Preliminary assessment of macro and trace elements in marine fish from Greece

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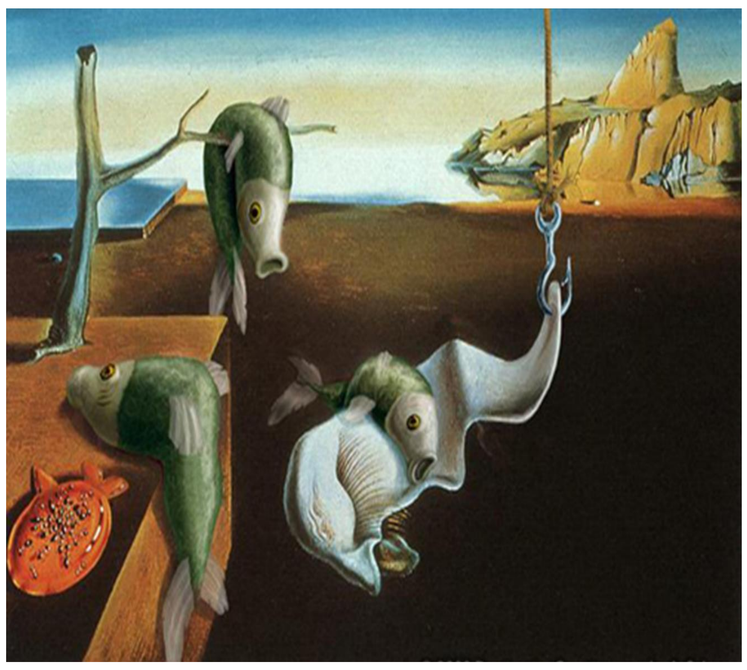
Why marine fish?



- Anthropogenic activities have led to increased heavy metals' emission and accumulation in the aquatic environment, including fish.
- The occurrence of toxic elements in fish has been a serious health threat for both aquatic organisms and humans.

Why Thermaikos gulf?

- Thermaikos gulf is a semi-closed shallow gulf in the northwestern Aegean Sea, characterized by intense activities taking place at its coastal area.
- Thermaikos gulf is also one of the major fishing grounds of Mediterranean Sea. Thus, the occurrence of toxic pollutants in aquatic organisms can provoke great health risks to the consumers.

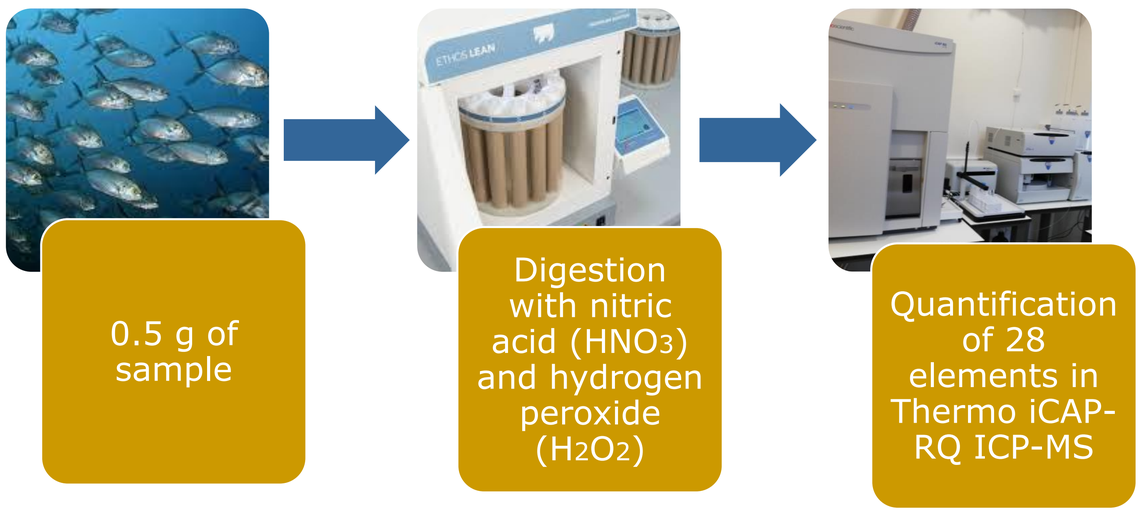
The problem

- Certain elements, such as heavy metals are characterized by high toxicity and carcinogenicity, even at very low concentrations.
- Toxic elements have been already detected in the aquatic ecosystem.
- Heavy metals have been listed in United States Environmental Protection Authority (USEPA) based on their potential for human exposure and health risks.

Concerns about the potential health effects in humans and aquatic organisms

Sampling and analysis

- Ten fish samples (*D.labrax* and *S.solea*) collected from Thermaikos Gulf.



Results

- Macro elements (Mg, Na, Ca, P and K) had the highest detected concentrations (average C: 324.1 - 40669.6 mg/kg), followed by the trace elements Sr, Fe, Zn, Al and Mn (average C: 22.0 to 170.6 mg/kg).

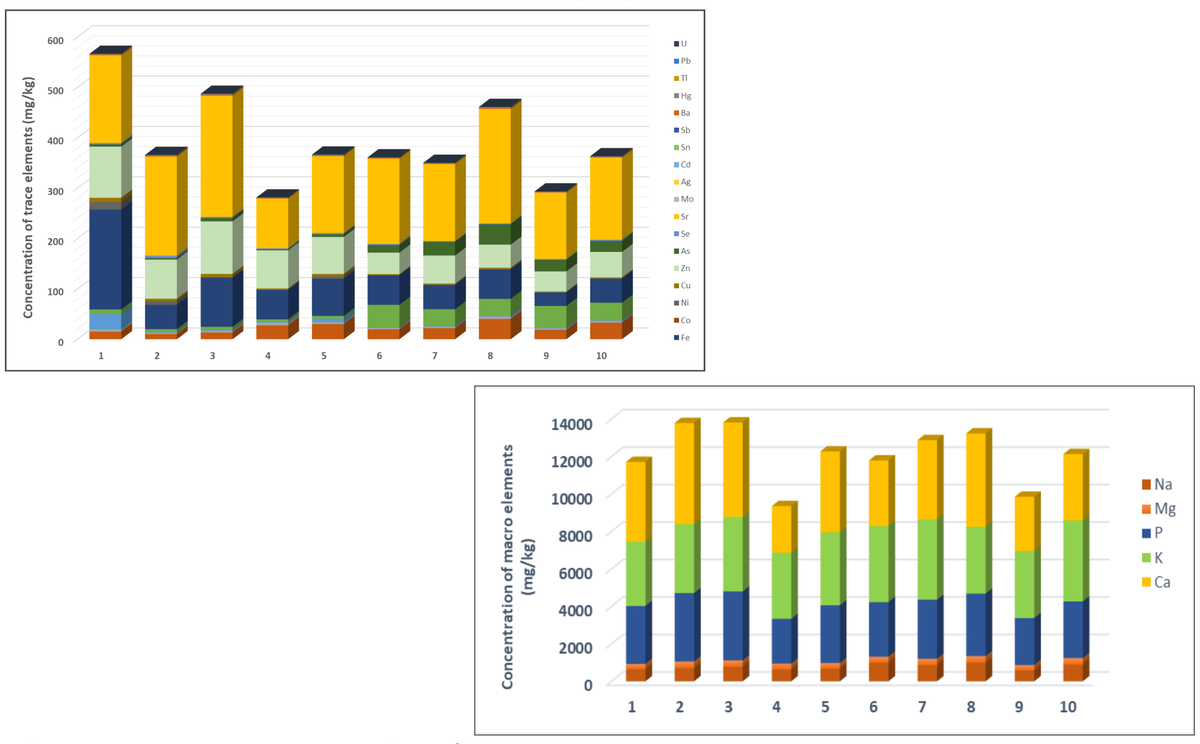
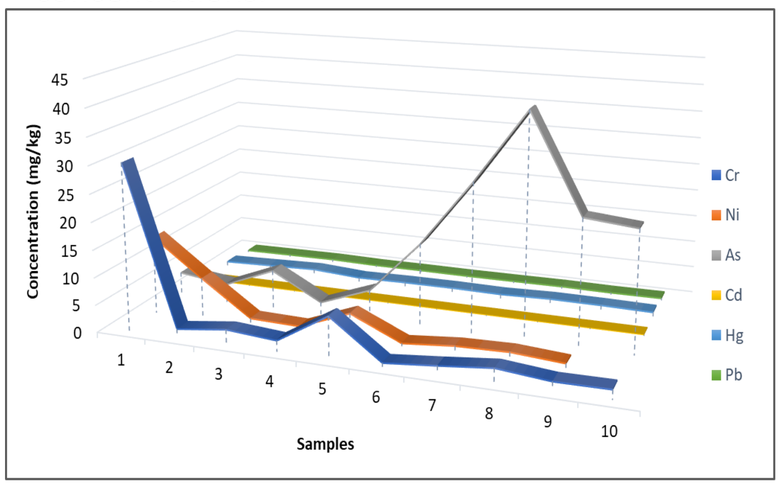


Figure 1: Concentrations (mg/kg) of trace and macro elements in fish.

- The undesired trace elements, characterized by high toxicity (Hg, Pb, Cs and As) were all detected in low concentrations (average C: <LOQ to 15.1 mg/kg), with As showing the highest levels.
- Elements that can be both essential and toxic, depending on their oxidation state and concentration (Ni, Cr and Cu) were also detected in low concentrations.



Toxic elements	Mean (mg/kg)	Range (mg/kg)	LOQ (mg/kg)
Hg	0.9	0.7-1.3	0.002
Pb	0.3	0.2-0.4	0.01
Cd	0.0	<LOQ-0.01	0.01
As	15.1	2.2-40.6	0.01
Cr	5.1	0.6-30.3	0.025
Ni	3.4	0.4-14.2	0.025

Figure 2: Toxic elements profile in fish samples.

- The contamination of the two fish species was almost the same for all the analytes, except for Cu, Mn, As and Zn.
- S.solea samples had higher concentrations of As and Mn, while the detected values of Zn and Cu were elevated in S.larbax.

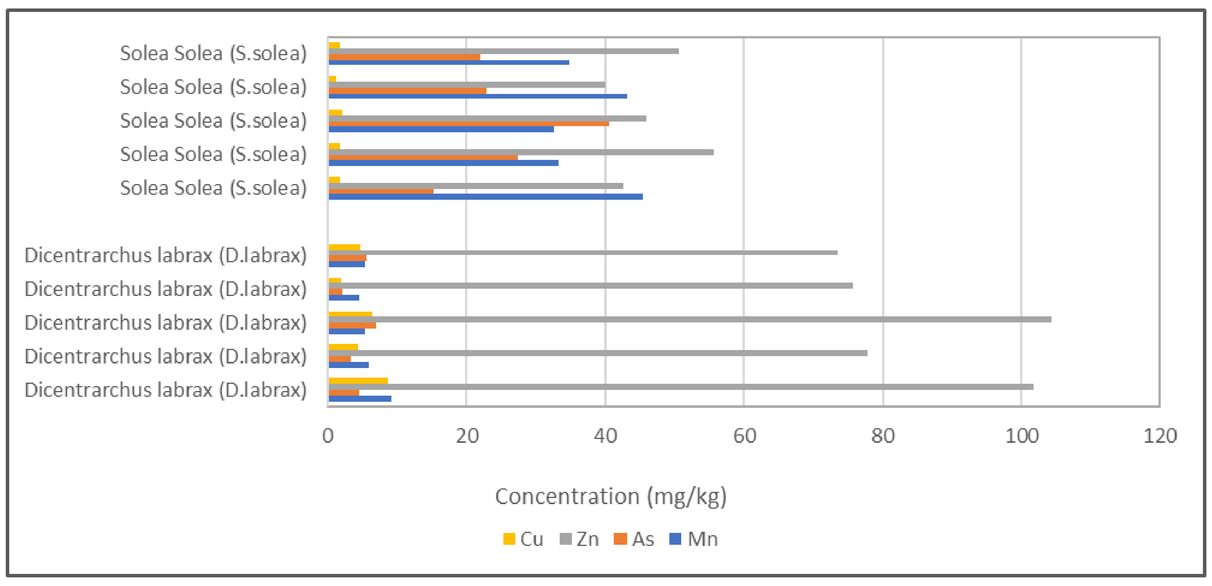


Figure 3: Detected concentrations of Cu, Zn, As and Mn in S.solea and D.larbax samples.