

# Index Application

António Quintas

IGAMAOT

# *Technical-Scientific Index for the Clarification of Illicit Actions on Water Resources*

Examples of application:

1. Dredging and Reclamation Works
2. Municipal Wastewater Treatment Plant

# 2º Dia

## Dredging and Reclamation Works

# Dredging and Reclamation Works

Natura 2000 site

big Social Concern (media, NGO, Institutions)

Action by IGAMAOT's "rapid response team"

# Reclamation works (dredging)



# Difficulties

On-the-job planning

No expert knowledge in dredging

Sheer dimension of the site

*At the time the *Technical-Scientific Index for the Clarification of the Illicit actions on Water* wasn't available to provide a framework*

# Dredging and reclamation works

On site inspection:

day 1

- On site visit (photos, data)
- Request for additional information from the company

day 2

- Water sampling
- Sediments sampling
- Drone flights: collection of photos, vídeos, and volume estimation
- Call for presence of other authorities (Nature and Water Conservation, Port authority)

# Dredging and reclamation works

Total Suspended Solids on water (15x above normal water body values)

Presence of “priority substances” (Cd, Ni, Pb)

***Occurrence potencial = 9***

Marine grasslands buried by sediments

Destruction of a big population of protected plant species (*Zoostera nolti*)

Effects were not temporary – discharges lasted weeks

***Negative Effect = 9***

Zones for the protection of habitats and wild fauna and flora and the conservation of wild birds and nature

High sensitivity of aquatic environment

***Potencial for water resources being affected =9***

# Dredging and reclamation works

## ***Additional factors:***

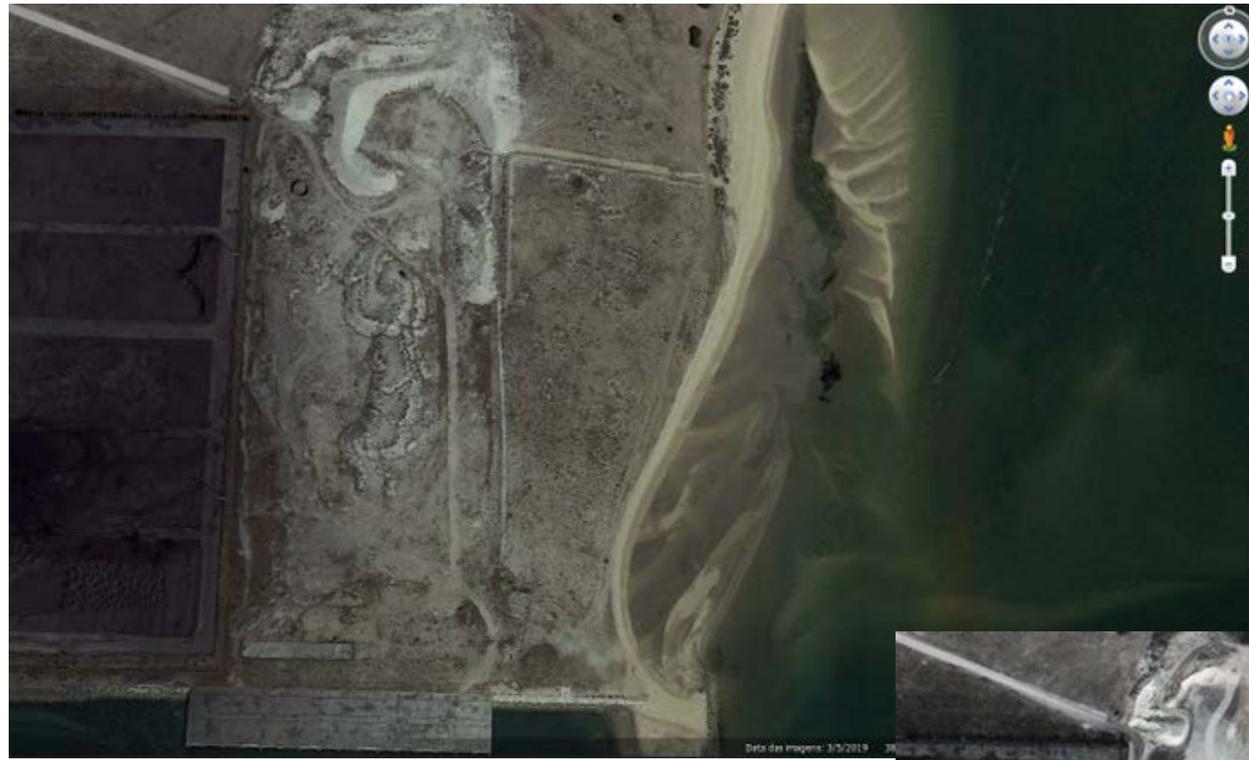
The “good” status of the water body was affected by the discharge with “high severity” (+50%)

The benthic macroinvertebrate that were buried by the discharges were already in regression on the last evaluation cycle of the water status

The discharge effects contribute to distancing of WFD’s objectives









# 2º Dia

## Wastewater Treatment Plant

# WTP

## Sampling procedure:

Discharge: 24h and pontual sample

Pontual samples in the River :

- 1 upstream
- 4 downstream

Samples on the wastewater plant after bypass and secondary treatment (pontual and 24h)

Same parameters on all sites/samples, to establish relations: pH, COD, BOD<sub>5</sub>, NH<sub>4</sub>, NH<sub>3</sub>, NO<sub>3</sub>, NO<sub>2</sub>, N<sub>global</sub>, P<sub>global</sub>, PO<sub>4</sub>, TSS and Zn (with quality normatives for the water body)

Measure: O<sub>2</sub>, conductivity, temperature and pH with probes

# Wastewater treatment plant

Very high BOD5 and COD > 4x ELV

***Occurrence potencial = 9***

It was measured a water quality deterioration downstream up to 255m

The values measured in the river are not compatible with aquatic life (NH<sub>4</sub>)

Effects on the water were continuous

***Negative Effect = 9***

Situated In the proximity of Sensible Zones

Area with objectives related with the protection of aquatic species (WFD)

***Potencial for water resources being affected =9***

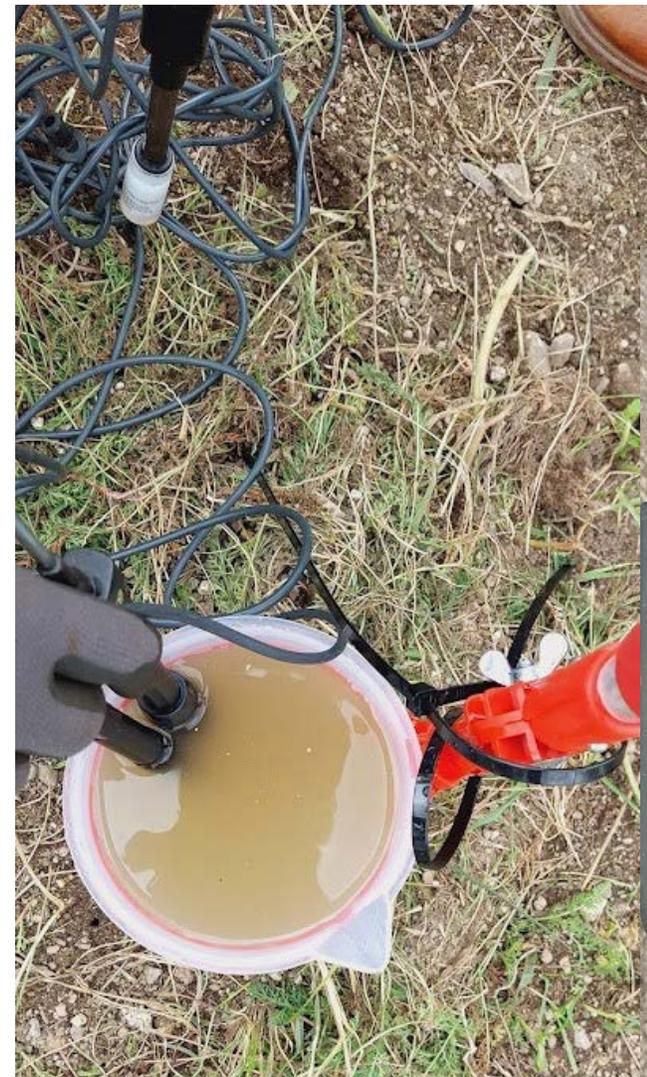
# Wastewater treatment plant

## ***Additional factors:***

The chemical parameters analysed downstream in the water body were the same responsible for the bad results on the last evaluation cycle of the water status

The discharge effects contribute to distancing of WFD's objectives





# 2º Dia

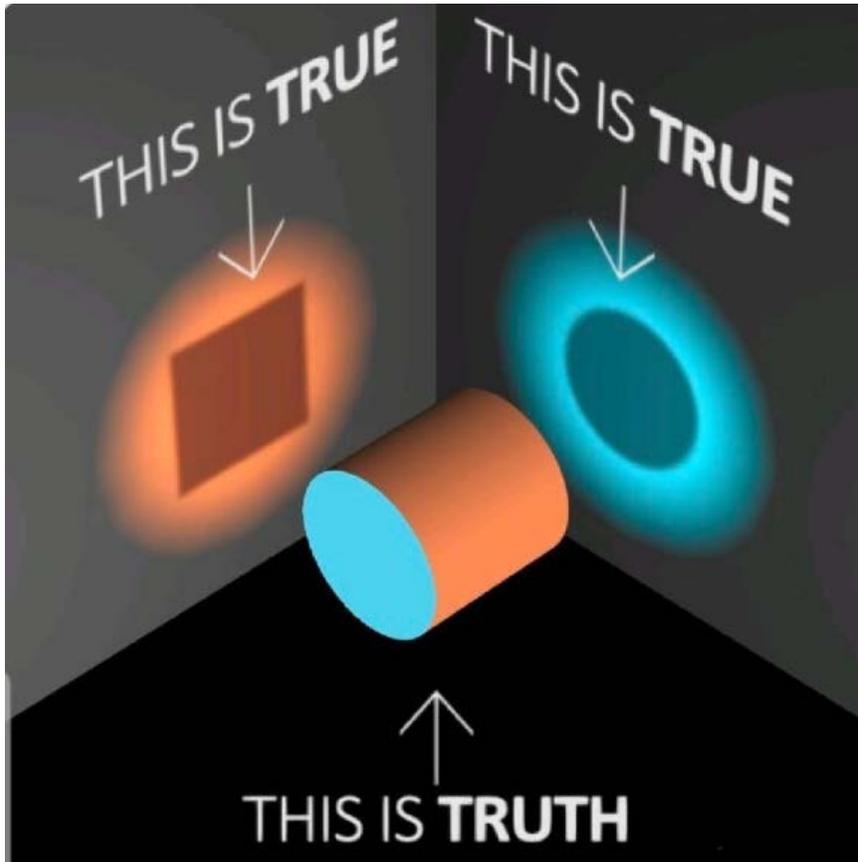
Sharing common thoughts...

# Strategy building

1. Study documentation
2. Analyse the data already available from:
  - a) Previous Inspections to the site or it's neighbourhood
  - b) Evaluation of the State of that water body, by the competent authority
  - c) Geo-information data Systems
3. Meet with prosecutor (and other authorities)
4. Lay down a strategy (and be prepared to adapt)

Be creative !

# Remember this...



# Chose the parameters

1. What is the ecological and chemical State of the Water Body (that is being affected)?
2. What are the parameters responsible for the State condition (WFD)?
3. Are there uses or services of that water body that are potential being affected? Are there concentration limit values established for them ?
4. What are the industries and other potential sources that damage the water body? What are the characteristics (“signature”) of their usual wastewater ?

# Sampling Plan

Consider the need to take samples of the water discharges and of the water body, at least :

1. Upstream (the discharge)
2. Downstream along the water body (considering 30-75-125-250 m)
3. Downstream until we can see a damage in the water (can check upon Conductivity, pH, Color or O<sub>2</sub> changes with probes) to measure the distance being affected
4. Where there are uses/services in the water body (ex. water abstraction spot)
5. Other streams that come into the water body that's being affected along the area that's being studied.
6. Consider the need to sample other species like fish, animals, plants that are being killed along the river by the discharge along a distance from 10 to 1000m

# Future possibilities – proactivity application

We can use data from:

- Results of previous inspections +
- Potential for water resources to be affected - available by desk analysis (Geoinformation)

To detect with this methodology installations that potentially may present a higher potential to be practicing a crime against water resources -> investigation focus

# 2<sup>o</sup> Dia Conclusions

Useful methodology - a guide of great help to plan data collection during investigation

Importance scale – we can now convert data into numbers

Relation between factors

# 2º Dia

Thank you all !

[aquintas@igamaot.gov.pt](mailto:aquintas@igamaot.gov.pt)