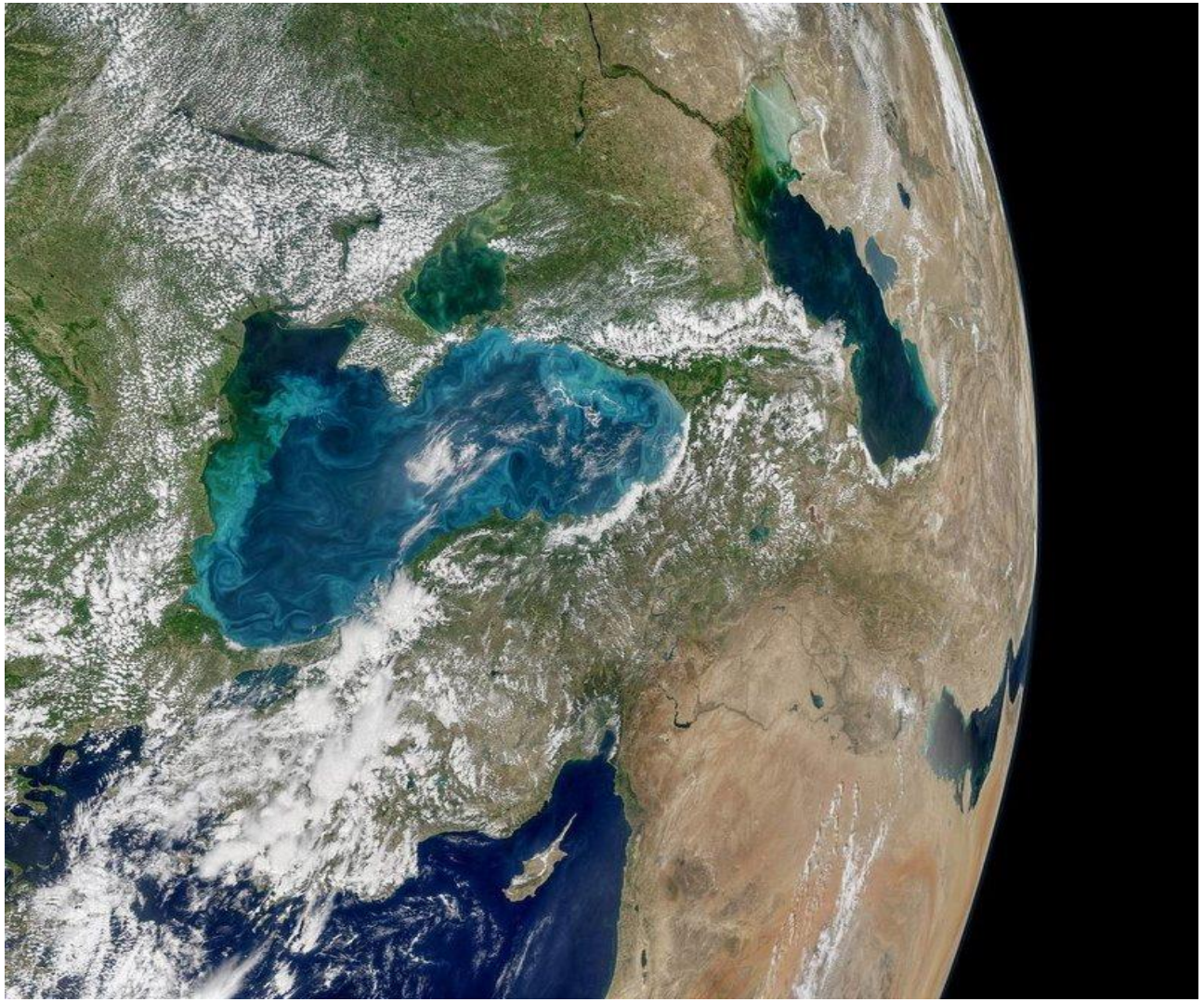
Turning the Tide of Pollution Event

Setting the Stage – brief overview of the BBSEA program

Bucharest, November 21, 2023

What does “blueing” mean?



NASA’S AQUA SATELLITE

“Blueing” of oceanic sectors is achieved by supporting more sustainable development of maritime activities such as shipping, ports, tourism, offshore wind or desalination.

“Blueing” is the equivalent of greening applied to the marine environment.

It does not refer to the proliferation of phytoplankton as shown on this NASA satellite photo

The World Bank is a Long-term Partner in the Black Sea

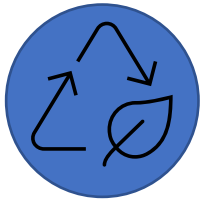
Supporting Black Sea Countries since 1990s

Integrated Coastal and Marine Areas Management and the Danube Program

Aligned with the European Commission's principles and guidelines

BBSEA Program Vision Statement in support of the CMA

Long-term Development Objectives of the program are:



To improve environmental health of the Black Sea

Increase social and economic benefits for the population

First activities implemented under the BBSEA include:

- Improve knowledge on sources of pollution, in particular nutrient
- Promoting regional collaboration
- **Engaging the public, private sector and civic society for pollution prevention in the Black Sea**
- **Fostering innovation to prevent and mitigate nutrient pollution in the Black Sea**

Beneficiaries:

- All CMA countries:

6 riparian countries and Moldova

- Pilot activities initiated in Georgia, Moldova, Turkey and Ukraine

BBSEA: Overall Program Structure

The overall program objective is to promote the adoption of a Blue Economy approach, with a priority focus on reducing pollution

Window 1:
ANALYTICAL WORK
To improve knowledge on pollution sources

Window 2:
INVESTMENT FINANCE
To prevent and mitigate key marine pollutants

TA & Convening Services

Dialogue, Coordination & Regional Planning

Commission on the Protection of the Black Sea Against Pollution

Jobs umbrella MDTF

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UNOPS

PROBLUE

NDC Support Facility

QUALITY INFRASTRUCTURE INVESTMENT PARTNERSHIP

gef

BSEC 30 YEARS OF COOPERATION

BBSEA Window 1: Analytical Work

ONGOING ACTIVITIES

Pillar I: Economics: Blue Wager Program (JOBS TF)

Pillar II: Eutrophication, Chemical Pollution:

Activity 1: Turning the tide of pollution ASA (**PROBLUE I**)

Activity 2: Nature Based Solutions in the Black Sea (**QII TF**)

Pilar III: Marine Litter

Activity 1: Plastic Value Chain/Life Cycle Analysis in Türkiye and Georgia: (**PROBLUE II**)

FUTURE ACTIVITES

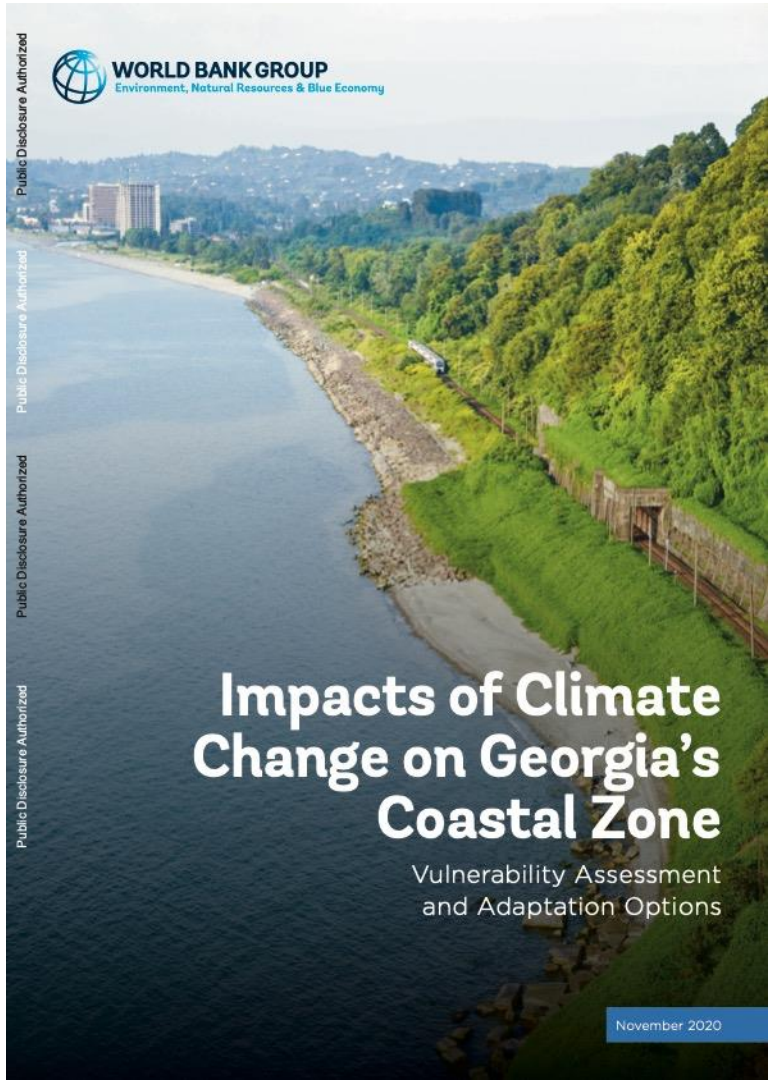
Pilar III: Marine Litter

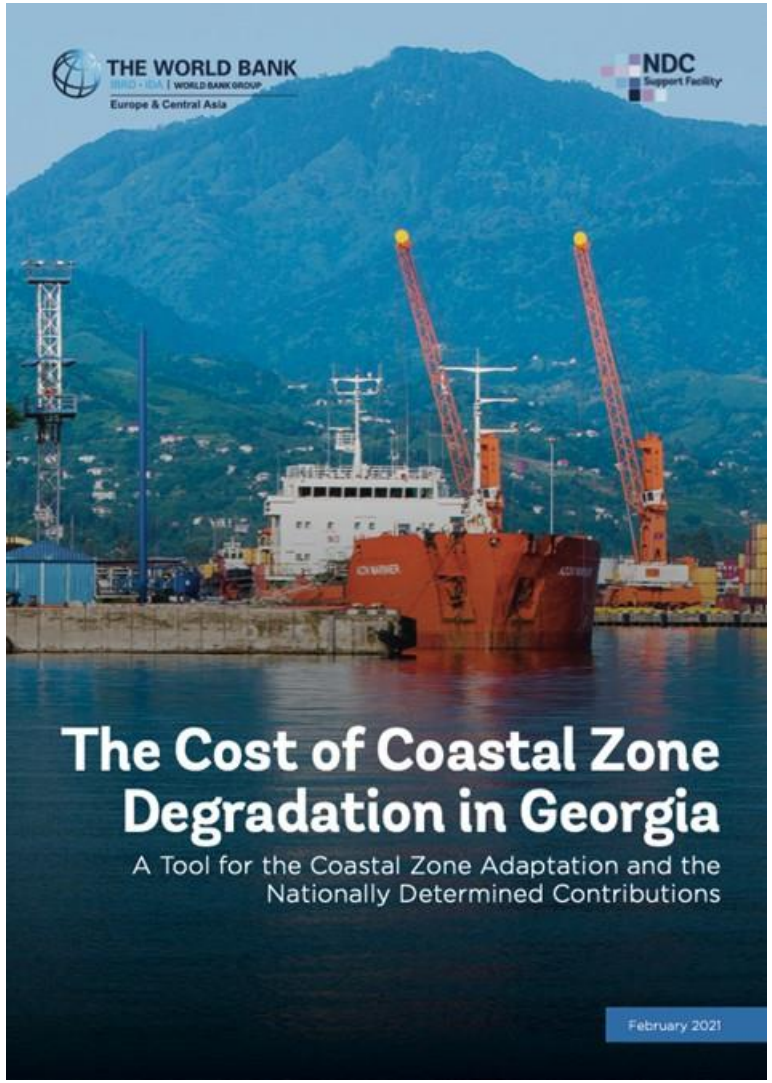
Activity 2: Improving Plastic Management and Circularity Policies in Türkiye and Georgia (**PROBLUE III**)

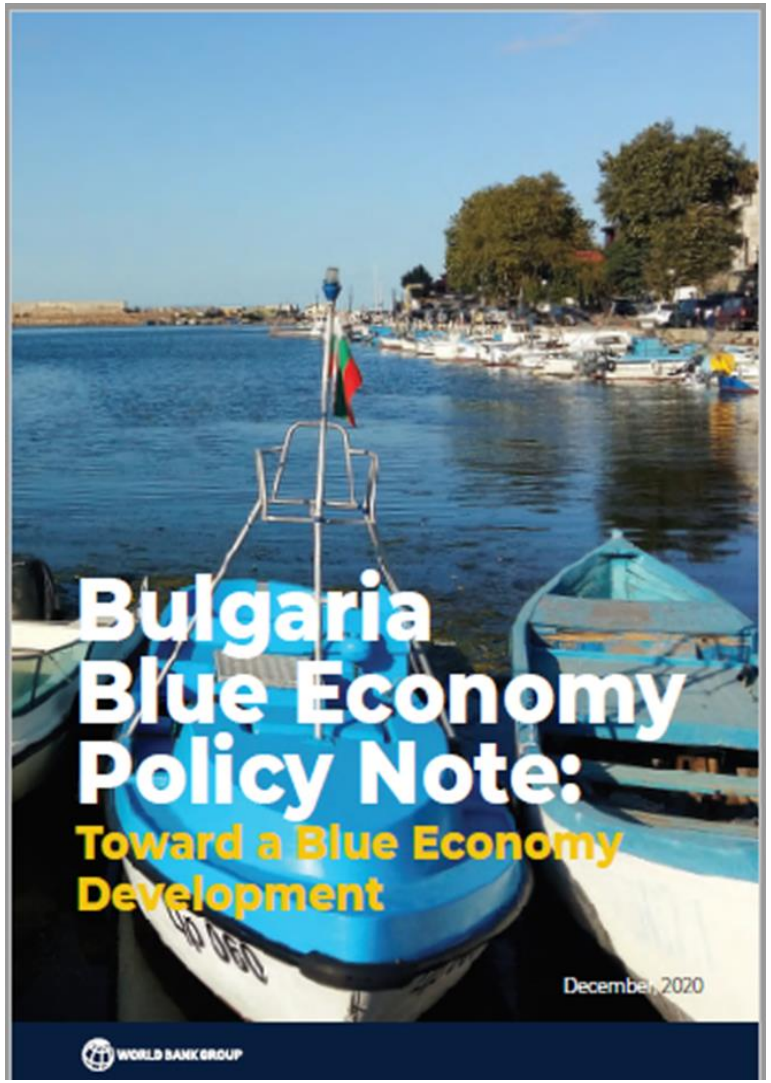
Component 1: Impact assessment of policy instrument packages for zero plastic waste and circularity with Plastic Policy Simulator

Component 2: Assessment of the lifecycle footprint of the most problematic plastic products and their alternatives with Plastic Substitution Trade-off Estimator for Georgia

WINDOW 1. RECENT ACTIVITIES: KNOWLEDGE OF BLUE ECONOMY, CLIMATE CHANGE







BBSEA Window 2: Investment Finance

ONGOING ACTIVITIES

- **Romania**: Integrated Nutrient Pollution Control Project + AF (P093775) €110M

FUTURE ACTIVITES

- **Romania**: Rural Pollution Prevention and Reduction Project (P179786) €60M IBRD
- **Regional**: BBSEA GEF Project (P173890) $6.39M grant

BBSEA Window 2: Investment Finance
BBSEA GEF Project Components

Component 1
Improved national and regional framework for pollution prevention and reduction

- Assessment of the current national policy and legal frameworks
- National investment recommendations
- Strengthening of the blue economy framework, knowledge exchange
- Support to the regional dialogue in the Black Sea basin

$1.13 million

Component 2
Strengthen public private partnership and innovative financing

- Eco-Business competitions and grants
- Investment preparation

$4.96 million

Component 3
Project management

$0.3 million

$6.39 million

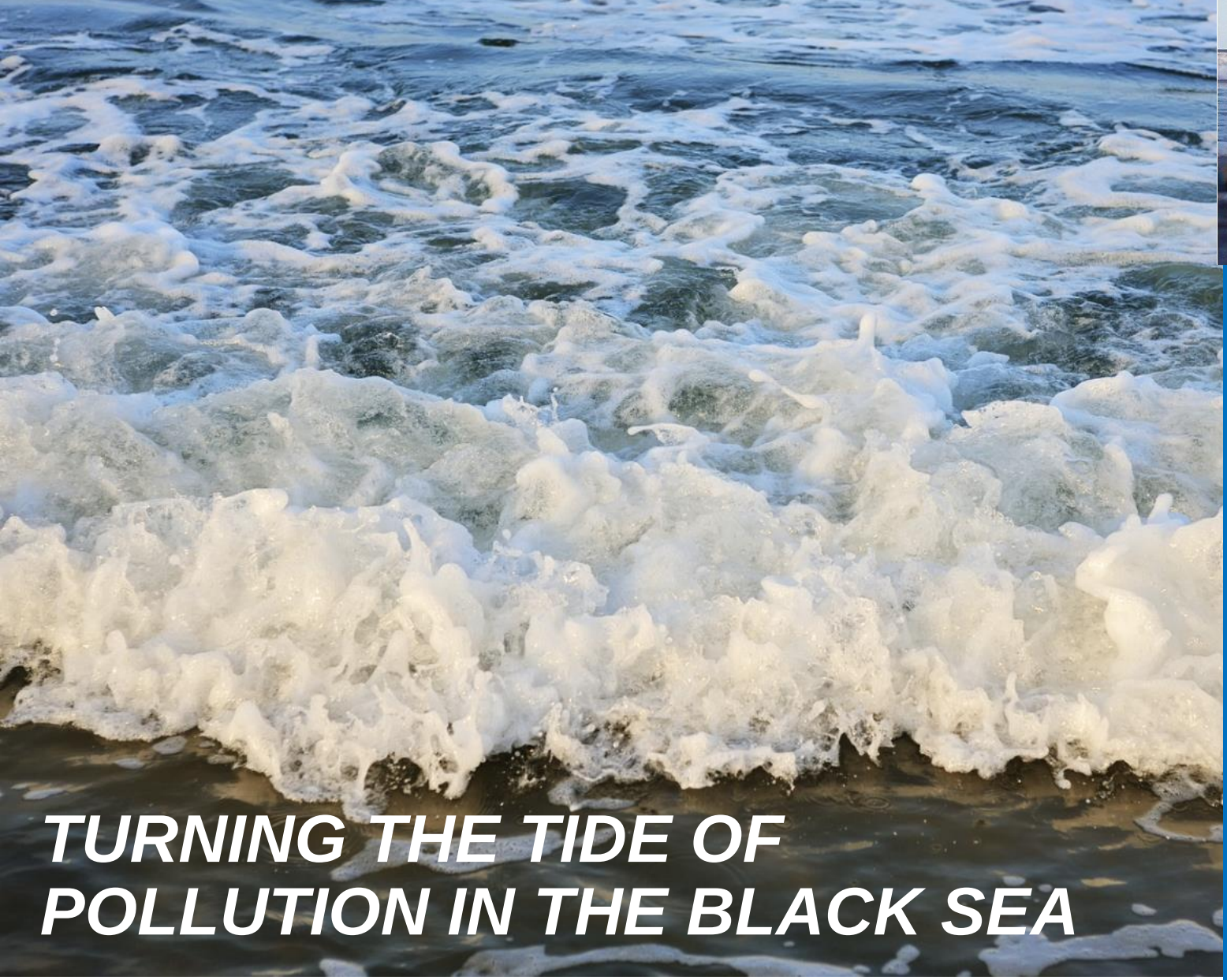
Implementing Agency

UNOPS

Expected Board Approval – March 2024

BLUEING THE BLACK SEA

Thank you!



Regional and National Marine Pollution Diagnostics

Eolina Petrova Milova
Senior Environmental Specialist
World Bank

Bucharest, 21 November 2023

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BLUEING THE BLACK SEA

PROBLUE
HEALTHY OCEANS · HEALTHY ECONOMIES · HEALTHY COMMUNITIES

BSEC

Commission on the Protection of the Black Sea Against Pollution

BBSEA Activity 1: Turning the Tide of Pollution (PROBLUE I): Key outputs

1.1 National Marine Pollution Diagnostics

(Bulgaria, Georgia, Moldova, Romania, Turkiye and Ukraine*)

1.2 Turning the Tide of Pollution in the Black Sea - Regional Marine Pollution Diagnostic

1.3 Summary of National Marine Pollution Diagnostics

* The report on Ukraine was based on data and information gathered before February 2022. The impact Russia's aggression against Ukraine will be studied further.

BLUEING THE BLACK SEA

Turning the Tide of Pollution: Regional Black Sea Marine Pollution Diagnostic

Objective: **Healthy marine and coastal ecosystems**

- Serve as a consolidated platform for enhancing the regional cooperation and restarting the dialogue on addressing pollution:

- Consolidate knowledge on marine pollution and suggest measures needed to achieve GES in the Black Sea

- Understand common nature of spillover effects from the Black Sea pollution to the economies in the region and identify possible common solutions

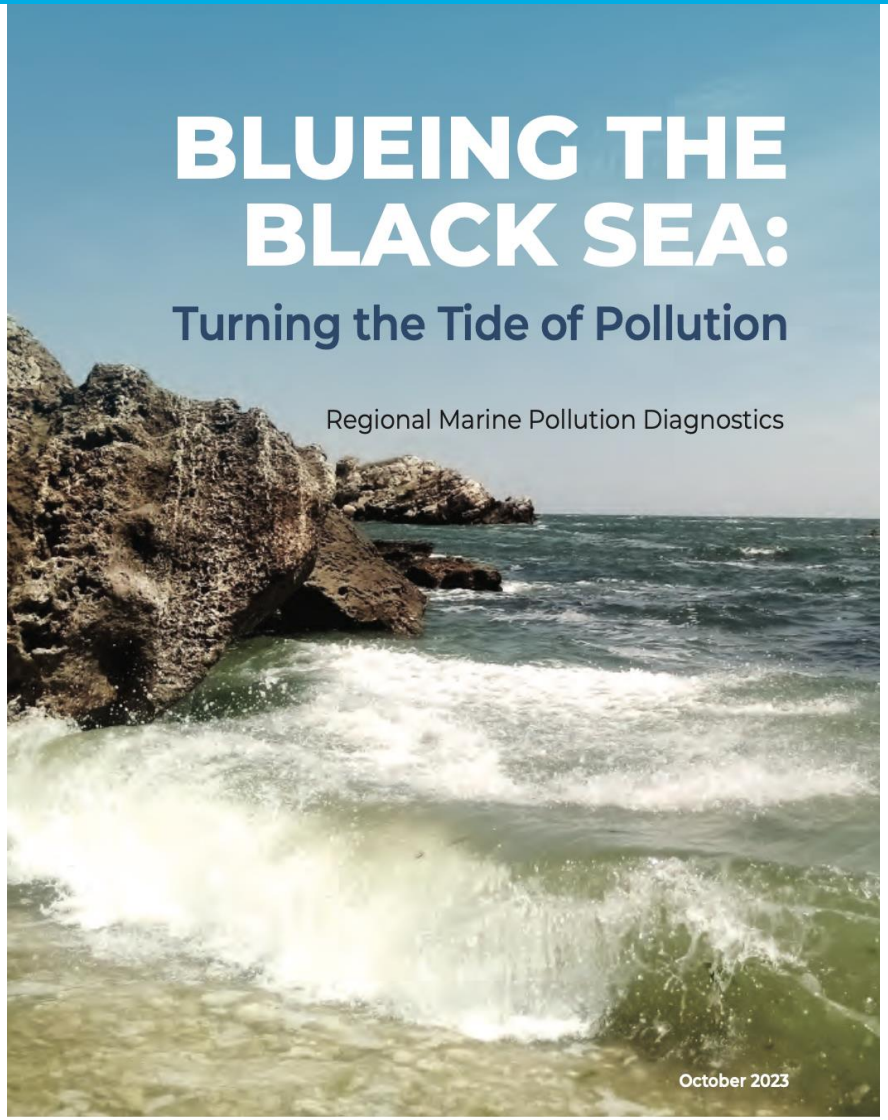
Specific Objectives

Identify the legal, institutional and policy gaps in each country

Identify measures in the key contributing sectors - agriculture, industrial discharges, municipal wastewater discharges and port activities,

Highlight the principal sources of point and diffuse pollution **with a focus on nutrient loads and chemical pollution** the associated drivers, pressures, impacts and suggests specific responses and common solutions:

Analyze the business-as-usual scenarios if no action is taken to address pollution



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Turning the Tide of Pollution: Vol. 2 Summary of Country Marine Pollution Diagnostics

Objectives

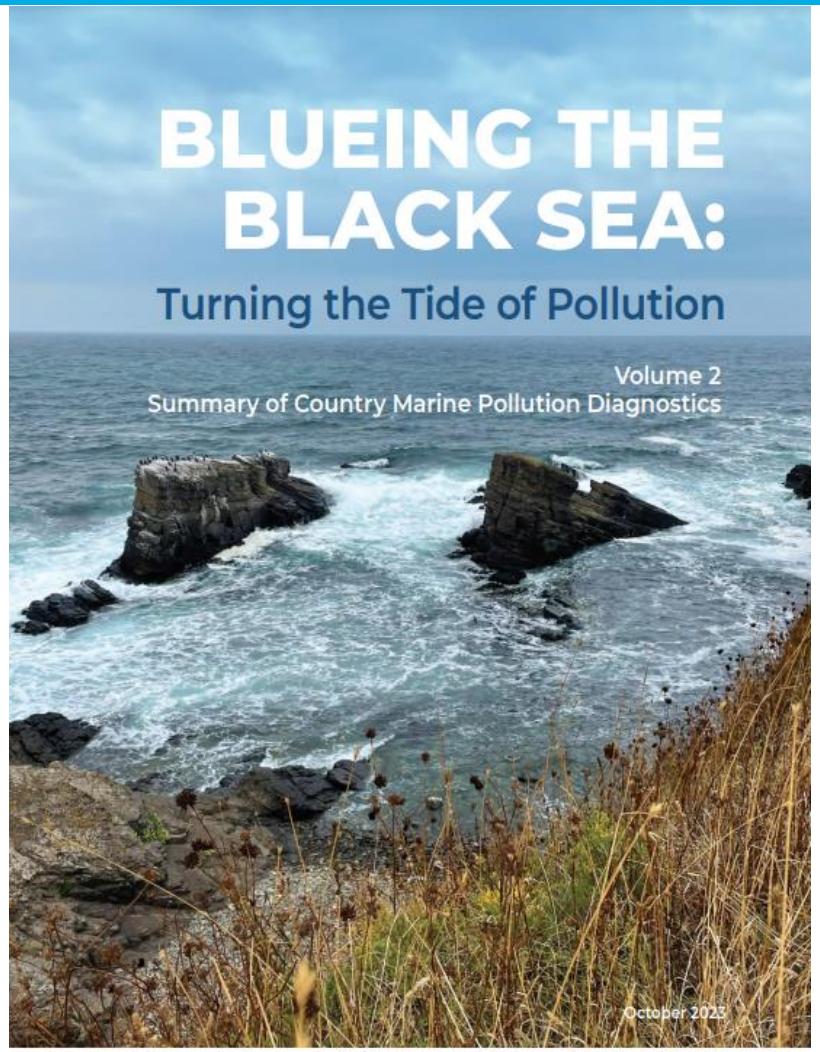
Assist the current and future efforts of the Black Sea countries to reduce pollution to marine environment by benefitting from a consolidated and shared knowledge

Identify priority actions for effective pollution prevention in specific sectors of the economy

Scope

Highlight the principal sources of point and diffuse pollution and the associated pressures and impacts

Suggest key policies where a shift from the business-as-usual scenario will lead to reducing marine pollution and eutrophication



Methodology for the Regional and National Reports

Building on prior and existing activities

- A desk review of water and marine pollution in the Black sea Countries (except Russia) and the Black Sea basin -> Background Technical Marine Pollution Diagnostic Reports

Stakeholder consultations

- BBSEA Consultations in all Black sea countries – 2021
- Appointment of BBSEA focal points- 2021
- Institutional level consultations on the draft Regional and national reports: July-Sept 2021
- Institutional consultations on the full draft Regional and National reports with the Black Sea countries, BSEC, BSC: July-November 2023
- Ad-hoc consultations with Country Focal points

Sources of information

- Publicly available data sources
- Data provided by the participant countries, Black Sea Commission
- Data from Regional and National Monitoring Reports,
- Scientific Research, International Projects (EMEP, EMBLAS-II etc., SMHI Hypeweb for nutrient loads of the rivers)
- Online survey to a large audience of stakeholders

Country	Academia/ Expert	Business	Decision maker	NGO Civil org.	Public org/ authorities	Other	Tot
Romania	16	18	7	13	13	2	69
Bulgaria	8	19	7	12	6	1	53
Turkey	5	4	9	4	6		28
Moldova	3	1	2	6	10	1	23
Ukraine	3	2	8	1	3		17
International		2	1	4	10		17
Georgia	2	1	5		3		11
Other	1	1					2
Tot	37	48	39	38	52	4	220

Scope of the Regional Black Sea Marine Pollution Diagnostic

The Black Sea's common economic space (Chapter 1)

Legal, Policy and Institutional context on pollution in the Black Sea **(Chapter 2)**

Environmental Degradation in the Black Sea – Nutrient Enrichment/Eutrophication (Chemical Pollution Heavy Metals, Invasive Species, Microplastics), **(Chapter 3)**

Are the Black Sea Countries on a Path to Achieving Good Environmental Status? Country Assessments, BS circulation patters, Sectors contributing to pollution **(Chapter 4)**

Why Eutrophication remains an ongoing concern (Chapter 5)

Common Drivers, Pressures and Impacts (population, economic drivers, Agriculture, Urban Sector, Industries, Tourism, Socio-Economic Impacts of pollution **(Chapter** 6**)**

Reverse Black Sea Pollution and Shaping the Future (Chapter 7)

Regional and National Marine Pollution Diagnostics: Legal and Institutional Review

Regional-level legal, policy and institutional analysis of nutrient & chemical marine pollution

- Summary chapter (included in Regional Pollution Diagnostic Report)
- Inform action for improved operation, implementation and enforcement of national legal and policy framework

National-level legal, policy and institutional analyses for Bulgaria, Georgia, Moldova, Romania, Türkiye, and Ukraine

- Summary chapter (included in National Pollution Diagnostic Report)
- Synthesize and communicate findings of six national legal, policy and institutional analyses

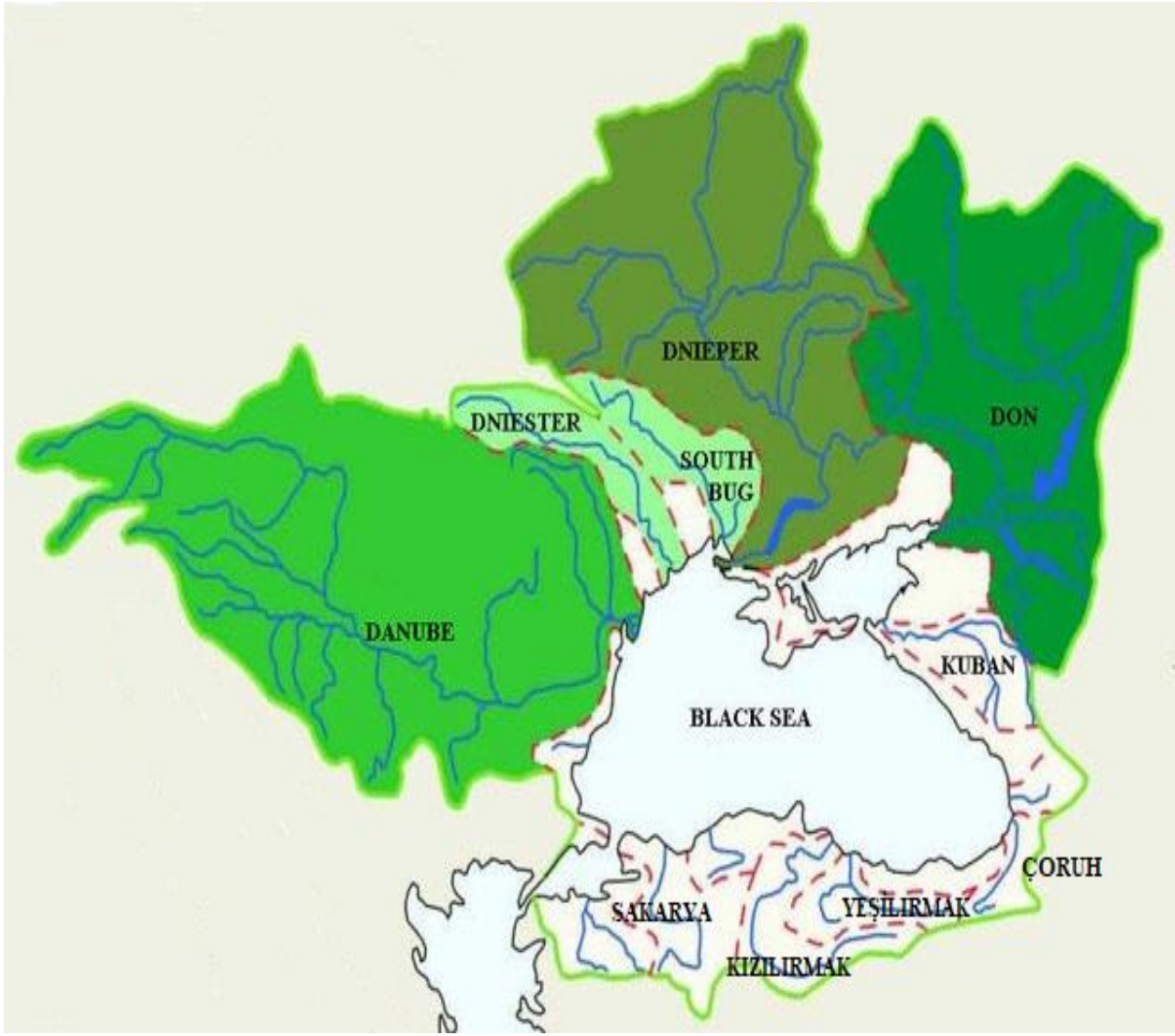
Objective: To Identify policy, legal & institutional gaps in international, regional & national laws & standards;

- **Analyze good international / industry practice**
- **Address legal 'fragmentation' – gaps & overlapping requirements;**
- **Address issues of implementation and enforcement**

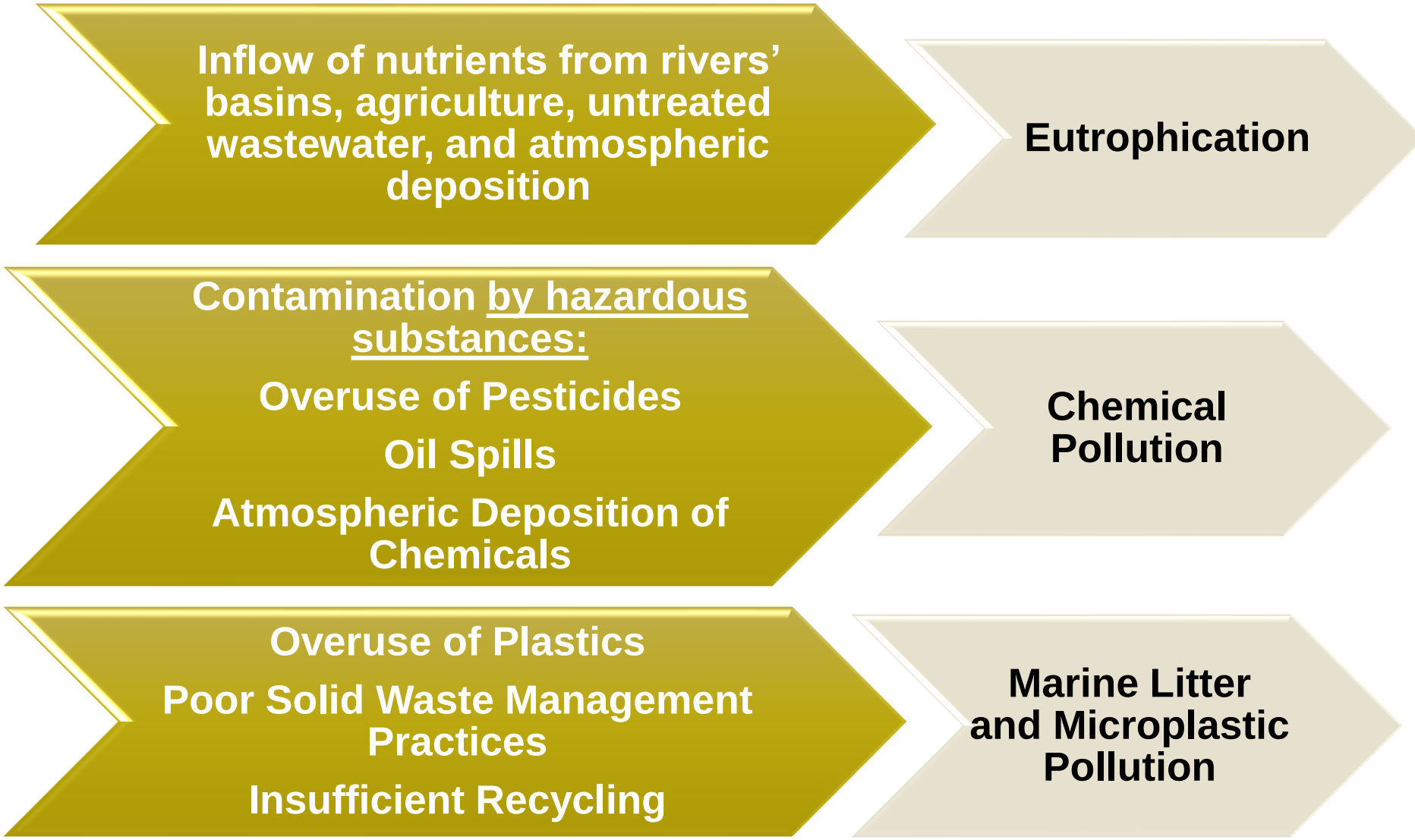
Environmental Degradation In The Black Sea

- The catchment of the Black Sea covers an area of 1,874,904 km^2
- Rivers carry 353 km^3 of water per year
- The Danube basin (817,000 km^2) represents 43.57% of the total area of Black Sea basin having an essential influence over its Western coast

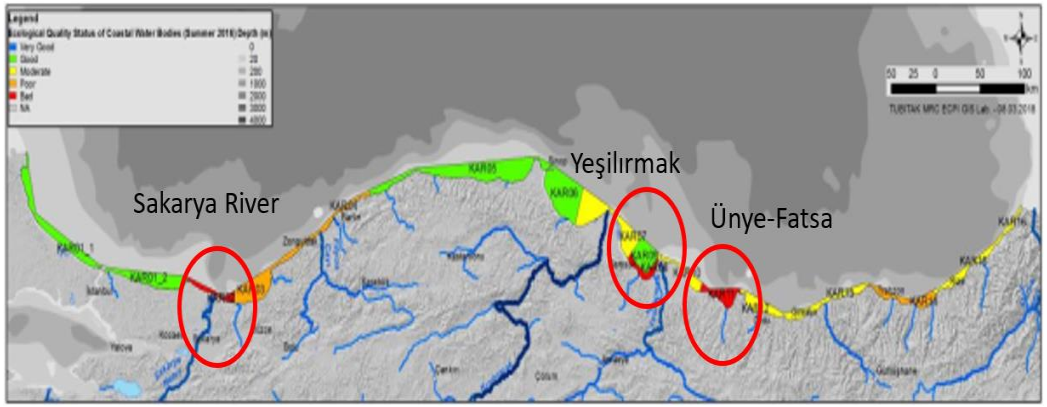
Black sea is the largest natural anoxic water basin in the World - due to its unique geomorphological structure; slow replenishment and bad mixing leading to stratification with lighter and fresher upper layer (up to 150 m), and deeper and more dense water layers saturated with hydrogen sulfide.



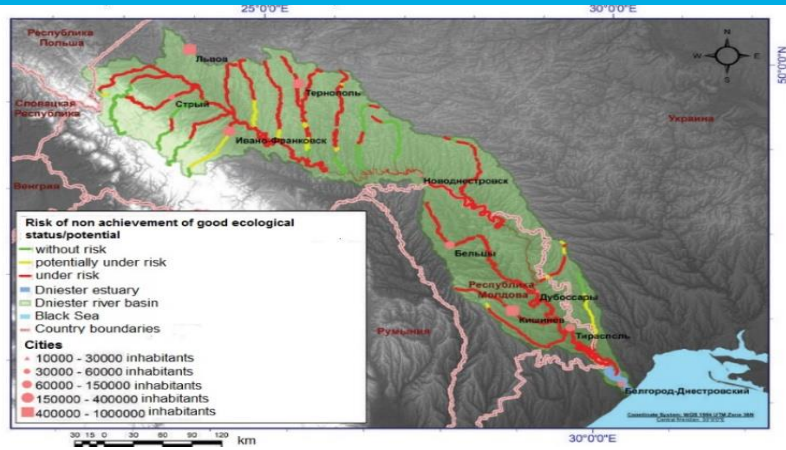
Environmental Degradation in the Black Sea



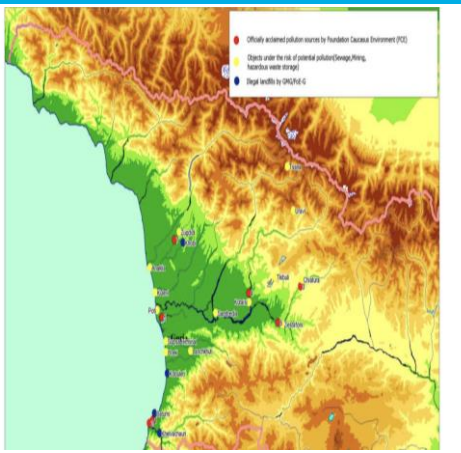
Are the Black Sea Countries on a Path to Achieving Good Environmental Status?



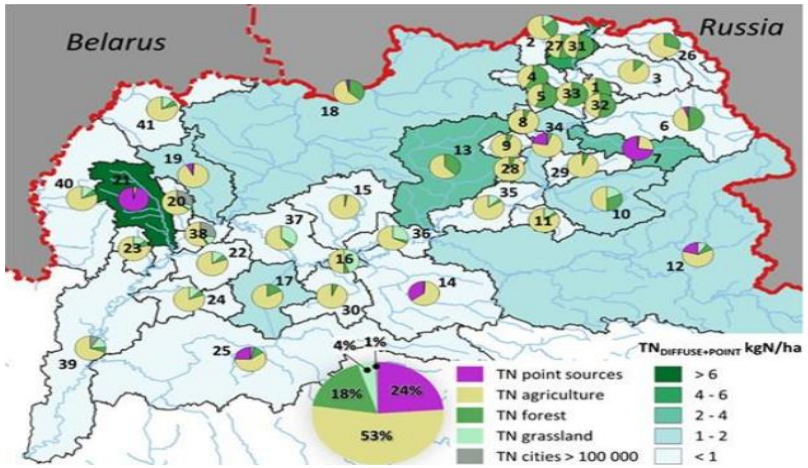
Ecological Quality of Turkish Black Sea Coastal Waters Based on the WFD Assessment



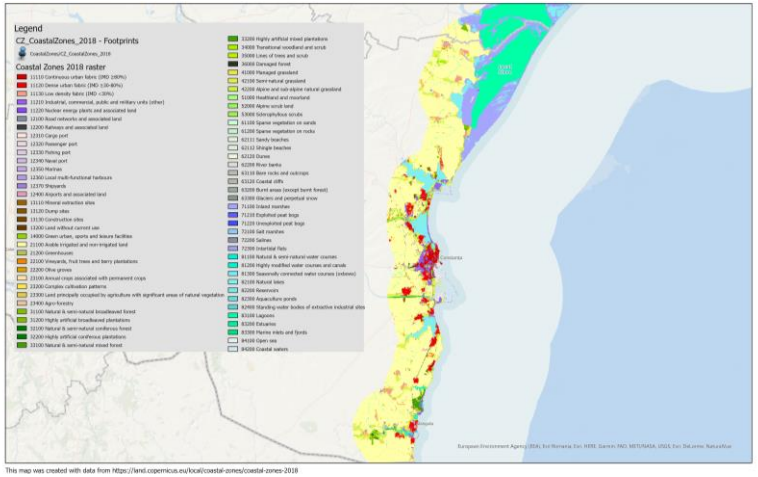
Danube-Prut and Black Sea River Basin Ecological Classification of SWBs



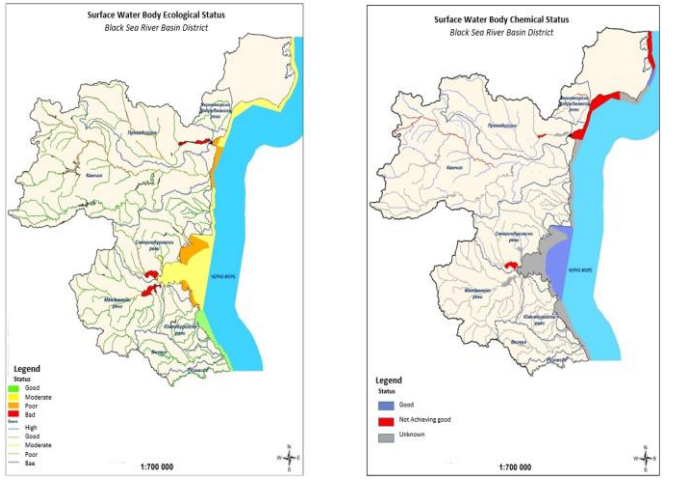
Hot spots of pollution in Georgia



Spatial distribution: total nitrogen load from sources in the Upper Dnipro & Desna sub-basin

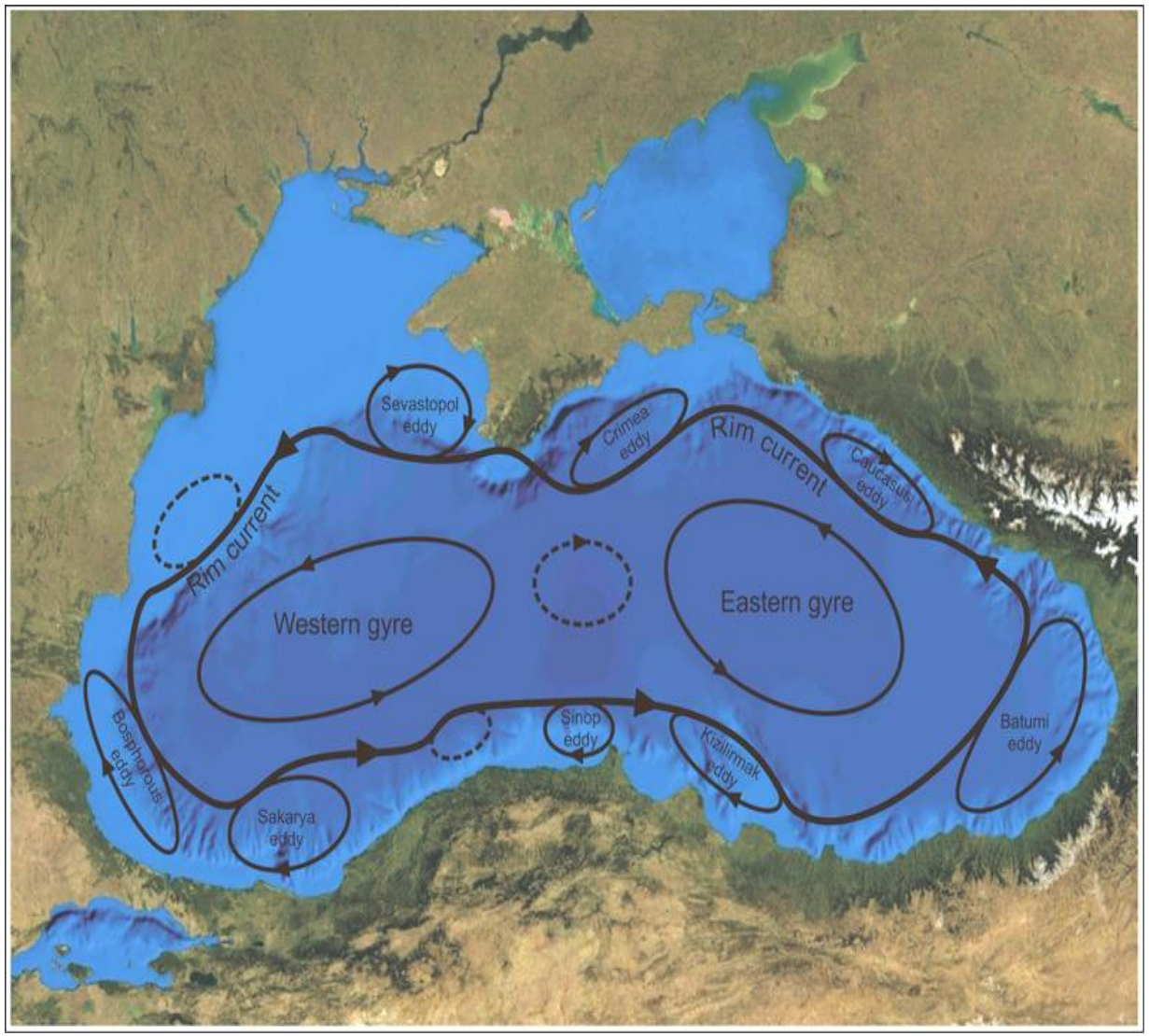


Pollution sources with direct discharge in the Black Sea



Bulgaria SWB Status Assessment, Black Sea River Basin District

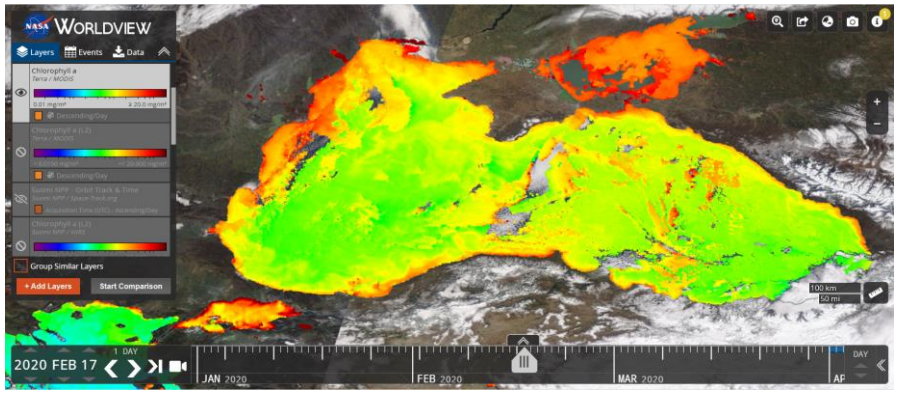
Black Sea Circulation Patterns and Movement of Pollution

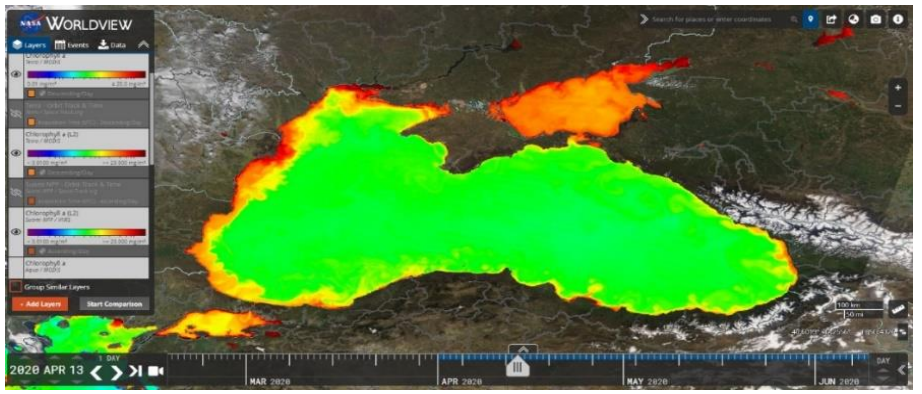


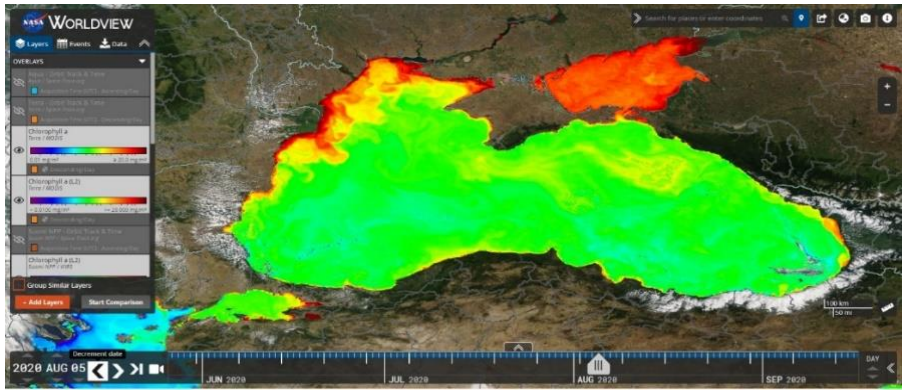
- Water circulation and direction of the currents play a significant role in the transport and movement of the pollutants discharged by the rivers to the Black Sea.
- The prevailing currents from north to south and the geomorphological structure of the western coasts of the Black Sea enhances the contact time of the pollutants and contribute to the eutrophication

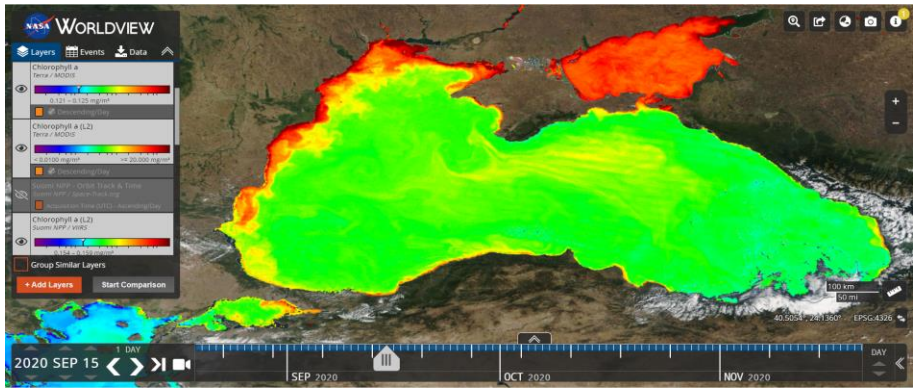
Eutrophication

- The abundance of fluvial nutrients in the Black Sea results in Eutrophication
- Eutrophication is an indicator of a deteriorating marine environment
- The high-level of anthropogenic impact on the Black Sea leads to the degradation of its open sea and coastal ecosystems









Seasonal Chl-a concentrations in 2020.

https://worldview.earthdata.nasa.gov (Aqua/MODIS and Terra/MODIS)

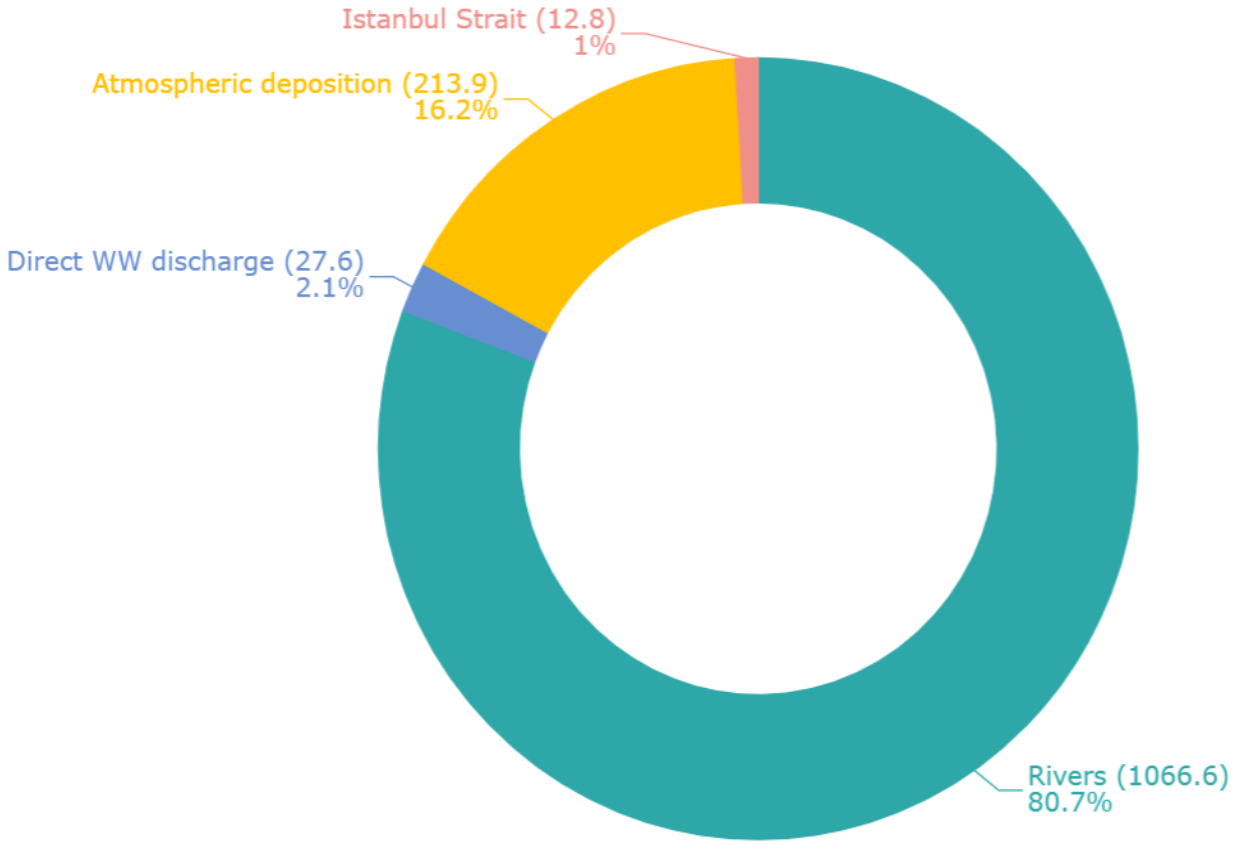
Why Eutrophication remains an ongoing concern?

Eutrophication has environmental, socioeconomic, and human health impacts

- **Riverine inputs:** Nutrient loads carried by main rivers flowing to the Black Sea (including the tributaries),
- **Direct wastewater discharges**: Nutrient loads from the municipal wastewater discharged directly to the Black Sea from the agglomerations located on the Black Sea coastal areas,
- **Atmospheric deposition**: Nutrient input through the atmospheric deposition onto the sea surface

Environment Quality Rate	Value of BEAST	Water quality	MFSD
EQR «RefCon»/«High»	<0,5	Hight	GES
EQR «High»/«Good»	0,5 – 1,0	Good	
EQR «Good»/«Moderate»	1,01 - 1,5	Moderate	not GES
EQR «Moderate»/«Poor»	1,51 – 2,0	POOR	
EQR «Poor»/«Bad»	>2	BAD	

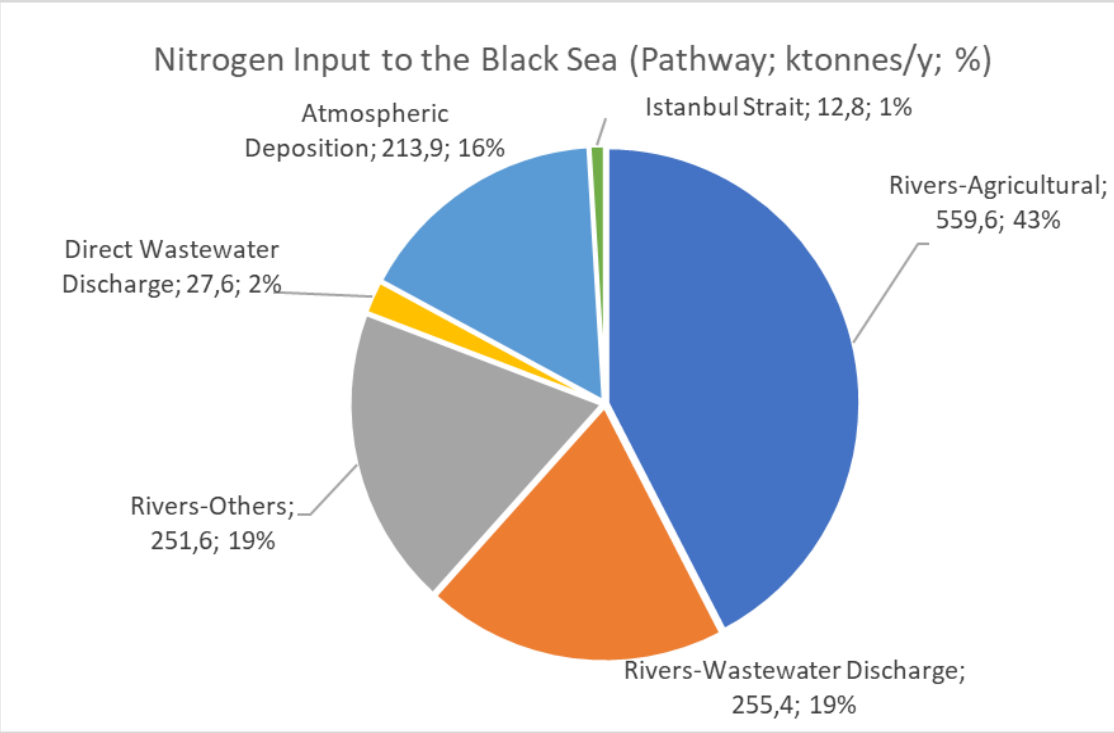
Source: Black Sea Commission 2019 State of the Environment Report 2009-2014

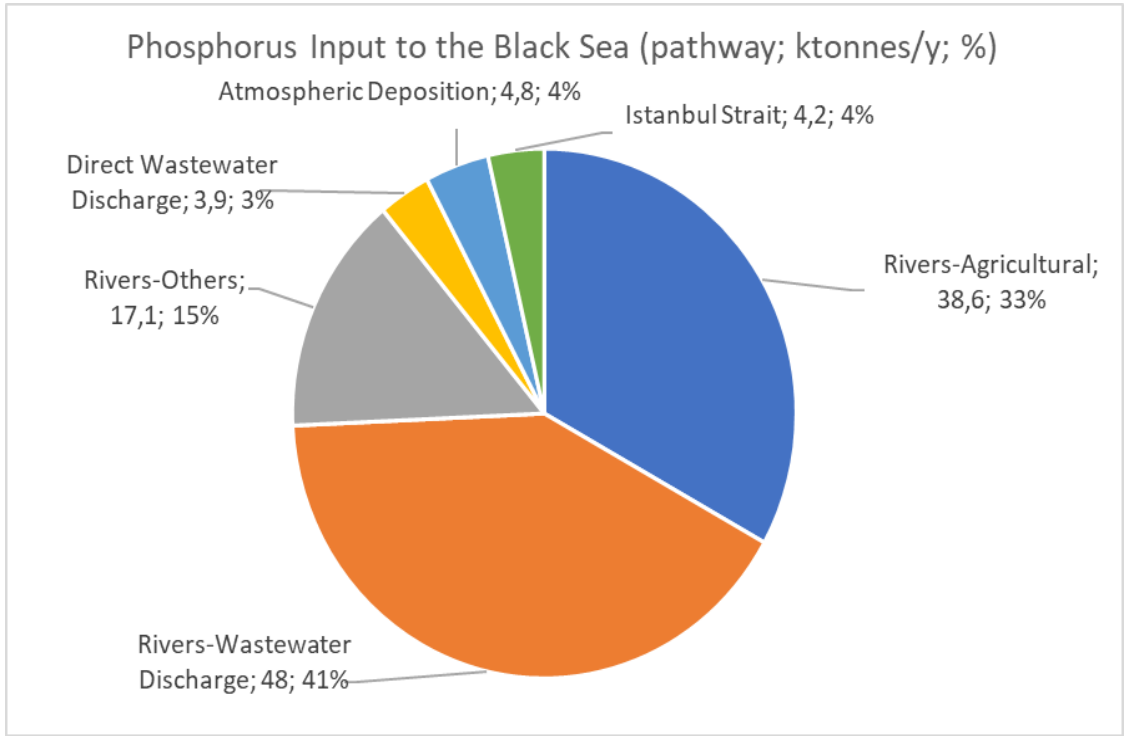


Contributions and Pathways of Total N Input to the Black Sea, thousand tons/year; %

Nutrient Loads: Total Inputs

- The total nutrient loads are primarily from **agriculture runoffs and municipal wastewater discharges carried by rivers**
- **Agriculture** is **the primary contributor** to the overall nitrogen input, accounting for 43%. This nitrogen is transported by rivers, particularly the Danube, Don, and Dnieper. Additionally, agricultural activities are estimated to contribute one-third of the total phosphorus input.
- **The second critical pollutant sources are direct and indirect municipal wastewater discharges**, with shares of 21 % and 44 % in total nitrogen and phosphorus inputs, respectively





Common Drivers, Pressures, and Impacts

Drivers / Pressures

- Over-fertilization (nitrogen and phosphorus) compounds, from agricultural, domestic and industrial sources
- Untreated wastewater, marine litter, oil pollution, ballast water, ship breaking, and repair

Impacts

- Reduced water quality affects public health, economic activities (e.g. fishing, tourism) and quality of life
- Linkages with climate change

Response

- Policy, programs and institutional responses to protect marine environment
- Investments in programs of measures addressing pressures and impacts

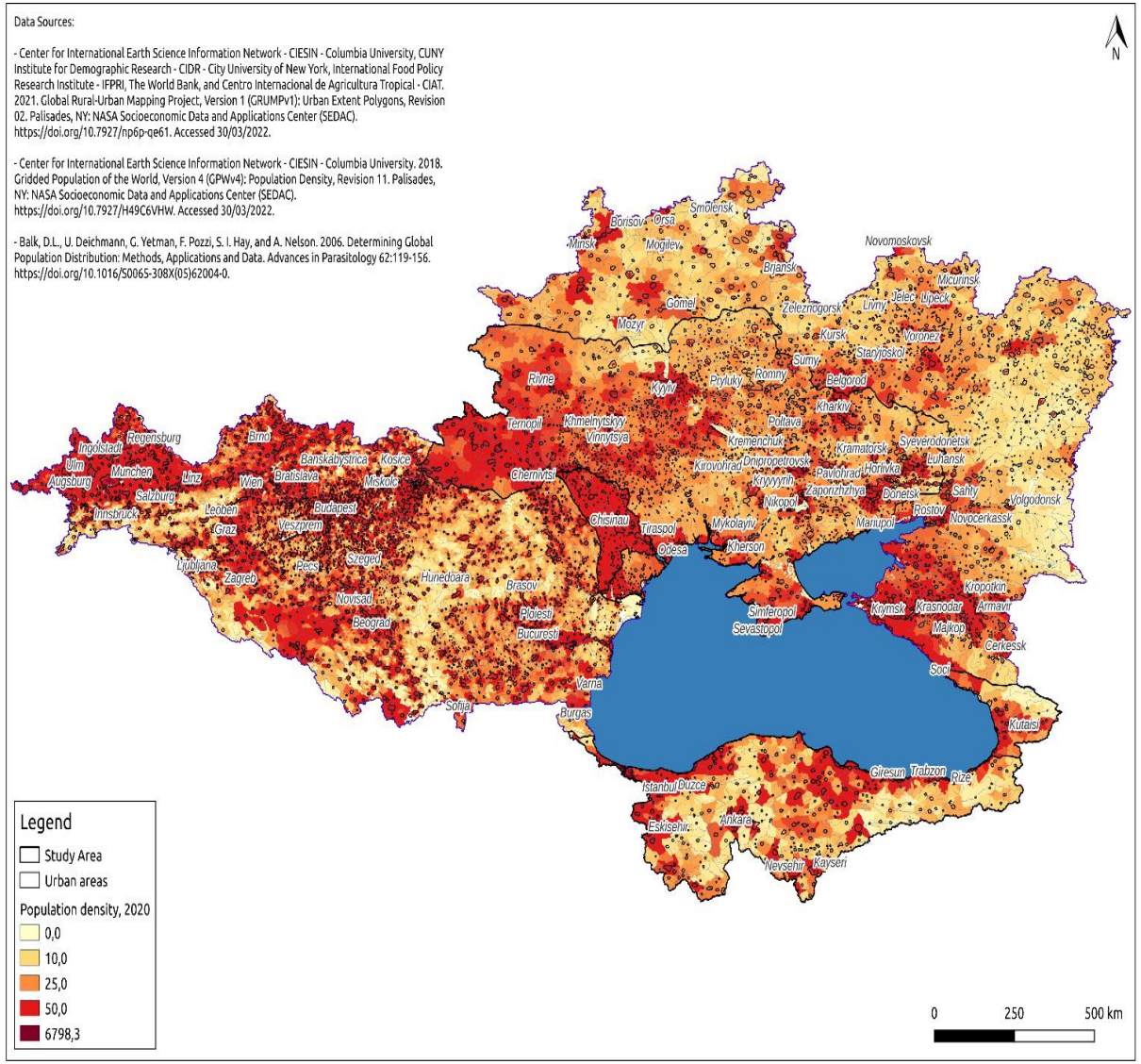
Demographic Drivers

More than 160 million people inhabit the Black Sea - 332 million people inhabit the wider Black Sea area

With 6–8 million tourists per year, tourism along the Black Sea coast is relatively well developed in most countries

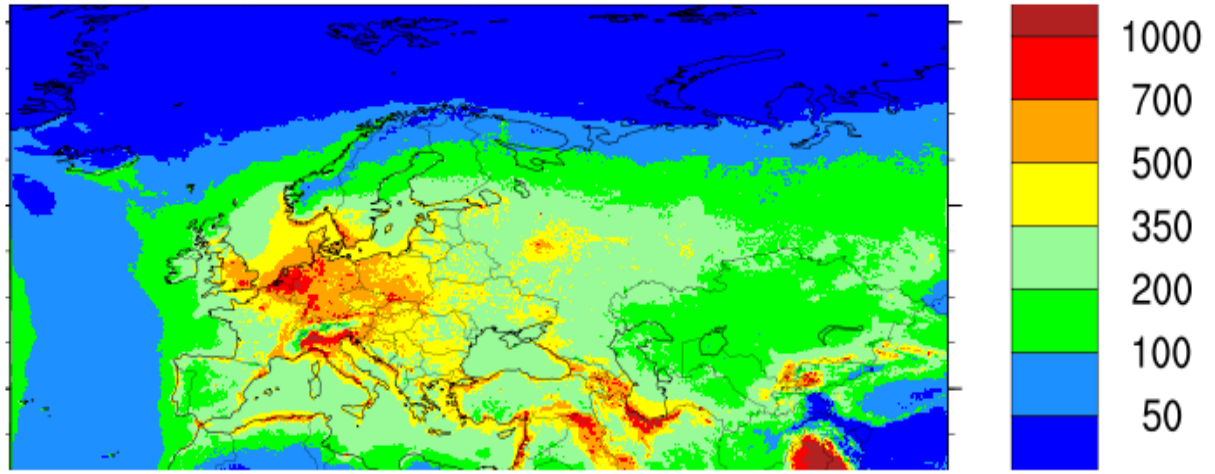
The growing population in the coastal areas triggers demand for resources and energy, resulting in increased pollution and a wide range of stressors to ecosystems.

Urbanization is linked to growing population pressures and to the volume of municipal wastewater discharges by the coastal populations

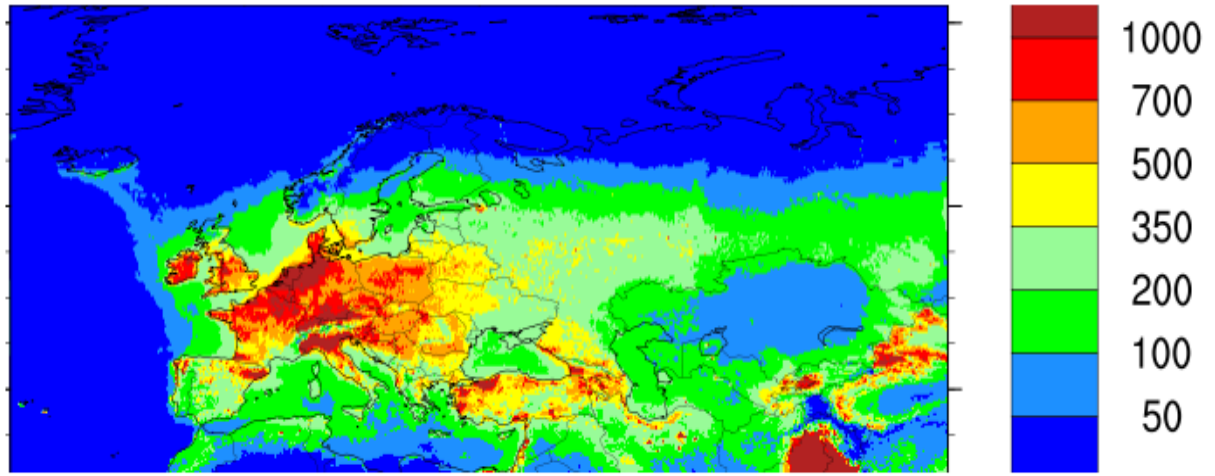


Economic Drivers of Pollution: Marine Polution Sources

- Agriculture is among the biggest contributors to pollution loads and a sizable contributor to the national output
- Municipal Wastewater Discharges: The nutrient loads from the municipal wastewaters of the coastal agglomerations were estimated based on population and treatment levels applied
- Industrial Discharges: Discharges of industrial effluents to SWBs without treatment is a significant environmental problem in the Black Sea region
- Port Activities and Marine Transportation: discharges from about 65 seaports along the coastline of the Black Sea, storm water runoff, accidental oil spills, etc.
- Coastal Tourism has increasing pressure on land, water, and other natural resources



(b) oxidized N



(c) Reduced N

Total deposition of oxidized and reduced nitrogen [mg (N) m^{-2}] in 2019 (Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components. EMEP Status Report 1/2021)

Logical Framework of Socio-economic Interrelations of Sea Pollution

Cleaner Black Sea is a foundation of the Blue Economy

BLACK SEA POLLUTION IMPACTS

Nutrient pollution: Accumulation of N&P, eutrophication, oxygen depletion

Water use for irrigation: Reduced water quantity, environmental flow

Atmospheric pollutants: Air pollution, climate change, eutrophication, acidification, toxicity

Pesticide contamination: Toxicity, reduced soil quality

Municipal solid waste: Decline in water quality

Wastewater discharge: Decline in water quality

Sewage discharge: Decline in water quality

Socio-Economic Impacts of the Black Sea Pollution

Job losses in key economic sectors: especially in the coastal areas around the Black Sea. All countries are already experiencing a decline in fisheries and aquaculture, in terms of both employment and income.

Untapped tourism potential: Tourism is underdeveloped around Black Sea, especially in Turkey. Such potential can be developed with improved infrastructure and environmental protection policies,

Deteriorated public health: water pollution poses significant human health risks, hence increased government expenditure in healthcare and lowered social welfare (health hazards, diseases) are expected.

Collapse of the seafood industry: high risk of overfishing (for example in Moldova, often accompanied by high water contamination levels. Strong need for sustainable fisheries.

Water scarcity: pressure arising from extensive water use for livestock and crop production, aggravated by population growth and climate change impacts such as droughts.

Crop production losses: agricultural industry threatened by the overapplication of nutrients. Water pollution will affect the productivity of the land used for crop production in coastal zones.

Reversing Black Sea Pollution and Shaping the Future

Objectives:

understand common nature of spillover effects from the Black Sea pollution to the economies in the region
determine actions that need to be taken to reduce pressures and drivers of water pollution

Assessment of the ecological status of marine environment based on different indicators to identify measures needed to achieve and/or maintain Good Environmental Status (GES) in the Black Sea.

Recommendations:

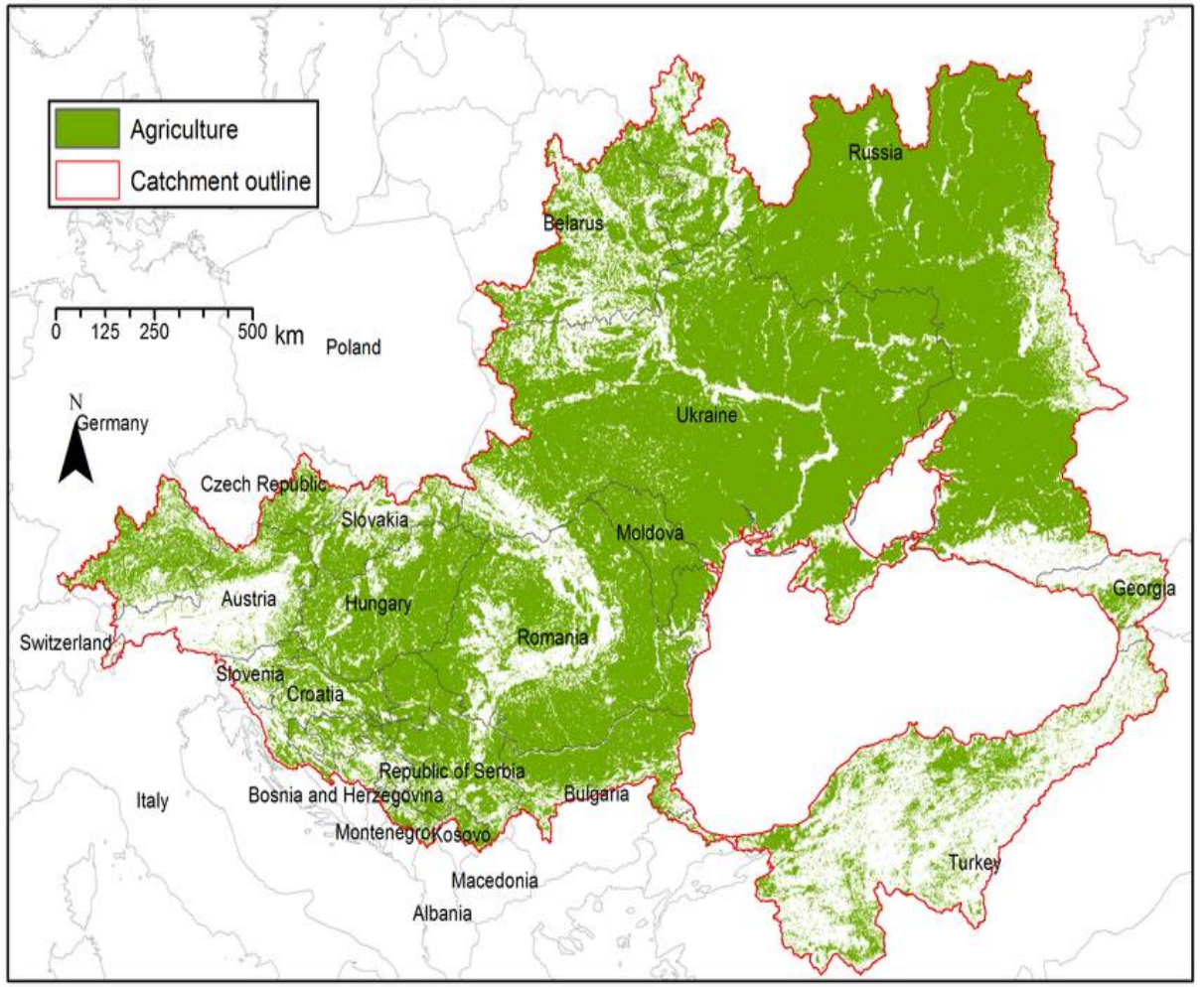
- Coordinated Actions
- Address Institutional Regulatory and Enforcement Bottlenecks for Pollution Prevention
- Enhance Pollution Monitoring Capacity, Quality of Monitoring Data and Information Sharing
- Address Fundamental Gaps in Environmental Compliance in Agriculture, Urban and Sanitation, and Industry

Source: https://www.researchgate.net/figure/

Reversing Black Sea Pollution and Shaping the Future

Agriculture

- **Establishing good agricultural practices** to prevent excessive fertilizer and uncontrolled pesticide use in the nitrate-sensitive zones
- Invest in **effective irrigation technologies to prevent water pollution**
- **Use of innovative fiscal and/or incentive schemes**
- Public support for the adoption of '**green' investments in livestock manure management**
- Accelerate the adoption of **climate-smart agriculture** to reduce nutrient losses.



Agricultural area within the Black Sea catchment (based on MODIS Land Cover 2001).

Reversing Black Sea Pollution and Shaping the Future

Municipal and Industrial

- Adapting the European and international standards for the treatment of water
- Strengthening the control over industrial and municipal wastewater treatment systems
- Changing the consumer applications to prevent pollutant discharges sourced from domestic practices
- Modernization of existing wastewater treatment plants and the establishment of new facilities equipped with advanced technologies for nutrient removal, especially in densely populated settlements
- Construction/rehabilitation of urban sewage systems and financing of pollution monitoring studies
- The establishment of marine protected areas
- Strengthening the policies and the establishment of smart monitoring/tracking systems to control pollution from vessels in ports

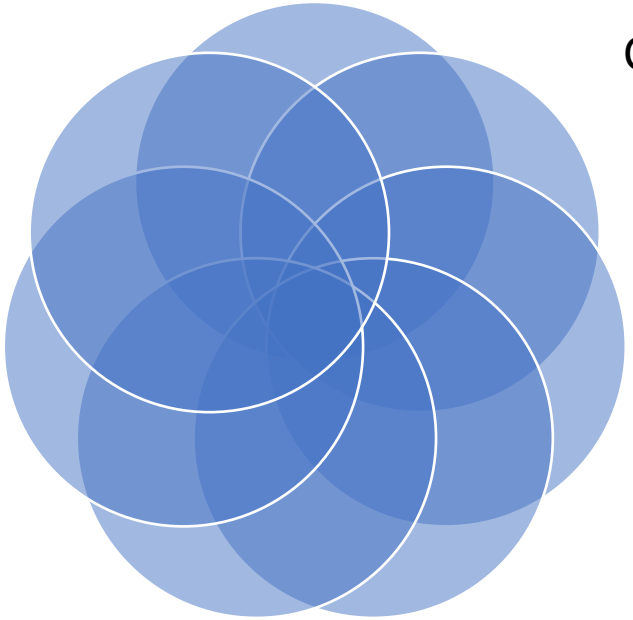
Source: https://www.researchgate.net/figure/Sub-basin-map-of-the-Black-Sea_fig2_301216125.

Reversing Black Sea Pollution and Shaping the Future

CMA Countries

World Bank (BBSEA)

Black Sea Economic Cooperation Organization (BSEC)



European Commission

Commission on the Protection of the Black Sea Against Pollution (BSC)

UNDP & FAO

Global Environnent Facility (GEF)

Taking actions to achieve ‘good ecological status’ in the Black Sea will be a promise for a better future for 17.5 million people living in the Black Sea region.

Thank you!

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BLUEING THE BLACK SEA

PROBLUE
HEALTHY OCEANS · HEALTHY ECONOMIES · HEALTHY COMMUNITIES

BSEC

Commission on the Protection of the Black Sea Against Pollution

Royal HaskoningDHV
Enhancing Society Together

Nature-based Solutions for improving water quality in the Black Sea

(Virtual) Stakeholder Workshop, Bucharest

Sameer Safaya
November 2023

Contents

- Introduction to the RHDHV team
- Objective
- Black Sea summary
  - Types of pollution
- What is the nature-based approach?
- NbS and WWT
- Examples
- STAIN workshop
- iReport

RHDHV Team

- Core Team
  - Sameer Safaya – Sustainability Expert, Hydrologist (Lead)
  - Dr. Gokce Guyer – Wastewater expert
  - Juliette Eulderink – Water Management expert

- Support Team
  - Dirkjan Douma – Deputy team lead
  - Paul Jansen – Wastewater specialist
  - Arend Jan van de Kerk – Civil Engineer
  - Dr. Arend de Wilde - Ecologist
  - Dr. Petra Dankers – Coastal Morphologist and NBS specialist
  - Bente de Vries - Coastal Morphologist and NBS specialist
  - Dr. Kerusha Lutchmiah – Wastewater Engineer & stakeholder manager
  - Micheline Hounjet – STAIN specialist

Objective

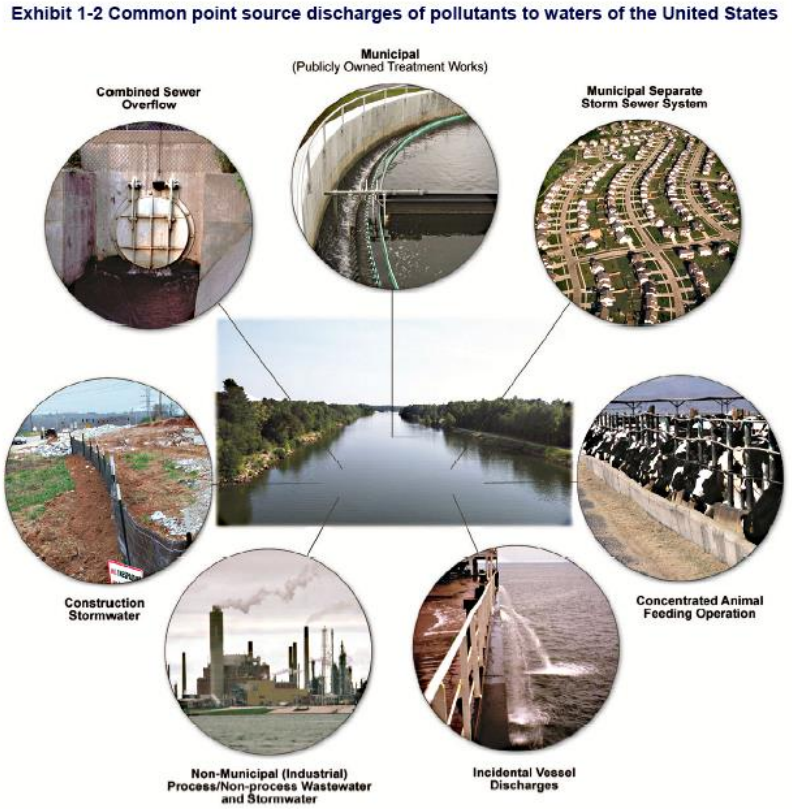
- System understanding of the Black Sea
  - Context
    - Historical
    - Geophysical
    - Socioeconomic
    - Institutional
  - Main sources of pollution (Pollution Diagnostics)

NBS Guidelines in The Black Sea

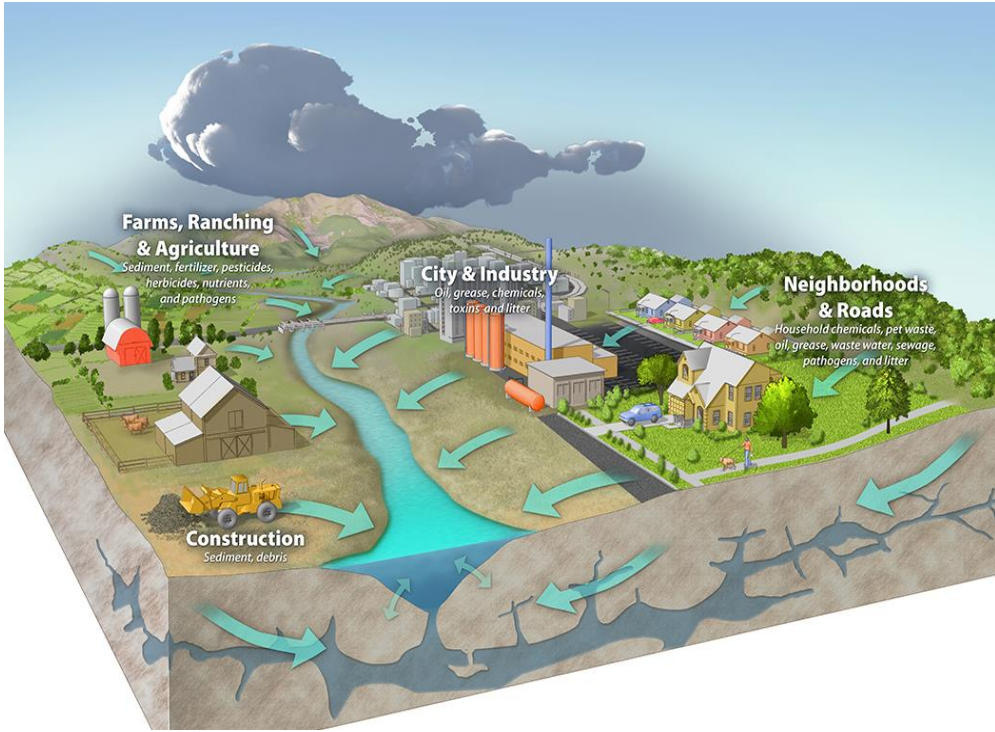
Case-studies

2 main types of pollution

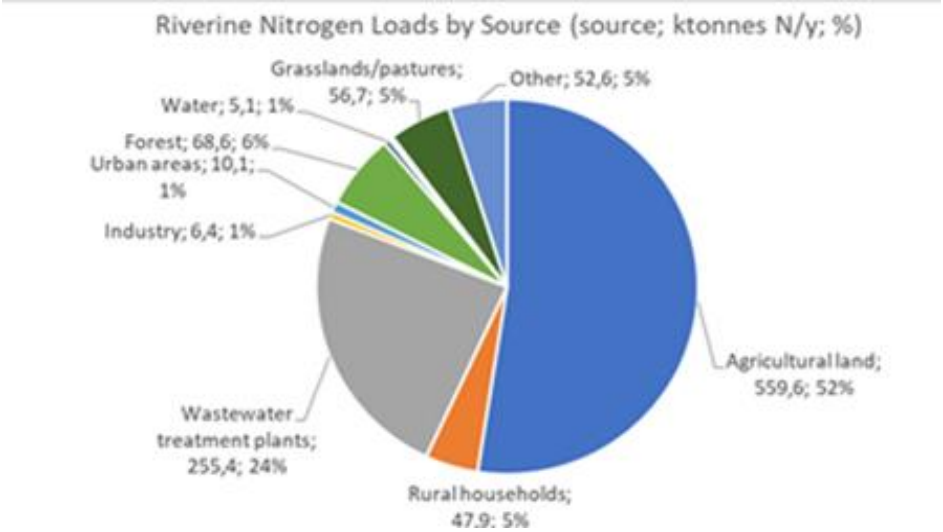
- Point Source

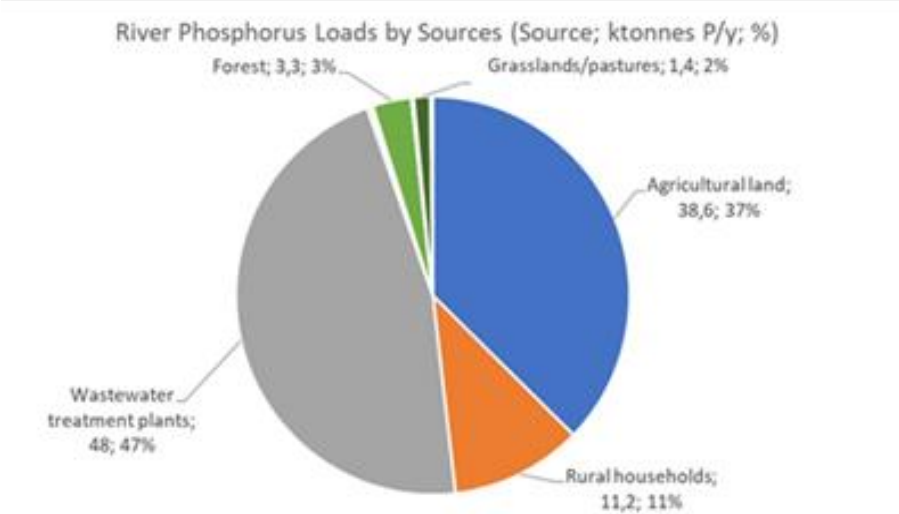


- Diffuse

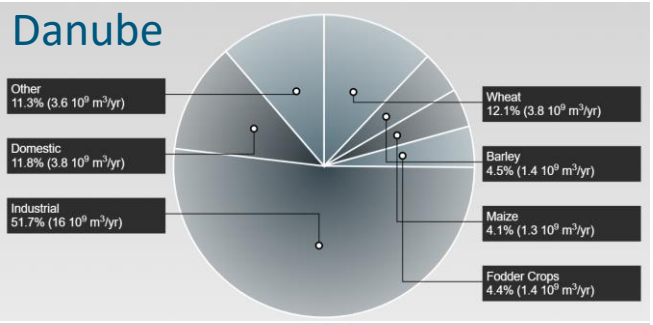


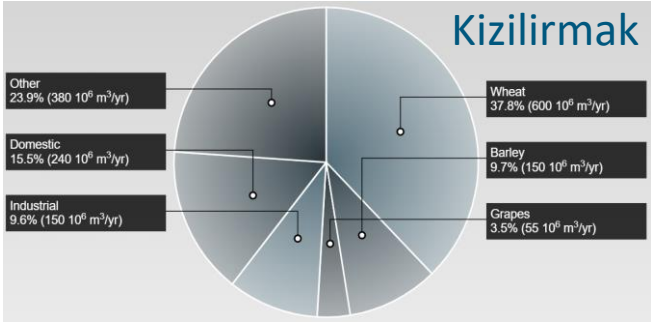
Results from WB Diagnostics Report (draft)



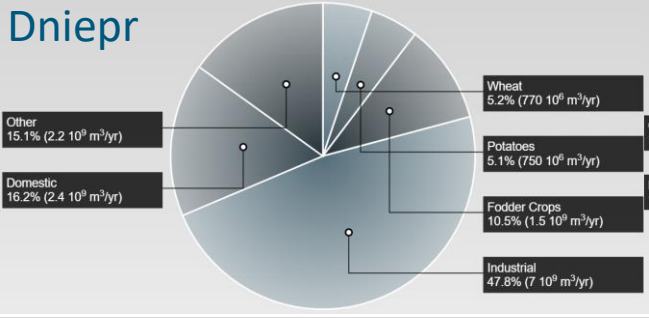


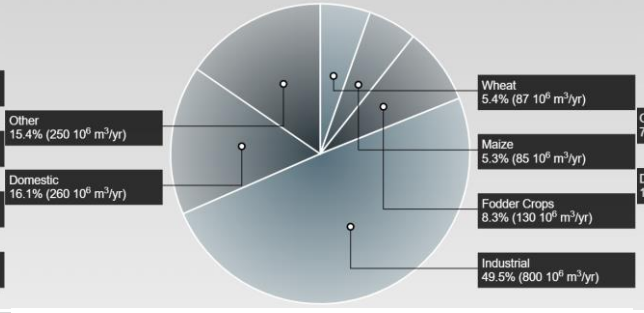
Grey Water Footprint – basin level details

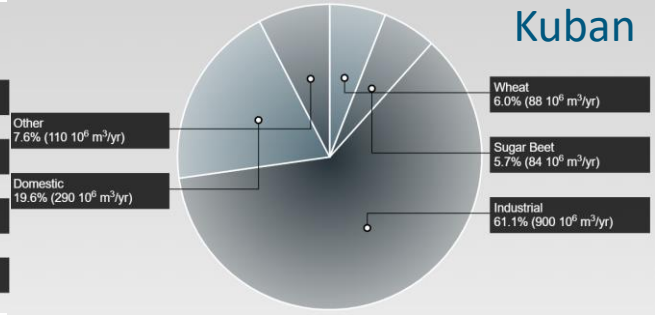


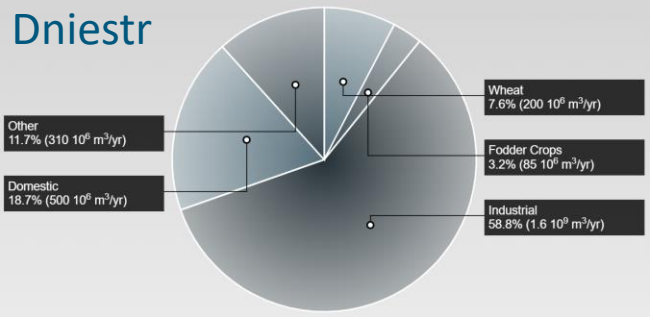


Southern Bug

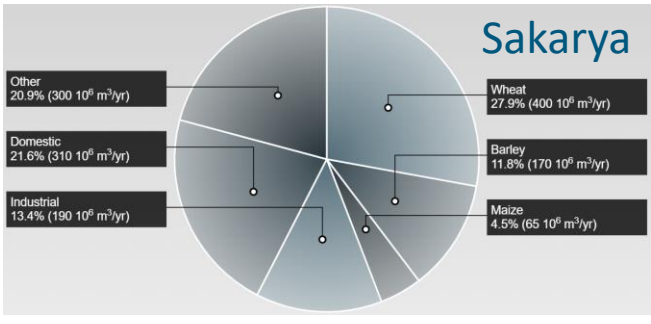








Source: Water Footprint Network



Main source of pollution for each river basin

River basin	N-load (%)	P-load (%)	Country	Main sources of pollution
General	-	-	-	• Main source P-load is generally wastewater treatment plants, then agricultural activities, then untreated household effluents. • Main source N-load is generally agricultural activities. • Mostly well connected to wastewater treatment systems but besides the western Danube, most basins do not have advanced treatment
Danube	54	43	Romania / Bulgaria/ Ukraine	• Main source P-load is wastewater treatment plants. • In Romania and Bulgaria, the connection to wastewater treatment is good, though level of wastewater treatment is mostly biological (secondary)
Don	17	15	Russia/ Ukraine	• Main source P-load is agricultural activity
Dnieper	14	20	Russia/ Belarus/ Ukraine	• Main source P-load is wastewater treatment plants
Dniester	3	5	Moldova/ Ukraine	• Main source P-load is wastewater treatment plants • Moldova has bad connection to wastewater collection system.
Southern Bug	3	3	Ukraine	• Main source P-load is wastewater treatment plants
Kuban	2	3	Russia	• Main source P-load is wastewater treatment plants
Others	7	11	-	• Main source P-load is wastewater treatment plants • Good connection to wastewater collection system, but level of treatment is primary and secondary

Why nature-based solutions?

- Holistic solution (green infrastructure) to address (sustainability) societal challenges with a friendlier ecological footprint
- Tackles Diffuse Pollution
- Dynamic & resilient; evolves with the environment and society over time.
- Intrinsic motivation; Improving the environment and restoring natural habitats improves well-being and societal resilience
- Meets direct needs of traditional (engineered) solutions and offers various co-benefits
- Integrates better with cultural heritage and landscape
- Tends to be cheaper in the long-term
- Links to SDGs and contributes to circular economy
- Scalable

VS

- Traditional engineering of landscapes (grey infrastructure) while more predictable and tested, tend not to blend well with social or environmental goals or norms
- Does not tackle diffuse pollution (only point-source) eg. WWTP
- While short-term thinking may deliver immediate results, they tend to have significant externalities (indirect costs to society and environment)
- Static, subject to degradation, tend to be fixed structures that cannot be easily moved (unlike sediment for example)
- Generally requires significant amounts of concrete and other hard materials with significant sustainability impacts (eg. high ecological footprint)
- Maintenance costs may be high in the long-run and tend to have limited co-benefits for the local communities other than their original (singular) functional requirements.
- Not scalable – often disrupts nature

Water-based systems

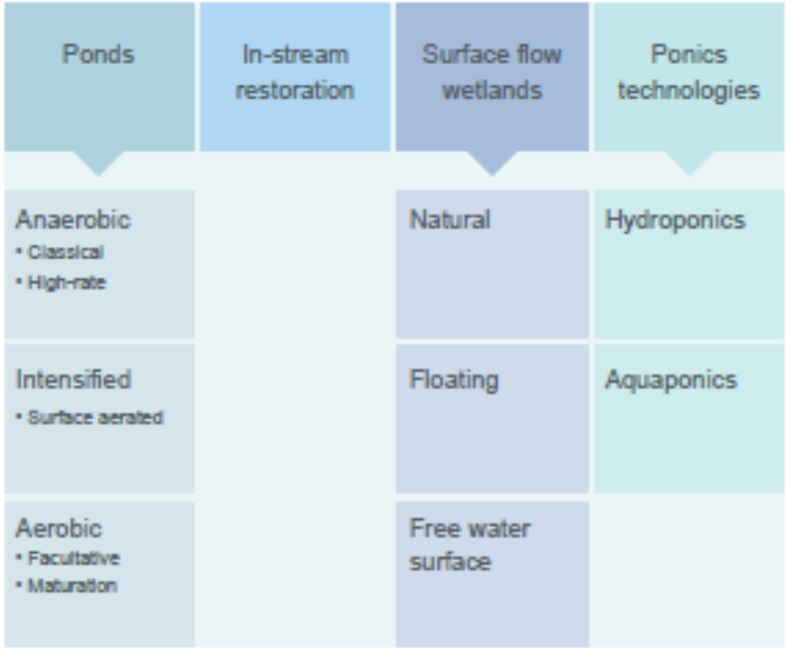


Figure 3. Classification of water-based NBS for wastewater treatment

Substrate-based systems

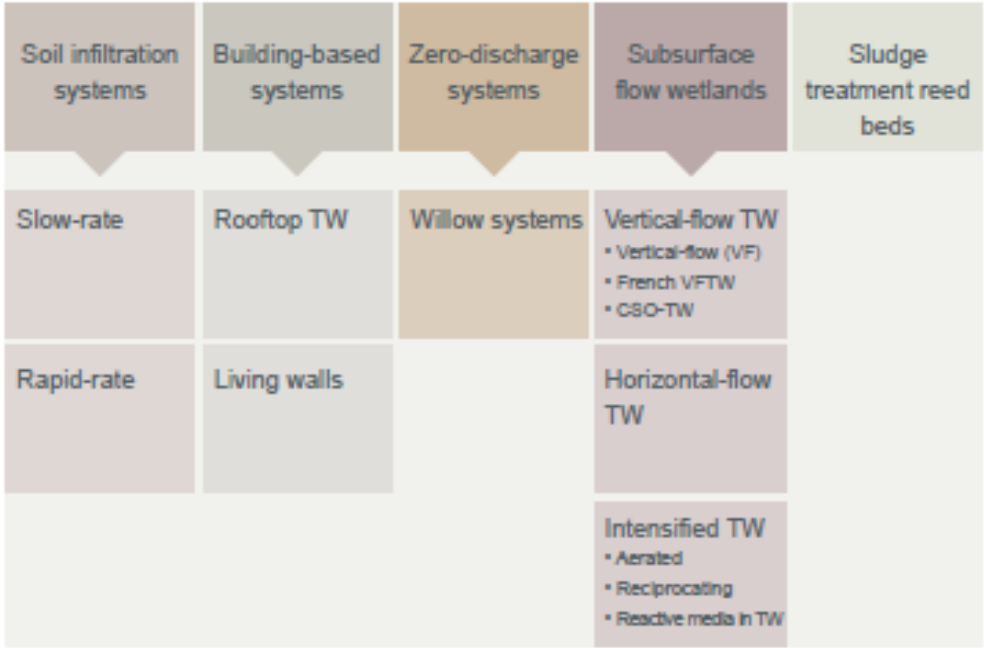


Figure 4. Classification of substrate-based NBS for wastewater treatment

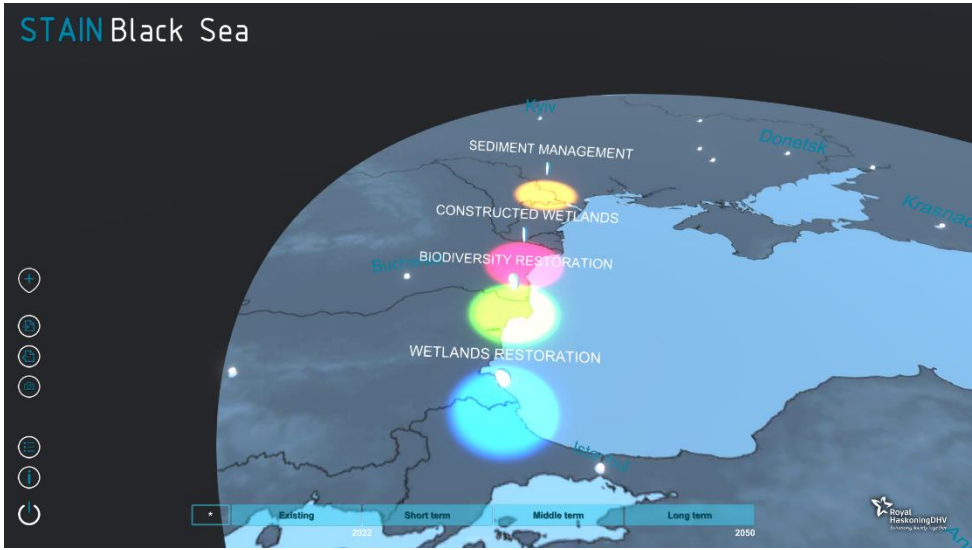
Selection Criteria

E.g. to select the most appropriate NBS measures from Cross et al. (2021) multiple criteria can be considered

Criteria	Subcriteria	Categories
Can the NBS be applied?		
Suitability for certain land units	Urban areas	Yes / No
	Agriculture (upstream/mountainous)	Yes / No
	Agriculture (downstream/lowland)	Yes / No
	Main river	Yes / No
	Small stream	Yes / No
	Lake	Yes / No
	Sea	Yes / No
How good is this NBS?		
Suitability for a type of influent wastewater	-	• Suitable for raw and grey water • Suitable for primary and secondary treated water • Suitable for river diluted water
Effectiveness for treating different kinds of pollution	Treatment of N	• <30% • >30%
	Treatment of P	• <30% • >30%
	Treatment of suspended solids	• <30% • >30%
	Treatment of ammonia-nitrogen	• <50% • >50%
	Treatment of fecal coliforms	Yes / No
Co-benefits	Contribution to biodiversity	Yes / No
	Contribution to spatial quality (incl. recreation, aesthetic value, reducing heat stress)	Yes / No
	Flood/storm mitigation	Yes / No
	Carbon sequestration	Yes / No

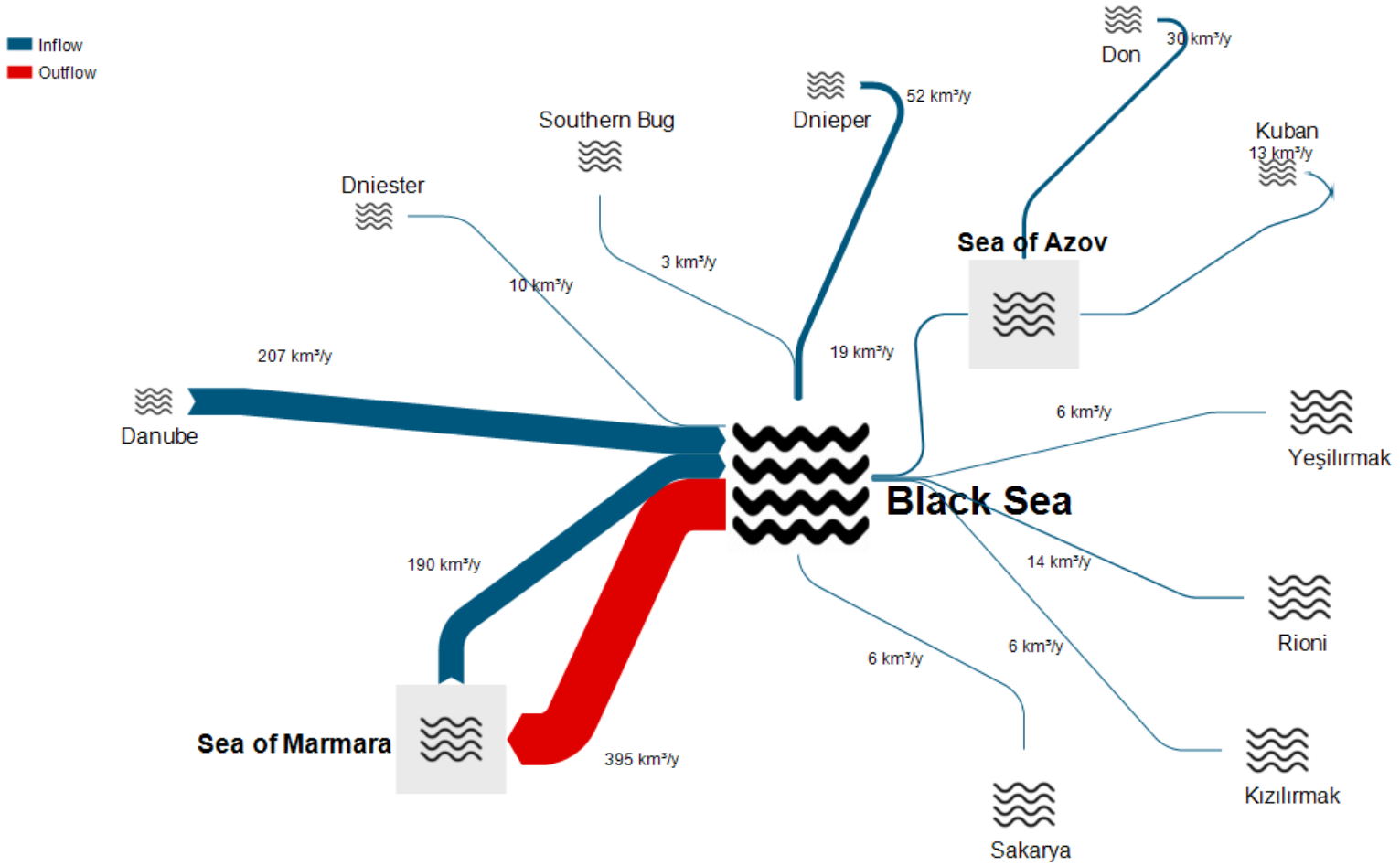
Measures for Blueing the Black Sea

1. Regarding inflows to the sea - Wetlands: restoring connections between rivers and wetlands
2. In the sea itself - Biodiversity restoration: (prevent overfishing) algae cultivation
3. Possible sediment management (is erosion an issue?) to maintain functioning of ecosystem services to act as a filter
4. Solid waste and plastic capture through constructed wetlands (feels again a bit more like another wetlands measure, but different angle.
5. Policy (and Enforcement)

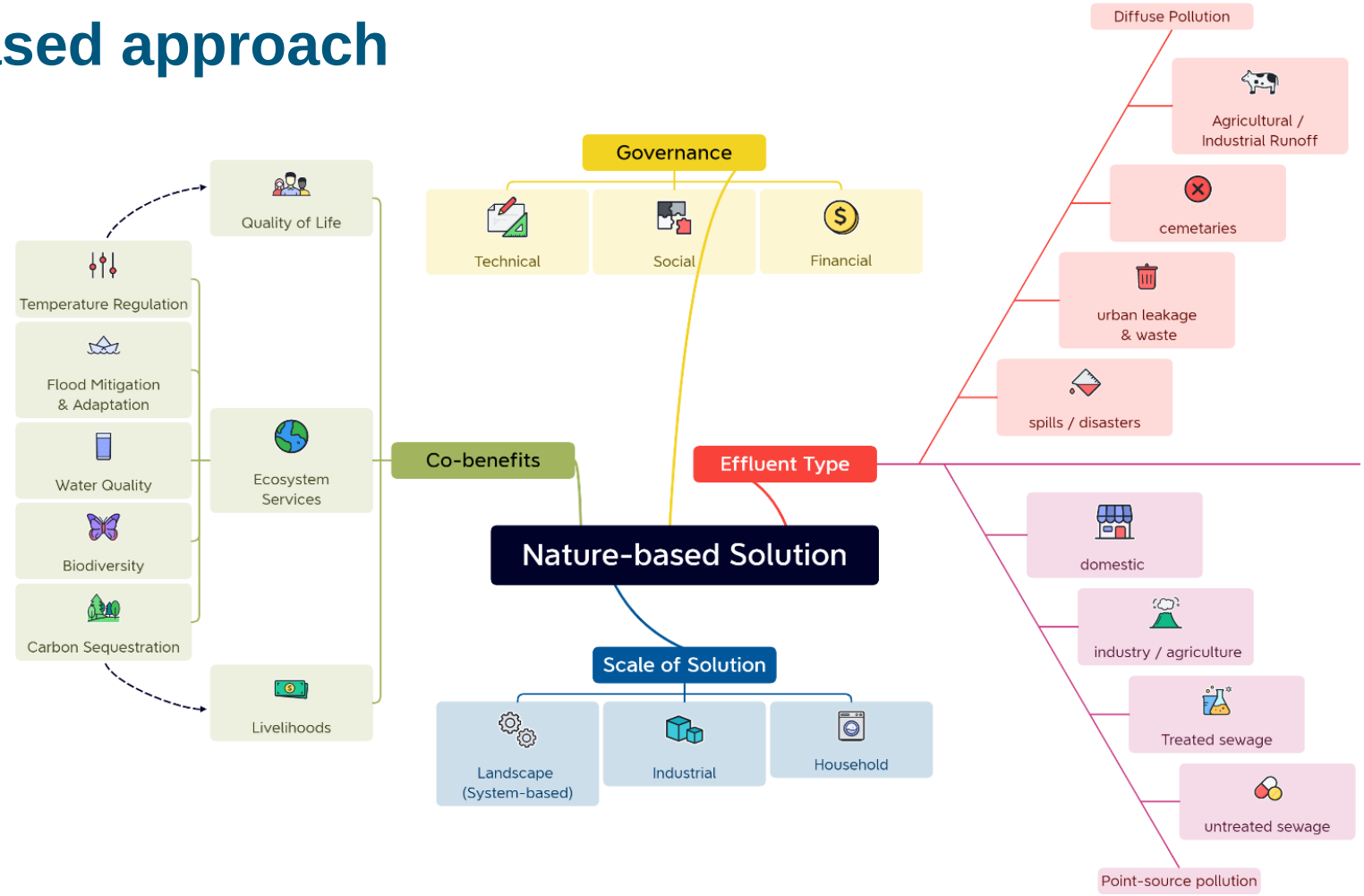


Sankey Diagram: Annual average discharges

Black Sea Catchment



Nature-based approach iReport…



Comments / Questions?

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The Blue Economy Jobs Program for Pollution Reduction Study

BBSEA Regional Launch Event
November 21, 2023

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BLUEING THE BLACK SEA

JOBS

pwc

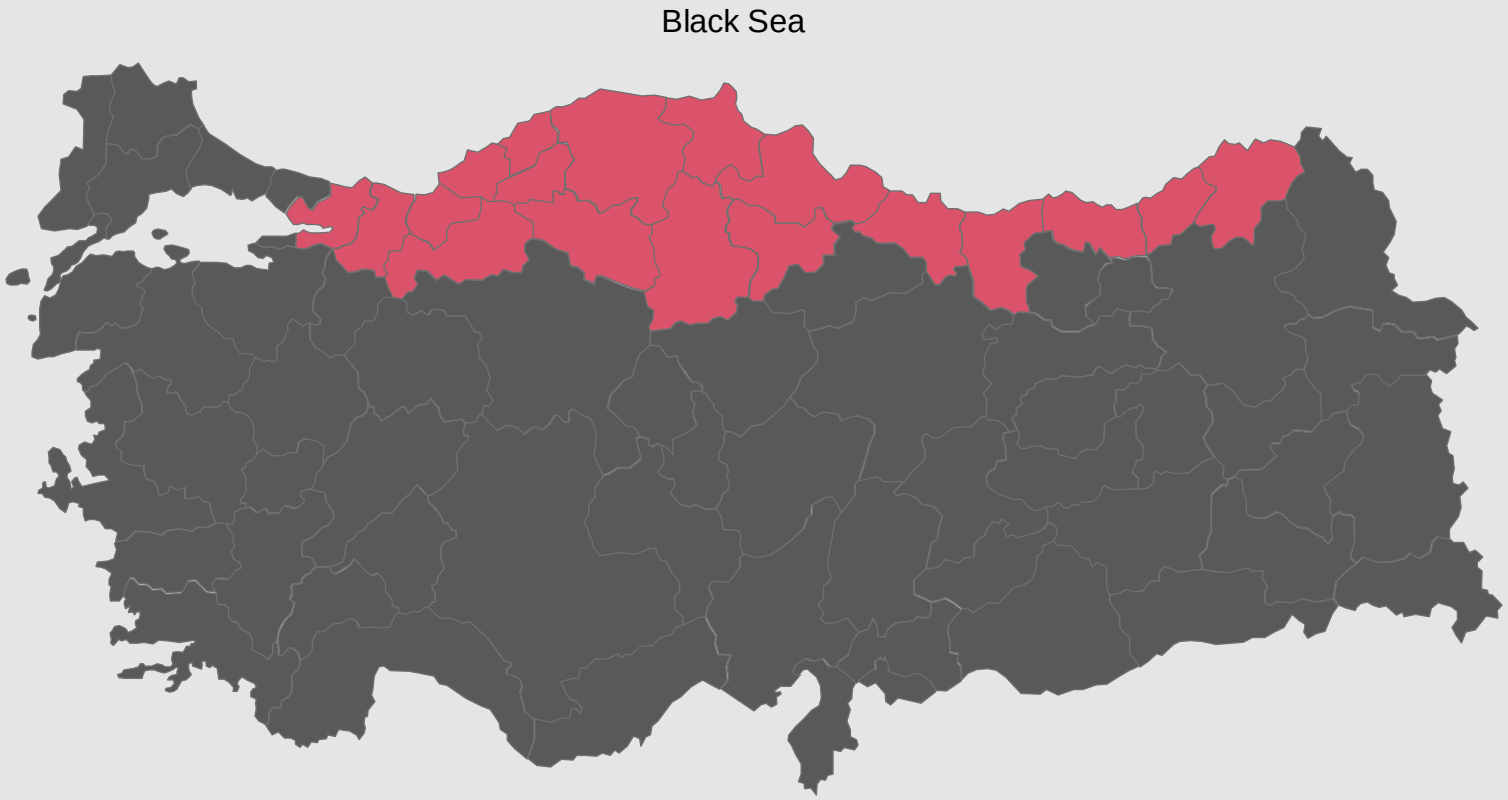
Agenda

- Study Overview
- Key Findings
- The Blue Economy Jobs Program for Pollution Reduction Study Recruitment Mechanism
- Policy Recommendations

01 Study Overview

The Blue Economy Jobs Program for Pollution Reduction study assessed the Black Sea region in Türkiye, investigating blue growth and employment opportunities in the region and cultivating recommendations that could be relevant for other Black Sea countries

Geographic Scope of the Pilot Study in Türkiye



The region of focus covers:

- ***21 provinces***
- ***~1700 km coastline***
- ***~11 million population***
- ***~12% of Türkiye's GDP***

We developed a study methodology with which to design a robust recruitment mechanism based on needs specific to the targeted region

Overview of the Project Activities

1. **Analysis of Marine Litter and Plastic Pollution**
2. **Review of Existing Policies and Legal Framework**
3. **Analysis of the Labor Market**
4. **Needs Assessment**
5. **Recruitment Mechanism Design**

Main Themes and Considerations

- **Regional Labor Market Dynamics**
- **Regional Economic and Sectoral Dynamics**
- **Current Ecological Concerns in the Region**
- **Ongoing Environmental Preservation Efforts**
- **Creation of Blue Jobs in the Region**

November 2023

Our team of multi-disciplinary experts reviewed the environmental and socio-economic dynamics within the region, crafting a customized approach to the study methodology

Project Leadership Team

Başar Yıldırım
Project Coordinator
PwC Turkey Chief Economist

Fatih Terzi
Team Leader

Technical Team

Blue Economy

Hakan Ercan
Labor Market and Employment Expert

Miguel Marques
Blue Economy and Blue Skills International Expert

Coastal Pollution

Ahmet Kıdeyş
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Coşkun Erüz
Coastal Pollution & Black Sea Expert

Nature-based Solutions

Hayriye Esbah Tuncay
Nature Based Solutions & Green Infrastructure Expert

Project Delivery and Management Team

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Deputy Project Coordinator
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Nil Kaya
Senior Consultant
PwC Turkey

Sena Mertoğlu
PMO Senior Consultant
PwC Turkey

November 2023

02 Key Findings

Throughout the study, we considered the region's prevailing levels of pollution, labor market conditions, sectoral composition and the investment climate

Key findings on current state and needs

Environmental Concerns

- Pollution sources in the region include **past or current unauthorized waste disposal in coastal areas, waste from rivers, unsanitary waste disposal zones (prevalent in rural areas).**
- **An initiation of an integrated coastal clean-up program is needed** that is in alignment with current coastal preservation efforts

Sectoral Outlook and Investments

- **Waste management, marine living resources, coastal and nautical tourism, port activities, desalination and marine monitoring would** initially be prioritized for blue employment opportunities.
- **Both public (in the short term) and private sector (in the long term) investments** are essential.

Social Overview

- Established social policies **are at an early stage in their alignment with principles of blue growth.**
- The region experiences youth emigration, and women face challenges in realizing their full labor market potential.
- The most **notable vulnerable groups in the region are unskilled women and youth.**

Labor Force Dynamics

- Established **labor force policies fall short on encouraging blue job opportunities.**
- **Skilled graduates from the region's universities** represent untapped potential for blue employment.
- **Both labor demand and supply would be supported** through strategic investments and upskilling opportunities.

Our study highlights the need for a comprehensive mechanism that would align environmental sustainability and coastal cleanup measures with limited economic prospects in these coastal communities

Main Environmental and Sustainability-related Issues

- **Sources of pollution are diversified** (unauthorized disposal, deep sea discharges, streams etc.)
- Polluting factors are mainly **anthropogenic**.
- Local **waste management practices** are not fully harmonized with regional needs.
- **Municipal resources should be supported** to further extend waste management practices towards rural areas.

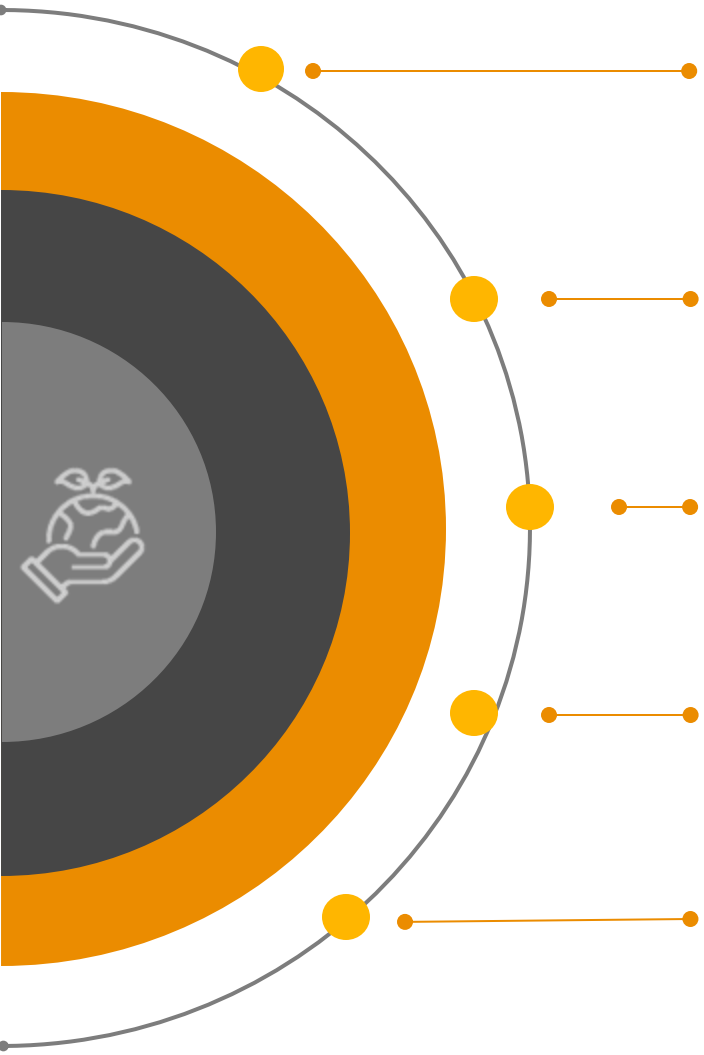
A tailor-made solution is needed to address both streams of issues simultaneously

Main Economic and Labor Market-related Issues

- There is a significant level of **youth emigration** in the region
- **The current level of labor force participation and employment for women** represents untapped potential
- The region is **sectorally diverse and competitive**, but furthering sectoral maturity can be achieved through promoting blue economy principles.
- **Skilled higher education graduates** in the region could be leveraged for blue employment

As part of our study, we conducted a survey and analyzed the results to extract valuable insights, drawing upon the regional and thematic expertise of the participants (1/2)

Key Environmental Insights from the Survey



65% indicated sources of pollution as; Unsanitary waste disposal zones, microplastics, flood and stormwater, waste transported through rivers and unauthorized dumping of solid waste on the coasts.

The prevailing actions for tackling coastal pollution are; Identification of pollution sources, development of waste management practices -especially in rural settlements- and prevention of solid waste disposal from rivers.

Necessary regulatory actions are; Drafting legislation for control, penalization, reward or remuneration processes, legislative and administrative measures for solid waste cleaning and recycling in rivers and reducing or banning the use of single-use plastic materials.

Suggested Leadership Roles; Ministry of Environment, Urbanization and Climate Change, Relevant Municipalities, Ministry of Agriculture and Forestry, Universities in the region.

90% believe that; nature-based solutions will be effective in cleaning solid waste/marine litter on the Black Sea shores.

As part of our study, we conducted a survey and analyzed the results to extract valuable insights, drawing upon the regional and thematic expertise of the participants (2/2)

Key Socio-Economic Insights from the Survey

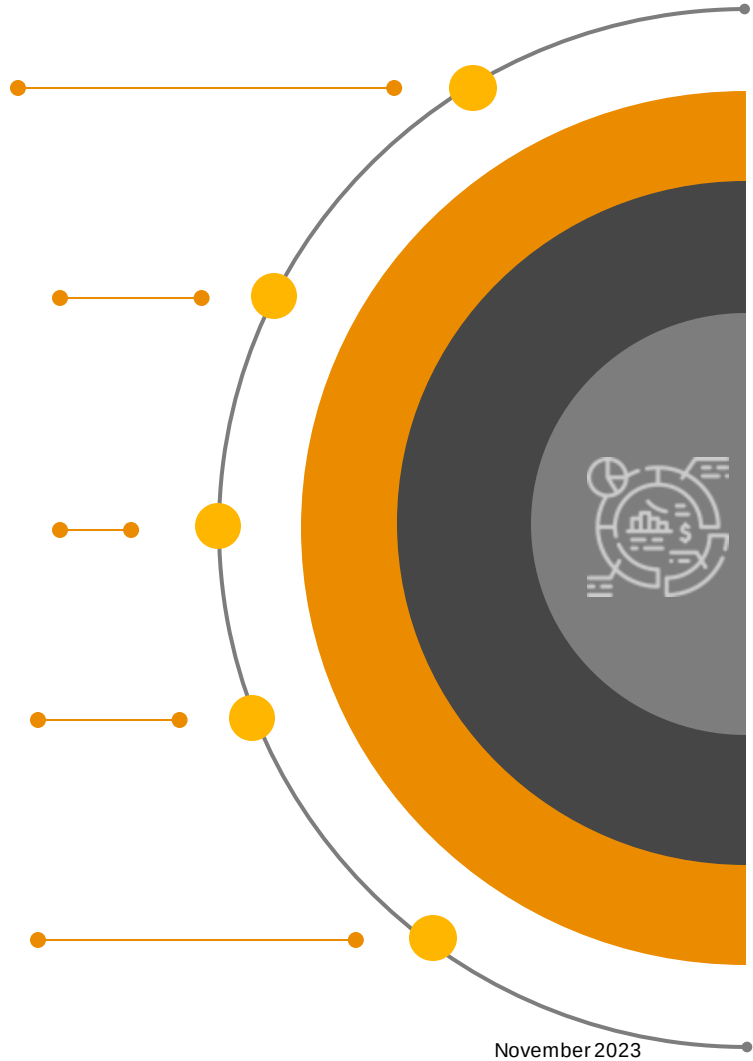
60% of participants selected their preference for allocating resources and implementing initiatives in 3 key sectors* for blue growth: Fisheries and Aquaculture, Waste Management and Aquaculture and Tourism

IFIs, the Central Government and Banks are anticipated to serve as potential fund providers if a proposed program or intervention were to be implemented

Fisheries and Aquaculture, Waste Management and Aquaculture and Tourism are expected to experience significant growth if the program is implemented

Financial Support, Skilled Labor Force and Entrepreneurship Activities, are identified as the most crucial needs for fostering blue growth in the region

A potential program is expected to **increase the level of welfare, regional GDP, labor productivity and sectoral diversity** in the region



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*Blue sectors with the highest potential in the region were identified through a combination of expert views, desk-based research, and survey results. This comprehensive approach aims to pinpoint the corresponding blue job profiles that should be prioritized by a potential employment program for the region.

03

The Blue Economy Jobs Program for Pollution Reduction Study Recruitment Mechanism

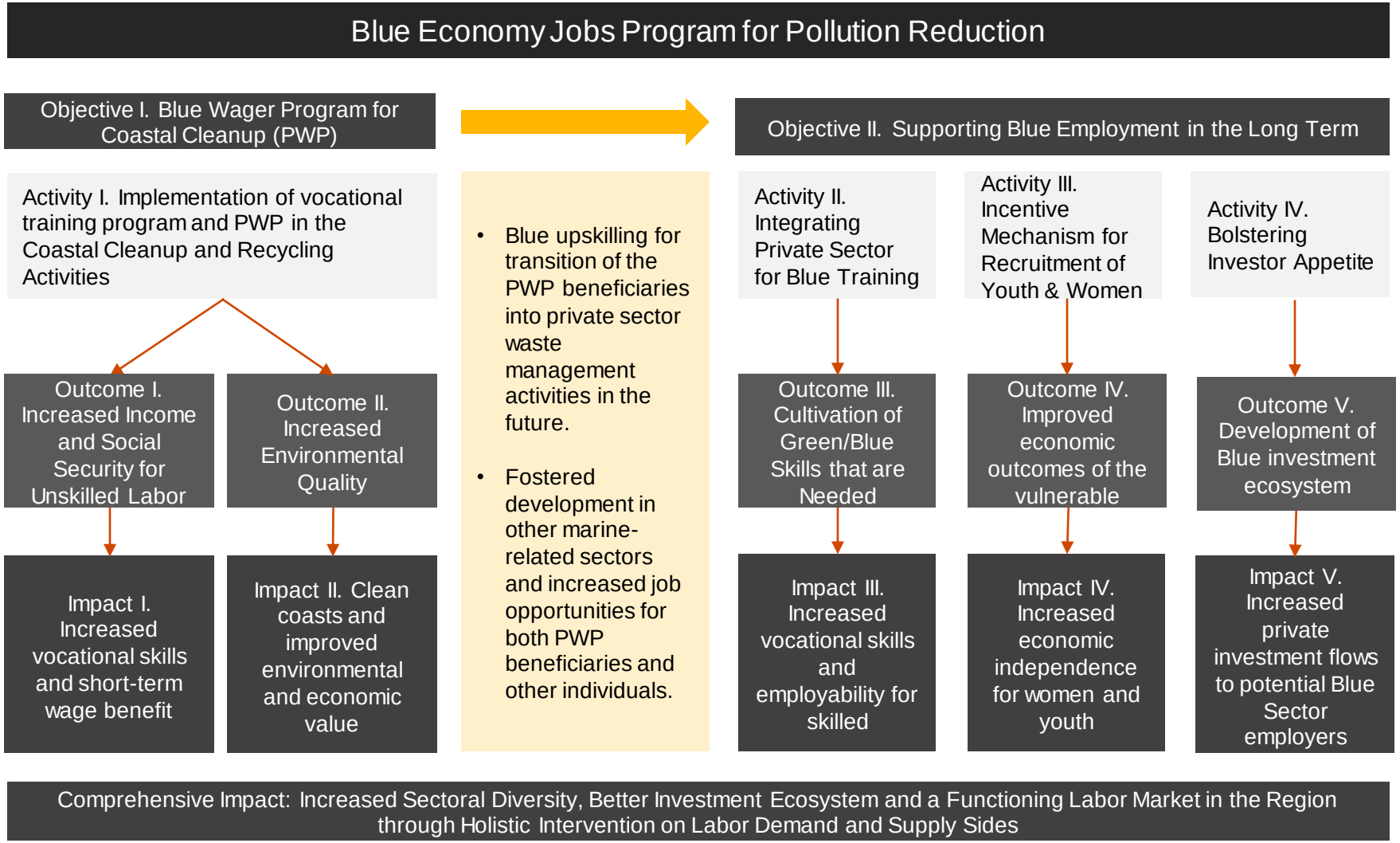
Within the scope of the study, we developed the following framework, taking into account long-term and short-term intervention areas uncovered during our analysis

Main Objectives

- Implement an initial coastal clean-up program **integrating unskilled women and youth. (PWP)**
- Ensuring **blue growth in the long term by** supporting skilled workers' integration through upskilling, incentive mechanisms for hiring and supporting investment ecosystem.

Key Considerations

- The framework should ensure coastal cleanup activities are not a one-time response but a sustainable **long-term intervention**
- The further efforts should support **both labor demand and supply** to promote blue employment



We narrowed-down potential blue sectors to be prioritized through several filters, evaluating their current standing and their promise in perpetuating blue growth in the region

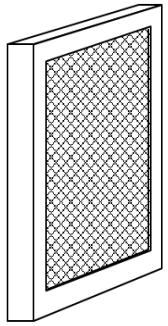
Potential Sectors based on Literature Review & Regional Applicability

Traditional Blue Economy Activities

- Waste Management
- Shipbuilding, Maintenance and Repair
- Marine Living Resources
- Port Activities
- Coastal and Nautical Tourism
- Marine Renewable Energy
- Maritime Transport

Emerging Blue Sectors

- Blue Biotechnology
- Desalination
- Marine Monitoring



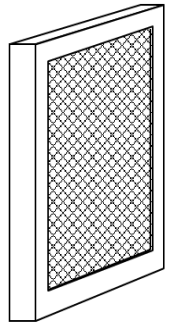
Potential Sectors based on Desk-Based Research & Regional Experts Views

Traditional Blue Economy Activities

- Waste Management
- Shipbuilding, Maintenance and Repair
- Marine Living Resources
- Port Activities
- Coastal and Nautical Tourism

Emerging Blue Sectors

- Blue Biotechnology
- Desalination
- Marine Monitoring



Potential Sectors Based on Stakeholder Discussions

Traditional Blue Economy Activities

- **Waste Management**
- **Sustainable Marine Living Resources**
- **Sustainable Port Activities**
- **Sustainable Coastal and Nautical Tourism**

Emerging Blue Sectors

- **Desalination**
- **Marine Monitoring**

Prioritized Sectors for Program Implementation

Blue Economy Jobs Program for Pollution Reduction

Objective I. PWP Implementation in Waste Management

- Waste Management (Coastal Cleanup & Recycling)

Objective II. Supporting Blue Employment in the Long Term Jobs Promotion in Selected Blue Sectors

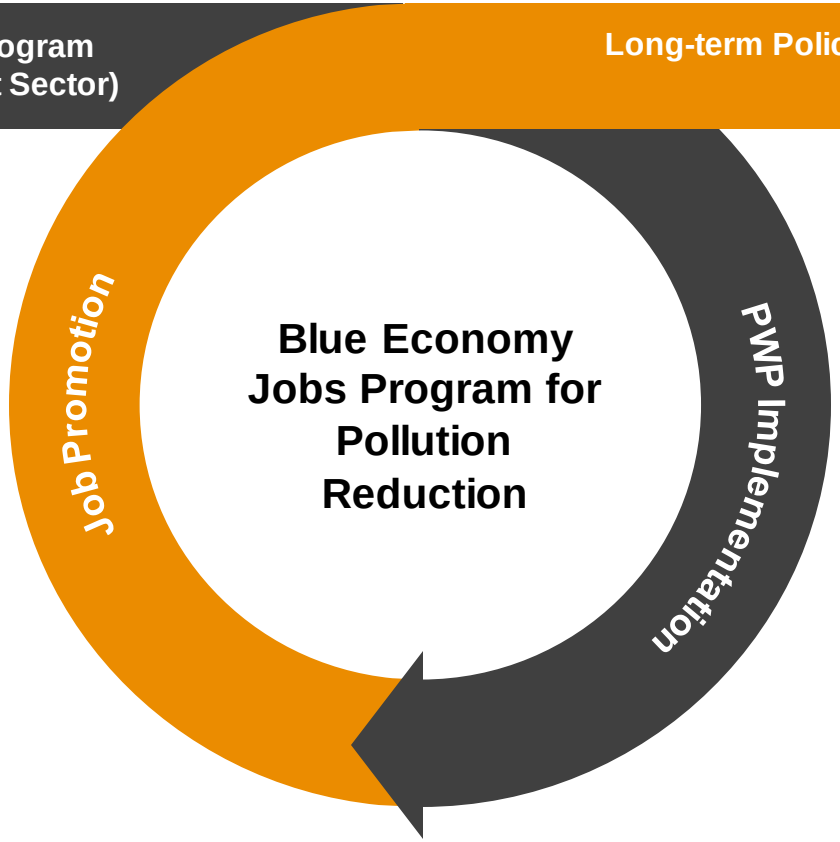
- Waste Management
- Desalination
- Marine Monitoring
- Sustainable* Marine Living Resources
- Sustainable* Port Activities
- Sustainable* Coastal & Nautical Tourism

04 Policy Recommendations

We further propose a set of policy recommendations addressing both short and long-term objectives to ensure the seamless implementation of a potential blue employment program

Short-term Policy Steps for Blue Wager Program (PWP Implementation in Waste Management Sector)

- Establishment of a **Blue Economy Taskforce**
- Development of a **Blue Economy Action Plan**
- Data collection and assessment on vulnerable groups in the region **to account for potential labor supply in PWP implementation.**
- Implementation of the initial **Public Works Program (PWP) in waste management sector** (including coastal cleanup and recycling)



Long-term Policy Steps for Blue Jobs Promotion in Selected Sectors

- Adoption of new l**egislative measures for coastal preservation, and integration of nature-based solutions** into these policies
- Collection and assessment of **complete firm-level data to account for labor-demand** in wide-range blue sectors
- **Implementation of blue upskilling activities** as part of the active labor market policies in wide-range blue sectors
- **Implementation of supportive activities for blue entrepreneurs** in the region as potential employers such as sectoral networking/investment focused events
- Development of a **Blue Taxonomy for clarification on blue investments**
- Implementation of **awareness-raising activities on the consequences of coastal pollution**, and clean conduct of business for coastal preservation
- Comprehensive assessment of **end-to-end value chains in marine related sectors for planning complementary blue interventions**

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Q & A

Any Other Matters Worth Addressing?	Your Expectations?	Any Questions?	Any Other Opinions?
			

Thank you!