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Microplastics in wetlands with different land uses: latitudinal differences (Spain - England)

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INTRODUCTION & AIM

It is well-known that one of the proofs of the Anthropocene is the presence of human waste in the stratigraphic record[1,2]. Among all the materials found, plastic stands out, especially in its form of microplastics (MPs).

There are many pathways by which microplastics enter wetlands such as through direct inputs, runoff in the watershed, agriculture, atmospheric deposition and tourism[3,4,5]. As soon as MPs are in the ecosystems, they produce many ecological impacts in biodiversity, production, ecosystem functions and animal health[6,7]. The catchment area and closeness to anthropic activities can make a difference in the MPs content of the water[8,9].

The hypothesis of this research is that there are microplastics in all the wetlands under study, but with differences both in a latitudinal gradient (between Mediterranean (Spain) and Temperate regions (UK) countries), and in an anthropic pressure gradient, understanding this as the human activities that take place in the catchment area. Consequently, a higher amount of microplastics in wetlands exposed to a greater anthropic influence is expected.

To test these hypotheses the main objective of this research is to compare microplastic pollution in ponds from UK and from Spain that have different levels of anthropic use in their catchment area.

METHOD

Sixteen wetlands have been studied. The selection of aquatic systems was carried out with the criteria of land use in the catchment area of each ecosystem, considering the little or no anthropic use, mainly forestland (Non-Anthropic Ponds – NAP) and the influence by anthropogenic activities, especially agriculture (Anthropic Ponds - AP) (Fig. 1).

Fig 1. Example of a NAP (left) and an AP (right) in Spain

Three integrated composite samples were collected in each wetland and each of them consisted of three subsamples of 600 mL (Fig. 2). In UK, each sample was filtered *in situ* through a 125 µm pore metal mesh. In Spain, the samples were collected in glass jars and filtered in the laboratory using the same dimensions and filters as in UK (Fig. 3).

Fig 2. Sample collection in one of the ponds

Fig 3. Filtration system

All the samples were observed with a Leica stereomicroscope MZ S9i. The pictures taken were analyzed to identify MPs

RESULTS & DISCUSSION

When comparing the microplastics count in particles per liter in the land use of the same country, in the UK not many microplastics were found (Fig. 5) and those found were larger in size in the AP, therefore more research will be done in different ways to count the MPs. In Spain it was more evident that there were more MPs in AP (Fig. 6)

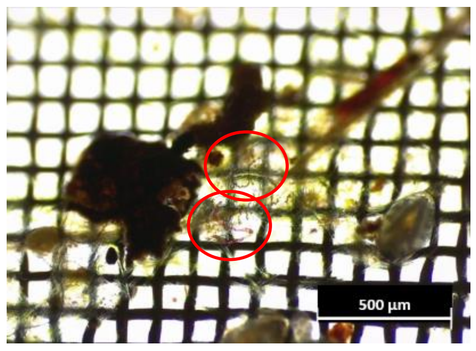

Fig 4. Example of a red and a black fiber found in a 125 µm filter from Laguna de la Franciscuela

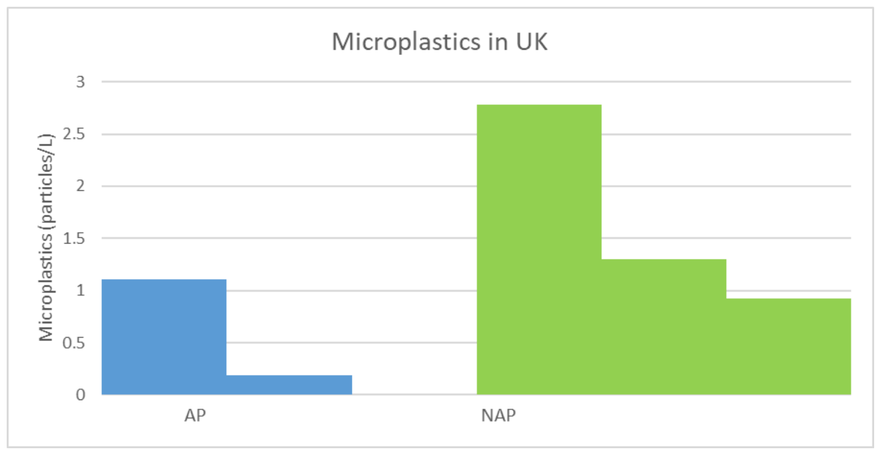

Fig 5. Preliminar results of MPs in UK

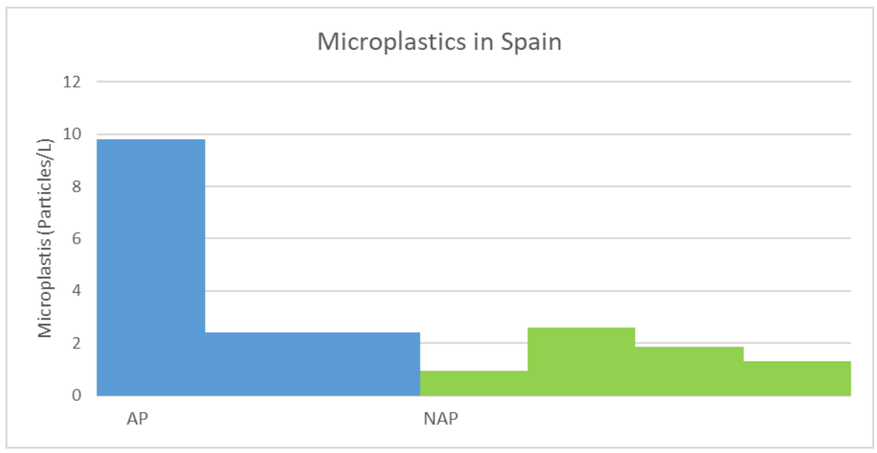

Fig 6. Preliminar results of MPs in Spain

The results of this study revealed that agriculture is also an important source of MPs, but only a significant difference was apparent in Spain. The reasons for that could be a more obvious separation between AP and NAP. The AP sampled in Spain were situated in the middle of intensive olive monocultures, characterized by soil erosion and plastic waste left in the fields. In UK, as well as predominating cereal crops and pastures, agricultural land also combines crop areas with forestland, which can mitigate the human impacts.

CONCLUSION

This is a study in progress, therefore most of the data, statistical analysis and results are not published yet, but some of the conclusions already found are:

- Microplastics have been found in all the wetlands studied except for one.
- Higher amount of microplastics was found in AP in Spain compared to NAP.

FUTURE WORK / REFERENCES

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