

# Play Marmara "Sea" Game report, 21 October 2021

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# Preface

Being an inner sea, The Marmara Sea is particularly fragile for pollution. The fact that there is a water bridge between the Black Sea and the Aegean Sea, and that Turkey has the densest cities, both urban and industrial, on its shores, deepens this sensitivity. Today, our approach to ecological problems in the Marmara Sea is under three main headings: Sustainable environmental management (wastewater discharges, marine litter, pollution from ships, use of coastal areas, etc.), effective fisheries management (fight against uncontrolled hunting, ghost nets, etc.) and climate change policies (mitigation and adaptation actions). For these approaches, it will be very beneficial to expand the ground of cooperation and increase its effectiveness in the light of scientific research. Sustainability of responsible cooperation for combating mucilage (sea saliva) that has started to appear on the surface of the Marmara Sea as of 2021 will only be ensured by the continuity of common mind and communication. There are many dimensions related to the environmental management of the Marmara Sea, such as pollution prevention, pollution control, inspection operations and policy making. Play Marmara "Sea" aims to motivate the parties to develop solutions together for this multi-dimensional management with an effec-

tive gamification infrastructure. It is aimed to experience the changes in sea water quality and species diversity with the actions to be taken within the framework of the knowledge, capabilities and responsibilities of each stakeholder.

Play Marmara "Sea" is a multi-actor "serious" game that focuses on the sustainable management of the wastewater that meets the Marmara Sea through point and diffuse sources, and focuses on the changes in seawater quality parameters and the developments in the marine ecosystem accordingly. Play Marmara "Sea" has been specially prepared by Play the City for the Marmara Urban Forum (MARUF21), which was held on 1-3 October 2021, with the support of Marmara Municipalities Union (MBB), Ministry of Environment, Urbanization and Climate Change and METU Marine Sciences Institute. In addition, it is considered that Play Marmara "Sea" will be a strong support for the motto of #MarmaraHepimiz (Marmara is ourselves), which is embodied by the coming together of all parties. The participants of the game consist of local administrators, water and sewerage administration managers, experts, politicians, professional organizations, non-governmental organizations and independent researchers representing the cities on the

coast of the Marmara Sea. In the Play Marmara "Sea" game session, participants from different cities, decision makers from central and local governments and all responsible persons discovered together how the synergy they developed with a common mind in the light of the Marmara Sea Action Plan would benefit the Sea of Marmara.

Play Marmara "Sea" directly contributed to the 14th Sustainable Development Goal (SDG) "Conservation and sustainable use of oceans, seas and marine resources for sustainable development". It is also valuable in that it creates synergies with other purposes such as resilient infrastructures (SDG 9), sustainable cities and communities (SDG 11) and partnerships for sustainable development (SDG 17) by addressing human activities on a regional scale to protect aquatic life.

Secretary General  
Marmara Municipalities Union

**Dr. M. Cemil Arslan**

# Play Marmara "Sea" Executive Summary

The common findings of the physical game session held on October 21, 2021 with the participation of 25 key stakeholders are as follows;

Reducing agricultural pollution concentrated in the Northern Marmara, Çanakkale and Southern Marmara sub-regions

Controlling Industrial and Urban wastes focused on Istanbul, Izmit Bay and occasionally South Marmara

## **Reducing industrial and urban wastewater:**

Transforming all wastewater treatment plants in the Marmara Region into advanced biological wastewater plants and increasing the capacity of existing plants, reusing the outputs of domestic wastewater as a water source in agriculture and industry, preventing the discharge of black olive water and whey into the sea, and it was decided to make a phase change, to increase the supervision in organized industrial zones and to control the discharge points.

## **Reducing pollution from agriculture and livestock activities:**

It has been proposed to support good agricultural practices, prevent pesticides used in agriculture and ensure the collection of pharmaceutical wastes in the entire region, make necessary legislative changes, recover waste from livestock in biogas facilities and use it as organic fertilizer.

## **Reducing the pollution caused by fishing:**

It has been concluded that controls in fisheries should be increased and it is important to control fishing in the Turkish Straits, which are sensitive ecosystems.

## **Increasing community awareness and cooperation:**

It was stated that it is important to provide training support to producers in agriculture and animal husbandry, and that it is necessary to carry out activities that will raise awareness of the community in general and to support non-governmental organizations in this regard. Cooperation between the Ministry of Energy and Natural Resources and the Ministry of Agriculture and Forestry in applications such as environmental and technological transformation of existing facilities, generation of energy from biomass and control of waste from agricultural activities were stated.



# Process

Play Marmara “Sea” is a specially designed game in which stakeholders such as experts and authorities interact about possible solutions for pollution and mucilage in the Sea of Marmara. Play Marmara “Sea” is a serious multi-stakeholder game that focuses on the sustainable management of wastewater from point and diffuse sources and entering the Marmara Sea. Play Marmara “Sea”; It consists of three stages: an interactive digital survey, an online seminar and a game session.

## **1-Interactive Digital Questionnaire**

The Interactive Digital survey focuses on the living life in the Sea of Marmara, the economic and social life in the surrounding, the effect of wastewater from point and diffuse sources, and the reasons for the decrease in the amount of dissolved oxygen. It aims to attract the public's attention about the responsible stakeholders and the action plan, to determine the perception on this issue and to raise awareness about some misunderstood facts.

## **2-MARUF21 Session**

Interactive digital survey results were evaluated in the webinar, which is the second leg of the game. More detailed information about the MARMOD model was given by focusing on the developments in the sustainable environmental management of the Sea of Marmara and the Marmara Sea Action Plan studies.

## **3- Game Session**

The outputs of the interactive survey results were evaluated and entered into the game. In the third stage of the game, the relevant stakeholders came together and evaluated and prioritized the Marmara Sea Action Plan items.

# 1 Digital interactive poll

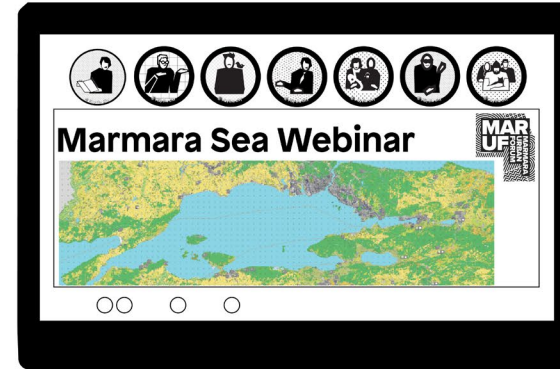
<https://playthecity.typeform.com/PlayMarmara>



invitation the webinar  
with participation poll

## 2 Webinar MARUF21

Online seminar session on October 2



### 3 Analog game session



into the game  
with experts

# Interactive Digital Poll

One of the main inputs of Play Marmara “Sea” design is the interactive digital questionnaire designed and published online as part of the MARUF21 preparation process, called MARUF On the Go.

The Interactive Digital Survey was published online from September 20 to September 29, 2021. A total of 327 people participated in the digital survey. The survey was designed to raise awareness of people living and working in the Marmara Region and to conduct a public survey on mucilage. The dissemination of the survey was provided by the communication network of the Union of Municipalities of Marmara. The participant profile is researchers, experts, professionals in ministries and municipalities. In the survey, 20 interrelated questions were asked about life in the sea, the effect of marine pollution on life, the reasons for the decrease in the amount of dissolved oxygen and how these reasons can be reduced.

At the end of the survey, 30 people were invited to participate in the Play Marmara “Sea” game session.

**What exactly are the causes of contamination? There are crowded cities around the Marmara Sea. In addition, these are places where industry and agricultural activities are intense. Beyond that, there is also the pollution load from neighboring seas. Which of the following do you think is the main reason that pollutes Marmara?**

327 people out of 327 answered this question



Industry

60.6% / 198 answers



Human Settlements

30.3% / 99 answers



Ship Waste

4.3% / 14 answers



Pollution from Black Sea

2.4% / 8 answers



Agriculture

2.4% / 8 answers





In the digital survey “What is the main pollutant of the sea?” question has been asked. Among the answers, “industry” was chosen with a majority of 60%. Other options, in order of preference; 30.3% mostly “human settlements”, 4.3% “ship waste”, and respectively “pollution from the Black Sea” and “agriculture” options were preferred.

Another question asked has been asked is "In your opinion, the right partnership that can manage the sea to achieve a healthy environment can be established by which stakeholders come together and work efficiently?". 322 people answered the question out of 327 people. The 3 most preferred stakeholders were "Ministry of Environment and Urbanization", "Researchers and Experts" and "Municipalities/Marmara Municipalities Union".

It is stated by various experts that one of the reasons for the formation of mucilage in the Sea of Marmara is the warming sea water. In order to prevent this, the articles of the Turkey Climate Change Strategy Plan made by the Ministry of Environment, Urbanization and Climate Change to prevent climate change were put to the vote in the digital survey. In the responses given, the action of "reusing and recycling waste" was chosen at a rate of 76%.

Thinking that the participants in the digital survey were the Sea of Marmara, it was asked whether they would have the legal power to be a plaintiff in court in the name of nature if they were struggling to survive under the influence of pollution, decreasing oxygen and global warming that you cannot cope with. This question was answered by 325 people out of 327, with 96.9% (315 answers) as "yes" and 3.1% (10 answers) as "no". The answers to the question of which stakeholders can we solve the pollution in the sea with partnerships were mostly given by the Ministry of Environment, Urbanization and Climate Change, researchers and experts, municipalities, Marmara Municipalities Union.

The Marmara Sea Action Plan (MADEP) was announced to the public in June 2021 by the Union of Marmara Municipalities and the Ministry of Environment, Urbanization and Climate Change. In the digital survey, participants were asked what kind of actions they would prioritize in the Marmara Sea Action Plan, which was gathered under 4 main headings as "Environmental Protection", "Innovative Practices", "Control" and "Innovative Legislation". Here, firstly, 36.1% of “control”, secondly 35.5% of “environmental protection”, thirdly 20.2% of “innovative practices” and finally 8.3% of “innovative legislation” related items.

In the context of this prioritization, it was asked which first two steps would be prioritized by those who chose "environmental protection and prevention", and this question was answered by 116 people out of 327. 60.3% of the answers (70 answers) Changing the discharge standards of wastewater treatment plants that discharge their treated wastewater into the Marmara Sea within 3 months; 49.1% (57 answers) Collaboration between public institutions and private companies for the conversion of wastewater treatment plants; 45.7% (53 answers) to designate the Marmara Sea as a protected area by the end of 2021.

### You chose environmental protection and prevention. Which first two steps would you prioritize?

116 people out of 327 answered this question



Changing the discharge standards of wastewater treatment plants that discharge their treated wastewater into the Marmara Sea within 3 months

60.3% / 70 answers



Collaboration between public and private companies for the conversion of wastewater treatment plants

49.1% / 57 answers



Determining the Marmara Sea as a protected area by the end of 2021

45.7% / 53 answers



Ensuring that fishing is carried out without disturbing the ecosystem of the sea and determining protection areas

20.7% / 24 answers



Reducing the use of detergents and promoting organic cleaning products

14.7% / 17 answers



Cleaning the underwater fishing nets in the Marmara Sea within 1 year

9.5% / 11 answers



## You chose innovative applications. Which first two steps would you prioritize?

63 people out of 327 answered this question

In the context of this prioritization, it was asked which first two steps would be prioritized by those who chose "innovative practices", and 63 people out of 327 answered this question. 74.6% of the answers (47 answers) to improve the plants whose treatment plants are not working properly and enabling the transition to advanced treatment technology; 74.6% (47 answers) of all wastewater treatment plants in the region are converted into advanced biological wastewater treatment plants; 68.3% (43 answers) to reuse treated wastewater and applying clean production techniques; 39.7% (25 answers) to use pressure and drip irrigation systems in agricultural areas, expanding organic agriculture; 36.5% (23 answers) are distributed as using clean methods in shipbuilding and repair.



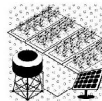
Enabling the transition to advanced treatment technology by improving the factories whose treatment plants are not working as they should

74.6% / 47 answers



Conversion of all wastewater treatment plants in the region to advanced biological wastewater treatment plant

74.6% / 47 answers



Ensuring reuse of treated wastewater and applying clean production techniques

68.3% / 43 answers



Using pressure and drip irrigation systems in agricultural areas, disseminating organic agriculture

39.7% / 25 answers



Using clean methods in shipbuilding and repair

36.5% / 23 answers





### You have chosen the control. Which first two steps would you prioritize?

118 people out of 327 answered this question

In the context of this prioritization, it was asked which first two steps would be prioritized by those who chose "Environmental Control", and 118 people out of 327 answered this question. 63.6% of responses (75 responses) to increase monitoring points from 91 to 150 for full control of wastewater treatment plants discharging into the sea; 44.1% (52 answers) to increase surveillance of sea-related rivers and agricultural areas with the help of remote sensing, satellite and early warning systems, unmanned aerial vehicles and radar systems; 39.8% (47 answers) to prevent the cooling water used in factories and hot water in thermal facilities from spilling into the sea. 19.5% (23 answers) to prevent pollution from reaching the sea by creating artificial wetlands in rivers and stream beds. 18.6% (22 answers) to make arrangements to prevent ships from dumping their wastewater into the sea. 14.4% (17 answers) to prevent pollution from olive black water and whey and make technological transformation to reduce wastewater.



Increasing monitoring points from 91 to 150 for full control of wastewater treatment plants that discharge to the sea

63.6% / 75 answers



Increase inspections of sea-related rivers and farmland with the help of remote sensing, satellite and early warning systems, drones and radar systems

44.1% / 52 answers



Preventing the cooling water used in factories and hot water in thermal facilities from spilling into the sea

39.8% / 47 answers



Preventing pollution from reaching the sea by creating artificial wetlands in rivers and stream beds

19.5% / 23 answers



Making arrangements to prevent ships from dumping their wastewater into the sea

18.6% / 22 answers



Prevent pollution from olive black water and whey and make technological transformation to reduce wastewater

14.4% / 17 answers



### You have chosen the new legislation. Which first two steps would you prioritize?

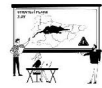
27 people out of 327 answered this question

In the context of this prioritization, it was asked which first two steps would be prioritized by those who chose "New legislation", and 27 people out of 327 answered this question. 70.4% (19 answers) of the responses prepared and implemented the Regional Waste Management Action Plan and Marine Litter Action Plan covering the coastal use of the Marmara Sea; 48.1% (13 answers) to prepare a strategic plan and work on the Sea of Marmara within 3 months; 37% (10 answers) to establish a scientific committee to work on mucilage and conducting research on its cleaning; 63.6% (75 answers) to create online platforms such as internet/website and application to raise awareness of people about marine pollution; 7.4% (2 answers) are distributed as providing economic support to fishermen.



Prepare and implement the Regional Waste Management Action Plan and Marine Litter Action Plan covering the coastal use of the Marmara Sea.

70.4% / 19 answers



Preparing and working on a strategic plan for the Sea of Marmara within 3 months

48.1% / 13 answers



Establishing a scientific committee to work on mucilage and conducting research on its cleaning

48.1% / 13 answers



Creating online platforms such as internet/website and application to raise awareness of people about marine pollution

37.0% / 10 answers



Providing economic support to fishermen

7.4% / 2 answers



# MARUF21 Play Marmara “Sea” Session

Within the scope of Marmara Urban Forum (MARUF21), which was held for the second time by the Union of Marmara Municipalities, digital survey results were presented and evaluated online on Saturday, October 2, 2021, between 10:00 and 11:30 in Turkey.

In the session, which was held as one of the "Dialogue Marmara" special sessions of MARUF21, METU Marine Sciences Institute Director Prof. Dr. Barış Salihoğlu, Head of Water and Soil Management Department of the Ministry of Environment, Urbanization and Climate Change Gürsel Erul, and Play the City founder and director Dr. Ekim Tan evaluated the results of the interactive digital survey under the joint moderation of MMU City Planning Coordinator Ezgi Küçük Çalışkan and MMU Environmental Management Coordinator Ahmet Cihat Kahraman.

In the session, firstly, the Marmara Sea Integrated Modeling System (MARMOD) Project carried out by METU Marine Sciences Institute and its contribution to the Play Marmara “Sea” digital survey framework and game setup were discussed. According to the MARMOD modeling system, the focus is on how long the diffuse and point pollution inputs are reduced, in how many years the oxygen level of the Marmara Sea can be improved.

**MARUF21**  
marmaraurbanforum.org | 1-2-3 OCTOBER

## PLAY MARMARA “SEA”

**OCT. 2, 2021** 10.00 - 11.30 UTC +3 **ONLINE**

**MODERATOR**  
**Ezgi Küçük Çalışkan**  
Urban Planning  
Coordinator, Marmara  
Municipalities Union

**MODERATOR**  
**Ahmet Cihat Kahraman**  
Environmental Management  
Coordinator, Marmara  
Municipalities Union

**SPEAKER**  
**Ekim Tan**  
Dr., Founder & Director,  
Play the City

**SPEAKER**  
**Barış Salihoğlu**  
Prof., Manager of the Institute  
of Marine Sciences, Middle  
East Technical University

**SPEAKER**  
**Gürsel Erul**  
Head of Water and Soil  
Management, Turkish Ministry of  
Environment and Urbanization

**MARUF21**  
MARMARA  
URBAN  
FORUM

 **MARMOD** 



# Game Players

Play Marmara “Sea” players are grouped into 5 sub-regions in the Marmara Region. Each player has experienced the game process within the framework of roles such as municipality, ministry, non-governmental organization, MMU by being associated with different role cards.

The teams grouped into five sub-regions are as follows;

Southern Marmara Team  
Canakkale Team  
Northern Marmara Team  
Izmit Bay Team  
Istanbul Team

The participants of the Play Marmara "Sea" game session, which was experienced within the scope of IFAT Expo in Istanbul on October 21, 2021, are listed below.

## **Çanakkale Team**

Çanakkale Provincial Directorate of Environment, Urbanization and Climate Change - Bekir Çelen  
Union of Marmara Municipalities - Nazlıcan Akcı

## **Southern Marmara Team**

Ministry of Environment, Urbanization and Climate Change - Hacer Çağlayan  
Bursa Metropolitan Municipality - Hatice Unlu  
Bursa Provincial Directorate of Environment, Urbanization and Climate Change - Selçuk Yalçın  
BUSKİ (Bursa Water and Sewerage Administration) - Nurcan Aydoğan  
Balıkesir Provincial Directorate of Environment, Urbanization and Climate Change - Barış Özdemir  
Balıkesir Provincial Directorate of Environment, Urbanization and Climate Change - Turhan Kandemir  
BASKİ (Balıkesir Water and Sewerage Administration) - Ayşin Şirvancı  
BASKİ (Balıkesir Water and Sewerage Administration) - Erdoğan Güzgün  
Digital Poll Participant - Berke İşgüder

## **Northern Marmara Team**

Tekirdağ Provincial Directorate of Environment, Urbanization and Climate Change - Kaan Sinan Tohumcu  
TESKİ (Tekirdağ Water and Sewerage Administration) - Barış Ulus  
TEDDD Inc. - İbrahim İnci  
Marmara Belediyeler Birliği - Nazlıcan Akcı  
Digital Poll Participant - Sena Sarıkaya

## **Izmit Bay Team**

Kocaeli Provincial Directorate of Environment, Urbanization and Climate Change - Harun Aras  
Kocaeli Metropolitan Municipality - Meriç Deniz  
Kocaeli Metropolitan Municipality - Mesut Önem  
Kocaeli Metropolitan Municipality - Taner Alkay  
Yalova Municipality - Gürkan Kaçar  
Yalova Provincial Directorate of Environment, Urbanization and Climate Change - M.Reşit Alp

## **İstanbul Team**

Ministry of Environment, Urbanization and Climate Change - Hacer Çağlayan  
Istanbul Metropolitan Municipality - Suat Biçer  
Istanbul Metropolitan Municipality - Mehmet Nuri Öztürk  
Istanbul Provincial Directorate of Environment, Urbanization and Climate Change - Mustafa Lütfi Bahar  
TURMEPA (DenizBizim Association) - Dağhan M. Yazıcı  
TURMEPA (DenizBizim Derneği) - Dağhan M. Yazıcı



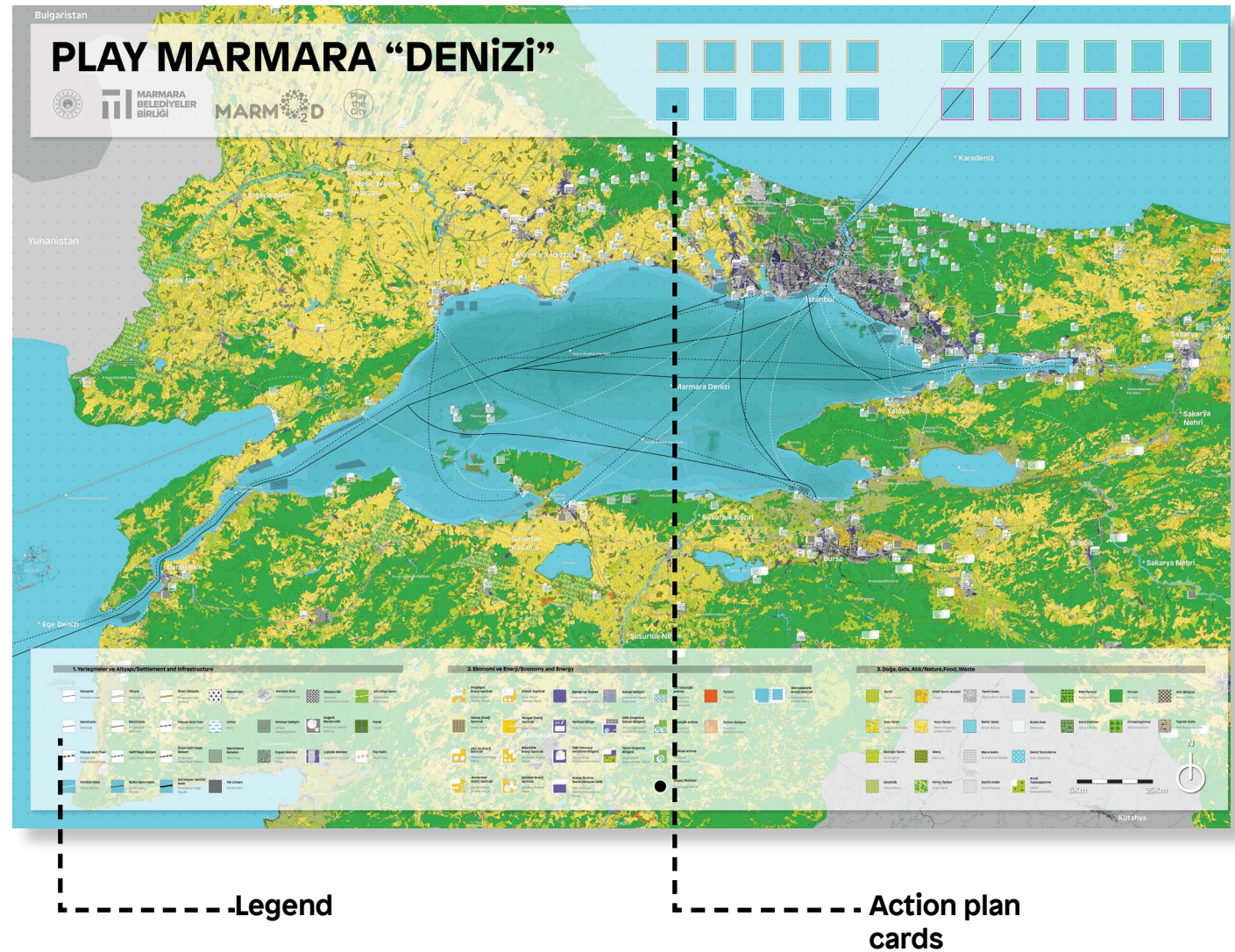


# Game Components

Play Marmara “Sea” has three game components. These components are; “Game Board”, “Action Plan Cards”, “MARMOD Interfaces”.

## Game Board

Game board was designed on the 1/150,000 scaled Marmara Region map and was created with a size of 1.8m X 2.7m and covers the Sea of Marmara and the settlements around it. The game board provides the connection between the game pieces and the board with a 5 km grid. The game board visualizes current land use, wastewater treatment plants and discharge points, sea use and sea bathymetry.





## Action Plan Cards

Action Plan Cards are the cards containing the actions of the "Marmara Sea Action Plan" prepared by the Ministry of Environment, Urbanization and Climate Change in cooperation with the Union of Marmara Municipalities. The cards consist of four main headings: "Control", "Environmental Protection", "Innovative Legislation" and "Innovative Practices".

Each Action Plan Card represents a decision of the 22-item action plan. Using these cards, players make suggestions in their geographical area, trying to increase the amount of dissolved oxygen in the sea and bring it into good environmental condition.



**KONTROL**



**EYLEM 22. Fabrikalarda kullanılan soğutma suları ve termal tesislerdeki sıcak suların Marmara Denizine dökülmesini engelleme.**



**YENİLİKÇİ UYGULAMALAR**



**EYLEM 8. Arıtma tesisleri gerektiği gibi çalışmayan fabrikaları iyileştirerek ileri arıtma teknolojisine geçişini sağlama.**



**ÇEVRE KORUMA**



**EYLEM 17. Deterjanların kullanımı azaltma ve organik temizlik ürünlerini teşvik etme.**



**YENİ MEVZUAT**



**Müsilajla ilgili çalışacak bir bilim kurulu kurma ve temizlenmesiyle ilgili araştırmalar yapma.**

--- Action category

--- Action description



Burgaz

Heybeliada

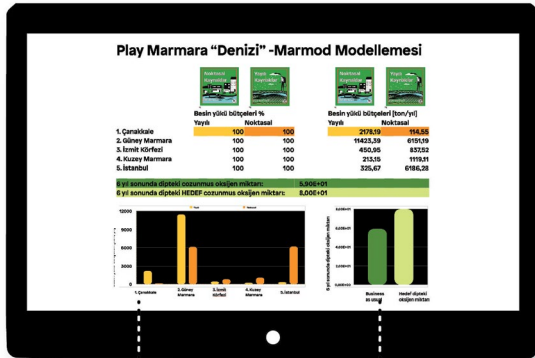
Pendik Limanı



# Game Session

## MARMOD Interfaces

In the document prepared within the scope of the Marmara Sea Integrated Modeling System (MARMOD) project, there are point pollution and diffuse pollution inputs of the 5 sub-regions of the Marmara Region. With the help of the tablet computers they use, the players try to reduce the pollution entries in the document by using realistic pollution reduction methods and try to save the amount of pollution in the sea from a risky situation.



--Pollution input --Dissolved oxygen

Play Marmara "Sea" game session is designed to simulate the Marmara Sea Conservation Action Plan and solve the problem with the participation of various stakeholders such as the scientific committee, ministries and municipalities related to the mucilage problem, marine pollution and improvement in dissolved oxygen level.

Play Marmara "Sea" game session process was experienced at IFAT Expo in Istanbul on October 21, 2021.

The basic 5 sub-regions in the model of the MARMOD project constitute the teams in the game. These sub-regions are; Çanakkale, Northern Marmara, Istanbul, Izmit Bay and Southern Marmara. Each sub-region has tried to reduce the point and diffuse pollution rate in its region by taking technical applications, control mechanisms, legislative changes and environmental protection decisions.

The game session process consists of 4 rounds. These;

### Round 1: MARMOD Project Modeling

Each team determines its own methods and tries to reduce the point and spread resources in its region by percentage. The determined pollution reduction rate is evaluated over the MARMOD model.

### Round 2: Action Plan Prioritization

Each team prioritizes the actions of the "Marmara Sea Protection Action Plan" prepared by the Ministry of Environment, Urbanization and Climate Change in cooperation with the Union of Marmara Municipalities, according to the methods used in the previous round.

### Round 3: Facing the Facts

The methods used by the teams in the first round and the actions prioritized in the second round are re-evaluated with the experts, who provide feedback for each team this round.

### Round 4: Voting

After all sub-regions have decided on the action plan prioritization and projects, the projects are re-evaluated with evaluation and expert opinion. Each sub-region player then votes for projects in another sub-region other than his own.



Marmod\_PlayMarmara

1. Çarşamba

2. Güney Marmara

3. İzmit Körfezi

4. Kuzey Marmara

Besin yükü bütçeleri %  
Yayıllı

Noktasal

100
100
100
100

Güney Marmara  
İzmit Körfezi  
Kuzey Marmara  
İstanbul

sonunda dipteki çözümün oksijen miktarı  
sonunda dipteki HEDEF çözümümüz oksijen miktarı

abc 123

€

%

/

★

boşluk

E

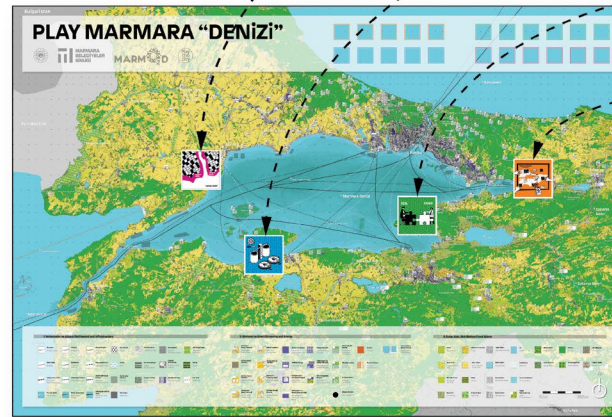
# 1 MARMOD Project Modeling

Teams evaluate pollution inputs.



# 2 Action Plan prioritization

Teams prioritize action plan.

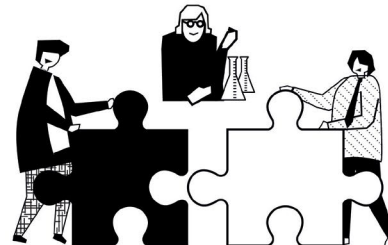


# 4 Vote

Teams vote for partnership and support

# 3 Facing the reality

Evaluation with experts



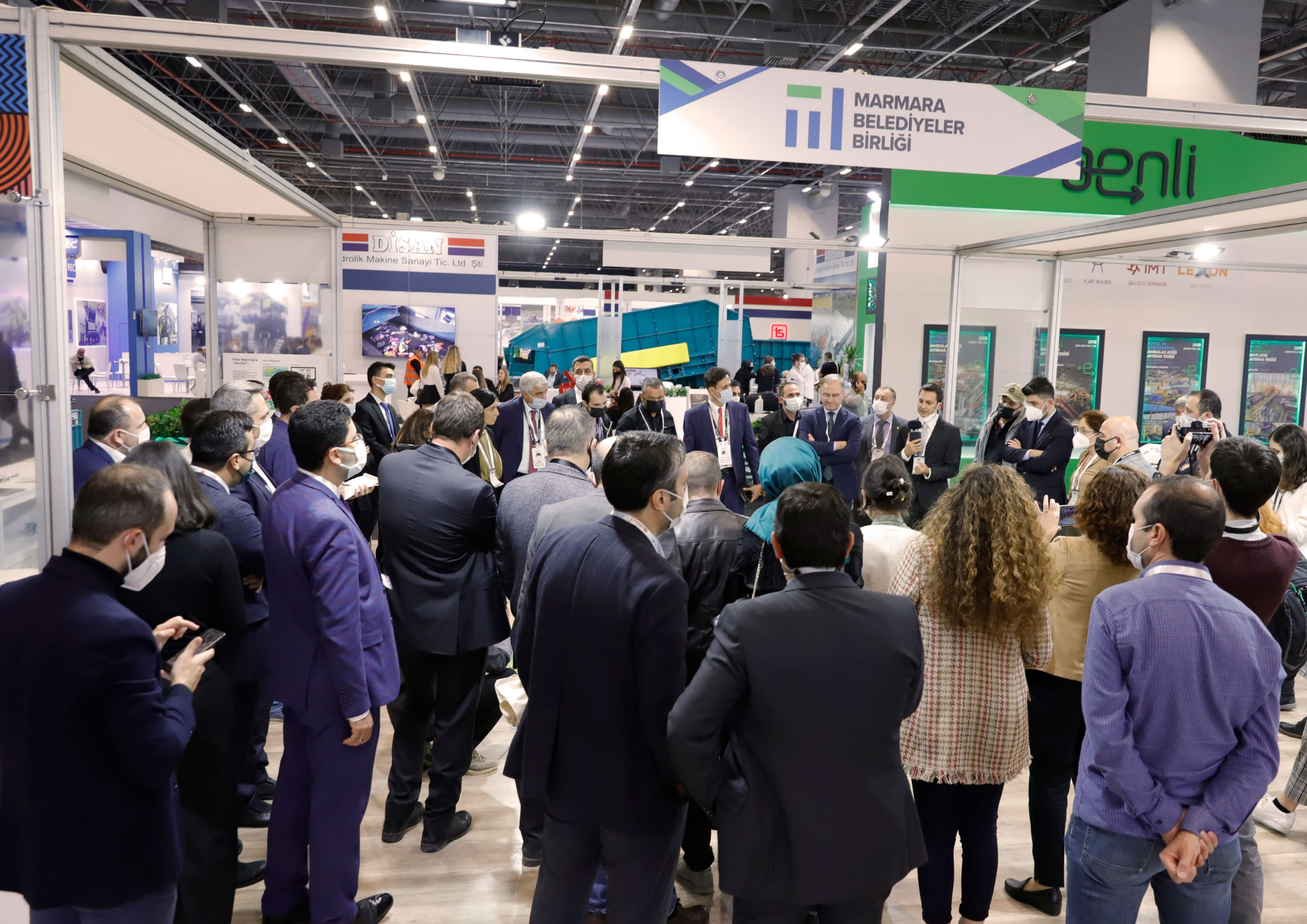


MARMARA  
BELEDİYELER  
BİRLİĞİ

Genli

DİSAW  
İrölk Makine Sanayi Tic. Ltd. Şti.

IMT LEXON  
PLANT BUILDER BALLISTIC SEPARATOR BULK FEEDS





# Proposals

In the first three rounds experienced during the Play Marmara “Sea” game session, the players developed various suggestions as 5 teams.

## Round 1 Proposals

In the first round of the Play Marmara “Sea” game, the teams of Çanakkale, Northern Marmara, İstanbul, İzmit Bay and Southern Marmara evaluated both the point and diffuse pollution rates of their sub-regions. The teams tried to reach the limit value of good environmental condition by reducing these ratios according to the MARMOD project model. In order to pass this limit value, each sub-region applied methods according to its own dynamics.

The İzmit Bay Team has promised to reduce the point pollution value by 65%. The methods they will use to achieve this reduction; to reduce the burden on treatment plants by controlling industrial facilities, to increase the capacity of existing wastewater treatment plants with innovative technologies, and to control both domestic and industrial wastes by amending the legislation. İzmit Bay team has decided to reduce the diffused pollution input by 75% by using the new legislation on good agricultural practices and environmental protection as a tool.

The Çanakkale Team proposed to reduce the point source of pollution by 15% and to increase the number of advanced biological wastewater treatment plants to 5 by establishing them in Gelibolu, Çan, Eceabat, Kepez and Biga districts. In addition, he proposed a phase change in olive black water by increasing the capacity of existing facilities. Other suggestions are to reduce the diffuse pollution inputs by 30% by using the methods of promoting organic farming, providing training to farmers, good agricultural practices and ensuring the collection of pesticides in the whole region.

In order to reduce the point pollution input, the Southern Marmara Team recommended that Bursa and Balıkesir switch to 80% advanced treatment in urban wastes, switch to 100% advanced treatment in organized industrial zones and other individual facilities, and reduce the point pollution input by 50%. The Southern Marmara Team, which reduced the diffused pollution inputs by 45%, suggested that 70% of the livestock sector wastes are taken to biogas facilities, 60% are reduced, and the resulting fermented wastes are used as fertilizer and the use of organic fertilizers is increased by using advanced agricultural techniques that will reduce the fertilization used in agriculture.

Istanbul Team envisaged to reduce point pollution inputs by 75% and diffuse source inputs by 20%. In order to achieve the reduction, it has been proposed to convert the treatment plants to advanced biological treatment, to improve the sewers in a way that will not be lost and leaked, to establish their own treatment facilities by organized industrial zones, to increase the inspections and to encourage the use of nitrogen-phosphorus-free cleaning products together with awareness and awareness activities.

The Northern Marmara Team, after advanced biological treatment of point pollution inputs, studies for the recovery of water instead of discharge to the receiving environment, increasing the discharge restrictions of the receiving environment and reducing the limit values, using domestic waste water outlets as a water source in agriculture and industry, and industry, municipality and OIZ. It envisaged a reduction of 30% by making suggestions to increase the audits and to audit the continuous measurement systems. Projecting to reduce the diffuse pollution input by 50%, the team recommended increasing the inspection of the facilities related to agriculture and animal husbandry, increasing the conscious agricultural practices by organizing farmer trainings on the use of fertilizers and pesticides, and increasing the necessary controls in the management of wastes related to mining.

At the end of the 1st round, the removal rates of all pollution inputs provided input to the MARMOD project model. As a result of these reductions, the amount of oxygen at the bottom reached  $8.28 \mu\text{M}$  at the end of 6 years, and as a result, the limit value for life, which was  $8.00 \mu\text{M}$ , was reached.

Subregions	Diffuse Source	Point Source
Çanakkale	70	85
Southern Marmara	85	50
İzmit Bay	25	35
Northern Marmara	50	70
İstanbul	80	25

**Table 1.** Source data for regions



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## Round 2 Proposals

In the second round of the Play Marmara “Sea” game session, the actions within the scope of the Marmara Sea Protection Action Plan prepared by the Ministry of Environment, Urbanization and Climate Change and the Union of Marmara Municipalities were prioritized by the players of the 5 sub-region teams in connection with the decisions they made in the first round.

In order to reduce the point pollution input in the first round, the *Izmit Bay Team* suggested taking action within 3 months to transform all wastewater treatment plants in the region, which is the 5th item of the Action Plan, into advanced biological treatment plants, and emphasized the importance of municipalities in this action. Action 8, which envisages the transition to advanced treatment technology by improving the factories whose treatment plants do not work properly, has been used with innovative applications. The team promoted Action 7, which highlights the use of gray water, emphasizing the reuse of treated wastewater and applying clean production techniques. In addition to these, the team underlined the importance of the legislation and stated that cooperation should be made with the Ministry of Agriculture and Forestry, especially in actions related to fisheries and livestock. For the

diffuse pollution input, they used Action 12, which recommends early warning and monitoring systems, focusing on actions in the Control category. They also supported Action 21, which envisages the use of online platforms for awareness activities. In the name of environmental protection, Action 17, which proposes to encourage the use of organic products instead of cleaning products containing phosphate and nitrogen, was selected.

The *Çanakkale Team* prioritized Action 5, which marks the conversion of all wastewater treatment plants in the region to advanced biological treatment, in order to achieve the pollution reduction rates they targeted in the first round. In addition, they proposed Action 8 for the improvement of the treatment plants of the factories in the region and for the construction of treatment plants for those that do not have treatment plants. Action 16, which is related to the phase change of olive black water by providing control in Çanakkale, where olive production is intense, gave priority to prevent pollution caused by olive black water and whey and to make technological transformation to reduce waste water. As the Dardanelles Strait is an important point for fishing, they proposed Action 20, which emphasizes providing economic support to fishermen. In addition, since

the entrance region of the dissolved oxygen-rich water coming from the Mediterranean is the Dardanelles, Action 19 pointing out to ensure that fishing is carried out without disturbing the sea ecosystem and to determine protection areas has been said. Innovative Legislation actions were emphasized by emphasizing the use of animal wastes primarily in biogas production and their secondary disposal. It has been suggested that the expression of pesticides should be added to Action 17, which points out to encourage the use of organic products instead of cleaning products containing phosphate and nitrogen.





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MARMARA DENİZİ  
CAMKALE

PLAY MARMARA "DENİZİ"  
GEMİ VE SİYAHİLERİN BAŞLANGIÇI  
HACER GÜZELAYAN

PLAY MARMARA "DENİZİ"  
GEMİ VE SİYAHİLERİN BAŞLANGIÇI  
HACER GÜZELAYAN

BEKİR CELEN  
PLAY MARMARA "DENİZİ"  
GEMİ VE SİYAHİLERİN BAŞLANGIÇI

BEKİR CELEN  
PLAY MARMARA "DENİZİ"  
GEMİ VE SİYAHİLERİN BAŞLANGIÇI

In order to reach the pollution input reduction rate that they targeted in the first round, the *Southern Marmara Team* gave priority to good agricultural practices in agriculture and Action 14 on organic agriculture, using pressurized and drip irrigation systems in agricultural areas and disseminating organic agriculture. In addition to this article, they emphasized the wastes in animal production and suggested that they could reduce dispersed pollution by 45% with organic fertilizer and biogas plant studies and emphasized that "they need a facility that will convert animal waste into fertilizer". He worked with Action 15, which is one of the control actions to control pollution from agricultural sources by focusing on creating buffer areas, and Action 16 to reduce pollution from olive black water and whey. Action 22, which is to prevent the cooling water used in the factories and the hot water in the thermal facilities from spilling into the sea regarding the discharge of cooling water, was discussed, and it was said that it was not very effective because there was a fluctuation of about 0.2-0.3 OC in the measurements. Another priority is Action 6, which indicates that the discharge standards of wastewater treatment plants that discharge treated wastewater into the Marmara Sea should be changed within 3 months. This action was supported by the legislative change regarding discharge limits. It is stated that the decision can be taken within 3 months, but 3

years are required for implementation. Action 5, which points to the conversion of all wastewater treatment plants in the region to advanced biological wastewater treatment plants, has been proposed, but it has been underlined that a significant investment is required for space, human resources and resources. Priority has been given to Action 12, which states the use of remote monitoring methods to increase control mechanisms.

The *Istanbul Team* said that Action 5, which is the transformation of all wastewater treatment plants in the region into advanced biological treatment plants, in order to reduce the pollution they determined in the first round, has given priority to this action by saying that it is a regional solution. Since Istanbul is a place where the private sector is concentrated, it has given priority to Action 9, which allows cooperation between public institutions and private companies for the transformation of wastewater treatment plants, and proposed public-private sector cooperation as a financial model. On the coastline, Action 13, which foresees the preparation and implementation of the Regional Waste Management and Marine Litter Action Plan, and the solution of the problems arising from waste management and segregation of garbage, has been proposed. With Action 12 highlighting ways to increase inspections of sea-related rivers and farmland with remote

sensing, satellite and early warning systems, drones and radar systems, and remove monitoring points from 91 to 150 for full control of wastewater treatment plants dumping water into the sea, both reducing dispersed resources. It was also emphasized that the management of ship wastes could be supported. The importance of establishing a scientific committee to support the improvement of waste management of factories with scientific studies was underlined and Action 1 was given priority, and it was stated that general cooperation at the provincial and regional scale would be more effective for this action. Emphasizing Action 17, it was stated that the support of the Ministry of Environment, Urbanization and Climate Change is important in promoting the use of organic products instead of cleaning products containing phosphate and nitrogen. Finally, it was stated that a transformation regarding social awareness is necessary and non-governmental organizations are an important stakeholder for that purpose.





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EXHIBITOR  
EKIM TAN  
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EXHIBITOR  
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The Northern Marmara Team primarily turned to Control actions for the reduction rate they promised in the first round. Priority has been given to Action 22, which includes preventing the cooling water used in factories and hot water in thermal facilities from spilling into the sea. Factories use large amounts of cooling water to keep their heated machines at a certain temperature, and this water is then discharged to certain standards. This creates thermal pollution. The team prioritized this as there are many cooling water-using industries in the Northern Marmara sub-region. At the same time, Action 12 again emphasized the importance of increasing monitoring stations at sea in order to increase control in the region. In innovative practices, it was agreed that Action 5, which envisages converting all wastewater treatment plants in the region to advanced biological treatment plants, is the most important step. It has been said that Action 7, which includes the reuse of treated wastewater and the application of cleaner production techniques, requires priority for the region. For the treatment plants of the industrial plants in the region, they stated Action 8, which envisages the transition to advanced treatment technology by improving the factories whose treatment plants do not work properly.

## Round 3 Proposals

All recommendations and action plans priorities developed by the teams in the first and second rounds, Prof. Dr. Barış Salihoğlu and Assoc. Dr. Evaluated by Ahsen Yüksek. As a result of these evaluations, it has been stated that the Istanbul and Dardanelles Straits, which provide water inflow to the Marmara Sea from the Black Sea and the Mediterranean, are critical regions for the marine ecosystem, so the decisions here are important.

It was emphasized that the system is very complex to reduce the amount of pollution in the Sea of Marmara and increase the amount of dissolved oxygen. According to Dr. Barış Salihoğlu and Assoc. Dr. Ahsen Yüksek, turning all wastewater treatment plants in the region into advanced biological treatment plants, where each team jointly proposes a solution, stated that the Action 5 article is really mandatory for the region.. It has been stated that with the improvements made in the facilities, the Marmara Sea can develop in a good way in the long run.

In the 3rd round of the game session, feedback was also received from the teams related to the MARMOD project modelling. As a result of these feedbacks, it was agreed that the measurements for each sub-region, especially in the Southern Marmara sub-region, could be more sensitive.







# Conclusions

## Play Marmara and Play Marmara “Sea”

The Play Marmara game, prepared for the Marmara International City Forum MARUF19, which was held for the first time in 2019 with the motto of "Cities that develop solutions", was a simulation example prepared for the experience of real actors in a mega-region for the first time in the world. This game, prepared for the Marmara Urban Region, which hosts an important part of the country's economy and ecosystems with its 25 million population and is the nodal point of international transportation and logistics connections, is designed as an open innovation platform where real stakeholders experience sustainable urban development on a geographical region scale in the light of real information. In the first part of this game, five sub-regions in the Marmara Region tested the partnership development scenario for the pollution of the Marmara Sea.

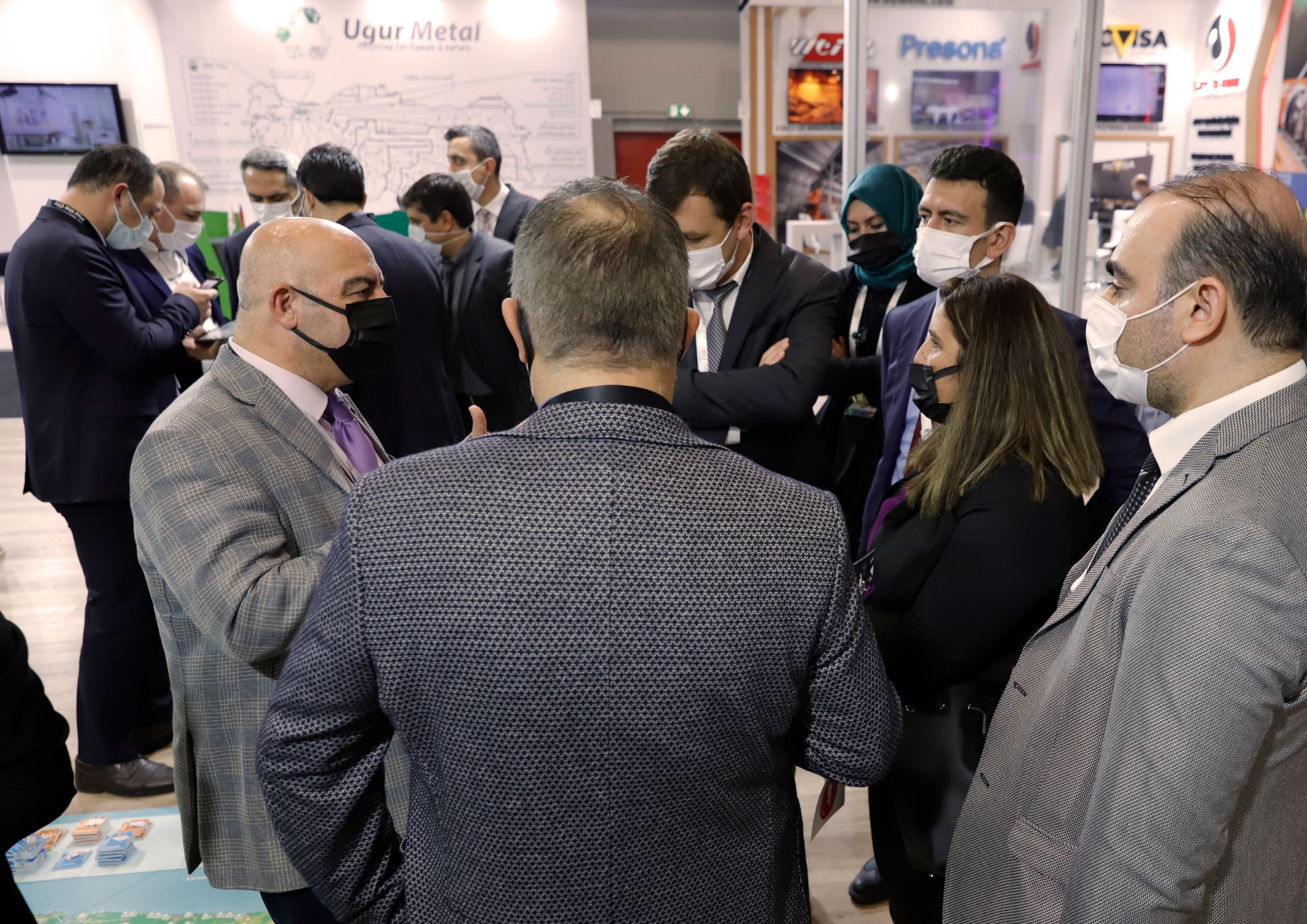
The Sea of Marmara was faced with an ecosystem disaster that had not been seen in such dimensions before and that affected the entire Sea in 2021, and the organism called mucilage showed its effect for a long time as a result of the excessive decrease in the dissolved oxygen level in the Sea. In order to get to the root of the mucilage problem, which was completely cleaned superficially as a result of the efforts of the authorities, scientific studies were initiated and the Marmara Sea Action Plan was prepared by the Ministry of Environment, Urbanization and Climate Change with the support of the relevant institutions.

MARUF21, which was held for the second time in 2021, took the Play Marmara experience one step further and started the process of designing a new game called Play Marmara “Sea” at a time when these environmental effects were felt by everyone. Marmara Municipalities Union (MBB), which was established in 1999, has played an active role in the work carried out in the case of excessive mucilage, as it has been since the day it was founded in accordance with its purpose of establishment.

Play the City, together with MBB, designed and implemented the Play Marmara "Sea" game, an innovative simulation that produces a solution for the "real world problem", by taking two important stakeholders by its side. These stakeholders are; It is the Ministry of Environment, Urbanization and Climate Change, which developed the Marmara Sea Action Plan with the support of MBB, and the METU Marine Sciences Institute, which has been carrying out studies focused on integrated pollution monitoring in the Marmara Sea for a long time.

For the first time, Play Marmara “Sea” has simulated real information and actors for the implementation of the Action Plan. Another pioneering experience is the interaction of scientific research based on measurement and modeling with the Action Plan. This interaction is multidimensional in that it provides real-time feedback to the stakeholder simulation of scientific research, while at the same time the game outputs provide feedback to the modeling within the scope of scientific research as data and actor synergy.





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## Findings: Multidimensional Synergies

Play Marmara “Sea” not only bridged the geographical region-wide implementation of central government-level coordination by enabling the multi-level governance framework to be experienced with a game plot, but also harmonized the actions of local governments towards the sources of pollution of the Marmara Sea at the geographical region scale in the context of the bottom-up governance framework. contributed to its realization. The third-level partnership dimension is partnership developed through scientific research processes. Beyond a static partnership setup, a multidimensional and sustainable partnership process has been operated, such as providing input to the game setup of the MARMOD project data, real-time feedback during the game session and providing input to the MARMOD project after the game.

The findings that emerged as a result of the synergies experienced in the game session are as follows;

**To reduce of industrial and urban waste; ;** Conversion of all wastewater treatment plants in the Marmara Region to advanced biological wastewater plants and increasing the capacity of existing plants, reusing the outputs of domestic wastewater as a water source in agriculture and industry, preventing the discharge of olive black water and whey into the sea, making phase change and increasing OIZ control and it was decided to control the discharge points.

**To reduce the pollution caused by agriculture and animal husbandry activities;** It has been suggested to support good agricultural practices, prevent pesticides used in agriculture and collect pharmaceutical wastes in the entire region, make necessary legislative changes, recycle wastes from livestock in biogas facilities and use them as organic fertilizers.

**To reduce the pollution caused by fishing;** It was concluded that controls in fisheries should be increased and it is important to control fishing as straits are important ecosystems.

**To increase community awareness and cooperation;** It was stated that it is important to provide training support to producers in agriculture and animal husbandry, and that it is necessary to carry out activities that will raise awareness of the community in general and to support non-governmental organizations in this regard. Cooperation between the Ministry of Energy and Natural Resources and the Ministry of Agriculture and Forestry in re-use applications such as biogas plant and in the transformation of facilities and awareness-raising activities with large private companies in the region were stated.





## Sustainable Development: SDG14 and Beyond

Sustainable Development sought the balance within the triangle of “Environment-Society-Economy”, this concept was reconceptualized as “People-Planet-Prosperity” at the World Sustainable Development Summit held in Johannesburg in 2002. The UN Congress (RIO+20), held in Rio de Janeiro in 2012, resulted in the decision to establish Sustainable Development Goals (SDGs) for 2030 in all countries. In 2015, the United Nations General Assembly approved 17 Sustainable Development Goals and 169 associated goals.

Play Marmara “Sea” is a simulation that centers on water and life in water, which are the most fundamental elements of sustainable development. He directly contributed to the 14th Sustainable Development Goal (SDG) “Conservation and sustainable use of oceans, seas and marine resources for sustainable development”.

In this regard, it is also valuable for the synergy between SDGs that human activities are handled on a regional scale in order to protect aquatic life. The Play Marmara “Sea” game, together with its preparation and implementation processes, was carried out in direct harmony with 6 of the sub-objectives of SDG.14. These; Target 14.1, Target 14.2, Target 14.4, Target 14.5, Target 14.6, Target 14.A.

Play Marmara "Sea" game specifically aligned with;

Target 14.1, with the dimension that reducing the pollution of the Sea of Marmara is the main objective of the game,

Target 14.2 with the action plan implementations and the synergy created on the protection and regulation of ecosystems in the Sea of Marmara,

Target 14.4 with game main outputs for sustainable fishing in the Sea of Marmara,

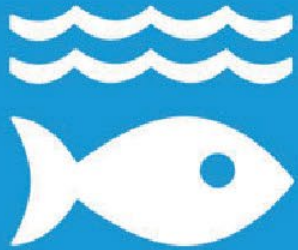
Target 14.5 in the context of the settlements on the shores of the Marmara Sea and the contribution of local governments to the game,

Target 14.6 in the context of overfishing in the Marmara Sea and related game outputs.

Target 14.A. due to the multi-faceted synergy with MARMOD, a scientific research project carried out on the pollution of the Marmara Sea, it has carried out a working process.



# 14 LIFE BELOW WATER



Conserve and sustainably use the oceans, seas and marine resources for sustainable development

## TARGET 14-1

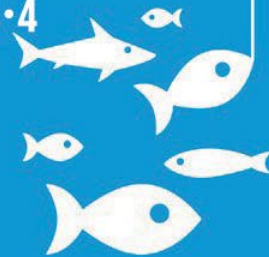


REDUCE MARINE POLLUTION

14 LIFE BELOW WATER



## TARGET 14-4



SUSTAINABLE FISHING

14 LIFE BELOW WATER



## TARGET 14-6



END SUBSIDIES CONTRIBUTING TO OVERFISHING

14 LIFE BELOW WATER



## TARGET 14-2



PROTECT AND RESTORE ECOSYSTEMS

14 LIFE BELOW WATER



## TARGET 14-5



CONSERVE COASTAL AND MARINE AREAS

14 LIFE BELOW WATER



## TARGET 14-A



INCREASE SCIENTIFIC KNOWLEDGE, RESEARCH AND TECHNOLOGY FOR OCEAN HEALTH

14 LIFE BELOW WATER



## Sustainable Partnerships for Solution

The Play Marmara “Sea” game provided a simulation ground for a sustainable partnership between existing corporate partnerships, scientific research and action plans to reduce the pollution of the Marmara Sea. It also has the feature of being a common mind and dynamic interaction platform for the sustainable development of these partnerships.

In the context of the Sustainable Development Goals, SDG 14. In addition to the "Life in Water" objective, SKA.9 "Industry, Innovation and Infrastructure", SDG.11 "Sustainable Cities and Communities" and SDG17. It has created synergies with all three SDGs, such as “Partnerships for Purposes”.

Partnership frameworks for the findings of the Play Marmara “Sea” game stand out predominantly among institutions and businesses. Permanent monitoring mechanisms that can be created with scientific research processes will not only be effective for the sustainability of the proposed partnership approaches, but also contribute to the sustainable development goals in a multidimensional way.

**For the reduction of industrial and urban waste;** Partnerships with the coordination of the Ministry regarding cooperation between OIZs,

**In order to reduce the pollution caused by agriculture and animal husbandry activities;** partnerships between local governments, producer cooperatives, large agricultural enterprises and the relevant ministry,

**To reduce the pollution caused by fishing;** partnerships between fisheries cooperatives, local governments and the relevant ministry,

**To increase community awareness and cooperation;** manufacturers, large enterprises, and inter-ministerial partnerships have come to the fore.



5K-6  
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## Play Marmara "Sea" Project Team

Dr. Ekim Tan (Play the City)  
Prof. Dr. Baris Salihoglu (METU)  
Prof. Dr. Güçlü İnsele (ITU)  
Assoc. Dr. Ahsen Yüksek (Istanbul University)  
Ezgi Küçük Çalışkan (Marmara Municipalities Union)  
Ahmet Cihat Kahraman (Marmara Municipalities Union)  
Güneş Şanlı (Play the City)  
İrem Özdardaneli (Play the City)  
Dr. Ulaş Akın (ekortel- Urban ekoSystemsems Lab)



# Appendix 1. Marmara Sea Action Plan

In order to eliminate the catastrophic mucilage pollution that occurs in the Marmara Sea and affects the natural life, under the coordination of our Ministry, the Marmara Sea Action Plan was prepared with the participation of the Governorships, Local Administrations, relevant Institutions/Organizations, Non-Governmental Organizations and academicians located in the Marmara Sea Basin. It was shared with the public in 06/06/2021.

In order to ensure that the works for the removal of pollution are carried out in an effective and coordinated manner, the Circular on the Implementation of the Marmara Sea Action Plan dated 07.06.2021 and numbered 2021/12 was published by the Ministry.

In accordance with the Circular numbered 2021/12: carrying out the works for the removal and disposal of mucilage in coordination with the Governorships at the highest level, with the participation of the responsible institutions/organizations, local administrations, unions and NGOs, and with all their personnel, machinery, equipment and similar facilities support was given to the work. In the direction of the studies;

Monitoring, control and supervision of all activities will be carried out by the Ministry of Environment, Urbanization and Climate Change, and for this purpose, a Coordination and Information Center will be established in Istanbul under the Presidency of the Deputy Minister.

A Coordination Center will be established under the chairmanship of the Governor in the Governorships in order to carry out and coordinate the studies carried out and to be carried out on a provincial basis.

**ACTION 1.** In order to reduce pollution in the Marmara region and to carry out monitoring studies; Coordination Board consisting of the Ministry of Environment and Urbanization, relevant institutions and organizations, universities, chambers of industry and NGOs; A Scientific and Technical Board will be established within the body of Marmara Municipalities Union.

**ACTION 2.** The Marmara Sea Integrated Strategic Plan will be prepared within three months and the work will be carried out within the framework of this plan.

**ACTION 3.** Studies to designate the entire Marmara Sea as a protected area will be initiated and will be completed by the end of 2021.

**ACTION 4.** Within the scope of the emergency response, as of June 8, 2021, studies will be initiated to completely clean the mucilage in the Marmara Sea with scientific-based methods, on a 24/7 basis.

**ACTION 5.** All of the existing wastewater treatment plants in the region will be converted into advanced biological treatment plants. Studies will be carried out in line with the objectives of preventing the discharge of wastewater into the Marmara Sea without advanced biological treatment.

**ACTION 6.** The discharge standards of wastewater treatment plants discharging into the Marmara Sea will be updated and implemented within 3 months.

**ACTION 7.** Reuse of treated wastewater will be increased and supported wherever possible. Clean production techniques will be applied.

**ACTION 8.** The transition to advanced treatment technologies will be accelerated by rehabilitation and improvement works of OIZs that do not operate their wastewater treatment plants properly.

**ACTION 9.** Public-private partnership models will be implemented to make the construction and operation of wastewater treatment plants much easier.

**ACTION 10.** Arrangements will be made within three months to prevent the discharge of wastewater from ships into the Marmara Sea.

**ACTION 11.** Cleaner production techniques will be expanded in shipyards.

**ACTION 12.** Within the framework of the studies carried out by our Ministry of Environment and Urbanization; All wastewater treatment plants that discharge to the receiving environment will be monitored online 24/7. 91 monitoring points in the Sea of Marmara will be increased to 150. With the help of the Turkish Environment Agency, inspections in all basins associated with the Marmara Sea will be increased using remote sensing, satellite and early warning systems, unmanned aerial vehicles and radar systems.

**ACTION 13.** The Regional Waste Management Action Plan and Marine Litter Action Plan, covering the coasts of the Sea of Marmara, will be prepared and put into practice within three months.

**ACTION 14.** Good agricultural and organic farming practices and pressurized and drip irrigation systems will be expanded.

**ACTION 15.** In the basins associated with the Marmara Sea, artificial wetlands and buffer zones will be created on the stream beds, thereby preventing the pollution from reaching the sea.

**ACTION 16.** In order to prevent pollution originating from olive black water and whey, technological transformations will be provided to reduce waste water.

**ACTION 17.** The use of cleaning materials containing phosphorus and surfactants will be gradually reduced. Organic cleaning products will be encouraged.

**ACTION 18.** All ghost nets in the Marmara Sea will be cleared within 1 year.

**ACTION 19.** Fishing activities will be made ecosystem-based, and protected areas will be developed.

**ACTION 20.** Economic support will be provided to fishermen who have suffered damage due to mucilage.

**ACTION 21.** A platform will be created to inform the public by carrying out studies to prevent marine pollution and to raise awareness of our citizens.

**ACTION 22.** Measures will be taken to reduce the effects of hot waters consisting of cooling waters and thermal facilities on the Marmara Sea.



# Appendix 2. Interactive Digital Poll Questions

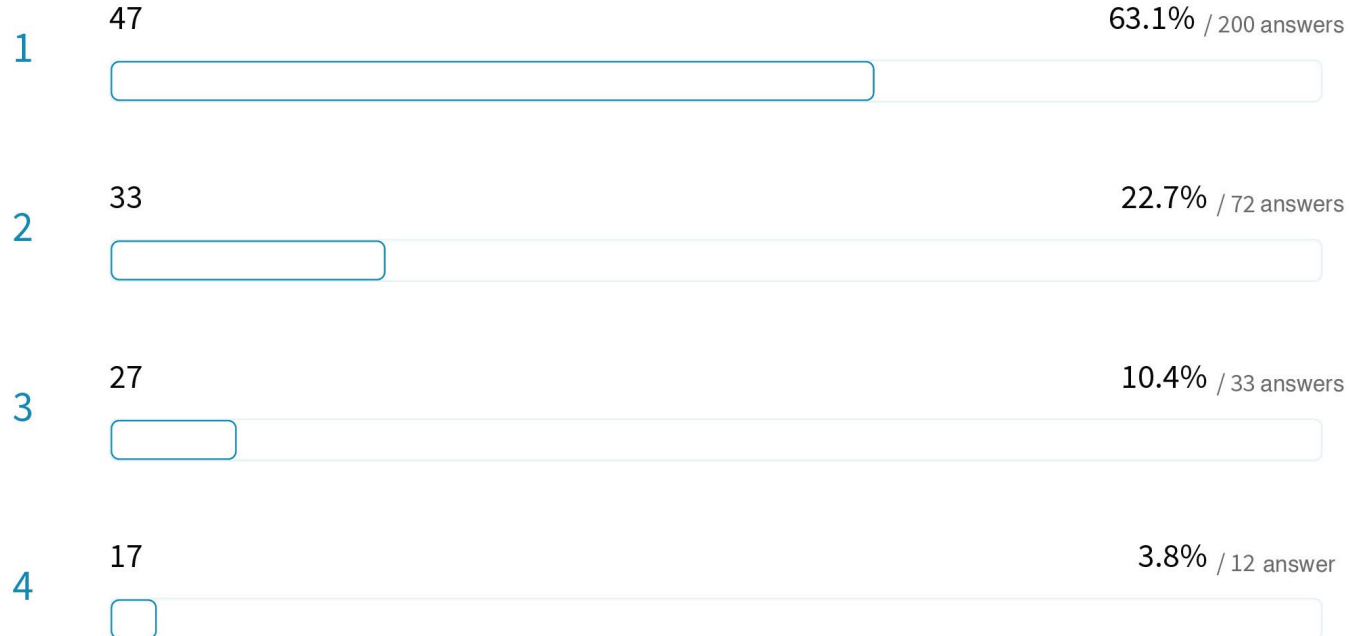


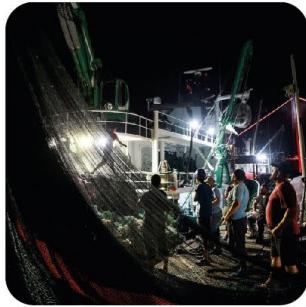
Life in Marmara includes not only the people here, but also all living things living on land and in the sea. Today, while species such as swordfish, white sea sand oyster, and tuna have disappeared from the Marmara Sea, many species are under threat in their habitat, which is stuck in the first 30 meters of the sea; eg mackerel.



There are around 100 fish species that have lived in Marmara from past to present. How many of them do you think we lost completely?

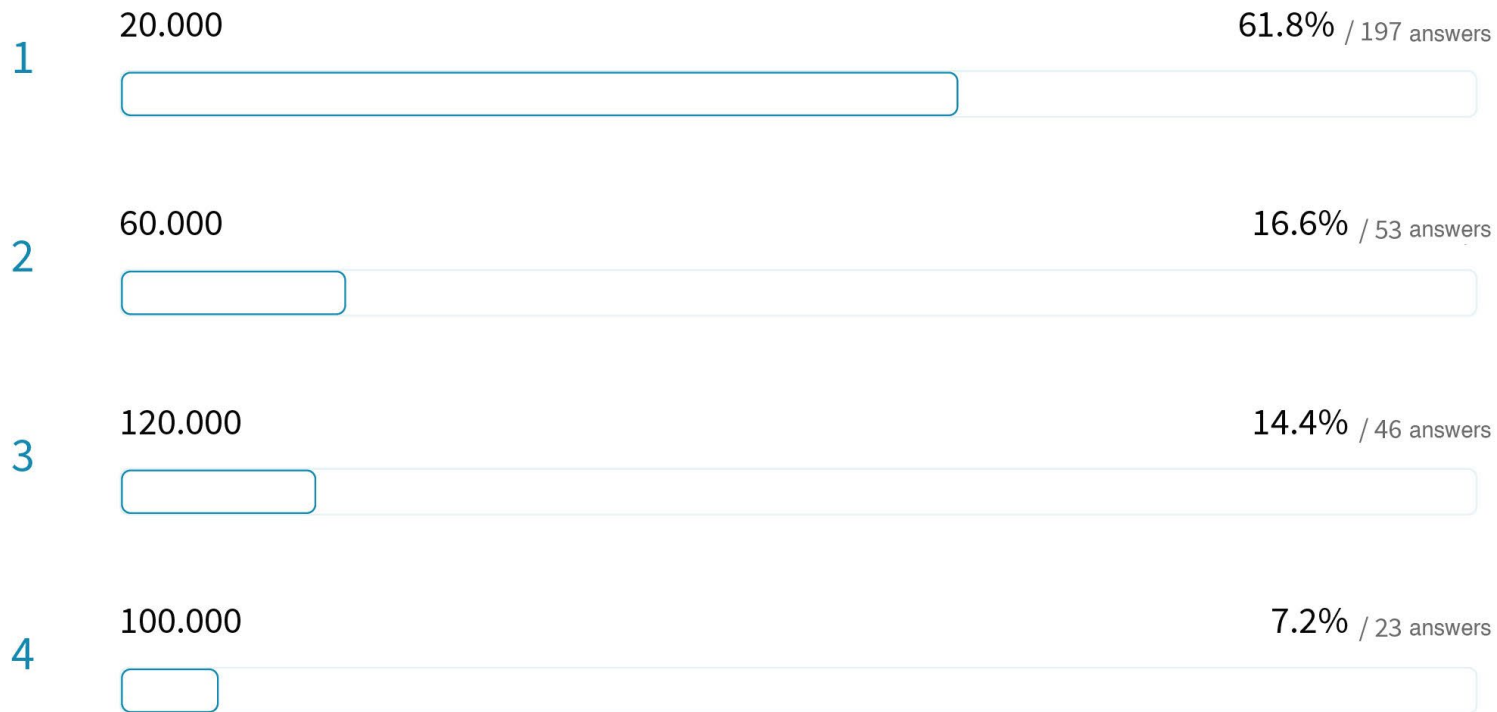
317 people out of 327 answered this question





The Sea of Marmara is indispensable not only for submarine life, but also for human settlements around it. The future of fishermen and tourism professionals depends on a healthy Marmara Sea. Fishermen complain of a serious decrease in the amount of fish in recent years. In your opinion, the amount of hunting, which reached 80,000 tons in the 2000s, is approximately how many tons today?

319 people out of 327 answered this question





# Which of the following do you think is the main reason that pollutes Marmara?

327 people out of 327 answered this question



Industry

60.6% / 198 answers



Human Settlements

30.3% / 99 answers



Ship Waste

4.3% / 14 answers



Pollution from Black Sea

2.4% / 8 answers



Agriculture

2.4% / 8 answers



**Which three strategies would you primarily invest in, determined by the Ministry of Environment and Urbanization, in the fight against climate change?**

324 people out of 327 answered this question



Reuse and recycling of waste

76.2% / 247 answers



Using renewable energy sources

57.7% / 187 answers



Using good production techniques in agriculture and animal husbandry

33.0% / 107 answers



Reforestation to rehabilitate degraded forest ecosystems

31.8% / 103 answers



Assigning energy managers to industrial organizations

28.4% / 92 answers



Promoting energy efficient buildings

27.8% / 90 answers



Promote the use of environmentally friendly means of transport, such as bicycles, in cities

23.5% / 76 answers



Increasing green space in cities

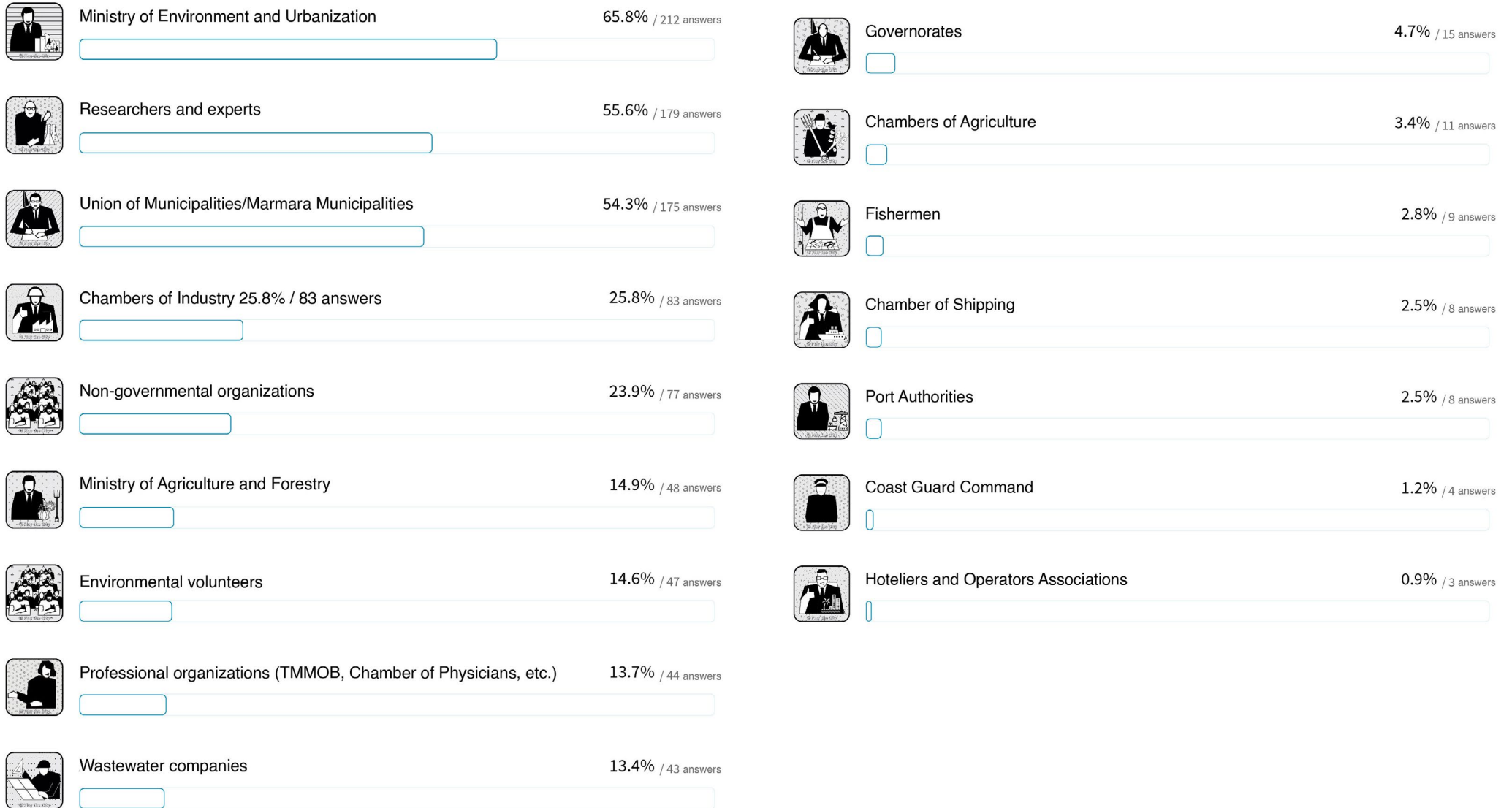
21.6% / 70 answers





**In your opinion, the right partnership that can manage the sea to achieve a healthy environment can be established by which stakeholders come together and work efficiently?**

322 people out of 327 answered this question

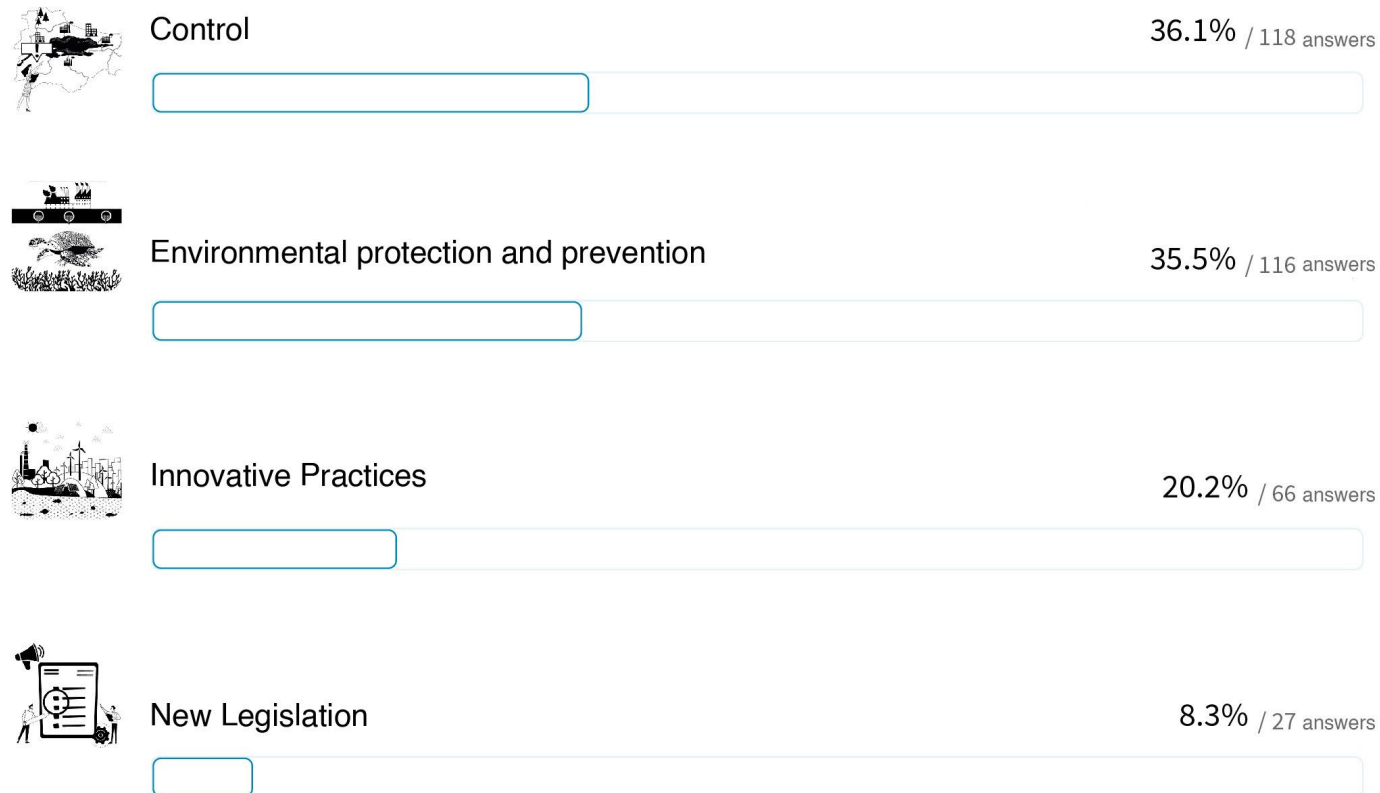


In June 2021, the Union of Marmara Municipalities and the Ministry of Environment and Urbanization announced the Marmara Sea Action Plan to the public. We can summarize these actions under 4 main topics:

- A. Environmental protection and prevention
- B. Innovative practices
- C. Control
- D. New legislation

If you were to implement the action plan, what kind of actions would you prioritize?

327 people out of 327 answered this question





## You chose environmental protection and prevention. Which first two steps would you prioritize?

116 people out of 327 answered this question



Changing the discharge standards of wastewater treatment plants that discharge their treated wastewater into the Marmara Sea within 3 months

60.3% / 70 answers



Collaboration between public and private companies for the conversion of wastewater treatment plants

49.1% / 57 answers



Determining the Marmara Sea as a protected area by the end of 2021

45.7% / 53 answers



Ensuring that fishing is carried out without disturbing the ecosystem of the sea and determining protection areas

20.7% / 24 answers



Reducing the use of detergents and promoting organic cleaning products

14.7% / 17 answers



Cleaning the underwater fishing nets in the Marmara Sea within 1 year

9.5% / 11 answers



## You chose innovative applications. Which first two steps would you prioritize?

63 people out of 327 answered this question



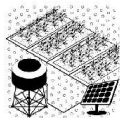
Enabling the transition to advanced treatment technology by improving the factories whose treatment plants are not working as they should

74.6% / 47 answers



Conversion of all wastewater treatment plants in the region to advanced biological wastewater treatment plant

74.6% / 47 answers



Ensuring reuse of treated wastewater and applying clean production techniques

68.3% / 43 answers



Using pressure and drip irrigation systems in agricultural areas, disseminating organic agriculture

39.7% / 25 answers



Using clean methods in shipbuilding and repair

36.5% / 23 answers



## You have chosen the control. Which first two steps would you prioritize?

118 people out of 327 answered this question



Increasing monitoring points from 91 to 150 for full control of wastewater treatment plants that discharge to the sea

63.6% / 75 answers



Increase inspections of sea-related rivers and farmland with the help of remote sensing, satellite and early warning systems, drones and radar systems

44.1% / 52 answers



Preventing the cooling water used in factories and hot water in thermal facilities from spilling into the sea

39.8% / 47 answers



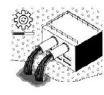
Preventing pollution from reaching the sea by creating artificial wetlands in rivers and stream beds

19.5% / 23 answers



Making arrangements to prevent ships from dumping their wastewater into the sea

18.6% / 22 answers



Prevent pollution from olive black water and whey and make technological transformation to reduce wastewater

14.4% / 17 answers





## You have chosen the new legislation. Which first two steps would you prioritize?

27 people out of 327 answered this question



Prepare and implement the Regional Waste Management Action Plan and Marine Litter Action Plan covering the coastal use of the Marmara Sea.

70.4% / 19 answers



Preparing and working on a strategic plan for the Sea of Marmara within 3 months

48.1% / 13 answers



Establishing a scientific committee to work on mucilage and conducting research on its cleaning

48.1% / 13 answers



Creating online platforms such as internet/website and application to raise awareness of people about marine pollution

37.0% / 10 answers



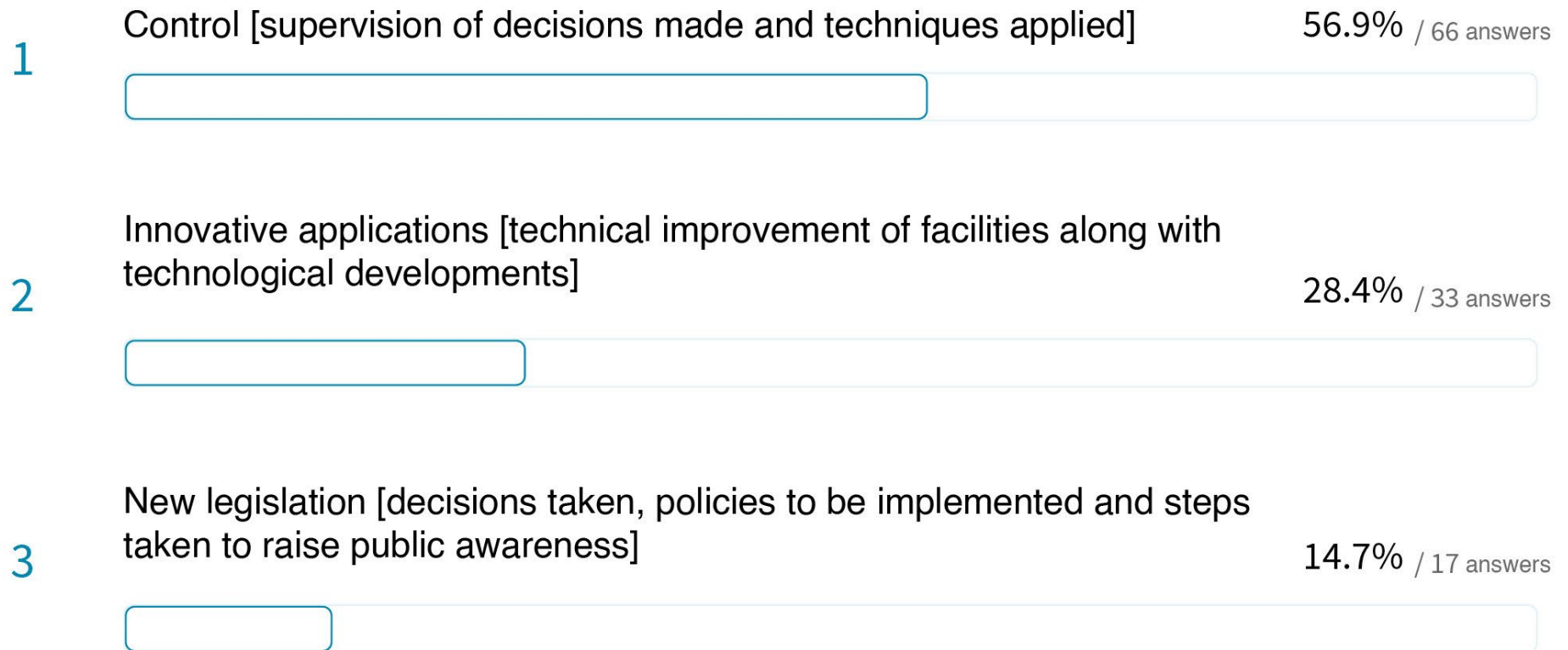
Providing economic support to fishermen

7.4% / 2 answers



## What is the second issue you prioritize with environmental protection and prevention?

116 people out of 327 answered this question



# What is the second issue you prioritize with innovative applications?

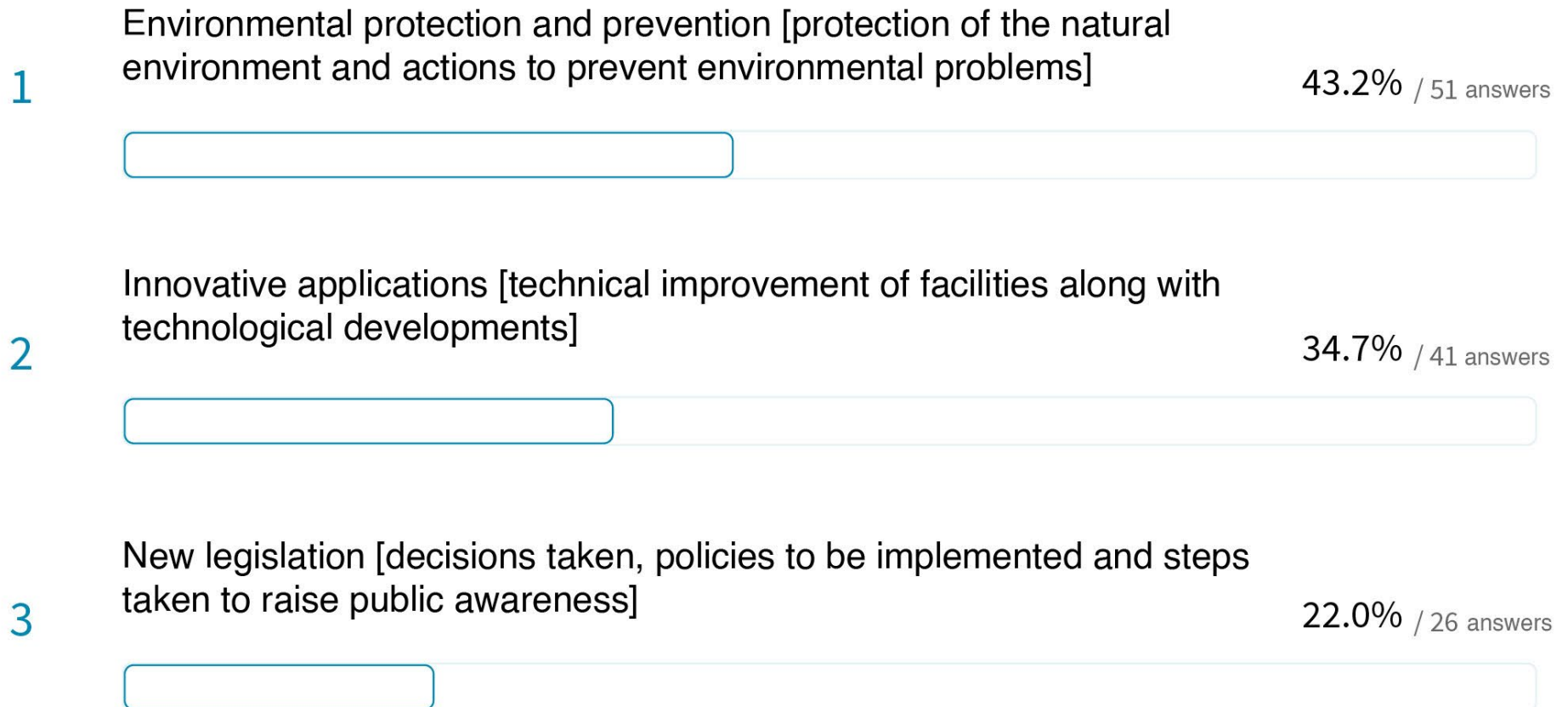
116 people out of 327 answered this question





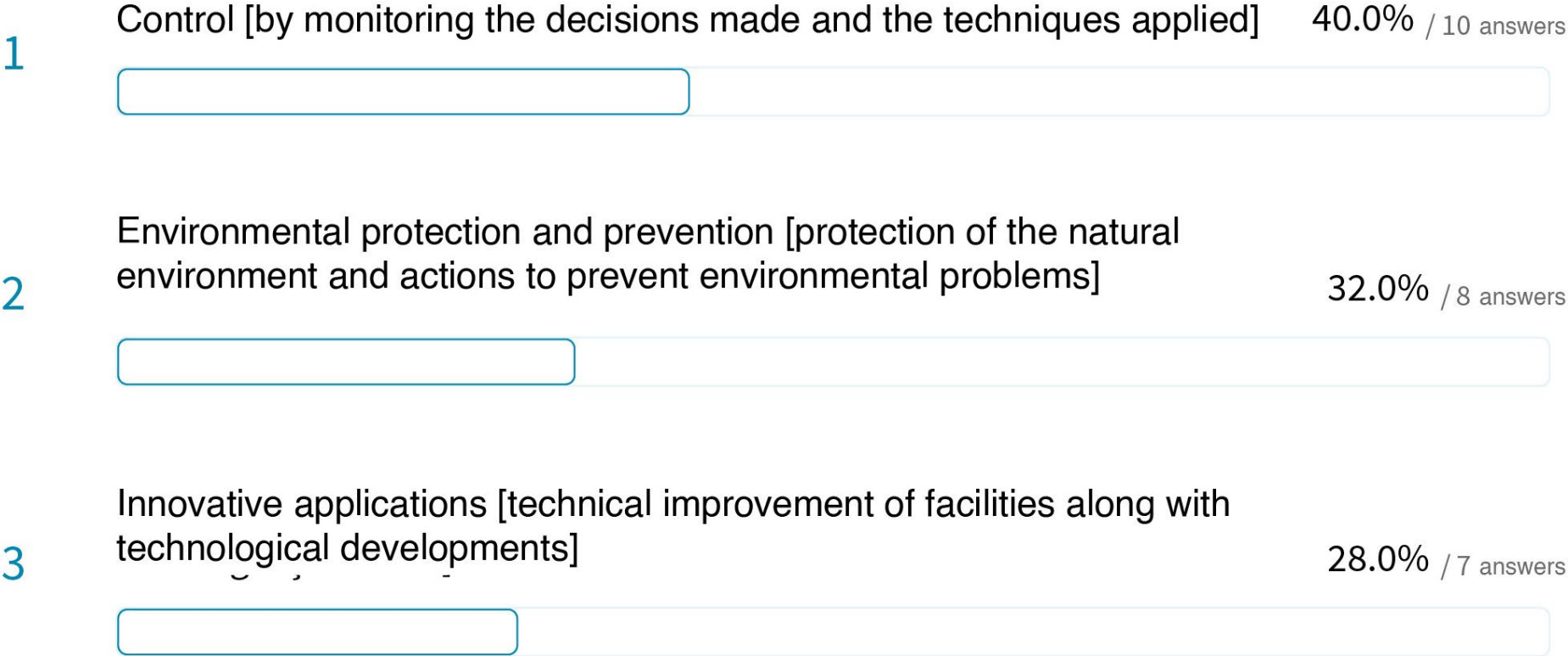
## What is the second issue you prioritize with innovative applications?

118 people out of 327 answered this question



# What is the second issue you prioritize with the new legislation?

25 people out of 327 answered this question



**You chose environmental protection and prevention. Which first two steps would you prioritize?**

82 people out of 327 answered this question



Determining the Marmara Sea as a protected area by the end of 2021 58.5% / 48 answers



Collaboration between public and private companies for the conversion of wastewater treatment plants 46.3% / 38 answers



Changing the discharge standards of wastewater treatment plants that discharge their treated wastewater into the Marmara Sea within 3 months 43.9% / 36 answers



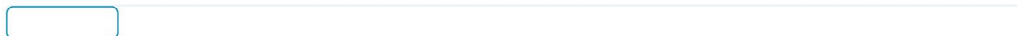
Reducing the use of detergents and promoting organic cleaning products 22.0% / 18 answers



Ensuring that fishing is carried out without disturbing the ecosystem of the sea and determining protection areas 18.3% / 15 answers



Cleaning the underwater fishing nets in the Marmara Sea within 1 year 11.0% / 9 answers





## You chose innovative applications. Which first two steps would you prioritize?

81 people out of 327 answered this question



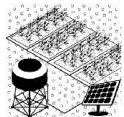
Conversion of all wastewater treatment plants in the region to advanced biological wastewater treatment plant

81.5% / 66 answers



Enabling the transition to advanced treatment technology by improving the factories whose treatment plants are not working as they should

75.3% / 61 answers



Ensuring reuse of treated wastewater and applying clean production techniques

64.2% / 52 answers



Using pressure and drip irrigation systems in agricultural areas, disseminating organic agriculture

39.5% / 32 answers



Using clean methods in shipbuilding and repair

23.5% / 19 answers



## You have chosen the control. Which first two steps would you prioritize?

106 people out of 327 answered this question



Increasing monitoring points from 91 to 150 for full control of wastewater treatment plants that discharge to the sea

63.2% / 67 answers



Increase inspections of sea-related rivers and farmland with the help of remote sensing, satellite and early warning systems, drones and radar systems

46.2% / 49 answers



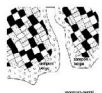
Preventing the cooling water used in factories and hot water in thermal facilities from spilling into the sea

44.3% / 47 answers



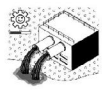
Making arrangements to prevent ships from dumping their wastewater into the sea

17.0% / 18 answers



Preventing pollution from reaching the sea by creating artificial wetlands in rivers and stream beds

15.1% / 16 answers



Prevent pollution from olive black water and whey and make technological transformation to reduce wastewater

14.2% / 15 answers



## You have chosen the new legislation. Which first two steps would you prioritize?

56 people out of 327 answered this question



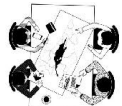
Prepare and implement the Regional Waste Management Action Plan and Marine Litter Action Plan covering the coastal use of the Marmara Sea.

76.8% / 43 answers



Preparing and working on a strategic plan for the Sea of Marmara within 3 months

67.9% / 38 answers



Establishing a scientific committee to work on mucilage and conducting research on its cleaning

62.5% / 35 answers



Creating online platforms such as internet/website and application to raise awareness of people about marine pollution

46.4% / 26 answers



Providing economic support to fishermen

19.6% / 11 answers





**The Nature Rights Movement, which involves incorporating the rights of nature into local law, is gaining popularity around the world. In many municipalities in the United States, any citizen or government can sue in court on behalf of nature. This approach, which opens up another way to legally fight companies that pollute, destroy or destroy the environment, is also prominent in New Zealand. New Zealand has expressly legalized three natural areas: (1) Te Urewera National Park, (2) Whanganui River, and (3) Mount Taranaki.**

**Imagine that you are the Sea of Marmara: You are struggling to survive under the influence of pollution, declining oxygen and global warming that you cannot cope with. Would you like to have such legal power?**

325 people out of 327 answered this question



# Appendix 3. List of Participants

## Appendix 3.A: Alphabetical Order

Ayşin Şırvancı (BASKİ - Balıkesir Water and Sewerage Administration)  
Barış Özdemir (Balıkesir Provincial Directorate of Environment, Urbanization and Climate Change)  
Barış Ulus (TESKİ - Tekirdağ Water and Sewerage Administration)  
Bekir Çelen (Çanakkale Provincial Directorate of Environment, Urbanization and Climate Change)  
Berke İşgüder (Digital Poll Participant)  
Dağhan M. Yazıcı (TURMEPA - DenizBizim Association)  
Erdoğan Güzgün (BASKİ - Balıkesir Water and Sewerage Administration)  
Gürkan Kaçar (Yalova Municipality)  
Hacer Çağlayan (Ministry of Environment, Urbanization and Climate Change)  
Harun Aras (Kocaeli Provincial Directorate of Environment, Urbanization and Climate Change)  
Hatice Ünlü (Bursa Metropolitan Municipality)  
İbrahim İnci (TEDDD A.Ş.)  
Kaan Sinan Tohumcu (Tekirdağ Provincial Directorate of Environment, Urbanization and

Climate Change)  
M.Reşit Alp (Yalova Provincial Directorate of Environment, Urbanization and Climate Change)  
Mehmet Nuri Öztürk (Istanbul Metropolitan Municipality)  
Meriç Deniz (Kocaeli Metropolitan Municipality)  
Mesut Önem (Kocaeli Metropolitan Municipality)  
Mustafa Lütfi İlkbahar (Istanbul Provincial Directorate of Environment, Urbanization and Climate Change)  
Nazlıcan Akıcı (Marmara Municipalities Union)  
Nurcan Aydoğan (BUSKİ - Bursa Water and Sewerage Administration)  
Selçuk Yalçın (Bursa Provincial Directorate of Environment, Urbanization and Climate Change)  
Sena Sarıkaya (Digital Poll Participant)  
Suat Bicer (Istanbul Metropolitan Municipality)  
Taner Alkay (Kocaeli Metropolitan Municipality)  
Turhan Kandemir (Balıkesir Provincial Directorate of Environment, Urbanization and Climate Change)

## Appendix 3.B: List of Participants by Institution Types

### Central Government Institutions

Hacer Çağlayan (Ministry of Environment, Urbanization and Climate Change)

### Ministry of Environment, Urbanization and Climate Change Provincial Directorates

Mustafa Lütfi İlkbahar (Istanbul Provincial Directorate of Environment, Urbanization and Climate Change)  
M.Reşit Alp (Yalova Provincial Directorate of Environment, Urbanization and Climate Change)  
Harun Aras (Kocaeli Provincial Directorate of Environment, Urbanization and Climate Change)  
Kaan Sinan Tohumcu (Tekirdağ Provincial Directorate of Environment, Urbanization and Climate Change)  
Bekir Çelen (Çanakkale Provincial Directorate of Environment, Urbanization and Climate Change)  
Selçuk Yalçın (Bursa Provincial Directorate of Environment, Urbanization and Climate Change)  
Barış Özdemir (Balıkesir Provincial Directorate of Environment, Urbanization and Climate Change)

Turhan Kandemir (Balıkesir Provincial Directorate of Environment, Urbanization and Climate Change)

### **Metropolitan and City Center Municipalities**

Suat Bicer (Istanbul Metropolitan Municipality)

Mehmet Nuri Öztürk (Istanbul Metropolitan Municipality)

Hatice Ünlü (Bursa Metropolitan Municipality)

Meriç Deniz (Kocaeli Metropolitan Municipality)

Mesut Önem (Kocaeli Metropolitan Municipality)

Taner Alkay (Kocaeli Metropolitan Municipality)

Gürkan Kaçar (Yalova Municipality)

### **Water and Sewerage Administration Departments and Subsidiaries**

Barış Ulus (TESKİ - Tekirdağ Water and Sewerage Administration)

Nurcan Aydoğan (BUSKİ - Bursa Water and Sewerage Administration)

Ayşin Şirvancı (BASKİ - Balıkesir Water and Sewerage Administration)

Erdoğan Güzgün (BASKİ - Balıkesir Water and Sewerage Administration)

İbrahim İnci (TEDDD A.Ş.)

### **Non-Governmental Organizations**

Dağhan M. Yazıcı (TURMEPA - DenizBizim Association)

### **Municipal Unions**

Nazlıcan Akcı (Marmara Municipalities Union)

### **Digital Poll Participants**

Berke İşgüder

Sena Sarıkaya

## **Abbreviations**

**BASKİ:** Balıkesir Water and Sewerage Administration

**BUSKİ:** Bursa Water and Sewerage Administration

**MADEP:** Marmara Sea Action Plan

**MARMOD:** Marmara Sea Integrated Modeling System

**MARUF:** Marmara Urban Forum (Marmara International Urban Forum)

**MBB:** Union of Marmara Municipalities

**METU:** Middle East Technical University

**OIZ:** Organized Industrial Zone

**SDG:** Sustainable Development Goals

**NGO:** Non-Governmental Organization

**TESKİ:** Tekirdag Water and Sewerage Administration

**TMMOB:** Union of Turkish Chambers of Architects and Engineers

**TURMEPA:** Turkish Marine Environment Protection Association