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Water and Data in Eastern Partner Countries

WATER MANAGEMENT, A BIG-PICTURE ISSUE

Baku, 4 December 2023

Ing. Philippe SEGUIN

Implementing partners

umweltbundesamt
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OiEau International Office for Water

OECD
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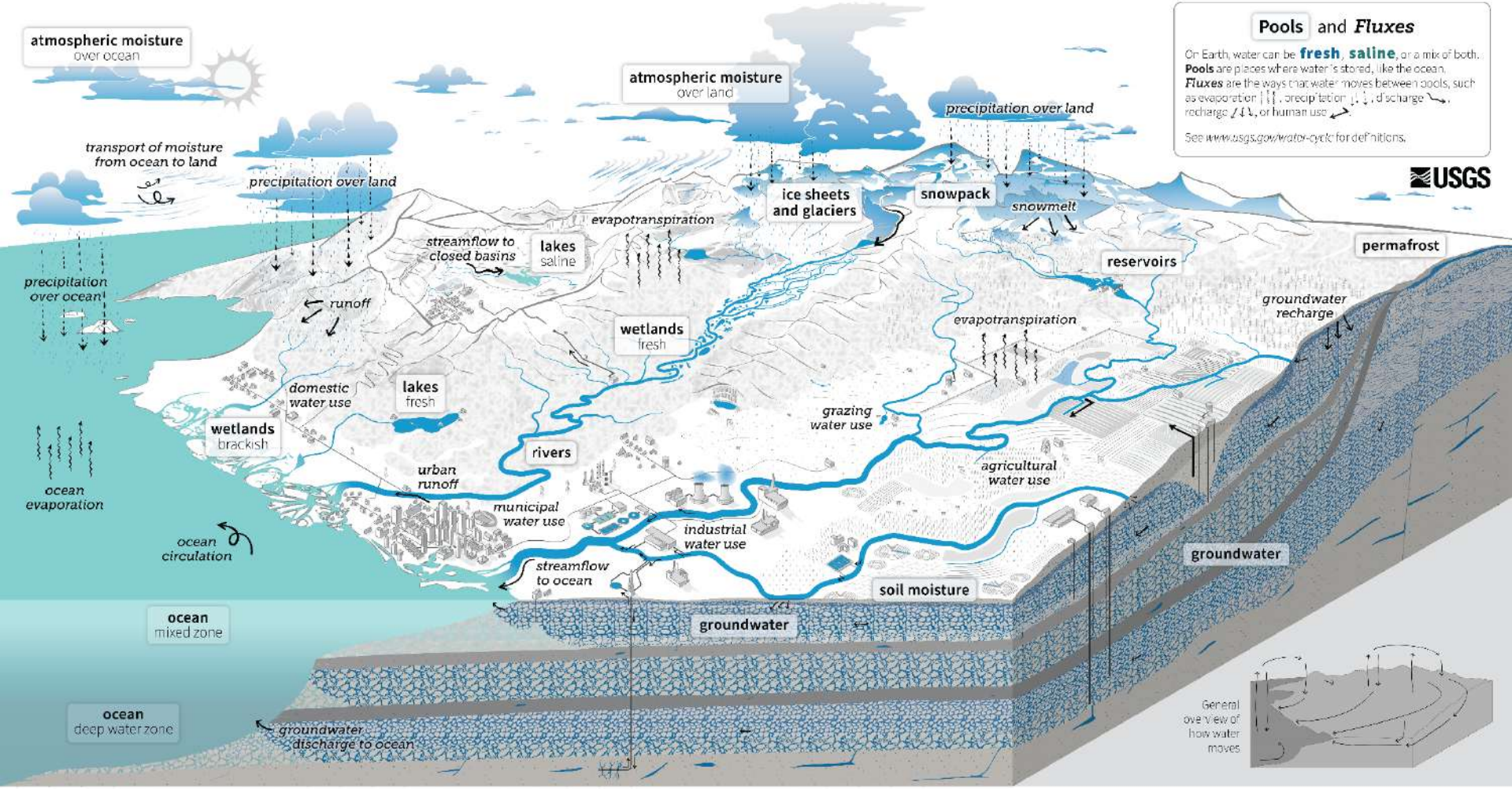
6 PILLARS FOR INTEGRATED WATER RESOURCES MANAGEMENT



The Water Cycle

The water cycle describes where water is found on Earth and how it moves. Water can be stored in the atmosphere, on Earth's surface, or below the ground. It can be in a liquid, solid, or gaseous state. Water moves between the places it is stored at large scales and at very small scales. Water moves naturally and because of human interaction, both of which affect where water is stored, how it moves, and how clean it is.

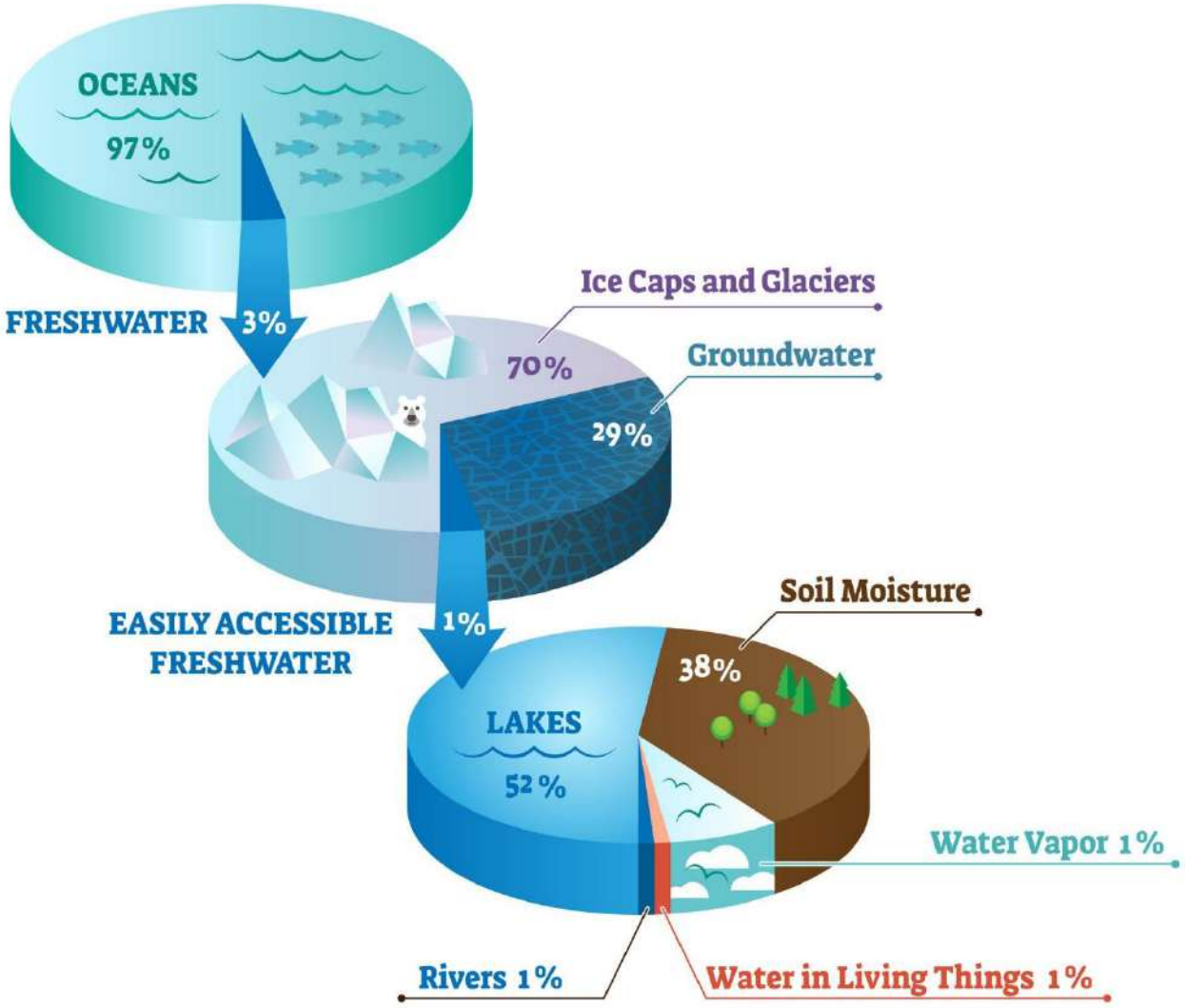
Liquid water can be fresh, saline (salty), or a mix (brackish). Ninety-six percent of all water is saline and stored in **oceans**. Places like the ocean, where water is stored, are called **pools**. On land, saline water is stored in **saline lakes**, whereas fresh water is stored in liquid form in **freshwater lakes**, artificial **reservoirs**, **rivers**, **wetlands**, and in soil as **soil moisture**. Deeper underground, liquid water is stored as **groundwater** in aquifers, within the cracks and pores of rock. The solid, frozen form of water is stored in **ice sheets**, **glaciers**, and **snowpack** at high elevations or near the Earth's poles. Frozen water is also found in the soil as **permafrost**. Water vapor, the gaseous form of water, is stored as **atmospheric moisture** over the ocean and land.

As it moves, water can transform into a liquid, a solid, or a gas. The different ways in which water moves between pools are known as **fluxes**. **Circulation** mixes water in the oceans and transports water vapor in the atmosphere. Water moves between the atmosphere and the Earth's surface through **evaporation**, **evapotranspiration**, and **precipitation**. Water moves across the land surface through **snowmelt**, **runoff**, and **streamflow**. Through infiltration and **groundwater recharge**, water moves into the ground. When underground, groundwater flows within aquifers and can return to the surface through **springs** or from natural **groundwater discharge** into rivers and oceans.

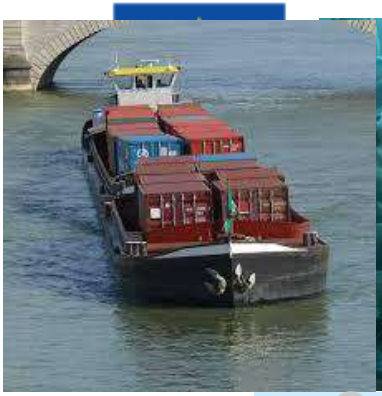
Humans alter the water cycle. We redirect rivers, build dams to store water, and drain water from wetlands for development. We use water from rivers, lakes, reservoirs, and groundwater aquifers. We use that water (1) to supply our **homes** and **communities**; (2) for **agricultural** irrigation and **grazing** livestock; and (3) in **industrial** activities like thermoelectric power generation, mining, and aquaculture. The amount of available water depends on how much water is in each pool (water quantity). Water availability also depends on when and how fast water moves (water timing), how much water is used (water use), and how clean the water is (water quality).

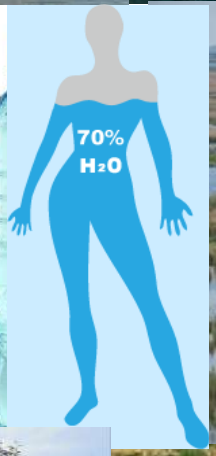
Human activities affect **water quality**. In agricultural and urban areas, irrigation and precipitation wash fertilizers and pesticides into rivers and groundwater. Power plants and factories return heated and contaminated water to rivers. Runoff carries chemicals, sediment, and sewage into rivers and lakes. Downstream from these types of sources, contaminated water can cause harmful algal blooms, spread diseases, and harm habitats. **Climate change** is also affecting the water cycle. It affects water quality, quantity, timing, and use. Climate change is also causing ocean acidification, sea level rise, and extreme weather. Understanding these impacts can allow progress toward sustainable water use.

EARTH'S WATER



WHICH WATER ARE WE TALKING ABOUT?





WATER FOR ALL, ALL FOR WATER!







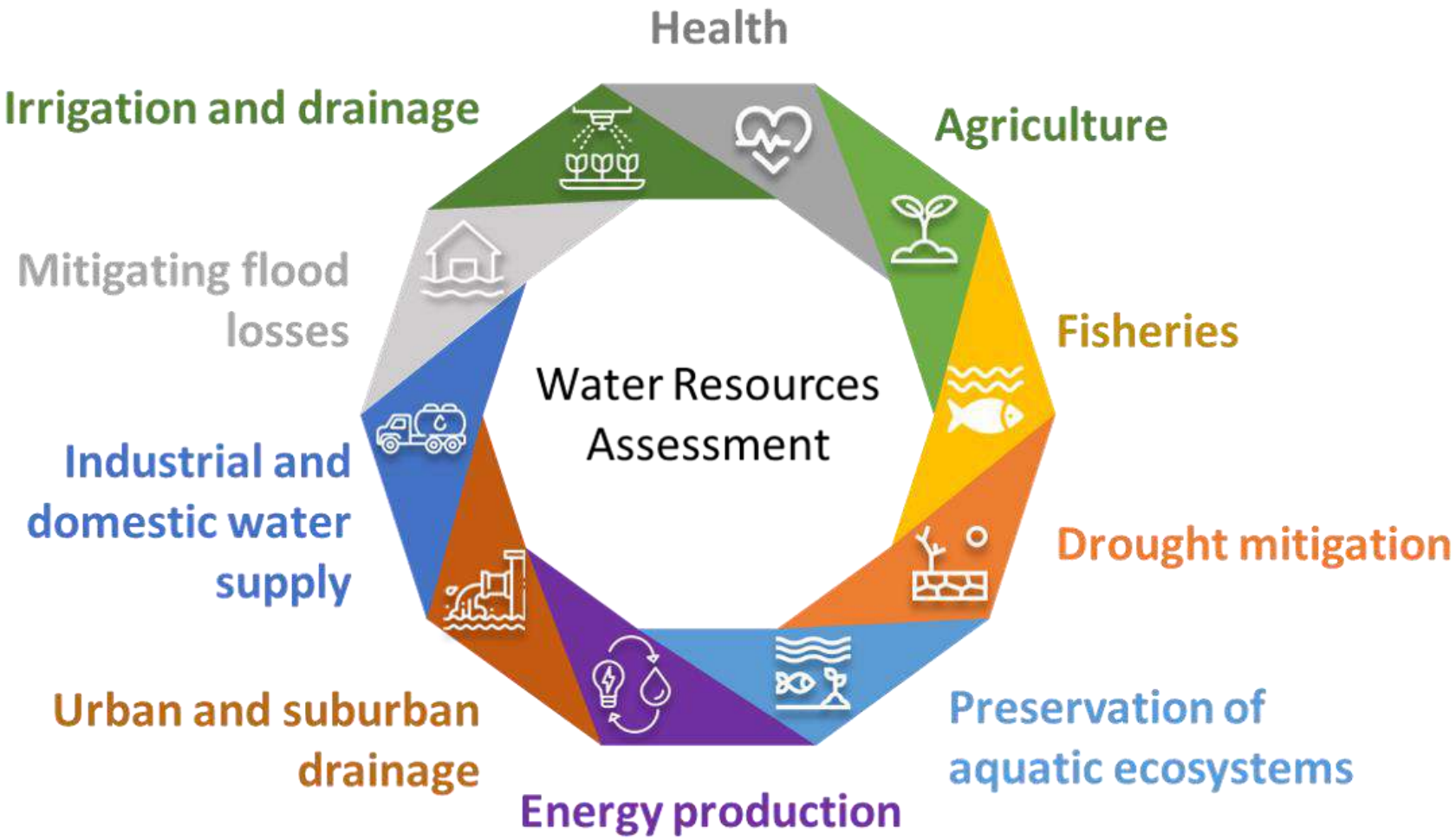



INTEGRATED WATER RESOURCES MANAGEMENT (IWRM)

Meeting the needs, keeping the balance

AQUATIC ENVIRONMENT
Uses, functions and perceptions

Commodity	• Water resources (agriculture, drinking water, industry) • Energy • Fishery, shell farms • Aggregates • Transport by inland waterways • Professional fishing	*Economic exploitation*
Watershed drain	• Flood transfer • Treated water transfer	*Facilitate transfers*
Landscape, leisures	• Landscape organisation • Nautical leisures • Leisure fishing • Hiking	*Landscape amenity*
Ecosystem	• Biodiversity • Free services	*Environmental protection*


Health
Irrigation and drainage
Agriculture
Mitigating flood losses
Fisheries
Water Resources Assessment
Industrial and domestic water supply
Drought mitigation
Urban and suburban drainage
Preservation of aquatic ecosystems
Energy production

VISION: SUSTAINABLE DEVELOPMENT

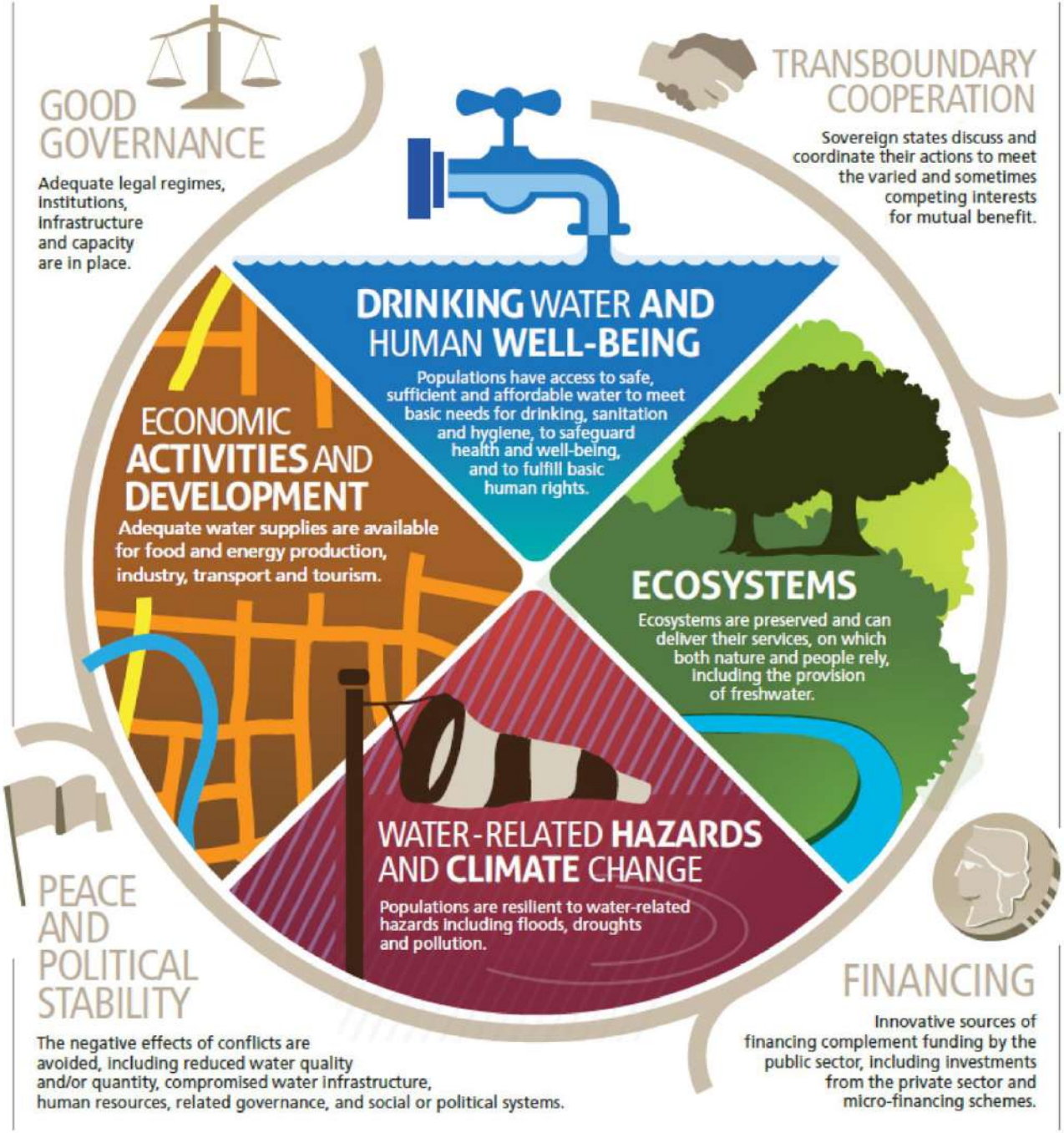
VISION

SUSTAINABLE DEVELOPMENT

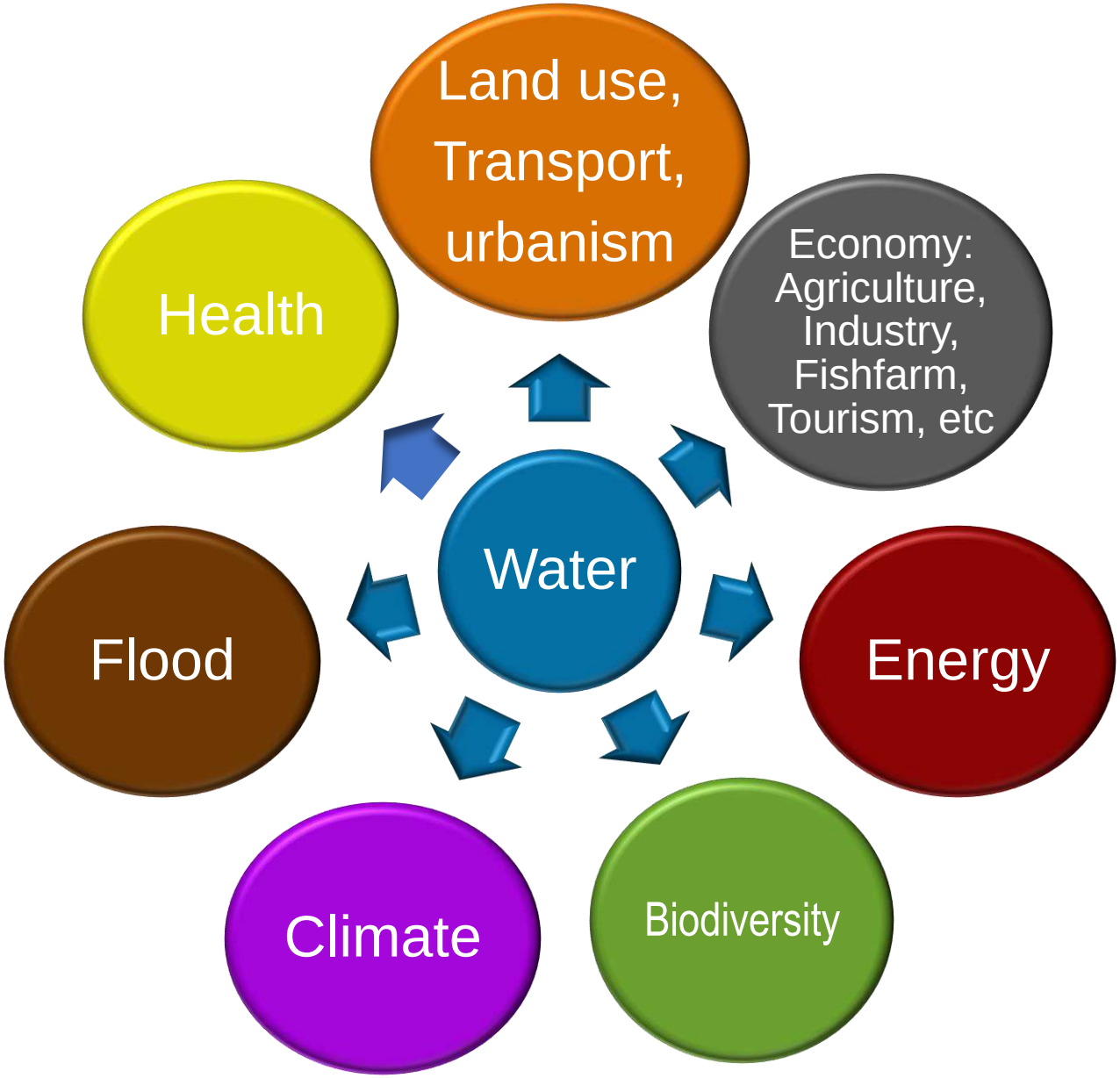
Integrated Water Resources Management IWRM

National Strategy

International Agreement

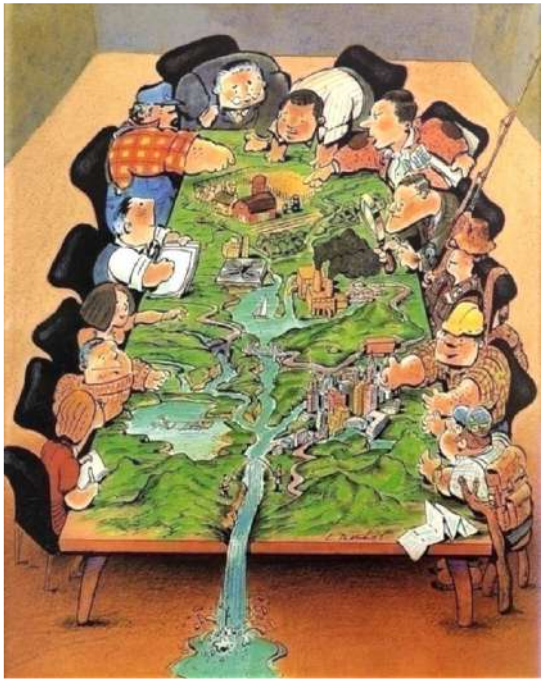

GOOD GOVERNANCE
Adequate legal regimes, institutions, infrastructure and capacity are in place.
TRANSBOUNDARY COOPERATION
Sovereign states discuss and coordinate their actions to meet the varied and sometimes competing interests for mutual benefit.
DRINKING WATER AND HUMAN WELL-BEING
Populations have access to safe, sufficient and affordable water to meet basic needs for drinking, sanitation and hygiene, to safeguard health and well-being, and to fulfill basic human rights.
ECONOMIC ACTIVITIES AND DEVELOPMENT
Adequate water supplies are available for food and energy production, industry, transport and tourism.
ECOSYSTEMS
Ecosystems are preserved and can deliver their services, on which both nature and people rely, including the provision of freshwater.
WATER-RELATED HAZARDS AND CLIMATE CHANGE
Populations are resilient to water-related hazards including floods, droughts and pollution.
PEACE AND POLITICAL STABILITY
The negative effects of conflicts are avoided, including reduced water quality and/or quantity, compromised water infrastructure, human resources, related governance, and social or political systems.
FINANCING
Innovative sources of financing complement funding by the public sector, including investments from the private sector and micro-financing schemes.

DIFFERENT PLACES OF GOVERNANCE AND PLANS AFFECT WATER

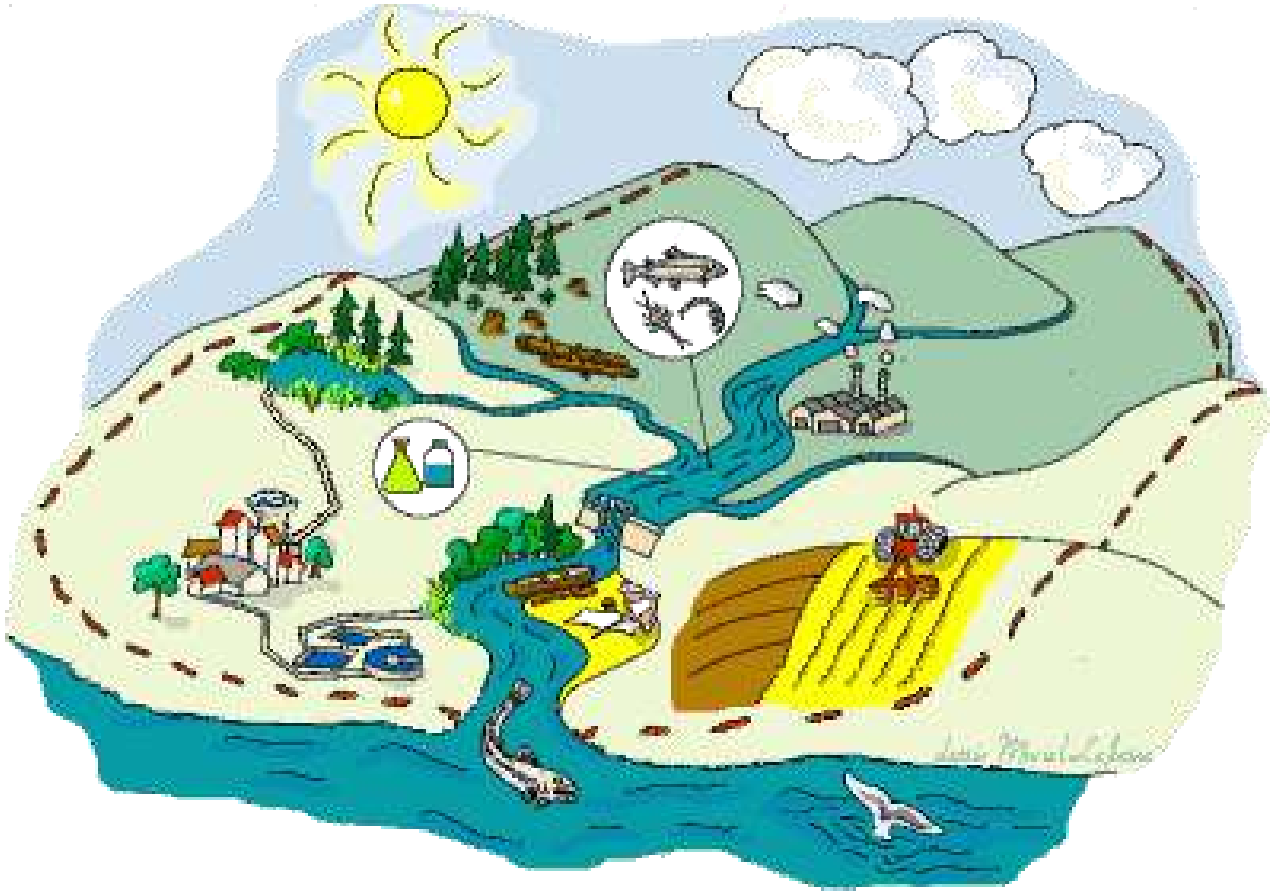


GOVERNANCE

CONCERTATION IS NECESSARY



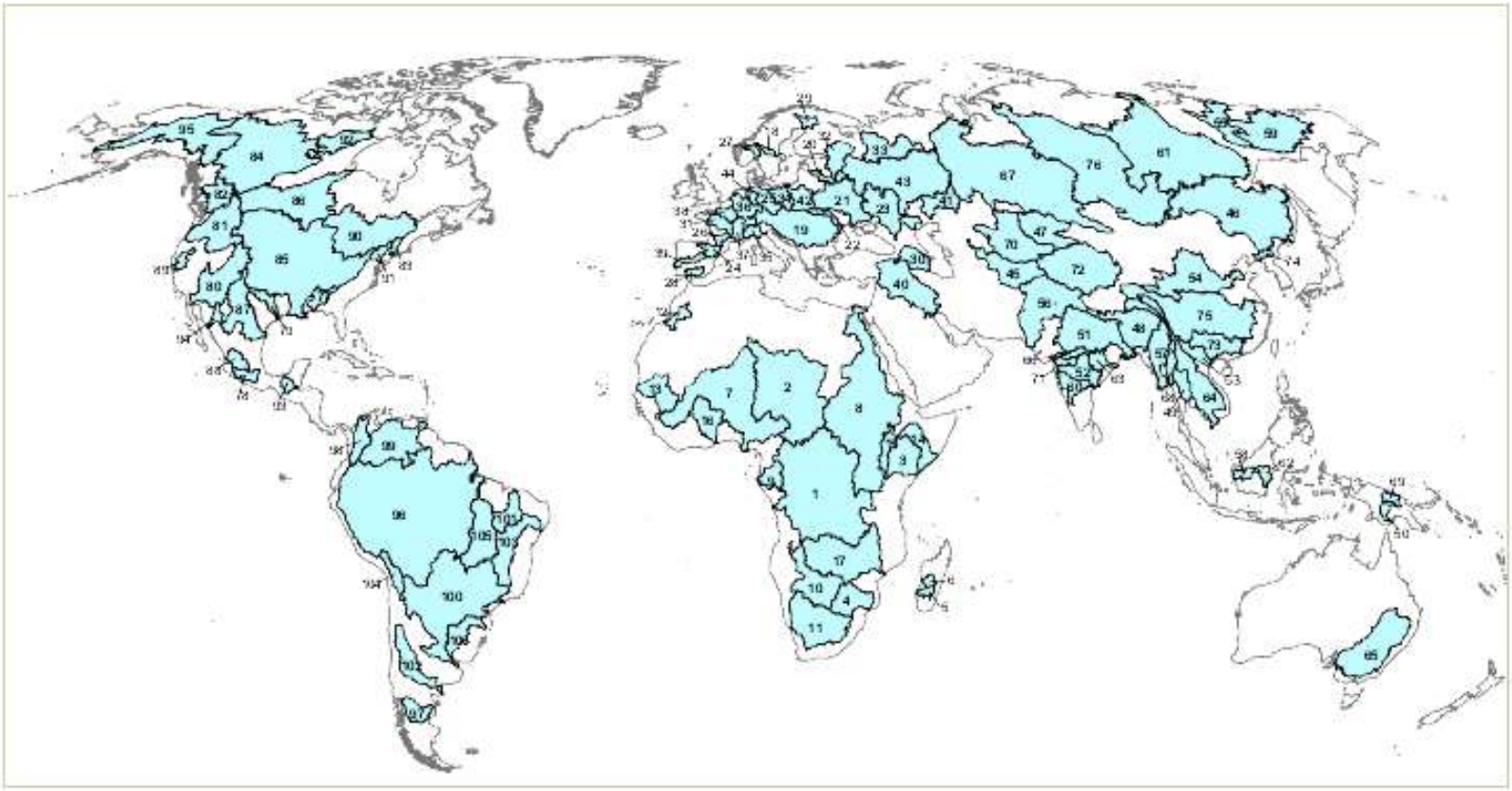
EVERYTHING HAPPENS IN A RIVER BASIN



A river basin is the portion of land drained by a river and its tributaries.

The River Basin is the unit for Integrated Water Resources Management (IWRM).


Illustration : Matthieu Nivesse - © ONEMA 2015



Africa

1 Congo
2 Lake Chad
3 Jubba
4 Limpopo
5 Mangoky
6 Mania
7 Niger
8 Nile
9 Ogooue
10 Okavango Swamp
11 Orange
12 Oued Draa
13 Senegal
14 Shaballe
15 Turkana
16 Volta
17 Zambezi

Europe

18 Dalalven
19 Danube
20 Daugava
21 Dnieper
22 Dniester
23 Don
24 Ebro
25 Elbe
26 Garonne
27 Glama
28 Guadalquivir
29 Kemijoki
30 Kura-Araks
31 Loire
32 Neva
33 North Dvina
34 Oder
35 Po
36 Rhine & Meuse
37 Rhone
38 Seine
39 Tagus
40 Tigris & Euphrates
41 Ural
42 Vistula
43 Volga
44 Weser

Asia & Oceania

45 Amu Darya
46 Amur
47 Lake Balkhash
48 Brahmaputra
49 Chao Phrya
50 Fly
51 Ganges
52 Godavari
53 Hong (Red River)
54 Hwang He
55 Indigirka
56 Indus
57 Irrawaddy
58 Kapuas
59 Kolyma
60 Krishna
61 Lena
62 Mahakam
63 Mahanadi
64 Mekong
65 Murray-Darling
66 Narmada
67 Ob
68 Salween
69 Sepik
70 Syr Darya
71 Tapti
72 Tarim
73 Xi Jiang
74 Yalu Jiang
75 Yangtze
76 Yenisey

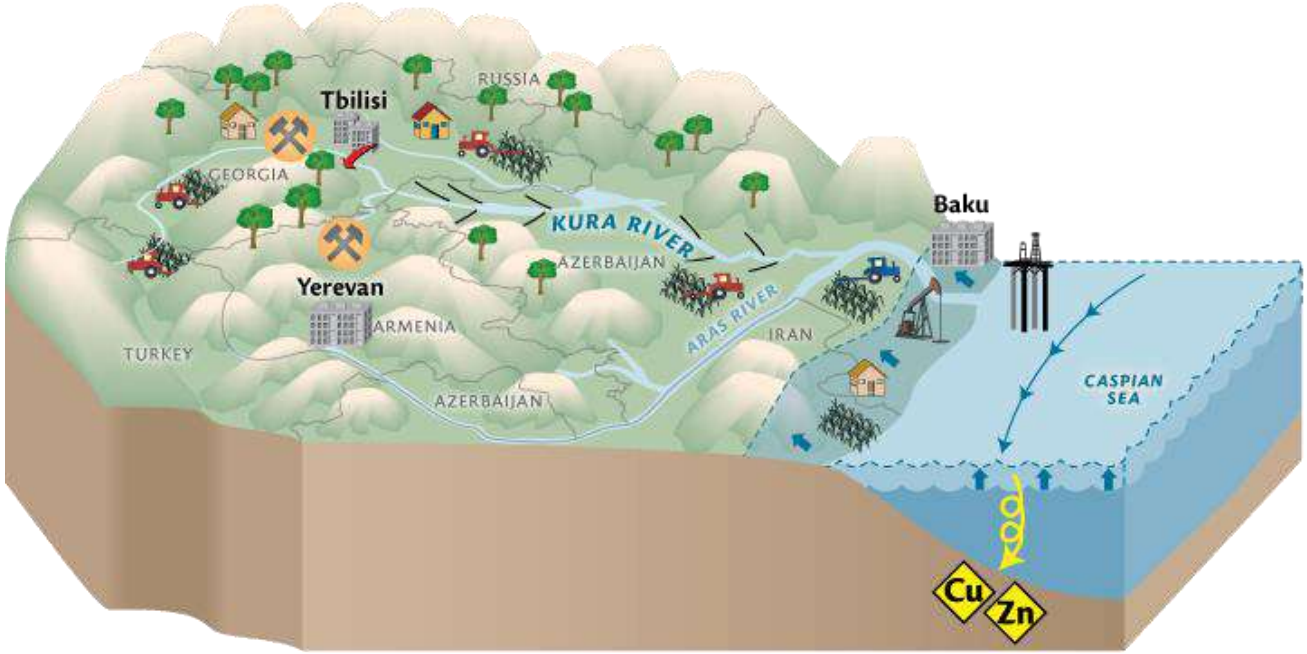
North & Central America

77 Alabama & Tombigbee
78 Balsas
79 Brazos
80 Colorado
81 Columbia
82 Fraser
83 Hudson
84 Mackenzie
85 Mississippi
86 Nelson
87 Rio Grande
88 Rio Grande de Santiago
89 Sacramento
90 St. Lawrence
91 Susquehanna
92 Thelon
93 Usumacinta
94 Yaqui
95 Yukon

South America

96 Amazon
97 Chubut
98 Magdalena
99 Orinoco
100 Paraná
101 Parnaiba
102 Rio Colorado
103 São Francisco
104 Lake Titicaca
105 Tocantins
106 Uruguay

DIAGRAM OF THE KURA RIVER BASIN



The central Kura River basin is part of the larger Kura–Aras River watershed, which drains to the Caspian Sea. Primary threats to the central Kura River basin include untreated wastewater inputs, mining activities, agricultural runoff, and irrigation ditches. The Caspian Sea has a general north-to-south flow, so the plume from the Kura–Aras River tends to flow south. Sediments near the mouth of the river have high concentrations of zinc and copper, which may have been involved in mass mortalities of the Caspian seal. Sea level in the Caspian Sea rose 3 m between 1977 and 1995 and continues to rise.

Conceptual diagram showing the features of and threats to the Kura River basin.

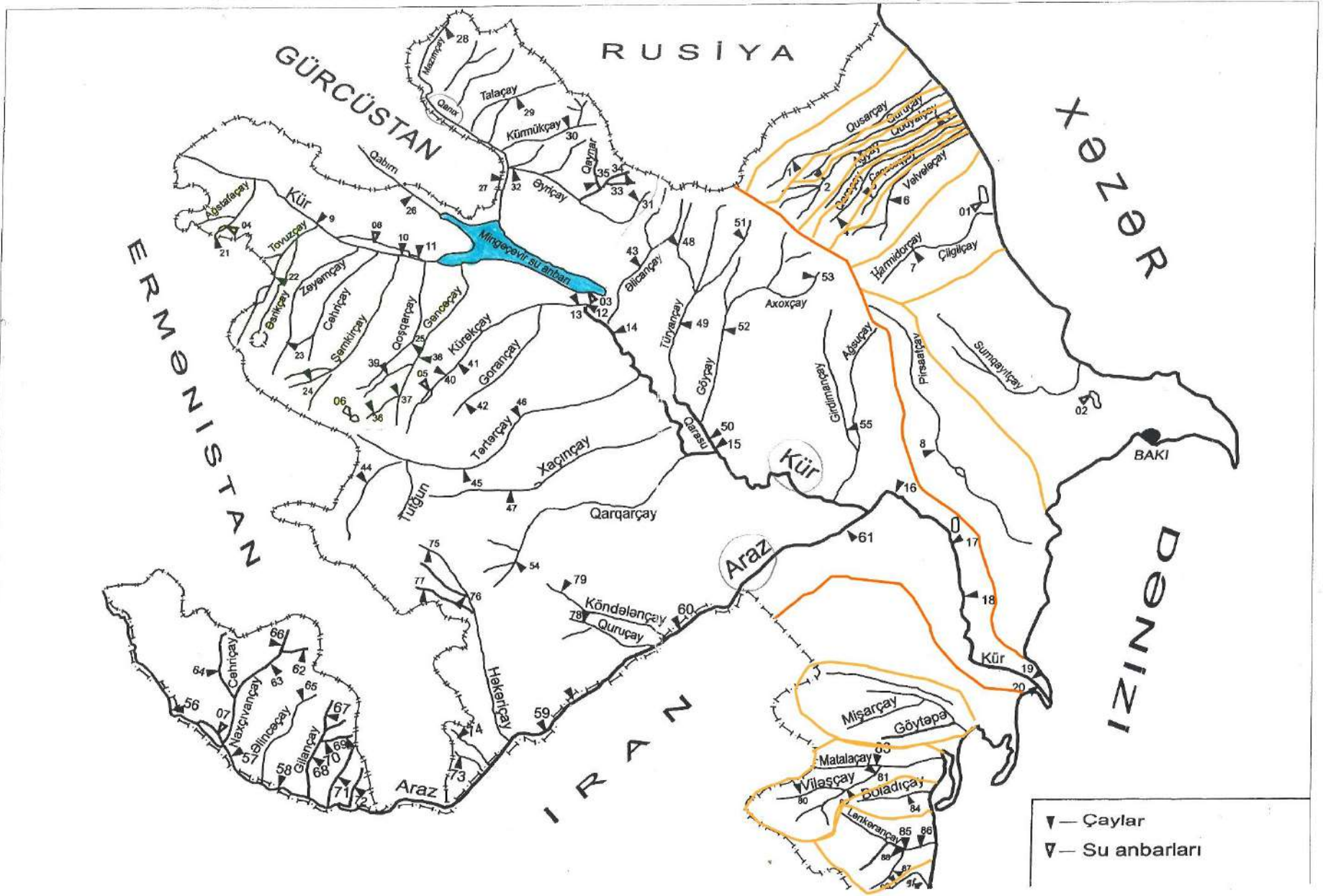
Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: South Caucasus region transboundary report card, IAN Press 2009.

ian.umces.edu

Starting from the end of the last century, the level of Caspian Sea declined again.


RUSSIA
Grozny
Makhachkala
Black Sea
GEORGIA
Batumi
Mtkvari
Liakhvi
Aragvi
Gori
T'bilisi
Iori
Alazani
Potskhovi
Khrami
Rustavi
Paravani
Paravani Lake
Kura
Lake Arpi
Lake Çıldır
Dzoraget
Debed
Pambak
Aghstev
Shamkir Res.
Mingachevir Reservoir
Ajiri
Zoyam
Shamkir
Ganja
Mingachevir
Turyan
Goy
Agsu
Kars
Akhuryan
Mantash
Akhuryan Reservoir
Kasakh
Hrazdan
Lake Sevan
Yerevan
Tartar
Baku
Aras
Metsamor
Karkar
Erzurum
ARMENIA
Aras
Arpa
Shirvan
Mt Ararat 5137m
Balik Lake
AZERBAIJAN
Zangmar
Vorotan
Hakari
Parsabad
Nakhchivan
Aras Reservoir
Voghchi
Khodafarin Reservoir
TURKEY
Caspian Sea
Lankaran
Balha
Aqchay
Van
Ardabil
Tabriz
IRAN
N
0
100
200
300 Km

HİDROLOJİ MƏNTƏQƏLƏRİN YERLƏŞMƏ SXEMİ



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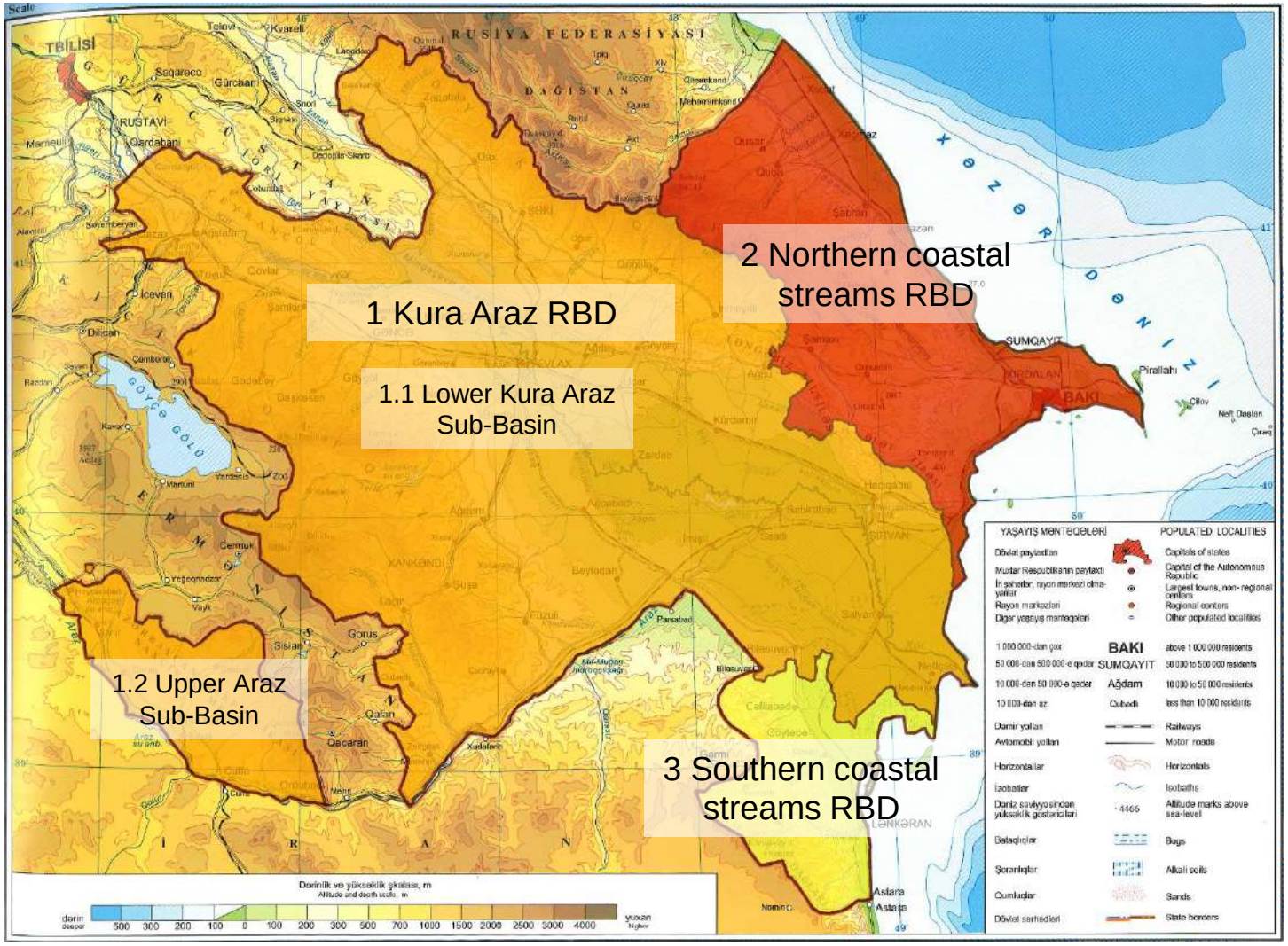
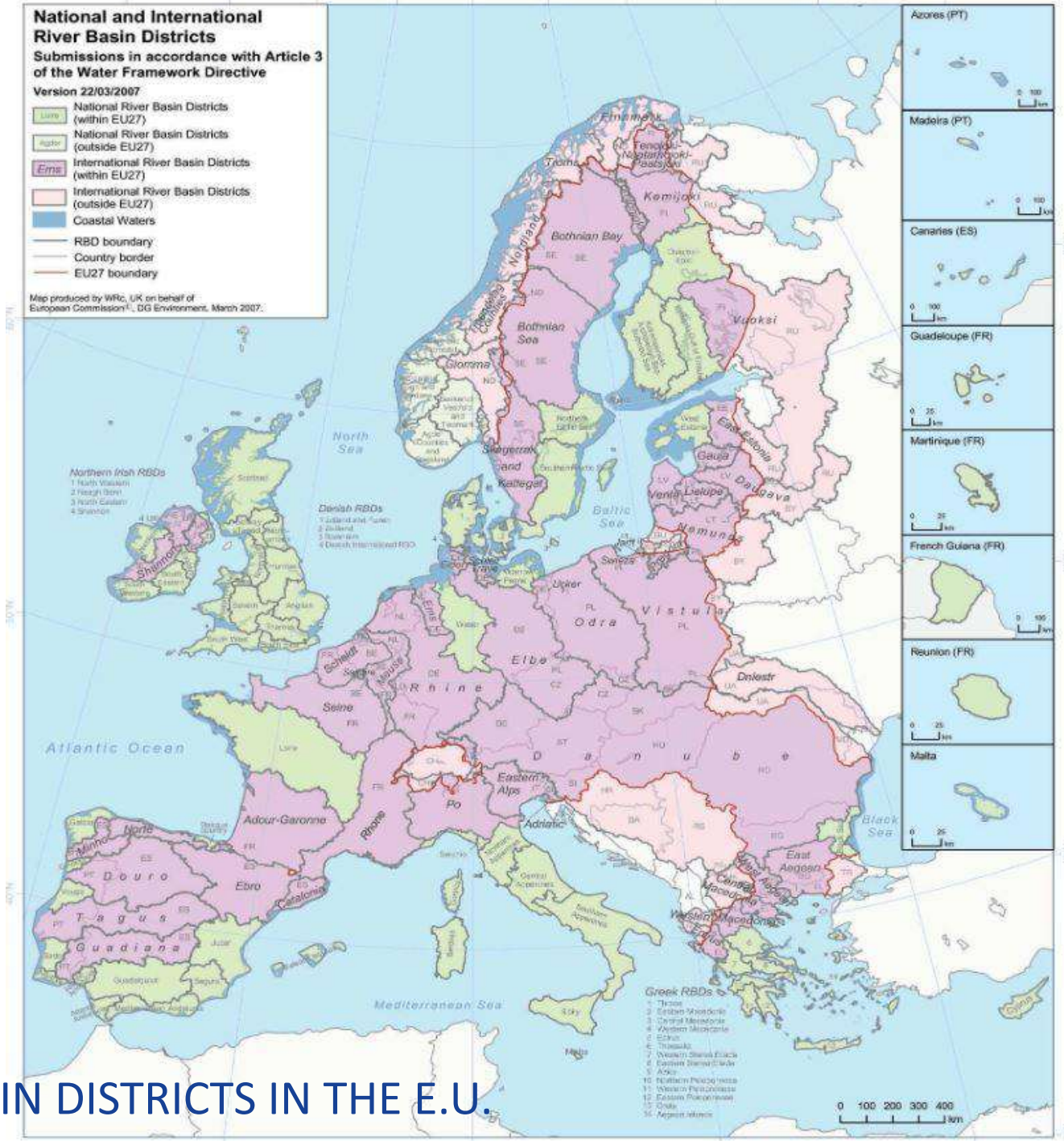
RIVER BASIN DISTRICTS PROPOSAL





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RIVER BASIN DISTRICTS IN THE E.U.

F
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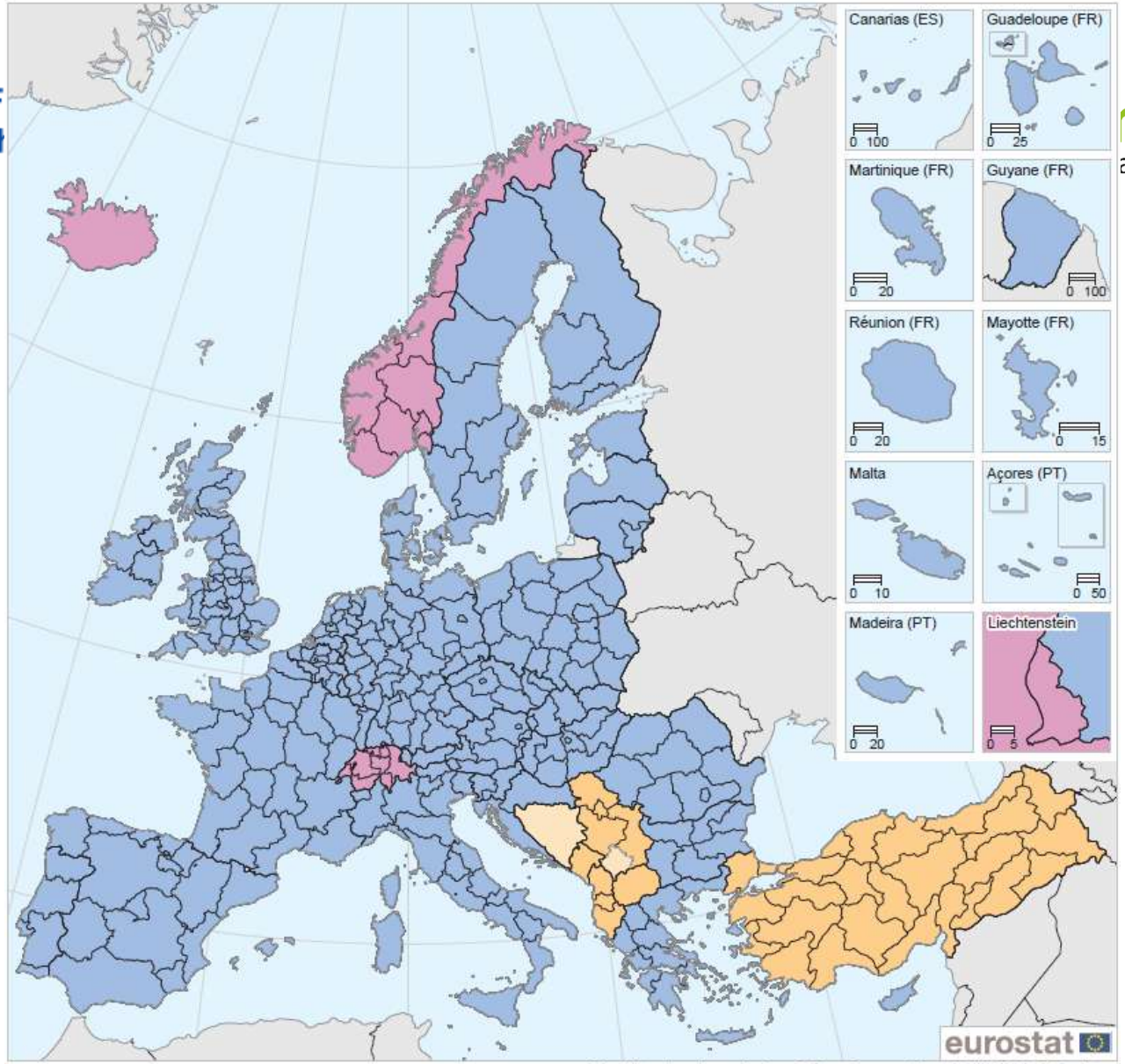

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat — GISCO, 11/2018

Member States of the European Union (EU-28)
EFTA countries
Candidate countries
Potential candidates

0 200 400 600 800 km

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GLOBAL TRENDS OF WATER MANAGEMENT IN THE WORLD

1. Public ownership of water / common heritage
2. Integrated Water Resources Management (IWRM)
3. Within a river basin or local planning system
4. Gathering competences & seeking better coordination
5. Partnership with users
6. Widespread licensing systems
7. Development of water charging systems
8. Cost recovery (water is not a free good)

THREE MAIN FAMILIES OF ACTORS IN FRANCE

STATE

- Negotiates at European and international level
- Prepares national legislation and regulations
- Controls their proper implementation (water police, permit system)

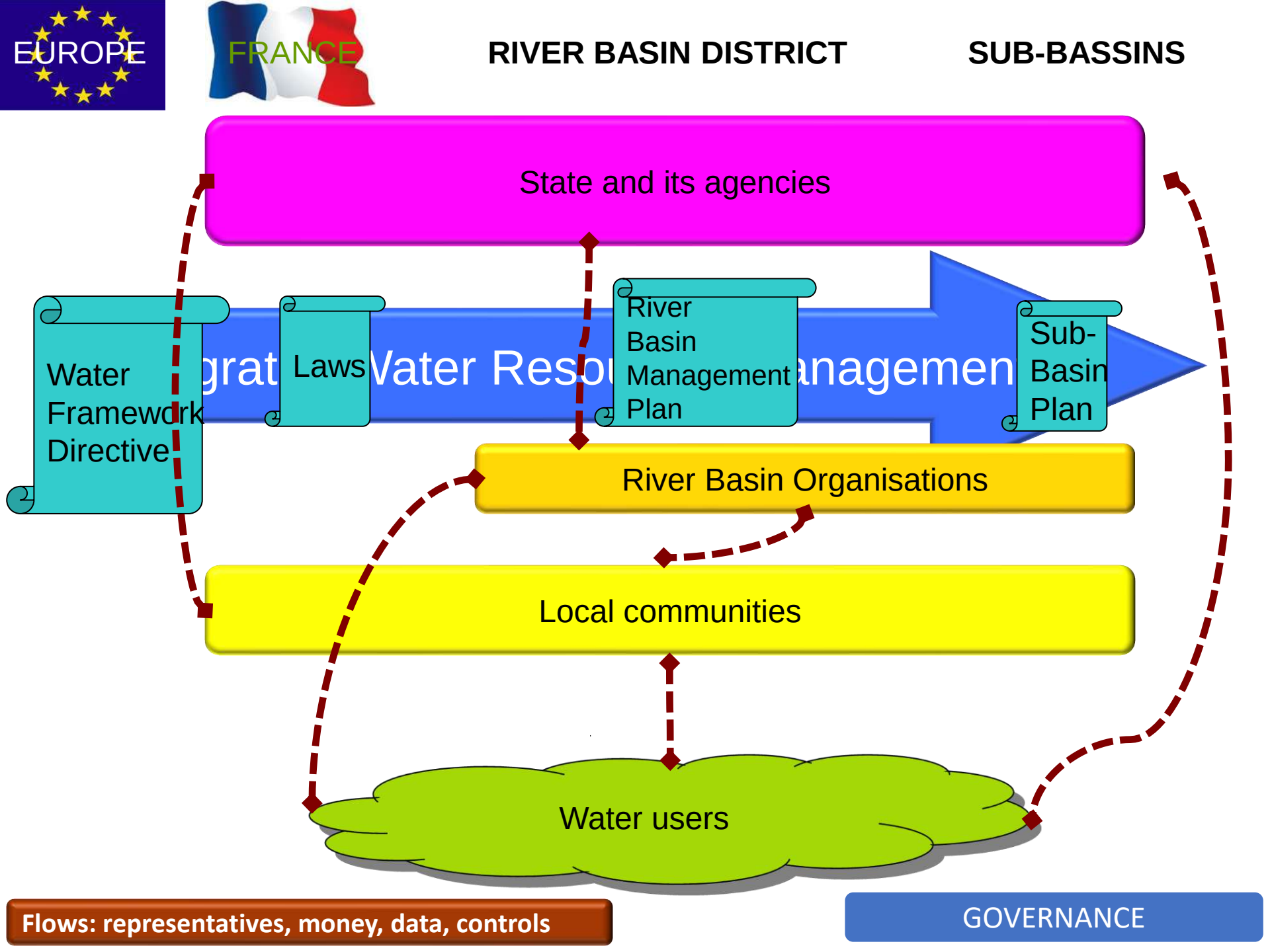
RIVER BASIN ORGANISATIONS

- Participate in water data collection
- Plan at river basin level
- Collect fees
- Provide technical and financial support to local decision-makers

PROJECT OWNERS
local authorities, industries, farmers, NGOs, etc.

- Invest in the management of water and sanitation services and in the preservation of water resources
- May receive incentives from State, River Basin Organisations, Europe, etc.

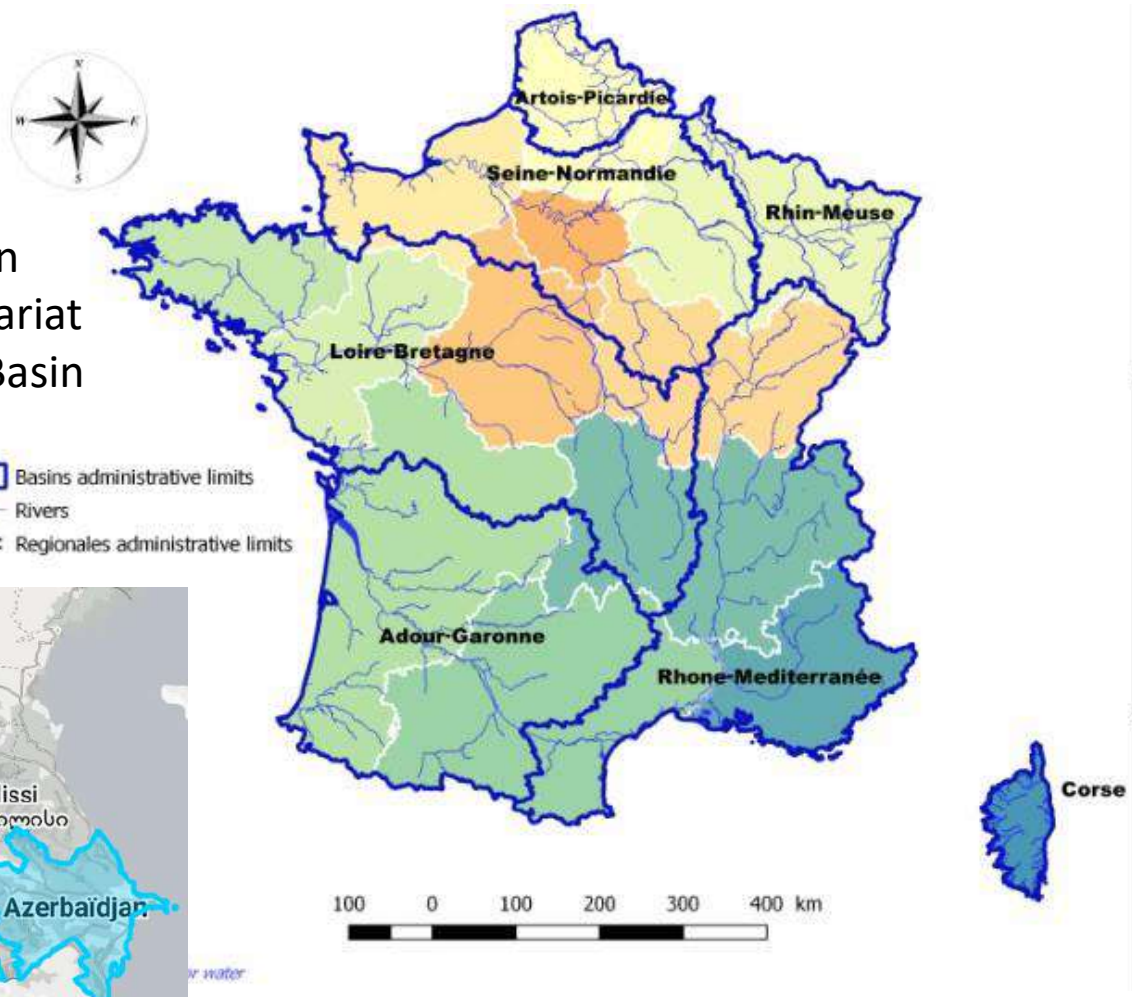
OiEau
Office International de l'Eau


EUROPE
FRANCE
RIVER BASIN DISTRICT
SUB-BASSINS
State and its agencies
Water Framework Directive
Laws
River Basin Management Plan
Sub-Basin Plan
River Basin Organisations
Local communities
Water users
Flows: representatives, money, data, controls
GOVERNANCE

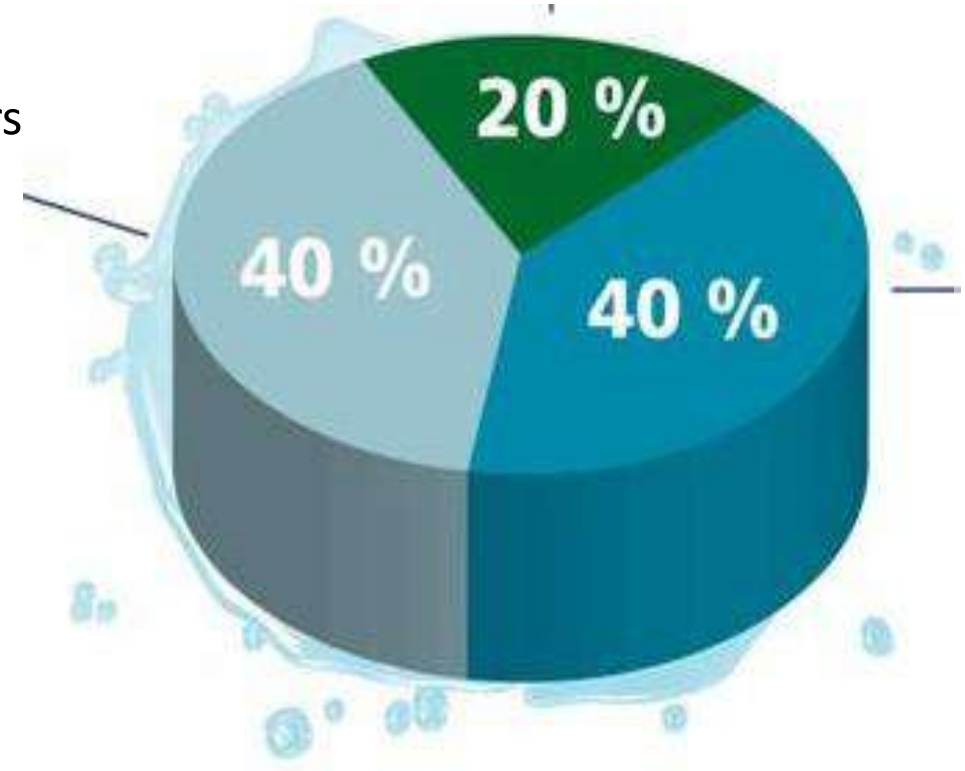
FRANCE: RIVER BASIN DISTRICTS AND ADMINISTRATIVE REGIONS

France
552,000 km²
66 million inhabitants

One River basin Organisation (basin council and its secretariat « water agency ») by River Basin District



CURRENT COMPOSITION OF A RIVER BASIN ORGANISATION: THE BASIN COUNCIL



THE LOIRE-BRITTANNY BASIN COUNCIL : WHO ARE THE 76 USERS? ARTICLE D. 213-17 OF THE ENVIRONMENTAL CODE

ECONOMIC USERS (50%)

- 10 agriculture incl. 1 for organic farming
- 18 industries
- 2 electricity production
- 2 water services
- 1 forestry
- 2 professional fishing (river, sea)
- 1 fishery
- 1 shellfish farming
- 1 tourism

NON ECONOMIC USERS (50%)

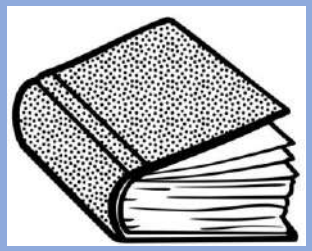
- 13 nature associations
- 10 consumer associations
- 7 fishing associations
- 2 protected areas
- 1 nautical activity
- 1 hunting association
- 4 experts

WHAT IS A RIVER BASIN MANAGEMENT PLAN (RBMP)?

- A global and integrated (holistic) approach to the management of water resources and aquatic ecosystems,
- To improve the health of people, water resources and ecosystems, and to promote development and coherence of sectoral policies.
- A planning document developed according to an established methodology, with public participation and respect for local beliefs,
- A non-technical and clear document with a legal scope for decision-makers and for raising awareness.

A RIVER BASIN MANAGEMENT PLAN (RBMP) IS A PLANNING DOCUMENT AT THE SCALE OF A RIVER BASIN DISTRICT

1. Characterisation of the River Basin (geology, uses, protected areas; pressures, etc.)
2. Status of Water Resources (surface water, groundwater, coastal water; quality, quantity, ecology; trends, climate change)
3. Diagnosis, main issues, objectives
4. Economic analysis
5. Programme of Measures



Adoption = Legal Scope

Implementation

Review (e.g. 6-year cycle in the European Union)

RIVER BASIN MANAGEMENT PLAN

This project is funded by the European Union

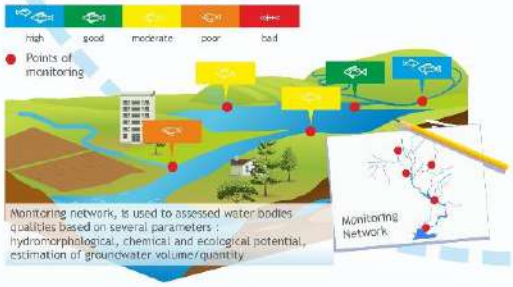
1.1 General description of the river basin

1.2 Water body identification and classification

2. Identification of significant pressures and impacts of human activity on the status of surface water and groundwater

3. Identification and mapping of protected areas

4. Monitoring programme for surface and groundwater bodies



5. Establishing of environmental objectives

6. Economic analysis

7. Programmes of measures

how to achieve good ecological status

PUBLIC CONSULTATIONS

in accordance with the EU-Ukraine Association Agreement

Public consultation

The main aim of the Plan is to ensure the achievement of good ecological and chemical status of surface water bodies and groundwater bodies

DPSIR APPROACH

Drivers

- Economy
  -agriculture
  -industry
- Economic activity
  -production (e.g. material extraction, technology application, etc.)

Pressures

- Water demand
  -resource consumption
  -stress (e.g. emissions)

State

- Water environment
  -water quantity
  -water quality
  -Physical characteristics

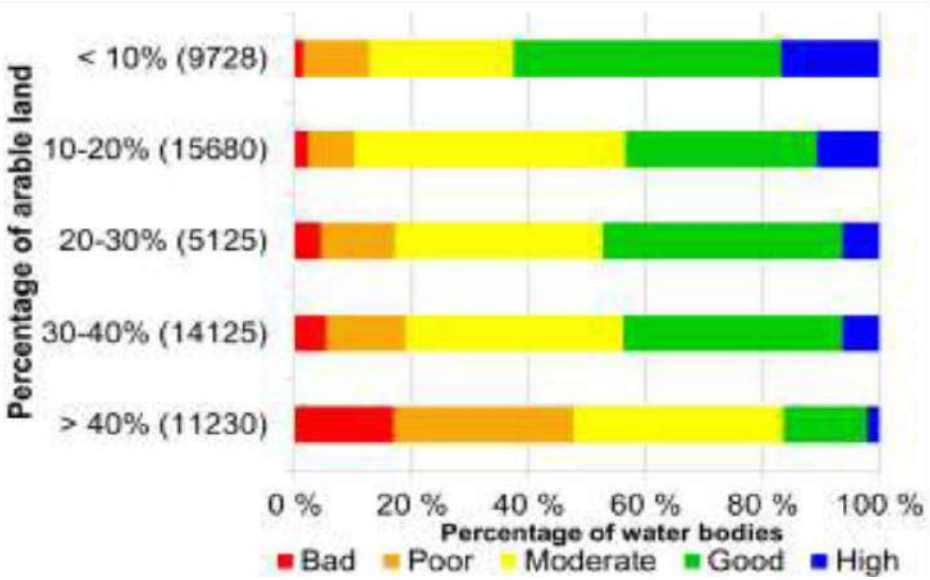
Impact

- Environment
  -pollution
  -depletion
  -ecological integrity
- Economy
  -externality
  -physical damage
- Society
  -human health
  -Conflicts

Responses

- Problem identification
  -impacts measurement
  -impacts prioritizing
  -environmental policies
- Policy making
  -management target setting
  -policy adjustment
  -social compensation
  -sector-specific policies

RELATIONS BETWEEN DRIVING FORCES AND STATUS



http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm

Table 3.1 *Broad categorisation by driving force of pressures to be considered (Note that this is expanded into a complete list of pressures in Table 4.1).*

DIFFUSE SOURCE	urban drainage (including runoff) agriculture diffuse forestry other diffuse
POINT SOURCE	waste water industry mining contaminated land agriculture point waste management aquaculture
ACTIVITIES USING SPECIFIC SUBSTANCES	manufacture, use and emissions from all industrial/agricultural sectors
ABSTRACTION	reduction in flow
ARTIFICIAL RECHARGE	groundwater recharge
MORPHOLOGICAL (Refer also to WFD CIS Guidance Document No 4 on HMWB)	flow regulation river management transitional and coastal management other morphological
OTHER ANTHROPOGENIC	miscellaneous

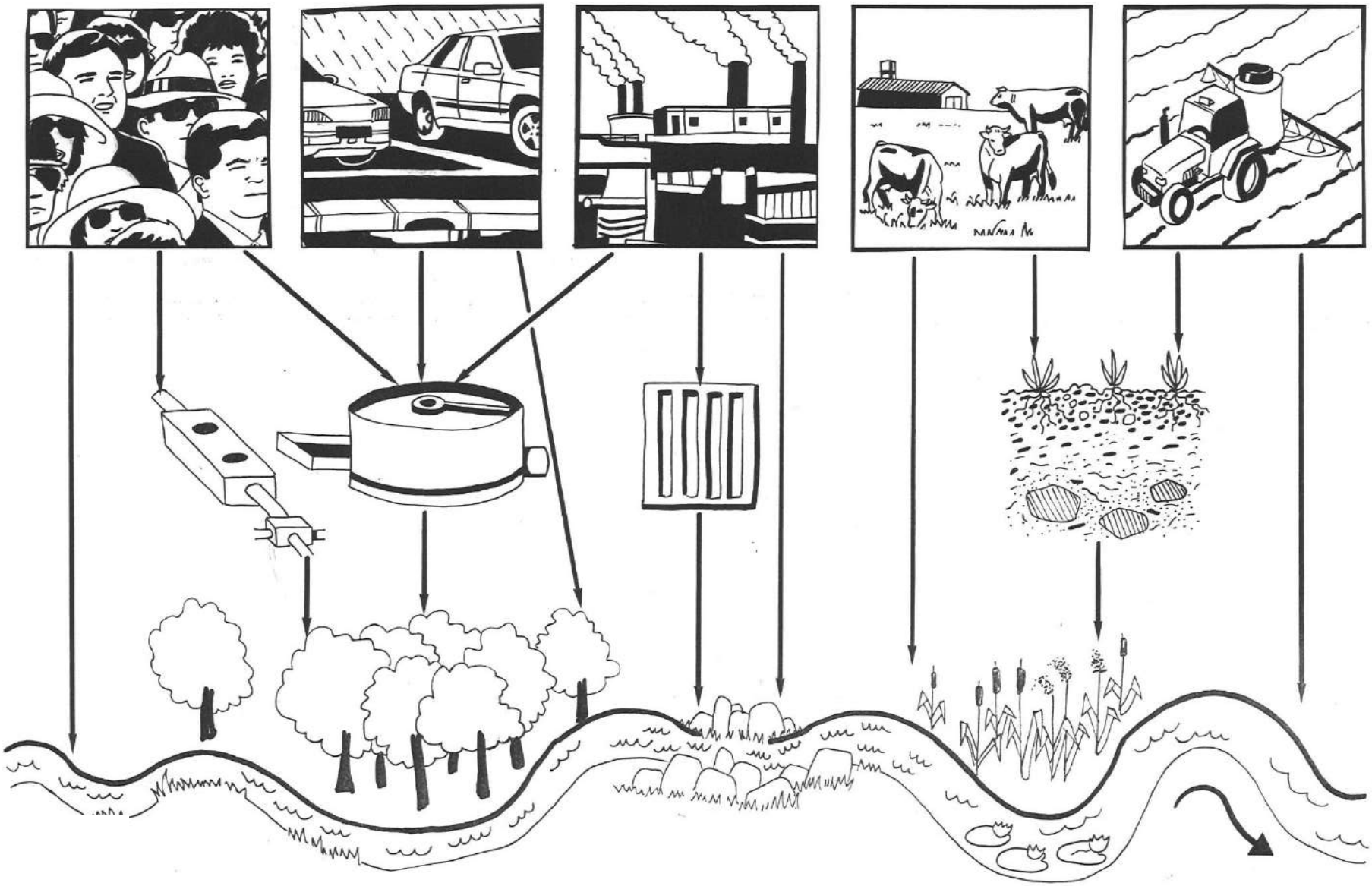
ALIEN INVASIVE SPECIES

ESTIMATION OF POLLUTION FLOWS

FROM HUMAN ACTIVITIES (DRIVERS) TO PRESSURES

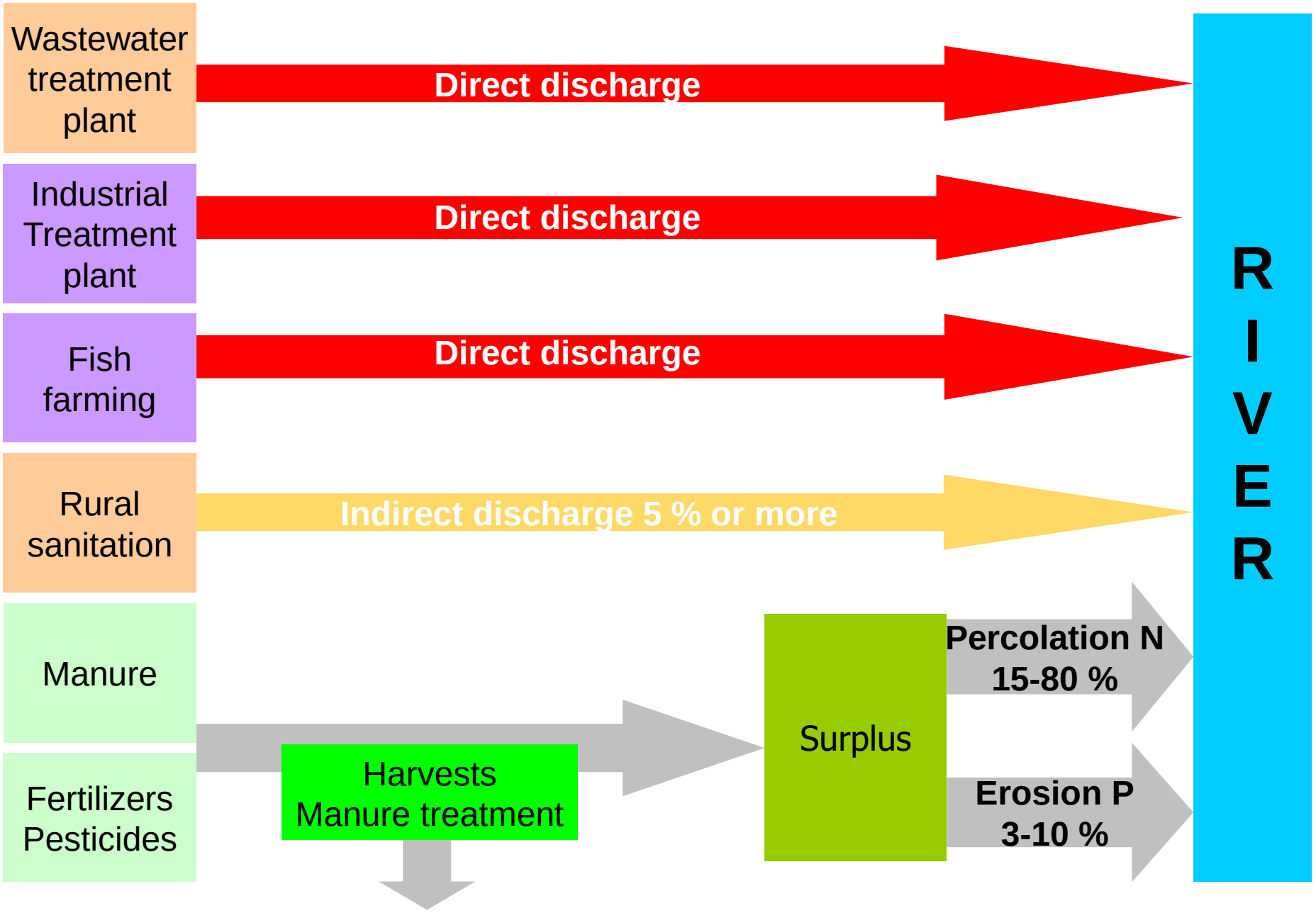
FROM SOCIO-ECONOMY DATA TO INTEGRATED WATER RESOURCES MANAGEMENT (IWRM) DATA

- How to estimate pressures from socio-economic data (population, agriculture census, etc) in order to compare pressures of various origins?
- Example: pressures on water quality



Pollution mass balance
or pollution flow estimation

How to estimate pollution flows simply ?



Action funded by the EUROPEAN UNION

SCREENING POLLUTION SOURCES (1)

- Inventories in the river basin : population

Population (connected to wastewater treatment plant or not, connection rate)

Wastewater treatment plants (location, process, pollution load, performance, discharges) for towns or industries

1 population equivalent (per day) :

90 g SS (suspended solids)

60 g oxidizable matters (=2/3 BOD5 + 1/3 COD)

15 g organic nitrogen and ammonia compounds

2 - 4 g Phosphorus compounds

100 – 150 liters/day

BOD5 : 5-day biochemical oxygen demand, COD : chemical oxygen demand)

DANUBE TIZSA 2011

In a first step, the generated loads were calculated based on estimation coefficients used for the Danube pressures analysis:

- BOD5 60 g/PE/day
- COD 110 g/PE/day
- Ntot 8.8 g/PE/day

Country	Coefficient (g P/ (PE d)
Hungary	1.7
Romania	1.5
Serbia	1.8

Country	Coefficient (g P/ (PE d)
Slovakia	1.55
Ukraine	2.05

DANUBE TIZSA 2011

No treatment	Generated loads are reported as discharged ones.
Primary treatment	BOD_5 reduction: 20% (UWWT Directive [91/271/EEC]) COD reduction: 25% (DRBMP) N_{tot} reduction: 9% (DRBMP) P_{tot} reduction: 10% (DRBMP)
Secondary treatment	BOD_5 reduction: 70% (UWWT Directive [91/271/EEC]) COD reduction: 75% (UWWT Directive [91/271/EEC]) N_{tot} reduction: 35% (DRBMP) P_{tot} reduction: 20% (DRBMP)
More stringent treatment	BOD5 reduction: 95% (DRBMP) COD reduction: 85% (DRBMP) N_{tot} reduction: 70% (UWWT Directive [91/271/EEC]) P_{tot} reduction: 80% (UWWT Directive [91/271/EEC])

As result of these calculations, discharged loads of BOD_5, COD, N_{tot} and P_{tot} were available for all UWWTPs/NOWWTPs.

Action funded by the EUROPEAN UNION

SCREENING POLLUTION SOURCES (2)

Inventories of industrial activities in the river basin :

- Fish farming : type of species, food

Pollution downstream (theoretical) :

30 kg N/year/t food

5 kg P/year/t food

- Beer :

Pollution downstream (theoretical) :

400 g SS/100 liters

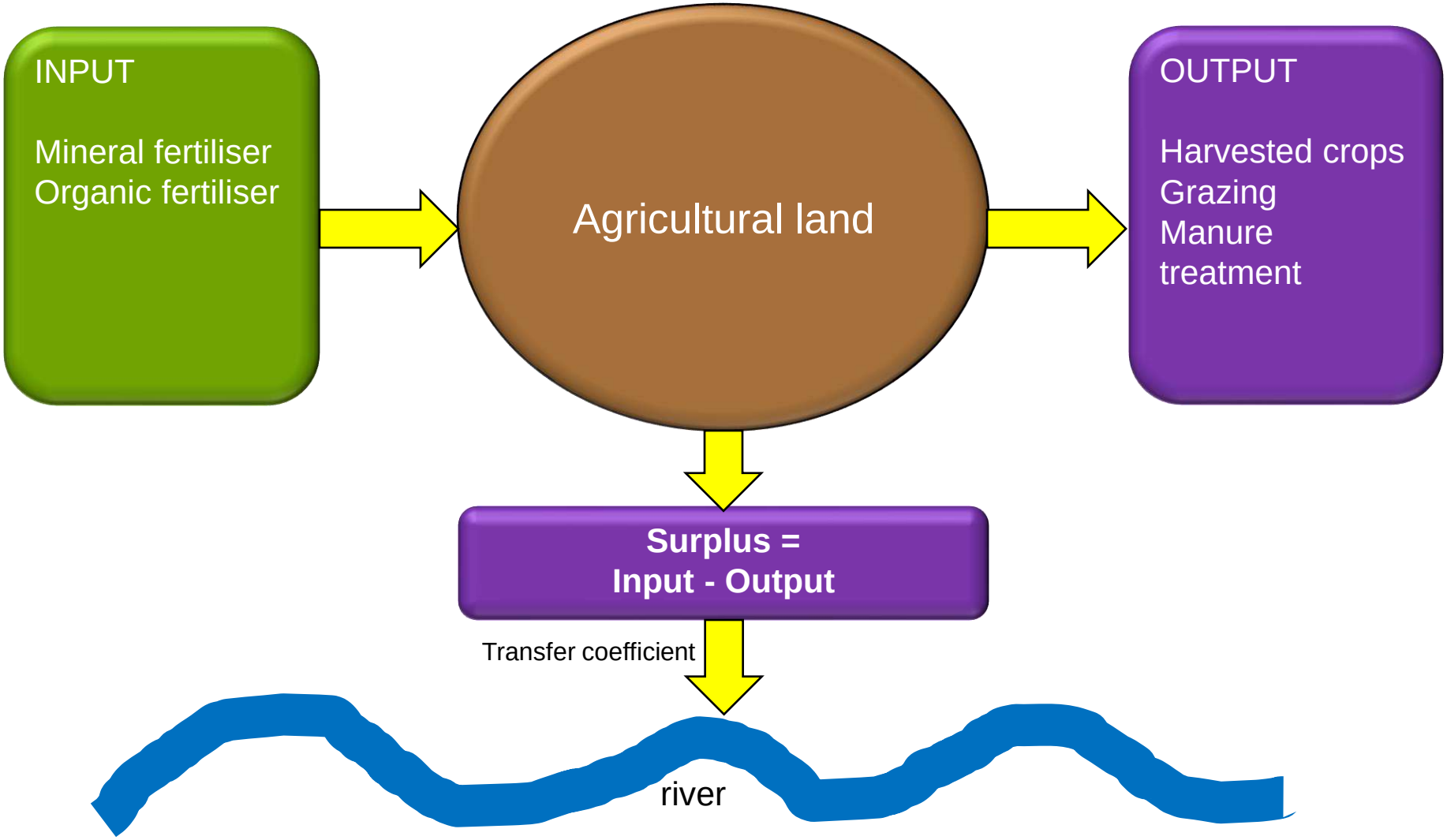
1700 g OM/100 liters

20 g N/100 liters

5 g P/100 liters

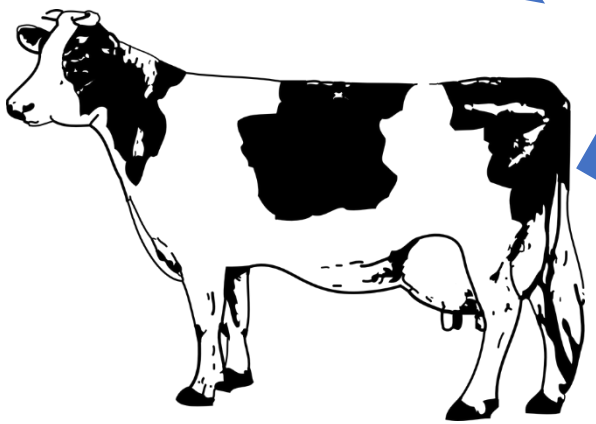
SS: Suspended solids

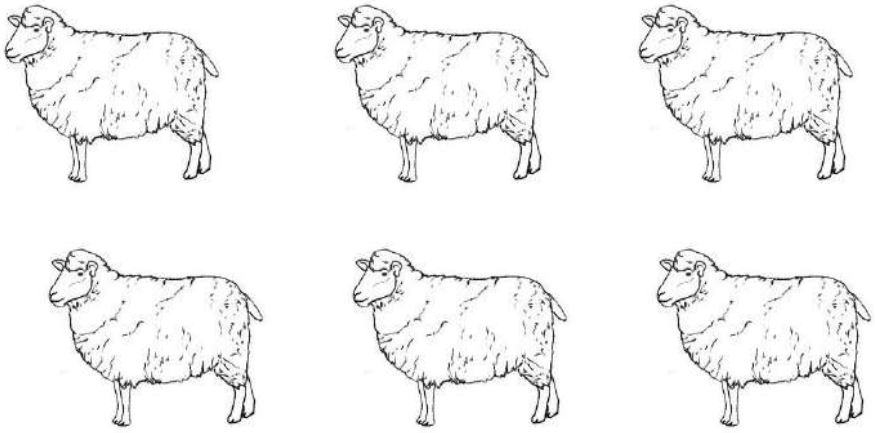
AGRICULTURE: BALANCE METHOD

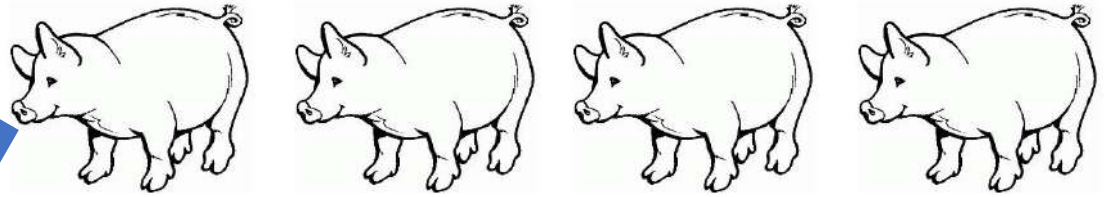


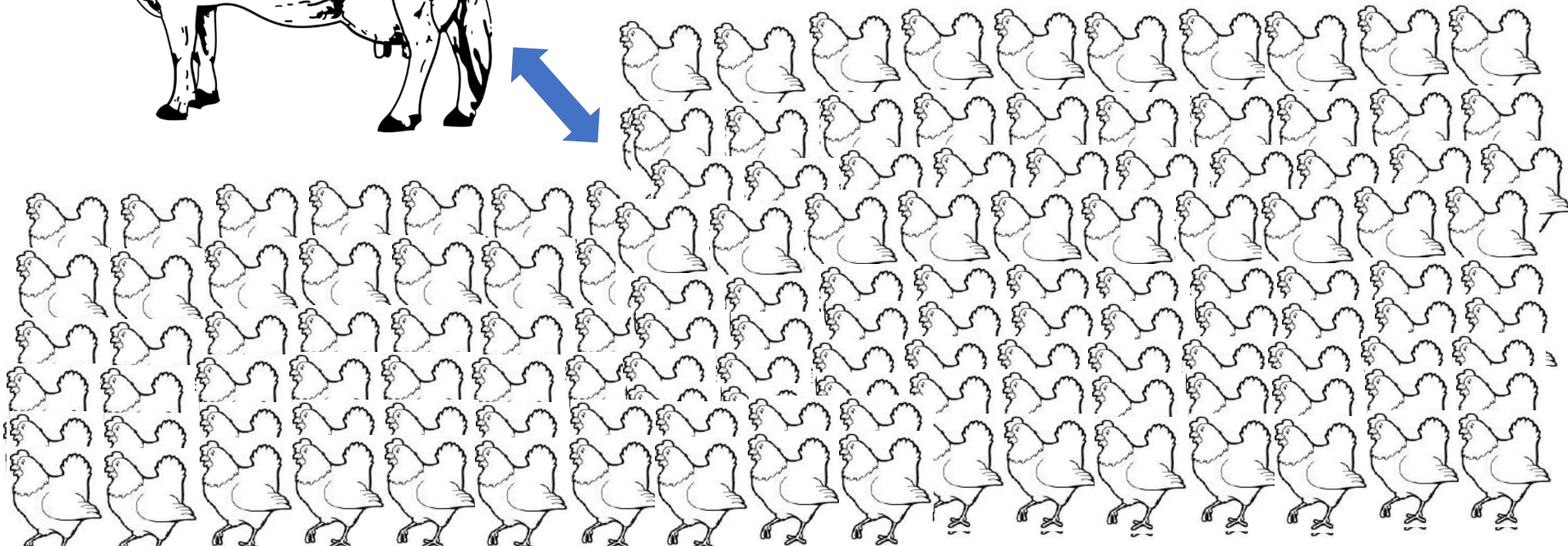
QUANTITIES OF NITROGEN FROM LIVESTOCK

Comparison with a cow (kg N/year)









Animal type	*Animal category*	*unit*	*Conv. coeff BLU Big Livestock Unit*	*Kg of N*	*P2O5/N ratio*
Cattle	Buffaloes	Animal present			
Cattle	Dairy cows	Animal present	1	85	0.5
	Males and females over 24 months old	Animal present	0.75	63.75	
	Males and females from 6 to 24 months old	Animal present	0.5	42.5	
	Males and females < 6 months	Animal present	0.05	4.25	
Horses		Animal present	0.5	44	
Sheep		Animal present	0.12		0.6
Goats		Animal present	0.05		0.6
Pigs	Sows and hogs	Animal present	0.17	14.45	0.7-0.8
	Piglets	Animal produced	0.0047	0.40	
	Fattening pigs	Animal produced	0.032	2.72	
Poultry and web-foots	Chickens	Animal produced /1000	0.35	29.75	1
	Ducks	Animal produced /1000	1	85	1
	Laying hens	Animal produced /1000	4	340	0.8-0.9

QUANTITIES OF NUTRIENTS REQUIRED FOR CROPS (KG/100 KG GRAIN)

Kg/100 kg grain harvested	N	P_2O_5	K_2O
Common wheat	1,9	0,9	0,7
Oat	1,9	0,8	0,7
Barley	1,5	0,8	0,7
Triticale	1,9	0,9	0,6
Rye	1,4	1,0	0,6
Corn	1,5	0,7	0,5
Colza	3,5	1,4	1,0
Sunflower	1,9	1,5	2,3

AGRICULTURE: NUTRIENTS PRESSURE

ESTIMATION PER BASIN, SUB-BASIN OR WATER BODY

$INPUT_N$ = mineral fertilisers + number of animals x nutrients production per animal

$OUTPUT_N = \Sigma_{CROP}$ (nitrogen need x average yield x area)

SURPLUS = INPUT - OUTPUT

For phosphorus: P_2O_5 in agriculture (P_2O_5 X 0.44 = P)

Depend on data available

GIS-overlay to localize risk areas of nitrate pollution

Figure 1 | Overlay of five parameters.

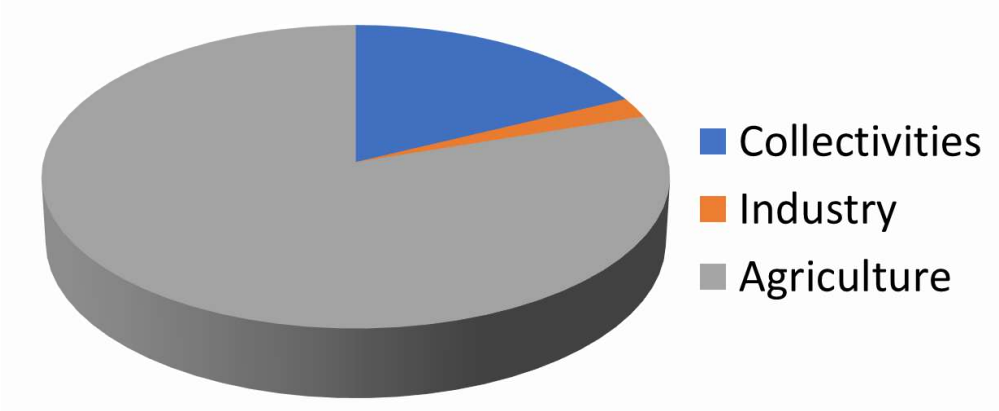
- Land use
- Soil
- Slope steepness (slope)
- Riparian buffer strips (buffer)
- Distance to surface waters (distance)

Loire-Bretagne Basin (160,000 km², 13 millions inhabitants)
NITROGEN N

t N/day	Municipalities	Industries	Agriculture	Total	
Gross	157	112	3614	3883	
Net	109	13	490	612	
Net/Gross %	69%	12%	14%	16%	

12 millions inhabitants	
g/day/inhabitant	9
Kg/year/inhabitant	3

10 millions hectars	
50	g/day/hectare
18	kg/year/hectare

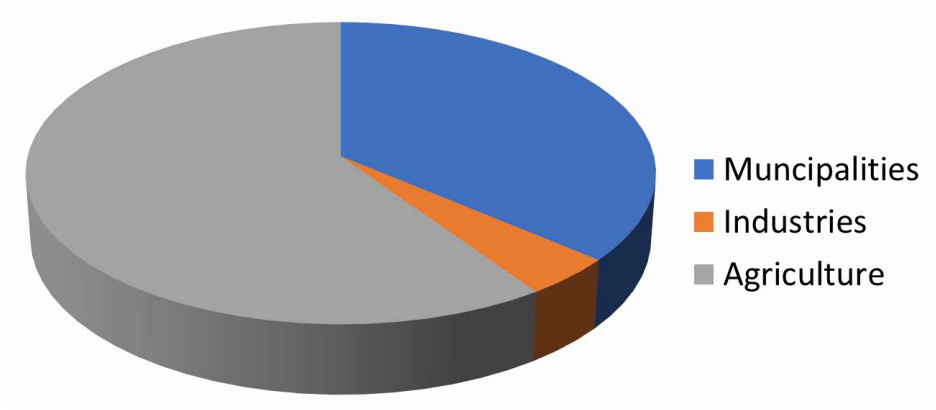


Loire-Bretagne Basin (160,000 km², 13 millions inhabitants)
PHOSPHORUS P

t P/day	Municipalities	Industries	Agriculture	Total	
Gross	27	19	489	535	
Net	17	2	28	47	
Net/Gross %	63%	11%	6%	9%	

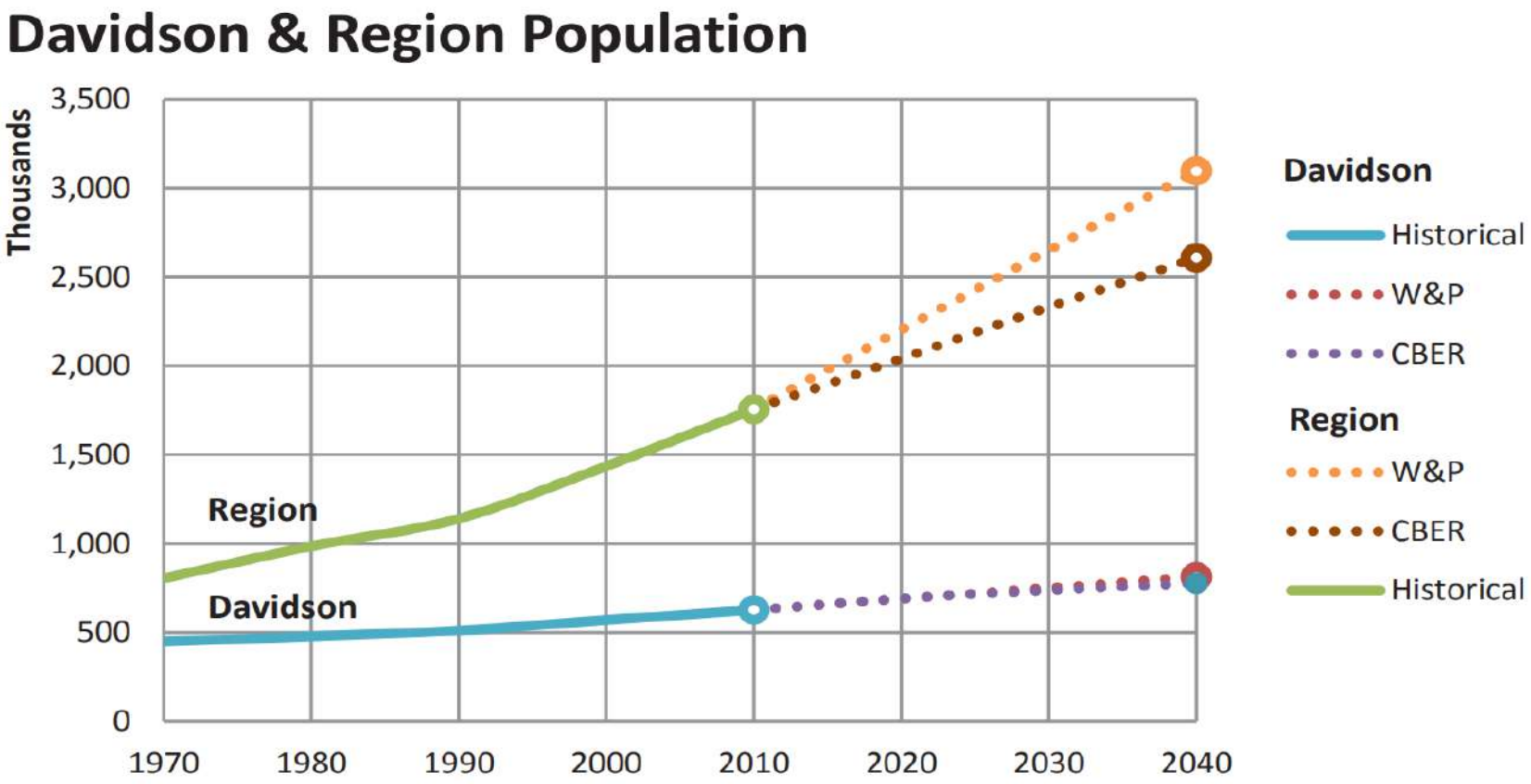
12 millions inhabitants	
g/day/inhabitant	1.5
Kg/year/inhabitant	0.5

10 millions hectars	
3	g/day/hectare
1	kg/year/hectare



SOME WATER USES UNIT RATES	DATA DOURCES
Domestic water use	
• 10 – 80 cubic meter/inhabitant/year (20 l/inhabitant/day in small villages hand pumps, 40 l/inhabitant/day small villages piped water, 60 l/inhabitant/day district towns), 230 l/inhabitant/day Vientiane)	Laos, Nam Ngum river basin profile (2008)
Agriculture	
• 70 l/day/cow	France
• 25 l/day/pork	France
• 0.4/ l/day/hen	France
• Variable 4000-12000 m3/hectare irrigated rice • Or 1400 l of water/1 kg rice produced	South-East Asia
Industries	
• 2500 mm/year evaporation - Nam Ngum 1 reservoir	The water footprint of electricity from hydropower, UNESCO-IHE (2011)
• 150 l water/cubic meter crushed and washed aggregates	France, Loire-Brittany water agency (2010)
• 0,8 m3/hectoliter soft drinks	France, Loire-Brittany water agency (2010)
• 8 m3/ton big animals carcass weight (slaughterhouse)	France, Loire-Brittany water agency (2010)
• 5,5 m3/ton chicken live weight (slaughterhouse)	France, Loire-Brittany water agency (2010)
• 2,5 m3/ton paper, carton	France, Loire-Brittany water agency (2010)
• 19 m3/ton laundry	France, Loire-Brittany water agency (2010)

POPULATION TRENDS



WHAT ARE THE PRESSURES DUE TO HUMAN ACTIVITIES: RECOMMENDATIONS

- Data available: Collect the data at the smaller administrative unit in order to be able to valorise them at different scales (water body, sub basin, basin).
- Relevant Pressures: Focus on relevant data as population, waste water treatment plants, significant industries, fertilising practices (mineral, organic), irrigation areas, significant structures on rivers.
- Pressures ranking: Use simple approach to define “high, medium, low” level of pressures. Link pressures/rivers: Small discharges can produce big impacts on small rivers.
- The pressures analysis gives:
  - objective elements to communicate with decision-makers and stakeholders in order to raise awareness and mobilise for actions.
  - rational elements to establish a programme of measures in order to improve the water resources in balance with socio-economics uses and ecosystems functions.

PLANNING

RBMP extract: Local quantitative objectives

Target low-water flow: all current uses are possible in balance with ecosystems. Impact on permit system.

Alert flow: first restriction measures for certain activities.

Crisis flow: water supply for population and ecosystems needs must be met. All measures restricting water abstraction must be implemented.

Point nodal

Zone nodale

PLANNING

RBMP extract: Prioritised sub-basins

Brown - Resolved quantitative imbalances e.g. quantitative management plans, water savings, etc.

Yellow – Maintain quantitative balance to achieve the good status of water bodies

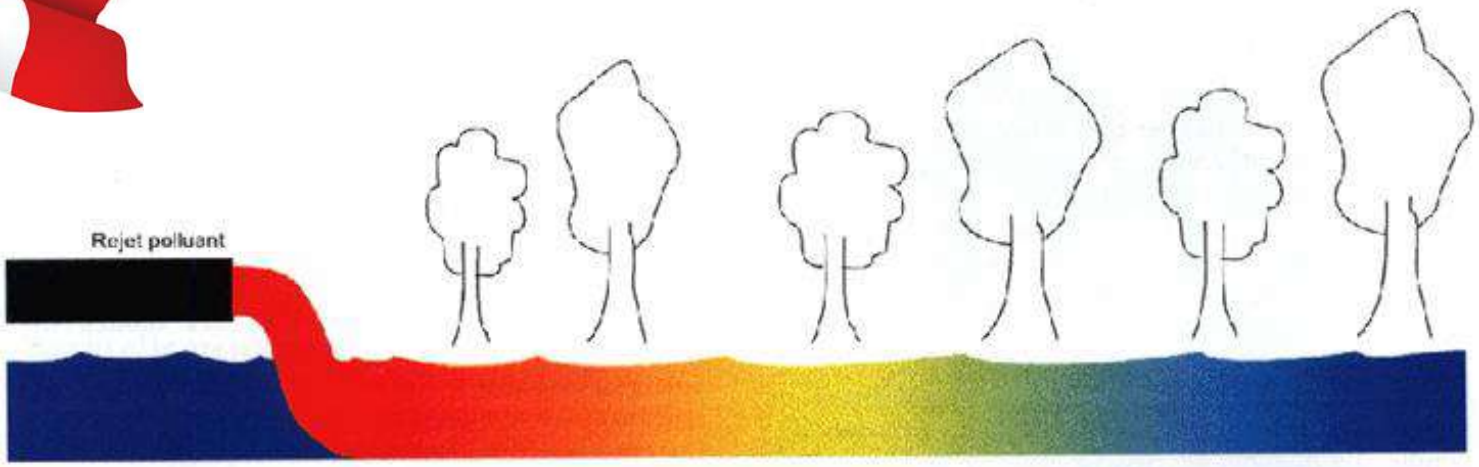
HOW TO EVALUATE THE ECOLOGICAL STATUS OF AN AQUATIC ECOSYSTEM ?

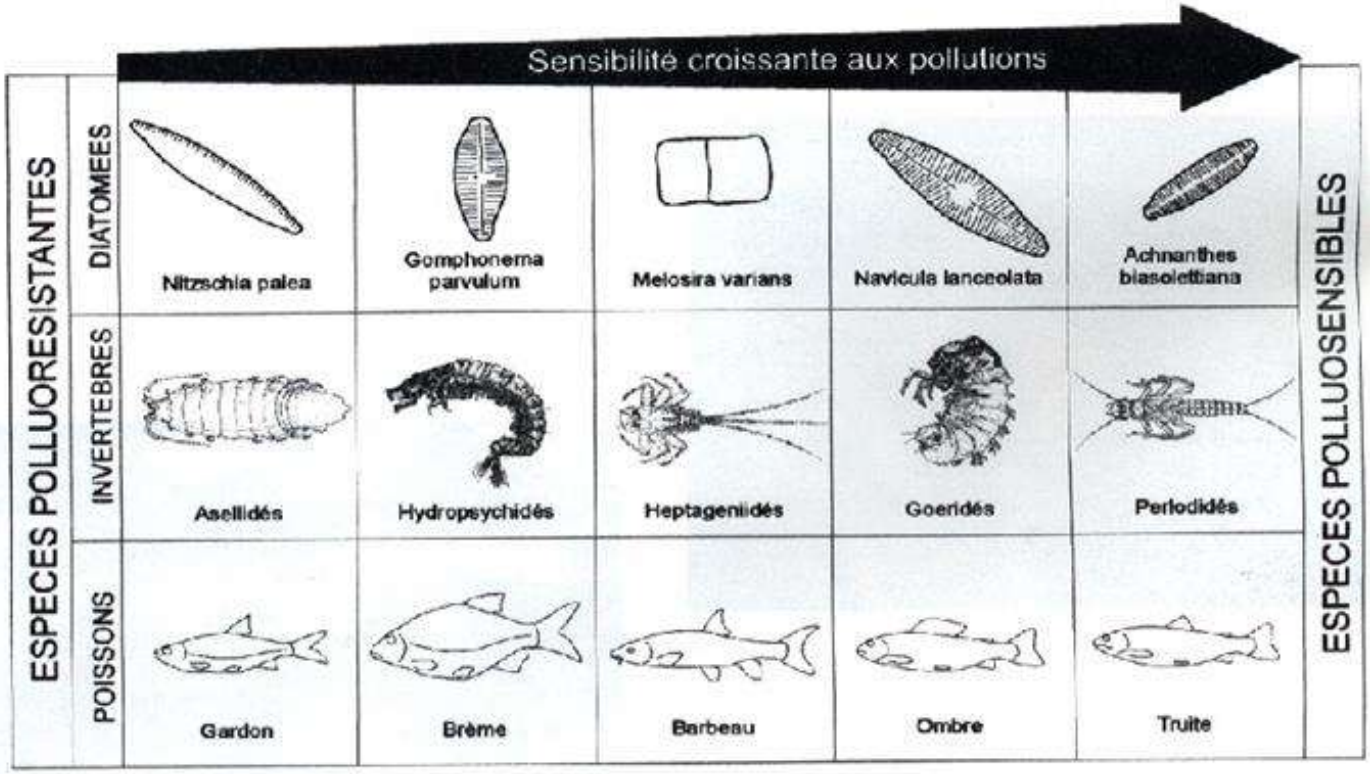
HABITATS

CHEMICAL COMPOSITION OF WATER

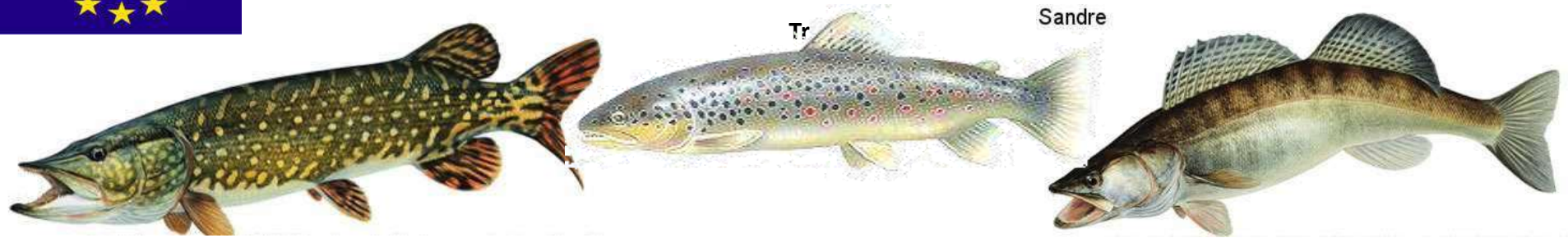
FAUNA & FLORA

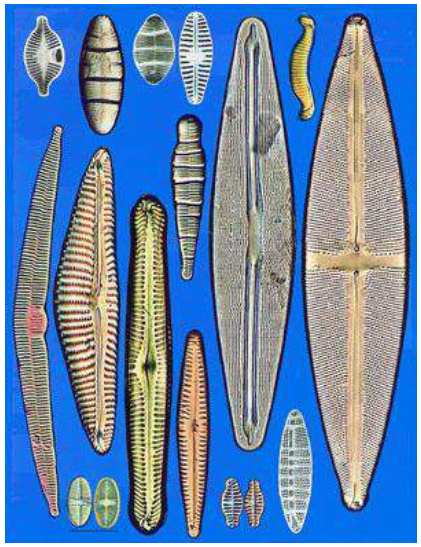
BIOLOGICAL INDICATORS





WATER FRAMEWORK DIRECTIVE





Good ecological status

=

lightly disturbed life

Diatoms **Diatoms** **Benthic invertebrates**

SETTING ENVIRONMENTAL OBJECTIVES "GOOD STATUS"

- For surface waters defined in terms of

  - biology (diatoms and benthic invertebrates – composition and abundance; fish fauna – composition, abundance and age structure);

  - chemistry;

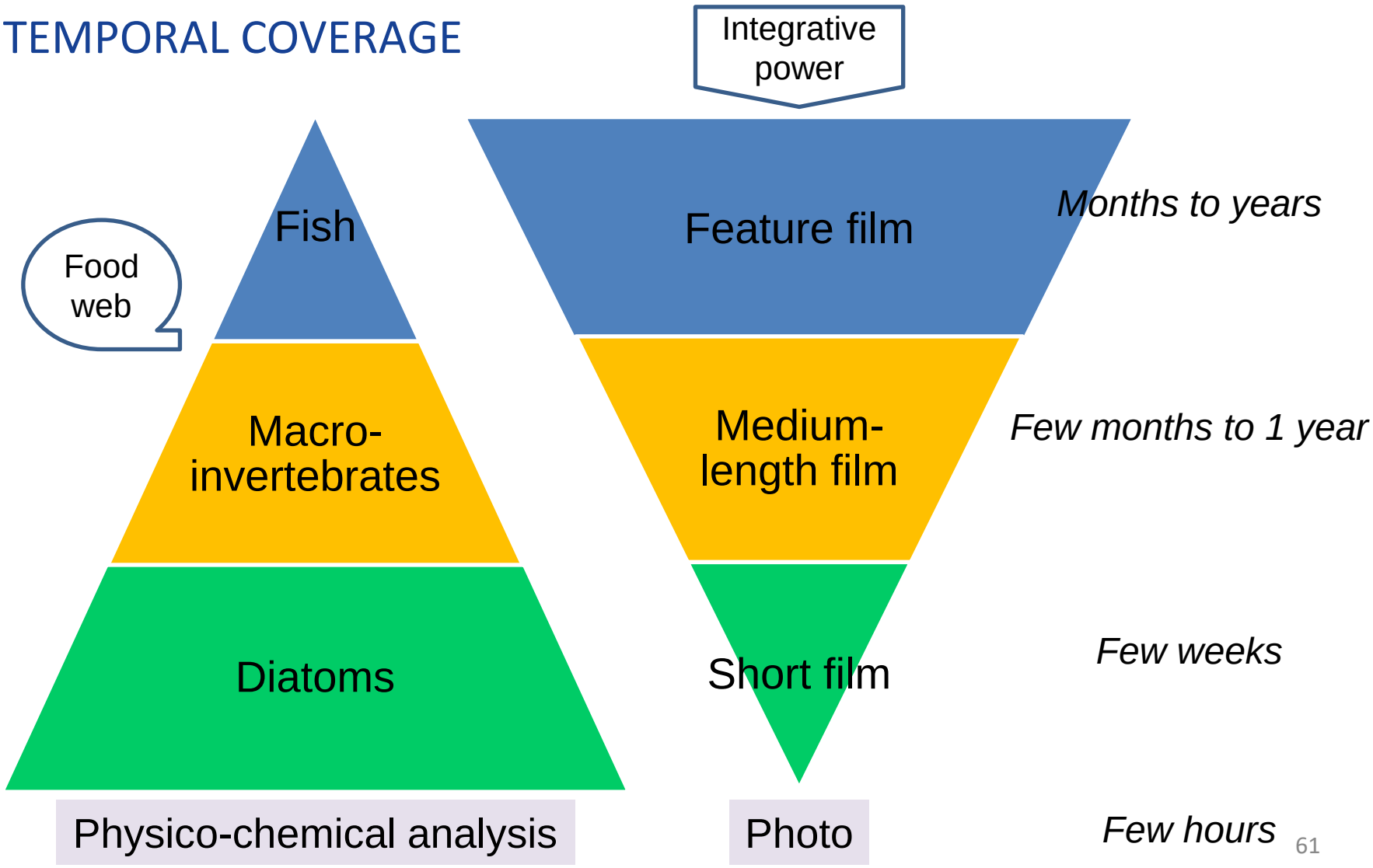
  - hydromorphology (to confirm the very good status);

- For groundwater defined in terms of

  - chemistry (compliance with numerical quality standards; no saline or other intrusions);

  - quantity (balance between natural recharge and abstractions)

TEMPORAL COVERAGE



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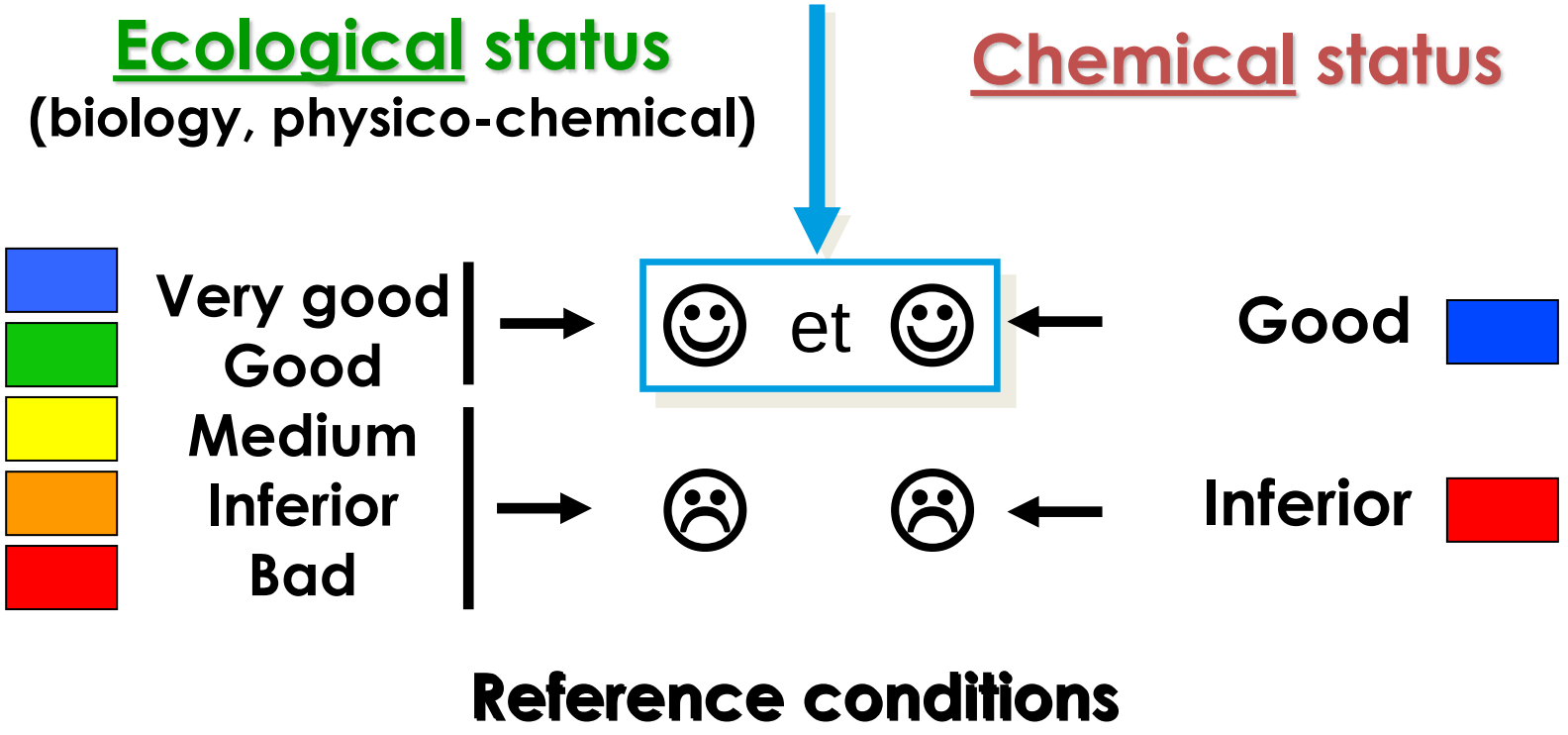
Good status of surface water



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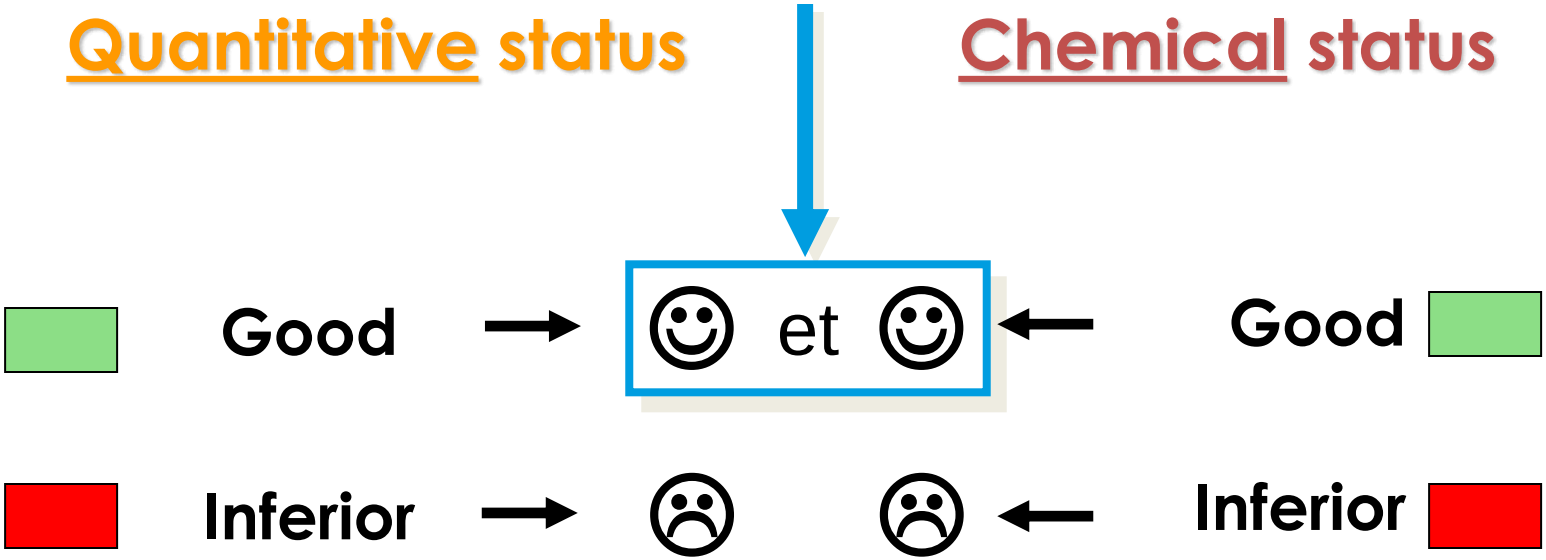
Groundwater good status



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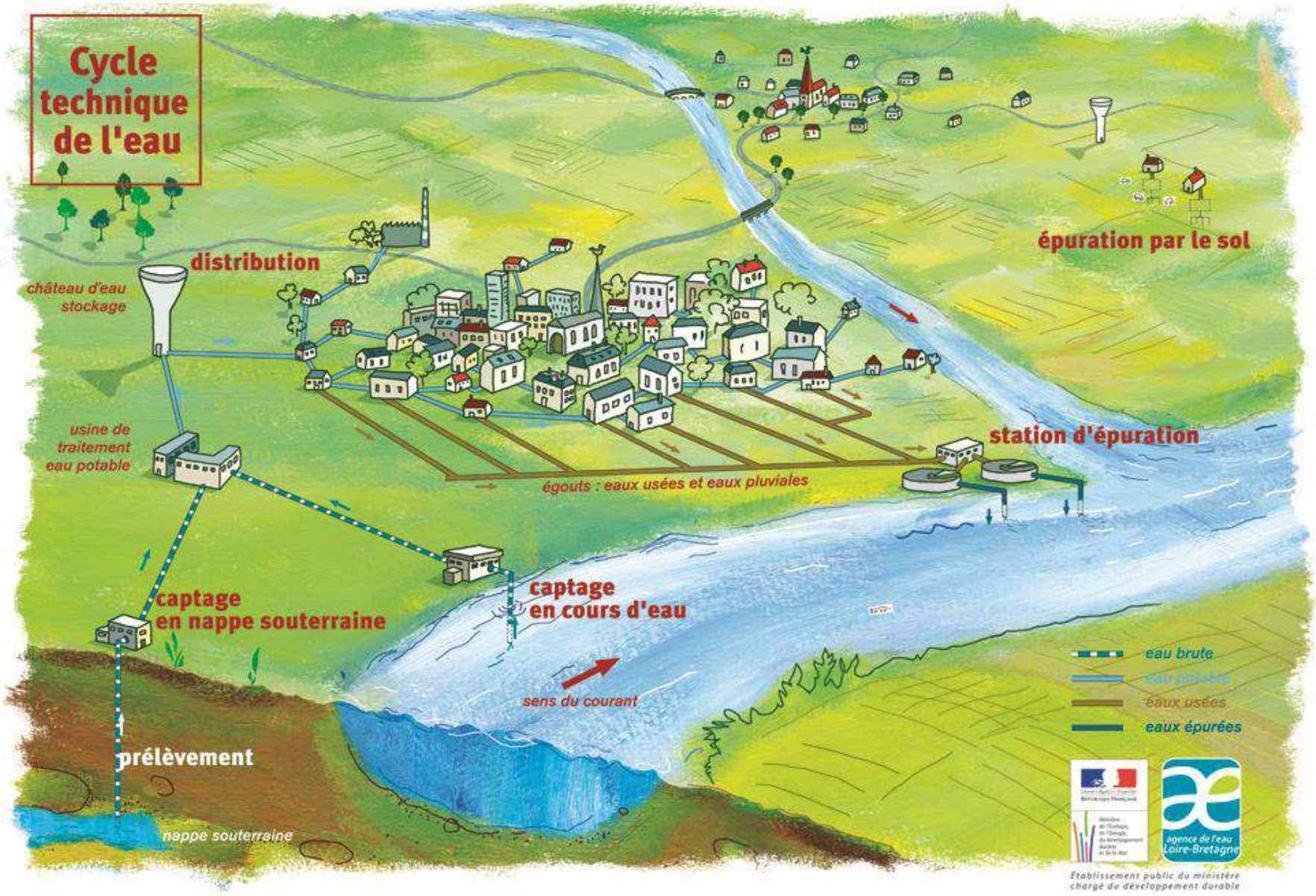
LIST OF RELEVANT KEY TYPES OF MEASURES (KTM)

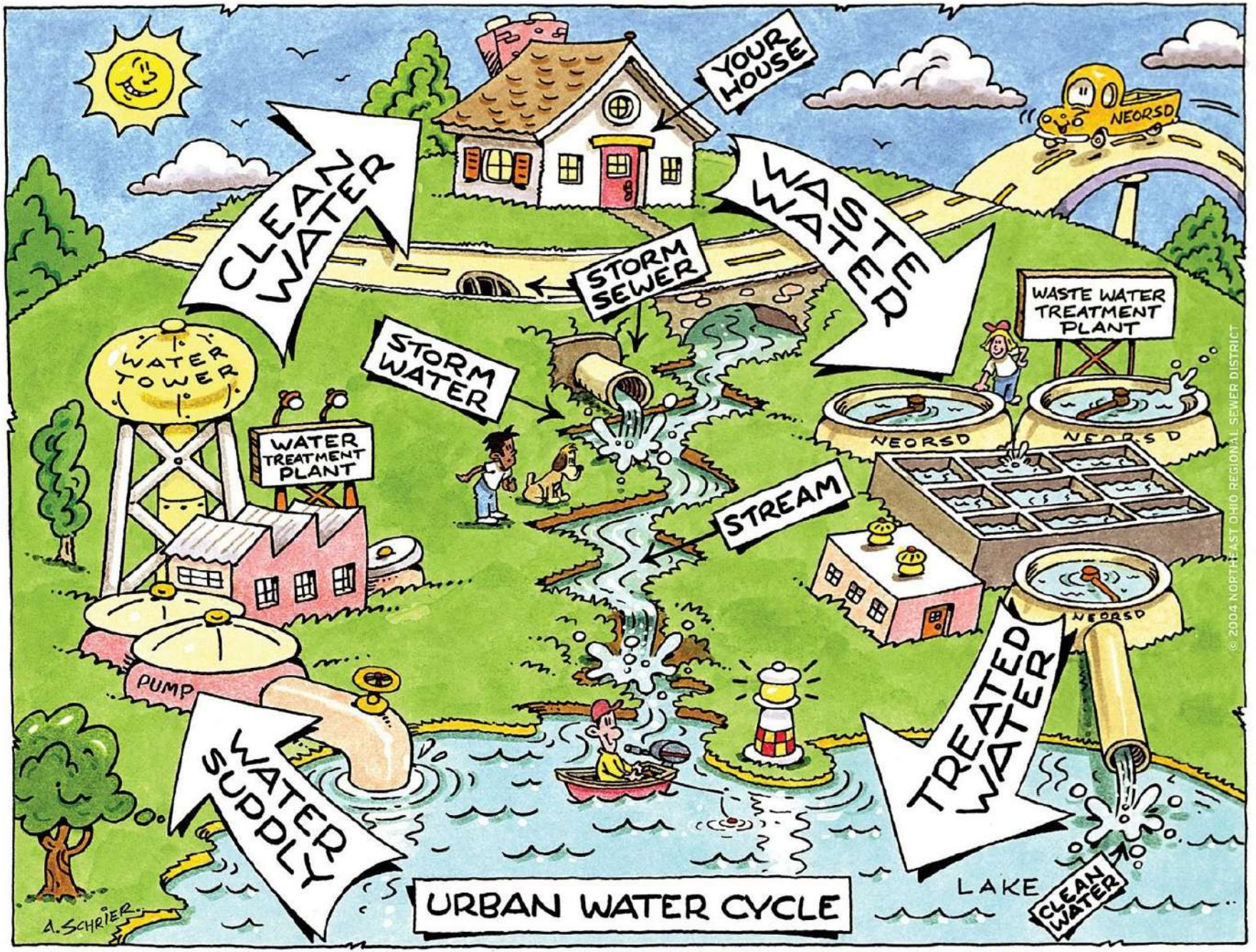
KTM1 – Construction or upgrades of wastewater treatment plants
KTM2 – Reduce nutrient pollution from agriculture
KTM3 – Reduce pesticides pollution from agriculture.
KTM4 – Remediation of contaminated sites (historical pollution including sediments, groundwater, soil)
KTM5 – Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)
KTM6 – Improving hydromorphological conditions of water bodies other than longitudinal continuity
KTM7 – Improvements in flow regime and/or establishment of ecological flows
KTM8 – Water efficiency, technical measures for irrigation, industry, energy and households
KTM9 – Water pricing policy measures for the implementation of the recovery of cost of water services from households
KTM10 – Water pricing policy measures for the implementation of the recovery of cost of water services from industry
KTM11 – Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture
KTM12 – Advisory services for agriculture
KTM13 – Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc)
KTM14 – Research, improvement of knowledge base reducing uncertainty
KTM15 – Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or for the reduction of emissions, discharges and losses of Priority Substances
KTM16 – Upgrades or improvements of industrial wastewater treatment plants (including farms).
KTM17 – Measures to reduce sediment from soil erosion and surface run-off
KTM18 – Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases
KTM19 – Measures to prevent or control the adverse impacts of recreation including angling
KTM20 – Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants
KTM21 – Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure
KTM22 – Measures to prevent or control the input of pollution from forestry
KTM23 – Natural water retention measures
KTM24 – Adaptation to climate change
KTM25 – Measures to counteract acidification
KTM99 – Other key type measure reported under Programme of Measures

DOMESTIC WASTEWATER TREATMENT

Small sanitation

Treatment wetlands


Cycle technique de l'eau
distribution
château d'eau
stockage
usine de traitement eau potable
épuration par le sol
station d'épuration
égouts : eaux usées et eaux pluviales
captage en nappe souterraine
captage en cours d'eau
sens du courant
prélèvement
nappe souterraine
eau brute
eau potable
eaux usées
eaux épurées
agence de l'eau Loire-Bretagne
Établissement public du ministère chargé du développement durable


YOUR HOUSE
CLEAN WATER
WASTE WATER
STORM SEWER
STORM WATER
NEORSD
WASTE WATER TREATMENT PLANT
WATER TOWER
WATER TREATMENT PLANT
NEORSD
NEORSD
STREAM
NEORSD
PUMP
WATER SUPPLY
TREATED WATER
LAKE
CLEAN WATER
A. SCHRIER
URBAN WATER CYCLE
© 2004 NORTHEAST OHIO REGIONAL SEWER DISTRICT

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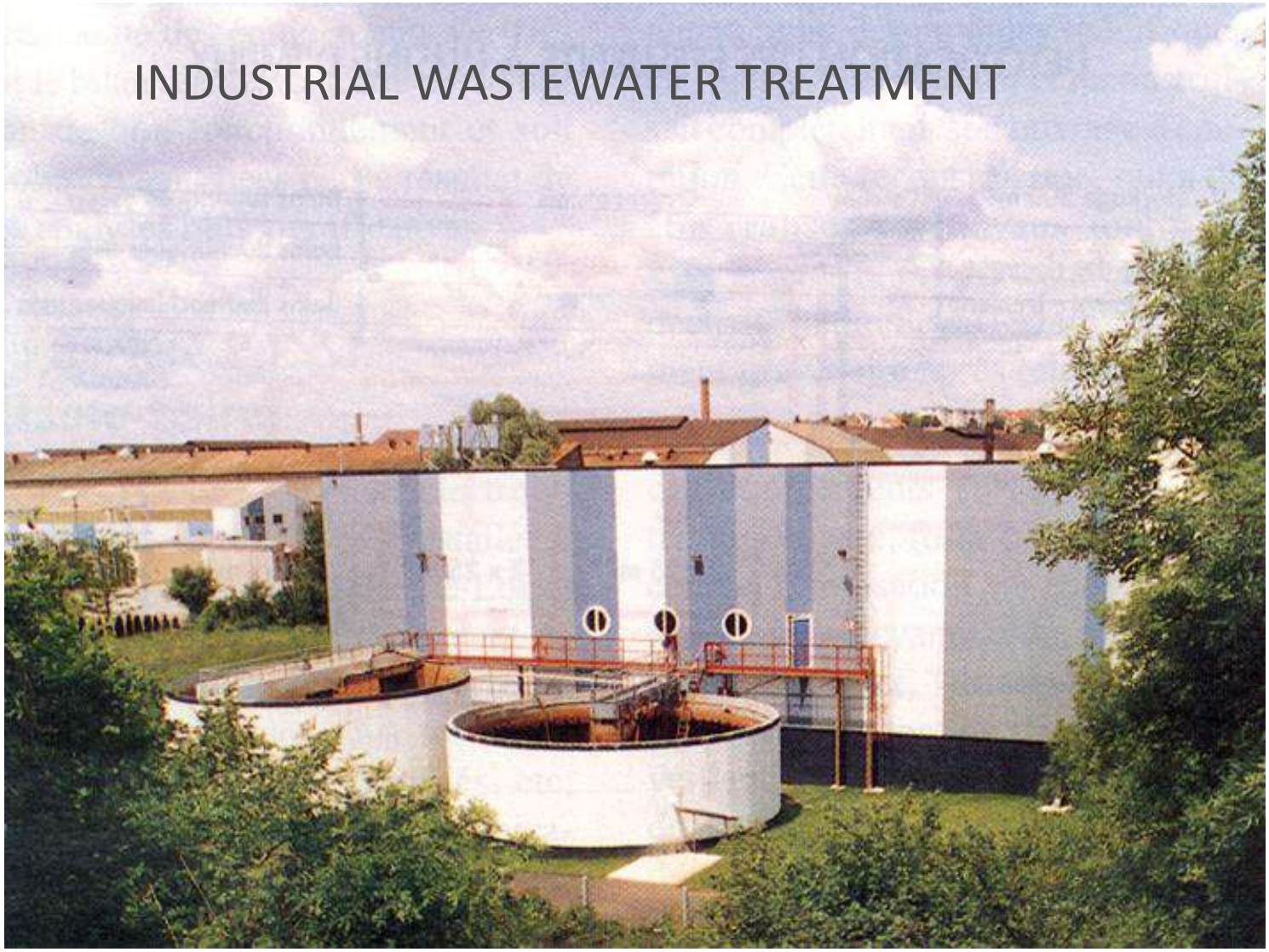
INDUSTRIAL WASTEWATER TREATMENT



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MANURE TREATMENT

REDUCING WATER LEAKS

CONSULTATIVE & DECISION-MAKING BODIES

IMPROVMENT OF AGRONOMIC PRACTICES

Farmers training

Farm demo equipment

Analysis

Demo equipment and practices

Photos : Communauté de communes du Pays de Lesneven et de la Côte de Légende

HEDGES AND BANKS IMPLEMENTATION

Source : Syndicat mixte bassins versants Jaudy Guindy Bizien

WETLANDS MANAGEMENT

Photo : CEVA

Photo : Communauté de communes du Pays de Chateaulin et du Porzay

Kervigen swamp (Brittany)

STORMWATER MANAGEMENT FACILITIES

ECOLOGICAL CONTINUITY

WEIR MILL :
ACHIEVMENT OF
A BY-PASS RIVER

Photos : FDAAPPMA 22

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ECOLOGICAL AND SEDIMENTAL CONTINUITY

Photos : Syndicat Mixte de Production et de Transport d'eau de l'Horn

KERALLE RIVER (BRITTANY)

Height : 3 m, width : 6 m

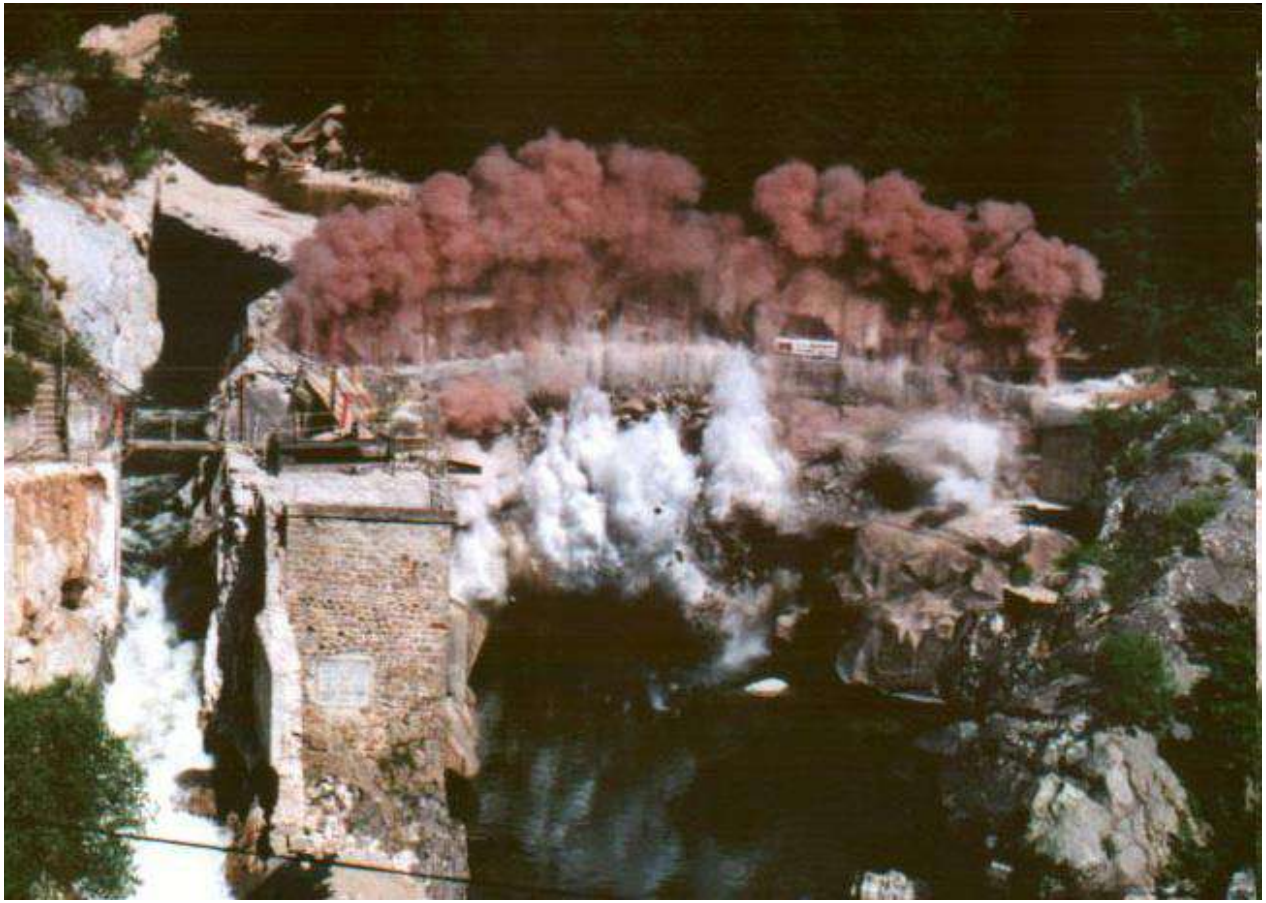
ECOLOGICAL AND SEDIMENTAL CONTINUITY

Height : 12 m

SAINT-ETIENNE-DU-VIGAN DAM (LOIRE)

ECOLOGICAL AND SEDIMENTAL CONTINUITY

24th June 1998



Height : 12 m

SAINT-ETIENNE-DU-VIGAN DAM (LOIRE)

ECOLOGICAL AND SEDIMENTAL CONTINUITY

24th June 1998

Height : 12 m

SAINT-ETIENNE-DU-VIGAN DAM (LOIRE)

ECOLOGICAL AND SEDIMENTAL CONTINUITY

September 1998

SAINT-ETIENNE-DU-VIGAN DAM (LOIRE)

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HABITATS DIVERSIFICATION FOR TROUT (ARGUENON RIVER BASIN)

Photos : FDAAPPMA 22

FISHPASS (BRITTANY)

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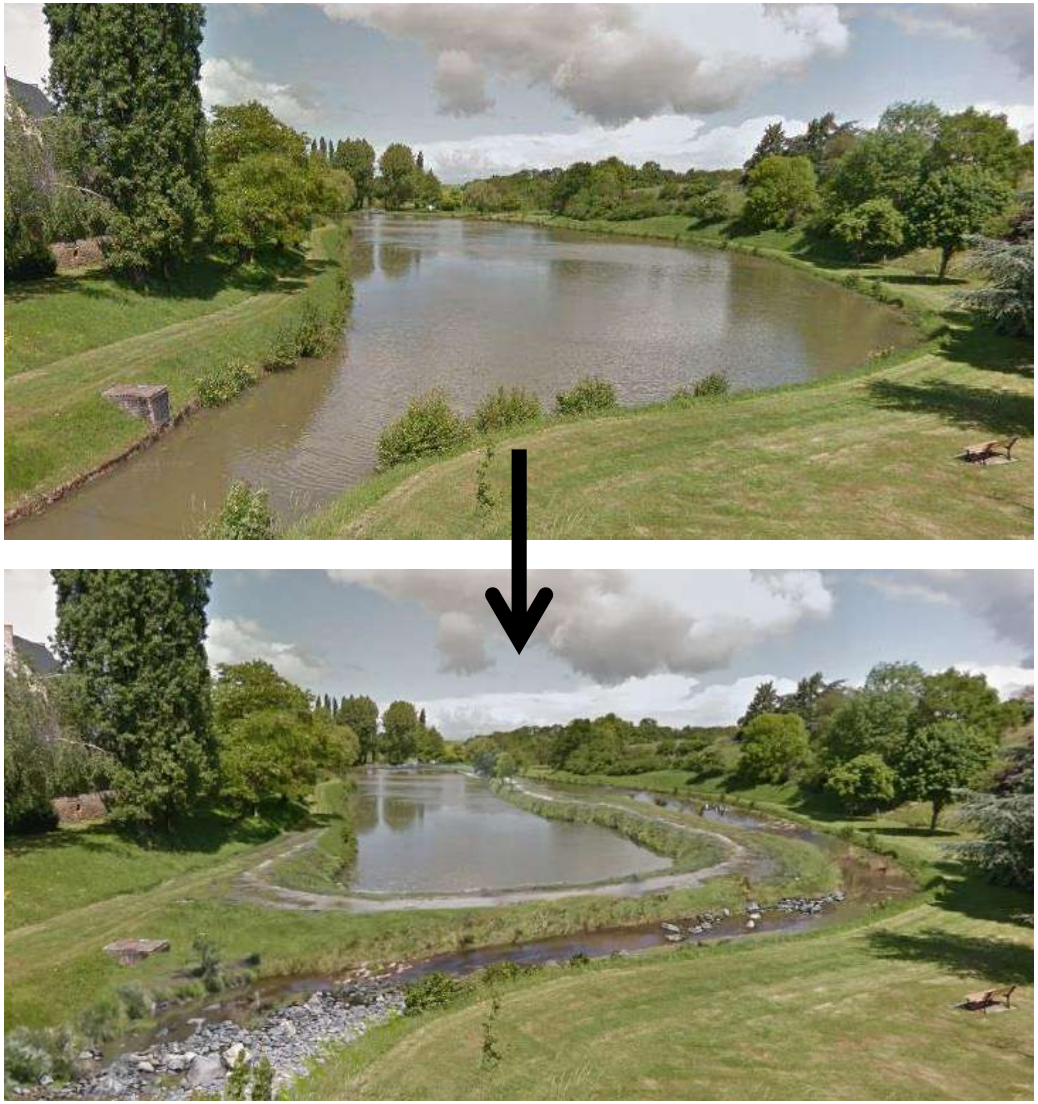
Luire river (Poitou)

DRINKING TROUGHS

DISCONNECTION OF A POND



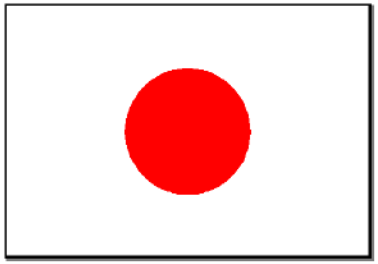
RE-NATURATION OF GOAS LAGORN RIVER (BRITTANY)

Some Efforts for River Restoration in Asia

- Example (5) *Batch River, Japan*

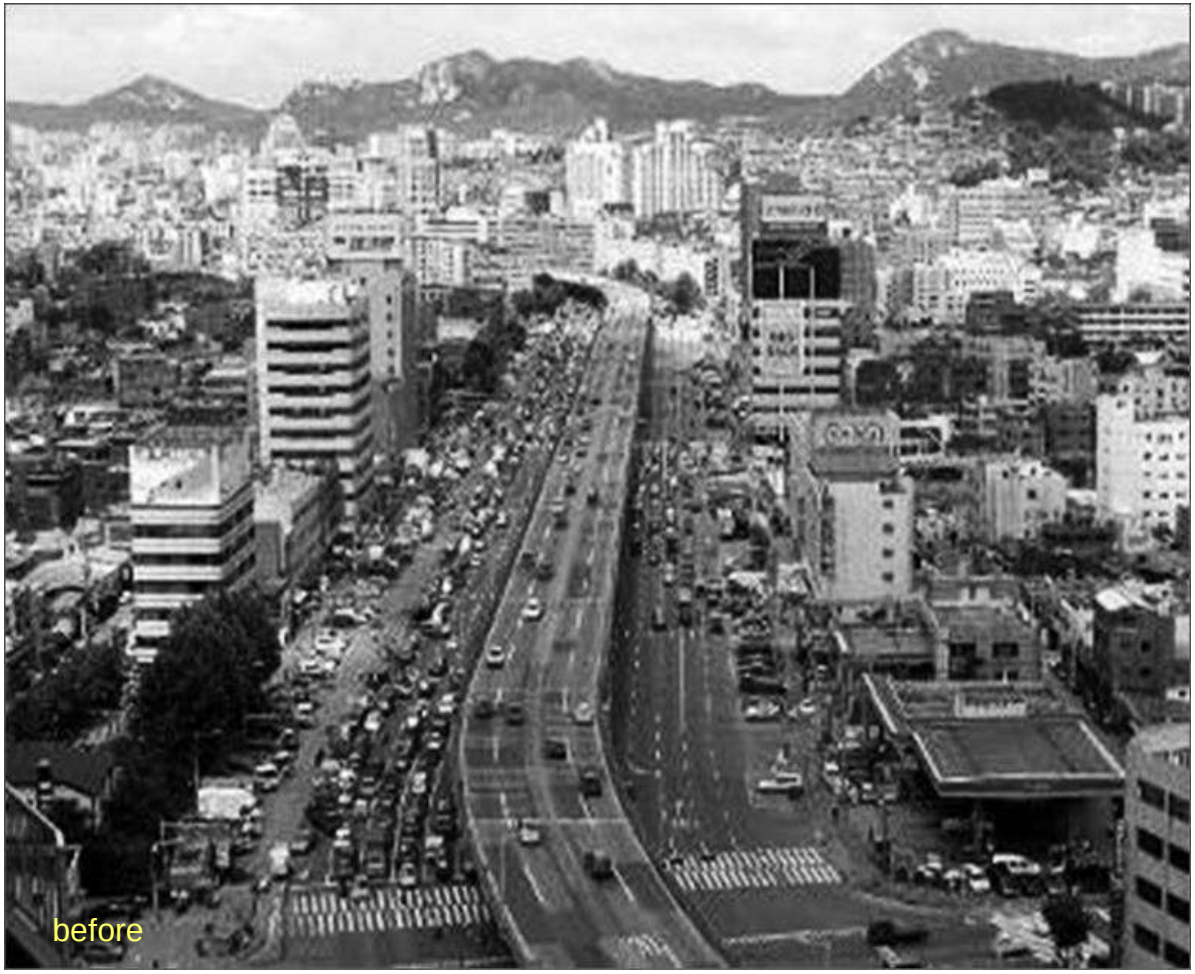
Before (80's)

After (now)



Some Efforts for River Restoration in Asia

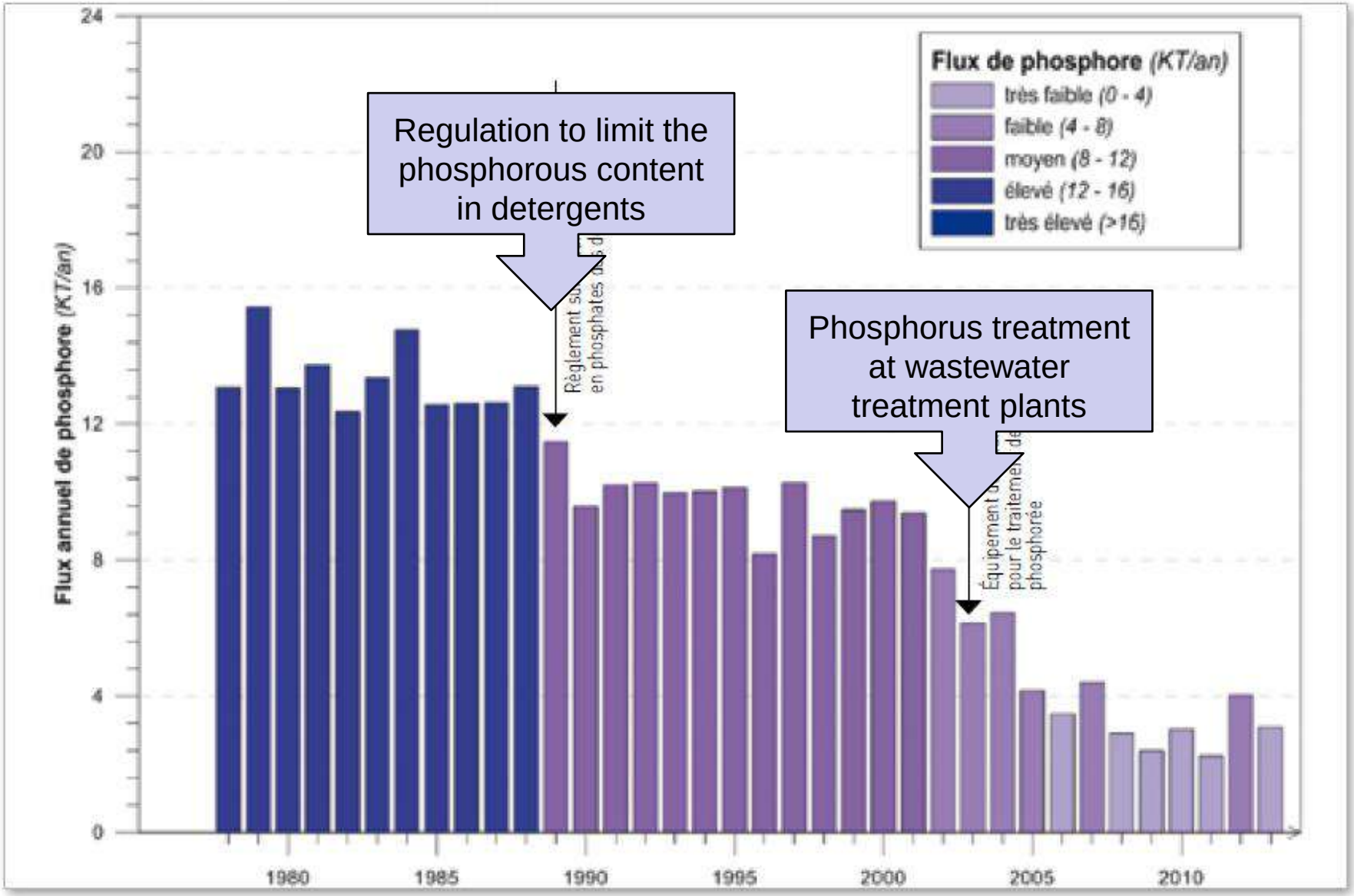
- Example (8) *Cheonggyecheon, Korea*



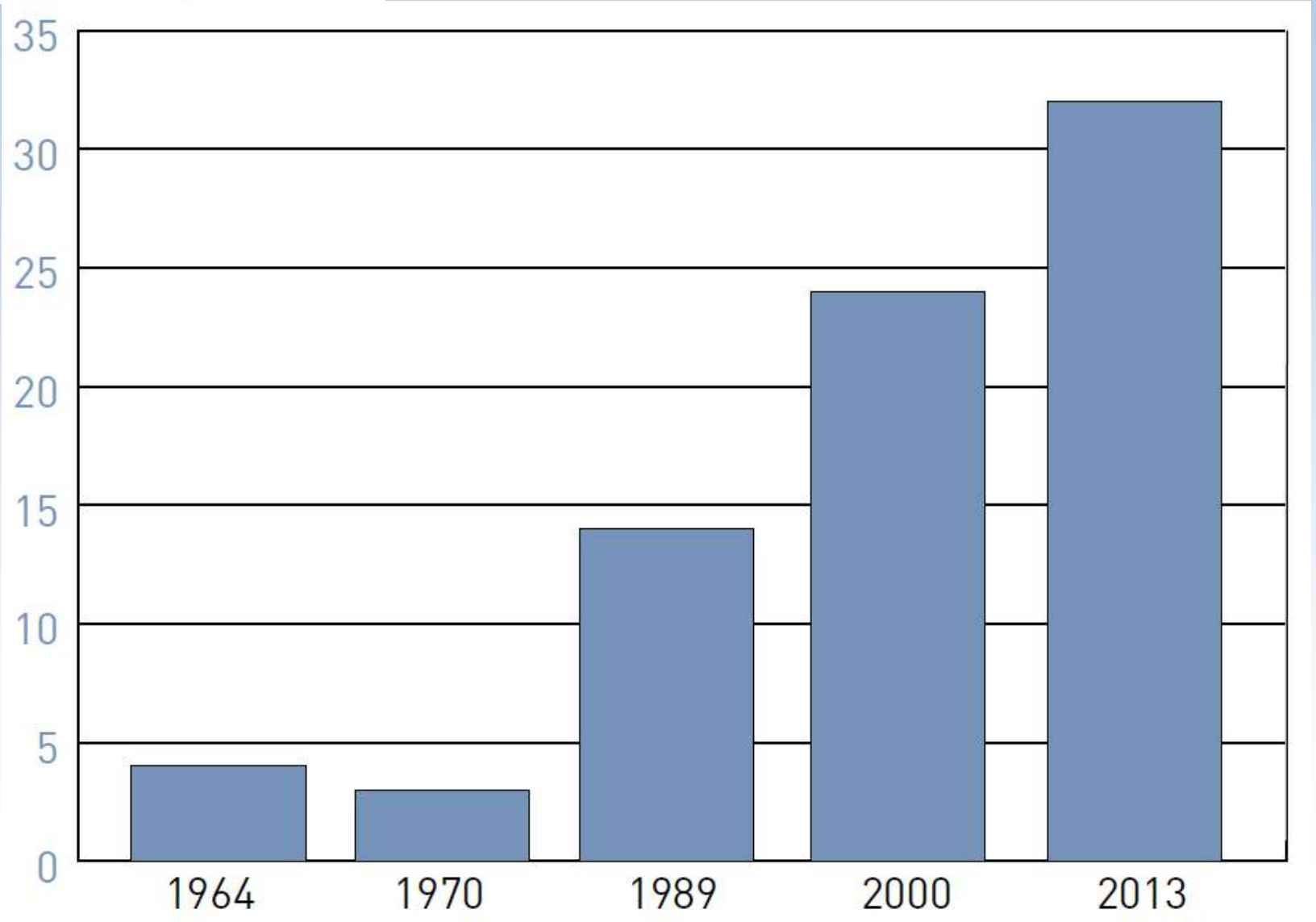
Some Efforts for River Restoration in Asia

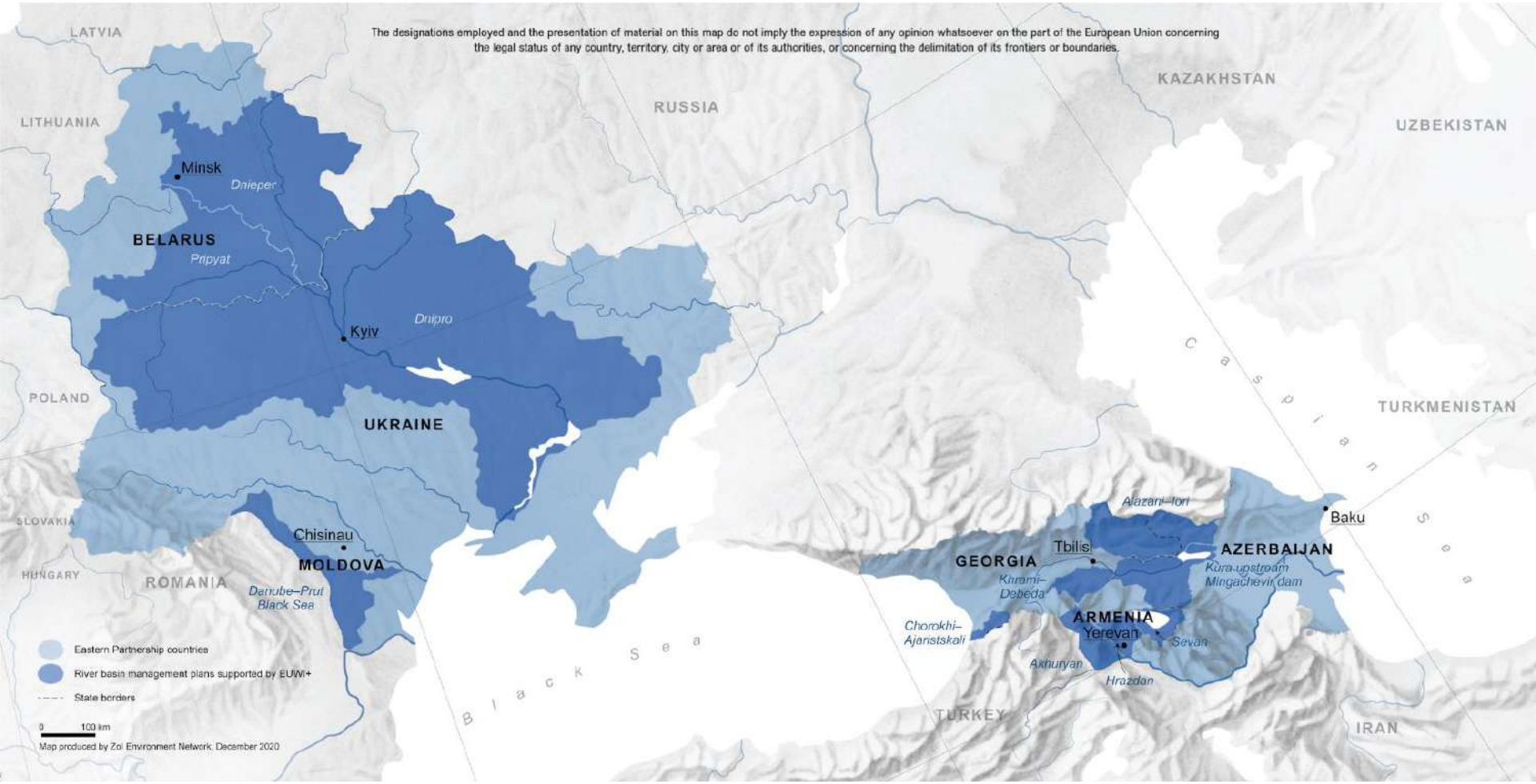
- Example (8) *Cheonggyecheon, Korea*

Phosphorus flow of the Seine Basin (unit: 1000 tonnes/year)



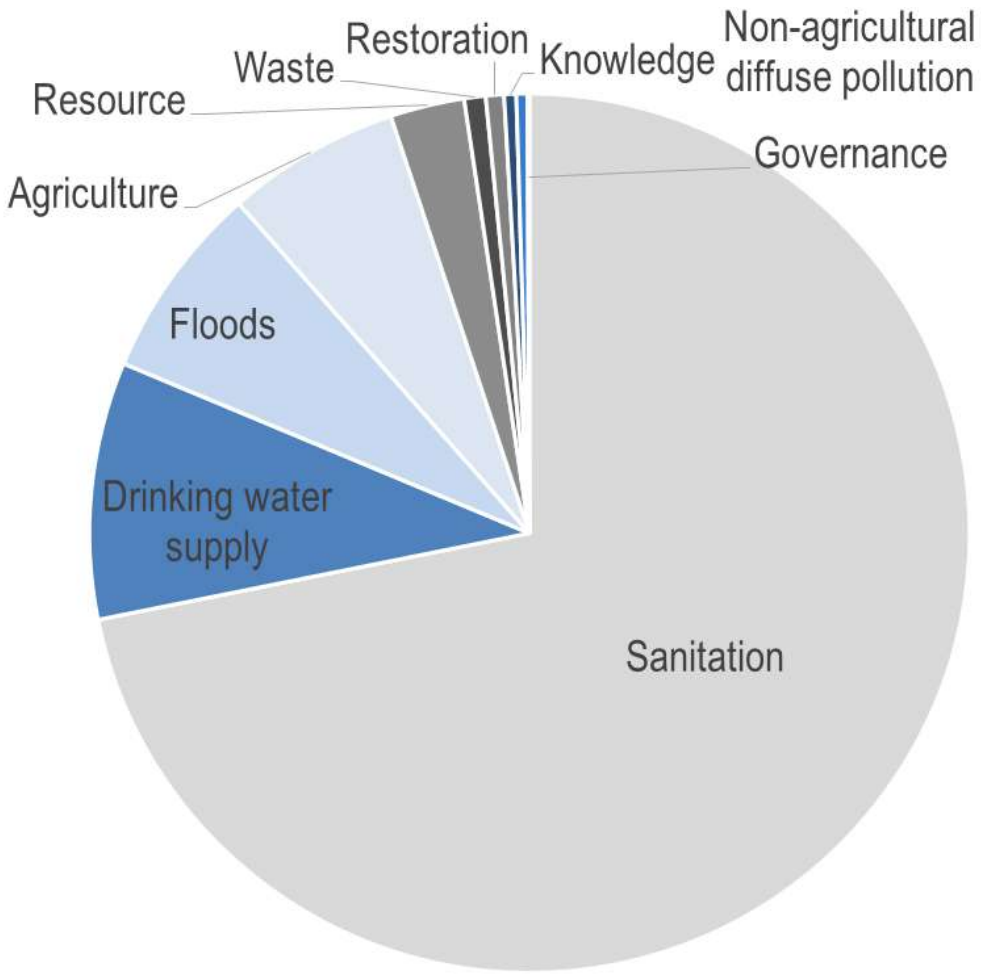
The increase in the number of fish species in the Seine downstream of Paris is the best sign of improvement in water quality





11 River Basins
470 000 km²
30 million inhabitants

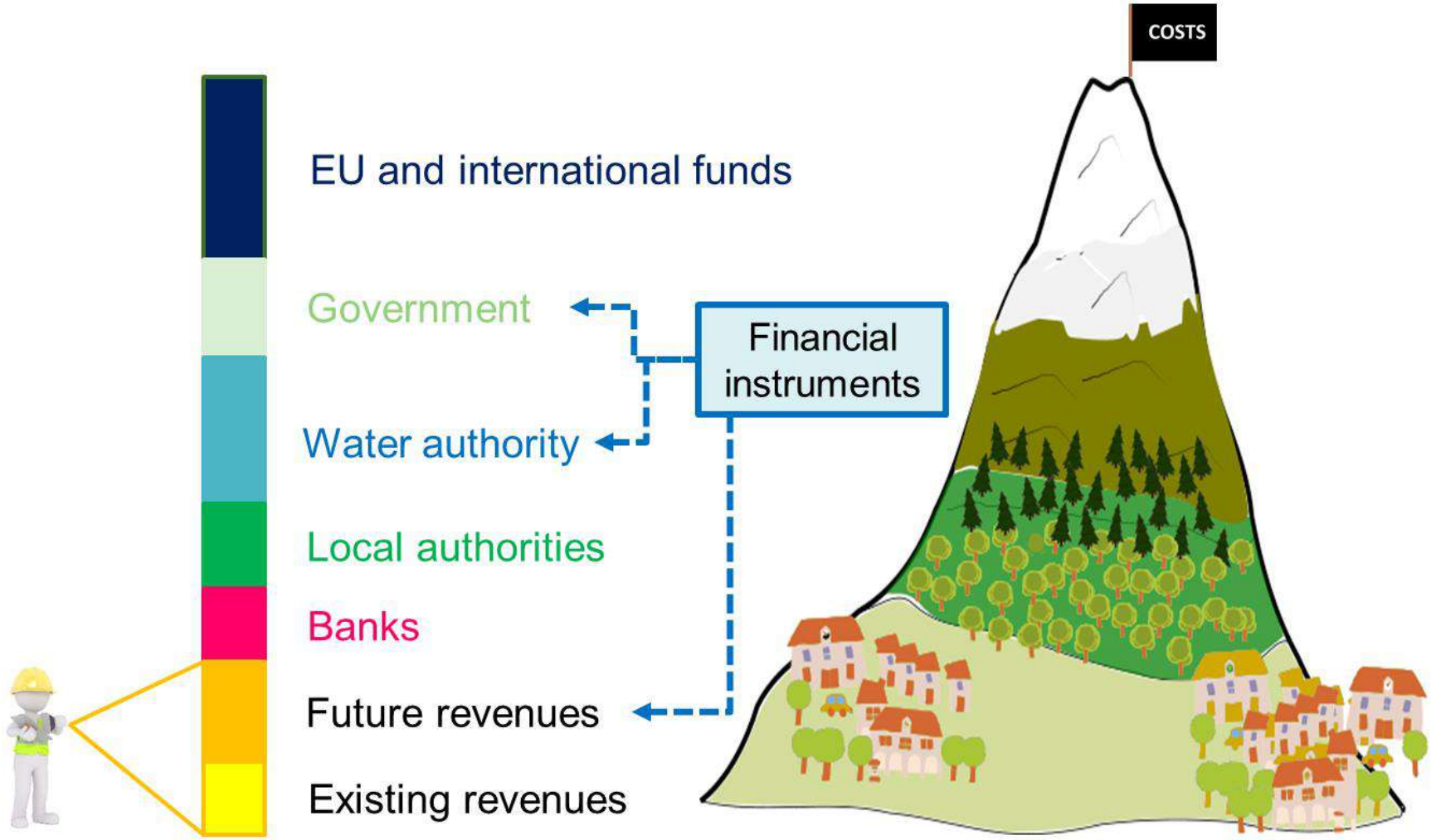
PROGRAMME OF MEASURES (8 RIVER BASINS)



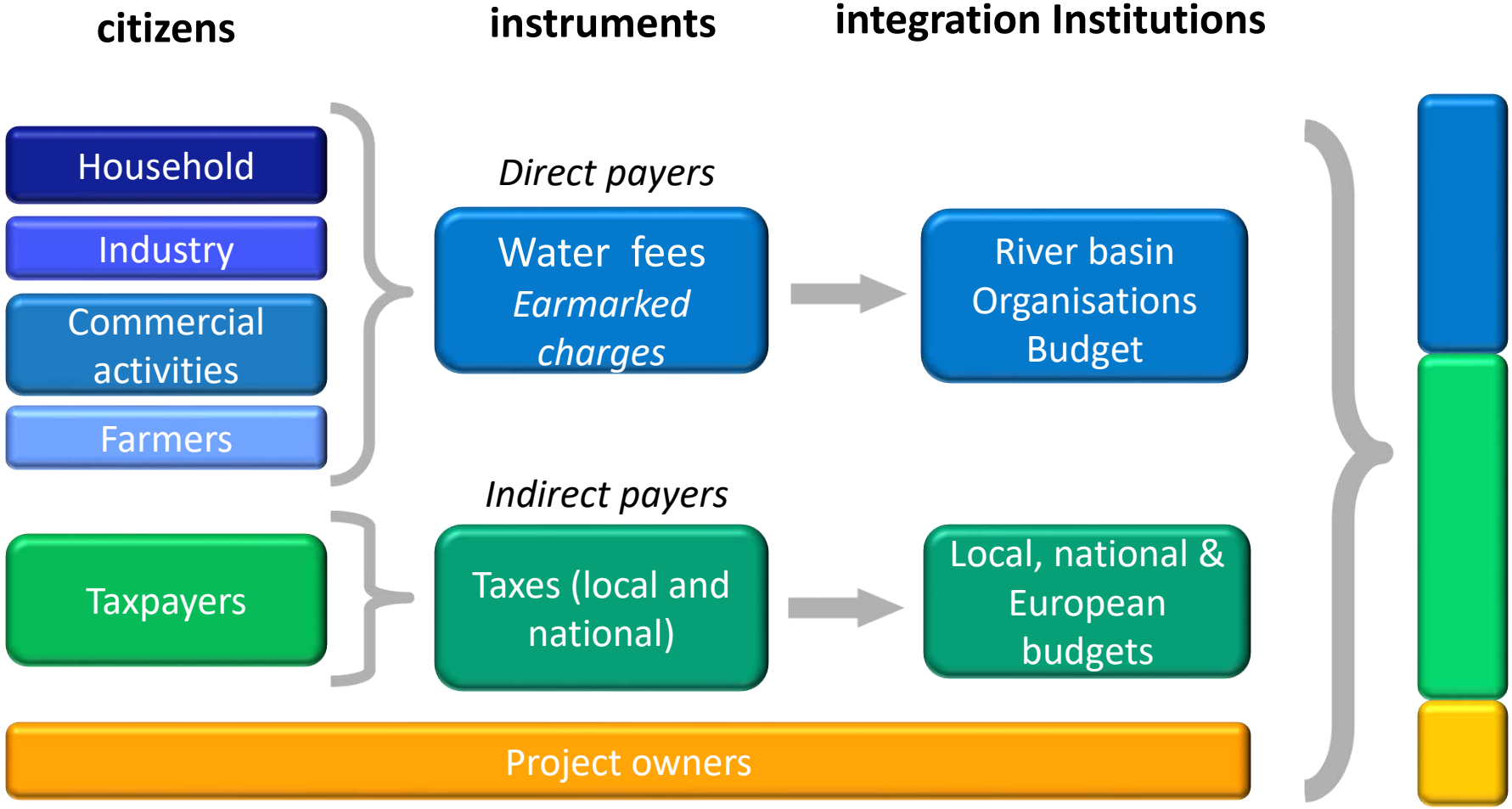
25 EUR/inhabitant/year
45 AZN/inhabitant/year

European Union:
45 EUR/inhabitant/year
85 AZN/inhabitant/year

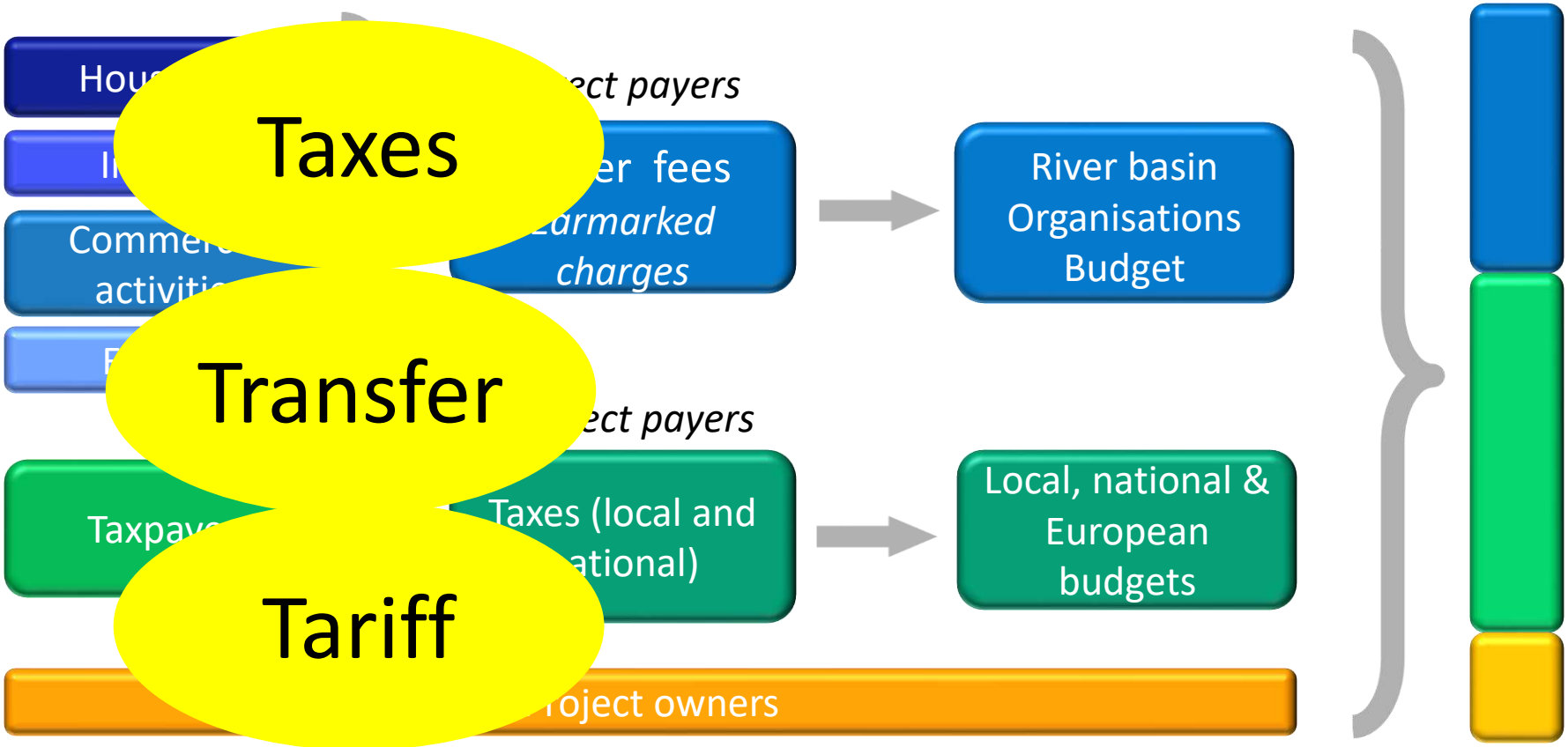
FUNDING

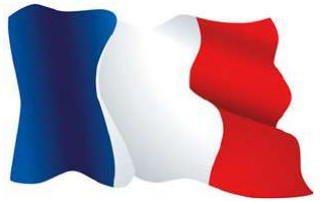

COSTS
EU and international funds
Government
Financial instruments
Water authority
Local authorities
Banks
Future revenues
Existing revenues

WHAT ARE THE CURRENT MECHANISMS FOR FINANCING WATER POLICY?



WHAT ARE THE CURRENT MECHANISMS FOR FINANCING WATER POLICY?





TAP WATER: PRICE BREAKDOWN

Water supply
40%

+

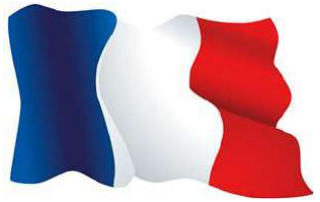
Sanitation
40%

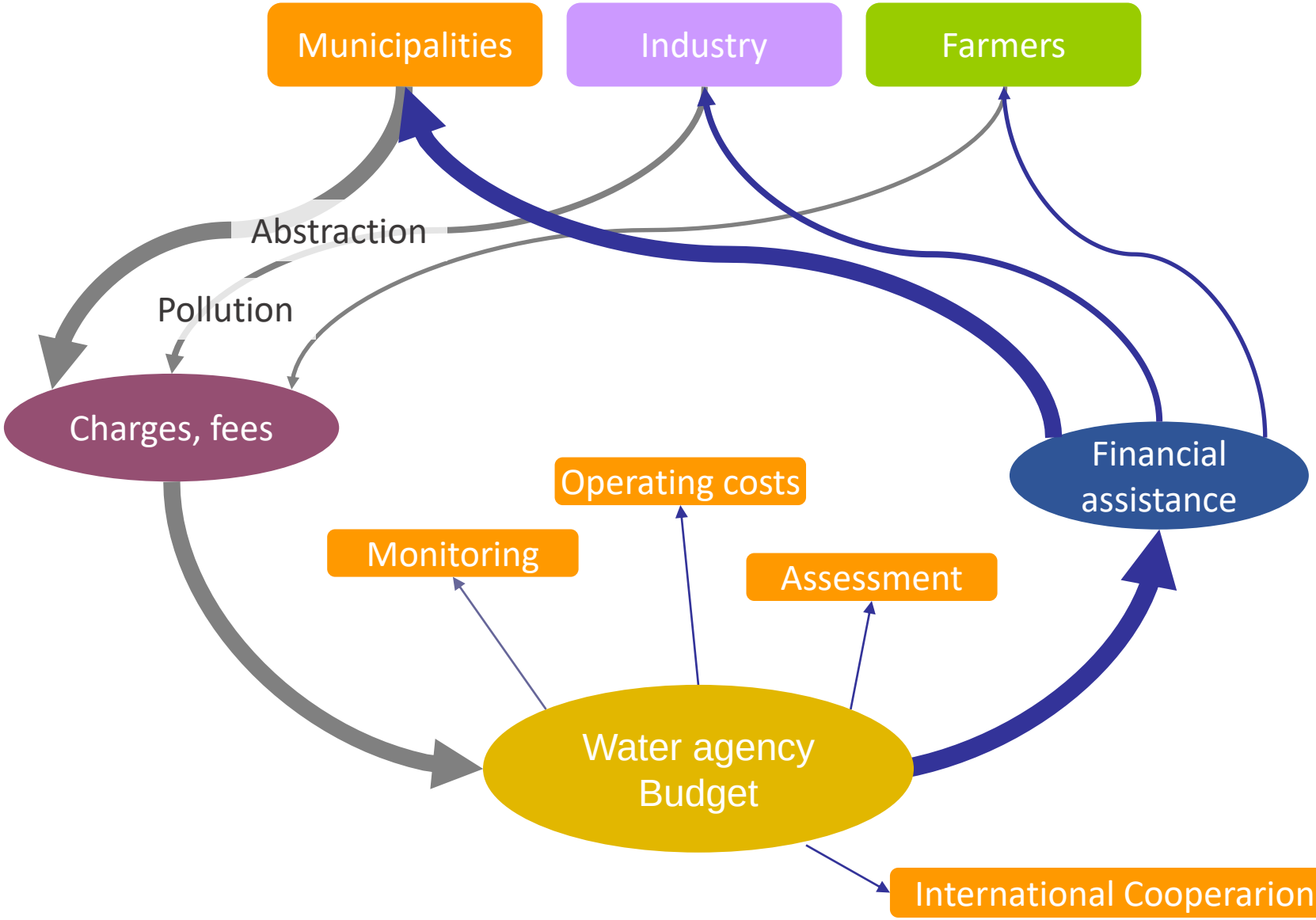
+

Ear-marked charges, fees
20%

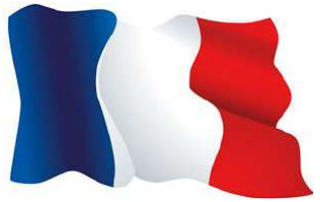
total water price: around 1% of average household income

WATER AGENCY FINANCIAL INCENTIVE



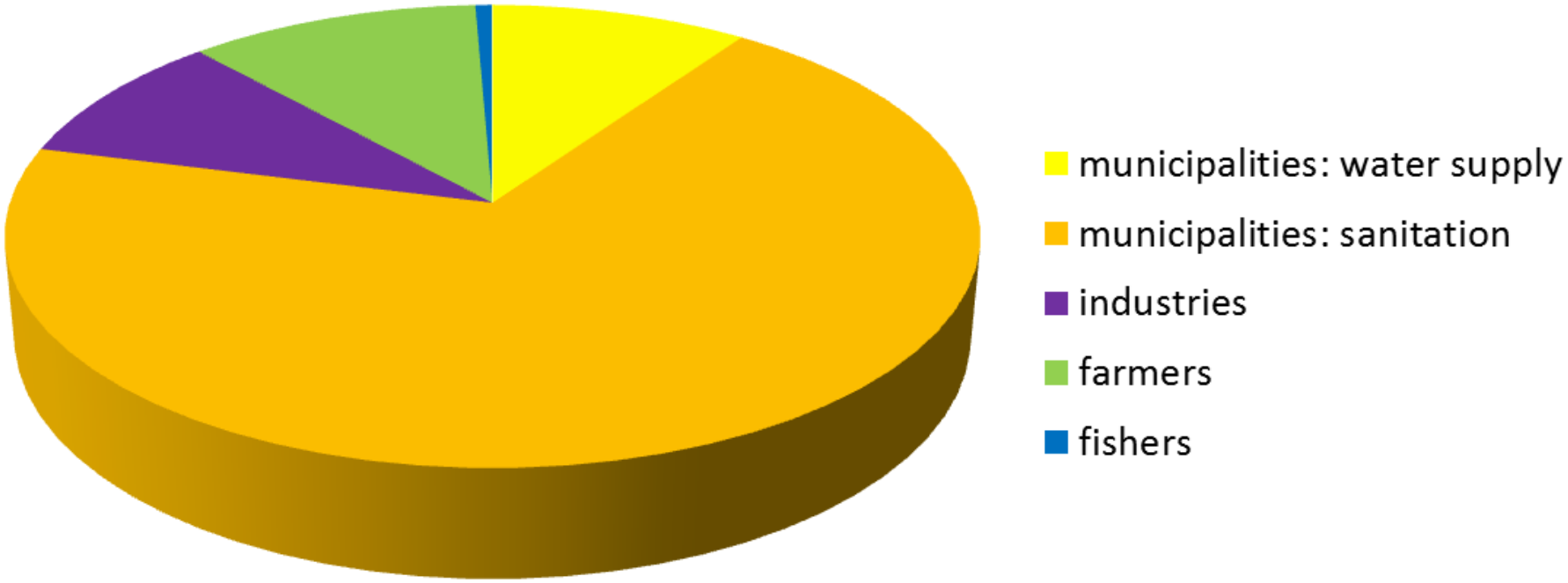


WATER AGENCY FINANCIAL INCENTIVE

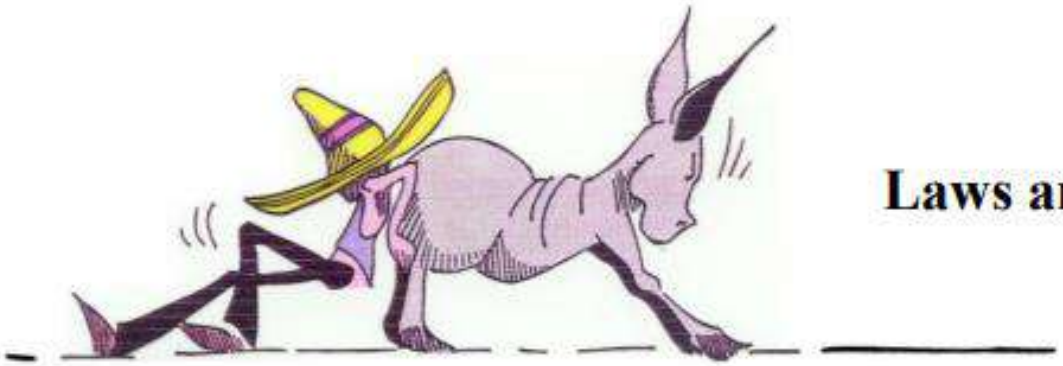


Water fees contributors
Loire-Brittany basin 2013-2018

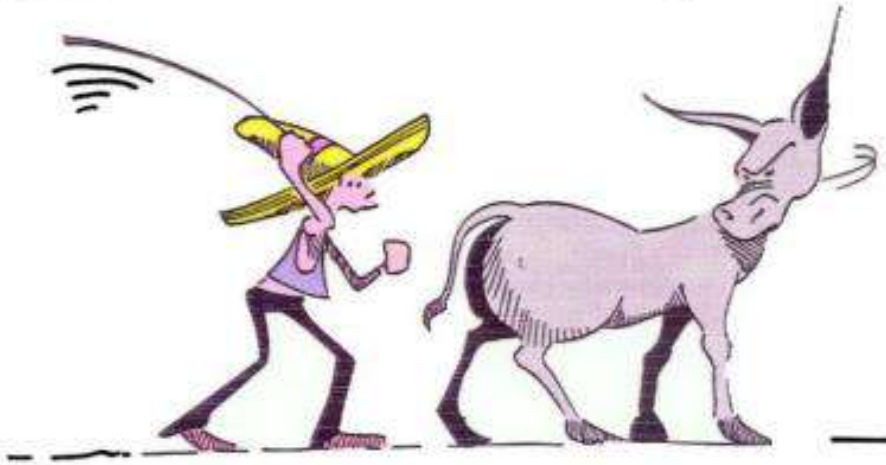
156 400 km², 13 millions inhabitants



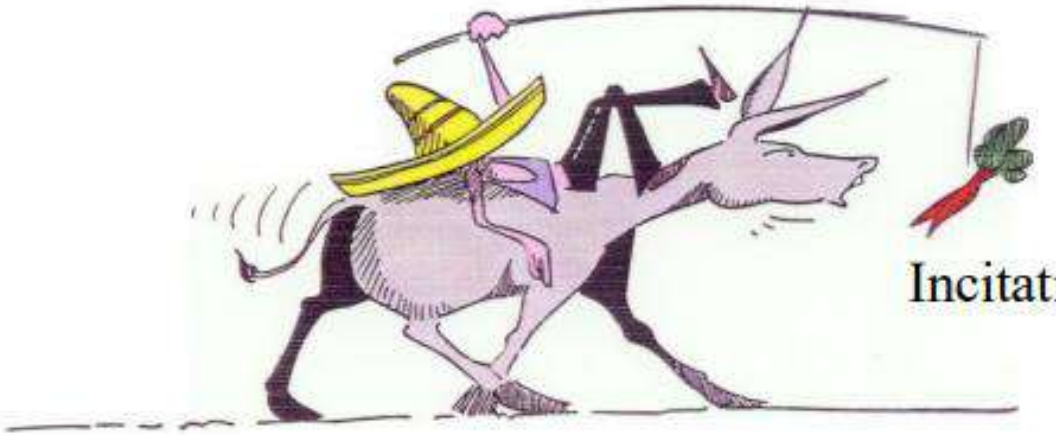
2 billion EUR (4 billion AZN) of fees collected from 2013 to 2018



Laws and standards



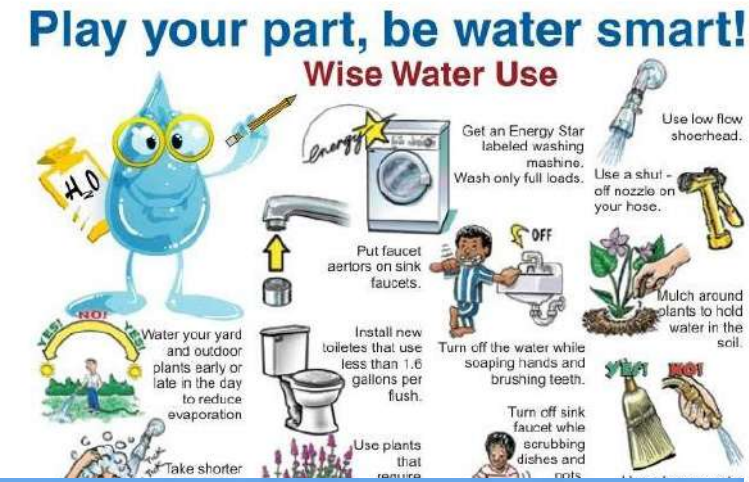
Repression

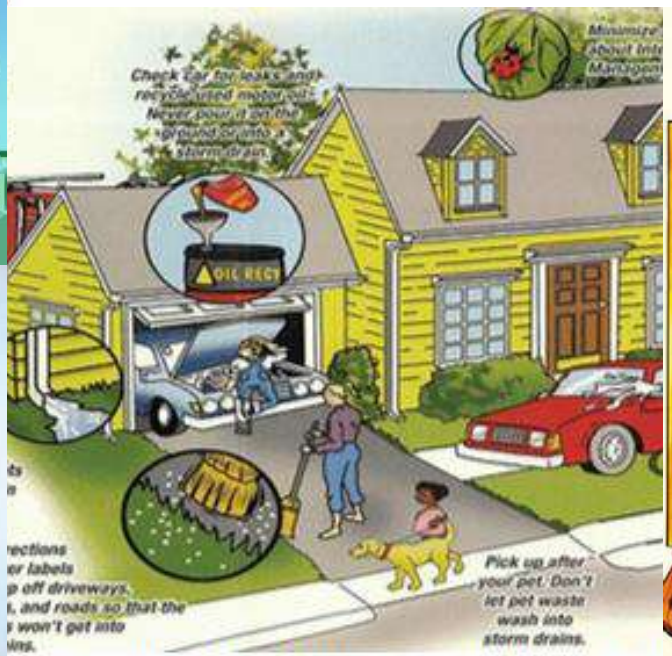


Incitation

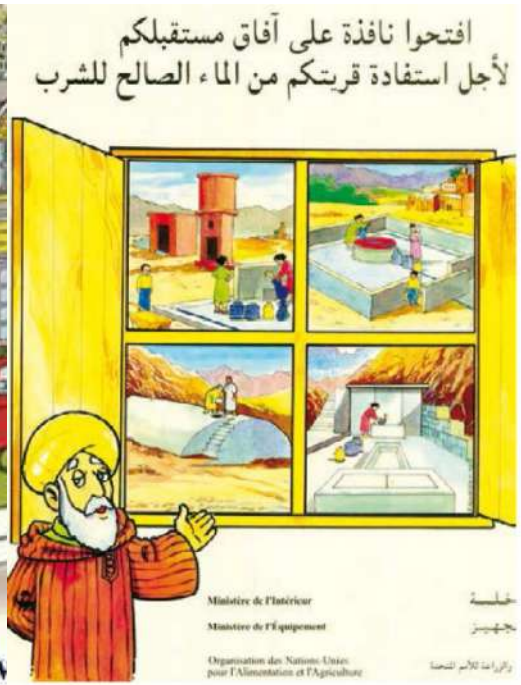
AWARENESS

WE ARE WATER CITIZENS





Sources of Stormwater Pollution Around a Home and W



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ECOSYSTEM SERVICES

BIOMES (CONSTANZA)

- Marine
  - Open ocean
  - Coastal
    - Estuaries
    - Seagrass/ algae beds
    - Coral reefs
    - Shelf
- Terrestrial
  - Forest
    - Tropical
    - Temperate/boreal
  - Grass/rangelands
  - Wetlands
    - Tidal marsh/ mangroves
    - Swamps/ floodplains
- Lakes/rivers
- Desert
- Tundra
- Ice/rock
- Cropland
- Urban

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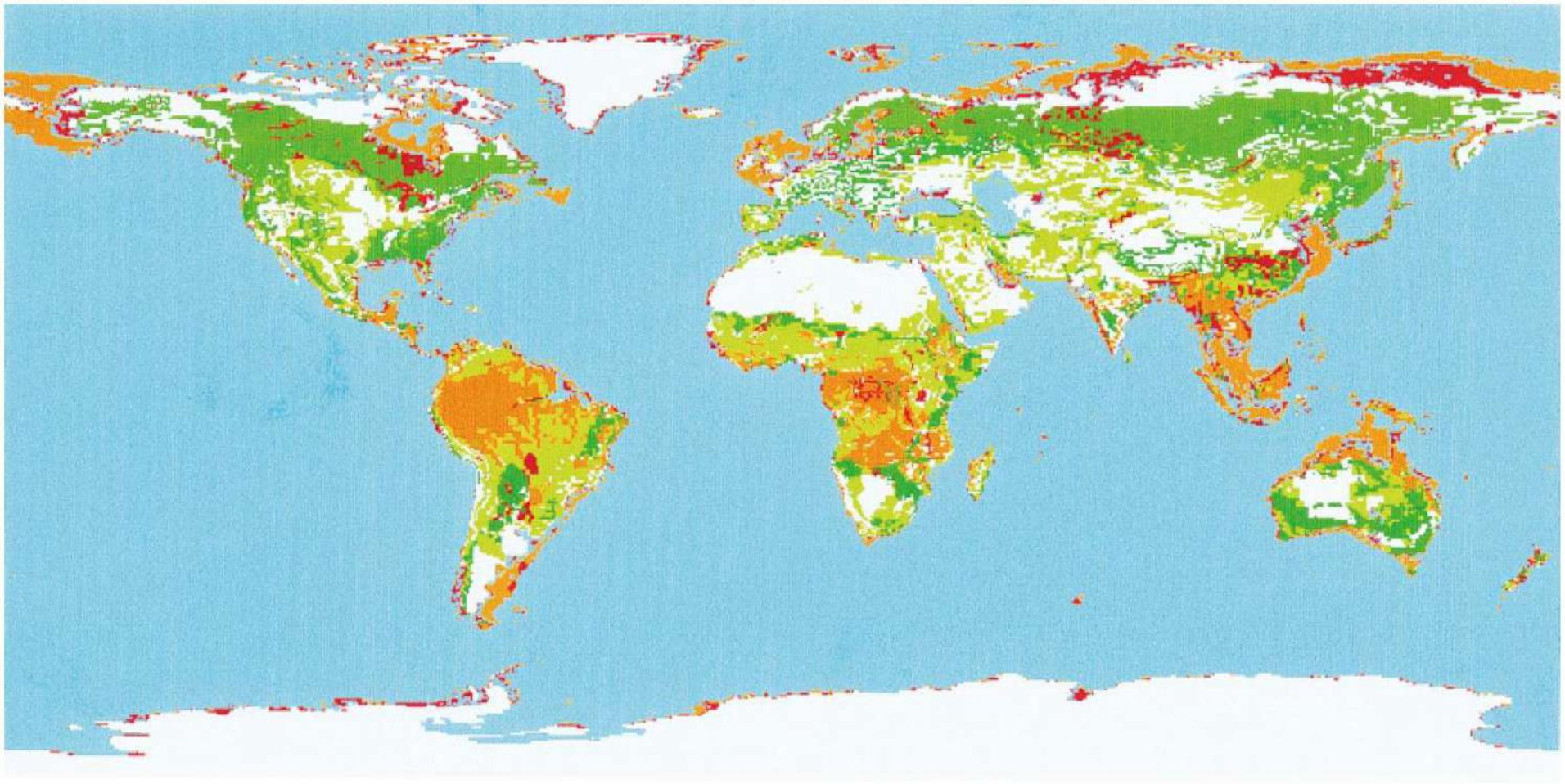
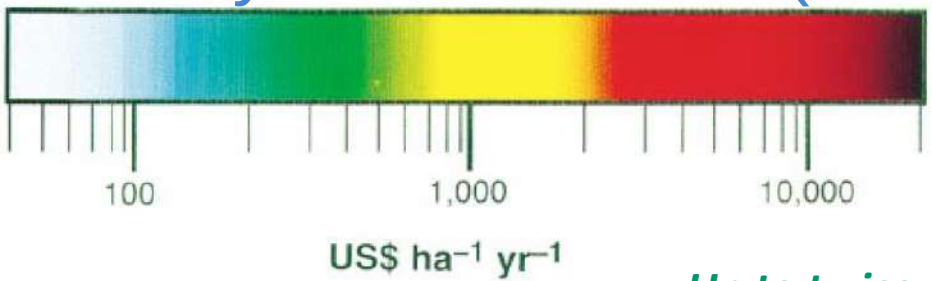
ECOSYSTEMS SERVICES (CONSTANZA)

1 Gas regulation	10 Pollination
2 Climate regulation	11 Biological control
3 Disturbance regulation	12 Refugia, habitat
4 Water regulation	13 Food production
5 Water supply	14 Raw materials
6 Erosion control, sediment retention	15 Genetic resources
7 Soil formation	16 Recreation
8 Nutrient cycling	17 Cultural
9 Waste treatment	



Value of ecosystems services (Constanza)



Up to twice as much of World GDP!

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BENEFITS FROM PROGRAMME OF MEASURES

Implementation of measures has a cost as well as inaction

Environment and ecosystems have a value and this value is significant

Economic valuation mixes monetary valuation and non-monetary units

Economic analysis is a social process to construct values and prepare for the future in a River Basin

1 glass of milk

200 litres

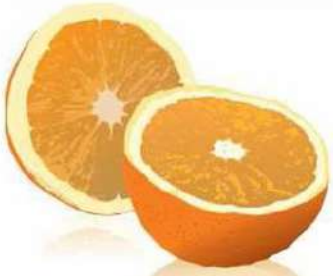
1 cup of tea

35 litres

1 cup of coffee

140 litres

1 orange



50 litres

1 apple

70 litres

1 glass of wine

120 litres

1 potato

25 litres

1 hamburger

2400 litres

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CRITICAL ELEMENTS FOR A SUCCESSFUL IWRM APPROACH

- Political will (at the highest possible level)
- Knowledge (not only from science, but from cross-sectoral sources of information, expertise, local knowledge)
- Institutional arrangements (start with existing institutions, but re-define mandates clearly)
- Community engagement (takes time to build and is a long-term investment)
- Economic prosperity (difficult to manage without financial support; it is not just about direct project funding, it is about mobilising a whole range of economic and financial incentives)

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THANK YOU
NOW LET'S TAKE A FEW QUESTIONS

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https://www.eu4waterdata.eu/en/