

POLITICAL ECOLOGY OF MUCILAGE IN MARMARA SEA: A CASE STUDY
OF NILUFER CREEK

by

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POLITICAL ECOLOGY OF MUCILAGE IN MARMARA SEA: A CASE STUDY
OF NILUFER CREEK

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ABSTRACT

POLITICAL ECOLOGY OF MUCILAGE IN MARMARA SEA: A CASE STUDY OF NILÜFER CREEK

This thesis examines the vulnerability of the Marmara Sea ecosystem to pollution and mucilage outbreaks, with a particular focus on the Nilüfer Creek, one of the major contributors to the ecosystem degradation in Marmara Sea. Using a political ecology framework, the study critically assesses existing regulations, preventive measures, and industrialization and urbanization processes to highlight the complex interconnections and interactions between different local, regional and national stakeholders. By using a multi-method approach that includes stakeholder mapping, institutional analysis, document review and targeted interviews, this study aims to comprehensively document the complex relations surrounding the Nilüfer Creek in Bursa. The thesis aims to not only contribute to a nuanced understanding of the linkages between the Nilüfer Creek and mucilage occurrences but also provide insights to improve sustainable water management practices in general. This study underscores the need for integrated governance and community engagement in addressing the complex intertwining of ecological, political and technological factors affecting water resources, especially around the Marmara Sea.

ÖZET

MARMARA DENİZİ'NDE MÜSİLAJIN POLİTİK EKOLOJİSİ: NİLÜFER ÇAYI ÖRNEĞİ

Bu tez, Marmara Denizi ekosisteminin kirlilik ve müsilaj patlamalarına karşı kırılganlığını incelemekte; özellikle Marmara Denizi'ndeki ekosistem tahribatının başlıca kaynaklarından biri olan Nilüfer Çayı'na odaklanmaktadır. Politik ekoloji çerçevesi kullanılarak mevcut düzenlemeler, önleyici tedbirler ile sanayileşme ve kentleşme süreçleri eleştirel bir şekilde değerlendirilmekte; yerel, bölgesel ve ulusal düzeydeki farklı paydaşlar arasındaki karmaşık etkileşimler ve ilişkiler ortaya konulmaktadır. Paydaş haritalama, kurumsal analiz, doküman incelemesi ve hedeflenmiş mülakatlar gibi çok yönlü bir yaklaşımla yürütülen bu çalışma, Bursa'daki Nilüfer Çayı çevresindeki karmaşık ilişkileri kapsamlı bir şekilde belgelemeyi amaçlamaktadır. Tez, yalnızca Nilüfer Çayı ile müsilaj oluşumları arasındaki bağlantıların derinlemesine anlaşılmasına katkıda bulunmayı değil, aynı zamanda sürdürülebilir su yönetimi uygulamalarının iyileştirilmesine yönelik öneriler sunmayı da hedeflemektedir. Bu çalışma, özellikle Marmara Denizi çevresindeki su kaynaklarını etkileyen ekolojik, politik ve teknolojik faktörlerin iç içe geçtiği bu karmaşık yapının çözümünde bütüncül yönetim ve toplumsal katılımın gerekliliğini vurgulamaktadır.

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LIST OF SYMBOLS/ABBREVIATIONS

Abbreviation	Explanation
ACCOBAMS	Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas
BARCOM	Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution
CBD	Convention on Biological Diversity
CFP	Common Fisheries Policy
CMS	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
COD	Chemical Oxygen Demand
CSB	T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı (Ministry of Environment, Urbanization and Climate Change)
EIA	Environmental Impact Assessment
HD	Habitats Directive
HELCOM	Baltic Marine Environment Protection Commission
NGO	Non-Governmental Organization
OIZ	Organized Industrial Zone
PCB	Polychlorinated Biphenyls
PHAs	Polycyclic Aromatic Hydrocarbons
SEPA	Special Environmental Protection Area
SIS	Small Industrial Site
TN	Total Nitrogen
TP	Total Phosphorus
WFD	Water Framework Directive

1. INTRODUCTION

Marmara Sea, a semi-enclosed inland sea of approximately 11,350 km², holds a distinct ecological structure owing to its unique geographical position connecting the Black Sea and the Aegean Sea via the Bosphorus and Dardanelles straits. Despite its small size, it functions as a critical ecological corridor and acclimation zone between these two major marine ecosystems. Characterized by a two-layer water structure and powerful currents, the sea is a vital hub for Türkiye's tourism, fisheries, and biodiversity (İstanbul Planlama Ajansı, 2021; Marmara Belediyeler Birliği, 2013).

This vital ecosystem is under immense anthropogenic pressure. The Marmara region is home to around 25 million people and includes major industrial centres such as Istanbul, Kocaeli, and Bursa (Ministry of Internal Affairs, 2019). The basin hosts a high concentration of industrial facilities, agricultural operations, and urban settlements, which collectively generate significant air and water pollution. Pollutants range from conventional organic matter, nitrogen (N), and phosphorus (P) to micropollutants such as metals, PAHs, PCBs, pharmaceuticals, and microplastics, which enter the sea via direct discharges, runoff, and atmospheric deposition (i.e. air pollution eventually leads to water pollution). This pollution load is compounded by inflows from the Black Sea, which carries pollutants from the Danube River, and by rising sea temperatures, which have reached their highest levels in the last decade (Aydın, 2021; Öztürk et al., 2021). The culmination of these pressures was the widespread marine mucilage outbreak in early 2021, a strong manifestation of the sea's deteriorating health (CNN Turk, 2021)

In response to the mucilage crisis, the Ministry of Environment, Urbanization and Climate Change, in collaboration with the Marmara Municipalities Union, launched an action plan to identify and mitigate pollution sources (Marmara Belediyeler Birliği, 2021). Investigations pointed to numerous contributors, including polluted river basins like the Ergene and Susurluk, direct municipal and industrial discharges, and agricultural runoff. For instance, the city of Bursa alone discharges approximately 336,000 m³ of wastewater daily, largely without nitrogen or phosphorus treatment, contributing significantly to the sea's nutrient enrichment (Öztürk et al., 2021).

Ecological degradation and mucilage formation in Marmara Sea have emerged as a result of the cumulative impacts of multiple pollution loads that have persisted over a long period of time and cannot be attributed to a single source. Wastewater generated from households, industries, and surface

runoffs, including those originating from agricultural activities—continuously transport excessive nutrients, organic matter, and chemical pollutants into the marine system. In addition to these land-based sources, maritime activities such as the discharge of ballast and bilge waters, tourism-related waste generation, and illegal or uncontrolled discharges further exacerbate the pollution burden. These pressures are compounded by inadequate wastewater treatment infrastructure, insufficient monitoring, and weak enforcement of environmental regulations, resulting in chronic eutrophication and declining ecosystem resilience. Together with hydro-meteorological factors such as limited water circulation and increasing sea surface temperatures, these interacting stressors create favorable conditions for the formation and persistence of mucilage in Marmara Sea (Marmara Belediyeler Birliği, 2021; TBMM, 2022).

The study adopts a case study approach that aims to examine in detail one of the long-standing and significant pollution pressures within a complex, multi-actor system such as Marmara Sea (Kahraman & Özkul, 2018). The primary reason for selecting the Nilüfer Creek is the concentration of industrial, urban, and agricultural activities within the same river basin, which provides an illustrative example for observing how pollution is generated, transported, and managed around other creeks and rivers in the Marmara Basin (TBMM, 2022).

Beyond being one of the major contributors to mucilage formation, Nilüfer Creek was selected as a case study due to the similarity in both the magnitude and diversity of pollution loads characterizing Marmara Sea. The creek exhibits long-standing, chronic pollution patterns rather than episodic contamination, reflecting sustained pressures from industrial, urban, and agricultural sources. Moreover, the environmental degradation of Nilüfer Creek has direct and persistent impacts on surrounding communities, shaping everyday lived experiences and public health concerns. Finally, unresolved organizational and governance-related challenges (such as fragmented institutional responsibilities, inadequate coordination, and persistent enforcement gaps) closely mirror the structural problems underlying pollution management in Marmara Sea. Taken together, these characteristics render Nilüfer Creek a suitable and representative case for examining the socio-ecological dynamics contributing to marine degradation and mucilage formation.

The degradation of Nilüfer Creek and the subsequent mucilage crisis in Marmara Sea cannot be understood through a purely technical lens. These are socio-ecological problems embedded in a complex interplay of economic development, technological choices, and political priorities, where pollution is often treated as a neglected 'externality' (Swatuk, 2019; Carrascal Incera et al., 2017). Therefore, this study adopts a political ecology framework to investigate the nexus of power, policy, and environmental degradation surrounding Nilüfer Creek.

At this background, this thesis is guided by the following research questions:

- i. What are the key political, economic, and social drivers behind the persistent pollution of Nilüfer Creek?
- ii. How do power relations between government agencies, industrial actors, and local communities shape the implementation and enforcement of environmental regulations?
- iii. To what extent have existing policies and post-mucilage action plans effectively addressed the root causes of pollution originating from the Nilüfer basin?
- iv. In what ways do water pollution and environmental governance practices in Türkiye influence distributive and procedural environmental justice, as exemplified by the Nilüfer Creek–Marmara Sea system?
- v.

The central aim of this thesis is to analyze the power relations among local, regional, and national stakeholders that shape the management and pollution of Nilüfer Creek. The research seeks to understand the linkages between the creek's pollution and the mucilage occurrences in Marmara Sea while critically assessing the effectiveness of current regulations and preventive measures. Through a multi-method approach, including institutional analysis, document review, and stakeholder interviews, this study will explore how industrialization, urbanization, and governance dynamics contribute to the ecological crisis.

By examining these complex relationships, the main insight coming out of this thesis is that the persistent pollution of Nilüfer Creek and its contribution to the Marmara mucilage event is not simply a failure of waste management technology; it is a symptom of deeper structural issues. It reflects complex interactions between economic interests, political decisions, and social power structures, where environmental degradation is often an accepted consequence of development (Swyngedouw, 1999; Kaika, 2005)

The remainder of this thesis is structured as follows. Chapter 2 establishes the conceptual and contextual foundation by detailing the theoretical framework of political ecology, the scientific background of mucilage, and the specifics of the 2021 Marmara Sea outbreak, including its environmental justice implications. Chapter 3 briefly outlines the research design and methodology used to conduct the study. Following this, Chapter 4 provides a detailed description of the case study area, focusing on the Susurluk Basin and Nilüfer Creek. The empirical findings from the document analysis and interviews are then presented in Chapter 5 and these results are then interpreted and

discussed in Chapter 6. Finally, Chapter 7 concludes the thesis by summarizing the key findings, reflecting on the study's contributions, and offering recommendations for future research.



2. LITERATURE REVIEW

Environmental pollution or ecological degradation observed in marine and fluvial systems cannot be reduced to a single causal factor, nor can they be adequately analysed through a singular (technical or managerial) lens. Rather, such disturbances are more accurately understood as manifestations of structurally embedded problems within socio-ecological systems—problems that emerge through the cumulative interaction of social, ecological, and political processes over time.

In this respect, the mucilage phenomenon observed in Marmara Sea and the chronic pollution characterising the Nilüfer Creek should not be approached merely as isolated environmental problems. Instead, they represent interconnected socio-ecological crises shaped by overlapping ecological, institutional, political, and economic dynamics. These processes cannot be sufficiently explained through technical, managerial or natural framing alone (such as climate change impacts or failures in wastewater management) but must be understood as outcomes of politically mediated decision-making processes, development priorities, regulatory arrangements, and economic interests that systematically reproduce environmental degradation.

Political ecology offers a critical, interdisciplinary lens to examine how environmental problems are not merely ecological phenomena but are fundamentally shaped by governance structures, power asymmetries, and socio-economic dynamics (Robbins, 2019; Forsyth, 2003). This perspective is particularly relevant in this context, where ecological crises like water pollution are linked to political and social factors between stakeholders. By situating the analysis at the intersection of ecological degradation, governance failures, and socio-political dynamics, this study seeks to understand how power imbalances influence both the drivers of environmental problems and the subsequent responses to them.

In this context, this literature review will first examine the political ecology literature, then present a brief and technical content on mucilage, and then discuss the urban and industrial metabolism of the Marmara region, connecting this to developmentalism in Türkiye and how this developmentalism manifests itself as ineffective environmental governance in the country.

2.1. Political Ecology, Hydrosocial Cycles, and Environmental Justice

The term *ecology* is often interpreted in a simplified manner, limited to the natural environment — plants, animals, and landscapes — and its preservation. Although these terms are considered as fundamental requirements for life and as elements that constitute the main cycles such as water or carbon, it is neglected that ecology is a complex matrix that cannot be thought about without socio-political and economic dimensions.

Political ecology investigates ecological distribution conflicts by examining how power is exercised in shaping access to environmental resources and services, as well as in redistributing the burdens of pollution along socially differentiated lines such as ethnicity, class, caste, and gender. The field focuses on conflicts arising from resource extraction and waste disposal across both local and global contexts, with climate change representing one of the most extensive manifestations of such struggles. Moreover, political ecology critically examines the power dynamics that shape environmental decision-making, focusing on how certain forms of knowledge, values, and valuation frameworks are institutionalized within governance processes, while others are marginalized or rendered invisible. While overlapping with environmental sociology in its attention to environmental movements, political ecology distinguishes itself through its systematic emphasis on political-economic structures, governance mechanisms, and asymmetries of power that shape socio-environmental outcomes (Martinez-Alier et al., 2012). This perspective emphasizes that environmental change is shaped by power relations that determine who gains from it and who bears its costs (Forsyth, 2003; Robbins, 2020; Bryant & Bailey, 1997). Kallis (2014) stresses that such change inevitably creates both winners and losers, with those holding greater political and economic influence often able to appropriate the benefits while externalizing the negative impacts onto less powerful groups.

In this case, while some of the stakeholders - such as industries, governmental institutions etc.- have the power to benefit from environment and rest of the stakeholders like farmers, fishers, local residents bear the costs of others usage. It is important to note that no single actor or social group can be considered wholly responsible or entirely innocent in the production of environmental degradation. However, political ecology draws attention to the fact that power, control, and decision-making authority are unevenly distributed. While some actors possess disproportionate influence over environmental governance and resource use, others are compelled to bear the social, ecological, and health-related consequences of decisions over which they have little or no control.

Building on this perspective, political ecology has increasingly engaged with water through the concept of the hydrosocial cycle, which rejects the analytical separation between natural hydrological processes and social relations. Rather than conceiving water as a purely physical entity circulating through an apolitical hydrological cycle, the hydrosocial approach emphasizes that water flows are actively produced through relations of power, technological infrastructures, and economic priorities. Dams, canals, treatment plants, pipelines, and drainage systems do not merely transport water; they reorganize access, control, and vulnerability, thereby reshaping social relations and patterns of inequality (Swyngedouw, 2004, 2009). In this sense, water and society are mutually constitutive, as social arrangements shape the circulation of water, while water infrastructures and governance frameworks, in turn, influence economic activities, settlement patterns, and everyday life.

The hydrosocial cycle perspective further underlines that decisions regarding water allocation, quality standards, and infrastructure investments are inherently political rather than purely technical. Such decisions tend to privilege certain users, sectors, and spatial scales while constraining others, reflecting dominant political-economic priorities and development models (Swyngedouw, 2009). Consequently, water-related conflicts cannot be adequately understood through technocratic management approaches alone, but require attention to the institutional arrangements, power asymmetries, and historical trajectories through which water is governed.

Closely connected to political ecology and the hydrosocial cycle is the framework of environmental justice, which explicitly addresses questions of equity, participation, and recognition in environmental governance. Environmental justice scholarship emphasizes that environmental harms and benefits are unevenly distributed, with marginalized communities disproportionately exposed to pollution and environmental risks (Martinez-Alier et al., 2012). Beyond distributional concerns, scholars such as Schlosberg argue that justice also entails procedural dimensions, including meaningful participation in decision-making processes, as well as the recognition of affected communities, their identities, and their knowledge systems (Schlosberg, 2007). From this perspective, environmental conflicts are understood not only as material struggles over resources, but also as conflicts over values, voice, and legitimacy.

Environmental justice approaches thus complement political ecology by foregrounding the normative implications of environmental governance. The exclusion of certain social groups from environmental decision-making, combined with unequal access to political and legal mechanisms, reinforces existing power imbalances and perpetuates environmental degradation. As a result,

sustainability-oriented policies that fail to address issues of justice and participation risk reproducing the very inequalities they seek to resolve (Martinez-Alier et al., 2012; Schlosberg, 2007).

In the context of the politics of pollution, political ecology challenges the notion of pollution as a mere externality, instead highlighting its emergence through politically mediated economic choices and regulatory practices (Bryant & Bailey, 1997; Robbins, 2020). Industrial production frequently generates spatially concentrated zones of environmental harm—often described as “sacrifice zones”—where ecosystems and surrounding communities are knowingly subjected to high levels of contamination to sustain economic growth and competitiveness (Martinez-Alier et al., 2012). In such contexts, the benefits of production are captured by powerful actors, while the social, ecological, and health-related costs are borne by less powerful communities.

The persistence of pollution in these areas also reflects the limitations of state regulation in the face of strong economic interests. Weak enforcement, fragmented institutional responsibilities, and growth-oriented policy frameworks often undermine effective environmental protection (Forsyth, 2003; Robbins, 2020). Urbanization further intensifies these dynamics by concentrating industrial activity, waste generation, and resource consumption, frequently exceeding the assimilative capacity of local ecosystems. As urban systems expand, rivers and surrounding environments are increasingly transformed into sinks for untreated or insufficiently treated wastes, reinforcing cycles of ecological degradation and social vulnerability.

Taken together, political ecology, the hydrosocial cycle, and environmental justice provide an integrated framework for analyzing pollution and environmental degradation as socially produced and politically contested processes. This perspective highlights that environmental problems cannot be resolved through technical fixes alone, but require critical engagement with the power relations, governance structures, and justice dimensions that shape socio-environmental relations.

2.2. Mucilage

Sea mucilage, also referred as sea snow or sea snot, is a naturally occurring material that contains high amounts of organic matter which is created by the excessive proliferation of phytoplankton where it is triggered by several environmental factors such as the high temperature of the surface water, and high amounts of organic matter such as nitrogen and phosphorus, and immobile sea water (Okay et al., 2007; Ozturk et al., 2016). Although it is mentioned that sea snow and sea

mucilage are the same, sea mucilage is the aggregated version of sea snow. Figure 2.1. shows one of the first images of mucilage captured near Erdek, Balıkesir (Massink, 2025).

Mucilage is a gelatinous organic matter that accumulates in the water column or on the surface, largely resulting from excessive phytoplankton growth and the decomposition of organic material. Its formation is closely linked to physical drivers such as climate change, rising sea surface temperatures, decreasing oxygen levels, and hydrodynamic regimes, as well as socio-economic drivers including untreated or insufficiently treated wastewater, agricultural runoff, and industrial discharges (Degobbis et al., 1999; Danovaro et al., 2009; Penna et al., 2004; Türkoğlu & Öner, 2010).



Figure 2.1 The first images of mucilage captured near Erdek, Balıkesir (Massink, 2025)

According to Danovaro et al. (2009), by trapping small phytoplankton and large zooplankton, as well as entraining suspended planktonic and detrital material, mucilage plays a dual role in marine ecosystems. In addition, it provides a highly suitable feeding habitat for microorganisms such as bacteria and viruses in the water, with clusters of organisms (including harmful microbial species) accumulating on its surface (See Figure 2.2). When the sea surface is covered with mucilage, contact between the water and the atmosphere is cut off, preventing oxygen transfer. Since mucilage is covering the surface and absorbs sunlight, the coverage is causing of warming the water.

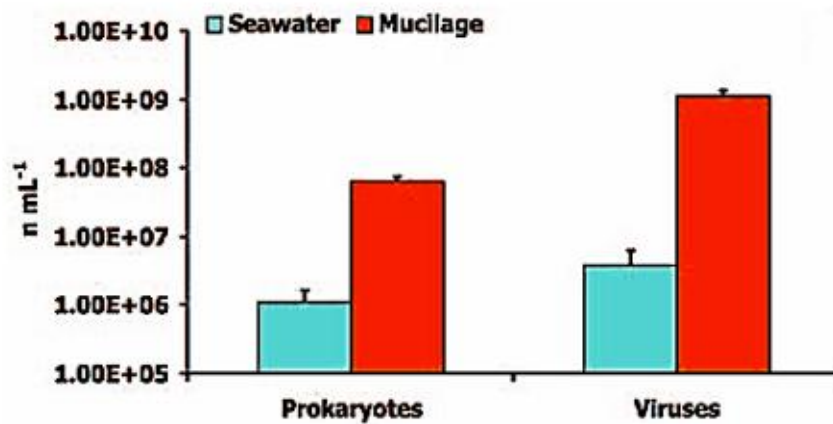


Figure 2.2 The abundance of viruses and prokaryotes in the samples from coastal waters of the Adriatic Sea in 2007 (Danovaro et al., 2009)

Visual pollution, odor problems and limited surface use of the water are some of the results of mucilage. It is found in greater quantities in the deeper layers of the sea than at the surface. While part of this formation breaks apart and rises to the surface, leading to a decrease in dissolved oxygen levels, while some of the parts sinks down, causing irreversible ecological damage to the habitats of benthic organisms and other species (such as rays, turbot, flounder, coral and mussel beds, sponges, oysters, crabs, shrimps, seagrasses, marine meadows, algae, etc.) whose ability to escape from adverse conditions is limited or nonexistent (Çevre Mühendisliği Portalı, 2021; Başçınar, 2009).

Sea mucilage therefore represents not only an ecological by-product of phytoplankton proliferation but also a dynamic matrix that reshapes marine food webs. While it provides a structural habitat and a reservoir for microbial communities, its accumulation alters nutrient cycling and oxygen availability, potentially triggering hypoxic conditions that destabilize local ecosystems (Danovaro et al., 2009). Evidence suggests that attributing mucilage development exclusively to eutrophication is insufficient, as processes such as hydrodynamic conditions, temperature fluctuations, and organic matter clustering play critical roles in sustaining the phenomenon (Genitsaris et al., 2019; Tas et al., 2020). Historical records indicate that mucilage is not a new phenomenon, having been observed for centuries in semi-enclosed seas such as the Adriatic and the Marmara.

Although it may vary due to the weather, water conditions and other climatic factors, mucilage formation generally occurs after a series of events. A review of the main causes of mucilage occurrences reported in diverse seas worldwide reveals that it is attributed to nutrient enrichment from agricultural runoff, untreated domestic and industrial wastewater, rising sea surface temperatures linked to climate change or other activities such as direct discharges of cooling waters

in industries, overfishing-induced ecosystem imbalance, and episodic stressors such as oil pollution (Degobbi et al., 2000; Danovaro et al., 2009; Tsuchiya, 2001; Passow et al., 2012; Hallegraeff, 1993; HELCOM, 2018; Basdurak et al., 2023).

Earlier formations often disappeared naturally within weeks or months through wave action, currents, and microbial degradation, without the need for human intervention (Danovaro et al., 2009). In some cases, solutions like vessel additions to the sea or piping out the mucilage are applied for the removal purposes. While such interventions can temporarily reduce the visible extent of mucilage, they do not address the underlying causes. Efforts in the northern Adriatic during the 1990s to reduce nutrient inputs—particularly nitrogen and phosphorus from wastewater and agriculture—helped alleviate eutrophication pressures but did not prevent recurring outbreaks (Danovaro et al., 2009). This highlights that lasting solutions require tackling root drivers, including improving wastewater treatment beyond basic mechanical and physical filtering and enforcing stricter regulatory frameworks (Fonda Umani et al., 2004; Aggarwal, 2021).

Marine mucilage poses severe ecological, social, and economic threats. Ecologically, it reduces dissolved oxygen levels and blocks sunlight penetration due to its extensive surface coverage, thereby contributing to biodiversity loss (Danovaro et al., 2009). By smothering benthic habitats and seagrass beds, mucilage leads to habitat degradation, while the accumulation of organic matter accelerates oxygen depletion and creates hypoxic or even anoxic conditions (Genitsaris et al., 2019). Furthermore, fish eggs and larvae become trapped in mucilage layers, resulting in reproductive failures and long-term impacts on fish populations (Tsiola et al., 2021). Such ecological alterations often favor opportunistic or invasive species, disrupting the natural balance of marine communities (HELCOM, 2018).

The phenomenon further undermines fisheries by triggering mass fish mortalities and increasing turbidity, which severely impairs fishing activities and threatens the livelihoods dependent on them (Ozturk et al., 2016). Socially, its unpleasant odor and unsightly appearance hinder recreational activities such as swimming, while the high viral loads it contains pose direct public health risks (Okay et al., 2007; Danovaro et al., 2009).

Economically, mucilage events result in substantial financial losses. Tourism revenues decline as coastal destinations lose their attractiveness, while fisheries face reduced catches and market value (Ozturk et al., 2016). Maritime transport and trade are also disrupted, as mucilage hampers ship navigation (Basdurak et al., 2023). In addition, waste management and mechanical removal

operations generate significant costs, placing an extra burden on municipalities and environmental authorities (Aggarwal, 2021).

On a broader scale, mucilage interferes with water and carbon cycles, altering biogeochemical processes and potentially accelerating climate change (Tsiola et al., 2021). Taken together, these impacts render mucilage not only an environmental disaster but also a multidimensional crisis with profound social, economic, and institutional consequences.

Marine ecosystems cannot be considered independently from river-based freshwater systems, particularly when surface water inputs to the sea are taken into account. A substantial proportion of nutrients, organic matter, and pollutants entering marine environments are transported via rivers, creating a direct and continuous link between inland freshwater systems and coastal seas. From this perspective, rivers function as integral components of marine ecosystem dynamics rather than as separate or external systems. Accordingly, the pollution of the Nilüfer Creek cannot be treated as an issue detached from the ecological condition of the Sea of Marmara. Instead, it represents part of a connected land–freshwater–marine continuum through which cumulative pressures are conveyed and transformed. Recognizing this interdependence is essential for understanding marine degradation processes such as mucilage formation and for framing effective responses that address both upstream and downstream dynamics.

2.3. Marmara Sea

Marmara Sea (or Sea of Marmara) is a semi-closed inland sea which has approximately 11350 km² area and connects to the Aegean Sea by Dardanelles and to the Black Sea by Bosphorus (Okay et al., 2007). It is surrounded by seven cities which are İstanbul, Kocaeli, Yalova, Bursa, Balıkesir, Çanakkale ve Tekirdağ (See Figure 2.3). Approximately one-third of Türkiye's total population resides in the Marmara region, which functions as a major industrial hub (T.C. İçişleri Bakanlığı, 2021). The area also hosts significant agricultural production, fisheries, outdoor sports, and tourism activities. Moreover, it holds a critical position along maritime trade routes.

Historically, the region has been of great importance, while also being located in a seismically active zone. In recent years, the Marmara region has additionally become home to the majority of migrants and refugees entering the country, particularly due to conflicts in neighboring regions, which has considerably diverged from previously anticipated projections. Furthermore, fluctuations in the Turkish economic market directly influence the social and economic life of the Marmara region.



Figure 2.3 Marmara Sea and the Straits of Bosphorus and Dardanelles

Marmara Sea is a combined water body carrying two distinct seas, which is also reflected to its marine life. The species are clearly separated from each other related to their living conditions. North of Marmara Sea consists a very dense plankton mass within the first 25 meters, acting as a water body similar to Black Sea. Rocky areas are covered with mussels, sea lettuce and green algae with a group of microorganisms as well as sea stars (Türk Balıkadamlar Spor Kulübü, n.d.).

In deeper sea levels, a warmer and more saline mediterranean waters begin. At these depths, species of Mediterranean such as larger fish and corals are seen. That is why, Marmara Sea is a significant ecological corridor to observe both Black Sea and Mediterranean species and a great chance to experience the features and contrasts between two seas. According to the recent studies, 235 fish species are living in the Marmara Sea (Türk Balıkadamlar Spor Kulübü, n.d.).

Marmara Sea also stands as a bridge between continents, serving as a unique migration corridor and marine habitat that supports the movement of species in the water, on land, and in the air. This region is shaped by the complex interplay of tectonic forces within the Alpide Belt, which extends from the Atlantic to the Himalayas. The convergence of the African and Eurasian plates continues to

reshape Anatolia, with the westward movement of the Anatolian Plate placing the Marmara region among the world's most seismically active areas. These tectonic dynamics have created diverse landscapes that owe their form to such activity.

In addition to feathered travelers, Marmara Sea is home to various marine mammals, serving as critical habitat for species such as the Short-beaked Common Dolphin (*Delphinus delphis*), the Harbour Porpoise (*Phocoena phocoena*), the Common Bottlenose Dolphin (*Tursiops truncatus*), and the Striped Dolphin (*Stenella coeruleoalba*). This highlights the ecological significance of Marmara as a connector between the Mediterranean and the Black Sea. Its role as a bridge between continents goes beyond geography—it functions as a vital conduit for migratory species, linking habitats and enabling survival and diversity across borders. Preserving this ecosystem is therefore essential not only for the species it supports but also for maintaining ecological balance and biodiversity across the wider region (Turkish Divers Sports Club, n.d.).

Its two-layer water structure (see figure 2.4) and powerful currents sustain biodiversity while simultaneously making the ecosystem highly vulnerable to pollution inputs (İstanbul Planlama Ajansı, 2021; Marmara Belediyeler Birliği, 2013).

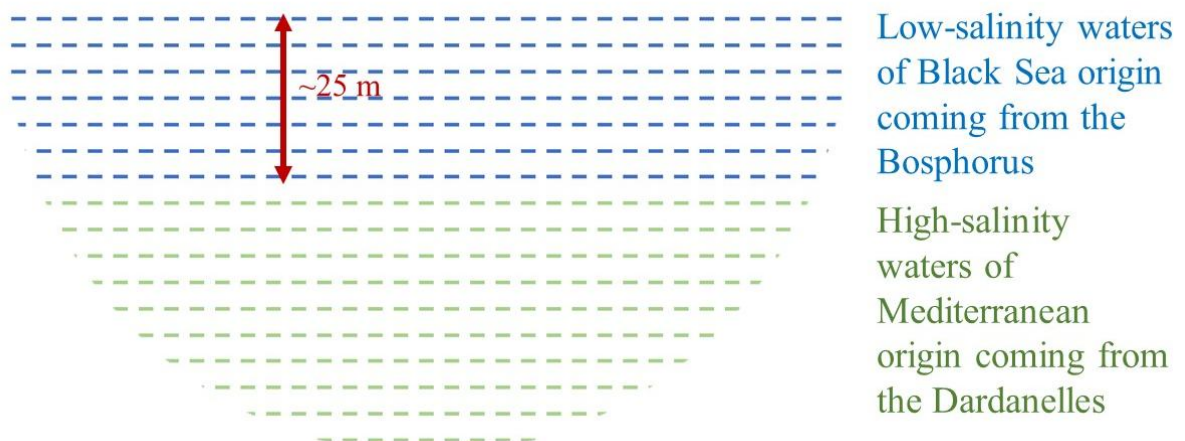


Figure 2.4 Salinity profile of the Marmara Sea (Pakdemirli, 2021)

At the same time, rapid urbanization, the expansion of industrial zones, and dense maritime traffic in the Marmara Region all contribute to intensifying ecological pressures (Ertör-Akyazı & Ertör, 2022). These overlapping dynamics position the Marmara Sea as both a vital ecological corridor and a contested socio-political space, where questions of governance, environmental justice, and sustainable futures are negotiated.

Marmara Sea, which includes the Turkish straits systems, demonstrates crucial ecological significance as a biological corridor/barrier and an acclimation zone through the physical linkages with the Black and Mediterranean Seas. Such a unique hydrological feature only indicates how important the health of the Marmara Sea is to the preservation of marine species in neighboring ecosystems. Considering its lake-like most proportions, Marmara Sea demonstrates oceanic characteristics in terms of biodiversity. There are several fisheries located in different bays, even if it is a route for the fish which migrate for reproduction or seasonal changes. The Marmara Sea is an important bird migration route, as well. There are 2 important protected areas and 16 important bird areas in terms of waterfowl and migratory birds, on the coastline of the Marmara Sea according to the RAMSAR convention (Marmara Belediyeler Birliği, 2013). Figure 2.5 shows the migratory routes of birds and sea mammals through the straits and Marmara Sea.

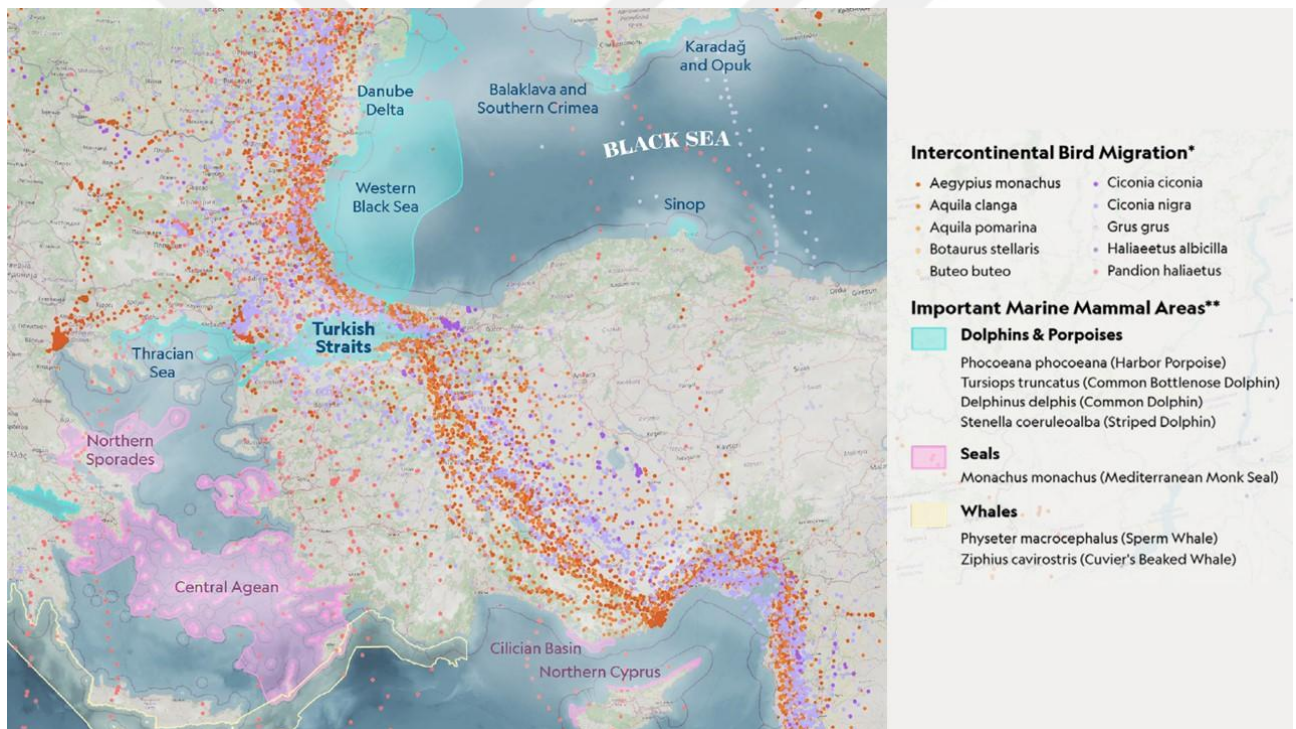


Figure 2.5 Bird and marine mammals migration routes on Marmara Sea (Bluescape, 2024)

Marmara Sea faces significant challenges due to pollution from various sources. Mechanically treated wastewater, approximately 279,000 m³ daily, is discharged into the Istanbul Strait, along with urban wastewater from Küçükçekmece and Adalar municipalities. Kocaeli contributes around 388,000 m³, while Bursa discharges 336,000 m³ of wastewater, lacking Nitrogen (N) or Phosphorus (P) removal. Additionally, Tekirdağ and Balıkesir significantly impact urban wastewater load, with daily contributions of approximately 44,000 m³ and 26,000 m³, respectively (Istanbul Planlama Ajansı, 2021, Öztürk et al., 2021). Hence, pollution in the Marmara Sea is predominantly attributed

to anthropogenic factors, which leads to a reduction in dissolved oxygen levels (Marmara Belediyeler Birliđi, 2021).

Several key factors emerge when examining the human-induced influences on Marmara Sea. These include stagnant weather patterns leading to reduced water flow, degradation of coastal regions, population growth, uncontrolled discharge of industrial and domestic pollutants into the sea, maritime activities such as shipping and dredging, and uncontrolled fishing practices. As a result, these factors have contributed to a noticeable decline in dissolved oxygen levels in seawater, which is stressing marine life and driving certain species to extinction. Marmara Sea relies on two main sources for its oxygen supply. Firstly, oxygen is absorbed from the atmosphere, but its effectiveness decreases with increasing depth and is usually only reached at a depth of 25-30 meters. Secondly, the sea receives oxygen from the Mediterranean water that flows through the Dardanelles. However, these sources are not sufficient to meet the current oxygen demand of the sea. An important aspect that increases the ecological vulnerability of Marmara Sea is its status as a closed system or inland sea. The nutrients entering the sea are consumed together with organic material, such as algae, that forms in the sea. As this organic material decomposes through bacterial activity, carbon dioxide is released into the environment, leading to ocean acidification. Certain processes return algae to the sea in the form of nitrate or phosphate, leading to an excess of nitrogen and phosphorus, which is particularly evident in Marmara Sea (Istanbul Planlama Ajansı, 2021).

Major polluting sources originate from a variety of land-based and sea-based activities, including direct discharges from households, industries, and ships, as well as runoff from agriculture. Furthermore, indirect sources such as recreational activities, illegal dumping, and inflows from other water bodies contribute to the overall pollution load (See Figure 2.6) (Istanbul Planlama Ajansı, 2021).



Figure 2.6 Major sources polluting Marmara Sea

As pollution sources, major contributors are Istanbul, Kocaeli and Bursa, when compared by the amount of wastewater entering to the Marmara Sea from the discharge points and since Bursa has some untreated wastewater without any removal of nitrogen (N) or phosphorus (P), and Nilüfer Creek contains high amounts of municipal and industrial wastewater, the research area is selected as Nilüfer Creek to understand if it is one of the main contributors of mucilage formation in Marmara Sea (Öztürk, et al., 2021).

2.3.1. Mucilage Outbreak in Marmara Sea

A significant outbreak of marine mucilage occurred in Marmara Sea in April 2021, though earlier events in 2007–2008 had already revealed the ecological fragility of the basin. Scientific studies show that its formation is associated with temperature changes, oxygen availability, hydrodynamic regime, and meteorological conditions (Danovaro et al., 2009; Degobbis et al., 1999). However, the primary driver has been eutrophication, fueled by river discharges and municipal wastewater inputs (Penna et al., 2004; Türkoğlu & Öner, 2010).

The semi-enclosed structure of the Marmara Sea amplifies these risks, since nutrient and pollution loads are trapped within the basin, leading to oxygen depletion and acidification (Altıok et al., 2023; İstanbul Planlama Ajansı, 2021). The 2021 crisis triggered mass mortality among invertebrates and pelagic fish due to suffocation and anoxia (Karadurmuş & Sarı, 2021).

One of the most visible and measurable consequences of mucilage formation is the alteration of water column properties, particularly light penetration and suspended particle concentration. As mucilage aggregates in the upper and intermediate layers of the sea, it increases the amount of organic matter and suspended solids in the water column, thereby directly affecting turbidity levels. Elevated turbidity not only disrupts primary production by limiting photosynthetically active radiation but also exacerbates oxygen depletion by enhancing microbial respiration processes. The samples taken from Marmara Sea showed sharp increases in turbidity levels at different depths of the sea which held significant implications not only for ecosystem health but also for maritime transportation (Marmara Belediyeler Birliği, 2021).

This mucilage outbreak generated significant economic losses across multiple sectors, most notably fisheries, coastal tourism, and maritime transport. Small-scale fishers were among the most severely affected, as mucilage clogged fishing gear, reduced catch volumes through fish mortality and altered migration patterns, and in some areas forced the temporary suspension of fishing activities altogether. Coastal tourism also suffered due to beach closures, visual pollution, unpleasant odors, and public health concerns, leading to cancellations and revenue losses for local businesses dependent on seasonal tourism. In parallel, maritime transport and port operations experienced disruptions caused by reduced visibility, increased turbidity, and the clogging of vessel and infrastructure systems, resulting in delays, higher operational costs, and efficiency losses in a region that plays a central role in Türkiye's trade and logistics networks (Reuters, 2021; BBC, 2024)

Beyond these immediate sectoral impacts, the mucilage crisis imposed substantial financial burdens on public institutions through large-scale emergency response measures. Extensive surface-cleaning operations, monitoring activities, and waste disposal required the mobilization of significant human and material resources, diverting public funds away from long-term investments such as advanced wastewater treatment and ecosystem restoration. From a political ecology perspective, this reactive allocation of resources reflects a broader pattern in which the economic costs of chronic environmental degradation are externalized to public budgets and vulnerable livelihoods, while the structural drivers of pollution remain largely unaddressed. Consequently, recurring mucilage events threaten not only ecological integrity but also the long-term economic resilience and sustainability of the Marmara region. As such, mucilage is not only an ecological problem but also a socio-political one, revealing the limits of current governance and regulatory practices (BBC, 2024; Daily Sabah, 2021).

In response, the Ministry of Environment and Urbanization launched the Marmara Sea Action Plan in June 2021, which promised stricter monitoring, improved wastewater treatment, and stronger institutional coordination (Çevre ve Şehircilik Bakanlığı, 2021; Marmara Belediyeler Birliği, n.d.). Large-scale surface cleaning campaigns were organized with the participation of municipalities, ministries, and volunteers. According to official figures, over 8,000 personnel, more than 1,000 boats and 18 marine vessels were mobilized, and approximately 8,000–9,000 tons of mucilage were removed from the sea and safely disposed of (Anadolu Agency, 2021; Reuters, 2021). Shortly after, the Marmara Sea was declared a Special Environmental Protection Area (Özel Çevre Koruma Bölgesi), granting it the highest legal protection status under Turkish environmental law (Çevre ve Şehircilik Bakanlığı, 2021).

While these steps represented unprecedented political recognition of the crisis, experts warned that cleaning the surface and legal designation alone would not be sufficient. Without effective enforcement, public participation, and investment in advanced wastewater treatment—especially for nitrogen and phosphorus removal—the basin would remain vulnerable to further outbreaks (Aydın, 2021; Aktan, 2024; Öztürk et al., 2021). As Acara (2019) has shown in the case of the Ergene River, legal or institutional measures often remain symbolic if not coupled with structural reforms, and the same concern applies to the Marmara Sea.

Despite the 2021 clean-up, mucilage has not disappeared entirely. Monitoring reports and scientific observations have confirmed that mucilage reappeared in different parts of the Marmara in subsequent years, though with varying intensity. Smaller outbreaks were reported in late 2022 and 2023, and experts have continued to warn that under current pollution pressures, mucilage will remain a recurring phenomenon (BBC, 2024; The Guardian, 2025). These cycles demonstrate that mucilage is not a one-time ecological disaster but an ongoing symptom of systemic environmental governance failures in Türkiye.

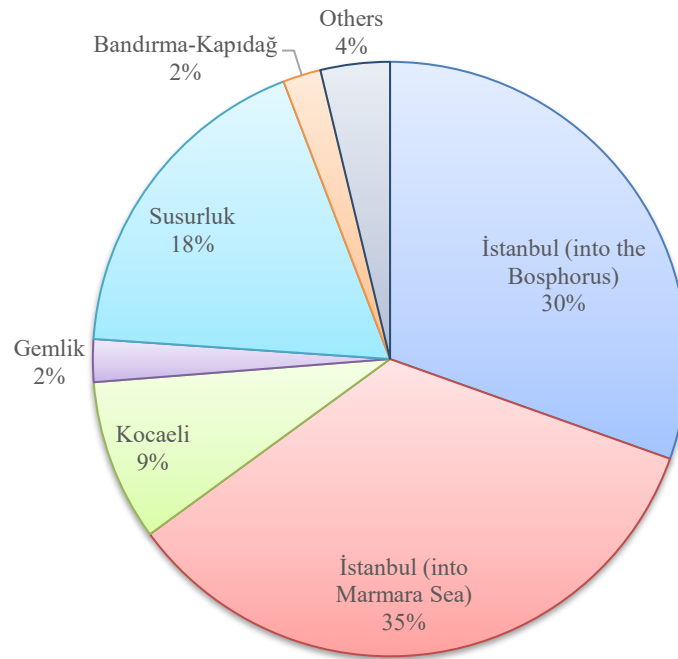


Figure 2.7 Nitrogen Loads Originating from Wastewater Discharges to Marmara Sea (İstanbul Teknik Üniversitesi, 2021)

The Figure 2.7 also shows the Nitrogen loads from wastewater discharges to Marmara Sea. According to the current scenario, based on data from 2005, nutrient loads (nitrogen and phosphorus) originating from the Marmara and Susurluk basins account for approximately 50% of the total nutrient load within the basin. The remaining 50% of the load is attributed to inputs from the Black Sea (Figure 20). It is assumed that approximately 20–25% of the lower-layer currents of the Marmara Sea (particularly those associated with wastewater discharges from Yenikapı and Kadıköy at the southern entrance of the Bosphorus) are transferred to the upper layer flowing from the Black Sea within the Bosphorus (especially at the Üsküdar sill) and subsequently recirculate back into the Marmara Sea (İstanbul Teknik Üniversitesi, 2021).

From a political ecology perspective, the mucilage outbreak exposes deep-seated asymmetries in power, responsibility, and accountability within the governance of the Marmara Sea. While nutrient pollution is largely generated by industrial production, urban wastewater systems, and intensive land-based activities upstream, the ecological and social costs are disproportionately borne by marine ecosystems, small-scale fishers, and coastal communities with limited political influence. This uneven distribution of environmental burdens highlights how decision-making processes remain dominated by economically and politically powerful actors, whereas affected populations are largely excluded from meaningful participation.

2.4. Environmental Governance in Türkiye

Environmental governance in Türkiye has evolved unevenly since the late 1970s and early 1980s, shaped by broader political-economic transformations rather than by a consistent commitment to environmental protection. Early environmental regulations emerged in response to rapid industrialization and urban growth, particularly following the 1980 military coup and the subsequent adoption of export-oriented, neoliberal development strategies. While environmental issues began to enter policy agendas during this period, they were largely subordinated to economic growth imperatives (Keyder, 1987; Adaman & Arsel, 2005).

The 1980s marked a critical turning point in Türkiye's development trajectory. Industrial expansion, regulation change, and the retreat of the state from direct economic planning fundamentally reshaped environmental governance. Rapid and often unplanned urbanization—especially concentrated in the Marmara Region—intensified pressures on land, water, and coastal ecosystems. As Adaman and Arsel (2009) and Özkaynak et al. (2015) argue, this period institutionalized a growth-first policy paradigm in which environmental regulation existed formally but was weakly enforced in practice. Environmental laws were increasingly framed as technical instruments, detached from social justice considerations and local ecological realities.

Political shifts in governance since the 2000s further reinforced these dynamics. While the harmonization process with the European Union led to the expansion of environmental legislation and institutional frameworks, enforcement gaps persisted. Scholars consistently highlight a structural contradiction in Türkiye's environmental governance: relatively comprehensive legal frameworks coexist with selective implementation, particularly when environmental protection conflicts with powerful industrial, infrastructural, or urban development interests (Adaman & Arsel, 2012; Akbulut & Erensü, 2014; Aydın, 2020). This contradiction reflects deeper power asymmetries within decision-making processes, where economic actors retain disproportionate influence over environmental outcomes.

Water governance offers a particularly illustrative example of these challenges. Türkiye's water policies have historically emphasized supply-side management (dams, inter-basin transfers, and infrastructure investments) while neglecting demand management, ecological integrity, and participatory governance (Erensü, 2016; Turhan, 2017). Rivers, lakes, and coastal waters have been treated primarily as economic inputs for agriculture, industry, and urban consumption rather than as

socio-ecological systems. This technocratic approach fragments institutional responsibility across multiple agencies, weakening accountability and obscuring cumulative pollution impacts.

From a political ecology perspective, water governance in Türkiye cannot be understood solely through regulatory or hydrological frameworks. Instead, it reflects contested power relations over access, control, and responsibility. Barca's (2014) analysis of the governance of commons is particularly relevant here. She demonstrates that commons such as rivers and seas are shaped by social power structures that privilege certain actors while marginalizing others. In Türkiye, disenfranchised populations (communities with limited political representation, economic resources, and institutional voice) often bear the environmental costs of water pollution, despite having minimal influence over decision-making processes.

The Marmara Sea mucilage crisis exemplifies these structural failures. While mucilage appears as a marine ecological phenomenon, its roots lie in decades of cumulative nutrient and pollution loads originating from rivers such as Nilüfer and Ergene. Industrial wastewater discharges, insufficient treatment capacity, agricultural runoff, and urban sewage converge in the Marmara basin, revealing the interconnectedness of freshwater and marine systems. Weak enforcement of environmental regulations, fragmented governance structures, and delayed infrastructural investments have allowed these pressures to accumulate over time (Altıok et al., 2023; Aktan, 2024).

Understanding Nilüfer Creek within this broader governance framework is therefore critical. Rather than framing the creek as an isolated pollution source, political ecology allows it to be analyzed as part of a hydrosocial system shaped by industrialization, urban expansion, and institutional inertia. Similar to Acara's (2019) analysis of the "Dead" Ergene River, Nilüfer Creek reflects how neoliberal development produces localized "sacrifice zones," where environmental degradation becomes normalized and chronic. Pollution is not accidental but structurally embedded, sustained by governance arrangements that prioritize economic activity while externalizing ecological and social costs.

The economic consequences of mucilage further reveal governance asymmetries. Fisheries, tourism, aquaculture, and coastal livelihoods have suffered significant losses, while the industries contributing to pollution often remain insulated from accountability. Drawing on Martínez-Alier's (2002) concept of the "environmentalism of the poor," these outcomes demonstrate how environmental burdens are unevenly distributed, disproportionately affecting communities that depend directly on ecosystem services. Cole's (2012) work on water equity similarly underscores

how environmental degradation deepens social and economic inequalities when governance systems fail to protect shared resources.

At the same time, public resistance and civil society mobilization have become increasingly visible. Protests such as the “*Denizime Dokunma*” (Do not touch my sea) demonstrations and advocacy efforts by environmental NGOs and activists signal growing contestation over environmental governance. These movements challenge the depoliticization of environmental issues and demand greater transparency, accountability, and participatory decision-making—core concerns of political ecology (Walker, 2005; Acara, 2019).

In sum, environmental governance in Türkiye is characterized by a persistent tension between formal regulatory strength and practical enforcement weakness. The cases of mucilage, Nilüfer Creek, and the Marmara Sea reveal how ecological crises emerge not merely from biophysical processes but from deeply embedded socio-political structures. Political ecology provides a critical lens for understanding these dynamics by linking environmental degradation to power relations, governance failures, and social inequality. Through detailed stakeholder mapping and institutional analysis of a single water body such as Nilüfer Creek, this study aims to contribute to broader discussions on how environmental governance failures propagate across interconnected freshwater and marine systems.

3. RESEARCH DESIGN AND METHODOLOGY

For this research, a multi-method approach is employed to provide a comprehensive understanding of the case study and its connections to environmental justice and political ecology. While the research mostly focuses on Nilufer Creek and its pollution, this study aims to examine the linkages between mucilage formation in Marmara Sea and Nilufer Creek pollution with a perspective of socio-political context. In this sense, the study situates the Nilüfer Creek within a larger system of interconnected water bodies, highlighting its role as a significant vector of nutrient and organic matter inputs that have been identified in scientific literature as critical drivers of mucilage outbreaks.

The research adopts a combination of desk-based and fieldwork methods to ensure both a comprehensive theoretical grounding and the incorporation of empirical insights from the field. This includes institutional analysis to examine key regulations, laws, and action plans governing water protection and pollution control; stakeholder mapping to identify relevant actors and analyze the distribution of power among them; and semi-structured interviews with a diverse group of key stakeholders, including academics, technical experts, journalists, governmental organizations, civil society organizations, and local residents, in order to capture a wide spectrum of perspectives and experiences. In addition, a document analysis is conducted, drawing upon academic literature, news articles, technical reports, and audiovisual materials such as videos and podcasts, to triangulate findings and contextualize the case within broader socio-political and ecological frameworks.

The process begins with an extensive review of academic literature on political ecology, incorporating socio-political and ecological perspectives. Given that the case study focuses on environmental pollution involving multiple water bodies, the analysis also covers relevant regulations, laws, and action plans concerning water protection. In addition to these legal and policy frameworks, the research examines official reports, special protection initiatives, and the political discourse surrounding the issue, including discussions in the Grand National Assembly and motions for written parliamentary questions.

Secondly, to analyze power distribution, relevant stakeholders which are directly and indirectly connected to Nilufer Creek and Marmara Sea are identified. The identified stakeholders are categorized into twelve groups: governmental organizations, organized industrial zones, industries, tourists, the general public (excluding residents), international funding bodies, academics, academics, experts, journalists, fishers, residents, and non-governmental organizations (NGOs). Stakeholder

mapping and identification constitute a critical step in the analysis, as the causes of pollution are complex and cannot be attributed to a single source, while its impacts are distributed across (and influenced by) multiple stakeholder groups.

Finally, the data gathered from document analysis and semi-structured interviews is used for the analysis to address the core research inquiries of the thesis. First, the statements are synthesized to understand how different stakeholders perceive and frame the pollution problem, revealing the divergent narratives surrounding the mucilage crisis. Second, the analysis identifies and evaluates the specific strategies and solutions put forward by these stakeholders. And lastly, the collected data is used for examining the environmental justice implications of the degradation in both the Nilüfer Creek and the Marmara Sea. This justice-oriented analysis is structured around two primary dimensions: *distributive justice*, which investigates the unequal allocation of economic costs and ecological burdens, and *procedural justice*, which scrutinizes the fairness of administrative processes, focusing on rights, institutional transparency, and the mechanisms of participatory governance.

4. CASE STUDY: NILUFER CREEK

4.1. Susurluk River Basin and Nilüfer Creek

The Susurluk Basin, located in western Türkiye, covers a drainage area of approximately 24,319 km², accounting for about 3.1% of the country's total surface area. The basin extends across parts of Bursa, Balıkesir, Kütahya, Bilecik, Çanakkale, Manisa, and İzmir provinces. Positioned in Northwestern Anatolia, it is bordered by the Sakarya, Gediz, Northern Aegean, and Marmara basins (SYGM, 2023).

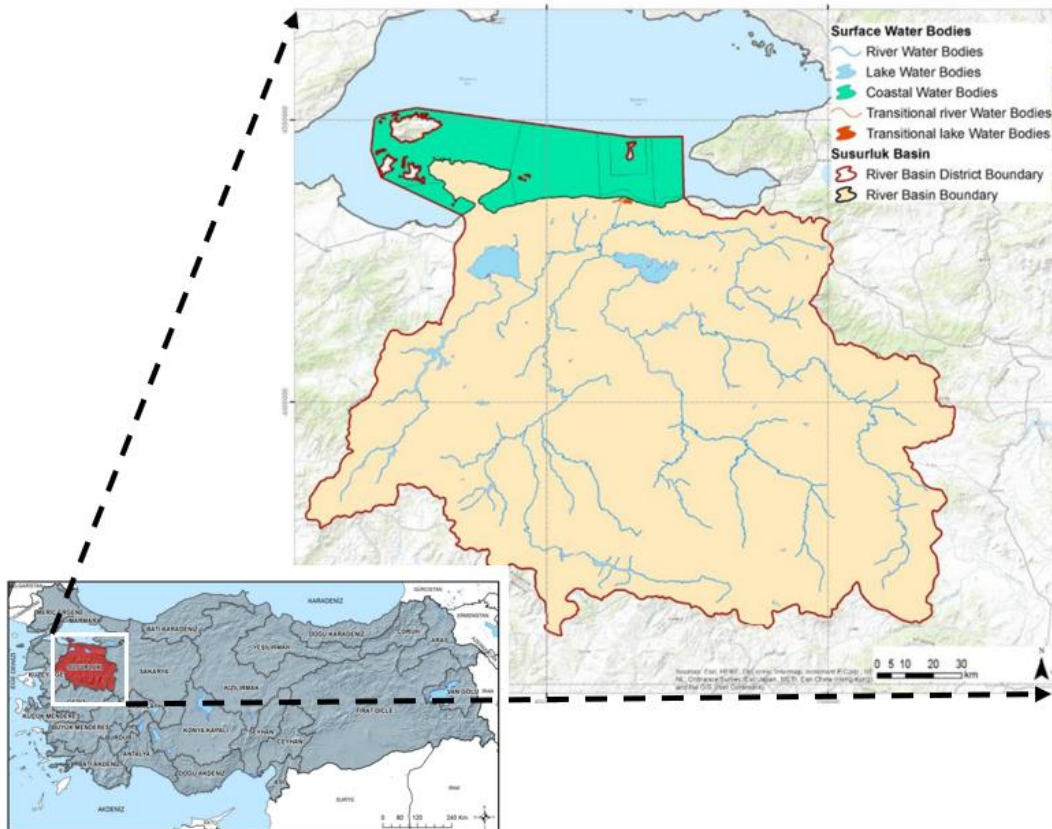


Figure 4.1 Susurluk Basin (SYGM, 2023)

The precipitation received in the basin flows through numerous rivers of varying sizes, discharging into Marmara Sea as well as into Lake Uluabat and Lake Manyas. Among the many rivers in the region, the most significant are the Simav, Nilüfer, Mustafakemalpaşa, and Koca streams. The Simav Stream originates from the Simav Plain, passes through Kütahya, and ultimately drains into

the Marmara Sea. Within the basin, Lake Uluabat and Lake Manyas stand out for their ecological and economic importance.

In terms of population distribution, Bursa and Balıkesir represent the most densely populated areas of the basin. Bursa alone accounts for 70.44% of the basin's population, with 78.7% of its total provincial population residing within the basin boundaries. According to the Bursa Provincial Industry Report, the industrial structure of the basin is dominated by textiles (22.27%), followed by furniture manufacturing (15.84%) and food production (9.75%).

The basin is not only industrially significant but also rich in cultural and natural heritage. It hosts numerous archaeological sites, examples of civil architecture, religious buildings, administrative and military structures, industrial and commercial buildings, monuments, and cemeteries. Additionally, protected areas such as national parks, nature parks, nature monuments, and wildlife conservation zones contribute to its ecological diversity.

Bursa Province, situated on the southern coast of the Marmara Sea, has a shoreline of approximately 135 km, with the districts of Karacabey, Mudanya, and Gemlik featuring extensive natural beaches. Tourism potential is also notable along the shores of Lake İznik and Lake Uluabat (Apolyont). The city is home to Uludağ, one of Türkiye's most important winter tourism centers, as well as cultural attractions such as the Bursa Archaeology Museum, Turkish-Islamic Art Museum, Atatürk House Museum, Ottoman House Museum, and Mudanya Armistice House Museum. Significant religious sites include the Grand Mosque (Ulu Cami), Emir Sultan Mosque, and the Helena Konstantinos Church. Bursa also serves as a hub for congress and cultural tourism through venues like the Merinos Atatürk Congress and Culture Center and TÜYAP Bursa International Fair Center, while sites such as Sadağ Thermal Springs and Canyon and Bayramdere Bear Conservation Area support nature-based tourism. Furthermore, the basin holds global recognition with "Bursa and Cumalıkızık: The Birth of the Ottoman Empire" inscribed on the UNESCO World Heritage List. Ecologically valuable sites such as Lake Uluabat and Lake Manyas also lie within its boundaries.

Economically, the basin is characterized by agriculture, livestock breeding, dairy production, mining, and industry. Water use in the region is driven by agricultural irrigation, animal husbandry, domestic and municipal supply, industry, and tourism. Agricultural water consumption is particularly notable. With the rise in population, the demand for drinking and domestic water has also increased. In terms of industry, Organized Industrial Zones (OIZs), Small Industrial Sites (SIS), and independent industrial facilities indicate that water use is highest in the Nilüfer sub-basin. Similarly, tourism-

related water consumption is most concentrated in Bursa and the Nilüfer sub-basin.

4.2. Nilüfer Creek and Pollution

Nilüfer Creek in Bursa city is one of the main streams that ends in Marmara Sea, after merging with Susurluk River. It starts from Uludağ Mountain as a fresh source, collects other waterbodies and eventually discharges into the Marmara Sea (Asik, 2023). Its main branch and tributaries have a combined length of around 168 km. Two drinking water reservoirs (Nilüfer and Doğancı) regulate the upper reaches of the Nilüfer Creek. The creek then turns northward, leaving the mountainous area. It flows north through the Bursa metropolitan region and subsequently turns westward. Covering the districts of Kestel, Gürsu, Osmangazi, Nilüfer, Mudanya, and Karacabey, it flows north of Lake Uluabat, merges with the Susurluk River, and ultimately discharges into Marmara Sea near the Karacabey Strait. The Nilüfer Creek is, in fact, a sub-basin of the Susurluk River (BÜSİAD, 2025). It is not only of fundamental importance for the irrigation of the Bursa plain and the adjacent agricultural areas, but also serves as the main absorber for domestic and industrial wastewater. The Nilüfer Creek is one of the most important rivers in Bursa Province. Along its course, drinking water reservoirs, settlements, agricultural lands, and industrial areas are located.



Figure 4.2 Nilüfer Creek (BÜSİAD, 2025)

Historically, the Nilüfer Creek has played a significant role in shaping Bursa's settlement

patterns both before and after the Ottoman period, functioning as a strategic natural element in the city's spatial development. In addition to supplying water to the urban population, the creek supported the productivity of surrounding agricultural lands, thereby contributing to the region's agrarian economy. Throughout history, it also served as a natural boundary and a transportation route for local communities. From an agricultural perspective, the Nilüfer Creek remains one of the primary water sources used for irrigating farmlands in Bursa, enabling the regular production of vegetables, fruits, and other crops, while the fertile soils along its banks continue to enhance the region's agricultural capacity and local economy. Ecologically, the creek plays a vital role in sustaining urban biodiversity by providing natural habitats for fish and aquatic plant species, and by supporting green areas and wetlands that contribute to the regulation of the city's climate and hydrological cycle. Furthermore, the Nilüfer Creek holds a critical position in urban planning and flood management, as infrastructure developments and regulatory measures along its course are essential for mitigating flood risks, ensuring urban safety, and sustaining infrastructure resilience through the effective control of water levels and the reduction of environmental risks (BUSIAD, 2025; Bursa Büyükşehir Belediyesi, 2025).

The region is the location to all industrial sectors, with the primary industries being mining, metals, textiles, chemicals, machinery, and food. While the creek influences these areas, it is also affected by them. As it flows through these zones, the Nilüfer Creek is exposed to multiple pressures. Industries discharge their waste into the environment which most of the case, it is not properly treated. Wastewater from the Bursa Industrial Zone is therefore discharged into the Nilüfer Creek by the Ayvalı Stream (Marmara Belediyeler Birliği, 2021). According to the Türkiye Environmental Problems and Priorities Report which is prepared by Environmental Impact Assessment, Permit and Audit General Directorate, the water quality of the Nilüfer Creek is classified in the category 4, which is the lowest quality (CSB, 2023). Especially during the last decades, the Nilüfer Creek has been heavily polluted due to uncontrolled industrialization and the rapid urbanization of the city of Bursa. The reduced water flow from the tributaries, especially in summer, leads to a preponderance of wastewater that poses a serious health risk (Dorak, 2015). Since there are several industrial zones that discharge to the Nilüfer Creek and municipal wastewater discharges after treatment, high amount of organic matter and other kind of pollution loads directly mix with Marmara Sea (Asik, 2023).

The onset of pollution in Nilüfer Creek can be traced back to the 1980s, a period that also marked the beginning of intensive industrial development in Bursa. In the study conducted by Karaer (2006), it was observed that pollution in Nilüfer Creek became evident from the late 1990s, reflecting the cumulative impacts of industrial and urban development that had intensified since the 1980s in Bursa. During the 2010s, research increasingly emphasized the multi-source nature of pollution in the creek.

Dorak et al. (2019) showed that in addition to industrial and domestic discharges, agricultural activities and irrigation practices contributed to declining water quality, transforming Nilüfer Creek into a risk factor for both environmental and human health. Similar conclusions were drawn from water quality index–based assessments, which consistently classified large sections of the creek as failing to achieve good ecological and chemical status under the principles of the Water Framework Directive (Aşık et al., 2023). Environmental Impact Assessment (EIA) reports prepared for industrial facilities, organized industrial zones, and wastewater infrastructure projects in Bursa have also identified Nilüfer Creek as a receiving environment under continuous pollution pressure. Several EIA documents explicitly acknowledge existing water quality problems in Nilüfer Creek and evaluate project-related discharges in the context of an already degraded aquatic system (Republic of Türkiye, Ministry of Environment and Urbanization, 2013; 2016; 2019).

In addition to academic studies and official environmental reports, media coverage has also documented the long-standing pollution of Nilüfer Creek. National and local news reports published over the years have repeatedly described visible water quality degradation, including the visual observation of color change and strong odors, particularly along urban and industrial sections of the creek in Bursa (Cumhuriyet, 2015; Hürriyet, 2018; Bursa Hakimiyet, 2020). Taken as a whole, these studies reveal that pollution in Nilüfer Creek has emerged through decades of cumulative organic, chemical, and nutrient inputs, reflecting a structurally entrenched and continuously neglected environmental problem.

An assessment of the Susurluk basin reveals severe degradation. Large stretches of Nilüfer Creek and its tributaries exhibit moderate to poor ecological conditions. The chemical status is even more critical, with much of the system failing to meet regulatory standards due to high concentrations of heavy metals, nutrients, and organic pollutants (Su Yönetimi Genel Müdürlüğü [SYGM], 2023). Ultimately, the data confirms that Nilüfer Creek functions less as a natural river and more as a conduit for industrial and municipal waste flowing toward the Marmara Sea.



Figure 4.3 Satellite imagery of the confluence between Nilüfer and Çapraz Creeks (Google Maps)

Satellite imagery (Figure 4.3) of the confluence between Nilüfer Creek and Çapraz Creek illustrates the direct interaction of polluted waters with agricultural fields. Farmers in the region frequently note the double burden: while they rely on the creek for irrigation, its contamination leads to reduced crop yields, soil degradation, and even health hazards (Cumhuriyet, 2021; Demir, 2021). Several interviewees admitted that untreated wastewater is used for irrigation during periods of scarcity, turning necessity into further ecological harm.

Despite growing awareness, governance responses have been largely symptomatic. Inspections and fines are imposed intermittently (Bursa Büyükşehir Belediyesi, 2025), but major polluters are rarely named publicly, and penalties fail to act as deterrents. Public authorities have announced multiple action plans linking Nilüfer Creek pollution to broader Marmara Sea crises such as mucilage (Çevre ve Şehircilik Bakanlığı, 2021), yet implementation remains fragmented. The repeated recurrence of mucilage in Marmara since 2021 underscores the inadequacy of these measures (Al Jazeera, 2021; The Guardian, 2025).

Civil society organizations and NGOs have consistently highlighted the injustice of turning Nilüfer Creek into a “wastewater channel.” Movements like the Bursa Water Collective emphasize that ecological well-being should not be sacrificed to industrial growth (Gazete Duvar, 2024). NGOs demand transparency—calling for real-time disclosure of pollution data, stricter sanctions against non-compliant industries, and inclusive governance mechanisms. Protests, petitions, and awareness

campaigns have kept the issue in the public eye (Arslanoğlu & Gün, 2025), but activists also underline the difficulty of sustaining momentum in the face of political and economic resistance.

The consistency of media coverage further illustrates a troubling reality: while headlines about fish kills, blackened waters, or carcinogenic pollution appear across years, the content of these reports rarely changes. The persistence of similar narratives over time reflects the structural stagnation in addressing the root causes of pollution. In other words, Nilüfer Creek has become emblematic of a chronic governance failure where ecological degradation continues despite visibility, scientific warnings, and community mobilization.



Figure 4.4 Nilüfer Creek in summer 2025 (Photo by the author)

5. RESULTS

This section outlines the results derived from institutional and document analysis, interviews, and stakeholder mapping, providing a multi-dimensional perspective on the case. To understand the power balance and institutional dynamics, it is essential to examine the existing laws, regulations, and directives, as well as their implementation flows, particularly about how state-affiliated institutions interact, distribute responsibilities, and negotiate conflicts.

5.1. Institutional Analysis

As part of the institutional analysis, I systematically reviewed a wide range of materials related to the Marmara Sea, the mucilage crisis, the Susurluk Basin, and specifically Nilüfer Creek. This included research articles, technical reports, and policy papers. In addition, I examined the existing legal framework, parliamentary questions submitted to the Grand National Assembly of Türkiye, and meeting reports of the Union of Marmara Municipalities, with particular emphasis on decisions adopted in the aftermath of the mucilage crisis. I also analyzed expert interviews, press statements, media coverage, podcasts, and other relevant publications, to capture both institutional perspectives and public discourse on the issue.

For legal framework, there is one main regulation, and the others are generally either an update on the regulation or a special plan or project which is prepared and announced after a serious environmental disaster or plan. Environmental Impact Assessment (EIA) reports are generally prepared on a project- or city-specific basis, rather than as comprehensive national or regional assessments. This means that EIAs tend to focus on the impacts of individual investments or urban-scale developments, while overarching, basin-wide or ecosystem-based reports are rarely produced.

According to the Water Quality Control Regulation, all tables and parameters are specialized for the industries, and there are general tables and parameters for deep-sea discharge and sea discharge, not specialized for the water body itself. After the mucilage outbreak, the Ministry of Environment announced a change in discharge standards, tightening the permissible Chemical Oxygen Demand (COD) values by 20% for municipal wastewater and introducing sector-specific standards for industrial wastewater, with restrictions up to approximately 50%. However, these changes did not include new limits for nitrogen (TN) and phosphorus (TP), which are key drivers of eutrophication and directly linked to mucilage formation. “Water Quality Standards for Sea Water” is given in the table below which is retrieved from Water Quality Control Regulation, for the second table it is the

“Characteristics of Domestic/Municipal Wastewaters Eligible for Deep-Sea Discharge” (Su Kirliliği Kontrolü Yönetmeliği [SKKY], 2004).

Table 5.1. Water Quality Standards for Seas (Su Kirliliği Kontrolü Yönetmeliği [SKKY], 2004)

Parameter	Criterion	Remarks
pH	6.0–9.0	–
Color and Turbidity	Natural	Must not reduce photosynthetic activity necessary for aquatic life by more than 90% of its normal value at the measurement depth.
Floating Substances	–	No floating oil, tar, or similar liquids, and no solid wastes such as garbage shall be present.
Total Suspended Solids (mg/L)	30	–
Dissolved Oxygen (mg/L)	>90% saturation	Dissolved oxygen values shall be monitored throughout the water column.
Biodegradable Organic Pollutants	–	After dilution, they shall not reduce dissolved oxygen below the prescribed level.
Crude Oil and Petroleum Derivatives (mg/L)	0.003	Should be assessed separately in water, biota, and sediment, and preferably not present at all.
Total Phenols (mg/L)	0.001	–
Various Heavy Metals	–	–
Copper (mg/L)	0.01	–
Cadmium (mg/L)	0.01	–
Chromium (mg/L)	0.1	–
Lead (mg/L)	0.1	–
Nickel (mg/L)	0.1	–
Zinc (mg/L)	0.1	–
Mercury (mg/L)	0.004	–
Arsenic (mg/L)	0.1	–
Ammonia (mg/L)	0.02	–

Table 5.2. Characteristics of Domestic/Municipal Wastewaters Eligible for Deep-Sea Discharge
(Su Kirliliği Kontrolü Yönetmeliği [SKKY], 2004)

Parameter	Limit	Explanation
pH	6–9	–
Temperature	35 °C	–
Total Suspended Solids (mg/L)	150	–
Oil and Grease (mg/L)	15	–
Chemical Oxygen Demand, COD (mg/L)	300	–
Surfactants (mg/L) MBAS	10	–
Floating Materials	–	No visible solids or floating matter shall be present, except within a strip above the diffuser outlet whose total width is equal to the depth of the seawater at that point.
Microbiological Parameters	–	In bathing water areas, microbiological parameters at the boundary of the coastal protection zone shall comply with the limits set in the Regulation on the Management of Bathing Water Quality (Official Gazette No. 30899, 25 September 2019).

The tables show the water quality parameters for seas and for the discharge limits of wastewater to the water bodies. Most of these parameters are crucial for the ecosystem such as pH and Temperature since all biological activities are required to be in a certain temperature and pH, which in our case also shows when the sea temperature rises, the biological activity of microorganisms increases. Also, for the pH, all living organisms must live in an environment with a stable acidity. Additionally, water turbidity plays a crucial role in sectors such as shipping and cargo transport, since high turbidity can compromise the accuracy of underwater detection and mapping systems, thereby increasing the risk of accidents. Not just shipping and transport activities, it is also important for recreational activities and public transport, and it is related to the sunlight penetration which again causes environmental degradation. Colloidal particles, floating materials and suspended solids are resulting in the turbidity of water, and these particles are related with the contamination of water also affecting the dissolved oxygen levels by covering the surface of the water. Dissolved oxygen levels are the most critical parameter for the sea ecosystem since it is vital for fish and other organisms. If the dissolved oxygen level drops, then the anaerobic bacteria and microorganisms start reproducing rapidly, which creates an unwanted odor. Next, biodegradable organic pollutants are causing dead zones in the water bodies since the biodegradation process requires large amounts of oxygen. Oils and phenols cover the surface of the water and are mostly toxic for aquatic life. Heavy metals are very significant due to the accumulation since these metals are not biologically degradable and toxic or carcinogenic for people. Chemical Oxygen Demand (COD) is a common parameter which is used

to identify the pollution level of organic/inorganic pollutants since high COD causes dead zones because of reduced levels of dissolved oxygen. Lastly, microbiological parameters are crucial to identifying the pathogens in the sea.

These parameters vary depending on the type of wastewater—whether it originates from industrial discharges, domestic sources, or agricultural activities. Each type of wastewater should be treated according to its specific characteristics. While it is crucial to apply treatment tailored to the wastewater itself, it is equally important to assess the water quality standards and ecological requirements of both the discharge point and the receiving water body.

There are multiple regulations related to the wastewater treatment and water quality control parameters to protect the habitat, one of which is Regulation on the Control of Water Pollution in Türkiye that is published in 1988. Although the Regulation on the Control of Water Pollution in Türkiye has been revised several times, the discharge standards still allow higher limits compared to European practices. In the EU, stricter thresholds are set for waters at risk of eutrophication, with specific standards for total nitrogen (TN), total phosphorus (TP), and even factors such as water temperature increase — all of which are directly linked to the formation of marine mucilage.

The other related laws are the Environmental law, Environmental Impact Assessment (EIA) Regulation, Regulation on Water Intended for Human Consumption, on Groundwater. For seas and coastal waters, there are several laws for marine accidents and the protection of coastal waters. Additionally, basin protection action plans, wetland protection regulations are also crucial for the water protection in Türkiye.

Table 5.3. International Agreements to which Türkiye is a Party (Yüksek, 2013)

Agreement / Convention	Relevance for Marmara Sea Mucilage & Nilüfer Creek Pollution
EC Habitats Directive (HD)	Protects habitats and species; relevant as habitat degradation in the Marmara region is intensified by eutrophication and pollution (European Commission, 1992).
EC Birds Directive	Safeguards migratory bird populations; important for wetlands like Uluabat, impacted by Nilüfer Creek pollution (European Commission, 2009).
EU Biodiversity Strategy	Provides framework for halting biodiversity loss; mucilage and eutrophication threaten biodiversity in the Marmara (European Commission, 2011).
EU Water Framework Directive (WFD)	Establishes water quality standards and river basin management; directly relevant for Nilüfer Creek within Susurluk Basin (European Parliament & Council, 2000).
Common Fisheries Policy (CFP)	Ensures sustainable fisheries; essential since mucilage and pollution reduce fish stocks in the Marmara (European Commission, 2013).
Bern Convention	Protects European wildlife and habitats; relevant for ecosystems under threat from pollution-driven collapse (Council of Europe, 1979).
Bonn Convention (CMS) incl. ASCOBANS, ACCOBAMS, AEWA	Conserves migratory species such as cetaceans and waterbirds impacted by marine pollution and habitat loss (UNEP/CMS, 1979; UNEP/ASCOBANS, 1992; UNEP/ACCOBAMS, 1996; UNEP/AEWA, 1995).
Barcelona Convention (BARCOM)	Regional Mediterranean agreement on pollution; relevant since Marmara is connected to the Mediterranean via the Straits (UNEP/MAP, 1976).
Bucharest Convention	Protects the Black Sea against pollution; important as Marmara–Black Sea nutrient flows affect both basins (Black Sea Commission, 1992).
Ramsar Convention	Protects wetlands; directly relevant for Uluabat Lake and Susurluk Basin wetlands polluted by Nilüfer Creek (Ramsar Convention Secretariat, 1971).
Convention on Biological Diversity (CBD)	Global framework for biodiversity conservation; mucilage, eutrophication, and industrial discharges threaten local biodiversity (United Nations, 1992).

All these international agreements are related to protect the ecosystem and play a crucial role in addressing the environmental challenges in Türkiye. As an example, although Türkiye agreed to be part of Ramsar Convention in 1993, most of the watersheds are suffering from pollution, one of which is Uluabat Lake, a lake that is selected as a protection zone for Ramsar Convention, is directly related with Nilüfer Creek. Most of the agreements and participation requires reporting on a regular basis, but process on the action plans and targets are not clear. In 2021, following the large-scale mucilage crisis, the entire Marmara Sea was declared a *Special Environmental Protection Area (SEPA)* by Presidential Decree. This designation placed the Marmara Sea under the authority of the Ministry of Environment, Urbanization and Climate Change, with the aim of strengthening conservation measures, preventing further pollution, and coordinating restoration efforts.

Although regulations and international agreements have aimed to address pollution, the actions taken have remained insufficient, and planned projects have often not been implemented, leading to an increase in pollution year by year. Both the pollution of the Nilüfer Creek and the pollution loads in the Marmara Sea have been the subject of ongoing studies for many years, with parliamentary inquiries being submitted and a growing body of academic research addressing these issues.

5.2. Stakeholder mapping

When an environmental disaster occurs, even though natural factors may play a role, there are always actors who contribute to its occurrence as well as groups who suffer from its consequences. The extent of the socio-economic and environmental damage varies across different stakeholders: some are directly responsible, others recognize the problem but lack the resources to act, while some actively work toward solutions and the prevention of future incidents. In this study, stakeholder identification was carried out by considering the mucilage outbreak in relation to the broader pollution of the Marmara Sea, as well as the Nilüfer Creek, which is regarded as one of its major pollution sources. Accordingly, groups with either direct or indirect relevance to these issues were categorized. In total, twelve stakeholder groups were identified, as shown in table 5.4.

Table 5.4. Stakeholder groups relevant to the study

No	Stakeholder	Importance / Relevance
1	Governmental Organizations	Policymakers and Decision-Making Processes
2	Organized Industrial Zones	Pollution Sources
3	Industries	Pollution Sources
4	Tourists	Affected by pollution
5	General Public	Source of pollution/ Affected by pollution
6	Fishers	Source of pollution/ Affected by pollution
7	Journalists	Reflecting the pollution, solutions, decisions, thoughts
8	NGO's	Reflecting the pollution, thoughts
9	Local Residents	Source of pollution/ Affected by pollution
10	Academics	Scientific perspectives, causes and solutions of pollution
11	Experts	Scientific perspectives, causes and solutions of pollution
12	International Funding Bodies	Policymakers and Decision-Making Processes, global agreements and investments

Following the identification of relevant stakeholders, I mapped them on a power/interest matrix as shown in Figure 5.1. This power interest analysis is essentially shaped through the interviews I conducted, the news articles and academic papers I reviewed, and the podcasts I listened to. The analysis helps to understand how the pollution of a single water body actually fits into a much broader framework, to understand with whom and in what ways its causes and impacts are related, and to analyze the power dynamics among these actors.

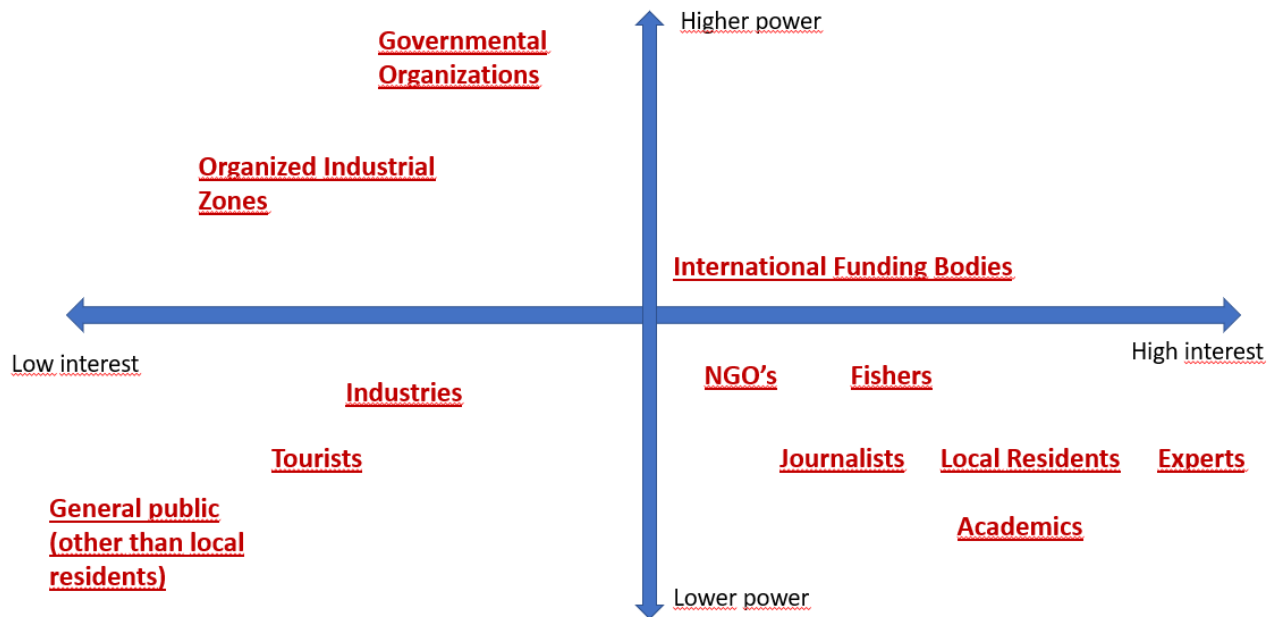


Figure 5.1. Power / interest matrix of stakeholders

The first group consists of governmental organizations. While they hold the greatest authority—controlling legislative, executive, and judicial functions—their level of engagement with the issue often remains limited compared to other stakeholders. This is largely due to the fact that receiving environments are overlooked, and although continuous studies and reports are produced, experts on the subject are not adequately involved in the process. Governmental bodies tend to address only the visible part of the problem, aiming to mitigate negative public perceptions, but in doing so they often allow the underlying issue to worsen. This dynamic reveals how deeply rooted yet largely ignored environmental disasters—such as the long-standing pollution of the Nilüfer Creek—have become chronic in Türkiye.

The second group can be identified as Organized Industrial Zones (OIZs). Given that industry and economic issues have become highly influential at the national scale, OIZs hold a powerful position. However, there is a lack of detailed reporting on the additional costs, inspections of wastewater treatment facilities, the operation of these plants, and the final discharge points of treated

effluents. For example, Bursa alone has 15 industrial zones discharging wastewater into the Marmara Sea. Moreover, the emergency action plan prepared for the Marmara Sea does not contain sufficient detailed strategies or information specifically addressing OIZs, which demonstrates a significant governance gap.

The third group consists of industries. These are not limited to those within the Organized Industrial Zones; rather, numerous other industries are also located around the Marmara Sea. Facilities operate across multiple sectors, such as dairy and livestock, leather, textiles, as well as electronics and household appliances, which demonstrates the complexity of the actual wastewater loads. In many cases, the high operational costs and the issuance of compliance reports push industrial facilities to enter into formal agreements; however, these agreements rarely lead to any meaningful change in practice.

Tourists are generally categorized as a low-power and low-interest group, since they are only temporarily connected to the Marmara Sea and not directly involved in governance processes. However, in the event of a persistent mucilage problem or the development of an anoxic environment, the resulting odor, visual pollution, and overall decline in environmental quality could severely undermine the attractiveness of the region. This would not only affect the tourism sector but also have wider impacts on the national economy and Türkiye's image in the international media. For this reason, while tourists remain a marginal actor in terms of direct influence, their potential indirect impact highlights the broader socio-economic stakes of the pollution problem.

The general public can be considered the least interested group, since for those who do not live in Istanbul or the nearby provinces, issues such as mucilage in the Marmara Sea or the pollution of a local creek like the Nilüfer are unlikely to align with high interest or high power. For this reason, the general public is placed at the lower end of the stakeholder mapping.

Fishers are classified as a moderate-to-high interest group, since their livelihoods are directly affected by the ecological state of the Marmara Sea and by events such as mucilage that reduce fish stocks. However, their engagement tends to focus on immediate economic concerns rather than long-term environmental governance, and their power to influence decision-making remains limited.

Journalists are an important stakeholder group because of their ability to shape public opinion and draw attention to environmental problems such as the mucilage outbreak. By selecting which issues are covered and whose voices are amplified, they play a mediating role between experts, policymakers, and the wider public. However, media coverage in Türkiye has been largely repetitive,

often focusing on the same experts or academics, while those with the actual authority to address the root causes of pollution are rarely interviewed. As a result, the media tends to highlight scientific perspectives but fails to generate accountability from the responsible institutions. Environmental issues also receive considerably less coverage compared to politics or the economy, which diminishes the visibility of ecological crises. This not only limits the potential of journalism to act as a driver of environmental governance, but also contributes to a decline in public trust in the media, as it is perceived as failing to address the underlying sources of the problem.

In Türkiye, NGOs generally lack significant power in shaping environmental governance, despite their role in raising awareness and mobilizing public opinion. One of the main reasons is the highly centralized political structure, where decision-making authority is concentrated in governmental institutions, leaving limited space for civil society participation. Additionally, NGOs often face financial constraints, as they rely heavily on project-based international funding rather than sustainable domestic support, which reduces their independence and long-term influence. Legal and political pressures, including restrictive legislation on associations and foundations, further limit their capacity to act freely and critically. In the environmental field specifically, NGOs are sometimes portrayed as oppositional or politically motivated, which weakens their legitimacy in the eyes of both policymakers and parts of the public. As a result, while NGOs play an important role in voicing environmental concerns and advocating for justice, their structural limitations prevent them from exercising substantial power in the governance of issues such as the pollution of the Nilüfer Creek or the broader ecological crisis in the Marmara Sea.

Local residents are considered a low-power group, with even less influence than NGOs, although they are both directly affected by and, at times, contributors to pollution. Around Nilüfer Creek, many residents rely on agriculture and face water scarcity, while farming practices and inadequate waste management can also exacerbate the creek's pollution. In the wider Marmara region, those affected by mucilage include swimmers, artists, and people who use the sea mainly for recreational purposes. Although these groups experience the ecological and social consequences of pollution, their capacity to shape governance processes or demand accountability remains highly limited.

Experts generally hold higher interest and relatively greater power compared to academics, as they are often directly involved in applied research projects, technical assessments, or advisory roles related to the pollution of the Marmara Sea and its tributaries. Their expertise makes them more visible in policy processes and media debates, and in some cases, they can influence immediate responses during environmental crises. Academics, on the other hand, typically operate within

universities and research institutions, producing long-term scientific knowledge but with limited direct leverage. Their recommendations are rarely consulted by governmental organizations, their proposed solutions often go unheeded, and funding constraints may hinder the continuation of their studies. As a result, while both groups contribute essential knowledge, experts are positioned with slightly higher influence, whereas academics remain in a weaker position despite their strong interest in the issue.

International funding bodies stand out as high-power and high-interest actors because environmental disasters in Türkiye, such as the pollution of the Nilüfer Creek and the mucilage crisis in the Marmara Sea, are not only ecological issues but also matters of international concern. These institutions link financial support and investment flows to compliance with global environmental standards, functioning both as potential funders of preventive measures and as enforcers through conditionality and sanctions when standards are not met. In this sense, environmental governance failures in Türkiye are closely tied to its attractiveness for sustainable investment: unresolved crises undermine investor confidence, while progress in environmental justice, transparency, and rule of law facilitates access to green finance and foreign capital. The Marmara Sea, in particular, amplifies this dynamic, as it is surrounded by industrial hubs, ports, and metropolitan centers that generate significant economic value. Any deterioration in its ecological status therefore carries direct implications not only for biodiversity but also for regional trade, tourism, and the broader investment climate, making international funding bodies indispensable stakeholders in both preventive and restorative governance.

Within the stakeholder mapping, it was relatively easy to gather information about those with high interest, while accessing others proved to be far more challenging. For instance, industries discharging into the Nilüfer Creek, as well as ministries or municipalities, were difficult to reach in terms of obtaining documents and official records. Moreover, policy plans often framed the issue as a natural phenomenon, while actions addressing improvements at the actual sources of pollution were delayed. Monitoring systems remain inadequate, and although inspections have recently increased, these efforts are heavily influenced by political considerations. At the same time, good practice examples are rarely observed, and the general public remains largely uninformed about the issue. The accessibility, coverage, and framing of media sources that could otherwise raise public awareness are also highly limited.

5.3. Interviews and document analysis

For this part of my research, I conducted semi-structured interviews and combined them with a document analysis in order to understand how different stakeholders perceive and frame the issues of pollution in the Nilüfer Creek and the wider Marmara Sea, especially in relation to the mucilage crisis. I designed the interviews to capture both expert knowledge and lived experiences, and I also tried to reach as many groups as possible. In total, I carried out 15 interviews between October 2024 and August 2025 with stakeholders including academics, experts, journalists, NGOs, governmental representatives, local residents, farmers, and members of the general public. Since most of the people I spoke with had knowledge primarily about one of the two cases, I separated the interviews into two categories: those related to the Nilüfer Creek and those related to the Marmara Sea and mucilage. Although I initially planned to conduct more interviews, I faced several limitations during this process. I could not reach most governmental bodies despite sending emails, calling several times, and even visiting municipalities in person. For industries, it was impossible to find a contact, as there is no publicly available information about which companies discharge into the Marmara Sea or the Nilüfer Creek.

Alongside the interviews, I also conducted a document analysis, which consisted of stakeholder statements produced between 2012 and 2025. These were not only written texts but also included different media formats such as newspaper articles, podcasts, videos, and recorded interviews. I focused specifically on sources where stakeholders themselves were quoted, so that I could compare these accounts with the interview data. These materials provided important insights into how stakeholders publicly framed the problems of the Nilüfer Creek and the Marmara Sea, and how these framings shifted over time—from parliamentary records and media coverage in the early 2010s, to the intense debates during the 2021 mucilage crisis, and finally to more recent discussions in 2024–2025. Other institutional documents such as legal frameworks, governmental reports, or policy strategies are not included here, as they were analyzed separately in the institutional analysis section. Table 5.5 below shows the stakeholder I interviewed, dates of the interviews and the topic that we discussed during the interview; and table 5.6 shows the list of stakeholders identified in the document analysis stage, whose statements are used in the content analysis.

Table 5.5 Interviews with Stakeholders

ID No	Stakeholder	Interview Date	Topic
I-1	Journalists	5.10.2024	Nilüfer Creek
I-2	Journalists	5.10.2024	Nilüfer Creek
I-3	Academics	25.07.2025	Nilüfer Creek
I-4	General Public	20.06.2025	Marmara Sea and Mucilage
I-5	General Public	16.04.2025	Marmara Sea and Mucilage
I-6	Experts	20.07.2025	Marmara Sea and Mucilage
I-7	Academics	25.07.2025	Nilüfer Creek
I-8	Journalists	5.10.2024	Nilüfer Creek
I-9	Local Residents	25.07.2025	Nilüfer Creek
I-10	Local Residents	25.07.2025	Nilüfer Creek
I-11	Governmental Bodies	25.07.2025	Marmara Sea and Mucilage
I-12	Local Residents	25.07.2025	Nilüfer Creek
I-13	Local Residents	25.07.2025	Nilüfer Creek
I-14	NGO's	5.10.2024	Nilüfer Creek
I-15	NGO's	18.08.2025	Nilüfer Creek

Table 5.6 Document Analysis of Stakeholders

ID No	Stakeholder	Topic
D-1	Political parties	Nilüfer Creek
D-2	Experts	Marmara Sea and Mucilage
D-3	Journalists	Marmara Sea and Mucilage
D-4	Resident	Marmara Sea and Mucilage
D-5	Resident	Marmara Sea and Mucilage
D-6	Resident	Marmara Sea and Mucilage
D-7	NGOs	Nilüfer Creek
D-8	Governmental Bodies	Marmara Sea and Mucilage
D-9	Academics	Marmara Sea and Mucilage
D-10	Farmer	Nilüfer Creek
D-11	Public Figure	Marmara Sea and Mucilage
D-12	Academics	Marmara Sea and Mucilage
D-13	Academics	Nilüfer Creek
D-14	NGOs	Nilüfer Creek
D-15	Resident	Nilüfer Creek
D-16	Resident	Nilüfer Creek
D-17	Fisher	Marmara Sea and Mucilage

ID No	Stakeholder	Topic
D-18	Fisher	Marmara Sea and Mucilage
D-19	Fisher	Marmara Sea and Mucilage
D-20	Governmental Bodies	Marmara Sea and Mucilage
D-21	Governmental Bodies	Nilüfer Creek
D-22	Academics	Marmara Sea and Mucilage
D-23	NGO'S	Marmara Sea and Mucilage
D-24	NGO'S	Marmara Sea and Mucilage
D-25	Experts	Marmara Sea and Mucilage
D-26	Public Figure	Marmara Sea and Mucilage
D-27	Resident	Nilüfer Creek
D-28	Resident	Nilüfer Creek
D-29	Experts	Marmara Sea and Mucilage
D-30	Academics	Marmara Sea and Mucilage
D-31	Resident	Marmara Sea and Mucilage
D-32	Resident	Marmara Sea and Mucilage
D-33	Academics	Marmara Sea and Mucilage
D-34	Fisher	Marmara Sea and Mucilage
D-35	Fisher	Marmara Sea and Mucilage
D-36	Governmental Bodies	Nilüfer Creek
D-37	NGOs	Nilüfer Creek

Based on the interviews and documents, I identified three main findings. The first is related to how different stakeholders perceive and frame the problem. Academics tend to emphasize systemic failures, while state institutions are more outcome-oriented, focusing on eliminating pollution through symptomatic measures. Depending on how they frame the problem, they also see the solutions differently: some point to the need for structural reforms and systemic change, whereas others focus on short-term technical interventions. In other perspective, I reviewed the interviews and documents that also in the environmental justice perspective where I divided environmental justice in two groups which are distributive and procedural justice. The next three subsections will discuss these findings in more detail.

5.3.1. Problem Perception

Since without understanding the root cause of mucilage, any intervention would remain superficial, and the issue will continue to escalate over time, accurate identification of the problem is perhaps more critical than proposing solutions. As such, several stakeholders frequently state different causes for the mucilage formation in Marmara Sea and pollution in the Nilüfer Creek. Although not all the statements specifically consist of such problem statements, nearly one third of the statements blame industries for the pollution. One reason for this is that industrial facilities use

Nilüfer Creek both as process and cooling water, and as the receiving environment for the discharge of wastewater.

On the other hand, unregistered industrial facilities, the insufficient monitoring and inspection of these facilities, and the continuously increasing number of industries and organized industrial zones are also frequently mentioned in the statements. Some of the stakeholders mentioned illegal wastewater and waste accumulations which cause serious pollution.

The fieldwork revealed that perceptions about the problems in the Nilüfer Creek and Marmara Sea problems vary significantly across stakeholder groups, but a shared understanding is that both the Sea and the Creek have been under heavy anthropogenic pressure for decades. Interviewees often stressed that unless the root causes are addressed, problems will keep recurring despite temporary solutions.

Academics and experts repeatedly emphasized systemic failures, ranging from insufficient wastewater treatment infrastructure and weak enforcement of environmental legislation to the lack of basin-wide management and fragmented institutional responsibilities (St-28, St-29, St-42, St-43, St-54, St-61; St-79, St-85, St-102). Although the Nilüfer Creek is clean at its source, it rapidly deteriorates as it flows through agricultural lands and 17 organized industrial zones before discharging into the Marmara Sea in a highly polluted state (St-34). Scholars pointed to treatment plants that often underperform due to costs and described the Marmara as “critical, unsustainable, and degraded,” with oxygen levels declining since the 1980s (St-32, St-97). They also underlined that despite producing evidence and submitting monitoring projects, their recommendations are rarely taken into account by policymakers (St-9, St-112).

Local residents and farmers articulated the problem through their everyday experiences: foul odors, unusable water, health risks, agricultural losses, and even conflicts among villagers over scarce water resources (St-30, St-130). Some admitted to irrigating with polluted water or even using industrial effluents as fertilizer substitutes (St-122, St-134, St-136), which places them in a paradoxical position of being both victims and inadvertent contributors to pollution. Residents often referred to the creek as no longer being a water source but “chemical waste” (St-118, St-121), while also expressing frustration with broken political promises and the absence of meaningful interventions (St-131, St-132).

NGOs framed the problem as one of environmental justice. They described Nilüfer Creek as a “chemical canal,” pointing to unchecked industrial discharges and the state’s prioritization of industrial growth over ecological well-being (St-70, St-84). They also criticized symbolic solutions such as deep-sea discharge, which they described as “sweeping pollution under the carpet” (St-50). In their view, the lack of transparency, insufficient stakeholder cooperation, and the non-implementation of the Marmara Action Plan have further entrenched the crisis (St-48, St-52, St-69).

Journalists, on the other hand, highlighted the selective visibility of the issue. They stressed that mainstream media tend to report on pollution only when it becomes visually dramatic, such as during the 2021 mucilage outbreak (St-14, St-141). Independent journalists emphasized industrial discharges and enforcement failures (St-72, St-75, St-77), whereas pro-government outlets often depoliticized the issue, presenting it instead as a natural or climate-related phenomenon (St-14). Journalists also noted difficulties in obtaining reliable data from state institutions (St-144). This contributes to a surface-level framing of the problem. As one expert warned, “the real problem is the invisible part... it’s like an iceberg” (St-63, St-55). Yet governmental actors reinforced the perception of a primarily aesthetic problem by showcasing surface cleaning campaigns and announcing the tons of mucilage collected (St-24, St-27, St-49, St-124, St-127).

Governmental bodies predominantly adopted an outcome-oriented perception. They acknowledged the presence of pollution but framed their interventions in terms of managing symptoms, such as mucilage collection or imposing temporary fines (St-1, St-26, St-75). Officials frequently attributed the mucilage phenomenon to climate change and warming seas (St-24), thereby diverting attention away from governance failures. Parliamentary questions raised by opposition deputies pointed to the lack of transparency and the inadequacy of current enforcement mechanisms (St-1).

Fishers, recreational users, and artists described the crisis in terms of lived experience and cultural loss. Fishers reported broken equipment, declining stocks, and the near impossibility of sustaining their livelihoods: “Mucilage is destroying fisheries” (St-40). Some called directly for stricter inspections of industrial discharges (St-41). Divers and swimmers described formerly vibrant ecosystems now turned into “dead seas” (St-17, St-18, St-19, St-31). For many, the Marmara is no longer only an ecological crisis but also a cultural and existential one: “I want to be at sea, but the sea is dying. I’m afraid it’s too late” (St-55).

Finally, the general public expressed a mix of anger, fear, and hopelessness. For many, mucilage represented undeniable proof of human-induced destruction: “Marmara Sea’s current state is the outcome of what humans did... nature does not deserve this” (St-87). Residents frequently described disgust and health risks—itchy skin after swimming, foul odors overwhelming villages, and imagery of the sea “vomiting” pollution (St-17, St-18, St-37, St-57, St- 64).

Overall, these accounts show fragmented perceptions of the problem. While scientists, NGOs, and independent journalists underscore systemic governance failures, public discourse and governmental framing often reduce the issue to a visible surface phenomenon. This discrepancy perpetuates a cycle in which immediate symptoms are addressed but deeper structural causes remain unresolved.

5.3.2. Solution alternatives

Academics and experts highlight solution alternatives grounded in scientific and technical reforms. They underline the necessity of upgrading all wastewater treatment plants to advanced biological systems, reducing nitrogen and phosphorus loads, and introducing continuous monitoring mechanisms (St-28, St-29, St-32, St-35). They also recommend establishing basin-scale governance frameworks that integrate scientific knowledge into decision-making and empower universities and research institutes as institutional actors.

NGOs put forward solution alternatives that emphasize justice, accountability, and participation. They demand a complete end to deep-sea discharge practices, stricter sanctions on non-compliant industries, and the public disclosure of real-time pollution data (St-50, St-51, St-53). They also stress the need for ecological governance structures that prioritize long-term sustainability over industrial growth. Through activism, petitions, and public campaigns, NGOs propose mobilizing citizens to ensure stronger oversight and accountability (St-69, St-70).

Local residents and farmers focus on alternatives that directly affect their daily lives. They call for guaranteed access to clean irrigation water, consistent inspections of industrial facilities, and institutional support for agriculture (St-122, St-130, St-131, St-132, St-136). However, their reliance on polluted water highlights both their vulnerability and the difficulty of implementing effective alternatives without systemic reforms.

Governmental bodies present solution alternatives that often remain short-term and outcome oriented. These include surface mucilage collection, temporary inspections, increased fines, and limited capacity improvements in treatment facilities (St-22, St-24, St-26, St-42). They also refer to the Marmara Action Plan as a comprehensive framework, yet its partial and inconsistent implementation has led stakeholders to view it as insufficient and fragmented.

Journalists suggest alternatives tied to their watchdog role: amplifying scientific evidence, maintaining pressure on public authorities, and challenging dominant narratives that depoliticize the crisis (St-12–15, St-73, St-80). They argue that long-term solutions require not only enforcement and governance reforms but also cultural shifts toward recognizing the sea as a shared ecological common.

Fishers and recreational users demand stricter enforcement of existing laws, bans on illegal discharges, and restoration measures to revive marine biodiversity and protect livelihoods (St-41, St-105, St-108). They frame these not only as economic necessities but also as cultural imperatives, since the degradation of the Marmara undermines both their work and their way of life.

Overall, the solution alternatives reveal a clear divide between technical and political approaches. Academics stress scientific and infrastructural reforms, NGOs and activists push for political accountability and structural governance change, and governmental bodies favor visible but temporary measures. Despite these divergences, there is a common understanding that lasting change requires combining technical interventions with political reforms, as neither dimension alone can secure the long-term recovery of the Marmara Sea.

At the same time, many statements across different groups reflect a deep sense of hopelessness, as years of neglect have made the hidden dimensions of the problem increasingly visible. Stakeholders recognize that the unseen layers of pollution are as dangerous as the visible ones, and that addressing them requires a new form of collective responsibility. Calls for unity and joint action are repeated throughout the interviews, emphasizing that the problem can only be solved through a holistic approach. Such an approach must start with legal and institutional protection, grounded in enforceable laws and transparent governance. Building trust in these mechanisms, together with ensuring accountability and openness, is seen as the essential first step toward meaningful and lasting recovery.

5.3.3. Environmental Justice

Environmental justice is commonly analysed along multiple dimensions, two of the most prominent being distributive and procedural justice. Distributive justice concerns how environmental goods, burdens, and risks are allocated among different social groups and stakeholders. Procedural justice, on the other hand, focuses on the fairness of decision-making processes, including access to information, participation, and the roles that affected communities are able to play in shaping environmental outcomes. In this section, interviews and documents are analyzed with the perspective of environmental justice and these two dimensions.

5.3.3.1. Distributive Justice. A systematic analysis of interview material and documentary sources indicates that stakeholder statements related to distributive justice cluster around several recurring themes. These include competition over limited resources, ecological degradation associated with both chronic pollution and mucilage formation, economic impacts and income loss, public health concerns, the loss of recreational opportunities, threats to subsistence practices, and inequalities in access to clean and safe water. Taken together, these dimensions reveal that the socio-ecological consequences of environmental degradation (extending from Nilüfer Creek to the broader mucilage crisis in Marmara Sea) are unevenly distributed, with communities living in close proximity to polluted water bodies bearing a disproportionate share of the ecological, economic, and social burdens.

Across almost all stakeholder groups interviewed regarding the use of natural resources, a recurring and explicit concern related to environmental justice was the ecological impact of pollution. What most clearly distinguishes villagers living in close proximity to Nilüfer Creek from other segments of the population is not only their direct exposure to an ongoing environmental disaster, but also the sense of isolation they experience in bearing its consequences. Further interviews suggest that this prolonged exposure has led to a gradual normalization of injustice, whereby environmental degradation is increasingly perceived as an unavoidable part of everyday life rather than as a condition that can be contested or remedied.

Villagers frequently mentioned past visits by public authorities, during which promises were made that pollution would be eliminated and that the creek would eventually become safe for swimming again. However, despite these repeated assurances, interviews consistently converged on a shared conclusion: that no meaningful or lasting action has followed. This persistent gap between

official promises and lived realities has reinforced a strong sense of abandonment among local communities and deepened their distrust toward responsible institutions.

The economic impacts on fishermen and farmers are particularly severe. During periods of intense mucilage formation, fishermen are often unable to cast their nets, effectively bringing fishing activities to a standstill. Similarly, farmers who rely on Nilüfer Creek as a source of irrigation water face severe constraints, with limited or no access to usable water, pushing agricultural production to the brink of collapse. In this context, fundamental dimensions of distributive justice—such as access to natural resources and economic freedom—are significantly undermined. As one fisherman explained: *“We attempted to fish using specialized nets and spent a significant amount of money, but we failed, and currently no fishermen are able to operate”* (St. 66). This illustrates how mucilage not only disrupts fishing activities but also imposes direct financial losses, effectively depriving fishermen of their primary source of income and undermining their economic security.

One local resident (farmer) states that *“Agriculture is coming to an end because there is no water, no support, and the odor has become unbearable. Our children no longer want to live here.”* (St. 130). This statement illustrates how environmental degradation extends beyond immediate economic losses to reshape the social and spatial conditions of rural life. From an environmental justice perspective, the lack of access to water and institutional support constrains residents’ ability to sustain agricultural livelihoods and remain in place. Pollution thus functions not only as an ecological burden but also as a driver of spatial and social displacement, particularly affecting younger generations. Such dynamics point to a form of spatial and distributive injustice in which environmental harm accumulates in specific locations, undermining both present livelihoods and prospects.

Statements related to public health and recreational use demonstrate how pollution both in Nilüfer Creek and Marmara Sea has fundamentally altered everyday interactions with water and generated widespread health-related concerns. Residents and recreational users describe direct physical discomfort and growing anxiety associated with contact with the water, noting that activities such as swimming or surfing (once routine practices) are now avoided altogether. As one interviewee stated, *“I had seen it on the internet, but when I came to swim, I realized how bad it was. I tried to swim, but my legs started itching”* (St. 17). Similarly, others emphasized increasing uncertainty, explaining that *“we used to come here every week to surf, but now we are worried and do not know whether it will harm us or not”* (St. 18). Intense odors, reduced water flow, and visible pollution further render the creek unsuitable for recreational use and everyday contact.

Beyond recreational use, several statements point to acute public health risks linked to the everyday use of polluted water. One local resident described how, after the local reservoir ran dry, irrigation was carried out using water from the creek on a one-time basis, noting that “*My son was hospitalized two hours later due to poisoning*” (St. 37). The statement proves that how limited access to clean water forces communities to rely on contaminated sources, transforming environmental exposure into an immediate health emergency. References to the severity of the odor are widespread across interviews, to the extent that exposure becomes virtually unavoidable for anyone passing near Nilüfer Creek; this condition was also directly observed during fieldwork, as the intensity of the odor was clearly perceptible in areas surrounding the creek.

These lived experiences are complicated by conflicting assessments offered by different institutional actors. While representatives of governmental bodies stated that tests conducted on mucilage and water quality indicated no immediate threat to human health, academic studies and expert assessments present a more cautious and critical perspective. Scientists emphasize that stagnant and low-flow water conditions significantly increase the capacity of mucilage to transmit microorganisms, including bacteria and viruses (Danovaro et al., 2009). The literature further highlights that even in the absence of acute toxicity, prolonged exposure to polluted and biologically active waters poses cumulative public health risks. This divergence between official reassurances and scientific warnings intensifies uncertainty among local communities and recreational users, who are left to navigate potential health risks without clear or consistent guidance. From an environmental justice perspective, this epistemic contradiction deepens distributive injustice by unevenly allocating health risks while limiting affected populations’ access to precautionary protection and reliable information.

5.3.3.2. Procedural Justice. During the interviews, it became evident that long-term exposure to pollution has eroded the community’s belief in the possibility of meaningful change. Many of the residents, who live with the consequences of industrial contamination daily, expressed a profound sense of resignation. Although there are areas in which they could potentially intervene, both limited access to information and the loss of collective hope constrain their capacity for action. This reflects a broader dynamic frequently highlighted in political ecology: environmental degradation not only affects ecological systems but also reshapes local agencies by normalizing vulnerability and disempowerment.

Furthermore, I observed a notable lack of coordination among villages and local groups. Due to weak communication channels and the absence of participatory governance mechanisms,

communities remain unaware of each other's initiatives, decisions, or acts of resistance. This fragmentation reinforces procedural injustice, as affected groups are structurally excluded from shared decision-making and from forming a unified political voice. During the interviews, one local resident noted that the pollution of the water has even led to disputes among families and between residents within the village (St. 129).

A striking example of this dynamic occurred in the last village I visited. The residents offered peaches irrigated with water from the Nilüfer Stream; yet following our discussion about the contamination of the stream, no one touched the fruit. This moment vividly illustrates how environmental degradation permeates everyday social interactions, producing distrust, uncertainty, and embodied forms of risk perception within the community.

In addition, residents spoke about the cultural transformations occurring in their settlements and the reluctance of younger generations to continue living in villages where pollution and its odor have become part of daily life. Several elderly participants noted that their children had already moved away to avoid these conditions, indicating that environmental degradation is not only reshaping ecological relations but also driving socio-cultural change and patterns of out-migration.

The findings also reveal significant procedural justice concerns, primarily rooted in a pervasive lack of transparency. Residents consistently emphasized that they are not informed about the state of pollution, ongoing monitoring activities, or regulatory decisions. Local news sources often present biased narratives, and independent journalists claimed that they face substantial obstacles when attempting to contact officials or obtain access to relevant data. Combined with strong industrial lobbying that shapes public communication and political priorities, these dynamics result in the systematic exclusion of affected communities from environmental decision-making processes.

The stakeholder statements reveal substantial procedural justice deficits, particularly regarding coordination, transparency, and the credibility of institutional communication. As one NGO representative emphasized, "There needs to be a commission established under the coordination of the Bursa Governorship. Everyone is doing something, but there is no coordination" (St. 69). This highlights the fragmented governance architecture in which multiple actors operate independently without an overarching mechanism to align responsibilities or ensure accountable decision-making. Such institutional fragmentation restricts citizens' ability to understand who is responsible for what, thereby limiting meaningful participation.

Academic experts offered even more critical perspectives, pointing to structural deficiencies in environmental management and long-term neglect. One academic explained that “the essence of the problem lies in wastewater management... years of accumulated pollution at the bottom of the Marmara Sea are like something swept under the rug. None of the 22 articles in the emergency action plan correspond to urgent actions” (St. 61). Another academic warned about public health risks, stating that “consuming fish without knowing what contaminants have accumulated in them or where they originate from is extremely risky and dangerous for public health” (St. 57). These statements collectively underscore that scientific assessments perceive current policies as insufficient, symbolic, and lacking urgency, with potentially severe ecological and human-health consequences. They also highlight a significant transparency gap: residents do not receive critical information needed to make informed decisions.

Governmental bodies, however, presented a markedly different narrative. One official asserted, “We analyzed the mucilage. It is not dangerous; we are certain of this. It contains no toxic structure, no pathogens, and no heavy metals” (St. 25). While reassuring on the surface, such statements lack methodological detail, monitoring frequency, or independent verification. The absence of publicly accessible data and the difficulty independent journalists face in obtaining official information further deepen concerns about regulatory opacity. This contrast between governmental reassurance and academic alarm illustrates not only a divergence in risk interpretation but also a deeper procedural justice problem: communities are left navigating conflicting narratives without transparent, verifiable evidence.

Taken together, these direct statements reveal a governance landscape characterized by fragmented coordination, weak enforcement, selective or incomplete official communication, and limited public access to reliable information. The discrepancy between academic assessments and government narratives—combined with the absence of transparent monitoring—has contributed to an erosion of public trust. Consequently, the pollution of the Nilüfer Stream and the Marmara Sea evolve from an environmental management issue into a broader environmental justice concern, in which affected communities face systematic procedural inequalities and institutional exclusion.

Consequently, the issue extends far beyond water pollution itself; it manifests as a broader environmental justice problem, in which communities not only bear the environmental and health burdens but are also denied equitable access to information, participation, and institutional protection.

6. DISCUSSION

The findings of this research show that the ecological crises of the Marmara Sea and Nilüfer Creek cannot be understood solely as natural or technical failures. Instead, they are deeply shaped by political, social, and economic structures that determine how problems are defined, how solutions are designed, and who benefits or suffers from the outcomes. Through the lens of political ecology, it becomes clear that the persistence of mucilage, the worsening pollution in Nilüfer Creek, and the broader ecological decline of the Marmara Basin are symptoms of systemic governance failures, weak enforcement, and entrenched power asymmetries (Robbins, 2012; Escobar, 1996).

A central finding is the systemic lack of transparency in both problem definition and solution implementation. Data on industrial discharges, the scientific reasoning behind policies, and the outcomes of action plans are often withheld from the public. This is not a minor oversight but an active exercise of power that prevents affected communities—fishers, local residents, and NGOs—from scrutinizing decisions or demanding accountability. As interviews revealed, even parliamentary questions raised about the identities of polluting industries or the fines imposed remain unanswered (St-1, St-46). Similarly, action plans like the Marmara Sea Action Plan were publicized but never accompanied by accessible progress reports or evaluations (St-61, St-42, St-145). This lack of transparency fuels public distrust and represents a procedural injustice: communities are not only exposed to pollution but also denied the information necessary to defend themselves against it.

The insufficiency of proposed solutions further compounds the crisis. Stakeholders across all groups emphasize that most measures remain palliative and fail to address root causes. Governmental actors frequently prioritize surface cleanups, temporary inspections, or fines that create the appearance of action without reducing actual pollution loads (St-49, St-22, St-26). For example, 11,000 cubic meters of mucilage were collected in 2021, yet untreated discharges from industries and municipalities continued at nearly the same pace (St-24–42). This cycle illustrates what stakeholders describe as “palliative engineering practices” (St-102), which manage symptoms rather than prevent them. The repeated recurrence of mucilage in 2021, 2024, and 2025 underscores the futility of such approaches.

The preference for short-term crisis management over long-term ecological sustainability is consistent with what political ecology literature calls the “treadmill of production” (Gould, Pellow,

& Schnaiberg, 2008). By treating mucilage as a sudden disaster to be “cleaned up,” the state obscures its structural causes in chronic industrial, agricultural, and municipal discharges. This short-termism is politically expedient: it allows authorities to demonstrate visible action and control, while avoiding the more challenging task of restructuring industrial practices or enforcing costly advanced treatment technologies. As one academic noted, advanced biological treatment systems were proposed for Istanbul as early as 1993, but postponed because of high costs and political resistance (St-147, St-148, St-149). The result is a governance system where immediate visibility is prioritized over long-term sustainability, leaving the sea chronically vulnerable.

Another significant finding concerns the inequitable distribution of costs. Rather than supporting companies and institutions that attempt to act responsibly, the state often imposes disproportionate financial burdens on them while leaving major polluters largely untouched. For instance, some industries in organized industrial zones invested in treatment plants, but their capacities remain inadequate compared to population density and industrial expansion (St-150). Meanwhile, others continue discharging untreated or partially treated wastewater with minimal penalties (St-1). This creates a political-economic landscape where compliance is financially punishing and non-compliance remains profitable. Such dynamics reflect the alignment of state power with extractive economic priorities, ensuring that the true costs of pollution are borne not by industries but by fishers who lose their livelihoods, farmers irrigating with polluted water, and coastal residents dealing with health risks.

Equally important is the exclusion of alternative voices and knowledge systems. Civil society organizations demand transparency, accountability, and structural reforms, such as ending deep-sea discharge projects and imposing real sanctions on non-compliant industries (St-20, St-21, St-68). Yet these demands are consistently sidelined in official decision-making processes. Academics and experts provide scientific evidence, pilot projects, and monitoring reports, but their findings rarely translate into policy (St-7, St-12, St-50). Journalists, meanwhile, play a contradictory role: independent outlets amplify scientific warnings and activist voices, while mainstream media often depoliticize the crisis by framing it as a natural or climate-related phenomenon (St-14, St-141). This selective visibility allows the state and industry to maintain control over the narrative, reducing public pressure for systemic change.

Underlying all these issues is the inadequacy of legal and institutional frameworks. Many environmental laws remain outdated, fragmented, or poorly enforced, leaving little room for effective protection against current ecological pressures. Stakeholders emphasize that inspections are irregular,

finances are insufficient, and long-promised wastewater treatment upgrades have not materialized (St-29, St-51, St-52, St-107, St-112, St-113). This legal inertia sustains the problem by ensuring that polluters face neither meaningful penalties nor binding requirements to improve. As a result, Nilüfer Creek continues to carry highly polluted water into the Marmara Sea, fueling eutrophication and contributing to mucilage blooms.

The research also reveals a growing sense of despair among stakeholders. Across different groups—local residents, NGOs, experts, and even some governmental representatives—there is recognition that problems have persisted for decades with little visible improvement. Many stakeholders express the view that the situation has gone beyond repair, with statements such as “Marmara Sea is dying” (St-55, St-61, St-148) reflecting this pessimism. At the same time, there is widespread acknowledgment that only a holistic and collective approach can produce meaningful solutions. Calls for cooperation and solidarity recur across interviews, yet such collaboration has been limited in practice. This paradox highlights both the urgency and the difficulty of fostering collective action in a context where trust in institutions is low and transparency is lacking.

The case of the Marmara Sea thus illustrates how industrial growth and urban expansion externalize ecological costs onto already vulnerable communities, gradually turning entire regions into sacrifice zones where both ecological and human health are systematically undermined. This highlights that the degradation observed is not an unforeseen accident of nature but the political outcome of persistent governance failures and extractive economic priorities (Acara, 2019).

To sum up, the crises of the Marmara Sea and Nilüfer Creek are not simply ecological events but politically manufactured outcomes. They are perpetuated by a lack of transparency, inadequate and short-term solutions, inequitable burdens, exclusion of critical voices, and outdated legal frameworks. The recurrence of mucilage and the worsening state of Nilüfer Creek demonstrate that technical fixes alone will not suffice. Addressing these problems requires structural change: legally binding protections, transparent and participatory governance, and enforcement mechanisms that hold polluters accountable. Without such reforms, the Marmara Sea will continue to serve as both a repository of industrial waste and a symbol of governance failure.

7. CONCLUSION

“Those who hold the power to solve the problem are often closer to its source — yet show the least interest in addressing it”

Glenn E. Martin (Martin, 2022)

“Our world functions much like the human body: a single change in one part reverberates throughout the whole. To truly grasp the transformations in our seas, we must look beyond the waters themselves and seek to understand all the areas that are directly and indirectly connected to them.”

(Marmara Belediyeler Birliği, 2022, p. 18)

The findings of this thesis reveal that the mucilage crisis in the Marmara Sea cannot be understood solely as an ecological anomaly but must be framed as the cumulative outcome of systemic governance failures, uneven power relations, and entrenched political-economic priorities. By employing a multi-method approach—combining stakeholder mapping, semi-structured interviews, and document analysis, this research demonstrates how the perceptions, interests, and capacities of different actors converge and diverge, shaping both the persistence of pollution and the inadequacy of solutions.

A central outcome of stakeholder mapping was the identification of a highly fragmented governance structure in which responsibilities are distributed across multiple institutions without effective coordination. This fragmentation has created gaps that allow pollution to continue unchecked, particularly in critical tributaries such as Nilüfer Creek. Mapping also revealed that power is unevenly distributed: state authorities and industries dominate decision-making spaces, while NGOs, local residents, and small-scale fishers are systematically marginalized. This imbalance reflects not only who holds formal authority, but also whose knowledge and experiences are validated in environmental governance.

The interviews highlighted how different groups perceive the problem in ways that are shaped by their positionality. Academics and experts emphasized structural issues, such as the chronic underperformance of wastewater treatment plants, the absence of basin-scale management, and the inadequacy of existing regulations. NGOs framed the problem as a question of environmental justice, underscoring both the inequities of pollution exposure and the exclusion of local communities from

decision-making. Local residents and farmers described lived realities of foul odors, unusable water, agricultural losses, and inter-family conflicts over scarce resources—concrete manifestations of environmental injustice. Fishers stressed how mucilage and chronic pollution have jeopardized their livelihoods, while journalists pointed to selective visibility in the media, noting that pollution only becomes newsworthy when it is visually dramatic, such as during the 2021 outbreak.

This multi-method approach demonstrates why integrating diverse perspectives is crucial: each group highlights a different facet of the crisis, but together they reveal a pattern of systemic neglect. The combination of stakeholder mapping and interviews allowed the research to go beyond technical assessments, showing that environmental degradation is not only about ecological decline but also about power, accountability, and justice.

The analysis shows that mucilage is a socially produced ecological disaster. It is not the inevitable outcome of climate change alone, but rather the result of decades of governance failures, unchecked industrial discharges, weak enforcement of legislation, and the prioritization of economic growth over ecological sustainability. In this sense, the findings confirm the relevance of a political ecology approach: environmental crises in Türkiye are actively shaped by political and economic structures, not merely by biophysical processes.

In practical terms, the results underline that current solutions (primarily emergency cleanups and fragmented action plans) are insufficient to prevent future crises. The lack of transparency regarding pollution sources, the failure to disclose the outcomes of action plans, and the absence of effective monitoring systems reinforce public distrust. Without systemic reform, including stronger enforcement of regulations, basin-wide ecological monitoring, and genuine participation of marginalized stakeholders, similar ecological disasters are likely to recur.

Ultimately, this thesis demonstrates that addressing mucilage and related ecological crises requires more than technical fixes: it demands a restructuring of governance that foregrounds transparency, accountability, and environmental justice. By situating the case of Nilüfer Creek within the broader political ecology of the Marmara Sea, the research contributes to understanding how power asymmetries and governance gaps produce and reproduce ecological vulnerability.

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APPENDIX A: LIST OF STATEMENTS

Statement no	Statements Turkish	Statements English	Stakeholder Group
1	Nilüfer Çayı ve kollarını çevreleyen sanayi tesislerinin envanteri çıkarılmış mıdır? Bu sanayi kuruluşlarının arıtma sistemleri bulunmakta mıdır? Olmayan kuruluşlarla ilgili yürüttüğünü takibat ve işlemler nelerdir? Bakanlığınız tarafından gerçekleştirilen denetimler sonucunda onlarca firmaya 75 milyon TL ceza kesildiği paylaşılmıştır. 75 milyon TL olarak kesildiği ifade edilen ceza hangi firmalara, ne kadar cezai işlem olarak ve hangi suçlara karşılık uygulanmıştır? Bakanlığınız Nilüfer Çayı'ndaki kirliliğin önlenmesi için ceza uygulamalarının dışında somut olarak bugüne kadar hangi adımları atmış ve denetimlerde bulunmuştur? Toplum sağlığı dikkate alındığında ceza uygulaması dışında daha radikal önlemler almayı planlıyor musunuz?" Meclise bu şekilde verdiğim soru önergesi reddedildi.	Has an inventory been prepared of the industrial facilities surrounding Nilüfer Creek and its tributaries? Do these industrial facilities have treatment systems? What follow-up actions and procedures are carried out regarding those that do not? It has been stated that, as a result of inspections conducted by your Ministry, dozens of companies were fined a total of 75 million TL. Which companies received these fines, how much was imposed on each of them, and for which violations were the penalties applied? Apart from issuing fines, what concrete steps has your Ministry taken so far to prevent pollution in Nilüfer Creek, and what inspections have been conducted? Considering public health, do you plan to take more radical measures beyond imposing fines? The parliamentary question I submitted in this form was rejected.	Political parties
2	Sebebi bence iki faktör; evsel ve sanayi atıkları ile ikinci faktör mevsim normallerinin üstünde bir su ve hava sıcaklığı bulanıklılık kirlilik son yıllarda çok arttı. Küresel ısınma da diyebiliriz.	In my opinion, the reason is twofold: domestic and industrial waste, and secondly, water and air temperatures that are above seasonal norms—turbidity and pollution have increased significantly in recent years. We could also call this global warming.	Experts
3	Kamuoyu ile musilaj ile ilgili yapılan testler paylaşılmıyor.	The tests conducted on mucilage are not being shared with the public.	Experts
4	Asıl sorunun denizin derinliklerinde olduğunu tüm halkın bilmesi gerekir. ben erdekte askerlik yaptım ve daha önce suyu cam gibi olan denizin korkunç halini görünce çok üzüldüm.	The public must know that the real problem lies in the depths of the sea. I completed my military service in Erdek, and I was deeply saddened when I saw the terrible state of the sea, which used to be crystal clear.	Journalists
5	orada nesli tükenmekte olan midyeye benzeyen pinalar var ve denizi temizliyorlar normalde ancak daldığımda müsilaajın onların da üstünü kapladığını gördüm. biz millet olarak her şeyi çok çabuk unutuyoruz. müsilaajı görmeyince denizin dibindeki sıkıntıyı yine unutacağız.	There are pen shells there—an endangered species similar to mussels—and they normally clean the sea, but when I dived, I saw that the mucilage had covered them as well.	Journalists
6	biz millet olarak her şeyi çok çabuk unutuyoruz. müsilaajı görmeyince denizin dibindeki sıkıntıyı yine unutacağız.	As a nation, we forget everything very quickly. When we no longer see the mucilage, we will again forget the problem at the bottom of the sea.	Journalists
7	Ama bilim insanları böyle değil. Senelerdir bas bas bağıryorlardı. Marmara Denizi'ndeki kirlilikle alakalı çok sayıda haber yaptım. Devlet de görüyor bunu ama sanayicilerin çok büyük baskısı var. Marmara'daki sorunun kaynağı ne? Bunun üzerine eğilmiyoruz	But scientists are not like this. They have been shouting about it for years. I have made numerous reports about the pollution in the Marmara Sea. The state sees it too, but there is enormous pressure from industrialists. What is the source of the problem in Marmara? We are not focusing on this.	Journalists

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8	Ergene Nehri'ni temizleyeceğiz dediler. Seneler evvel derin deşarj yönteminin açılışını yaptılar. Derin deşarj denilen şey de organik bir yükür. Bu sefer Marmara'ya daha da yük bindi. Düşünebiliyor musun saniyede bilmem kaç bin metreküp su basılıyor denize. Marmara'nın kaldırabileceği yük belli ve artık kaldıramıyor.	They said they would clean the Ergene River. They pioneered the deep discharge method years ago. Deep discharge is an organic load. This time, it put an even bigger burden on the Marmara Sea. Can you imagine, thousands of cubic meters of water are being pumped into the sea every second? The Marmara Sea has a certain capacity to handle, and it can no longer do so.	Journalists
9	Bakanlık 22 maddelik acil eylem planı açıkladı. Üç ay sonra korumaya başlayacağız dediler. Acil eylem planı deniyor ama üç ay sonrası gösteriliyor. Neden üç ay sonra? Zaten herkes üç aya unuttur bu olayı, kendileri de unuttur. Benim konuştuğum bütün bilim insanları yarın düğmeye basılması gerektiğini söylüyor. Radikal karar alınmadığı sürece doğa bize bunun bedelini ağır bir şekilde ödetecek.	The ministry announced a 22-point emergency action plan. They said they would start protection in three months. It's called an emergency action plan, but they're pointing to three months from now. Why three months? Everyone will forget about this in three months, they'll forget about it too. All the scientists I've spoken to say that action should be taken tomorrow. Unless radical decisions are made, nature will make us pay a heavy price.	Journalists
10	Radikal karar alınmadığı sürece doğa bize bunun bedelini ağır bir şekilde ödetecek.	Unless radical decisions are made, nature will make us pay a heavy price.	Journalists
11	Tamamı bahsettiğimiz sistemsizlikle alakalı. Memlekette güvensizlik hâkim.	It's all about the lack of a system we've been talking about. There's a prevailing sense of insecurity in the country.	Journalists
12	Her neyse Marmara'nın durumu da çok basit. Bilim insanları bas bas bağıyor. Kirlenmeyeceksin. Biyolojik arıtma yapacaksın. Denize daha fazla yük vermeyeceksin.	Anyway, the situation in Marmara is very simple. Scientists are shouting loudly. You will not pollute. You will do biological treatment. You will not pollute the sea any more.	Journalists
13	Balıkçıların büyük çoğunluğu kendi derdindedir. Balık tutamıyoruz, ağ atamıyoruz gibi kendi maddi sorunlarıyla alakalı serzenişte bulunurlar. Çoğunluğu, "Aman denizimiz kirleniyor burası bizim ekosistemimiz dikkat edelim." gibi şeyleri düşünmez. Zaten bu kadar düşünseler filolarını büyütmezler ve avları bu kadar sık yapmazlar.	The vast majority of fishermen are preoccupied with their own problems. They complain about their own financial problems, such as not being able to catch fish or cast their nets. Most of them don't think, "Oh no, our sea is polluting, this is our ecosystem, let's be careful." If they thought that much, they wouldn't expand their fleets and fish so frequently.	Journalists
14	Hükümete yakın medya kuruluşları da müsilağla alakalı haber yapıyor ama bu haberi nasıl veriyorlar o önemli. "Marmara Denizi'nde doğadan kaynaklanan müsilağ oluştu, yönetsel bir hata yok ortada ve Çevre Bakanlığı da gerekli çalışmalar yaparak üstesinden gelmeye çalışıyor." olarak vermekteler. Yapılan şeylerin çoğu göstermelik. Sebebini hiç konuşmayıp bu sonuçtan insanlara umut vermeye çalışıyorlar.	Media organizations close to the government also report on mucilage, but how they report this news is important. "Mucilage originating from nature has formed in the Sea of Marmara, there is no administrative error and the Ministry of Environment is trying to overcome it by doing the necessary work." Most of the things that are done are for show. They never talk about the reason and try to give people hope from this result.	Journalists
15	müsilağ marmara denizi için bir korku filmi gibi, vidanjörle temizlenemeyeceğini kendi gözlerimle gördüm. Elbette hiçbir şey yapılmamasından daha iyi ama kıyılarda yapılan o borularla çekme işlemi ile de bu iş bitmez.	I saw with my own eyes that mucilage cannot be cleaned with a vacuum truck, like a horror movie for the Sea of Marmara. Of course, it is better than doing nothing, but this job does not end with those pipe towing operations on the coasts.	Journalists

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16	Bu müsilajın ilerleyen evrelerinde çürük yumurta kokusunun her yeri kaplayacağı söyleniyor. Düşünsene geçmişte Haliç'in koktuğu gibi bütün Marmara'nın koktuğunu, çok feci bir durum.	It is said that in the later stages of this mucilage, the smell of rotten eggs will cover everywhere. Imagine that the whole Marmara smelled like the Golden Horn smelled in the past, it is a very disastrous situation.	Journalists
17	İnternette görmüştüm ama şimdi yüzmeye gelince ne kadar kötü olduğunu daha net gördüm. Yüzmeye çalıştım ama bacaklarım kaşınmaya başladı.	I had seen it on the internet, but now when it comes to swimming, I have seen more clearly how bad it is. I tried to swim, but my legs started to itch.	Resident
18	Surf yapmaya her hafta gelirdik ancak şimdi endişeliyiz ve bize zarar verip vermeyeceğini bilemiyoruz.	We used to come to surf every week, but now we are worried and we don't know if it will hurt us.	Resident
19	Müsilajı çocukluğumda da görürdüm ancak bu seviyede hiç görmemiştim. Dalmaya çekiniyoruz çünkü ne olduğunu tam olarak bilmiyoruz.	I used to see mucilage in my childhood, but I had never seen it at this level. We hesitate to dive in because we don't know exactly what it is.	Resident
20	Nilüfer Çayı içinde balığı, kurbağası, kaplumbağası, yılanıyla, su bitkileriyle bir yaşam döngüsüydü, ancak şu an burada yaşam ihtimali sıfır. Çünkü bu artık bir su değil, kimyasal atık. 4 milyona yaklaşan nüfusumuzla, 20'den fazla sanayi bölgemizle biz bütün evsel ve sanayi atığımızı Nilüfer Çayı'na bırakıyoruz. Bunu hem evimizde hem de sanayimizde yapıyoruz. Yani sanayicimiz kadar evdeki teyzemiz de suçlu. Çünkü biz lavabolardan döktüğümüz kızartma yağları, bulaşık yağları, deterjan gibi atıklarla kirletiyoruz. Zaten sanayi başlı başına bir kirlilik unsuru, sanayi demek kirlilik demek. O yüzden de Nilüfer Çayı kirli akıyor, su olmaktan çıkmış kimyasal atık halinde akıyor	Nilüfer Creek was a life cycle with fish, frogs, turtles, snakes and aquatic plants, but now the possibility of life here is zero. Because this is no longer water, it is chemical waste. With a population of nearly 4 million and more than 20 industrial zones, we leave all our domestic and industrial waste to the Nilüfer Creek. We do this both at home and in our industry. In other words, our aunt at home is as guilty as our industrialist. Because we pollute with wastes such as frying oils, dishwashing oils, detergents that we pour from the sinks. Industry is already a pollution element in itself, industry means pollution. That's why Nilüfer Creek flows polluted, it flows as chemical waste that has ceased to be water	NGOs
21	Sanayici kirli teknoloji kullanmamalı, suyu yerinde artırmalı. Yani suyu daha az tüketen ve hiç kirliletmeyen teknoloji kullanılmalı. Yani biraz yatırım yapmalı. Biz bir gün yine Marmara Denzinin hali ne olacak, diyeceğiz. Bu su Marmara Denizi'ne aktığı sürece denizin ekosistemi bozulacaktır. Biz bunu yıllardır söylüyoruz ama ne yazık ki son müsilaj olayına kadar sesimizi kimseye duyuramadık. Bizim duyuramadığımız sesi doğa kendisi duyurdu	Industrialists should not use dirty technology, they should treat water on site. In other words, technology that consumes less water and does not pollute it at all should be used. So he should invest a little. One day, we will say what will be the state of the Marmara Sea again. As long as this water flows into the Sea of Marmara, the ecosystem of the sea will be disrupted. We have been saying this for years, but unfortunately we could not make our voices heard until the last mucilage incident. Nature herself heard the voice that we could not hear	NGOs
22	Deniz kirliliğinin önlenmesi için biyolojik arıtma yapılması gerektiğini vurguladık, toplantının sonucu alınan kararlardan bir tanesi özellikle denize deşarj standartlarını kısıtlamamız gerektiğini ifade ettik.	We emphasized the need for biological treatment to prevent marine pollution, and one of the decisions taken as a result of the meeting was that we should restrict the discharge standards into the sea.	Governmental Bodies
23	Marmara Denizi, en derin yerinde bile mesela "Çınarcık çukuru" dediğimiz yerde bile hidrojen sülfürün yani	Even in the deepest part of the Sea of Marmara, for example, in the place we call the "Çınarcık pit", we know that hydrogen sulfide, that	Governmental Bodies

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	Karadeniz'de gördüğümüz hayatın olmadığını ifade eden şeyin orada olmadığını biliyoruz şu anda. Denizin ilk 10 metresinde, hatta 20-25 metreye kadar şu anda müsilaj yok, sadece arada yani tabanla şehir arasında kalmış bir müsilaj tabakası mevcut.	is, the thing that expresses the absence of life we see in the Black Sea, is not there. There is currently no mucilage in the first 10 meters of the sea, even up to 20-25 meters, there is only a mucilage layer in between, that is, between the bottom and the city.	
24	İstanbul'da 6 bin 440 metreküp, Kocaeli'de 476, Bursa'da 165, Tekirdağ'da 154, Balıkesir'de 811, Çanakkale'de 919, Yalova'da 2 bin 118; 11 bin metreküp civarında müsilaj topladık. Depone sahalarına götürdük, oralara bıraktık. En az Tekirdağ'dan gelmiş çünkü bu bölgede durağanlık çok az, müsilaj oluşumu için uygun şartlar yok yani orada çok hareketli bir deniz olduğu için orada durmuyor, başka yerlere gidiyor. Temizlemeseydik ne olacaktı? Aynı müsilaj o körfezden o körfeze geziyor rüzgarla birlikte çünkü müsilaj organı olmayan bir madde, organı olmuyor yani eli kolu yok, dolayısıyla, rüzgârın etkisiyle nereye giderse oraya savruluyor. Bugün, aynı müsilaja çip taksanız Çanakkale'de görüyorsunuz, ertesi gün Caddebostan'a geliyor.	6 thousand 440 cubic meters in Istanbul, 476 in Kocaeli, 165 in Bursa, 154 in Tekirdağ, 811 in Balıkesir, 919 in Çanakkale, 2 thousand 118 in Yalova; We collected around 11 thousand cubic meters of mucilage. We took them to the warehouse areas and left them there. It came from Tekirdağ at least because there is very little stagnation in this region, there are no suitable conditions for mucilage formation, so it does not stop there because there is a very active sea there, it goes to other places. What would have happened if we hadn't cleaned it? The same mucilage travels from that bay to that bay with the wind because mucilage is a substance that does not have an organ, it does not have an organ, that is, it has no hands, so it is blown wherever it goes by the wind. Today, if you put a chip in the same mucilage, you see it in Çanakkale, the next day it comes to Caddebostan.	Governmental Bodies
25	Müsilajı analiz ettik. Bir kere tehlikeli bir şey değil, bundan eminiz. Toksik bir yapısı yok, ondan da korktuk, "Acaba toksik bir yapı varsa bu mikrobik bir şey olur, yaygınlaşır." diye, en çok korktuğumuz şeylerden biri oydu. Patojen içermiyor, ağır metal de yok içinde. Yani dolayısıyla, bunlar sevindirici tarafları.	We analyzed the mucilage. First of all, it is not a dangerous thing, we are sure of that. It does not have a toxic structure, we were afraid of it, "I wonder if there is a toxic structure, it will be a microbial thing, it will become widespread", that was one of the things we feared the most. It does not contain pathogens, there are no heavy metals in it. So, therefore, these are the pleasing aspects.	Governmental Bodies
26	7/24 bütün Türkiye'deki çevreyle ilgili denetim biriminde çalışan, il müdürlüklerimizde çalışan bütün ekipleri buraya getirdik. Marmara Havzası'nda bu 7 ili, sadece 7 ili değil, aynı zamanda o havzada bulunan Kütahya da dâhil olmak üzere bütün hepsinin bütün tesislerini inceledik ve 10 bini aşkın son bir ayda denetim faaliyeti yaptık, 22 milyon TL'ye yakın ceza yazdık ve 50'den fazla işletmenin de faaliyetine men cezası verdik.	We brought all the teams working in the environmental inspection unit and our provincial directorates here 24/7. We examined all the facilities of these 7 provinces in the Marmara Basin, not only 7 provinces, but also all of them, including Kütahya, which is located in that basin, and we carried out inspection activities of more than 10 thousand in the last month, we wrote a fine of nearly 22 million TL and banned the activities of more than 50 businesses.	Governmental Bodies
27	Şu anda çok fazlaca hem Twittir'de hem diğer yerlerde "Yüzeyi temizlediniz bu iş değil, esas müsilaj altta, Marmara öldü, cesedi kokuyor" falan gibi ifadeler var. Milleti çok korkutmamak lazım. Evet, tamam, olmuştur ama biz ülke olarak, devlet olarak, Bakanlık olarak bütün belediyelerle birlikte bir konsensüs içerisinde beraber hareket ederek bu problemi -bu memleketin meselesi olduğu için- öyle çözmek istedik ve öyle de yaptık. Hiç kimseyi dışlamadan, herkesi kapsayıcı bir şekilde, herkesin	Right now, there are a lot of expressions such as "You cleaned the surface, this is not the job, the real mucilage is at the bottom, Marmara is dead, his body smells" and so on. We should not scare the nation too much. Yes, okay, it happened, but we, as a country, as a state, as the Ministry, wanted to solve this problem by acting together with all municipalities in a consensus - because it is the issue of this country - and we did so. We have been eager to do this job without excluding anyone, in an inclusive manner, using everyone's	Governmental Bodies

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	imkân ve kabiliyetlerini kullanarak bu işi yapma hevesinde olduk ve başarımız da aslında dünyada örnek olarak karşımıza çıkıyor.	opportunities and abilities, and our success actually appears as an example in the world.	
28	"Arıtma tesisleri Marmara Bölgesi için yeterli değil"	"Treatment plants are not enough for the Marmara Region"	Academics
29	Atıkların kontrol edilmesi lazım. Eylem planında da müsilajla mücadele için birçok doğru karar alındı. Ama önemli olan bunların uygulanması ve sonrasında da denetim... Arıtma tesisleri Marmara Bölgesi için yeterli değil. Bazı belediyelerin arıtma tesisleri için çok yatırım yaptığını görüyoruz ama nüfus yoğunluğuyla karşılaştırıldığında kapasiteleri yetersiz kalıyor.	Waste needs to be controlled. In the action plan, many correct decisions were taken to combat mucilage. But the important thing is their implementation and then inspection... Treatment plants are not sufficient for the Marmara Region. We see that some municipalities invest a lot in treatment plants, but their capacity is insufficient compared to the population density.	Academics
30	Balığ geçtik zaten kaplumbağa, kurbağa bile kalmadı derede. Biz burada tuttuğumuz balığın büyük bir bölümünü çaya geri saldık. Aşırı bir koku ve kirlilik var artezyen kuyusu kullanamayanlar var onlar dere suyu ile sulama yapıyor o da ne oluyor pazar tezgahlarında satılan ürünlere ve dolayısıyla bizlere geçiyor. Hiç bir türlü akarsuyu kullanamıyoruz. Bölge çiftçileri olarak mağduru.	We have already passed the fish, there are not even turtles or frogs left in the Creek. We used to release most of the fish we caught here back into the Creek. There is an excessive odor and pollution, there are those who cannot use artesian wells, they irrigate with Creek water, and what happens is that it passes to the products sold in the market stalls and therefore to us. We cannot use any kind of Creek. As farmers in the region, we are victims.	Farmer
31	Müsilaj suyun altına kaplanmış durumda, deniz canlıları nefes alamıyor	Mucilage has covered the underwater, sea creatures cannot breathe	Public Figure
32	Marmara bu duruma tabii çok kısa bir sürede gelmedi. 1980'lerden yani son 60 yıllık bir süreç içinde bu noktaya gelindi. 1980'lerde Marmara oksijenli bir denizken artık belli bir derinliğin altında, yaklaşık 30 metrenin altında oksijen seviyeleri oldukça düşmüş durumda. Bu oksijen seviyelerinin bu noktada olmasının ana sebebi Marmara'ya olan kirlilik girdisi. Tabii Marmara birçok baskıyla mücadele eden bir deniz. Bunların içinde tabii iklim değişikliği en önemli baskılardan biri ama iklim değişikliğinin ötesinde doğrudan insan etkisi olan işte kirlilik, balıkçılık faaliyetleri. Biliyorsunuz son dönemlerde müsilaj... Onu yaşadık, kimyasal kirlilik ve bunların sonucunda oksijensizleşme gibi baskılar altında Marmara Denizi.	Of course, Marmara did not come to this situation in a very short time. This point has been reached in the 1980s, that is, in the last 60 years. While Marmara was an oxygenated sea in the 1980s, oxygen levels have dropped considerably below a certain depth, below about 30 meters. The main reason why these oxygen levels are at this point is the pollution input to Marmara. Of course, Marmara is a sea that struggles with many pressures. Of course, climate change is one of the most important pressures, but beyond climate change, pollution and fishing activities have a direct human impact. As you know, mucilage has been used recently... We experienced it, the Sea of Marmara is under pressures such as chemical pollution and as a result, deoxygenation.	Academics
33	Tüm bu baskıları nasıl ortadan kaldırırız, nasıl azaltırız ve Marmara'yı nasıl daha oksijenli bir hale getiririz? Marmara'nın biyoçeşitliliğini yani Marmara'nın ekosisteminin sağlığını nasıl artırırız? MARMOD Projesi bunlara çözüm arıyor. MARMOD Projesi ile biz Marmara Denizi'nin belli bir süre içinde -bu süreyi de yaklaşık 5 yıl olarak düşünebilirsiniz-oksijenle yaşayan canlıların yaşayabileceği bir hale getirmeyi hedefliyoruz. Yani 30 metrenin altında oksijenle solunum yapan canlıların yaşaması	How can we eliminate all these pressures, how can we reduce them and how can we make Marmara more oxygenated? How do we increase the biodiversity of Marmara, that is, the health of Marmara's ecosystem? The MARMOD Project is looking for solutions to these. With the MARMOD Project, we aim to make the Sea of Marmara a place where oxygen-based creatures can live within a certain period of time - you can think of this period as about 5 years. In other words, it is very difficult for creatures that breathe with oxygen below 30	Academics

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	bugün oldukça güç. İlk hedefimiz bunu bu canlıların yaşayabileceği bir hale getirmek, biyoçeşitliliği ve ekosistemi daha sağlıklı bir hale getirmek ve bu kirlilik baskısını azaltmak ilk hedeflerimiz arasında. Uzun vadeli -daha da uzun vadeli- amaçları içinde de Marmara Denizi'ni bu 1980'lerdeki oksijenli -biyoçeşitliliğinin oldukça sağlıklı olan- haline getirmek ana hedefimiz.	meters to survive today. Our first goal is to make it a way for these creatures to live, to make biodiversity and the ecosystem healthier, and to reduce this pollution pressure. Among the long-term even longer-term goals, our main goal is to make the Sea of Marmara oxygenated in the 1980s - with a very healthy biodiversity.	
34	Kaynağından çıkan suyu analiz ettiğimizde parametrelerin hepsi maksimum değerlerin altında olduğu için iletkenlik ve pH açısından oldukça temiz, içilebilir hatta sulamalarda uygulanabilir olduğunu gördük ancak farklı bölgelerden kirli suyu aldığımız zaman bu suların ne tarımsal sulamada kullanabileceğini ne de içilebilir olduğunu analiz ettik.	When we analyzed the water coming out of its source, we saw that it was very clean, drinkable and even applicable in irrigation in terms of conductivity and pH, since all the parameters were below the maximum values, but when we took dirty water from different regions, we analyzed that these waters could neither be used in agricultural irrigation nor drinkable.	Academics
35	Tekstil sektörü ağırlıklı bir bölgeden su örneği aldığımızda boyar maddelerin yoğun olduğunu görüyoruz. Kimyasalların daha yoğun olduğu bölgeler var. Ağır metallerin de suyun içine karıştığını analizlerin sonucunda görüyoruz. Organik malzemeler de benzer şekilde suyun içinde bulunuyor. Tekstil endüstrisinin atık suları boya, krom, nişasta, kostik (NaOH) ve asidik atık kimyasallar içerdiğinden çevreye zararlıdır. Kullanılan suyun büyük bir miktarı ön terbiye proseslerinde harcanır. Kumaşların ön terbiye işlemlerinde de bazı yıkamalarda, pH dengelemede, kasar ve mercerizasyon proseslerinde kostik kullanılır. Suyun eski haline dönüp kaynağındaki gibi temiz akabilmesi için sanayi sektörünün arıtma tesisi kurması ve bunu geliştirmesi gerekiyor. Önlem alınırsa kaynağında oldukça temiz bu suyun içilebileceğini ve tekrar kullanılabilirliğini söyleyebiliriz. Tarımsal sulamada da kullanabiliriz. Şu anki durumda sulamada kullanmaya kalktığımızda bu ekolojik döngü içinde tarımsal kaynakları tüketeceğimiz için insan sağlığına da zarar verecektir.	When we take a water sample from a region dominated by the textile industry, we see that dyestuffs are intense. There are regions where chemicals are more concentrated. As a result of the analysis, we see that heavy metals are also mixed into the water. Organic materials are similarly found in water. The wastewater of the textile industry is harmful to the environment as it contains dyes, chromium, starch, caustic (NaOH) and acidic waste chemicals. A large amount of the water used is spent in pre-treatment processes. Caustic is used in the pre-treatment processes of fabrics, in some washings, pH balancing, bleaching and mercerization processes. In order for the water to return to its former state and flow clean as at its source, the industrial sector needs to establish a treatment plant and develop it. If precautions are taken, we can say that this water, which is very clean at its source, can be drunk and reused. We can also use it in agricultural irrigation. In the current situation, when we try to use it for irrigation, it will harm human health as we will consume agricultural resources in this ecological cycle.	Academics
36	Şehir merkezinde akan su, su değil. Bilhassa şu mevsimde suyun debisi hayli azalmış durumda. Su azaldığı ve atık çoğaldığı için kirlilik daha fazla oluyor. Kışın çaya verilen atıklar belki bu kadar koku ya da kötü görüntü yaratmıyor çünkü su bol. Yazın tamamen atık haline dönüşüyor.	The water flowing in the city center is not water. Especially in this season, the flow rate of water has decreased considerably. Pollution is higher as water decreases and waste increases. The wastes given to the creek in winter may not create such a smell or bad appearance because there is plenty of water. In summer, it turns into completely waste.	NGOs
37	Dere boyuna gelip ağlamamız gerekiyor ama gelemiyoruz çünkü çok kötü kokuyor. Şu anda kullanılacak bir vaziyeti yok. Çocukluğumuz, gençliğimiz buralarda geçti. Geçen sene	We have to come to the creek and cry, but we can't because it smells so bad. It is not in a position to be used at the moment. We spent our childhood and youth here. Last year, our dam ran out of water, we	Resident

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	barajımızda su bitti, tek sefere mahsus buradan sulama yaptık. Oğlum iki saat sonra zehirlenip Tıp Fakültesi Hastanesine gitti. Biz bu suyu içiyorduk, böyle temiz suyu vardı. Mis gibi kokardı. Yetkililerden buna bir çare istiyoruz.	irrigated from here for once. My son was poisoned two hours later and went to the Medical Faculty Hospital. We were drinking this water, it had such clean water. It smelled good. We want a solution from the authorities.	
38	Özellikle hafta sonları daha kötü kokuyor. Ziftten öte bir şey. Köyün en üst kısmında oturuyorum. Orada bile bu koku nefesimi kesiyor	It smells worse, especially on weekends. Something more than pitch. I live at the top of the village. Even there, this smell takes my breath away	Resident
39	15-16 yaşlarındayken balığa gittiğimizde levreği, çuprası, kefalı, karedesi hepsi vardı. Şimdi bir tane bir şey bulamazsın. O fabrikalar atıklarını bıraktılar sahile şimdi çöplük oldu. Ağımızı atıyoruz, mantarlarımızın suyun üzerinde kalması gerekiyor. Dibe çekiliyor. Ağı çekene kadar saatlerimiz gidiyor. Makaralarımız kırılıyor.	When we went fishing when I was 15-16 years old, they had sea bass, sea bream, mullet, karede. Now you can't find a single thing. Those factories left their waste on the beach, now it is a garbage dump. We throw away our net, our mushrooms need to stay above the water. It is being pulled to the bottom. Our hours go by until we pull the net. Our reels are breaking.	Fisher
40	Müsilaj balıkçılığı bitiriyor. Her geçen sene deniz bitiyor, balıklar ağır ağır tükeniyor	Mucilage ends fishing. Every year the sea is running out, the fish are slowly running out	Fisher
41	Müsilaj sorunu ile balıkçının tek başına mücadele etmesinden şikayetçi. Müsilajın olduğu bölgelerde ağ atmadıklarını söyleyen Mehmet kaptan, daha önce teknesinin makarasının müsilaj nedeniyle kırıldığından bahsediyor. Müsilaj tüm deniz canlılarını öldürdü. Artık fabrika atıklarını denetleyelim. Deniz kimyasala doydu."	He complains that the fisherman struggles alone with the mucilage problem. Captain Mehmet, who says that they do not cast nets in areas where there is mucilage, mentions that the reel of his boat was broken due to mucilage before. Mucilage killed all sea creatures. Let's control factory waste now. The sea has had enough of chemicals."	Fisher
42	Biz 22 maddeden oluşan Marmara Denizi Eylem Planımızı açıkladık. Ancak bu eylemlerin en önemli maddeleri belediyelerimiz tarafından halen hayata geçirilmedi, tek bir adım bile atılmadı. (...) Biz müsilaj sorununu bir kez daha yaşamak istemiyoruz. Lütfen vakit çok geç olmadan milletimize ve doğamıza verdiğiniz sözleri yerine getirin. Müsilaj ve benzeri sorunların yeniden yaşanmaması için söz verilen atık su arıtma tesislerinin bir an önce yapılması elzemdir. Belediyelerimizin hiçbir itirazı olmadan ortaya koymuş oldukları 22 maddelik eylemlerin bir an önce yapılması çok önemlidir. Belediyelerin mutabakatla imzaladıkları ve söz verdikleri gibi var olan tesislerin standartlarını bir an önce yükseltmeleri gerekiyor. Marmara Denizi'ne bir litre bile kirli su gelmesine izin veremeyiz, vermemeliyiz. Sorumluluk alanlarına girmeyen konuları maalesef böyle gündemler ortaya geldiğinde polemikle tartışmayla gündeme taşıyarak Marmara Denizi'ni kurtaramayız. Milleti farklı gündemlere yönlendirip kendi sorumluluk alanını gizlemekten, gözlerden uzak tutmaktan belediyelerimiz	We announced our Marmara Sea Action Plan, which consists of 22 items. However, the most important items of these actions have still not been implemented by our municipalities, not a single step has been taken. (...) We do not want to experience the mucilage problem again. Please fulfill your promises to our nation and nature before it is too late. It is essential to build the promised wastewater treatment plants as soon as possible in order to prevent mucilage and similar problems from happening again. It is very important that the 22-point actions that our municipalities have put forward without any objection are carried out as soon as possible. Municipalities need to raise the standards of existing facilities as soon as possible, as they signed and promised with the agreement. We cannot and should not allow even a liter of polluted water to come into the Sea of Marmara. Unfortunately, we cannot save the Sea of Marmara by bringing issues that do not fall within their area of responsibility to the agenda with polemics and discussions when such agendas arise. Our municipalities should stop directing the nation to different agendas, hiding their own area of responsibility and keeping it out of sight, and	Governmental Bodies

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	vazgeçmeli ve acilen işlerine odaklanmalıdır. Siyaseten bu tarz gündemler peşinde koşarak kendinizi bir süre kurtarabilirsiniz ama söz verdiğiniz aksiyonları yapmazsanız o güzel Marmara'mızı kaybederiz. Ben tekrar tekrar Marmara'ya kıyısı olan tüm belediyelerimizi kendi sorumluluklarına, Marmaray'ı kurtarmaya davet ediyorum.	focus on their work urgently. You can save yourself for a while by pursuing such political agendas, but if you do not take the actions you promised, we will lose our beautiful Marmara. I repeatedly invite all our municipalities on the coast of Marmara to their own responsibilities and to save Marmaray.	
43	Bakanlık olarak 25 Aralık 2024'te tekrar harekete geçtik. Müsilaj Bilim ve Teknik Kurulu'nu Ankara'da topladık. Toplantıda yerine getirilmeyen 3 önemli maddeden biri olan ileri biyolojik atık su arıtma tesislerinin eksikliğini hocalarımız tekrar tekrar vurguladılar. Buradan belediyelerimize diyoruz ki; lütfen, hep birlikte, ortak akılla ortaya koymuş olduğumuz 22 maddelik eylem planını hep birlikte uygulayalım, millete verdiğimiz sözleri tutalım.	As the Ministry, we took action again on December 25, 2024. We convened the Mucilage Science and Technical Committee in Ankara. Our professors repeatedly emphasized the lack of advanced biological wastewater treatment facilities, which is one of the 3 important items that were not fulfilled at the meeting. From here, we say to our municipalities; Please, let's implement the 22-point action plan that we have put forward with a common mind, and keep our promises to the nation.	Governmental Bodies
44	Ekosistemin dengesi bozuldukça, besin tuzları ve organik madde miktarı arttıkça bazı türler aşırı derecede artış gösteriyor. Daha sonra bunların ölümüyle birlikte parçalanma, ayrışma sürecinde ortamdaki bakteriyel faaliyetle birlikte müsilaj ortaya çıkıyor.	As the balance of the ecosystem deteriorates and the amount of nutrient salts and organic matter increases, some species increase excessively. Then, with their death, mucilage emerges with bacterial activity in the environment during the disintegration and decomposition process.	Academics
45	Önümüzdeki dönemlerde müsilajın ne şekilde görüleceği biraz da iklim koşullarına bağlı olacak. Çünkü mevcut kirlilik baskısı sürdüğü ve Karadeniz suyundaki girişlerde bir azalma olduğu sürece, Marmara'daki yüzey suyunda değişim az olacaktır. Bu da önümüzdeki aylarda daha yoğun bir sürecin habercisi olabilir. Ancak buradaki ana hedef oksijen seviyesinde artış sağlamak. Oksijeni artırmak için de hem şehir atıklarının bir an önce ileri biyolojik arıtmaya geçirilmesi hem de yayılı kaynaklardan gelen girdilerin azaltılması gerekiyor.	How mucilage will be seen in the coming periods will depend on climatic conditions. Because as long as the current pollution pressure continues and there is a decrease in the inflows in the Black Sea water, the change in the surface water in Marmara will be small. This may herald a more intense process in the coming months. However, the main goal here is to increase the oxygen level. In order to increase oxygen, both city wastes should be transferred to advanced biological treatment as soon as possible and inputs from diffuse sources should be reduced.	Academics
46	bir zamanlar balıkların yaşadığı canlı bir ekosistemken, bugün IV. Sınıf su kalitesine sahip bir atık kanalına dönüşmesinin” halk sağlığını ve Marmara Denizi'ni tehdit ettiğini belirterek, Çevre, Şehircilik ve İklim Değişikliği Bakanı Murat Kurum'un yazılı olarak yanıtlanması istemiyle konuyla ilgili kapsamlı bir soru önergesi sundu.	once a living ecosystem inhabited by fish, today it has turned into a waste channel with Class IV water quality", threatening public health and the Sea of Marmara, and submitted a comprehensive parliamentary question on the subject with the request of the Minister of Environment, Urbanization and Climate Change, Murat Kurum, to answer in writing.	Governmental Bodies
47	Yaz sıcaklarının artmasıyla birlikte, deniz suyunun sıcaklıkları da artış göstermeye başladı. Müsilaj da maalesef deniz suyu sıcaklığının artmasıyla birlikte yüzeyde kendini göstermeye başladı. Geçtiğimiz kış aylarından itibaren biliyoruz ki denizin derinlerinde müsilaj oluşumu başlamıştı ve canlı yaşamını tehdit	With the increase in summer heat, the temperatures of sea water have also started to increase. Unfortunately, mucilage started to show itself on the surface with the increase in sea water temperature. Since last winter, we know that mucilage formation had started in the depths of	Academics

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	etmeyle ilgili riskler barındırıyordu ve şimdi de gördüğümüz manzara aslında bunun tam anlamıyla gerçekleşmeye başladığının göstergesi	the sea and there were risks of threatening living life, and the scene we see now is an indication that this has started to happen	
48	"Marmara Denizi artık yaşamakta zorlanıyor. Ergene nehrine deşarj yapan arıtma tesislerinin 2021 den bu yana Marmara denizine çevrilmesinden kısa bir süre sonra Marmara denizinde müsilaj görülmeye başladı. Marmara denizi eylem planı sözde uygulamaya alındı, planda kaçak deşarjlarla mücadele, OSB arıtmalarına yönelik kesin hükümler, müsilaja sebep olan gübre, deri, gıda sanayi ve deniz suyunu soğutma suyu olarak kullanan tesislere karşı özel önlemler yoktu.	"The Sea of Marmara is now having difficulty living. Shortly after the treatment plants discharging into the Ergene river were converted to the Marmara Sea since 2021, mucilage began to appear in the Marmara Sea. The Marmara Sea action plan was supposedly put into practice, there were no special measures in the plan to combat illegal discharges, definite provisions for OIZ treatments, fertilizers, leather, food industry and facilities that use sea water as cooling water that cause mucilage.	Resident
49	Denizin yüzeyindeki müsilaj toplanarak bitti algısı toplumun bilincine yerleştirildi. AKP iktidarı geçen üç yıllık süreçte denizin kirletilmesini önleyecek iradeyi göstermedi, Ekim 2024 te müsilaj tekrar ortaya çıktı. Deniz tabanını saran tül görünümüne yoğun yapılar oluştu. 2025 yılı ilk aylarında deniz suyunu filtreleyen pina, sünger, mercan, midyeler ile denize oksijen sağlayan deniz çayırılarının üstünü kaplayarak denizi hızla ölüme sürüklemeye başladı"	The perception that the mucilage on the surface of the sea was collected and finished was placed in the consciousness of the society. The AKP government has not shown the will to prevent the pollution of the sea in the past three years, and mucilage reappeared in October 2024. Dense structures with a tulle appearance surrounding the seabed were formed. In the first months of 2025, it started to rapidly drag the sea to death by covering the seagrasses that provide oxygen to the sea with pina, sponges, corals, mussels that filter the sea water."	Resident
50	Marmara Denizi derinliğinin yüzde 98'inde yaşayan canlılar oksijensiz bırakılarak ölüme terk edildi. Bilim insanlarının yıllardır yaptığı uyarılar ortadayken, iktidar Marmara Denizi'ne öldürücü bir darbe daha indirmek üzere. Nilüfer Çayı'na boşaltılan atık sular, Karacabey Boğazı'na derin deşarj yöntemiyle aktarılacak. Bu daha fazla kirlilik, daha fazla müsilaj ve daha az yaşam demektir. Marmara Denizi'nin ölüm fermanı olan bu projeye açıkça karşı çıkıyoruz.Zaten kirli akan Nilüfer Çayı, kapalı bir kanal sistemiyle daha da yoğun ve gizli bir kirlilik tehdidine dönüşecektir. Eğer bu proje durdurulmazsa kirlilik patlayacak, oksijensiz ölü bölgeler su yüzeyine ulaşacak, Marmara Denizi geri dönülmez biçimde kaybedilecektir. Üstelik bu proje, müsilajın yeniden görülmeye başladığı bir dönemde, bilim insanlarının tüm uyarılarına rağmen gündeme getirildi. Sanki doğayı savunan herkesle dalga geçilir gibi. Bilinmelidir ki yapılmak istenen şey, kirliliği derine itmek, halının altına süpürmektir.	Creatures living in 98 percent of the depth of the Sea of Marmara were left to die by being deprived of oxygen. While the warnings made by scientists for years are obvious, the government is about to deal another fatal blow to the Sea of Marmara. Wastewater discharged into the Nilüfer Creek will be transferred to the Karacabey Strait by deep discharge method. This means more pollution, more mucilage and less life. We openly oppose this project, which is the death warrant of the Sea of Marmara. The already polluted Nilüfer Creek will turn into an even more intense and hidden pollution threat with a closed canal system. If this project is not stopped, pollution will explode, oxygen-free dead zones will reach the water surface, and the Sea of Marmara will be irreversibly lost. Moreover, this project was brought to the agenda at a time when mucilage was starting to appear again, despite all the warnings of scientists. It's as if everyone who defends nature is made fun of. It should be known that what is wanted to be done is to push the pollution deep and sweep it under the carpet.	Resident
51	Bazı atık su arıtma tesisleri bugün bile gözümüzün önünde açıkça kirli deşarj yaparken, Bakanlık bunu bile engellemezken,	Who can claim that it will not be discharged without treatment in a closed channel, when some wastewater treatment plants are clearly	Resident

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	kapalı kanalda arıtma yapılmadan deşarj edilmeyeceğini kim iddia edebilir? Üstelik mevcut kanun, kirlilik yükü çok daha yüksek atık suların denize derin deşarjına izin vermektedir.	dirty discharges in front of our eyes even today, and the Ministry does not even prevent it? Moreover, the current law allows for the deep discharge of wastewater into the sea with a much higher pollution load.	
52	Nilüfer Çayı, hem sanayi hem evsel atık su arıtma tesislerinin yeterince arıtmaması ve yaygın kaçak deşarjlar nedeniyle sürekli kirlenmektedir. İktidar, elindeki kamu gücüyle bu çayı ve ülkenin tüm derelerini temizleyebilirdi. Ama tercihini doğadan değil, sermayeden yana kullandı. Bugün derelerimiz, göllerimiz ve denizlerimiz bu tercihlerin sonucunu yaşıyor.	Nilüfer Creek is constantly polluted due to insufficient treatment of both industrial and domestic wastewater treatment plants and widespread illegal discharges. The government could have cleaned this Creek and all the Creeks of the country with the public power in its hands. But he chose capital, not nature. Today, our Creeks, lakes and seas are experiencing the result of these choices.	Resident
53	Biz halkız. Ve bizim talebimiz temiz akan derelerde, canlı kalan denizlerde, nefes alabilen şehirlerde yaşamaktır. Nilüfer Derin Deşarj Projesi derhal durdurulmalıdır. Yarını savunmak için bugünden ses veriyoruz.	We are the people. And our demand is to live in clean flowing Creeks, alive seas, and breathable cities. The Nilüfer Deep Discharge Project should be stopped immediately. We speak up today to defend tomorrow.	Resident
54	Deniz tabanına bağlı türler için bu tam bir trajedi. Marmara Denizi'ne boşaltılan atıklar arıtılmadığı sürece, deniz yaşamı yok olmanın eşiğinde. Ekosistemdeki bozulma artık geri dönüşü olmayan bir noktaya geldi.	For species that depend on the seafloor, this is a tragedy. As long as the wastes discharged into the Sea of Marmara are not treated, marine life is on the verge of extinction. The deterioration in the ecosystem has now reached a point of no return.	Experts
55	Asıl sorun görünmeyen kısım, Buzdağı gibi. Denizde olmak istiyorum, ama deniz ölüyor. Korkarım artık çok geç.	The real problem is the invisible part, like the Iceberg. I want to be in the sea, but the sea is dying. I'm afraid it's too late.	Public Figure
56	Organik atıklar suyun içerisindeki oksijeni tüketiyor. Oradaki organik kirletici parçalanıyor ve parçalanırken sudaki oksijeni tüketiyor. Sudaki oksijenin tükenmesi ile birlikte suyun içerisinde balıkların ve diğer canlıların yaşayabileceği çözülmüş oksijen seviyesi, neredeyse sıfıra düşüyor. Bu durum ekosistemi etkiliyor.	Organic wastes consume the oxygen in the water. The organic pollutant there breaks down and consumes the oxygen in the water as it breaks down. With the depletion of oxygen in the water, the level of dissolved oxygen in the water, where fish and other living things can live, drops to almost zero. This affects the ecosystem.	Academics
57	Ayrıca ölen balıkların toplanması, bir şekilde satılıp tüketilmesi, halk sağlığı açısından çok büyük bir risk teşkil ediyor. Çünkü o suda zaten bir kirlilik olduğu için, orada canlı ölümleri gerçekleşiyor. Balıkta biriken kirliliğin ne olduğunu bilmeden, ne kaynaklı olduğunu bilmeden o balıkları tüketmek, halk sağlığı açısından da oldukça riskli ve tehlikelidir	In addition, the collection of dead fish, their sale and consumption in some way poses a great risk to public health. Because there is already pollution in that water, living deaths occur there. Consuming those fish without knowing what the pollution accumulated in the fish is and without knowing what it originates from is very risky and dangerous in terms of public health	Academics
58	Yaşanan balık katliamını duyunca, Bursa'dan buraya geldim. Bakıyorum suyun üzerine, binlerce balık ölüsü var. İnsanlar, burada bu balıkları topluyor, evine götürüyor, çoluğuna çocuğuna yediriyor. Maalesef bu, insanları adeta zehirlemektir	When I heard about the fish massacre, I came here from Bursa. I look at the water, there are thousands of dead fish. People collect these fish here, take them home, and feed them to their children. Unfortunately, this is almost poisoning people	Resident
59	Bu, bir katliamdır. Nasıl olur da kedi veya köpek ölümlerinde insanlar ayaklanıyorsa, bunun için de harekete geçilmesi gerekiyor. Yazık değil mi? Bu hayvanlara nefes alabilmek için	This is a massacre. Just as people revolt over the deaths of cats or dogs, action needs to be taken for this. Isn't it a pity? It comes to the	Resident

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	yüzeye çıkıyor. Bunlar, suya ilaçları bırakıyor. Sonrasında hayvanlar zehirleniyor	surface to allow these animals to breathe. These leave drugs in the water. Then the animals are poisoned	
60	Bu bir çevre felaketi. Normalde de bazı aylarda hafif olarak görüyorduk ama bu derece hiç değildi. Denizin korunması gerekiyor çözüm olarak, denizi korumayıp devlet kaynaklı şovlarla bunu yapmak mümkün değil	This is an environmental disaster. Normally, we saw it as mild in some months, but this degree was not at all. The sea needs to be protected as a solution, it is not possible to do this with state-sponsored shows without protecting the sea	Experts
61	Atıksu yönetimi bunun temeli aslında, derin deniz deşarjları yüzünden marmara denizi dibinde yıllardır biriken bir kirlilik aslında. Halının altına süpürülen bir kısım gibi. 22 maddelik acil durum planının hiçbir maddesi acil olarak yapılacak şeyler değil. Haliç örneğini unutmamak gerekir ve buraya yapılan her aksiyonun ölümcül sonuçları olabileceğini unutmamak gerekiyor.	Wastewater management is actually the basis of this, it is actually a pollution that has accumulated at the bottom of the Marmara Sea for years due to deep sea discharges. It's like a part swept under the carpet. None of the items of the 22-item emergency plan are things to be done urgently. The example of the Golden Horn should not be forgotten and it should not be forgotten that every action taken here can have fatal consequences.	Academics
62	Ürkütücü bir görüntü, denize girmeyi asla düşünmüyoruz.	It's a frightening sight, we never think of swimming in the sea.	Resident
63	alınan önlemler geçici ve yüzeysel. Sadece görüntü olarak işe yarayacak.	The measures taken are temporary and superficial. It will only work as an image.	Resident
64	İnsanların artık korkusu var denize yaklaşmaya ve haklılar çünkü patojen taşıyor ve biz insanların bunlara yaklaşmasını istemiyoruz.	People now have a fear of approaching the sea and they are right because it carries pathogens and we don't want people to approach them.	Academics
65	Tanker facıalarından sonra yaşadığımız en büyük sıkıntı. Balıkçılar olarak çok zordayız.	It is the biggest problem we have experienced after tanker disasters. As fishermen, we are in a very difficult situation.	Fisher
66	Özel bir ağ ile balık yakalamaya çalıştık çok para harcadık ancak başaramadık ve hiçbir balıkçı şu an avlanamıyor.	We tried to catch fish with a special net, we spent a lot of money, but we couldn't and no fisherman can catch now.	Fisher
67	AORT damarımız tıkanmış durumda, bursa eğer bir adım atılmazsa terkedilen bir şehir olacak. Yerleşim yerleri, tarımsal faaliyetler ve sanayi ana nedenler olarak görülüyor.	Our AORT vein is blocked, Bursa will be an abandoned city if no step is taken. Settlements, agricultural activities and industry are seen as the main reasons.	Governmental Bodies
68	Sanayinin yer altından su çekmesi tarımın vahşi sulama yapması ve betonlaşma yüzünden oluyor.tekstildeki boyalar, metal sanayi, gıda sanayindeki katkı maddeleri. Her bir kirlilik yükü tek başına bu hale getirmiyor.	The industry's extraction of water from underground is due to agriculture's wild irrigation and concreting, dyes in textiles, metal industry, additives in the food industry. Each pollution alone does not make the load like this.	NGOs
69	Nilüfer çayının bursa valiliği koordinasyonu ile bir komisyon kurulması lazım. herkes bir şeyler yapıyor ancak bir koordinasyon yok.	A commission should be established with the coordination of the Bursa governorship of Nilüfer creek. Everyone is doing something, but there is no coordination.	NGOs
70	Baskıların envanteri çıkarılmalı. dip taraması yapılması şart. Siz altını temizlemeden üstünü temizleyemezsiniz bu suyun. Arıtma tesislerinin tam kapasite çalışmasının sağlanması ve kurulması gerekmektedir. Ve denetim kesinlikle yapılmalı.	An inventory of the prints should be made. Bottom dredging is a must. You cannot clean the top of this water without cleaning the bottom. It is necessary to ensure and establish full capacity operation of treatment plants. And the inspection should definitely be done.	NGOs

Statement no	Statements Turkish	Statements English	Stakeholder Group
71	Gazeteci olarak yaptığım araştırmalar ve görüşlere göre Nilüfer Çayı'nda ana sorun kirlilik. Nedenleri sanayi atıkları, evsel atıklar ve çevresel etkenler.	According to my research and opinions as a journalist, the main problem in Nilüfer Creek is pollution. The causes are industrial wastes, domestic wastes and environmental factors.	Journalists
72	Müsilajın kaynaklarından biri Akarsular aracılığıyla denize dökülen evsel ve sanayi atıkları.	One of the sources of mucilage is domestic and industrial wastes poured into the sea through rivers.	Journalists
73	Denetimlerin sıklaştırılması, ağır yaptırımlar, insanların doğaya saygı göstermeyi öğrenmesi ile bu kirlilik sorununu çözebiliriz	We can solve this pollution problem by tightening inspections, heavy sanctions, and people learning to respect nature	Journalists
74	Müsilaj ve Nilüfer Çayı hakkında yapılan haberlerde en çok dikkat çeken kaynağında temiz ve içilebilir olan suya Marmara'ya döküldüğü noktada kokudan yaklaşılamaması.	The most striking thing in the news about Mucilage and Nilüfer Creek is that the water, which is clean and drinkable at its source, cannot be approached from the smell at the point where it is poured into the Marmara.	Journalists
75	Haberlerin ardından kamuoyunda yankı bulunca OSB fabrikaları denetlendi, bazılarına cezalar verildi.	After the news, when it resonated with the public, OIZ factories were inspected and some were fined.	Journalists
76	Marmara Denizi / Nilüfer çayı ile bağlantı: sanayi tarafından kullanılmayacak derecede kirlenmiş, müsilaj oluşumuna katkı yapıyor.	Connection with the Marmara Sea / Nilüfer Creek: polluted to the extent that it cannot be used by the industry, it contributes to the formation of mucilage.	Journalists
77	Nilüfer Çayı'nın ana sorunu: sanayi kaynaklı kirlilik, içinde canlı yaşamıyor.	The main problem of Nilüfer Creek: pollution from industry, no living creatures live in it.	Journalists
78	Nilüfer Çayının kirlilik sebebi kaçak deşarjlar, belediye ve özel şirketlerin denetim sorunları.	The cause of pollution of Nilüfer Creek is illegal discharges, inspection problems of municipalities and private companies.	Journalists
79	Müsilajın ana sebebi: Marmara'nın alıcı ortam olamayışı, derin deniz deşarjları, biyolojik arıtma eksikliği.	The main cause of mucilage: Marmara is not a receiving environment, deep sea discharges, lack of biological treatment.	Journalists
80	Bence çözüm derin deşarjın durdurulması, ileri biyolojik arıtma zorunlu hale getirilmeli, sıkı denetim ve cezalar uygulanmalı.	I think the solution is to stop deep discharge, advanced biological treatment should be made mandatory, strict controls and penalties should be applied.	Journalists
81	Genel olarak STKlarda yaşadığımız sorun direnç, işlevsizleşme, ama bazı platformlar etkinlik sağladı.	In general, the problem we have in NGOs is resistance, dysfunction, but some platforms have provided effectiveness.	Journalists
82	STKlar ile beraber aktif hareket etme durumunda Kamu kurumları ile çalışmıyoruz, özel sektörle işbirliği yapmıyorlar.	In case of active action with NGOs, we cannot work with public institutions, they do not cooperate with the private sector.	Journalists
83	Paydaş işbirliği: mevcut siyasi iktidar göz boyuyor, çözüm için duyarlı iktidar gerekir.	Stakeholder cooperation: the current political power is deceived, a sensitive government is needed for a solution.	Journalists
84	Nilüfer Çayı çoğunlukla sanayi kaynaklı kirletilmektedir. 1970'lerden sonra hızla kirletilen çay günümüzde pis kokan ölü su kütlesidir.	Nilüfer Creek is mostly polluted by industry. creek, which was rapidly polluted after the 1970s, is a body of dead water that smells bad today.	NGO's
85	Kaçak deşarjlar, arıtma sorunları, gece kirlilik şikayetleri.	Complaints of illegal discharges, treatment problems, pollution at night.	NGO's
86	Nilüfer Çayı sanayi ve kanalizasyon suları ile sürekli kirlenmektedir.	Nilüfer Creek is constantly polluted by industrial and sewage water.	NGO's

Statement no	Statements Turkish	Statements English	Stakeholder Group
87	Marmara Denizi'nin mevcut durumu sürdürülemez.	The current situation of the Sea of Marmara is unsustainable.	Experts
88	1989'dan beri kitlesel canlı ölümleri ve oksijen düşüşü görülmektedir.	Since 1989, mass deaths and oxygen decline have been observed.	Experts
89	Marmara Denizi atıksu havuzu gibi kullanılmaktadır.	The Marmara Sea is used as a wastewater pool.	Experts
90	Derin deniz deşarjı çevre suçu olarak görülmelidir.	Deep sea discharge should be seen as an environmental crime.	Experts
91	Müsilajın sebebi kirlenme zincirinde bir halkadır.	The cause of mucilage is a link in the chain of pollution.	Experts
92	Çözüm: doğa temelli çözümler, bilimsel temelli izleme sistemleri.	The solution: nature-based solutions, scientifically based monitoring systems.	Experts
93	Sistematik kirlenme sonucu biyolojik alan daralmaktadır.	As a result of systematic pollution, the biological area is shrinking.	Experts
94	2020 müsilajı sadece görünen yüzdür.	The 2020 mucilage is just the visible face.	Experts
95	Bulanıklık ve ışık geçirgenliği sorunu büyüktür.	The problem of turbidity and light transmission is big.	Experts
96	Çözüm: uluslararası bağlayıcılığı olan koruma konvansiyonu gereklidir.	Solution: an internationally binding protection convention is needed.	Experts
97	Marmara Denizi sistematik kirlenme sonucu bozulmuş.	The Sea of Marmara has deteriorated as a result of systematic pollution.	Experts
98	atıksuların hepsi Marmara'ya akıyor	All wastewater flows into Marmara	Experts
99	Oşinografik yapı atıkları seyreltmeye yetmiyor, kirlilik kronikleşiyor.	The oceanographic structure is not enough to dilute the waste, pollution becomes chronic.	Experts
100	2020 müsilajı sorunun görünen yüzüydü.	The 2020 mucilage was the visible face of the problem.	Experts
101	Bulanıklık en kritik sorun, ışık geçirgenliği 19 metreden 2.2 metreye düştü.	Turbidity is the most critical problem, with light transmittance dropping from 19 meters to 2.2 meters.	General Public
102	En büyük sorun: palyatif mühendislik uygulamaları.	The biggest problem: palliative engineering practices.	General Public
103	Müsilaj oluşumunun üç fazı: türlerin azalması, kalanların anormal artışı, cansız ortama dönüş.	Three phases of mucilage formation: decrease of species, abnormal increase of remainder, return to the inanimate environment.	General Public
104	Nilüfer Çayı'nın Marmara'ya katkısı: var ama genel yük yanında az.	The contribution of Nilüfer Creek to Marmara: There is, but it is less compared to the general burden.	General Public
105	Çözüm: doğa temelli çözümler, bilimsel izleme, bağımsız konvansiyon.	The solution: nature-based solutions, scientific monitoring, independent convention.	General Public
106	Yerel yönetimlerin rolü: mevzuat yetersiz, merkezi idare sorunlu.	The role of local governments: legislation is inadequate, central administration is problematic.	General Public
107	Önlemler: yetersiz.	Precautions: insufficient.	General Public
108	Sonuç: Marmara Denizi can çekişiyor, bilimsel ve bütüncül çözümler gerekiyor.	Conclusion: The Sea of Marmara is dying, scientific and holistic solutions are required.	General Public
109	Sanayiler sebebiyle Nilüfer Çayı kirlendi, ölçümlerde ağır metaller görüldü.	Nilüfer Creek was polluted due to industries, heavy metals were seen in the measurements.	Academics
110	DSİ plan yaptı ama Nilüfer Çayı'nı dahil etmedi.	DSI made a plan, but did not include the Nilüfer Creek.	Academics
111	Kaçak sanayiler ve kontrol eksikliği sorun.	Illegal industries and lack of control are the problem.	Academics

Statement no	Statements Turkish	Statements English	Stakeholder Group
112	Biz daha önce bu konuyla ilgili izleme teknolojileri geliştirdik ancak bu TÜBİTAK projeleri reddedildi.	We have previously developed monitoring technologies on this subject, but these TÜBİTAK projects were rejected.	Academics
113	Atıksu arıtma tesisleri yüksek maliyet nedeniyle çalışmıyor ya da çalışmıyor gösteriliyor.	Wastewater treatment plants are shown not to work or not to work due to high cost.	Academics
114	Havza yönetim planları var ama yetersiz.	There are basin management plans, but they are insufficient.	Academics
115	Nilüfer Çayı kirliliği tarımdan değil, sanayi atıklarından.	Nilüfer Creek pollution is not from agriculture, but from industrial wastes.	Academics
116	Çözüm: atık yönetimi, izleme sistemleri, OSB sularının kontrolü.	Solution: waste management, monitoring systems, control of OIZ waters.	Academics
117	Uludağ'dan su şirketleri şişeleme suyu alıyor, köylüye su gelmiyor.	Water companies buy bottled water from Uludağ, but no water comes to the villagers.	Local Residents
118	Nilüfer Çayı endüstrilerin suyu.	Nilüfer Creek is the water of industries.	Local Residents
119	Sanayi Tesisleri kurulduktan sonra Nilüfer Çayı bitti.	After the Industrial Facilities were established, the Nilüfer Creek was finished.	Local Residents
120	1980'lerde Nilüfer Çayı'nda yüzebiliyorduk.	In the 1980s, we could swim in the Nilüfer Creek.	Local Residents
121	Sanayi tesisleri açılınca çay kirlendi.	When industrial facilities were opened, the creek became polluted.	Local Residents
122	Gece su olmuyor, tarım arazilerinde sulama sorunu var.	There is no water at night, there is an irrigation problem in agricultural lands.	Local Residents
123	Çok sayıda kaçak sanayi tesisi var.	There are many illegal industrial facilities.	Local Residents
124	Marmara sahillerindeki müsilajı biz temizledik.	We cleaned the mucilage on the Marmara coast.	Governmental Bodies
125	Kirlilik farklı kaynaklardan geliyor.	Pollution comes from different sources.	Governmental Bodies
126	Her kurum farklı sorumlu olduğu için ortak karar alınamıyor.	Since each institution is responsible differently, joint decisions cannot be made.	Governmental Bodies
127	Belediyeler kendi inisiyatifi ile müsilaj topladı.	Municipalities collected mucilage on their own initiative.	Governmental Bodies
128	Sorun hala devam ediyor, ortak kurul ve günlük ölçüm lazım.	The problem still continues, a joint board and daily measurement are needed.	Governmental Bodies
129	Köylüler arasında su yüzünden tartışmalar çıkıyor.	There are arguments among the villagers over water.	Local Residents
130	tarım bitiyor çünkü su yok, destek yok, kokudan rahatsızsınız, çocuklarımız burada yaşamak istemiyor	Agriculture is ending because there is no water, no support, we are uncomfortable with the smell, our children do not want to live here	Local Residents
131	bazı vekiller köyümüze gelip su sorununu çözeceğini söyledi.	Some deputies came to our village and said they would solve the water problem.	Local Residents
132	Hiçbir yatırım yapılmadı, köylülerle konuşulmadı.	No investment was made, no conversation was made with the villagers.	Local Residents
133	Köylüler arasında dayanışma yok.	There is no solidarity among the villagers.	Local Residents
134	Tarımsal sulama için Nilüfer Çayı'nı kullanıyorum.	I use Nilüfer Creek for agricultural irrigation.	Local Residents
135	Ürünlerde doğrudan zarar görmedim ama koku rahatsız ediyor.	I was not directly damaged by the products, but the smell is disturbing.	Local Residents

Statement no	Statements Turkish	Statements English	Stakeholder Group
136	Endüstrilerin atık günlerinde kırmızı su akıyor, bazı çiftçiler gübre niyetine kullanıyor.	Red water flows on the waste days of the industries, some farmers use it as fertilizer.	Local Residents
137	Sanayi tesisleri yüzünden çay kirlendi.	Creek was polluted because of industrial facilities.	Local Residents
138	Nilüfer Çayı'nın ana sorunu sanayi tesislerinin atıklarıdır.	The main problem of Nilüfer Creek is the wastes of industrial facilities.	Journalists
139	Müsilajın sebebi insan ve kirliliktir.	The cause of mucilage is human and pollution.	Journalists
140	Çözüm: denetim, Marmara Eylem Planı, doğal kaynakların korunması.	Solution: audit, Marmara Action Plan, protection of natural resources.	Journalists
141	Haberlerde kirlilik sadece görünür olunca gündem oluyor.	Pollution in the news is only on the agenda when it is visible.	Journalists
142	Kamuoyunun bir kısmı önlem aldı, bir kısmı normalleştirdi.	Some of the public took precautions, some normalized it.	Journalists
143	Kaçak deşarjlarla ilgili belediye çalışmalar yürüttü ama kalıcı çözüm yok.	The municipality has carried out studies on illegal discharges, but there is no permanent solution.	Journalists
144	Devlet kurumları bilgi vermiyor, uzmanlara ulaşmak zor.	State institutions do not provide information, it is difficult to reach experts.	Journalists
145	Marmara Eylem Planı hazırlandı ama uygulanmadı.	The Marmara Action Plan was prepared but not implemented.	Journalists
146	Paydaş işbirliği için adımlar atılmalı, halkı aktif hale getirmek gerekiyor.	Steps should be taken for stakeholder cooperation, and it is necessary to make the public active.	Journalists
147	1993 yılında İstanbul için bir ana plan hazırlandı; dört büyük ileri biyolojik arıtma tesisi önerildi (Göktürk, Riva, Tuzla ve Küçükçekmece). Ancak ileri arıtma pahalıydı ve çok fazla alan gerektiriyordu. Bu nedenle projeler ertelendi.	In 1993, a master plan was made for Istanbul; 4 large advanced treatment plants were proposed (Göktürk, Riva, Tuzla, Küçükçekmece). But advanced treatment was expensive and required a lot of space. That's why the projects were postponed.	Academics
148	1997–2000 revizyonunda, öncelikle acil derin deniz deşarjları yapıldı. (...) Derin deniz deşarjı literatürde bir arıtma teknolojisi olarak kabul edilmektedir; ancak ölçüm ve izleme yapılması zorunludur. Raporlarda da bu husus belirtilmiştir. (...) Baltalimanı derin deniz deşarjına biyolojik arıtma eklenmiştir; bunun diğer noktalarda da yapılması gerekir. Eğer bu yapılmazsa, önümüzdeki yıllarda müsilaj ataklarını sıkça görürüz.	In the 1997–2000 revision, emergency deep-sea discharges were made first. (...) Deep sea discharge is considered a treatment technology in the literature, but measurement and monitoring must be done. The reports also stipulated this. (...) Biological treatment has been added to the Baltalimanı deep sea discharge; This should be done to other points as well. If it is not done, we will see mucilage attacks frequently in the coming years.	Academics
149	İstanbul'da 106 adet dere bulunmaktadır. Atık suların bu derelere bağlanmaması gerekirdi; ancak hatalı bağlantılar nedeniyle yıllardır arıtılmamış atıklar Marmara'ya gitmektedir. Kurbağalıdere'nin kokmasının nedeni de bu yanlış bağlantılardır.	There are 106 Creeks in Istanbul. Wastewater should not have been connected to them, but with the wrong connections, untreated waste for years goes to Marmara. If Kurbağalıdere smells, it is because of these wrong connections	Academics
150	"Arıtma tesisleri Marmara Bölgesi için yeterli değildir." Atıkların kontrol altına alınması gerekmektedir. Müsilajla mücadele kapsamında hazırlanan eylem planında birçok doğru karar alınmıştır. Ancak asıl önemli olan, bu kararların	"Treatment plants are not sufficient for the Marmara Region." Waste needs to be controlled. In the action plan, many correct decisions were taken to fight mucilage. But what matters is the implementation of these decisions and subsequent inspections... Treatment plants are	Academics

Statement no	Statements Turkish	Statements English	Stakeholder Group
	uygulanması ve sonrasında yapılacak denetimlerdir... Arıtma tesisleri Marmara Bölgesi için yeterli değildir. Bazı belediyelerin arıtma tesislerine ciddi yatırımlar yaptığını görüyoruz; ancak nüfus yoğunluğu ile karşılaştırıldığında bu tesislerin kapasiteleri yetersiz kalmaktadır.	not sufficient for the Marmara Region. We see that some municipalities have invested heavily in treatment plants, but compared to the population density, their capacities remain inadequate.	

APPENDIX B: QUESTION LIST FOR SEMI-STRUCTURED INTERVIEWS

EK 2- SORU ÖRNEKLERİ

Uzmanlar

- Nilüfer Çayı'nın mevcut durumu hakkında genel bir değerlendirme yapabilir misiniz?
- Nilüfer Çayı'nın ana sorunu nedir?
- Müsilajın ana sebebi sizce nedir?
- Sizce bu sorunun giderilmesi için ne yapılması gerekiyor, kim tarafından?
- Nilüfer Çayı çevresindeki tarımsal faaliyetler su kalitesini nasıl etkiliyor?
- Tarımsal gübre ve pestisit kullanımı Nilüfer Çayı'ndaki kirliliği nasıl tetikliyor?
- Bursa'da sanayi tesislerinin artması Nilüfer Çayı üzerinde ne tür etkiler yaratıyor?
- Marmara Denizi'nde müsilaj oluşumunun ana nedenleri nelerdir?
- Nilüfer Çayı'nın Marmara Denizi'ndeki müsilaj oluşumuna katkısı hakkında ne düşünüyorsunuz?
- Müsilajın ekosistem ve su kalitesi üzerindeki uzun vadeli etkileri neler olabilir?
- Bölgedeki atıksu yönetimi uygulamaları bu sorunun çözülmesinde ne kadar etkili?
- Daha etkili bir atık yönetim sistemi için önerileriniz neler?
- Yerel yönetimlerin müsilaj ve Nilüfer Çayı kirliliği konusunda alması gereken önlemler neler olabilir?

Gazeteciler ve Basın

- İlgi alanınız nedir? Ne türde haberler yapıyorsunuz?
- Nilüfer Çayı'nın ana sorunu nedir?
- Müsilajın ana sebebi sizce nedir?
- Sizce bu sorunun giderilmesi için ne yapılması gerekiyor, kim tarafından?
- Müsilaj ve Nilüfer Çayı hakkında yapılan haberlerde dikkatinizi çeken en önemli unsurlar neler?
- Bu haberlerin kamuoyuna yansımaları sizce nasıl oldu?
- Bursa Nilüfer Çayı ile ilgili kronik bir sorunun medyada yer alması sonrası aksiyon alınma süreçleri nasıl işliyor?
- Müsilaj ya da Nilüfer Çayı hakkında haber yaparken, yetkili kişilere ulaşmada zorluk yaşıyor musunuz? Hangi aşamalardan geçiyorsunuz ve uzmanlarla görüşme fırsatınız oluyor mu?
- Müsilaj ya da Nilüfer Çayı ile ilgili haberlerin ardından kamuoyunda veya uygulamada nasıl değişimler yaşandı?

Sivil Toplum Kuruluşları

- Topluluğunuzun çalışma amacı nedir? Marmara denizi / Nilüfer çayı ile nasıl bir bağınız var? Hangi çevresel konular üzerine çalışıyorsunuz?
- Nilüfer Çayı'nın ana sorunu nedir?
- Müsilajın ana sebebi sizce nedir?
- Sizce bu sorunun giderilmesi için ne yapılması gerekiyor, kim tarafından?
- Marmara Denizi özelinde yürüttüğünüz çalışmalar hakkında bilgi verir misiniz?
- Nilüfer Çayı özelinde yürüttüğünüz çalışmaları nasıl değerlendiriyorsunuz?
- Yapılan sivil toplum örgütlenmeleri ve diğer derneklerle çalışmalar sırasında gözlemlediğiniz sorunlar nelerdir?
- Akademik dünyadan, kamu kurumlarından veya özel sektörden nasıl bir ortaklık kurulabilir bekliyorsunuz?
- Paydaşlar arasında etkili bir işbirliği ortamı oluşturmak için hangi adımların atılması gerektiğini düşünüyorsunuz?
- Bölge halkının bu süreçte daha aktif yer almasını sağlamak için bir mekanizma var mı, yoksa nasıl oluşturulabilir?

Hanehalkı

- Ne iş yapıyorsunuz? Mesleğinizin ya da yaşamınızın hangi noktası nilüfer çayı ile / Marmara denizi ile bağlantılı?
- Eğitim düzeyi
- Kaç yıldır Nilüfer Çayı etrafında yaşıyorsunuz? Çocukluğunuzdan bu yana Nilüfer Çayı'nda bir değişim fark ettiniz mi?
- Nilüfer Çayı'nın ana sorunu nedir?
- Müsilajın ana sebebi sizce nedir?
- Sizce bu sorunun giderilmesi için ne yapılması gerekiyor, kim tarafından?
- Çay üzerindeki kirlilik, günlük yaşamınızı nasıl etkiliyor?
- Müsilaj sorunu, bölgedeki su kaynaklarına olan güveninizi nasıl değiştirdi?
- Sizce bu sorun nasıl çözülür? (Kirlilik ya da müsilaj)
- Daha önce yetkililerle iletişime geçtiniz mi? Nasıl bir geri dönüş aldınız?
- Yetkililer sizinle iletişime geçti mi
- Sivil toplum örgütlerinin çalışmalarına katılım sağlıyor musunuz?
- Sizce halkın daha geniş katılım gösterebilmesi için nasıl bir sosyal hareket başlatılabilir?

Meclis Üyeleri, Belediyeler, Kurumlar

- Nilüfer Çayı'nın ana sorunu nedir?

- Müsilajın ana sebebi sizce nedir?
- Sizce bu sorunun giderilmesi için ne yapılması gerekiyor, kim tarafından?
- Yıllardır çözüm bulunamamasının ana sebepleri nelerdir?
- Gelecekte yapılacak çalışmalar için bir eylem planınız var mı? Şu ana kadar neler yapıldı, süreci anlatabilir misiniz?
- Nilüfer Çayı ve müsilaj sorunları için farklı bir strateji öneriyor musunuz?
- Müsilaj sorunuyla mücadele için çıkarılmış mevcut yasalar ve uygulamalar yeterli mi?
- Marmara Denizi ve Nilüfer Çayı'nın rehabilitasyonu için bütçe ve kaynak tahsisinde öncelikler nasıl belirlenmeli?
- Atıksu gönderen kurumlar arasında sürekli olarak parametreleri aşan firmalar var mı? Bu firmalara nasıl bir yaptırım uygulanıyor?

Nilüfer Çayı Etrafındaki Endüstriler

- Proseslerinizden ne tür atıksular çıkıyor? Bu atıksular nereye deşarj ediliyor?
- Ortam parametreleri ve SKKY çerçevesinde çıkan atıksu standartlara uyuyor mu?
- Nilüfer Çayı'nın ana sorunu nedir? Neden kirli?
- Müsilajın ana sebebi sizce nedir?
- Sizce bu sorunun giderilmesi için ne yapılması gerekiyor, kim tarafından?
- Atıksu tesislerinin çalışmaları ve raporları size aylık olarak iletiliyor mu?
- Diğer kirleticiler ve sanayi kirliliği genelde ayrı tutuluyor ve müsilaj için de nilüfer çayı kirliliği için de sanayi tesisleri suçlanıyor, siz bu yaklaşımı nasıl buluyorsunuz?
- Bu olumsuz söylemleri nasıl değıştirebiliriz, nasıl bir aksiyon alınsa sanayi tesisleri daha şeffaf olurdu sizce?

APPENDIX C: PHOTOS

Nilüfer Creek - Photo taken by the author. (25.07.2025)



Nilüfer Creek - Photo taken by the author. (25.07.2025)



Nilüfer Creek - Photo taken by the author. (25.07.2025)