



# A SURVEY OF THE PRESENCE OF THERAPEUTIC DRUGS IN URBAN AND RURAL SEWAGE SAMPLES FROM GRAN CANARIA ISLAND (SPAIN)

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## INTRODUCTION

Legislation about the presence of pharmaceutical compounds in purified waters is very limited and in most cases, there are not maximum values for the different drugs so, water purification facilities like WWTPs not are designed for the removal of this type of compounds. Moreover, in small communities is very difficult and expensive to build them. For this reason, natural WWTPs are low-energy consumption facilities which use the slope of the ground and plants to purify wastewaters [1].

In this work, 11 pharmaceutical compounds have been analyzed in a traditional WWTP which treats the wastewater of a high-density populated area of Gran Canaria island (Spain) and in a natural WWTP which treats wastewater from a small village of the same island.

## MATERIAL & METHODS

### Analysis procedure:

Sample collection

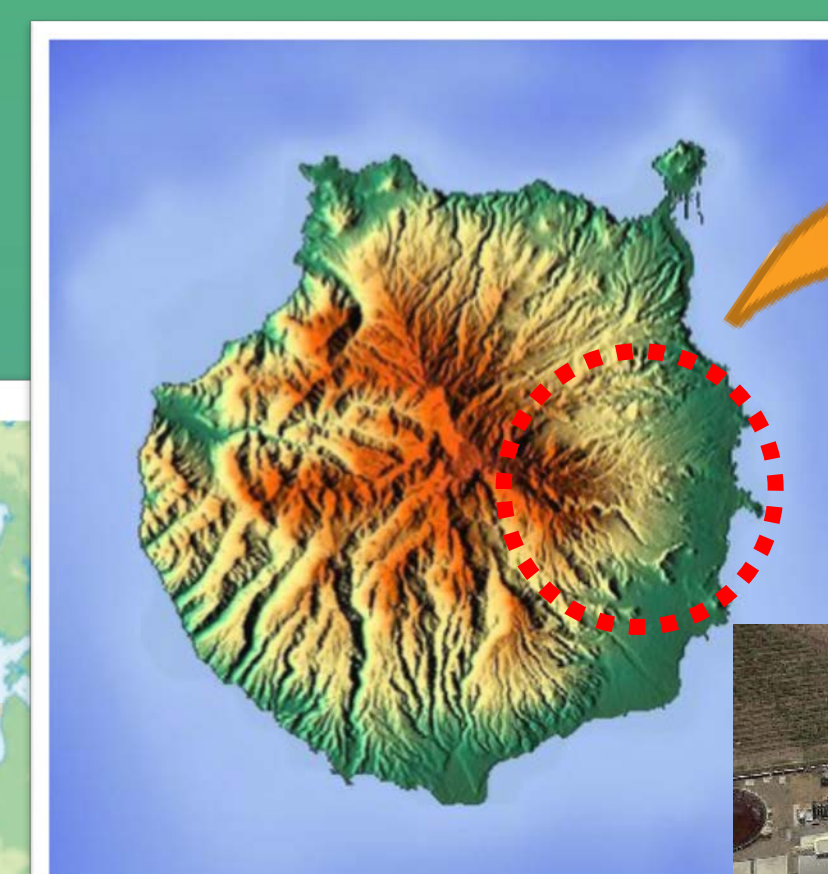
Filtration through 0,65 µm membrane filters

Adjust pH to 7

Solid phase extraction using 250 mL of simple. Extract in 5 mL of methanol

Evaporation of extracts. Reconstitution in 1 mL of methanol

### Sample collection:



### Wastewater treatment plants

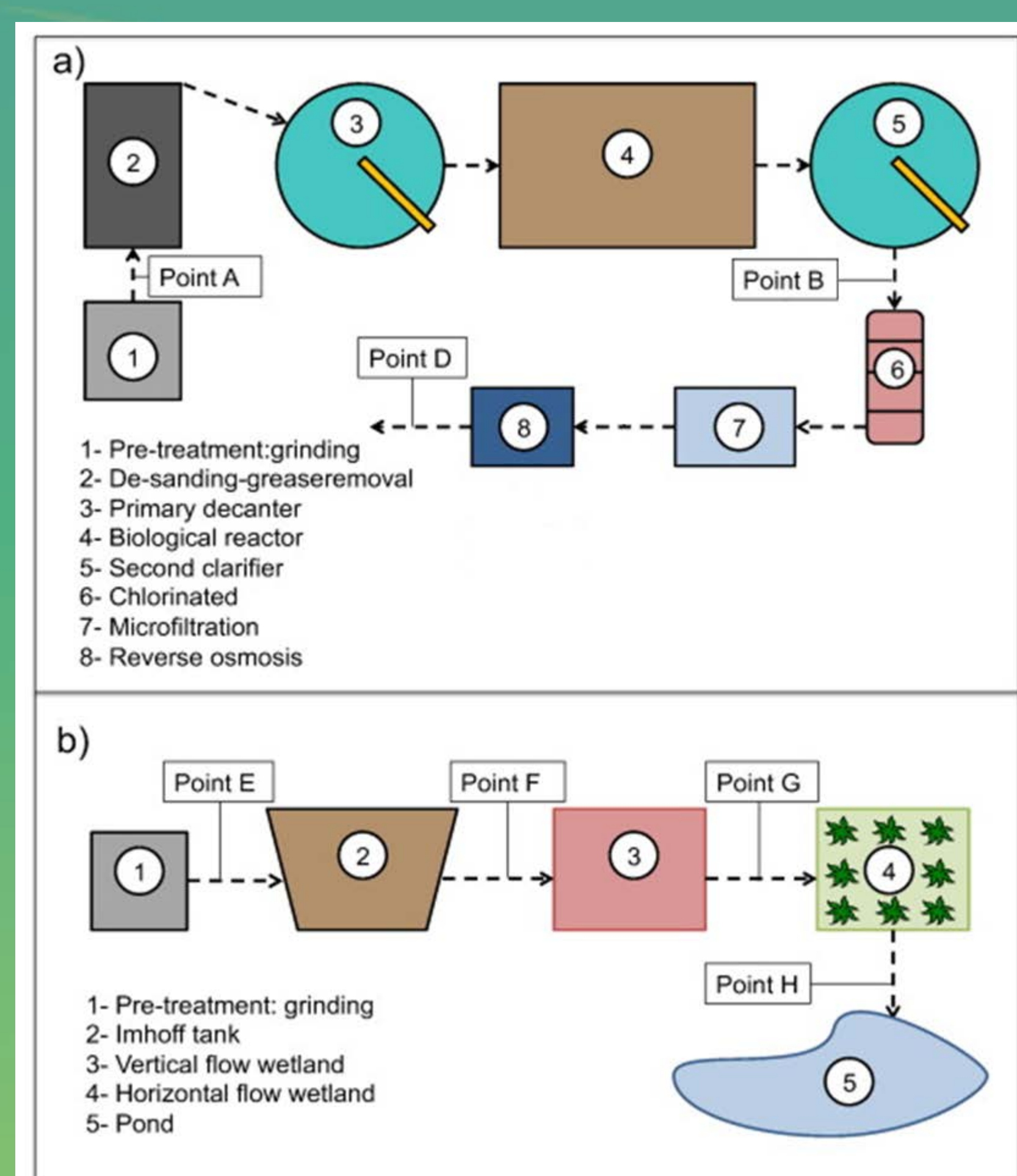


Traditional WWTP

Natural WWTP

## RESULTS

### Sampling points and detected concentrations:



Extracted from Afonso-Olivares et al. [2]

Pharmaceutical compound	Average concentrations (µg·L <sup>-1</sup> )						
	Point A	Point B	Point D	Point E	Point F	Point G	Point F
Nicotine	7,864	0,156	0,074	14,127	9,466	1,483	0,176
Atenolol	1,109	0,190	0,073	2,740	2,024	0,380	0,121
Trimethoprim	0,358	0,147	0,051	0,234	0,080	0,042	nd
Paraxantine	54,971	0,734	0,060	61,641	16,669	2,144	0,281
Caffeine	41,283	0,205	0,093	76,851	33,209	3,747	0,322
Erytromycin	nd	nd	nd	nd	nd	nd	nd
Carbamazepine	0,341	0,548	0,053	0,927	0,655	0,739	0,855
Naproxen	14,717	0,072	0,030	5,520	6,763	2,934	1,020
Ibuprofen	24,588	0,120	nd	34,738	21,595	12,770	11,260
Diclofenac	0,143	0,058	0,077	nd	0,625	0,305	0,822
Gemfibrozil	2,916	0,103	nd	1,735	3,494	3,431	4,549

nd: not detected

- ✓ Great eliminations
- ✓ Highest concentrations at influents
- ✓ Compounds with highest concentrations:
  - ✓ Stimulants
  - ✓ Anti-inflammatory

## CONCLUSIONS

The preliminary results provided by ADAPTARES Project shows that the treatments employed for sewage samples are very efficient, with eliminations rates higher than 85% for almost all the studied compounds. However, it is essential to continue evaluating the treatment processes, taking into account the growing presence of that analytes in the urban waters, specially anti-inflammatory and stimulants. Moreover, we must enlarge the monitor not only from Gran Canaria Island but also in Madeira and Cape Verde, partners of the Project, in order to promote the efficient water reuse in Macaronesia.

## ACKNOWLEDGEMENTS

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## REFERENCES

- [1] J. A. Herrera-Melián, R. Guedes-Alonso, A. Borreguero-Fabelo, J. J. Santana-Rodríguez, Z. Sosa-Ferrera, *Environ. Sci. Poll. Res.*, 2018, 25(21), 20374-20384
- [2] C. Afonso-Olivares, Z. Sosa-Ferrera, J.J. Santana-Rodríguez. *Sci. Total Environ.*, 2017, 599-600, 934-943