



Ecological state of the Lake Durowskie during restoration measures

Milton Avalos
Tesfalem Getahun Belihu
Jasmina Sargac

Supervisors: **Mr Sc Piotr Domek**
PhD Piotr Klimaszuk

LAKE DUROWSKIE - current state and problematic

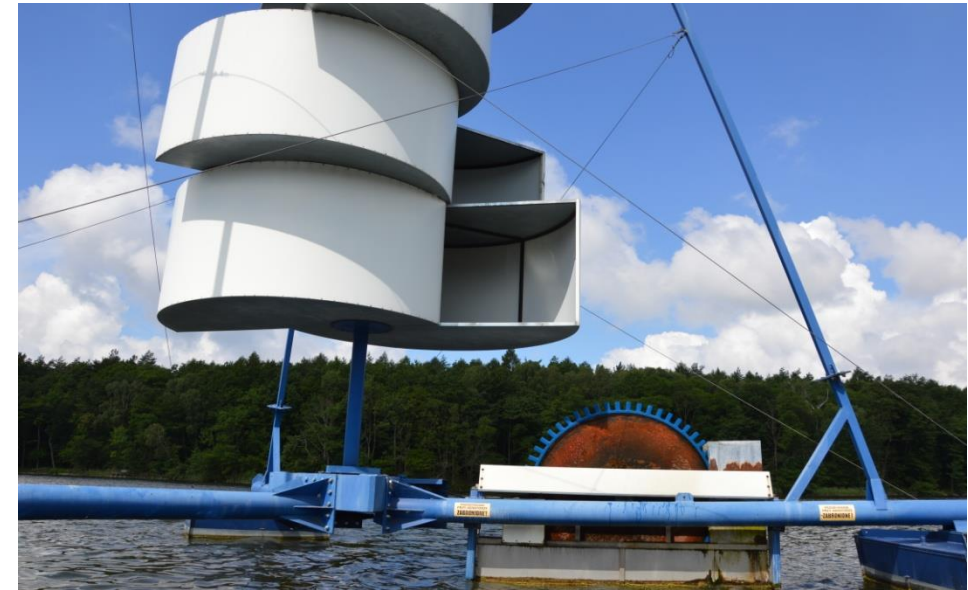
- increased income of nutrients
 - changes in the littoral zone due to human activities (fishing, recreation zones...)
- eutrophication of the lake and decrease of water quality

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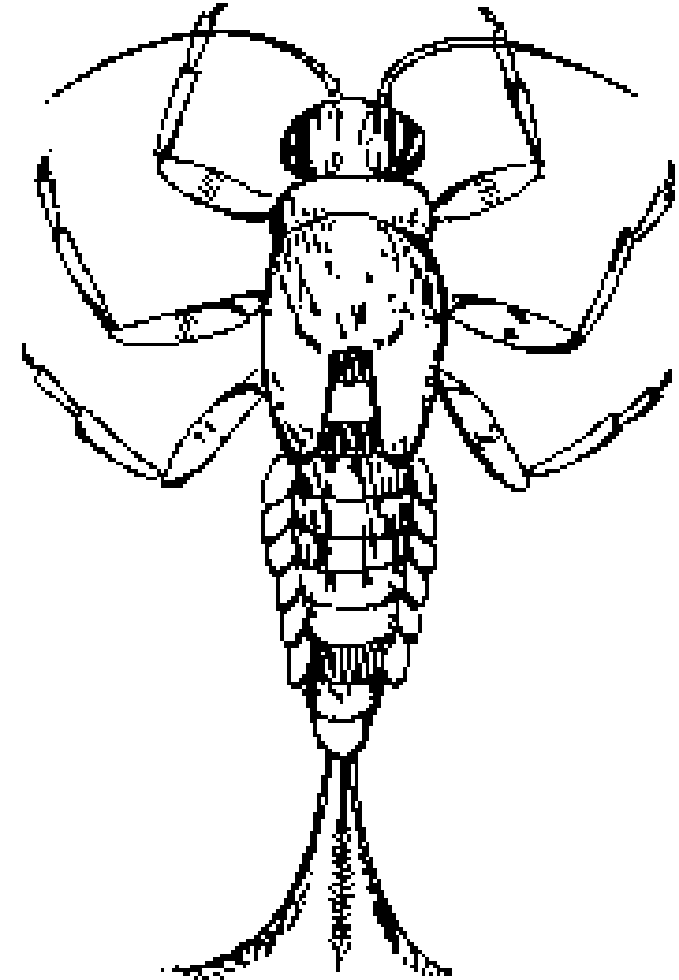
Restoration measurements since 2008

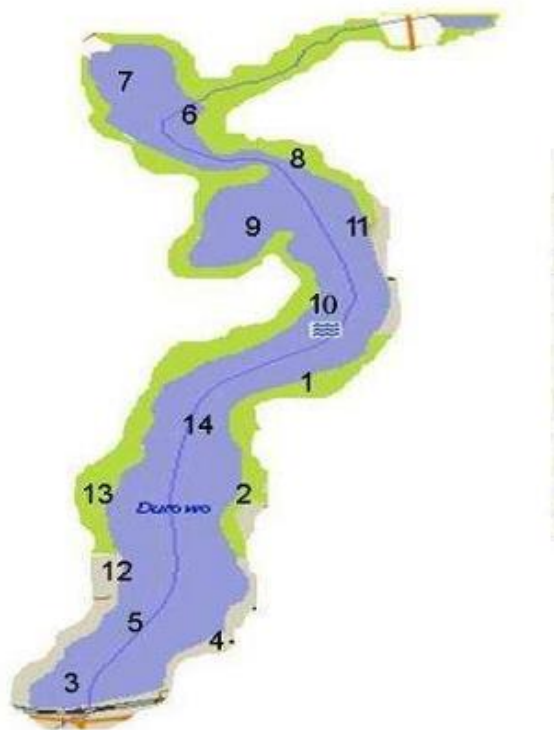
- ✓ 2 aerators
- ✓ Chemical treatment
- ✓ Biomanipulation



Macroinvertebrates → **bioindicators**

- ✓ live in water for all or most of their life
- ✓ stay in areas suitable for their survival
- ✓ limited mobility - easy to collect
- ✓ good indicators of localized conditions





Durowskie Lake

Surface area: 143,7 ha
 Max depth: 14,6 m
 Mean depth: 7,9 m
 Main tributary: Struga Gołaniecka River
 Catchment area: 236,1 km²

Sites	Description
1 Littoral	Reed near forest cover
2 Littoral	Near urban area
3 Profundal	Near dam
4 Littoral	Near urban area
5 Profundal	(Aerator 1)
6 Profundal	
7 Littoral	
8 Littoral	Littoral
9 Profundal	Profundal
10 Profundal	(Aerator 2)
11 Littoral	With reed
12 Littoral	Near urban area
13 Littoral	Reed near forest cover
14 Profundal	



“Czapla” sampler



“Kajak” sampler



- ✓ Sampling of sediments and organisms
- ✓ Sieving of sediment samples
- ✓ Laboratory work (taxa categories, weighting, species identification)

Introduction

Material & Methods

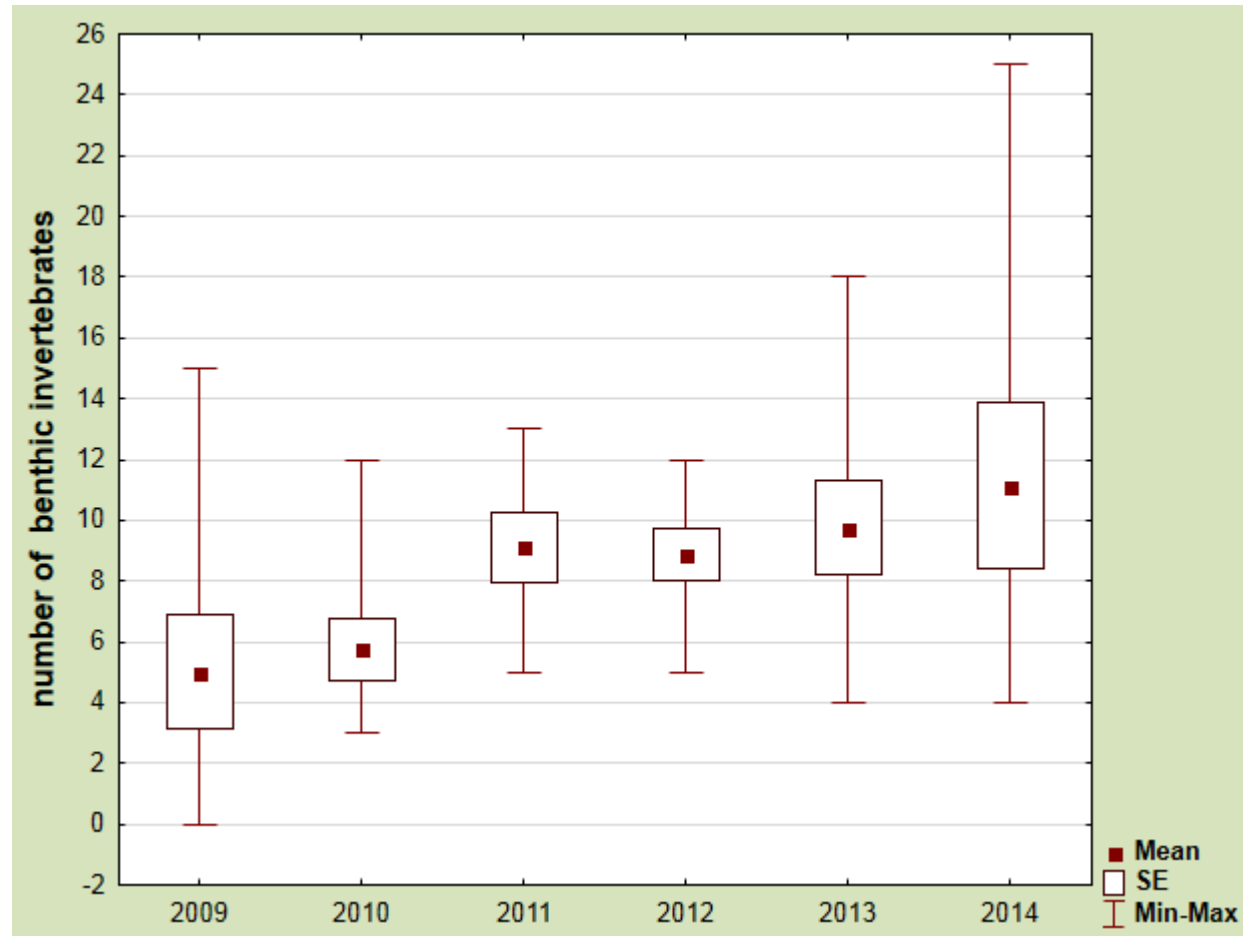
Results & Discussion

Conclusions



Taxon S	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Plathelminthes														
Tricladida				+										
Nematoda							+							
Hirudinea:														
Erpobdella octooculata (L.)				+										
Glossiphonia complanata (L.)				+										
Helobdella stagnalis (L.)		+		+			+				+			
Hemiclepsis marginata (O.F. Müller)		+		+								+		
Piscicola geometria (L.)											+			
Oligochaeta		+		+			+					+		
Bivalvia:														
Anodonta anatina (L.)		+		+			+				+			
Unio pictorum (L.) +	+													
Unio tumidus (L.) + + + +	+						+						+	
Pisidium sp		+		+							+			
Gastropoda:														
Bitynia tentaculata (L.) +	+	+		+			+				+			
Lymnaea peregra							+							
Potamopyrgus antipodarum (E.A. Smith)							+						+	
Theodoxus fluviatilis (L.)		+		+										
Viviparus contectus (Millet) +				+			+							
Valvata piscinalis (O.F. Muller)		+												
Isopoda:														
Asselus aquaticus (L.)		+		+										
Megaloptera:														
Sialis lutaria (L.)				+										
Sialis fuliginosa Pictet				+										
Coleoptera														
Hydroporus sp.	+													
Ephemeroptera:														
Caenidae	+	+		+			+	+			+	+	+	
Beatidae		+		+										
Odonata:														
Coenagrionidae		+		+										
Cordulidae							+							
Lestidae				+										
Trichoptera														
Apatania sp		+		+				+						
Trichoptera sp		+		+			+				+			
Ceratopogonidae				+			+	+						
Chaoboridae:														
Chaoborus flavicans (Meig.)			+		+	+			+	+				+
pupae of Chaoborus sp.					+		+			+				
Chironomidae														
Larvae	+	+		+			+	+	+		+	+	+	
Pupa		+		+									+	
Hydracarina														
Hydrachna sp		+		+							+			
Hydracarina		+		+			+	+			+			
TOTAL TAXA PER SITE	6	18		25			16	5			10	4	5	

Number of benthic invertebrates in Durowskie Lake

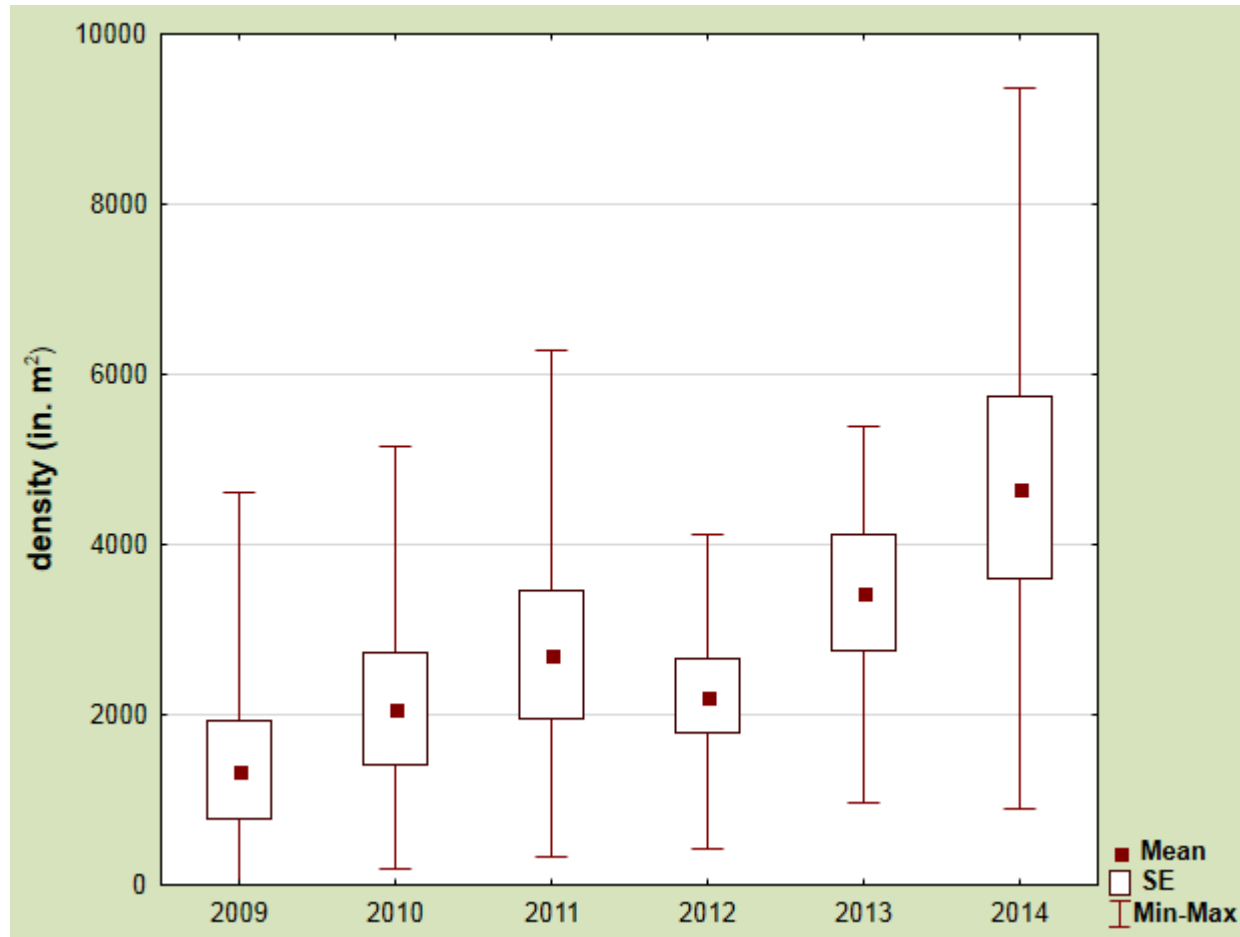


Possible trend of increase in the number of benthic taxa in the last 5 years

Site 4 (urban area of littoral zone) showed the highest diversity

Only littoral sites considered

Species density in Durowskie Lake

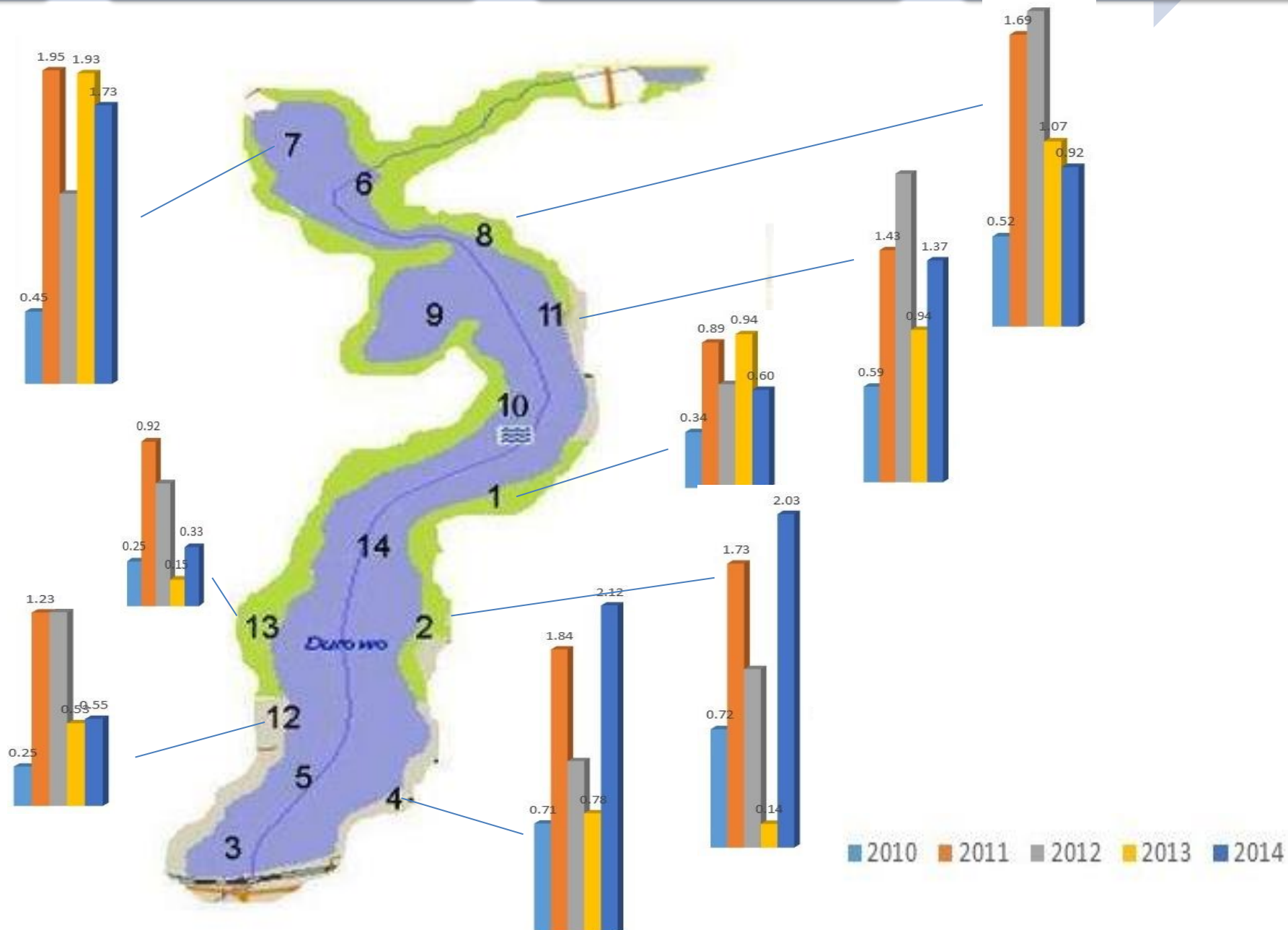


Species density support the trend of increase in macroinvertebrate biodiversity

Shannon-Wiener Index

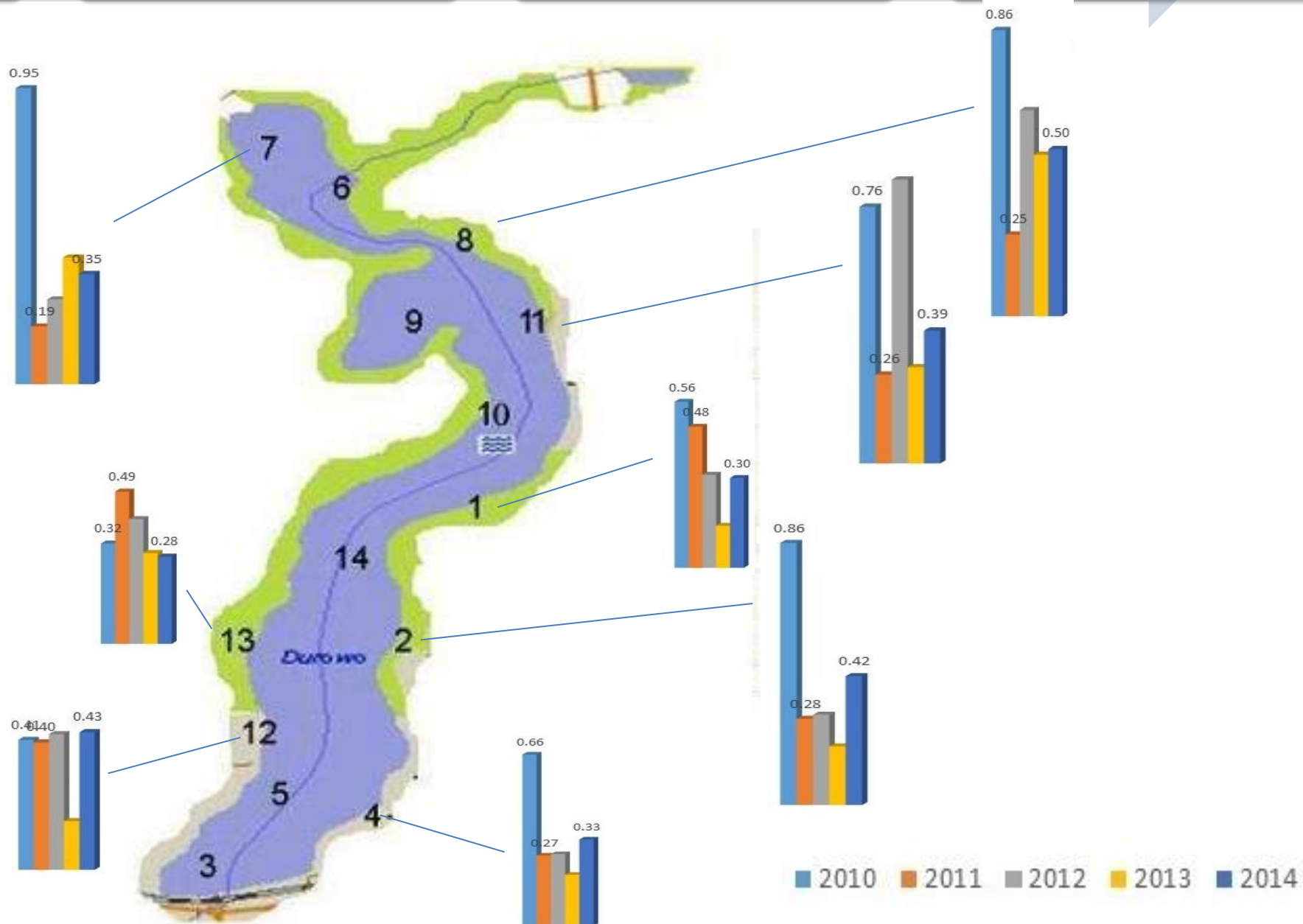
All sites except 1, 7 and 8 show an increase in biodiversity compared to 2013

Highest concentration of biodiversity is found in stations 2, 4, 7 and 11



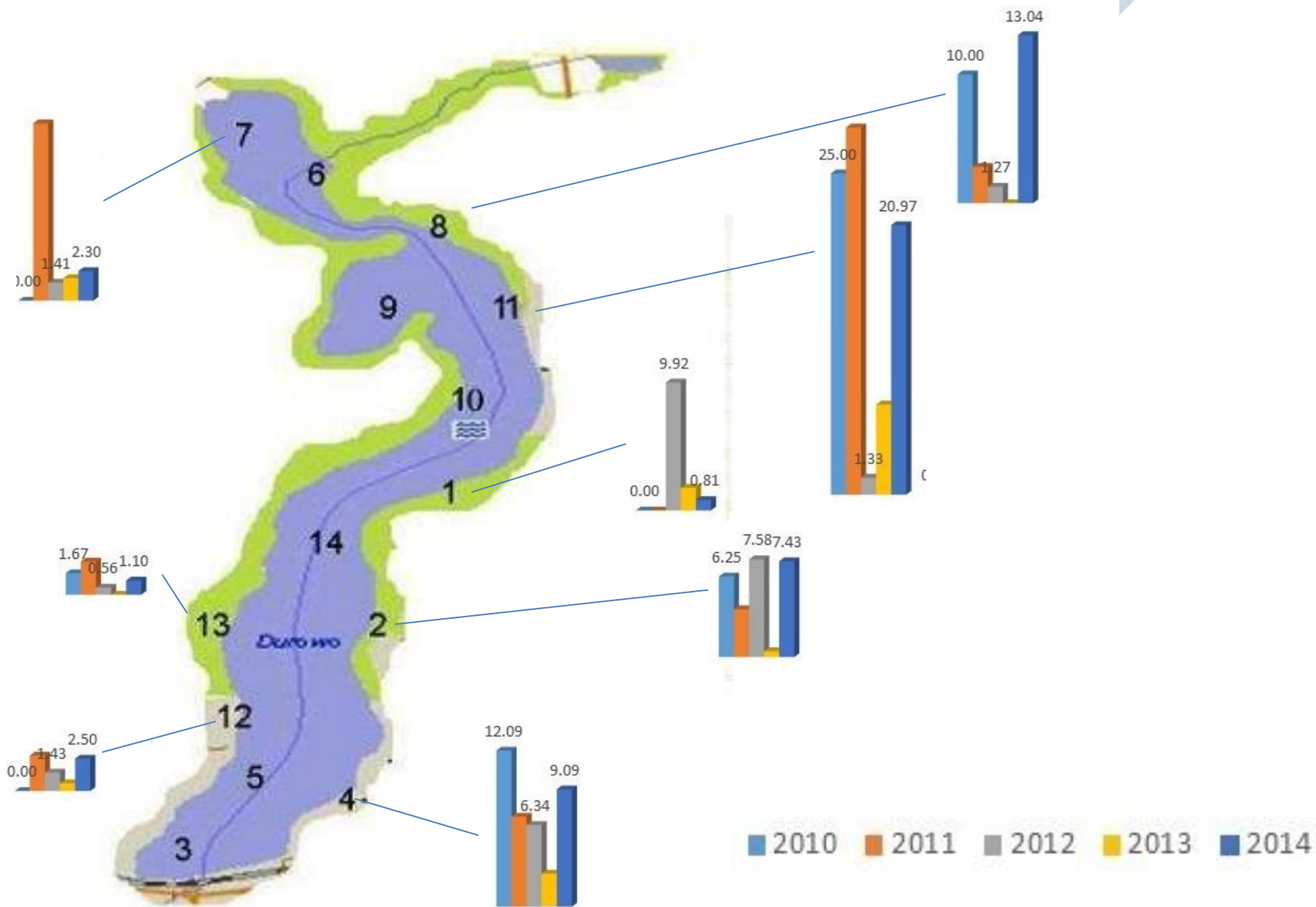
Species Evenness

Diversity seems quite low in site 8
BUT
it is the most even community in quantities of species (forest cover and macrophytes)

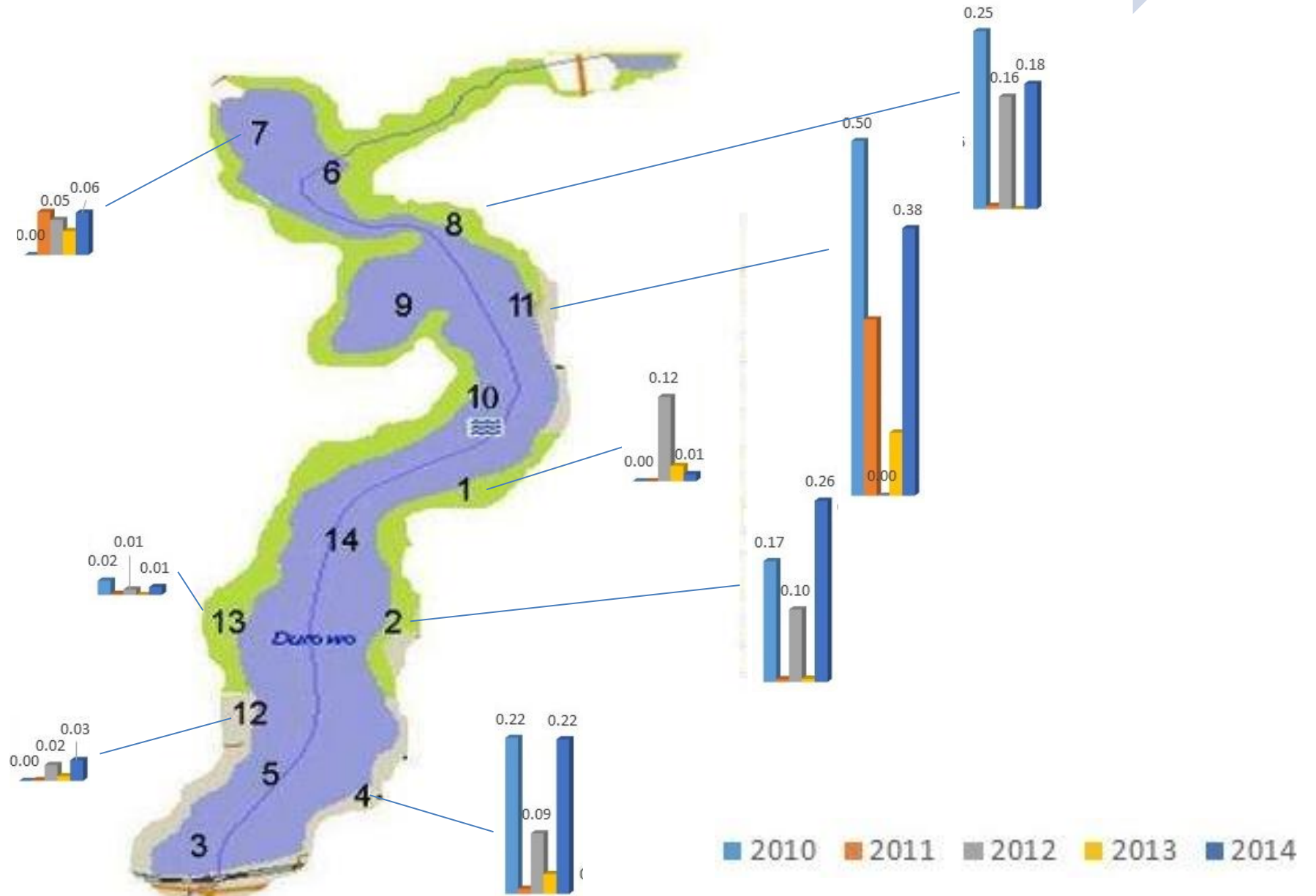


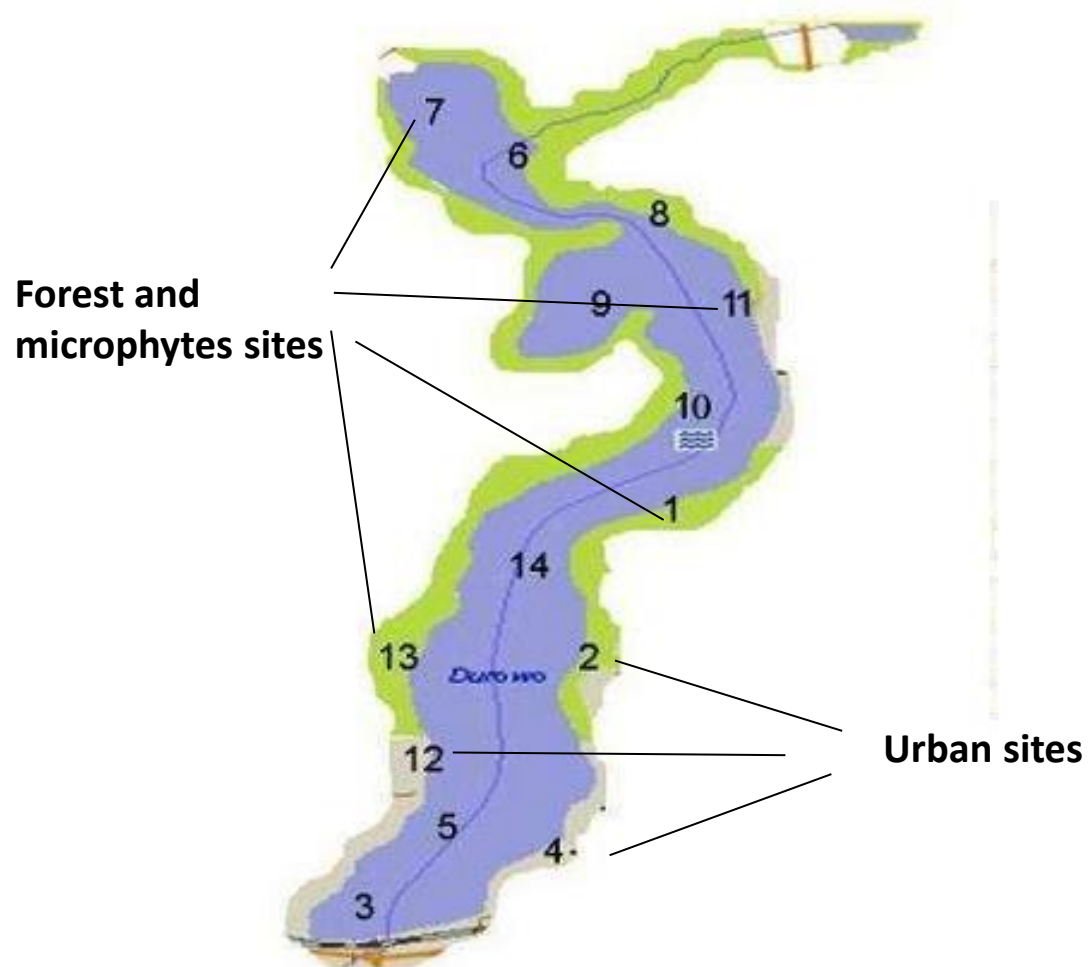
EPT %

High values in station 2, 4.8 and 11. However, station 1, 7, 12 and 13 show low values, indicating a relative decrease in water quality in these areas.



EPT Chironomidae





- Taxa number has steadily increased in the last five years. 2014 showed a record with 34 taxa groups, some new like Coleoptera
- Urban sites (2, 4) have the highest diversity (but many species are indicators of altered environment). Second site with highest was forest with macrophytes (7, 11)
- Overall the very low values of EPT in some sites (1, 7, 12, 13) are alarming. It is necessary to identify main causes (proximity to inflow or urban areas)
- The various indexes reflect an improvement compared to 2013, but it is also important to consider the long term goals



THANK YOU FOR YOUR ATTENTION