

Occurrence, Distribution and Bioremediation of Endocrine Disrupting Chemicals in Coastal Sediments from Macao SAR, China

Alexandre Lebel^{a)}, Liu Jun^{b)}, Irina Moreira^{c)}, Xianzhi Peng^{b)}, Paula Castro^{c)} and David Gonçalves^{a)}

a) Institute of Science and Environment, University of Saint Joseph, Macau SAR, China
b) Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou, China
c) Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Porto, Portugal

Introduction

The presence of endocrine disrupting chemicals (EDCs) in municipal and industrial effluents is a major issue for marine and coastal environments near big cities and the situation of the Pearl River Delta (PRD), China, is particularly interesting as it is one of the most densely populated area of the world. The occurrence of EDCs in the PRD region is well documented but specific data related to Macau is still unavailable.

The levels of bisphenol-A (BPA), estrone (E1), 17 α -estradiol (α E2), 17 β -estradiol (β E2), estriol (E3), and 17 α -ethynylestradiol (EE2) were measured from sediment samples collected along the coastline and intracoastal waterway of Macau.

Methods

Simultaneous analysis of six EDC's in sediments was performed by using a combination of ultra-sonicated and solid phase extraction, followed by silica gel fractionation, derivatization with dansyl chloride, and determination by LC/MS. Additionally, the sediment samples were used for biodegradation assays in order to evaluate the capacity of the ecosystem to degrade BPA and BPS which were measured by HPLC.

Results

- BPA was found in all 46 collected samples
- Lower values were associated with the presence of mangrove trees.

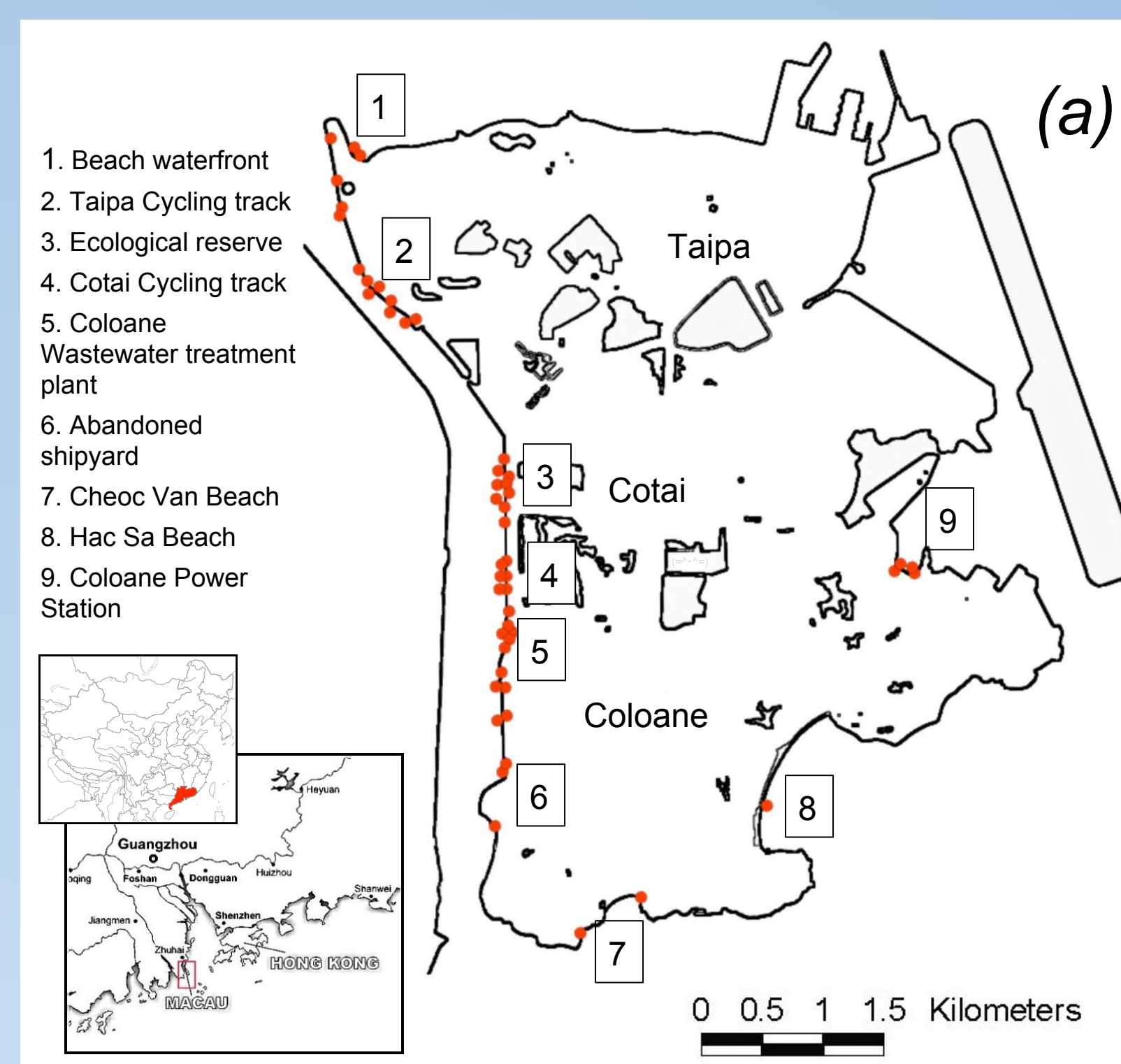
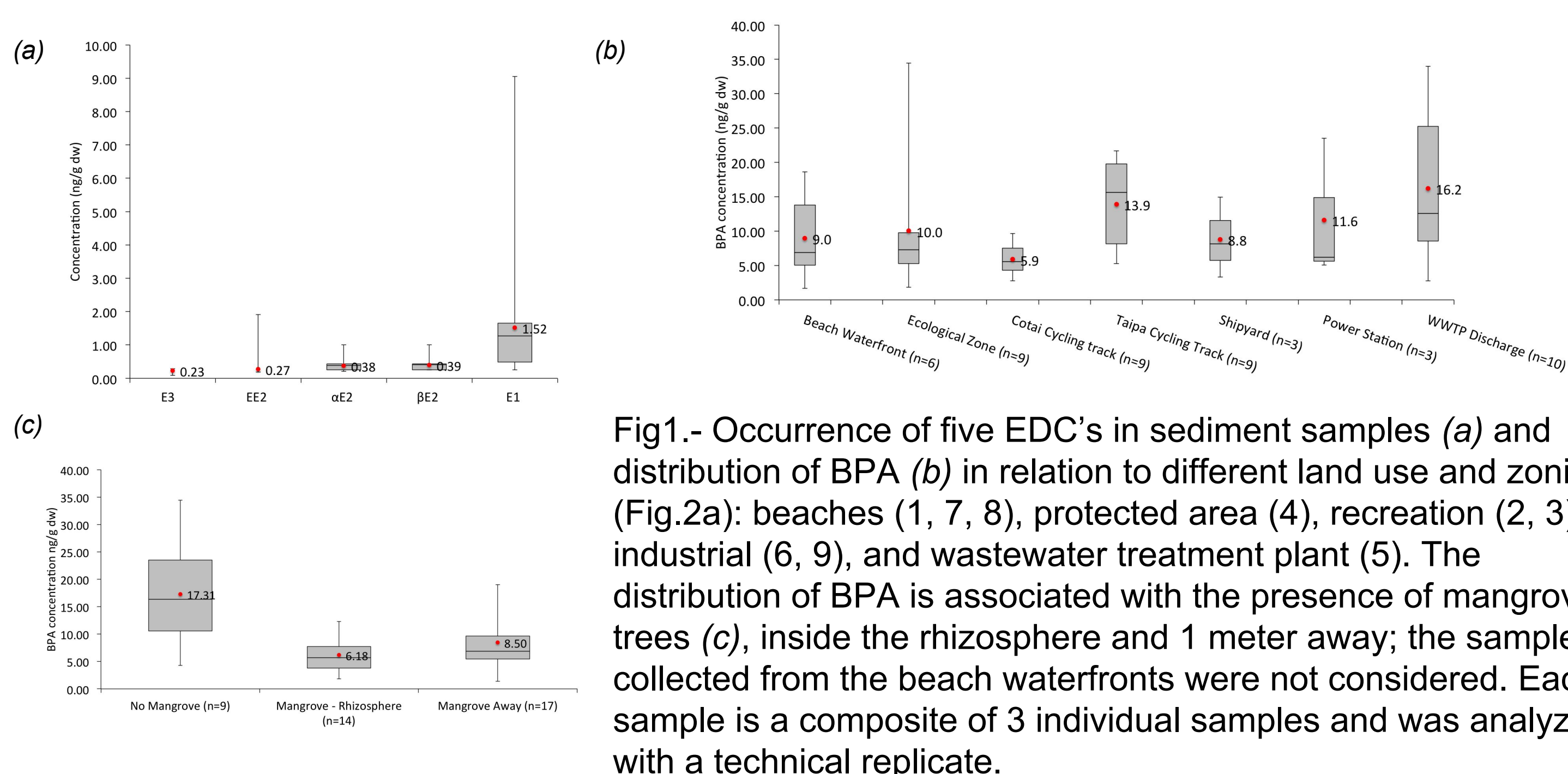


Fig.2- Sediment samples were collected along the coastline of Taipa-Cotai-Coloane (a), Macau SAR, China, located in the Pearl River estuary. The presence of mangrove trees (b) and the rhizosphere activity were considered during the collection.

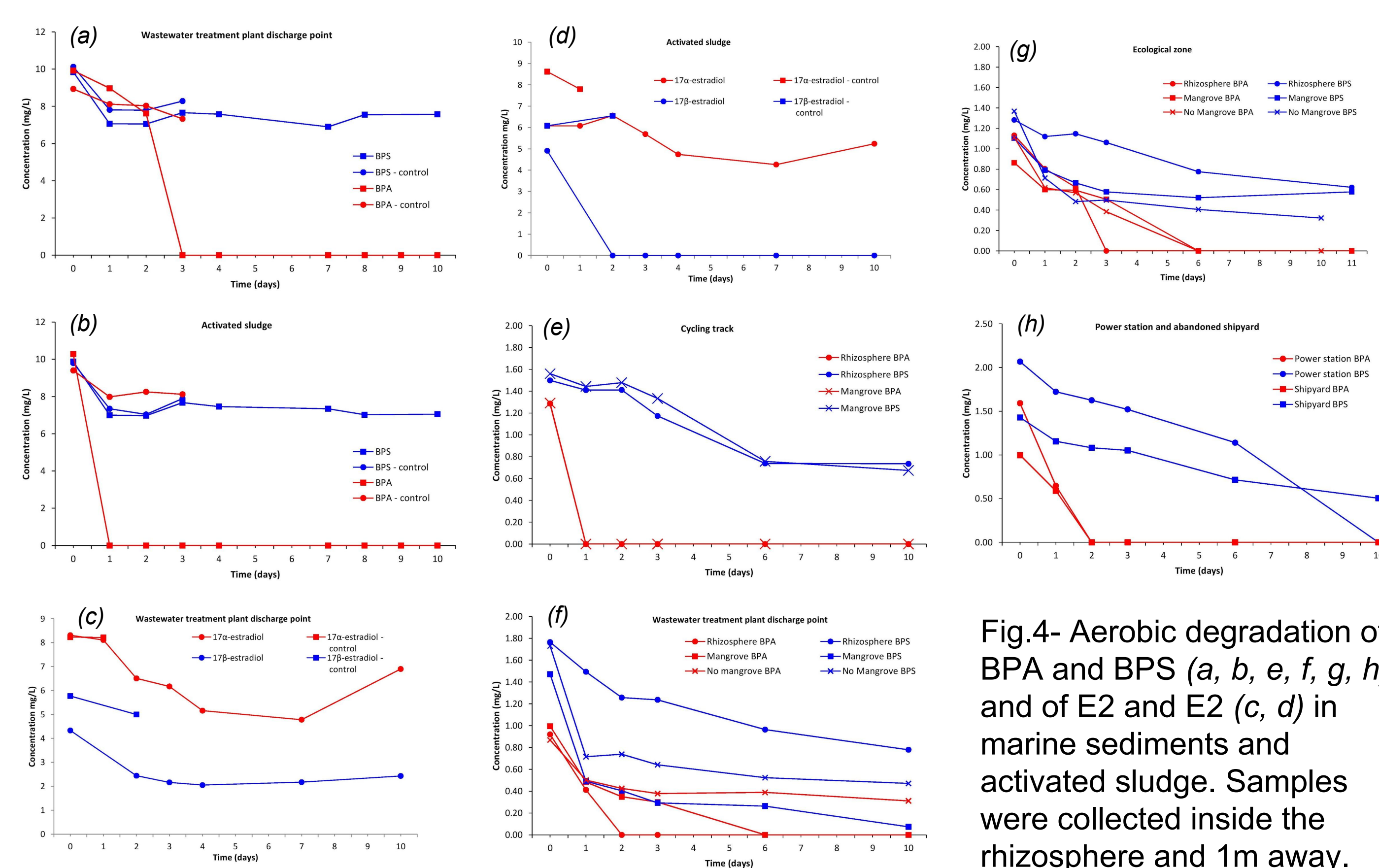
- Bacterial diversity is higher in the presence of BPS than of BPA

Growth of pure colonies isolated from enrichment cultures obtained from activated sludge and sediment samples

Carbon source	No growth	Low	Medium	High	Very high	Total
BPA	1	9	3	4	0	17
BPS	2	13	8	3	1	27

Fig.3- Isolated colonies were plated on agar media with BPA or BPS as sole carbon source. Qualitative observation was made after 7 days.

- After 10 days, BPS was still present in most samples, although full degradation of BPA was achieved in a few days in all samples.



Final remarks

Mangrove trees seem to facilitate the degradation of BPA. However, slower degradation of BPS may cause accumulation in sediments. Ongoing characterization of the microorganisms present in the collected sediments may contribute to the development of new bioremediation strategies.