

Watercourse rehabilitation : complementarity between morphology and water quality

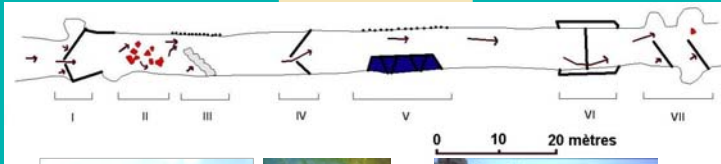
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Two rivers, regulated during the sixties, the Western River Ourthe and the River Semois, have been restored respectively in 1998 and in 2002-03. While the first has excellent water quality and higher slope (0.35%), the latter presents the less good restoration conditions with a bad water quality and low slope (0.05 to 0.15%). On the Ourthe River, the restoration consisted only into buildings in the bed between the limits of the straightened riverbanks. On the Semois River occurred a deeper restoration with the digging of new meanders.

River Ourthe

River Semois

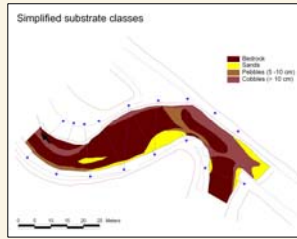


Morphologic diversity

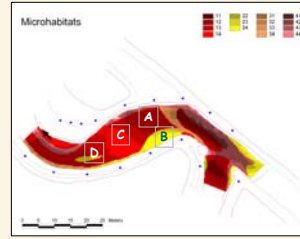
Habitats classification based on depth and substrate - Sample : 2th meander on Semois River



4 depth classes obtained from subtraction of riverbed DTM and low water level (~0,66 m³/s)



13 different substrate classes simplified into 4 main classes: majority of bedrock, sands, pebbles (5 - 10 cm), cobbles (> 10 cm).



Microhabitats obtained by depth and substrate classes crossing (4 x 4 = 16 theoretical classes). The four selected classes represent ~ 60% of the habitats.



Biological diversity

Macroinvertebrates

	Zone aménagée	Témoïn
Nbre taxa	34	26
IBGN	17	14
Indice Shannon	Diversité habitats 0,82	0,82
	Diversité faune 0,75	0,77

Presence of sensitive species : Leuctridae, Brachycentridae, Glossosomatidae...

The management did not allow to increase the variety of micro-habitats but brought a replacement of the zones of gravel by big blocks. The fitted out sector presents a fauna slightly more diversified with an IBGN superior, on the other hand Shannon index is similar to the sector witness because it's milieux of very good quality at first.

Samplings of macroinvertebrates aim at seeing if the management realized to increase the number of habitats had an impact on the diversity of the populations. For that reason we put in relation the type of substratum and the species diversity. Two approaches were led, the one qualitative, the other one semi-quantitative based on the biological features.

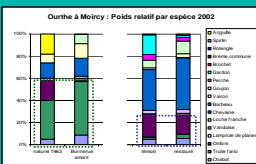


	Avant travaux 2001		Après travaux 2006		
	Lot 2	Lot 1	Témoïn	Lot 2	Lot 1
Nbre taxa	21 (1698)	18 (838)	22 (838)	21 (1185)	21 (571)
IBGN	9	8	7	7	6
Indice Shannon	1,84	1,97	2,50	1,88	2,01

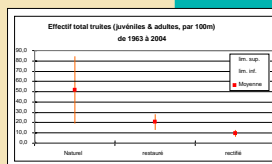
Indicator groups : Limnephilidae / Baetidae

The dominating factor is unquestionably the quality of the water with a deficit in oxygen connected to an average organic pollution which limits the colonization by sensitive species. It's difficult to show a difference in the community from rectified sectors without management and from improved sectors.

Fish populations

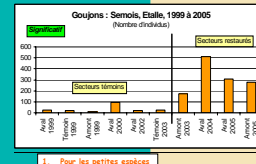


No perceptible difference for trout and associated species between restored and reference reach

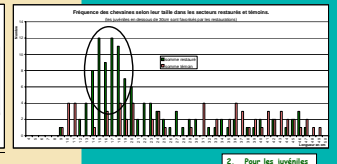


Slight difference (unsignificative) between natural and restored reach

Fish results rely on several electrofishing inventories performed before and after the restoration works or out in the restored areas. For the Ourthe river, 21 operations were carried out during 9 different years : 5 represent the natural situation, 7 the restored reaches and 9 the regulated unrestored areas.



1. Pour les petites espèces Leche, Chabot et Goujon



2. Pour les juvéniles de l'espèce Chevesne

For the Semois river, 12 operations were carried out during 6 different years : 6 before the restoration and 4 after it, the last 2 corresponding to non restored reaches after the restoration. Unfortunately, for this river no natural situation is available and due to the bad water quality, the best biological state can't be reached. Comparison with this excellent state is therefore impossible.

River modifications principally induced an habitat diversification. They created shallow and high velocities habitats. These, favourable to small fish raised the populations of small sized species and of juveniles of a larger one.

Conclusions

On River Ourthe, in spite of the good quality of water and good biological index, the physical management too timid did not allow to find the good fish state present somewhere else.

Water quality and physical quality aim separately and must be together to reach the good biological conditions of the river.

On the River Semois, although the bad quality of the water maintains the biological index very low, physical managements have a significant impact on fish populations (quantitative and qualitative)