



PRESENTATION OF CASE STUDIES ON PRESSURES ASSESSMENT



PROJECT FOR DETERMINATION OF SENSITIVE AREAS AND WATER QUALITY OBJECTIVES ON THE BASIS OF WATERSHED IN TURKEY



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River Basins in Turkey



Figure: 25 River Basins in Turkey (RBPAP, 2013).

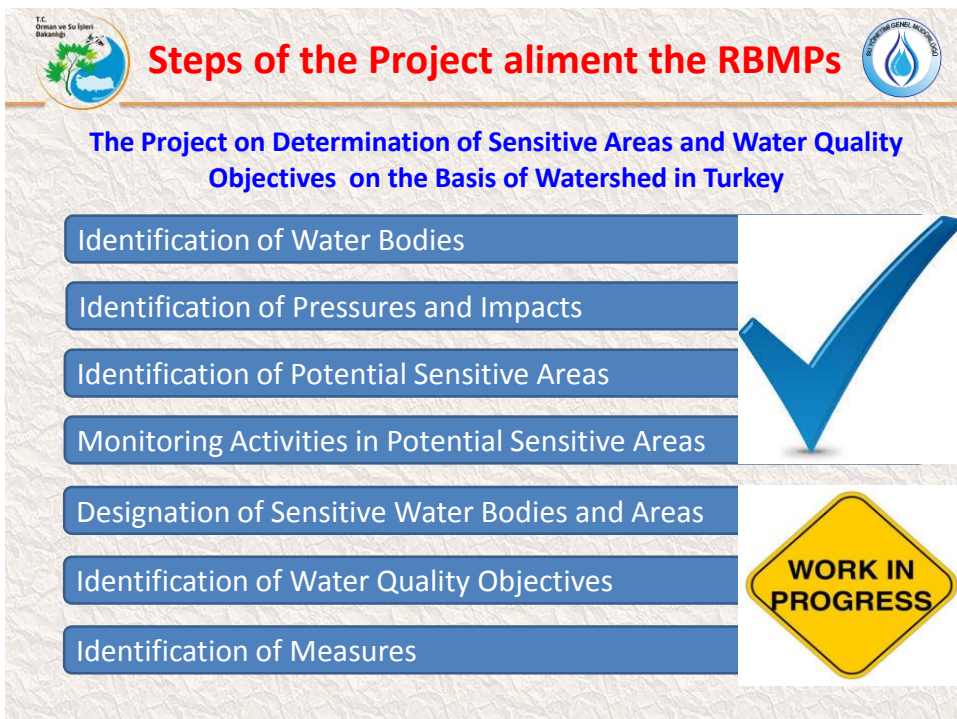
"Sensitive Area" Concept in WFD

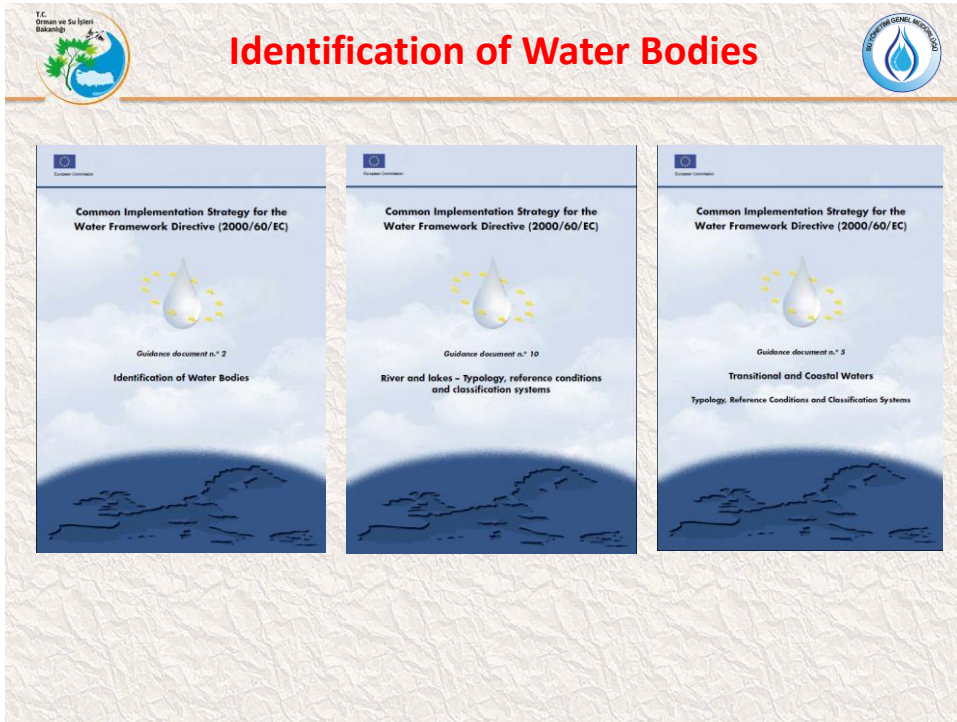
ANNEX IV

PROTECTED AREAS

1. The register of protected areas required under Article 6 shall include the following types of protected areas:
 - (i) areas designated for the abstraction of water intended for human consumption under Article 7;
 - (ii) areas designated for the protection of economically significant aquatic species;
 - (iii) bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC;
 - (iv) **nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC and areas designated as sensitive areas under Directive 91/271/EEC; and**
 - (v) areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EEC ⁽¹⁾ and Directive 79/409/EEC ⁽²⁾.
2. The summary of the register required as part of the river basin management plan shall include maps indicating the location of each protected area and a description of the Community, national or local legislation under which they have been designated.


Directive, C. (2000). Council Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy. *Official Journal L*, 327, 72.






Identification of Water Bodies (Acceptances)

- ✓ Minimum water body area: 100 km² for rivers; for lakes and ponds: 50 ha
- ✓ Pressure from Point Sources: Equivalent Population > 10000 people;
Pressure from Diffuse Sources: Agricultural Area > 60%
- ✓ "Strahler" scale is used (Strahler 1 and 2 were ignored).
- ✓ If a river is in drinking water sub-basin or within the boundaries of protected area, it is determined as water body regardless of its Strahler scale.
- ✓ If the heavily modified part is more than 10% of the water body, this part is taken as a separate water body.
- ✓ The geology layer is classified under 5 sub-types as calcareous, alkaline, siliceous, alluvial and mixed. The water bodies are evaluated under 2 categories as high mineral (calcareous and alkaline) and low mineral (siliceous).



Basins - Number of Water Bodies




Basin Name	River	Lake	Total	Basin Name	River	Lake	Total
Akarçay	29	11	40	Gediz	85	11	96
Antalya	52	20	72	Kızılırmak	108	71	179
Aras	48	14	62	Konya	56	34	90
Asi	33	7	40	Northern Aegean	36	10	46
Western Med.	53	23	76	K.Menderes	34	11	45
Western Black Sea	67	22	89	Marmara	165	40	205
Burdur	15	11	26	Meriç-Ergene	78	37	115
B.Menderes	78	48	126	Sakarya	155	58	213
Ceyhan	80	22	102	Seyhan	61	18	79
Çoruh	32	13	45	Susurluk	106	37	143
Eastern Med.	67	11	78	Van	21	16	37
Eastern Black Sea	52	6	58	Yeşilırmak	69	40	109
Fırat-Dicle	225	61	286				

In 25 River Basins


Number of Rivers: 1805

Number of Lakes: 652


TOTAL: 2457




Determination of Typology



<u>Rivers</u>	<u>Lakes</u>
<ul style="list-style-type: none"> Flow Regime (seasonal/continuous) Elevation Inclination Geology Drainage Area Precipitation 	<ul style="list-style-type: none"> Elevation Area Depth Geology



Basins - Number of Typologies



Basin Name	River	Lake	Total
Akarçay	11	6	17
Antalya	21	6	27
Aras	10	2	12
Asi	14	5	19
Western Med.	19	10	29
Western Black Sea	13	8	21
Burdur	7	4	11
B.Menderes	17	10	27
Ceyhan	22	12	34
Çoruh	8	5	13
Eastern Med.	22	8	30
Eastern Black Sea	12	4	16
Fırat-Dicle	30	13	43

Basin Name	River	Lake	Total
Gediz	9	4	13
Kızılırmak	15	13	28
Konya	22	11	33
Northern Aegean	8	3	11
K.Menderes	9	4	13
Marmara	6	5	11
Meriç-Ergene	4	3	7
Sakarya	24	11	35
Seyhan	22	8	30
Susurluk	15	8	23
Van	4	4	8
Yeşilırmak	14	8	22

In 25 River Basin

Number of Typologies in Rivers: 56

Number of Typologies in Lakes: 23



Driving Forces and Pressures Assessment



Diffuse Source	<ul style="list-style-type: none"> • Urban drainage (including runoff) • Agriculture (surface runoff, soil erosion, artificial drainage flow & leaching) • Forestry (surface runoff & soil erosion) • Other diffuse (industry discharges to the atmosphere & transportation)
Point Source	<ul style="list-style-type: none"> • Urban wastewater • Industrial wastewater • Mining (uncontrolled discharges) • Landfill leakage
Morphological & Abstraction	<ul style="list-style-type: none"> • Flow regulation • Reduction in flow • Variation in flow characteristics (e.g. volume, velocity, depth)
Others	<ul style="list-style-type: none"> • Fisheries (fishing & fish stocking) • Introduction of alien species (Competition with indigenous species)

CIS for the WFD, Guidance Document No: 3 Analysis of Pressures and Impacts, 2003.



Identification of Potential Sensitive Areas



STAGE 1

- SWAT (Soil and Water Assessment Tool) Model results

STAGE 2 (General Screening Approach)

- For lakes:
 - Trophic State Index (TN, TP & Chlorophyll-a) → calculated based on the model
- For rivers:
 - Water quality monitoring results
 - Pressure-impact analysis (point, diffuse and morphological)
 - Sensitivity Index (based on basin)

STAGE 3

- Expert Opinions



Monitoring Activities in Potential Sensitive Areas



For lakes


300 ha > 2 points

300 ha < 1 point


For rivers

Minimum 1 Point

for each *Potential Sensitive Area*



Physicochemical Monitoring Activities in Potential Sensitive Areas




Monitoring parameters:


- pH
- Temperature
- Dissolved Oxygen
- Chlorophyll-a
- Secchi Disk
- Suspended Solid
- Total Organic Carbon
- Total Nitrogen
- Nitrate
- Ammonium
- Total Phosphorus
- Phosphate

Monitoring frequency:

- 4 sampling/year (seasonal)



Biological Monitoring Activities in Potential Sensitive Areas

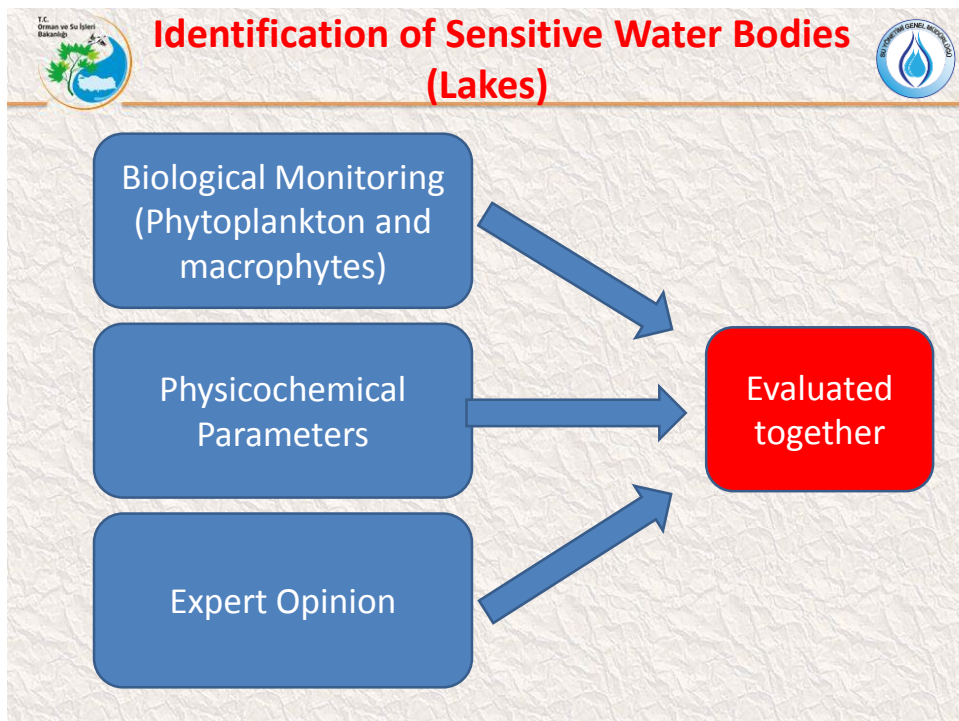
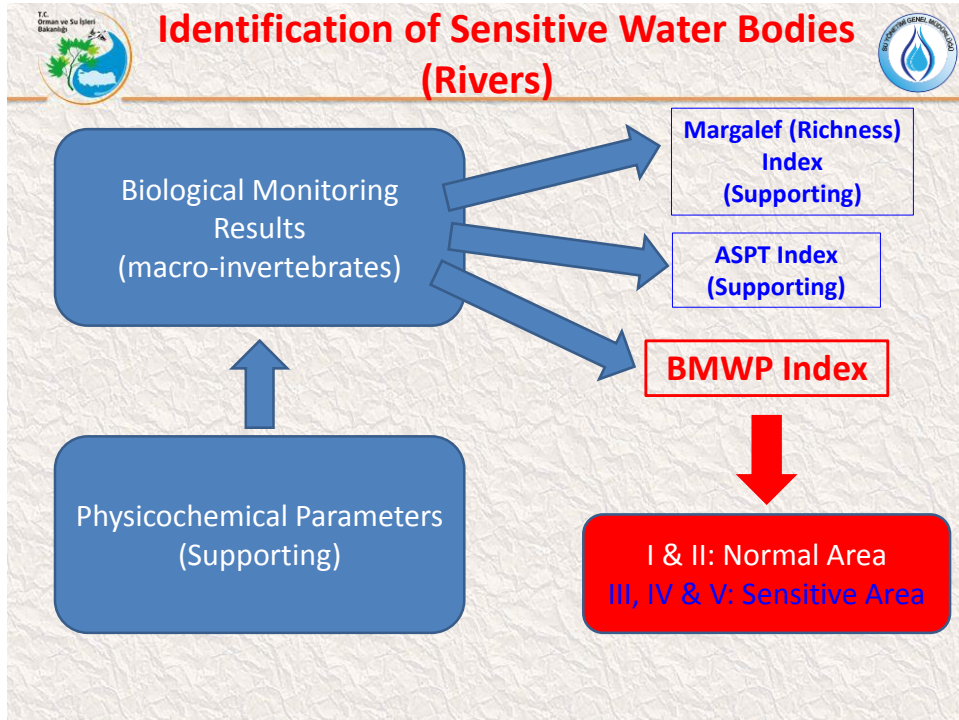


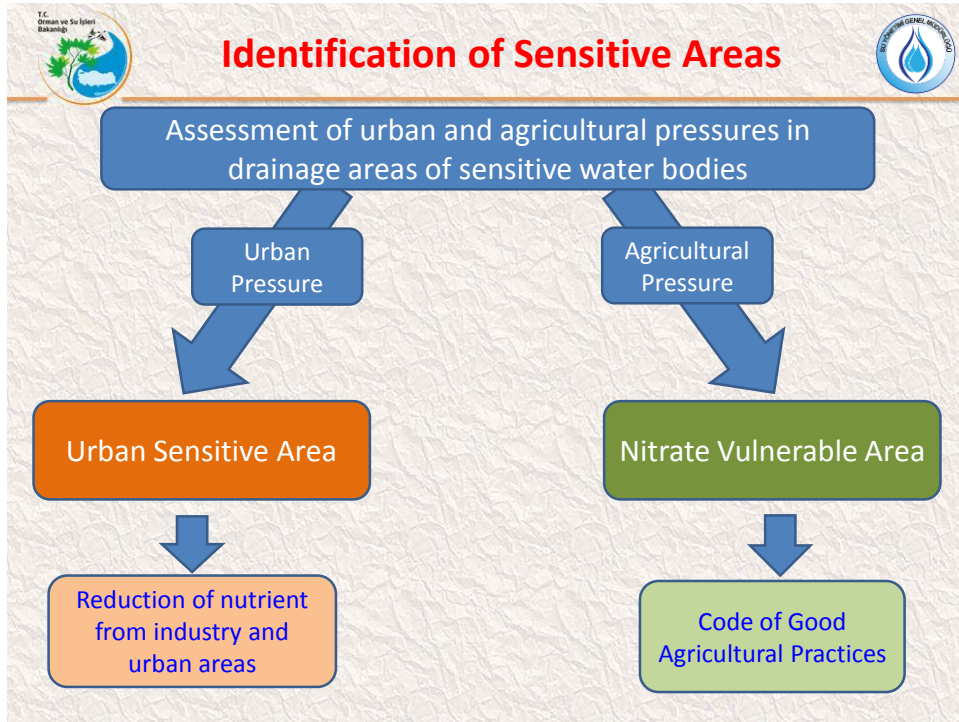
Monitoring parameters:

- Lakes:
 - *Phytoplankton* → deep lakes
 - *Phytoplankton and macrophytes* → shallow lakes
- Rivers:
 - *Macro-invertebrates*

Monitoring frequency:

- Lakes : Once a year (15th of September-15th of October)
 - *Cyanobacteria* → fall season
- Rivers : Once a year (in spring)
 - Aegean and Mediterranean: March-May
 - East and Black Sea: June-July







**THANK YOU VERY
MUCH FOR YOUR
ATTENTION**

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Senaryolarda Uygulanan Tedbirler



Measures for Point Sources:

- ✓ Population < 2000 → Secondary Treatment
- ✓ 2000 < Population < 10.000 → Secondary Treatment
- ✓ Population > 10.000 → Tertiary Treatment (Biological N, P removal)

Code of Good Agricultural Practices (CoGAP):

- ✓ 50% reduction in load from agriculture (including livestock)

Soil Erosion Control:

- ✓ 50% reduction in load from forestry