

Disasters and risk management in the age of climate and ecological crisis



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Compiled by: Özüm Çelik, Green Thought Association

GEF Project Coordinator: Adrián Tóth, Green European Foundation

Desing: Yağmur Yumrutepe, Green Thought Association

Green European Foundation

Rue du Fossé – 1536 Luxembourg
Brussels Office: Mundo Madou
Avenue des Arts 7-8, 1210
Tel: +32 2 329 00 50
info@gef.eu
www.gef.eu

Green Thought Association

Türkali Mahallesi, Şehit Nuri Sokak
No:18, Beşiktaş / İstanbul
Tel: +90 543 807 72 25
info@yesildusunce.org
www.yesildusunce.org

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This report was prepared by transcription of the recording of the GEF Cities as Places of Hope conference. Since the aim is not to write an academic paper no specific style is used to cite sources. Those who are interested can access the event recording on our YouTube channel or [this link](#).



INTRODUCTION

The conference entitled “Disasters and Risk Management in the Age of Climate and Ecological Crisis”, organized as part of the “Cities as Places of Hope” project, was held online on 18 November 2021 between 13:00-16:00. In this conference climate crisis and risk management were addressed in the context of forest fires, health, drought, flood disasters and biodiversity by Erdem Ergin (disaster risk management specialist), Prof. Dr. Ali Osman Karababa (public health specialist), Dr. Akgün İlhan Boğaziçi University), Prof. Dr. Nesibe Köse (İstanbul University Cerrahpaşa Faculty of Forestry, Department of Forest Botany) and Dr. Emrah Çoraman (İstanbul Technical University).

The opening speech was addressed by Yağız Eren Abanus, Project Assistant of Yeşil Düşünce Derneği, who gave a brief overview of the association's activities and ongoing projects. Abanus referred to the article entitled “Governance Strategies for Cooling Cities: Cases of Athens and Istanbul”, produced as part of the Cities as Places of Hope Project and based on good practices in cities, and then announced that the activities to be done next year will be on the theme of ‘resilient cities.’



SESSION ONE – Disaster Management and Green Politics

Crisis Management – Erdem Ergin (Disaster Risk Management Specialist)

The first session of the two-session conference started with a presentation of “Disaster Management and Green Politics” that was facilitated by Özlem Teke. Disaster risk management specialist Erdem Ergin, the first speaker of the conference, made a presentation on crisis management. Ergin mentioned that he started his disaster studies with earthquake and earthquake studies are still common in Turkey but he has channeled his studies into climate disasters over the years due to the increase in climate disasters and the change of the risk profile from nation-wide scale to individual scale. In his speech, he gave information about how we can be resilient against the changing risk profile and stressed the importance of increasing the effectiveness of legal frameworks in a field involving different stakeholders such as public institutions, civil society, universities, and the private sector.

Ergin mentioned that the risks affecting our lives differ, and each period has its own risk agenda: “In the last two years, Elazığ and İzmir earthquakes occurred. Drought was declared in 41 cities. Many forest fires and floods happened.” After saying that coronavirus disease currently affects our lives, he mentioned countries’ efforts during the recovery period. He stressed that as a part of the recovery strategy developed by the European Union against Covid-19, green transformation and post-pandemic recovery activities have been combined and the Green Deal agenda has become more of an issue. Similarly, he gave an example of the faster development of China’s digital infrastructure with lockdowns and restrictions during the pandemic. He emphasized that societies and states that had a certain growth rate can turn the crisis into an opportunity, while crises may hasten the collapse in unstable economies. It was highlighted that it would be better to see the crisis as an accelerator rather than something negative, and Turkey’s recent climate policy changes can be evaluated considering these.

Ergin spoke of Turkey’s institutional structure and its risk profile differing with cold war, earthquake, migration, pandemic etc., and said that the issue of migration has become mainstream in the 2010s. He emphasized that it was not possible to foresee the current size of migration from Syria to Turkey, which started to increase in 2015, and the same can also be said for the future of climate events that have started to increase their impacts today. It was highlighted that just as the issue of migration has been put more on the agenda in 7-8 years, so will the climate issue. Emphasizing the consensus that the number of climate disasters announced annually by the Turkish State Meteorological Service (MGM) is not normal, Ergin asked the following question: “Is our normal changing?” He stressed that floods, storms, and hail rank in the top three climate disasters but we do not have enough data on which event affects which sector.

In terms of deviations in the size of disasters, it was mentioned that while 20-40 thousand hectares of forests burn annually in Turkey, 170-180 thousand hectares of forest have burned in 2021. Ergin, who was in Akyaka during the forest fires, said that he and the experts took the 1999 Earthquake as the reference point to understand the extent of the crisis in forest fires. He compared forest fires and earthquakes, saying that forest fires contrary to earthquakes have the risks of occurring more frequently in a certain region and spreading more than one city and fires triggered by disasters like drought, heat waves. Besides, concerns about the probability of flood due to erosion and spatial profile changes due to the current deforestation in the region were expressed.

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Erdem Ergin, in the last part of his speech, divided the disaster phase into three temporal categories under the title of resistance: pre-disaster, during a disaster and post-disaster. Ergin stressed the importance of pre-disaster studies. He, in the context of improving the status quo, cited vaccines as an example of risk reduction activity in health crises and risk analysis, risk transfer and risk reduction plans of the Disaster and Emergency Management Presidency (AFAD). He mentioned crisis, early warning, mobilization, and intervention when explaining during a disaster phase. Damage assessment, recovery and reconstruction processes were emphasized when talking about post-disaster activities. He mentioned that these three categories, which differ in temporal extensiveness, may be intertwined and AFAD envisages a 5-year recovery period from forest fires. He concluded that when the frequency and magnitude of disasters increase, the recovery period becomes shorter and therefore crises turn into a vicious circle, and climate disasters exacerbate this situation.

Health Policies – Prof. Ali Osman Karababa (Public Health Specialist)

Prof. Dr. Ali Osman Karababa, public health specialist, was the second speaker of the first session and made a presentation on 'Ecological Destructions and Infectious Diseases'. Ali Osman Karababa started his presentation with an image of Aydin Ovası (Aydın lowlands) and mentioned these data: "Number of geothermal power plants in the region, which are spread to an area of 2943 km², is 28 and this number continues to increase. Currently, 87% of Aydin Ovası, which is one of the most fertile lowlands of Turkey, is allocated to geothermal power plants (GPPs)." Karababa showed the map of active mining and power plant projects on Kazdağıları (Mount Ida) and revealed that there is no un-excavated land on the peninsula.

Karababa presented the data from the conference day and told that this year in the world,

- 4,580,820 hectares of forest land was destroyed,
- 6,167,030 hectares of land was degraded due to erosion,
- 32,004,430,552 tons of CO₂ was released into the atmosphere,
- 10,570,076 hectares of land became desert,
- 8,625,517 tons of toxic chemicals were released to nature.

Karababa spoke of the issue of ecological footprints in relation to ecological destruction, saying that it is normal to talk about disasters considering this situation.

He showed the world map of countries by ecological footprint and said that Turkey in the bold red is among the countries that have the highest ecological footprint. He demonstrated the increase with the following calculation:

In 2005 in Turkey;

Biocapacity per person 1.7 global hectares – Ecological footprint per person 3 global hectares = Biocapacity reserve – 1.3 global hectares

In 2020, 15 years from now on,

Biocapacity per person 1.52 global hectares (↓) – Ecological footprint 3.3 global hectares (↑) = Biocapacity reserve – 1.81 global hectares (↑)



Ali Osman Karababa said that all these figures are indicators of a big ecocide and we are consuming the future right now. "Ecological footprint includes the category of food (52%), goods (21%), transportation (15%), services (6%), and housing (6%)". Emphasizing that energy consumption is the main source of the climate crisis he mentioned the mistakes in the government's energy policies with the following example: "As of the end of August 2021, Turkey's installed power is 98,492 MW. Considering our consumption, even the highest consumption is 48,000 MWhr. It turns out that the installed capacity is even more than twice the consumption demand."

Ali Osman Karababa said that 63% of the world's carbon dioxide emissions were produced by the rich, ranked as the highest and high-income minority group, which constitutes 11% of the world's population. He highlighted that if an environment is provided where the carbon emissions of this group are balanced and controlled, a big step in the climate crisis would have been taken. He emphasized climate injustice, mentioning that the people at the lowest income level, who make up 50% of the population, are responsible for only 7% of global emissions. He spoke of forest fires, heat waves, decrease and pollution of water resources, air pollution, desertification, famine, flood, migration, infection, diseases, rise in sea levels as consequences of climate change and the necessity of radical measures and effective disaster plans.

He mentioned that the resulting emissions from burning nearly 200,000 hectares of forests in Turkey in 2021 are equivalent to almost annual emissions of the country, and it will take forty years for the burning forests to become a carbon sink again. He highlighted the risk of a food crisis by showing Turkey's desertification map and that 36 lakes in Turkey have completely dried up and 14 of them are in danger. Run-of-the-river dams have a major role in this water withdrawal and unconscious irrigation, and wrong agricultural policies are important factors as well.

It was mentioned that the European heat wave – a significant indicator of climate change– of the 2003 summer resulted in 30,617 deaths. Regarding the impacts of climate change on health, he emphasized

the expected increase in cases of mental diseases, cardiovascular diseases, malnutrition, allergies, infectious diseases, injuries, poisonings, respiratory system diseases, and that Turkey's health system is unprepared for this.

Speaking of migration as one of the important results of the climate crisis, Ali Osman Karababa referred to analysis of the report published by the Institute for Economics and Peace in 2018 that "climate change caused disasters could displace at least 1.2 billion people by 2050". He reminded that 11,000 Tuvaluan people had to migrate to New Zealand and Australia due to the rising sea. Unemployment, poverty, increase of population with low standards and child employment were cited as some of the problems caused by these migrations, and it was mentioned that the climate crisis would have major effects on mental health as well. In addition, according to the World Health Organization, over 140,000 deaths have occurred due to climate change every year since 1970.

When talking about infectious diseases affected by the climate crisis, he stressed that the habitats of Rhinolophus bats are the most exposed to ecological destruction and human intervention, and the spread of zoonotic diseases is facilitated due to this intertwining. He also reminded that before the Covid-19 outbreak, the World Health Organization (WHO) added "disease X" to a list of potential diseases.

To prevent zoonotic diseases the following advises were mentioned:

- reducing contact with wildlife,
- doing research on animals that transmit coronavirus, strict control of the sales of wild animals and the animals that may transmit coronavirus,
- prevention of wild animal trade,
- vaccine development and facilitating vaccine manufacturing,
- equal sharing of manufactured vaccines and medicines,
- making Turkey capable of manufacturing its own vaccine again and restructuring the Refik Saydam Hıfzıssıhha Enstitüsü (Refik Saydam Hygiene Institute) for this purpose.



Finally, it was said that disaster risk analysis should be done and management plans should be prepared, and implemented as soon as possible in order to mitigate the effects of disasters, which inevitably increase with the climate crisis. The importance of intersectoral cooperation for disaster preparedness and the urgency of responses were emphasized as well. It was said that state institutions alone cannot be sufficient against disaster, and that the state should be open to cooperation with non-governmental organizations, professional chambers, unions, universities, international organizations, and many other institutions. From this point of view, Ali Osman Karababa expressed the negative experiences he had with the Ministry of Health, specifically the Türk Tabipler Birliği (Turkish Medical Association), of which he is a member. To conclude his speech, Karababa cited the 17th and 56th articles of the constitution and reminded that the constitution recognizes each person's right to health and to a healthy environment.

Questions & Answers

Meryem Kayan: You mentioned prioritization of disasters. For İstanbul, we are talking about meteorological and climate disasters on the one hand and the risks of natural disasters such as earthquakes on the other. Besides, population growth continues at full speed with refugees. When we consider these,

- 1.How do we determine the criteria of prioritization, which includes many barriers, especially financial ones? How do we cope with climate/meteorological disasters in particular?
- 2.How do we provide inter-institutional cooperation? For example, while AKOM (Disaster Coordination Center) develops an action plan against storms and floods, Deprem ve Zemin İnceleme Müdürlüğü (Earthquake and Site Investigation Department) works on tsunami and earthquake. The Department of Parks, Gardens and Green Areas is responsible for green areas. There are also ministries working on a higher scale, etc.

Erdem Ergin: Yes, many of our cities are exposed to more than one risk. Prioritization can be done in two ways.

Public institutions such as İstanbul Büyükşehir Belediyesi (İstanbul Metropolitan Municipality) should take plurality as a reference point. Prioritization should be based on the question of how many people benefit the most. Here the strategic priority is life safety too but there must also be social, economic and environmental criteria. To conclude, public institutions should prioritize considering the numbers and maximum benefit. However, if we elaborate, prioritization is done on the basis of socio-economic classification and different grouping. Collaboration/cooperation between institutions may change with the type of disaster in line with their duties. However, collaboration/cooperation with civil society and the private sector should be enhanced by dealing with the issue more broadly. Civil society mobilization has been very beneficial, especially in the disasters that occurred in the last two years.

Gökhan Ersoy: If we leave earthquakes aside, is there any functional early warning system at the local or central level for climate crisis-caused disasters in Turkey?

Bülent Özgen: Could you give information about the early warning systems for floods, earthquakes, and storms?

Erdem Ergin: Early warning systems in Turkey are open to development. These are developed at the regional level and according to disaster. There is no research that we can show as good practice yet.

Arda Gülbeyaz: Hello. Even the students of the relevant department are taught not risk management but crisis management. We as a country are just learning integrated disaster management and I do not know its quality. In your opinion how is this perception formed/changed?

Erdem Ergin: You are right, crisis management is the starting point. All countries and institutions start from the same point because life safety is very important in the first 72 hours. After completing crisis management, countries/institutions deal with recovery (more effective) and the very last with pre-crisis.



The logic behind this is as follows: if we know what happens during a crisis and recovery, the answer to the question of what we do not want to happen pre-disaster can be found more concretely. Pre-disaster appears as a starting point in the equation but when you start from there it remains abstract. The crisis and recovery offer a much more concrete start, especially when it comes to real events.

Ozan Erzincanlı: The pandemic crisis recurs without recovery. Due to the new variant, it is suggested that the name of the disease to be Covid-21.

Erdem Ergin: The Covid-19 pandemic crisis is very similar to the climate crisis in terms of uncertainty and evolution. We take the Covid management as a reference in our institutional studies; decision mechanism, information flow, the way of doing actions. It gives us a very valuable insight about the disaster risk management approach of the institution.

Küresel Denge Derneği - Zeynep Talu: Well, Mr. Karababa what is the importance of Chikungunya disease?

Ali Osman Karababa: We can easily say that diseases in North African countries will pose a risk for Turkey due to the shifting of the North African climate belt towards Turkey with climate change, and different mosquitoes such as Chikungunya can become a threat.

Meryem Kayan: Can we say that the species spreading these diseases increase due to the deterioration of the balance between species, biodiversity loss and the climate crisis?

Ali Osman Karababa: Biodiversity loss can be the major cause of both health problems and many ecological problems. Here, there is a necessity to take the biodiversity loss into account caused by the intensive use of pesticides.

Yağız Eren Abanus: What is the level of heat waves preparedness in Turkey?

Erdem Ergin: The heat wave is very connected to the demographic structure. The mortality rate in Turkey during the heatwave is not high compared to Europe because the proportion of elderly people in its population is not high.

Studies are carried out to include the climate dimension in Turkey Disaster Response Plan (TAMP) and adaptations at the city level.

Ebru Genç (AFAD): TAMP is usually prepared by taking the destructive impact into consideration. In that context, earthquakes are of top priority in İstanbul. Some studies continue to introduce event-based intervention plans in the future.

TAMP is being developed for preparedness during a disaster. In addition to these, disaster risk reduction plans are developed specifically for cities and Turkey in general. 80 cities have completed these plans. İstanbul will complete its risk reduction plan by the end of December and implement it by the beginning of January.

Ali Osman Karababa: Disaster preparedness plans need to be multilateral but we, as civil society, and citizens, cannot access them.

Eda Hafizoğlu: How do you associate excessive precipitation and flood with physical and mental health/well-being? What are the parameters that challenge us the most? I also want to ask the following questions: how are the people with disabilities included in these action and strategy plans or researches? How can we access these risk reduction plans?

Erdem Ergin: Mental health is very important and has a priority. After the İzmir earthquake, Middle East Technical University students asked us for emotional support. Although they live in a different city they were also affected. I and my students from the University of Rome are doing research on common and increasing findings related to Covid including drug use and depression.

Socio-economic or demographic breakdowns are not yet used in existing disaster management plans (crisis-oriented) and risk reduction plans (pre-disaster-oriented). However, once used, these plans will provide us with a more detailed range of solution development.



We include these breakdowns in our studies for the private sector.

Ali Osman Karababa: When we look at the WHO or IPCC documents, the risk of being displaced due to the process is very high. Displacement poses a high risk to mental health. Moreover, when this risk occurs the adaptation of those people to their new places and the inability to meet their basic needs such as food and shelter also have a negative impact on their mental health.

Ebru Genç: Disaster risk reduction plans at the city level are currently a 5-year plan and will be updated annually. After the plans are approved, they will be made public by the AFAD Presidency, except for some data of the institutions.

Rabia Dandin: As an energy systems engineer I want to ask you in which fields and how should energy production be done without negatively impacting climate change?

Ali Osman Karababa: According to the calculations of electrical engineers, an installed power of 65,000 MW is sufficient for Turkey. So first, excess fossil fuel capacity should be deducted from the installed power capacity, which is currently approaching 100,000 MW. Secondly, in renewable energy projects the private sector should act according to the site selection criteria determined by scientists.

Seda Elhan: Could you give information about the impacts of disasters on the non-human and to what extent the non-human are included in risk reduction plans?

Erdem Ergin: Unfortunately, this issue is not yet addressed in the current plans. There are best practices in other countries. Especially in some countries, there are evacuation mechanisms specific to livestock because they have economic value.

Ozan Erzincanlı: How should we explain the disasters that increase in frequency and the increasing risks to children and young people without being alarmist?

Erdem Ergin: Disaster is a cycle of nature. The problem is that we are not prepared for this cycle. When giving information, you must also provide the capacity to deal with that information because education should lead to behavioral change or changes in thinking. If this is not the case then stress arises. So, you should provide a solution as well as the information.

SESSION TWO - Forest Fires, Drought and Climate Adaptation Policies in Cities

Two Sides of the Same Coin: Drought and Floods - Dr. Akgün İlhan (Boğaziçi University)

In the second session of the conference, facilitated by Yeşil Düşünce Derneği Board Member Gökhan Ersoy, drought, floods, heat waves, forest ecosystems, biodiversity and climate adaptation policies in cities were discussed. The first speaker of this session, Dr. Akgün İlhan made her presentation on the theme of the perception of the climate crisis by people in general as changes in water and precipitation regimes. In that context, it was emphasized that on the one side of the same coin there are floods as a result of the abundance of water, and on the other, drought due to the water scarcity; and forest fires as a result of the combined effects of the heat waves increasing in parallel with drought and its connection with precipitation regimes.

First, Akgün stressed the importance of water problems that may occur in the future due to the population growth rate, although there is not much change in the amount of 112 billion cubic meters of water per year in Turkey. She mentioned that the amount of water per person in the 1960s decreased from 4000 cubic meters to below 1700 after the 2000s, which is the upper water stress level. In 2021 this amount was 1340 cubic meters per person. This trend indicates that if there is no significant decrease in precipitation, Turkey may become a water-poor country like Qatar and Saudi Arabia (where the amount of water per person is below 1000 cubic meters) in 2050.



On the other hand, the importance of water quality is stressed regarding pollution as follows:

According to the results of 143 surface water monitoring, presented in the Turkey Environmental Problems and Priorities Assessment Report published by Çevre, Şehircilik ve İklim Bakanlığı (Ministry of Environment, Urbanization and Climate) 24% of our water is the first level good quality water, 18% is second level lightly polluted water, 23% is third level polluted water, 35% is fourth level very polluted water. In other words, only less than a quarter of our water is of good quality. Domestic wastewater, agricultural pesticides and fertilizers and domestic solid wastes are the biggest sources of water pollution. 71% of groundwater is of good quality and 29% of poor quality.

Pesticides and fertilizers, livestock and domestic wastewater are some sources responsible for groundwater pollution.

Secondly, the situation in Turkey regarding the right to water was evaluated in comparison with global data and then the following findings were presented:

- According to the UN, between 50 and 100 liters of water per person per day are needed.
- More than half of the 7.8 billion world population (4.2 billion) does not have access to a proper sewage system.
- 2.2 billion people do not have access to clean drinking water.
- Billions of people do not have access to running water. Whether these people are deprived of their right to water is determined by the distance to the source of water (maximum 1 km or maximum half an hour to bring water home).

Akgün said that there is no running water problem in Turkey but the risk of water disconnections due to the lack of economic means to access water and unaffordable water bills (people spending more than 3% of their budget on water). She also gave the example that 50 thousand subscribers in İstanbul faced water cuts before the Covid-19 pandemic. The local administration and solidarity-oriented policy of stopping water cuts and suspended bills developed against the Covid-19 crisis were given as examples.

Considering that water is consumed in carboys in our country and access to water becomes a significant problem because both water and containers generate economic cost and this mostly affects the poor. Additionally, she mentioned that there are three different levels of the water footprint in terms of goods and services in relation to water consumption: blue (referring to the consumption of surface water and groundwater), green (referring to the consumption of rainwater) and gray (referring to pollution of water sources).

Thirdly, different impacts of the water cycle that is disrupted gradually with the climate crisis in Turkey, apart from deaths, were elaborated with the following examples:

- the frequency of the dry period in Turkey has decreased from every 20 years to every 4-5 years after the 1980s,
- even the Black Sea region has been affected by this drought,
- when drought and heat waves occur at the same time, harmful substances in the soil increase proportionally due to excessive evaporation of surface waters,
- heat waves can affect lake thermal and oxygen dynamics (for example, the mucilage of cyanobacteria due to the increasing temperature in the Marmara Sea),
- due to the overuse of groundwater aquifers, fresh water reservoirs, are discharged and saltwater intrusion from the sea leads to salinization,
- sanitation problems caused by floods contaminating water resources...

Besides, the cumulative impact of simultaneous occurrence of extreme climatic events including heat waves, drought and forest fires was emphasized.

Dr. Akgün İlhan concluded her presentation by addressing the solutions that are realistic, focusing on different scales and applied in different countries (London - Green Belt, Wuhan - Sponge City, Curitiba - River Parks, Utrecht - Rain Gardens). The recommendations mentioned in that context are as follows:

- to be a water-sensitive, and green city,



- contributing to the water supply by reducing the loss and leakage rates in water transmission (although the loss and leakage rate, which was around 44 percent in 2012 in Turkey, has recently been decreased to 37%, considering the current problems in terms of reliability of the data, this loss and leakage rate should be rapidly reduced by the serious implementation of new regulations),
- labor and chemical and energy use saving, less consumption of clean water and reduction in water bills with cyclical water management (for example, reuse of greywater produced by buildings in cities with simple treatment, as in Australia and Israel),
- rainwater harvesting from rooftop catchments, storing in reservoirs and using in gardens and for pools,
- restoring the water cycle and ensuring its sustainability,
- against the improper land uses (deforestation, use of asphalt in cities and reduction in infiltration due to concrete) protecting and expanding trees in streams, lakes, water channels, medians, plants, hobby gardens, groves, squares, green roofs, parks, and other green areas; planting bushes and trees with high water-holding capacity in these areas, as in the sponge city example in Wuhan.
- green infrastructure implementations, such as storage and use of water collected by rainwater harvesting system that is developed separately from sewage treatment.,
- feeding groundwater by swales and water-permeable asphalt/concrete reducing impermeable surfaces,
- conservation and enhancement of natural water systems by nature-based urban planning and designs; for example, reduction of normal flow and peak flows,
- implementation of biofiltration methods to capture and hold water to reduce overflows, thus preventing urban pollution from reaching the ocean by waterways,
- storing rainwater and increasing the visual and recreational quality of the city by integrating this storage into the landscape.

Forest Ecosystems and Climate Change - Prof. Dr. Nesibe Köse (İstanbul University Cerrahpaşa Faculty of Forestry - Department of Forest Botany)

Prof. Dr. Nesibe Köse made a presentation on trees as part of the forest ecosystems and gave information about the impacts of climate change on different tree species and in different regions of Turkey. She said that although studies on forests in Turkey are short-term and not related, they are based on the projections provided by the species distribution models.

These models do not include every parameter, and there may be different parameters that may affect the predictions negatively. At the beginning of her presentation, she mentioned that the distribution of Scotch pine and some oak species in the southern part of our country declined, the western and southern distribution of the oriental beech retreated, and there is a possibility of settling of eastern beech in the Caucasus region in the north. She then emphasized larch, tree deaths, nomadic culture, Scotch pine and the nature of the Eastern Black Sea as a refugee.

First, the following findings based on 20 years of field monitoring on larch, which is a relatively sufficient finding, were presented:

- these trees need rainfall in May and June to grow,
- high temperatures negatively affect the growth of trees,
- larches may be affected negatively by the intense drought in Central Anatolia (especially in the steppe transition zone) and in inner parts of the Mediterranean, as a result of the decrease in precipitation and temperature increase, which are the impacts of climate change,
- larches in the bottom zones of the mountains are more affected than those at the top.

She emphasized that tree-growth analysis based on tree samples in Isparta, a city located in southern Turkey, showed that the growth started to decrease after 1975 and drought due to high temperature has decreased the growth of trees since the mid-1970s. In addition, according to the reports of the Orman Genel Müdürlüğü (General Directorate of Forestry), tree deaths, including larches, have accelerated in the last 2 years.



In terms of fire ecology, she emphasized that characteristics of larch not burning from bottom to the top, unlike Calabrian pine, have changed recently. Besides, larch can survive fires without being completely destroyed and this makes long-term monitoring possible, which is important to understand the fire-climate-forest relationship. According to the analysis of the samples from the Black Sea, Aegean, Central Anatolia, and Mediterranean regions collected by this monitoring method, even though the climate has changed for about 600 years, the fires took place in August and October. In addition, it was emphasized that there were no widespread fires in the last 100 years and this was related to the extinguishing activities of forest workers and stressed the importance of the strategy of preventing the spread of the fire.

Apart from these, the subject was elaborated on the following findings:

- drought increases the chances of fire,
- since there were no fires spreading in the region in the last century, the substance accumulation in the forests has increased and this increases the risk of crown fires,
- longer fire season due to increase in heat waves, and the other factors increase mega-fires and crown fires,
- problems that may arise in the regenerative capacity of larch forests after fires and the risk of gene loss.

Besides, considering the social dimension she mentioned that though many lightning marks were seen during tree monitoring on a route where the Yoriks graze their goats in the Manavgat region, the spread of fires has been prevented by the goats eating fire-prone vegetation. On the other hand, the spread of fires has increased in recent years because goats have not been allowed to graze in this area. It was criticized that goats are forbidden in the forests and that they are seen as enemies of saplings.

Then speaking of scotch trees, she said that

- they can adapt to a wide variety of climates,
- in the southernmost part of the world, they are found only in our country and Spain,
- March, April temperatures and May, June rainfalls have positive impacts on their growth,

- while their need for precipitation does not change, their need for temperature is very variable in some regions,
- according to the linear evaluation tables, if the temperature exceeds 7 degrees in March and April, the growth decreases and the risk of tree death, especially scotch pine, increases,
- if the temperature exceeds 12 degrees in May, climate change can threaten the existence of this tree species in our country.

To conclude, she gave some information derived from research that has been going on for 8-10 years in the Eastern Black Sea Region and said that the predicted temperature increase can positively affect the conifers in this region. She mentioned that the Eastern Black Sea and Caucasus region, unlike other regions of Turkey, could be a refugee for species in the future as in the past geological periods. She stressed the importance that the natural old forests in the region should be protected and activities that would cause habitat fragmentation in these forests should be avoided.

Biodiversity - Dr. Emrah Çoraman (İstanbul Technical University)

The last speaker of the conference Dr. Emrah Çoraman addressed biodiversity with a focus on cities from a broad historical perspective and emphasized the importance of nature-based solutions and what we can do.

Çoraman said that Istanbul as a migration route for different species including butterflies, bats and fish has a remarkable level of biodiversity and then emphasized Turkey's rich biodiversity as it is one of the rare countries that have three hotspots, Çoraman gave brief information about the #wildistanbul activity they carry out in Istanbul Municipality, where they try to highlight other living things in green cities.

He presented the following findings in this part of his speech, devoted to a brief overview of problems related to biodiversity:

- 600 million breeding birds have vanished across Europe since 1980,
- house sparrow population, one of the most recognizable birds, has declined %50 percent,
- 40% of insect species in protected areas in Germany are in danger of extinction over the next few decades.

A scientific study published in 2021 (Morrison et al. 2021) including the analysis of 200 thousand bird sounds (recordings of both natural sounds and bird sounds) collected from different parts of the world in the last 25 years reveals that:

- the variety and intensity of bird song have declined,
- since birds learn their songs from each other, diversity in their cultures suffers as populations decline,
- it is predicted that a decline in bird sounds, one of the elements that connect humans with nature, will also have implications for human health.

Using the data from 20,000 populations of 4000 species, the Living Planet Index study, conducted by the WWF and the Zoological Society of London, shows an average 68% decrease in monitored populations since 1970. Comparing continents, it was highlighted that although the situation in Europe and Central Asia was not bad, the 84% decline in Latin America and a similar result were observed in Africa and Asia-Pacific regions.

The following drivers were cited as the reason for this decline, respectively:

1. Habitat loss
2. Over-hunting
3. Invasive species
4. Pollution
5. Climate change (most effective in Latin America and the Caribbean)

The prediction is mentioned that since climate change is listed as the last driver, before experiencing the impact of the climate crisis on biological diversity we would lose biodiversity to a great extent due to other drivers. On the other hand, tackling the climate crisis with nature-based solutions that can increase biodiversity is stressed as an important strategy.

In the context of the “6th mass extinction” agenda that has become popular recently, different mass extinction events in the history of the Earth were listed in the table below. The high danger of mass extinction was emphasized considering today’s extinction rate of species, especially mammals, vertebrates, and birds.

Historical Order	Geological Period	Distance to the present	Percentage of extinction
First	Ordovician - Silurian	440 million years ago	%86
Second	Late Devonian	365 million years ago	%75
Third	Permian - Triassic	252 million years ago	%96
Forth	Triassic - Jurassic	201 million years ago	%80
Fifth	Cretaceous - Paleogene	66 million years ago	%60-76

He emphasized that considering mass extinction events when %70 of species vanish in two million years, the prediction that %34 of the amphibian species and 22% of the mammal species decline in a few decades or a century is concerning.

In the last part of his presentation, Çoraman focused on what should be understood from biodiversity and the solutions that can be implemented in the city. Then he presented promising findings of the monitoring he did around the artificial pond on the İTÜ Ayazağa campus and specified that in the area with a radius of 1 km around the pond,

- there are endemic plant species.
- gray heron, little bittern and black-crowned night heron live in the area.
- 151 of 352 bird species living in İstanbul can be watched on campus.

As a solution, he emphasized the necessity of reducing vulnerability and supporting the recovery speed of ecosystems. He concluded his speech by stressing the importance of considering biodiversity together with species, genetics, function, and ecosystem diversity, and increasing different ecosystems in İstanbul and connecting them with green corridors.

Questions & Answers 2

Ozan Erzincanlı: As urbanization increases, the soil absorbing water is covered with concrete. What are the negative impacts of this?

Akgün İlhan: Concrete and asphalt pavement sealing the soil increase the risk of flooding.

Melis Naz Tanrıverdi: There are so many green spaces that are not qualified... Soil is our most valuable tool to hold water, but it is also exposed to various poisons, and its water-holding capacity is very low due to incorrect mixtures. Isn't it necessary to implement the right land and soil policy?

Akgün İlhan: Yes, qualified green space is important. The number of locally grown bushes and trees should increase. It is also important to connect green spaces with green corridors.

Eda Hafızoğlu: How can we ensure the cyclical use of water on the city level, except housing? Are there any studies on this?

Akgün İlhan: There are examples of the cyclical use of water besides housing, but they are not enough. Some factories and university campuses do this. A similar activity is conducted at the Ankara campus of the Çevre ve Şehircilik Bakanlığı (Ministry of Environment and Urbanization). But these are only fragmentary small projects, not holistic ones.

Ali Osman Karababa: Is there any city where green corridors are developed?

Emrah Çoraman: As far as I know, there are plans but no examples. For example, the Yeşil Vadiler Projesi (Green Valleys Project) in İstanbul.

Emet Değirmenci: Do municipal employees know about wildlife corridor projects in Europe? I would like to stress the importance of these projects, which can also serve rehabilitation, especially with regard to increasing biodiversity.

Emrah Çoraman: The development of corridors may vary according to the type of support. Thus, these corridors are very difficult to develop for some species, while easier for others.

Akgün İlhan: There was such a project competition for the Melez Çayı (Melez Stream) in İzmir. This means that there are plans for İzmir.

Meryem Kayan: Speaking of corridors, it is more difficult to transform this since the destruction is more intense in cities such as İstanbul and İzmir than the European cities.

Ali Osman Karababa: Can groundwater dams be a solution for the future?

Akgün İlhan: These dams prevent evaporation, but they cannot be very large scale and can vary according to the structure of the aquifer. Thus, they can have very small contributions. The solution is water saving. Desalination can also be a harmful process.

Rabia Dandin: The dirty water and chemical wastes of factories dumped into water are the biggest sources of water pollution, right? Can we increase the amount of clean water by raising people's awareness and preventing the waste from factories from being dumped into the water?

Akgün İlhan: There are factories implementing the water cycle. Therefore, not only industrial waste but domestic waste is also important. Only %50 of domestic waste undergoes advanced biological treatment. Besides, nitrogen and phosphorus loads diffuse from agricultural lands to the Marmara Sea through precipitation and excessive irrigation. In order to prevent this, we should treat our wastewater better in cities, consume less water, and switch to cyclic use. In other words, we must reduce the demand pressure on our primary water resources. Extensive use of pesticides and fertilizers should be avoided in agriculture.

Gürsel Tonbul: Is there any research-based prediction about which new species will replace the extinct species?

Nesibe Köse: There are models showing that maquis can replace red pine, i.e., species that need less moisture can grow in the relevant region.

Bülent Özgen: What can we say about the Kiri tree?



Nesibe Köse: Exotic species and monocultures should not be introduced to the environment since there is so much destruction and pressure in both cities and forests. It is necessary to protect the natural vegetation of the city and the natural species that do not need much water. There are studies on this in İstanbul as well.

Melis Naz Tanrıverdi: How efficiently can we use the urban periphery?

Emrah Çoraman: İstanbul is an ever-expanding city, so I'm not sure if we can effectively use the periphery of the city.

CONTRIBUTIONS FROM DIFFERENT COUNTRIES

Storm Desmond and the Power Cut Caused by Flooding in Lancaster - Anne Chapman

In December 2015 Lancaster was affected by Storm Desmond. Parts of the city were flooded and these areas included the electricity sub-station for the urban area of Lancaster and Morecambe, resulting in a major power cut. It took several days for the substation to be operational again, though power was partially restored after a day using lorry-mounted generators at local sub-stations. These generators were brought in from all over the country.

This was the first major power cut in an urban area of the UK for several decades and it revealed how dependant on electricity we have become, since the last major power cuts in the 1970s. In particular, there were:

Difficulties in communication:

- There was no mobile signal as masts did not have power. Most landline phones also did not work, unless they were 'plug-in' landlines, where the telephone cable is plugged into the wall and no other power is required.

- Home routers did not work so even if you had some power in a laptop battery you could not connect to the internet.
- Problems with communication meant that people who had to make decisions about institutions, such as headteachers or the vice-chancellor at the university, were very much on their own, without access to information.
- The only way of finding out what was going on was to go out and ask people you met in the street, or to listen to the local radio station, 'Bay Radio' with a battery-powered radio. Bay Radio was based in Lancaster and broadcast on FM, which was working. They heroically managed to move equipment upstairs (from a flooded downstairs) and to get a generator to provide them with power.

Problems with electrically-powered doors, intercom and safety systems:

- Intercom systems to visit people in flats did not work so it was not possible to visit and check on vulnerable people living there. Some flats have a pumped water supply so people in them were without water. One care home had a lock linked into the fire system so could not lock their door without electricity and another could not use their gas cooker without the extractor fan being on.

The Lancaster power cut is an example of the secondary impacts of flooding, which often affect far more people than the flood itself. While the transition to zero-carbon requires more use of electricity we also need to be able to cope without, and therefore need contingency plans for how we will manage in a prolonged power cut. That coping will involve us relying on those local to us as travel and communication with those further afield are likely to be difficult.

Writer: Anne Chapman is a member of Green House Think Tank. She lives in Lancaster, in the North West of England. Anne has written about the Lancaster power cut in " Dealing with Extreme Weather", Facing up to Climate Reality, Honesty, Disaster and Hope, Green House Think Tank and London Publishing Partnership, 2019, pp. 93-107.



Fresh Mountain Air for Rent - The Alpine and Carpathian Regions as a Climate Indicator - Dagmar Tutschek

Climate crisis. Which images come to mind when we read "climate crisis" in the news? Burning bushlands in Australia and California, hurricanes in the Caribbean and Florida, deserted uninhabitable areas in southern Europe and Africa, melting ice shelves in the Arctic Sea. Dramatic pictures, no doubt.

But the most sensitive area in regard to climate change is a mountainous area: The Alpine and Carpathian regions in Europe. The Alps and the Carpathian mountains together extend over more than 2500 km from the Mediterranean coast near Nice to the southern border of Romania. From sea level to peaks with altitudes above 4800 meters.

What makes these regions so special? First of all, the vegetation. For tens of thousands of years, plant life has learned to specialize. They have learned to adapt to the soil and to the broad variety of different climate zones that often differ from one valley to the next. Conditions are very challenging in the mountains. The higher the altitude, the harder it is to survive. For plants, for animals and for people. But the higher the average temperatures, the higher the habitat zone. That means more competition among the different species. Some of the ones very well adapted to high altitude conditions will lose this battle. This is bad for Alpine biodiversity.

A large area of the mountains is covered by forests up to an altitude of almost 2000 meters depending on local conditions, on the soil, on the rainfall, and the availability of water. The forests are an essential factor for the living conditions in the Alpine and Carpathian mountain regions. Strong and resilient trees are necessary to store humidity and to prevent soil erosion. Lack of resilient forests leads to instability. Landslides, avalanches and inundations are terrible disasters that affect the lower-lying areas when forests are not strong and resilient enough. Lack of any forests at all ultimately results in regional water deficiency.

Deforestation and an inappropriate new mix of fast-growing tree species, which were planted in the past seventy years, have dramatically weakened the forests' resilience in the Alps and the Carpathian mountains.

Additionally, glaciers are melting due to global warming. As a result, natural water resources in the mountains and the adjacent regions are shrinking. This is reducing fertility and the habitability of large areas will decline enormously.

The vegetation of the Alps and the Carpathian mountains is a leading indicator for the negative effects of climate change. We have to monitor this area and its habitats very carefully, and we have to act fast. At the climate summit in June 2019 in the Alpine region of Eastern Austria organized by the Austrian Green Foundation, a group of international experts presented the role of the Alps and the Carpathian mountains as the most important climate indicators in Europe. In October 2021, an enormous fire that lasted two weeks destroyed 115 hectares of forests just around the village of the climate summit. The weeks before the forest fire, the region had suffered an exceptionally dry period – caused by the climate crisis. It's time to act.

Writer: Dagmar Tutschek from Austria. She is the Chairwoman of the FREDA, The Austrian Green Future Academy and the Co-President of GEF, Green European Foundation.

Case of Major Greek Cities – Dr. Rigas Tsiakiris

Big cities alongside the Mediterranean coastline are predicted to be affected by extreme climatic conditions in the near future increasing heat waves, drought, floods, fires in their surroundings, atmospheric pollution, etc. which will change the baseline of everyday living of millions of inhabitants.

In Greece, where more than a third of the total population lives in the city of Athens and its surroundings (Attica prefecture), a row of such disastrous events have already taken place during the last decades, starting from the year 1987, when more than 1.100 Athenians died during an extreme heatwave. Thereafter, most of the suburban forest had gone up in flames beginning with a catastrophic fire in 2007 which extirpated most of the adjusted Parnitha National Park that is characterized as "the green lungs of Athens". In addition, in 2018 a big percentage of natural forest in the nearby mountains burned and 102 people have been trapped and died in Mati, a sub-urban area mixed with a forest nearby the seashore. Moreover, shocking images with smoke clouds above the city made headlines last year as forest fires approached again the suburbs and ash was "raining down" all over Athens for days.

But also deadly floods hit likewise the west part of the prefecture and have killed at least 15 people in 2007, which have been caused by heavy overnight rain. Besides, Athens, which is now the hottest metropolis in mainland Europe, has observed a 5.2% increase in mortality for every 1°C increase in daily max temperatures over 31,5°C between 2000-2012. Similarly, Thessaloniki, the second biggest city of Greece with more than a million inhabitants, has also been badly affected by an unpredictable threat due to climate change: a row of mild winters has caused a population increase of a destructive species of bark beetles that have devastated of a big percentage of the pine trees of Sheikh Su, Thessaloniki's extended peri-urban forest, which is mainly a pine plantation.

Such repeated extreme events, that neither ambitious plans such as "Athens Resilience Strategy for 2030" could predict and alleviate, makes new holistic approaches imperative based on wider area-landscape climate change mitigation strategies even on prefecture-level. These should include a wide array of actions from small scale "backyard" arrangements, to bigger scale green infrastructure developments including appropriate adjustments in urban and peri-urban agriculture and forestry with integrated, interdisciplinary, and participatory actions that could make the urban landscape more resilient and habitable increasing its economic, environmental and socio-cultural benefits.

Writer: Dr. Tsiakiris Rigas, he is a member of the Scientific Board of the Green Institute Greece.

SPEAKERS' BIOGRAPHIES:

Erdem Ergin

He is a senior disaster risk management specialist and climate resilience advisor. His focus is urban resilience, critical infrastructure, systemic shocks, decision-making under uncertainty and capacity building. His current engagements include co-founder and director of Business Resilience 360 Consultancy, adjunct professor at the University of Rome and coordinator of the "Critical Infrastructure Resilience" summer school at the Venice International University. He is on an active roster for the UN Disaster Assessment and Coordination and for the World Bank for Post Disaster Need Assessment.

He has over 20 years of experience, mixing fieldwork with institutional capacity. Most relevant fieldwork and disaster experience include: crisis management evaluation for open mines during the 2021 forest fires (Turkey), post-disaster economic impact assessment for the 2020 Elazig and Izmir earthquakes (2020), decision making under uncertainty for SMEs during Covid (2020), post-disaster impact and need assessment for the energy sector in Bosnia (2014), advisor to the Prime Minister of Haiti after the earthquake (2010). Most relevant institutional capacity include: lead expert for the design of the largest climate change adaptation fund of Turkey (2019), lead expert for Istanbul climate change adaptation strategy and the road map (2017), design and supervision of risk assessments on critical infrastructure (energy and logistics), food chains and organized industrial zones (2018), lead expert for the first climate change impact risk assessment on thermal power plants in Turkey (2015), lead expert for the development of new lending offerings on climate resilience for organized industrial zones for IFC (2017), over 1,200 hours of training for adults and professionals on risk assessment, climate change adaptation, crisis management, and recovery. He has worked in Turkey, the Balkans, the United States, the Caribbean and West Africa for national institutions, international organizations, businesses and associations.



He holds a M.Des in urban studies with a major in risk and resilience for cities from Harvard University Graduate School of Design, a M.Sc. in engineering management with a major on the crisis, disaster and risk management from George Washington University, and B.Sc. in Chemical Engineering from the Middle East Technical University.

Prof. Dr. Ali Osman Karababa

He worked as a lecturer at Ege University Faculty of Medicine, Department of Public Health between 1979-2017 and retired in February 2017. While working as a public health specialist, he specialized especially in environmental health. Besides his academic studies, he participated in the environmental movements as an activist and a member of the Aegean Environment and Culture Platform (Ege Çevre ve Kültür Platformu). He contributed to ecological movements in many parts of the country with his scientific reports. He is a member of the Green Party.

Dr. Akgün İlhan

Akgün İlhan holds a BSc degree in Landscape Architecture from Ankara University (1996). She completed her MA in Curriculum & Instruction (2002) at Hacettepe University and MSc in International Environmental Science at Lund University (2005) in Sweden with the Swedish Institute Scholarship. Between 2004 and 2005, she did an internship in the Water Division of UNESCO (Paris) where she carried out international research on public participation in river basin management. Akgün İlhan completed her PhD in the field of Environmental Sciences at the Institute of Science and Technology (ICTA) in Universitat Autònoma de Barcelona with the FI scholarship from the Catalan Government. Meanwhile, she also worked as a research associate, under the supervision of Joan David Tàbara, in the European Union funded project called "Methods and Tools for Integrated Sustainability Assessment" (MATTISE). After completing her studies she came back to Turkey and worked for the Right to Water Campaign (İstanbul/Turkey) in the period of 2012-2018. She has also given lectures ("Environment & Tourism" and "Sustainability from Environmental & Social Perspectives") in Boğaziçi University Tourism Administration Department since 2017.

Akgün İlhan is the author of the book Towards a New Water Policy: Water Management, Alternatives and Recommendations (2011) and chapters and articles in books, newspapers, and magazines about various dimensions of the water crisis and climate change in Turkey. She is the producer of a radio program called Su Hakkı which was aired between 2012-2018 and a current radio program with the name Sudan Gelen since May 2018 in Açık Radyo. She was a 2019/20 Mercator-IPC Fellow in İstanbul Policy Center working on water management and climate change.

Prof. Dr. Nesibe Köse

She is a faculty member at İstanbul University, Cerrahpaşa Faculty of Forestry. Her main focus is dendroclimatological, dendroecological, dendroarchaeological and dendrogeomorphological scientific disciplines using tree rings. She generated a large annual ring dataset of climate-sensitive trees in Turkey. This tree ring dataset has been used to determine the hundred years variation of the northern border of the tropics, to construct the Old World Drought Atlas (OWDA), as well as to reconstruct past precipitation and river flow data. She is currently doing research on how climate change impacts the growth of important forest trees and on a long-term fire regime to reveal fire-climate relationships in larch forests.

Dr. Emrah Çoraman – İstanbul Technical University – Eurasia Institute of Earth Sciences

He does scientific studies in the field of ecology and evolutionary biology. His main research topics are the mechanisms that shape biodiversity patterns and especially the impacts of geography and changing environmental conditions on the genetic structure of species. He did his master's and PhD at Boğaziçi University, Institute of Environmental Sciences. In these studies, he analyzed the genetic diversity of bat species living in Anatolia and concluded that many species in Anatolia belong to different genetic lineages and these lineages differ ecologically from their European counterparts and respond differently to climate change. He did his post-doctoral research in the Berlin Natural History Museum – Leibniz Institute for Evolution and Biodiversity Studies. Here he has deepened his research by using genomic data.



He came back to Turkey in January 2020 and started to teach at İstanbul Technical University, Eurasia Institute of Earth Sciences. In addition to his academic studies, he has participated in many nature conservation projects. Some of these projects were supported by institutions including the European Union, WWF-Turkey and the Conservation Leadership Program (BirdLife International, Flora & Fauna International, Wildlife Conservation Society and Conservation International consortium). He has been on the advisory board of the United Nations Environment Program Eurobats agreement since 2010. He works on a digital platform that would bring studies on Anatolian natural history together. He provides consultancy to the Urban Ecosystems Directorate of the İstanbul Metropolitan Municipality Department of Parks, Gardens and Green Areas.



Contact us :



GREEN EUROPEAN FOUNDATION
Rue du Fossé 3, L-1536 Luxembourg
Brussels Office: Mundo Madou,
Avenue des Arts 7-8, 1210 Brussels
t: +32 2 329 00 50
e: info@gef.eu

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