

Assessment of the impact of anthropogenic pollution and seasonal variation on the quality of surface water in the ZAT river, Tensift basin, Morocco

Introduction

River water quality fluctuates from source to downstream as a result of anthropogenic water pollution, which can be caused by point source discharges (such as industrial or urban wastewater) or diffuse loads (such as agricultural discharges), combined with the influence of variables like temperature and water flow. This study investigates the effects of seasonal and geographic flow variations, anthropogenic pollution, and water quality on the ZAT River in Morocco. The weighted index (WI), is used to establish the chemical assessment of water quality. Moreover, the Iberian Biological Monitoring Working Group's biological index IBMWP is used to evaluate water quality.

Objective

- 1) Experimental monitoring to evaluate the physicochemical and biotic quality of the rivers in the ZAT catchment basin.
- 2) Study the effects of anthropogenic pollution and flow-related temporal and geographical changes on the quality of surface water.

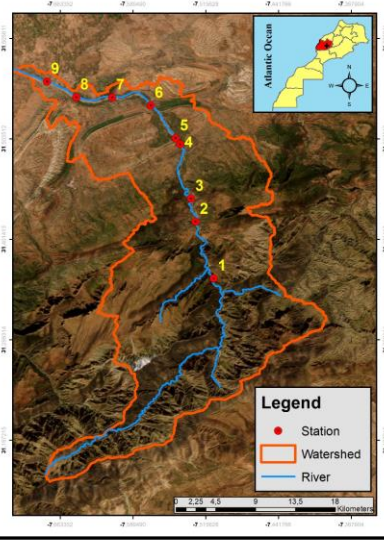


Figure 1: Geographic location of the studied stations (S1 to S9), ZAT River, Morocco.

Results

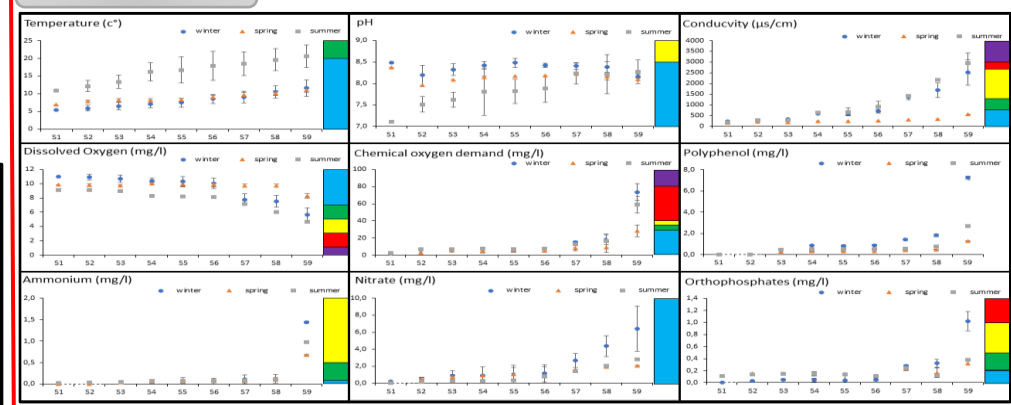


Figure 2: Results of the monitoring of the Physicochemical quality of the river of the ZAT

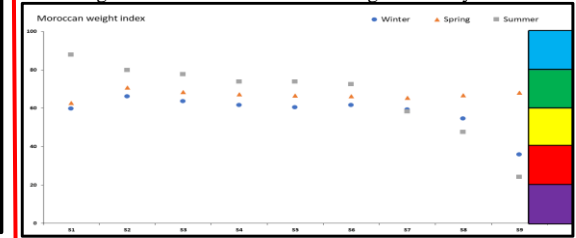


Figure 3: Values of Weighted Index recorded at the ZAT sub-basin stations

Table 1: Taxonomic richness of the study stations (S1 to S9) in Oued ZAT, Morocco during the two study periods.

			Sampling period																			
			January (Winter)									June (Summer)										
Classes	Ordres	Familles	S1	S2	S3	S4	S5	S6	S7	S8	S9	S1	S2	S3	S4	S5	S6	S7	S8	S9		
macroinvertebrate	Ephemeroptera	Baetidae	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
		Caenidae	+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	
		Heptageniidae	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Insecta	Diptera	Simuliidae	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		Chironomidae	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		Limoniidae											+	+	+	+					+	
		Tabanidae	+										+									
Trichoptera	Hydropsychidae	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
	Psychomyiidae											+										
Mollusca	Gasteropodes	Planorbidae										+										
		Lymnaeidae											+				+					
Tubularia	Tricladida	Planariidae									+											
Arachnida	Hydracarina	Hydracarina	+	+	+						+	+	+	+	+	+	+	+	+	+	+	

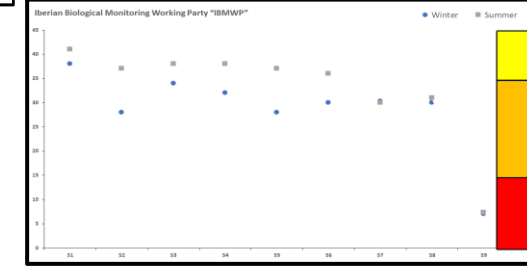
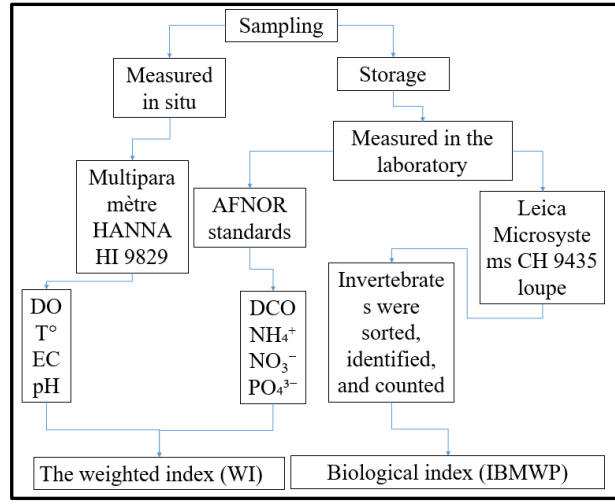


Figure 4: Values of the IBMWP index for the stations studied, in Oued ZAT, Morocco

Methodology



Discussion

According to the weighted index, the water quality is good to medium from points 1 to 7. But the quality is bad in the point 9. There were high concentrations of pollutants recorded between stations 7 and 9, especially in station 9 due to high anthropogenic contamination, and low flow. There is low biological biodiversity represented only by 11 families in the valley during winter and 13 in summer. The valley dried out before winter due to climatic conditions which impact its natural richness. During the summer, two more families emerge in the area, showing restoration of the biodiversity may be related to higher water flow. However, only two families are found in station 9 in both seasons, confirming the low chemical quality described by the weighted index.

Conclusions

This study was carried out during a 6-month monitoring period (winter, spring, and summer of 2021), to evaluate the water quality and the ecological status of the ZAT River at 9 sampling points alongside the watershed. The results indicated that Anthropogenic contamination and the variables like temperature and water flow are variables impacting the worsening of water quality in the summer. This is highlighted by stations 7, 8, and 9, which had high concentrations of pollutants compared to the other stations. The results also showed that urban pollution significantly impacts water quality degradation, which is highlighted at station 9.