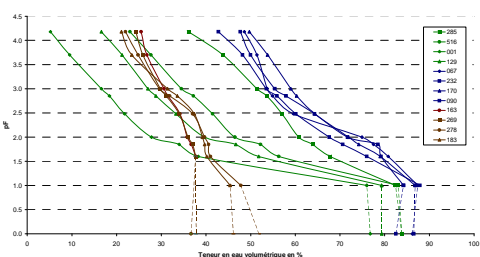
The study consists in modelling the impacts of restoration practices carried out notably within the framework of the LIFE European project on the hydrological behaviour of the peat bog. Then we modelled the effect of climate change.



### Peat bog in the Haute Lesse-Ourthe sub-basins



### Physical properties and retention curve of peaty materials

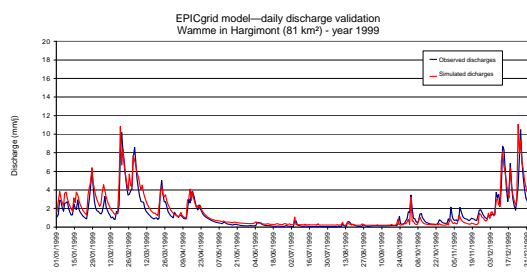


Physical properties and retention curve of peaty materials were characterized on the basis of undisturbed samples using the Richards' apparatus.

### Hydrological modelling

Calculations were carried out using the hydrological model EPICGrid (GxABT). EPICGrid is a physically based and distributed hydrological model. It runs at daily time step.

The model was initially validated on several reference catchments of the study zone.



Simulations highlighted the differences in physical and hydrous properties of the different peat types ("true" peat and "degraded" peat). Local and regional impacts of peat bogs restoration on their hydrological behaviour have been evaluated. Finally, simulations allowed us to evaluate climate change's impact on the hydrological behaviour of the peaty mediums. The model showed notably that future climatic conditions could generate severe droughts which can become critical in some situations.

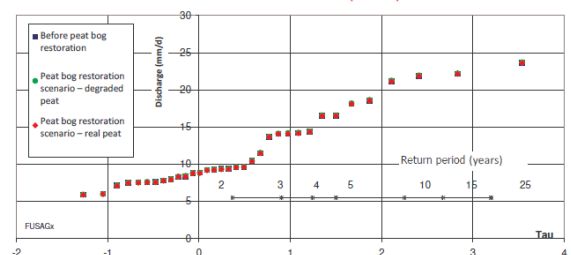
### Local impact of restoration measures on peat bog hydrology & Climate change effect

	Rain (mm)	Actual evapotranspiration (mm)	Direct runoff (mm)	interflow (mm)	Deep percolation (mm)
Drained conifers on degraded peat (intense drainage )	1117	625	191	0	301
Echam4 2070-2100	-9%	+12%	-18%		-44%
Non drained wetland on degraded peat	1117	482	86	0	548
Echam4 2070-2100	-9%	+7%	-75%		-13%
Non drained wetland on real peat	1117	541	3	1	571
Echam4 2070-2100	-9%	-4%	-79%		-14%

The positive effect of stopping artificial drainage of peat bogs can only be achieved if accompanied by a restoration of the physical properties of the peat and the entire peat bog system (wetland type vegetation—real peat subsoil—underlying clay—topography).

### Regional impact of restoration measures: extreme discharge analysis

EPICGrid model: Comparison of annual maxima of simulated daily discharges, displayed on a Gumbel graph, for different peat bog restoration scenarios – Western Ourthe in Erneuville (270km²)



On a regional level, the hydrological impact of the restoration of peat bogs is not worth considering because they covered such a small part of the surface area studied (1% of the catchments). A similar proportion applies to the proportion of peat bogs in the Meuse catchment area