Examination of soil and water quality along the Koppány Valley Habitat Rehabilitation Experimental Area

Centeri, Cs.[1], Vona, M.[2], Gelencsér, G.[3], Akác, A.[1], Szabó, B.[1]

[1]Szent István University, Inst. of Environmental and Landscape Management, Dept. of Nature Conservation and Landscape Ecology
H2103 Gödöllő, Páter K. u. 1., e-mail: Centeri.Csaba@kti.szie.hu
[2]Central Directorate for Water and Environment, H-1012 Budapest, Márvány u. 1/d
[3]Vox Vallis Development Association, H-7285 Törökkoppány, Kossuth L. u. 66.

Introduction

Landscape and land use change play an important role in the Koppány Creek Valley in Somogy County, Hungary (**Figure 1.**). Once, the area was characterized by large extent of forestland, peaty and swampy areas but these were almost totally altered, made them suitable for arable farming.

Materials and methods

During our research we compared the maps of the first three military surveys, covering an era of 1770 to 1870 and in addition, the Unified National Map from the end of the 20th century. Besides the analyses of the above mentioned maps, soil analyses were done on sloping and on flooded areas as well and water analyses on an experimental area, covering an approximately 2 km section of the Koppány Creek below Gerézdpuszta (Koppány Valley Habitat Rehabilitation Experimental Area). In addition to the chemical analyses, biota was also examined. Macrozoobenton was analysed and Saprobity Index was determined.

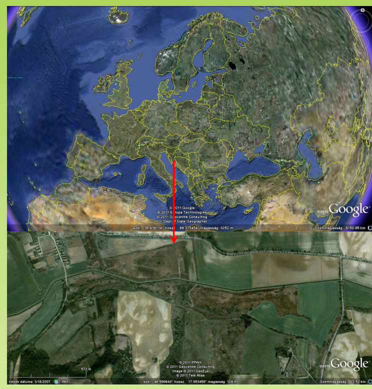

Figure 1. Situation of the Koppány Valley Experimental Area of Hungary in Europe (Source: Google Earth)

Results

Figure 2. Shallow soil in the Koppány Valley Experimental Area, Hungary

Comparison the soils of the forested and non-forested areas, we can state that overall water management capacity has suffered negative changes, including the change of infiltration and water holding capacity from good to bad. Brown forest soils disappeared on significantly large areas that are now covered by shallow, weakly humic soil types with a soil surface formed on loessy parent material or very close to and/or mixed with it (**Figure 2.**) while hillfoots suffer serious sedimentation (**Figure 3.**).
These changes in soil characteristics means more erosion, more runoff and soil loss, and at the bottom of the slope, more sediment accumulation. Shallow drillings proved the soils to be 160-240 cm, respectively. Compared with the thickness of the non-eroded soils it means 60-140cm sediment accumulation.
Water chemical analyses at the beginning, at the end of the experimental area and between the creek and a fishpond proved that – in average – the water quality after the fishpond is one class below the quality of the other two water sampling points.
Water quality class of the Koppány Creek at the Koppány Valley Habitat Rehabilitation Experimental Area was III. B. (less polluted) based on the analysis of the 298 individuals from 13 taxons, characterized by caddis-fly (*Hydropsyche angustipennis*) (**Figure 4-5.**). Saprobity Index proved the water to be a Hungarian average: ß-mesosaprob (S=2.05), water quality = Class II (good) (**Table 1.**).

Figure 3. Sedimented soil in the Koppány Valley Experimental Area, Hungary

Saprobity index evaluation
Sampling date: 30. June 2011.
Date of laboratory examination: 07. July 2011.
Origin of samples: Nágocs Creek, below fishponds

Species	h	si	G	h*G	S*G*h
Closterium acutum	5	2,5	3	15	37,5
Trachelomonas oblonga	1	2	5	5	10
Pediastrum duplex	2	2,4	3	6	14,4
Scenedesmus acuminatus	3	2	4	12	24
Oocystis lacustris	5	1,6	3	15	24
Tetraedron minimum	1	2	3	3	6
Tetraedron caudatum	1	2	3	3	6
Scenedesmus quadricauda	3	2,5	3	9	22,5
Pediastrum boryanum	2	2,4	3	6	14,4
Schroederia setigera	2	1,7	2	4	6,8
Coelastrum microporum	1	2	4	4	8
Scenedesmus ecornis	1	2,2	3	3	6,6
Pediastrum simplex	1	2,5	3	3	7,5
Aulacoseira granulata	1	2	4	4	8
Cryptomonas marssonii	5	1,6	3	15	24
Nitzschia acicularis	1	2,5	3	3	7,5
Monoraphidium contortum	1	2,2	1	1	2,2
Tetraedron trigonum	1	1,6	3	3	4,8
Total:		37,7	56	114	234,2
				S=	2,05
Result:	**S=**	**2,05**			
ß-mezosaprob					
Water quality class:	**II.**	**good**			

Table 1. Results of saprobity index calculations

Macrozoobenton examination report

Sampling site: Koppány Creek, Gerézdpuszta
Sampling date: 30. June 2011.
No. of sub-sample: 20

TAXON LIST

Taxon group / *Family (MMCP)* / Taxon name	observed individuals
Crustacea	
GAMMARIDAE (4)	
Gammarus roeselii	23
Diptera	
CHIRONOMIDAE (2)	
Chironomidae Gen. sp.	15
SIMULIIDAE (3)	
Simuliidae Gen. sp.	5
TABANIDAE (3)	
Tabanidae Gen. sp.	4
Ephemeroptera	
BAETIDAE (4)	
Baetidae Gen. sp.	7
Gastropoda	
VALVATIDAE	
Valvata naticina	21
BITHYNIIDAE (3)	
Bithynia leachii leachii	4
LYMNAEIDAE (3)	
Lymnaea peregra	3
Lymnaea auricularia	1
PLANORBIDAE (3)	
Planorbis planorbis	4
Odonata	
CALOPTERYGIDAE (4)	
Calopteryx splendens	2
PLATYCNEMIDIDAE (3)	
Platycnemis pennipes	1
Trichoptera	
HYDROPSYCHIDAE (5)	
Hydropsyche angustipennis	208

Water quality class: III. B.
Evaluation: less polluted

Figure 4. Macrozoobenton report of the upper part of the examined area (Gerézdpuszta, Hungary, 2011)

Macrozoobenton examination report

Sampling site: Koppány Creek, Somogydöröcske
Sampling date: 30. June 2011.
No. of sub-sample: 20

TAXON LIST

Taxoncsoport / *Family (MMCP)* / Taxon name	observed individuals
Araneae	
ARGYRONETIDAE ( )	
Argyroneta aquatica	1
Coleoptera	
DYTISCIDAE	
Platambus maculatus	1
Bivalvia	
SPHAERIIDAE (5)	
Pisidium sp.	3
Crustacea	
GAMMARIDAE (4)	
Gammarus roeselii	20
Diptera	
CHIRONOMIDAE (2)	
Chironomidae Gen. sp.	16
TABANIDAE (3)	
Tabanidae Gen. sp.	1
Ephemeroptera	
BAETIDAE (4)	
Baetidae Gen. sp.	1
Gastropoda	
VALVATIDAE	
Valvata naticina	11
BITHYNIIDAE (3)	
Bithynia leachii leachii	3
LYMNAEIDAE (3)	
Lymnaea peregra	7
PLANORBIDAE (3)	
Planorbis planorbis	2
Heteroptera	
CORIXIDAE (3)	
Hesperocorixa linnaei	1
GERRIDAE (4)	
Gerris sp.	2
NEPIDAE (4)	
Ranatra linearis	1
Nepa cinerea	4
Hirudinea	
ERPOBDELLIDAE (3)	
Erpobdella octoculata	2
Odonata	
CALOPTERYGIDAE (4)	
Calopteryx splendens	16
PLATYCNEMIDIDAE (3)	
Platycnemis pennipes	5
Oligochaeta	
[Kl:Oligochaeta] (1)	
Oligochaeta Gen. sp.	9
Trichoptera	
HYDROPSYCHIDAE (5)	
Hydropsyche angustipennis	2

Water quality class: III. A.
Evaluation: less polluted

Figure 5. Macrozoobenton report of the lower part of the examined area (Somogydöröcske, Hungary, 2011)

Conclusions

Based on our results we call attention on the importance of reforestation and on the rehabilitation of the former wetlands. Covering the erosion hotspots could greatly improve infiltration capacity of the soils, resulting less runoff erosion, less sediments, better water management. Furthermore, wetlands filter pollution arriving from agricultural lands and as habitats provide refuge for rare and protected species, floodplains provide protection functions against flooding, and furthermore it is important as landscape value. The reintroduction, rehabilitation and protection of naturally flooded and swampy areas would equally serve the increase of water quality, biodiversity and decrease of negative flooding effects.

SZIE Környezet- és Tájgazdálkodási Intézet

KOPPÁNYVÖLGYI Vidékfejlesztési Közhasznú Egyesület

VÖLGY HANGJA FEJLESZTÉSI TÁRSASÁG KHE