“Substantial” damage in the context of the ECD

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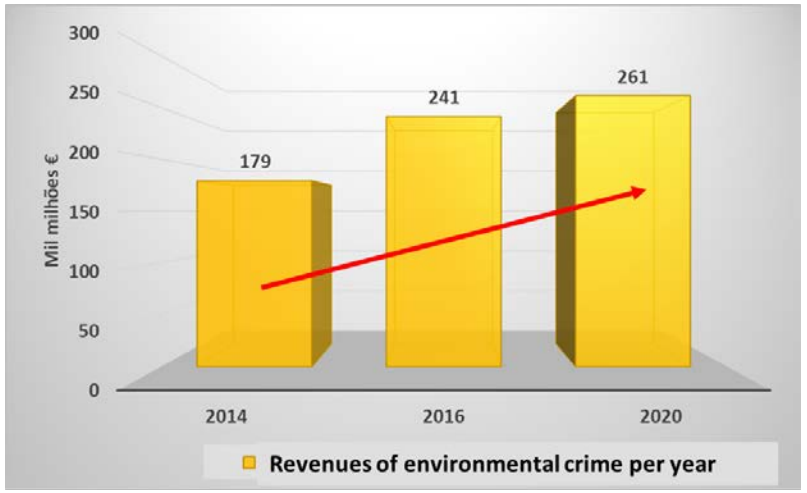
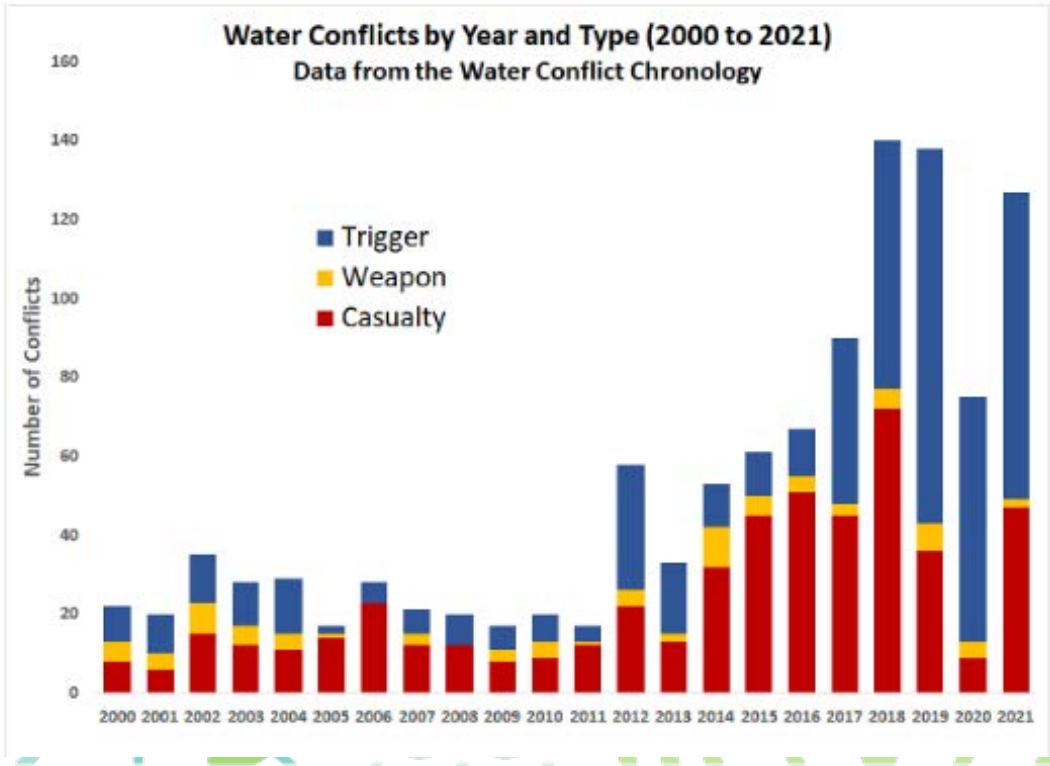
REPÚBLICA PORTUGUESA

ENVIRONMENT AND CLIMATE ACTION

Environmental Crimes $ Water crimes



The fourth major area of international crime (after drugs, counterfeiting and human trafficking)



Challenge: What is the meaning of damage...

Dictionary

Harm
Loss

ECD

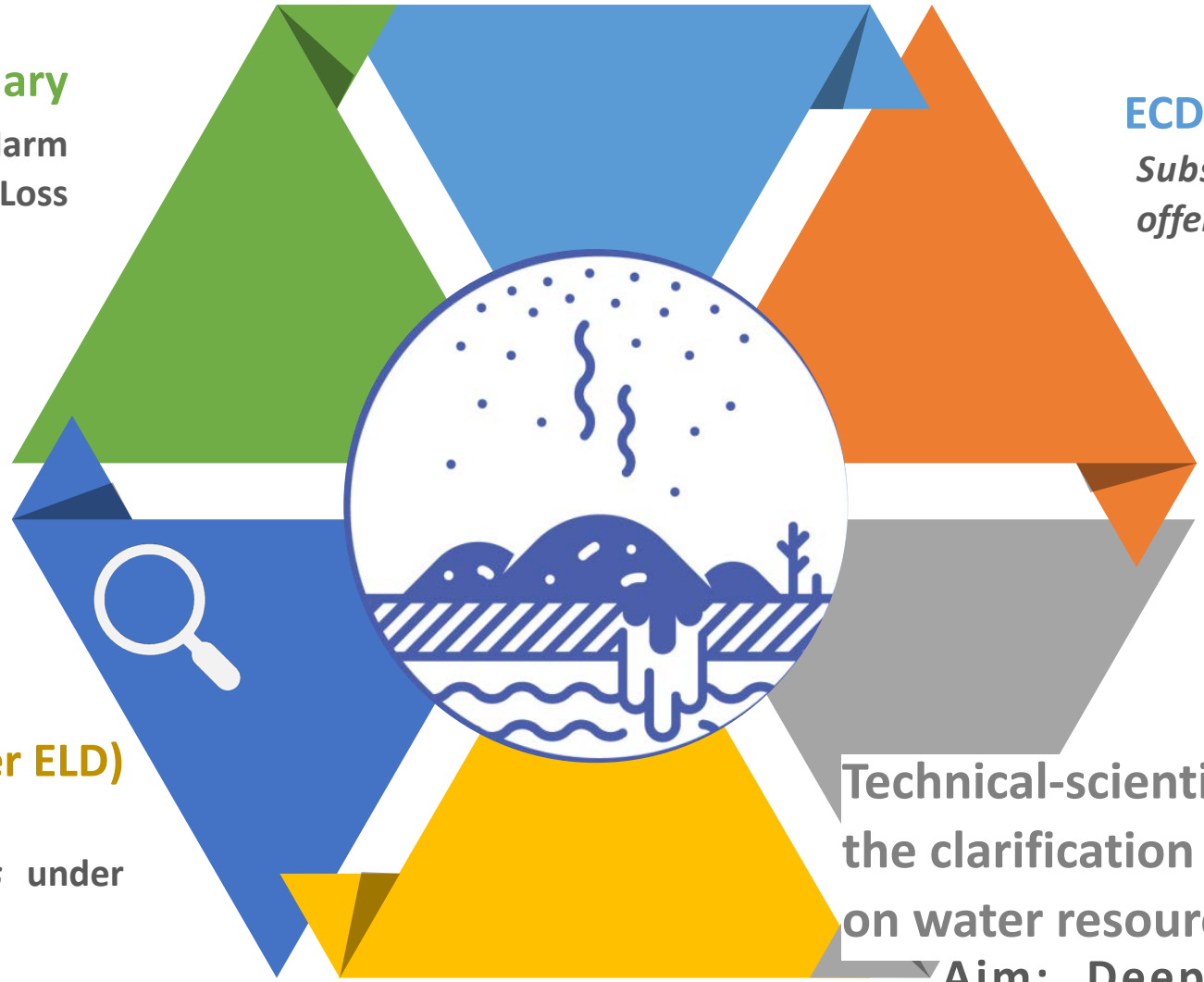
Substantial damage (linked to offenses)

ELD

A measurable adverse change in a natural resource or measurable impairment of a natural resource service which may occur directly or indirectly

Risk assessment methodologies

Harm or loss resulting from the exposure of a given receptor to a given hazard, in a given spatial and temporal reference



Water damage (under ELD)

Any damage that significantly adversely affects the *Status* under WFD

Technical-scientific index for the clarification of illicit actions on water resources (I_{tc})

Aim: Deepen the concept of "damage"

What is the mean of “substantial damage”?

TECHNICAL-SCIENTIFIC INDEX FOR THE CLARIFICATION OF ILLICIT ACTIONS ON WATER RESOURCES

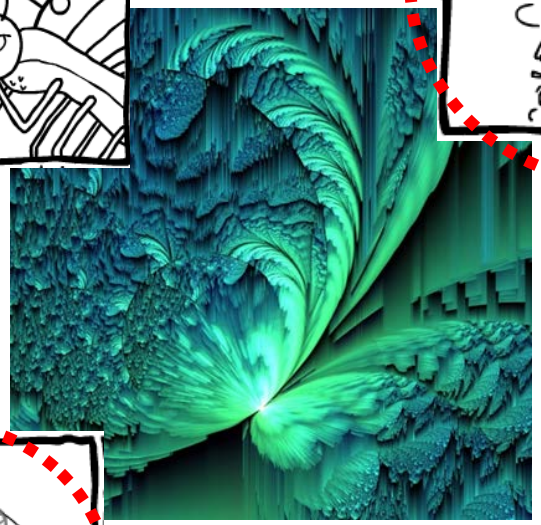
Which approach…

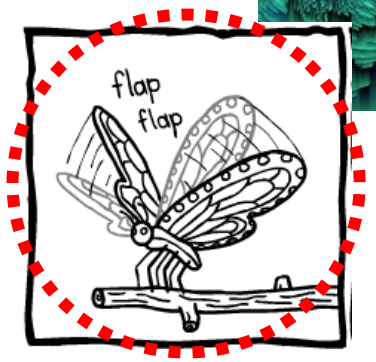
Working group within National IMPEL Network:

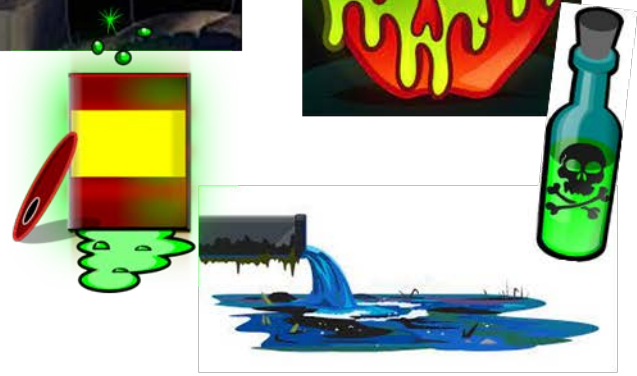
- **APA (Environment Agency)**
- **IGAMAOT (Inspection)**
- **Public Prosecution Service**
- **Criminal Police**

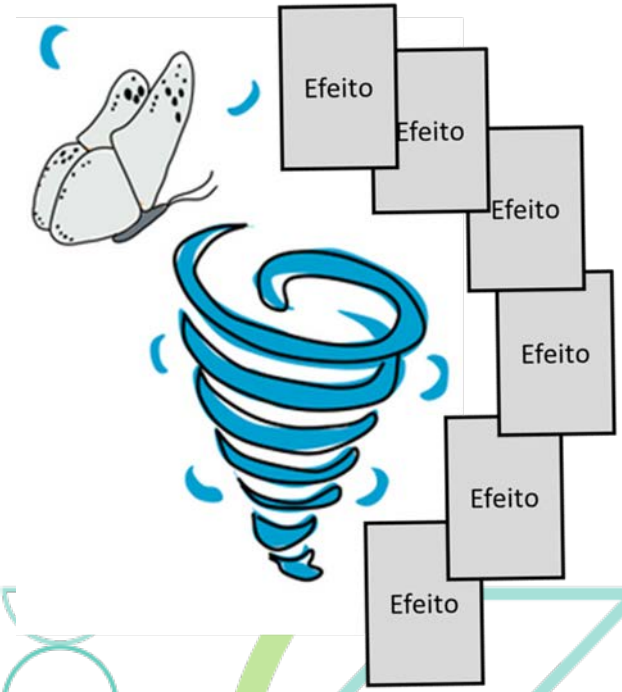
Acknowledgement: ICNF (Nature & Forest Conservation Institute)

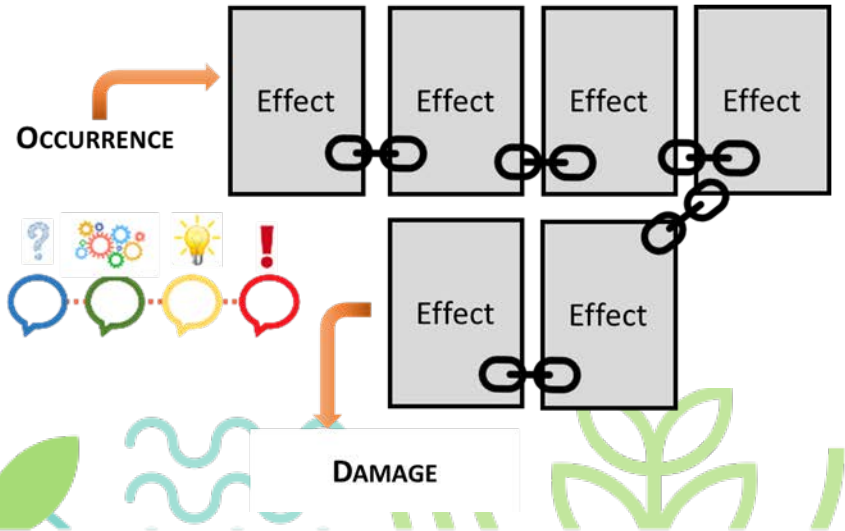
Butterfly effect











Common language to avoid legal/technical misinterpretations

01. Adverse effect

impairment of the quality of water resources, aquatic ecosystems or the current uses or services provided by water bodies

02. Significant adverse effect

Adverse effect resulting from an unacceptable outcome for surface water and/or groundwater resources, which may/should result in significant damage to them

03. Occurrence or hazardous event

An abnormal act of limited duration, which may occur once or periodically and has an adverse effect on water resources.

04. Result of the occurrence in the receiving environment

The effective result on water resources of a given occurrence or hazardous event that has arisen in a given space and time reference, as measured by the I_{tc}

Technical-Scientific Index of illicit for water resources (I_{tc})

01 OCCURRENCE POTENTIAL

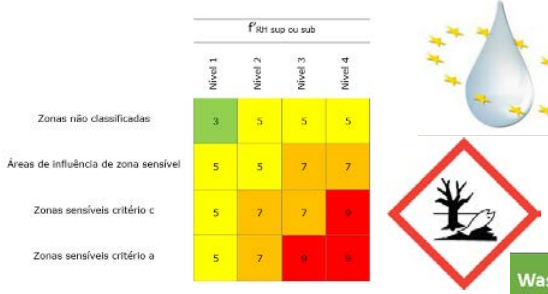
Measures what happen (or is happening): Exclusevivly linked with the intrinsic characteristics of the occurrence or hazardous event

02 NEGATIVE EFFECT

It relates to the severity of the effect and its continuity over time (integrates the temporal dimension)

03 POTENTIAL FOR WATER RESOURCES BEING AFFECTED

Includes the susceptibility of surface and groundwater resources to pollution



$$Severity_{WR\ SW\ or\ GW} = \frac{\sum f_{Sev_{SW\ or\ GW_i}}}{n_{f_{Sev_{WR\ SW\ or\ GW}}}}$$

METHODOLOGY

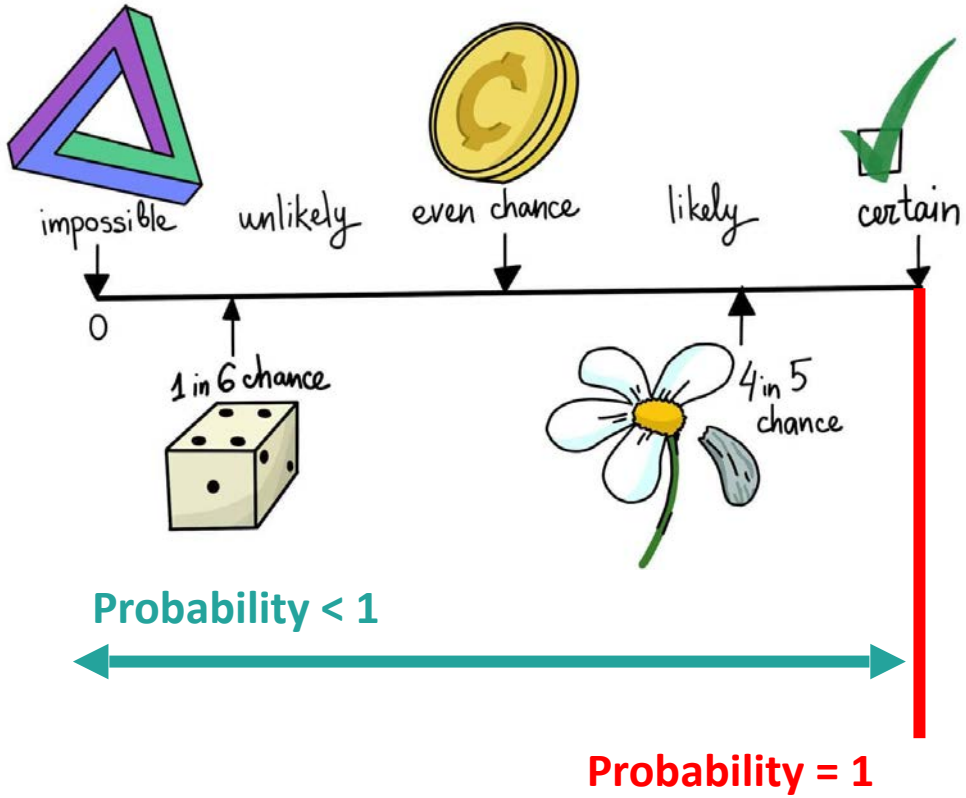
1. A methodology to determine the magnitude of damage (numerical value)
2. A methodology that allows to observes the "whole" broken down by the various factors and establishes the respective relationship to determine the magnitude of the damage
3. A methodology that translates “substantial” to a math value

Wastewater discharges	Level
ELV < [Parameter] ≤ ELV	3
2xELV < [Parameter] ≤ 3xELV	5
3xELV < [Parameter] ≤ 4xELV	7
[Parameter] > 4xELV	9

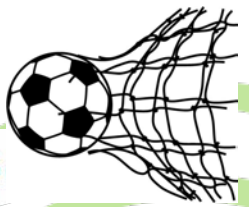
$$I_{tc} = \frac{P_{occurrence} \times Effect_{neg} \times P_{afecting\ WR\ (SW\ or\ GW)}}{9^{n-1}}$$

9^{n-1} – Normalization factor
n – n.º of terms in the equation that can have max rank (i.e., value of 9)

Scientific support: Probability vs Reality



0 < Probability ≤ 1



Probability = 1
"Prediction of match score"
after the game is over!

Probabilistic assessment	Assessment of a real occurrence
Probability of occurrence ≤ 1	Probability of occurrence= 1
Probability of damage ≤ 1	Probability of damage = 1
Very low to very high risk of damage	Real damage level from very low to very high

RISK CHARACTERISATION METHODS CAN BE EMPLOYED PROVIDED THAT THE LIKELIHOOD OF AN OCCURRENCE/EVENT IS EQUAL TO ONE (1).

Technical-Scientific Index of illicit for water resources (Itc)

Occurrence potential

- Waste/chemical disposal, spills, leakages…
- Wastewater discharges (chemical & microbiological parameters)
- Occurrences near groundwater abstraction

Negative effect

- Type of occurrence
  - Continuous over time
  - Discontinuous in time
  - Punctual event
- Severity
  - Mortality (quantity & quality)
  - Water quality deterioration
  - Impairment of uses or ecosystem services

Potential for water resources being affected

- Surface water
- Groundwater
- Vulnerability to pollution
- Sensitivity of aquatic environment
- Protected areas
- Distance to water (streams, flooding areas, abstractions, dams…)

- Use of importance scale (3 to 9) to each factor
- Math relations between factors
- Matrixes between factors/ relations
- Priorization of results in importance scale (3 to 9)
- Measuring significance by qualitatively comparing the importance of each factor in relation to the reference situation (considered in the absence of occurrence)
- Incorporation of a comparative analysis between the reference situation and the situation after the occurrence

- Additional factors:
  - Status of the affected water body(ies) & direct effect on pameters that support the water status
  - Recurrence of violations / non-compliance of previous notifications

Methodology Validation

Inspection body

Ruggedness tests

Application to cases under investigation (or for investigation)

Environmental Agency

Confidence tests

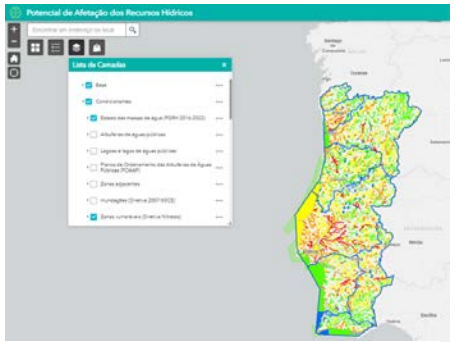
Application to real situations to distinguish between administrative infractions and possible prosecution for criminal offenses

Determination of the magnitude of damage

Tools developed:

01

1. GIS tool (geovisualizer)



To assess the water resources susceptibility to pollution

02

02. Assessment *in situ*

Roadmap/check-list: To help evidence collection on field & assessment/ desktop studies

03

03. Collection of evidence

04

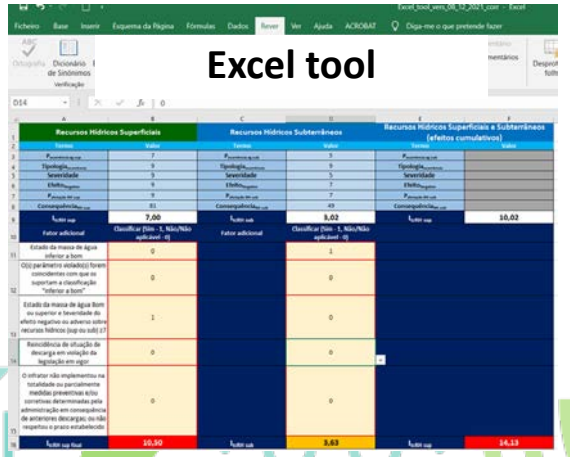
04. Factors classification

05

05. Index determination

I_{tc}

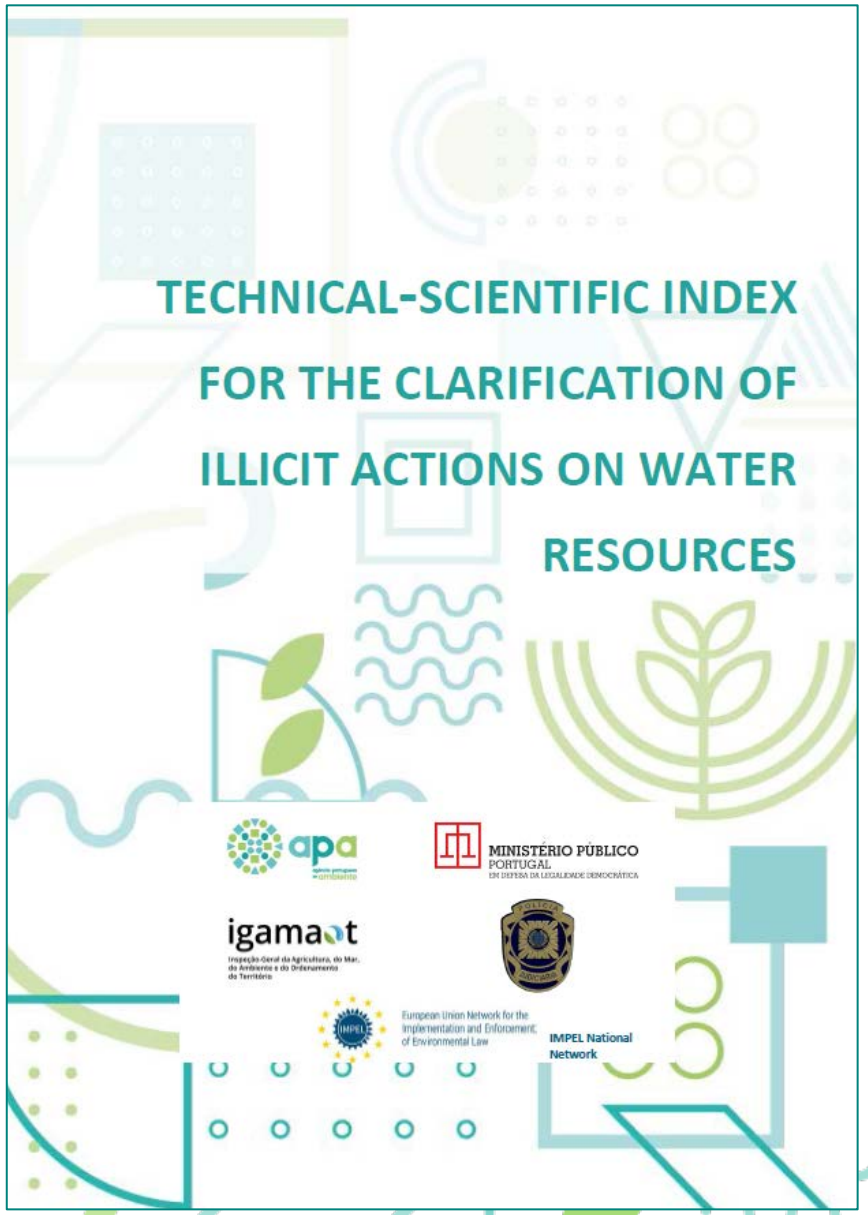
Results assessment



$I_{tc} \geq 4$

$I_{tc} < 4$

Guidance document



- **Officially approved by APA & IGAMAOT (4th May 2023)**
- **Public document**
- **Versions in PT and EN**
- **https://apambiente.pt/agua/indice-tecnico-cientifico-esclarecimento-do-ilicito-sobre-os-recursos-hidricos**

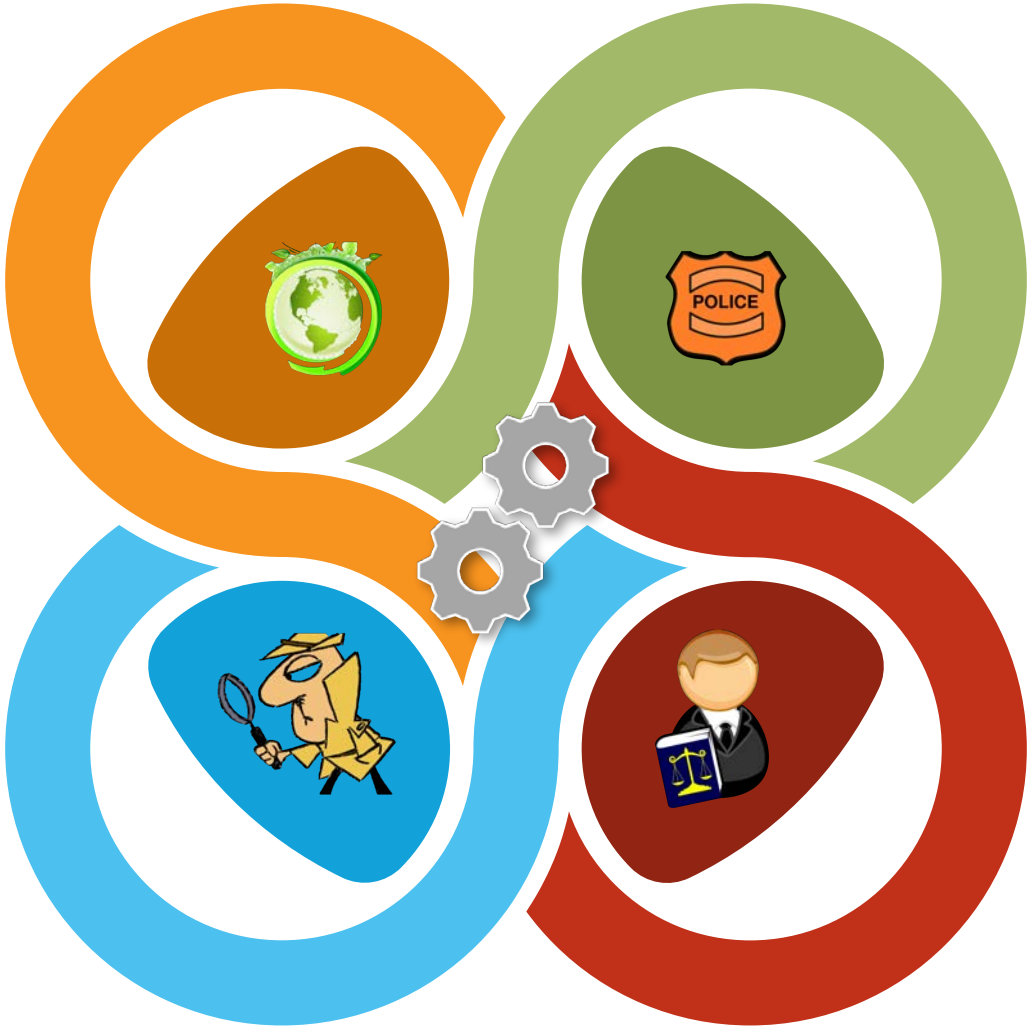
Training & Capacity building

Environment agency

- Competences in control and enforcement
- 5 Regional departments

Inspection

- National body with environmental inspection competences



Criminal police bodies

- Several bodies in PT (PSP/ GNR/PJ)
- Marine police
- Coverage of all territory

Public Prosecution Service

- Presentation of methodology, its principles, validation methods and the tools developed

Final remarks

- Methodology supported in technical-scientific approaches (Risk assessment basis: Probability of occurrence equals to 1 means that math equations allows to measure its respective effects)
- Definition of criteria & respective measure/magnitude of damage (translates “substantial” to a math value in a scale from 3 to 9)
- Metric scale that allows to distinguish cases that should follow an administrative penalty or a possible criminal offense
- Addresses any type of action that could jeopardizes water resources (wastewater discharges, chemical spills, waste disposal…) and allows to integrate cumulative effects on surface and groundwater
- Validation by the Inspection and Environment Agency on real cases (possible “water crimes”)
- Intends to allow a quicker and easier assessment by the inspection/police/officers promoting a better and holistic approach to support reports for prosecutors (several tools were developed)
- Several training sessions were already promoted

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