EDUCATION

FOR SUSTAINABLE DEVELOPMENT

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Spis treści

Abstract

As part of research and analytical work, this report has been created in the field of knowledge, awareness, and attitudes of residents (ecology, sustainable development) which will allow for a full understanding of the problems that arise as part of a wide range of statutory activities and non-formal activities to be carried out by the Partners. This will enable us in the future to concentrate human and technical resources on tasks that will meet the educational needs of residents in all levels in areas affecting the broadly understood natural environment and ecology. At the same time, these activities should be effective enough to bring measurable practical benefits through their use in the natural and socio-economic environment and conservation of resources (lower environmental pollution, liquidation of illegal landfills, improvement of air quality, higher percentage of renewable energy in economic turnover, higher level of EU funds for pro-environmental goals).

Introduction

In recent years, sustainability has come to the fore more than ever including selective waste collection, zero-waste, recycling, environmentally friendly solutions, carbon neutrality and mitigation of the adverse effects of climate change, ecological footprint, and the use of natural resources (Maximilian et al. 2019; Millot & Maïzi, 2021; Chen et al. 2022). Concepts that we encounter every day and have become a part of our existence, but how well do we live according to these aspects? What is an average citizen willing to do in the name of sustainability? Do we give up our needs, or perhaps transform them? How well do we even understand the meaning of these concepts?

The fact of the unsustainability of the current socio-economic processes, their self-destructive nature from an ecological, social, and thus ultimately economic point of view, was already documented by numerous studies in the second third of the 20th century. First of all, one of the very important features of the concept of sustainability is that it cannot be limited to certain geographical units, it can only be interpreted on a global scale. One of the reasons for this is the interdependent nature of ecological systems related to the territorial aspects of ecological changes. According to the ecological literature, any effect is transmitted in the entire ecosystem and thus in the entire biosphere, so it affects all elements of the system directly or indirectly (Ellis, 2015). One of the most important questions is, what changes should the business sector undergo in order to be able to say that it is no longer part of the problem, but rather part of the solution? Corporate sustainability is a business approach that increases the company's value (even its share value) in the long term by exploiting opportunities and reducing risks in the field of economic, environmental, and social development. Corporate sustainability leaders create long-term value by shaping their strategies and management to take advantage of market opportunities for sustainable products and services while successfully reducing and avoiding sustainability costs and risks. However, when talking about a sustainable company, we have to go beyond the traditional, mainstream discourses on corporate environmental awareness and corporate social responsibility. As a result of the wide-ranging nature of the topic of sustainability and the scientific uncertainty regarding the tools needed to move in the direction of sustainability, social participation and deliberation play a particularly important role in assessing the sustainability of companies, which in the case of companies primarily means operating in accordance with the needs of stakeholders. There are countless tools at our disposal for both environmentally conscious management and social responsibility. However, the

success of the application of these tools and substantial progress in corporate environmental awareness and social responsibility also depend on the attitude of the individuals involved in decision-making.

In the past few months, several studies have come to light that examined the attitude of the European population towards sustainability. Based on those results, it can be seen that the European population is concerned about their environment, and the willingness to take action is also increasingly typical. In many cases, however, concrete steps are not taken, even though we know that we should do more for our environment than we currently do.

Regarding the environmental consciousness of the general public in those countries, which belong to the largest CO_2 emitters in the world, the Gallup Institute can provide reliable results of the last four decades. Interesting to study the Gallup Poll results from the United States, concerning sustainability issues in the public opinion between 1988 and 2022. The two most central questions were about the priorities between economic growth or environmental protection (Fig. 1) and the perception of the seriousness of climate change (Fig. 2).

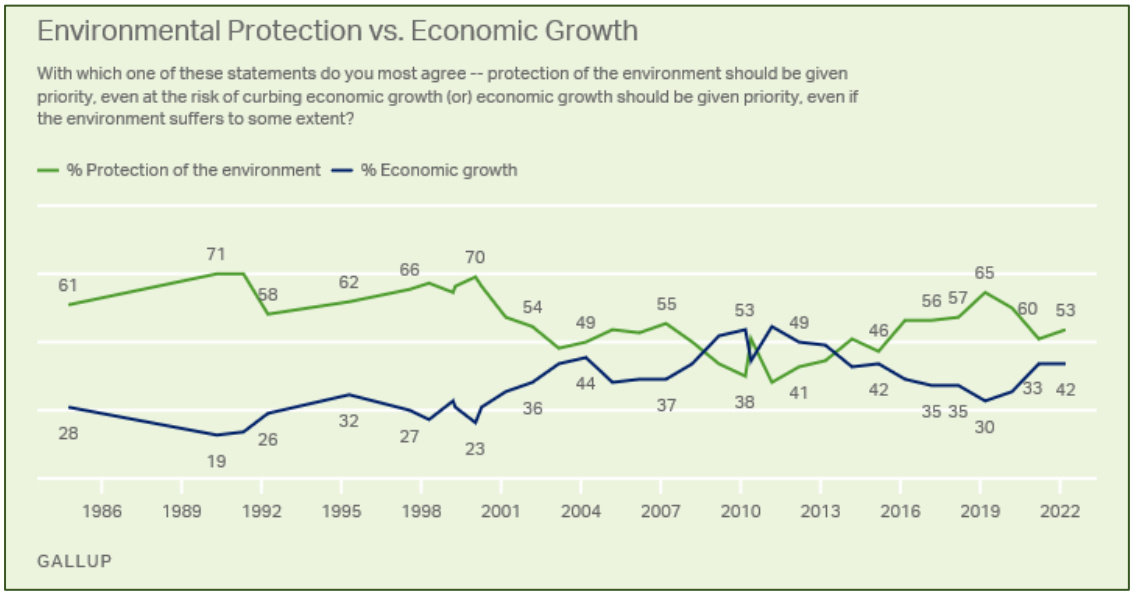


Figure 1 Changes of public opinion in the US about the priorities concerning environmental protection or economic growth. Source: Gallup, 2022.

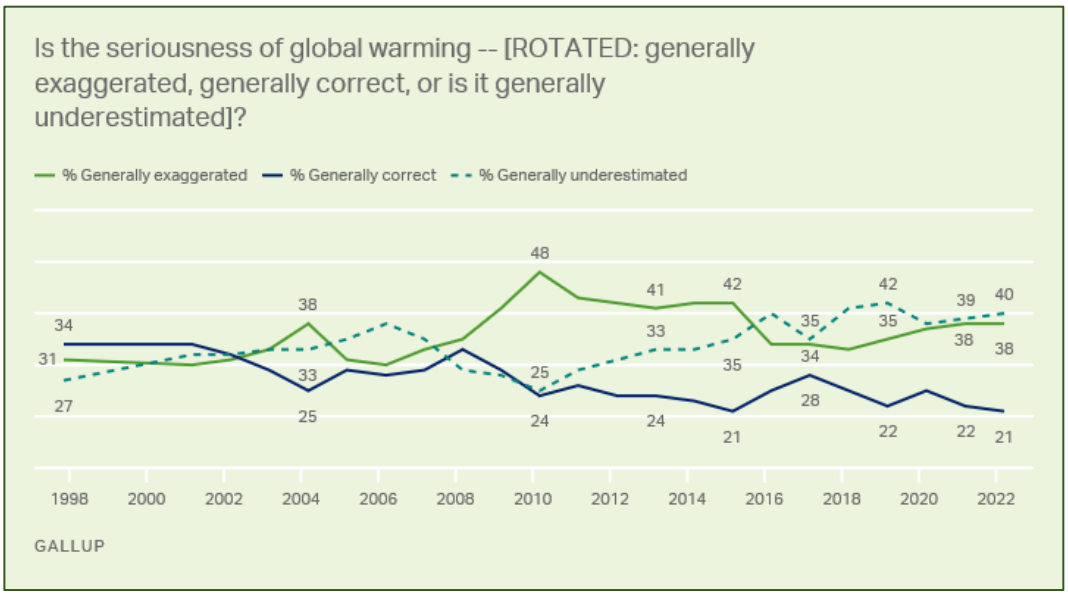


Figure 2 Changes of public opinion regarding the seriousness of global warming between 1998 and 2022. Source: Gallup 2022.

Several available studies also deal with the popularity of environmental protection steps that can be incorporated into everyday routines, and the frequency of their application. Among the steps related to a sustainable lifestyle, the selective collection of waste is among the most frequently mentioned: according to their own admission, more than two-thirds of people collect their garbage separately. In addition, conserving energy and water and avoiding single-use plastics also made it to the top of the list.

Overall, it can be said that we see the need for a sustainable lifestyle, and we are trying to develop in this area. In some cases, our lack of knowledge, our financial possibilities or even our comfort is a barrier, but perhaps with time and a lot of information, this can continue to improve. We know less about the relationship between our finances and sustainability, but the basic openness is there. Thus, if a wide range of sustainable products will be available and dissemination of knowledge helps to make them known, it is expected that they will quickly become popular, although price and personal economic conditions will be of key importance.

Research and decision-making bodies believe that part of reducing the climate impact is a circular economy. Previous research to some extent lacks a business perspective on industrial symbiosis and regenerative business models (Kidell and Åberg, 2021). The knowledge gap in research makes it interesting to conceptualize business models for businesses that work in an environmentally sustainable way. Based on the conceptualization, challenges and opportunities can be identified. Society and industry have, with the help of research and conceptualization of nature-based solutions, the opportunity to act based on the conditions of the time to promote

sustainable development from a regenerative perspective. Kidell and Åberg (2021) explained that the regenerative activities promote sustainable development by contributing in various ways to reduced use of virgin resources. It is obvious, that companies with regenerative business models can offer value in the form of customers and partner companies being able to communicate a sustainable profile. Important challenges are legislation, communication of the value proposition and site-specific residual streams. Important opportunities are new measures for sustainability, innovation and, above all, the driving force of public opinion for a more circular economy.

One of the most recent studies examined EU member states and specifically wanted to explore the impact of the pandemic on consumer behaviour (European Commission, 2020). The results from Hungary and Poland show that more than three quarters of respondents either shop closer to home or support local businesses, which is definitely an important step towards reducing our ecological footprint. The research also highlights that the environmental awareness of Hungarian and Polish consumers is currently not significantly behind the European average. At the same time, the research also shows the economic impact of the virus situation. In Hungary, four out of ten people are worried about paying their bills for the next month, and almost 60%, according to their own admission, prefer to postpone larger expenses. Based on research by ALTEO in January 2021, in Hungary, there is almost no Hungarian who is not concerned about the future of the planet. Nine out of ten residents are climate anxious and worry about the consequences of environmental pollution. This mainly affects Budapest residents and university graduates, as they are the ones who are most aware of the factors endangering our planet. Although different demographic groups have different views on their importance, the majority agree on one thing: environmental protection is the shared responsibility of the entire society. Every third Hungarian has already encountered the concept of the ecological footprint, yet they do not know its exact meaning (37%). To a targeted question, 77% of Hungarians answered that they would like the state to encourage the development of residential green financial solutions that support the rise of sustainable, climate-friendly industries. This reinforces the interest in the subject, which gives rise to confidence in future demand. According to the latest data published in 2021, if everyone lived like Hungarians and Poles, we would need 2.3 Earths (Mihály et al. 2021). Already during a survey in 2019, 95% of the respondents answered that they consider environmental protection important, and the latest research proves that since then the sustainable lifestyle and the protection of our environment have become even more important to all of us.

The key areas of the research – theoretical background

The 2005 World Summit Outcome Document identifies the "interrelated and mutually reinforcing pillars" of sustainable development as follows: economic development, social development and environmental protection. These three are often depicted in the attached way, which is misleading, since they are not equal, but embedded in each other: the economy is a subsystem of society, and society is a subsystem of the ecosystem. Ecological sustainability is decisive because it defines society and, through it, the economy. At the same time, the complex management of the three subsystems is essential for effective intervention.

For many, the topic seems to be closely related to the need for economic growth to enable the long-term growth of the economy without the long-term development being harmed by the overuse of natural resources or the overproduction of harmful effects. For others, the concept of growth itself is problematic, since the Earth's resources are finite. At the same time, concepts have been created that call for the solution of a partial task to be environmentally friendly, or to be solved in a climate-neutral way, and in this sense, they are called sustainable (due to the lack of drinking water, agriculture has to develop its own sustainable irrigation program, as well as agricultural lands, cities, production processes, societies, etc.).

Key issues of sustainability in terms of environmental protection – ecosystem conservation

There are two conditions for the development and survival of self-sustaining systems. One is that the elements of the system interact and are in balance with each other. It is often enough that the elements interact with their immediate neighbours. The nature of the interaction can be both cohesive and repulsive, but in the long-term cohesion and balance must prevail (Stansberry et al. 2019). The other condition is that the system must be open, i. e. interact with the environment. A self-sustaining system must be in close contact with the environment, with which it exchanges material and energy. These are actually subsystems within the unity of society and nature such as the sustainable use of land in agricultural production, the sustainability of cities, the way (process) of the production of certain products, the sustainability of societies, etc.

Regarding the relevance of the key issues of sustainability, the following areas were chosen for the surveys:

1. climate change

2. air pollution
3. noise
4. light pollution
5. overexploitation of natural resources
6. uncontrolled deforestation
7. too fast increase of human population
8. urbanisation
9. water pollution
10. plastic litter in the environment
11. illegal ‘wild’ garbage dumps / landfills
12. heavy dependence on fossil fuels
13. insufficient development of renewable energy sources
14. extinction of species (reducing biodiversity)

Climate change – reality and public perception

We face an acute risk of catastrophe if we fail to limit global warming to 1.5 degrees. It is a huge challenge, but there is still a chance to manage this and every tenth of a degree we manage to slow the warming will reduce the impact on nature and us humans. To meet the 1.5 °C target, we need to halve our global emissions of greenhouse gases by 2030 and reach net zero (a balance between emissions and absorption) by 2050 (Bertram et al. 2018; Hilaire et al. 2019). Richer countries like Germany or Sweden must progress even faster. Otherwise, the question is not whether there will be a disaster, but how big it will be, how quickly it will come and where it will hit hardest. Climate change is already affecting all parts of the planet today. The latest research shows that most of the more extreme climate changes will increase in line with increased global average temperature. The world's poor are affected the worst already today and the assessment is that they will be affected the worst in the future as well, which also makes climate change a major issue of justice. Climate change increases create new poverty and is expected to lead to a large number of climate refugees in the world. According to Nerini and co-workers (2019), evidence review suggests that climate change can undermine 16 Sustainable Development Goals, while combatting climate change can reinforce all 17 SDGs but undermine

efforts to achieve the 12th SDG, which is responsible production and consumption. However, it is important to emphasize, that climate change is also a natural consequence of earth-system functions, and the actions of humankind contribute only to the extent and the speed of these changes, which can be observed in the global warming diagrams of the last two hundred years.

Our knowledge of the global climate variations during the Quaternary, the geological period that began about 2.5 million years ago, comes largely from sediment cores sampled from the bottom of the world's oceans. In addition, there are results that show how the climate has changed over this time perspective from studies of ice cores that have been drilled from the ice sheets in Greenland and Antarctica. The variations in climate over the past 2.5 million years have included cold ice ages (glacials) and warmer interglacials. Especially during the last 900,000 years, the amplitude of the climate variations has increased (Adams et al. 2016), that is, the alternations between hot and cold have been strengthened. During the ice ages, the ice sheets occasionally reached down to the northern parts of Germany and Poland. The ice ages were also characterized by a changing climate with cold stadials and relatively warm interstadials during which the extent of the ice sheets decreased. The temperature during the ice ages in Northern Europe may at times have been 20 degrees lower than today.

The Quaternary period is usually divided into the Pleistocene and the Holocene. The Holocene corresponds to the interglacial period that we live in today and which began just over 11,000 years ago. In Northern Europe and other areas that have been periodically covered by glacial ice, there are mainly deposits that have been deposited in connection with or after the last ice sheet retreated. Older deposits have been largely eroded away by former ice sheets. In some areas, however, there are still older Quaternary deposits, which give a picture of how the climate and vegetation have settled before the last glaciation. In Europe, the last ice age is usually called the Weichsel. The climate was significantly colder than today and at times tundra conditions with permafrost prevailed in large parts of the Northern Europe. Global warming can release enormous amounts of methane, trapped in permafrost, which would further accelerate global warming since methane has a much stronger greenhouse effect than an equal amount of CO_2. Production of methane is favoured in the wetlands, which occupy up to 0.7 million km^2 containing an amount of 50 Gt of carbon (Gt C) in the Russian permafrost regions, the world's largest permafrost area (Anisimov, 2007; Anisimov and Zimov, 2021).

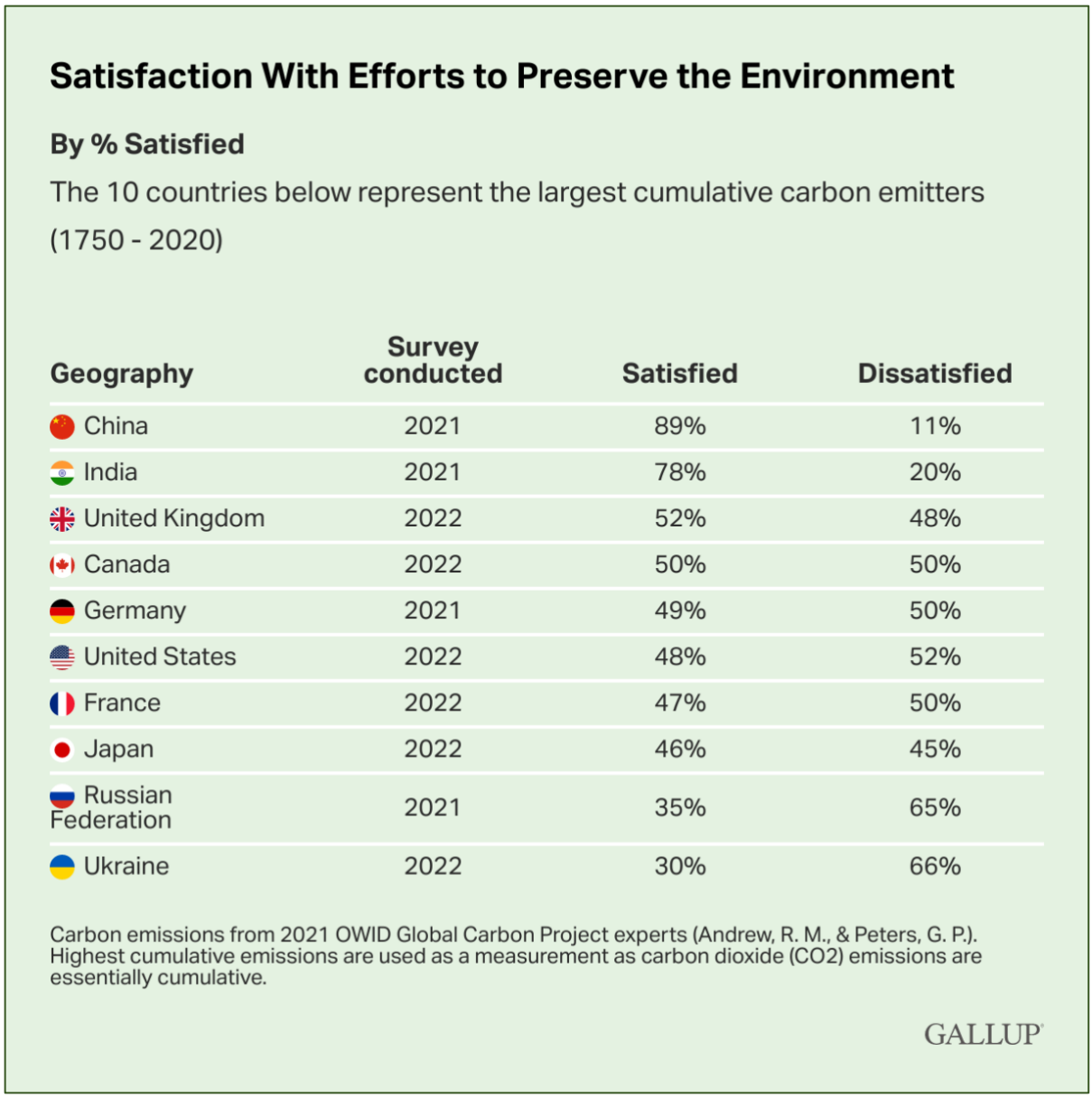
Despite the increasing evidence supporting the role of anthropogenic activities in climate change, there is still a substantial occurrence of climate change denial (Björnberg et al. 2017). Several researchers ask themselves whether it is fruitful to enter into a debate with climate

deniers, and some of them advise against this. They believe that it is better to map how the climate science deniers are organized and how their activities are financed. Another strategy could be to reformulate the climate issue from an environmental issue to a health or safety issue, which could be a route to increased political support. A general strategy is to educate the public about science, because then the climate science deniers' arguments cannot gain traction. With increased knowledge, there are no easy victims of the attempts to sow doubt.

Therefore, it is important to introduce education programmes for all levels of society in climate and climate adaptation based on their knowledge needs, experiences and interests. Target group-oriented training courses that range from one hour to several days can reach the widest range of stakeholders. The scientific background to climate change and the expected effects, linked to their region or industry, is the basis of these educations. Educators present various climate factors and how they can be linked to the businesses, which concrete action plans and strategies for climate adaptation can be developed. Business leaders should also get an insight into what planning documents are required to produce a climate adaptation plan.

Public opinion – level of satisfaction with political leaders in terms of climate change

In view of the increasing international concern about climate change and the outcomes of the Climate Change Conference (COP 27) from 6-20 November 2022 at Sharm el-Sheikh, Egypt, where 200 countries came together to take action towards achieving the world's collective climate goals as agreed under the Paris Agreement and the Convention, the necessity of public education is obvious. Gallup made a survey about the people’s opinion in 66 out of 123 countries in 2021 and 2022, and less than half of people reported being satisfied with their country's efforts to preserve the environment. This list includes many, but not all, of the world's cumulative top emitters of carbon dioxide, which is linked to global warming. For example, while less than half of adults in one of the biggest emitter – the U.S. - are satisfied with their country's efforts to preserve the environment, strong majorities in other big emitters such as China (89%) and India (78%) are satisfied (Fig. 3). Events like COP27 bring together leaders to agree on policies and pledge future action for their country, but many past COP agreements have failed to turn into real action. For example, all attending countries agreed at last year's summit to set tougher climate targets in 2022, but so far, only about 30 have. Further, global CO_2 emissions are projected to rise this year. Against this backdrop, the world is as divided as its leaders and somewhat skeptical: a median of 49% of adults across the 123 countries surveyed are satisfied with their country's efforts to preserve the environment, and about as many as 48% are dissatisfied.



Satisfaction With Efforts to Preserve the Environment

By % Satisfied

The 10 countries below represent the largest cumulative carbon emitters (1750 - 2020)

Geography	Survey conducted	Satisfied	Dissatisfied
China	2021	89%	11%
India	2021	78%	20%
United Kingdom	2022	52%	48%
Canada	2022	50%	50%
Germany	2021	49%	50%
United States	2022	48%	52%
France	2022	47%	50%
Japan	2022	46%	45%
Russian Federation	2021	35%	65%
Ukraine	2022	30%	66%

Carbon emissions from 2021 OWID Global Carbon Project experts (Andrew, R. M., & Peters, G. P.). Highest cumulative emissions are used as a measurement as carbon dioxide (CO_2) emissions are essentially cumulative.

GALLUP

Figure 3 Satisfaction with efforts to preserve the environment in the world's cumulative top emitters of carbon dioxide. Source: Gallup, 2022.

At the opening of the COP27 climate summit, U.N. Secretary-General Antonio Guterres reiterated the stakes of reaching a deal on climate change: "We are in the fight of our lives - and we are losing." While it appears from the breadth of public dissatisfaction worldwide with their country's environmental stewardship that many would agree with this statement, just as many are satisfied with what their country is or is not doing. Like their leaders, the people of the world remain largely divided on efforts to preserve the environment.

Air pollution – should be more obvious

Air pollution damages human health and the environment. In Europe, emissions of many air pollutants have decreased significantly in recent decades, leading to better air quality throughout the region. However, air pollution concentrations are still high and air quality problems remain. Air pollution is still the main environmental factor that causes the most premature deaths in Europe (Fig. 4). Deaths and illnesses caused by air pollution as well as the negative impact on ecosystems of air pollution entail large societal economic costs every year.

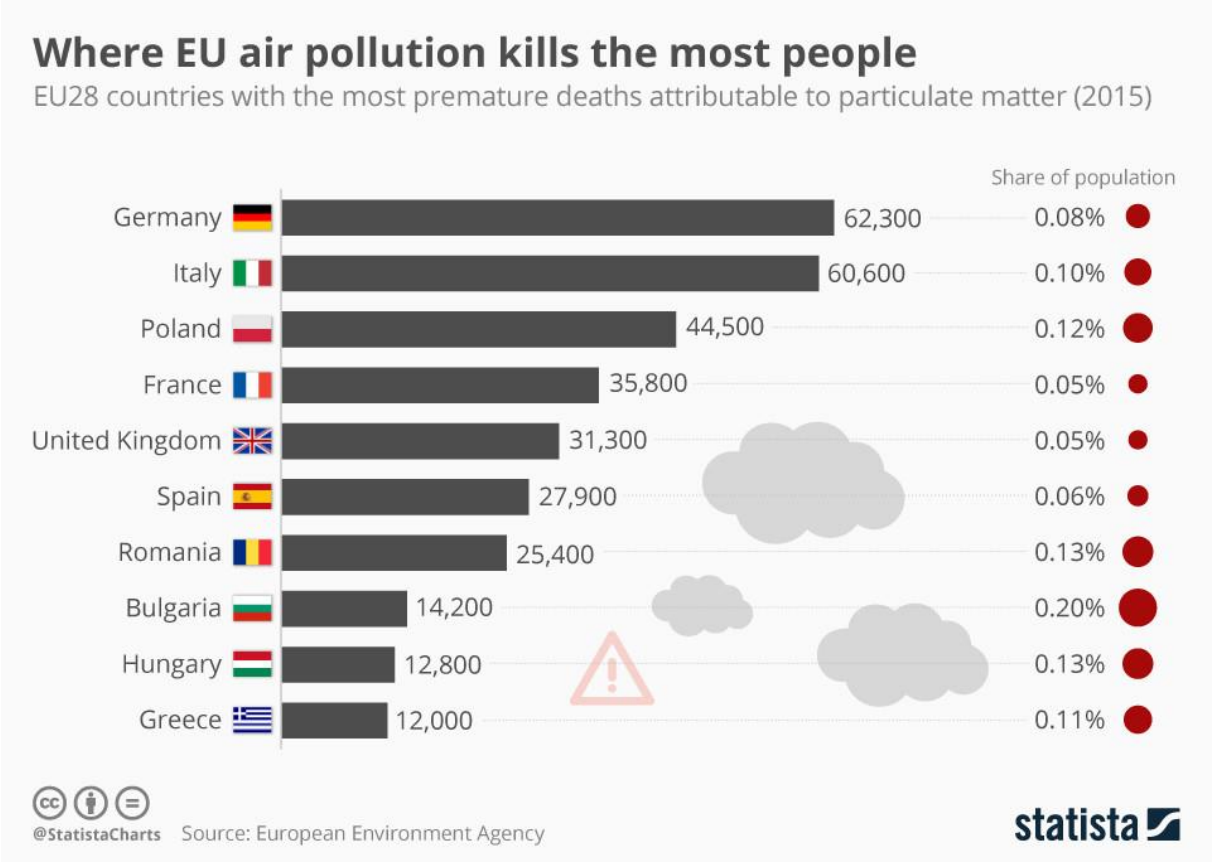


Figure 4 Early deaths from air pollution. Source: European Environmental Agency (2015) [1]

A significant part of Europe's population lives in cities or other areas where air quality standards are occasionally exceeded: ozone, nitrogen dioxide and particulate matter emissions pose serious health risks. In 2010, several countries exceeded one or more of their emission limits for four essential air pollutants. Therefore, it is still important to reduce air pollution. Air pollution is a local problem, a European problem and a problem for our half of the globe. Air pollutants emitted in one country can be transported in the atmosphere and cause or contribute to poor air quality elsewhere.

[1] https://www.weforum.org/agenda/2018/11/chart-of-the-day-where-eu-air-pollution-is-deadliest/

Particles, nitrogen dioxide and ground-level ozone are now considered to be the three pollutants that most significantly affect human health. Long-term exposure and exposure to high levels of these pollutants produce effects ranging from damage to the respiratory tract to premature death. Around 90 percent of European city dwellers are exposed to pollutants in concentrations higher than the air quality levels considered harmful to health. For example, it has been estimated that emissions of fine particles (PM2.5) into the air have reduced life expectancy in the EU by more than eight months. Benzo(a)pyrene is a carcinogenic pollutant of increasing concern and whose concentrations are above the threshold established to protect human health in several urban areas, particularly in Central and Eastern Europe. Air pollution also damages our environment in many ways:

Acidification decreased significantly between 1990 and 2010 in sensitive ecosystem areas in Europe that were previously exposed to acid precipitation with elevated levels of sulphur and nitrogen compounds.

Eutrophication is an environmental problem caused by the supply of increased levels of nutrients to ecosystems. There the progress was less. The size of the area of sensitive ecosystems affected by elevated nitrogen levels in the air decreased only slightly between 1990 and 2010.

Most agricultural crops are exposed to ozone levels that exceed EU long-term targets intended to protect vegetation. This applies in particular to a significant part of the agricultural areas in Southern Europe and in Central and Eastern Europe. Ground-level ozone adversely affects not only human health but also vegetation and ecosystems across Europe, leading to decreased crop yields and forest growth, and loss of biodiversity. In 2020, a historical minimum of 5.5% of Europe's agricultural lands were exposed to ozone levels above the threshold value set in the EU's Ambient Air Quality Directive (AAQD) for the protection of vegetation; the long-term objective was met in a historical maximum of 23% of agricultural lands. Ground level ozone concentrations are expected to decrease in Europe, North America and in East Asia while increase is projected in South Asia (Fig. 5).

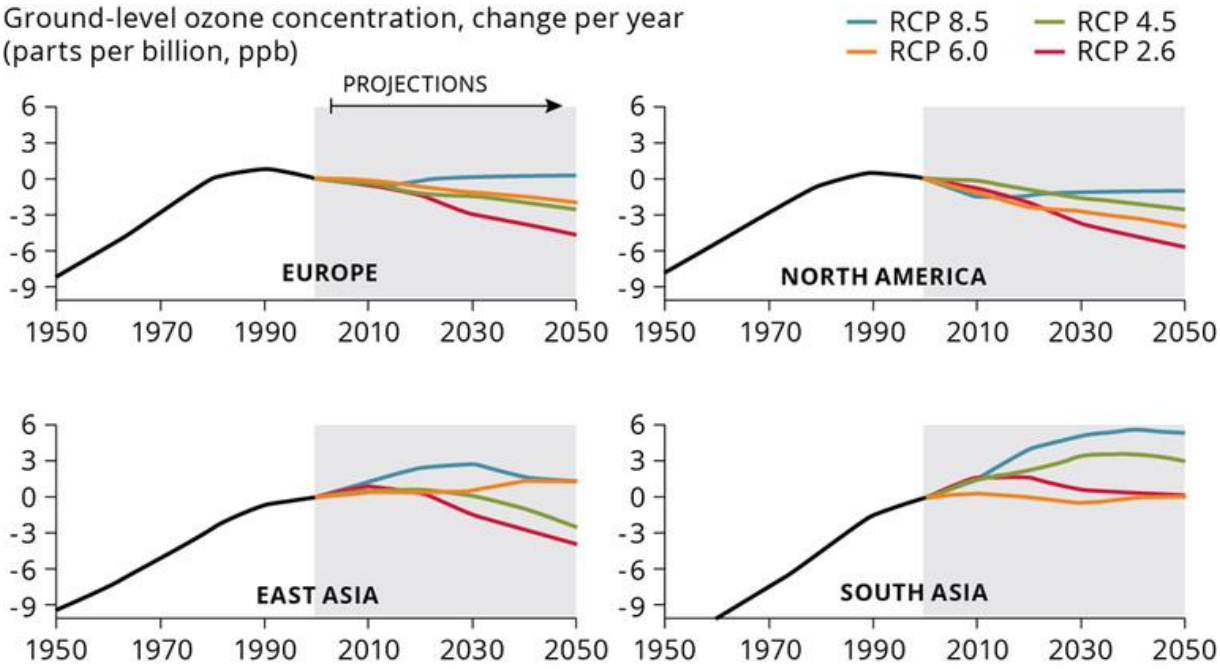


Figure 5 Estimated regionally averaged changes in surface ozone due to past or future changes in anthropogenic precursor emissions. Source: EEA 2017.

Air quality in Europe has not always improved in line with the general reduction in man-made (anthropogenic) emissions of air pollutants. There are several reasons for this:

- There is not always a clear linear relationship between reduced emissions and the levels found in the air.
- The contributions of long-range transport of air pollutants to Europe from other countries in the Northern Hemisphere are increasing.

Therefore, targeted efforts are still needed to reduce emissions even more to protect human health and the environment in Europe.

Sources of air pollution:

There are many different sources of air pollution, both of anthropogenic and natural origin:

- Combustion of fossil fuels for electricity generation, transport, industry and households.
- Industrial processes and use of solvents, for example in the chemical and mineral industry.
- Agriculture.
- Waste treatment.

- Volcanic eruptions, wind-borne dust, saltwater spray from the oceans and emissions of volatile organic compounds from plants are some examples of natural emission sources.

Within the European Union, the Sixth Environmental Action Program (6^{th} EAP) aims to achieve an air quality that does not lead to unacceptable risks to the environment and human health. The EU acts at several levels to reduce exposure to air pollution: through legislation, through cooperation with the polluting sectors, through national and regional authorities and non-governmental organizations and through research. EU policy aims to reduce exposure to air pollution by reducing emissions and setting air quality limit values. The Clean Air Europe (CAFE) programme, established under the Sixth Environment Action Programme, provides long-term, strategic, and integrated advice on air pollution policy. The 2005 Thematic Strategy on Air Pollution, underpinned by the CAFE programme, sets out ambitious but cost-effective targets and measures for European air quality policy up to 2020.

The European Environment Agency is the EU's centre for air pollution data. The Environment Agency supports the implementation of EU legislation on air emissions and air quality. It also contributes to the evaluation of EU air pollution policy and to the development of long-term strategies to improve air quality in Europe. The European Environment Agency's work is aimed at:

- publish data on a range of different air pollutants,
- document and assess air pollution trends and related guidelines and measures in Europe, and
- investigate how air pollution and political efforts in different areas interact and complement each other, including in the areas of climate change, energy, transport and industry.

On 26 October 2022, the Commission presented proposals for a revised/recast Directive on air quality and cleaner air in Europe, as a central part of the European Green Deal action plan on zero pollution of air, water and land.

- Tightened air quality standards until 2030 that are closer to the WHO guidelines and provide increased protection for human health.
- Clarified rules and requirements for action programs to address exceedances of air quality standards.

- Enhanced requirements for air quality control, i.e. measurement and modeling of air pollution.
- Extended provisions regarding sanctions in case of violation.

The Commission's impact analysis shows that the proposal is expected to contribute to a strong improvement in air quality around Europe until 2030 and that the benefits for society exceed the costs by a large margin.

A preliminary analysis of the proposed air quality standards indicates that Scandinavian countries have relatively good conditions for achieving the tightened levels by 2030. However, extended measures and control measures regarding wear particles and the use of studded tires may be needed to achieve the limit value for PM10. The proposal may involve increased administrative costs, but these are judged to be small in relation to expected social benefits from better air quality and reduced exposure to air pollution. Provisions on sanctions, appeals and the right to damages can have major consequences.

Tightened standards for air quality until 2030

The air quality standards for a number of pollutants, including nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), benzene and finer and coarser particles (PM2.5 and PM10), are proposed to be tightened with the aim of getting closer to the WHO guidelines. Updated target values and long-term targets for ozone as well as new threshold values for alarms for particles are also proposed. All current target values except ozone are instead proposed to become limit values, which means a stricter order. The new limit and target values are proposed to apply from 2030.

Long-term goal to meet WHO guidelines by 2050

A long-term goal to meet the WHO guidelines, including possible future adjustments by the WHO, is introduced so that the EU can reach its zero-pollution target by 2050 at the latest.

Regular review

The proposal includes a regular scientific review of whether current air quality standards are sufficient to protect human health and the environment. The review must take place no later than 2028 and every five years thereafter.

Enhanced requirements for exposure reduction

The requirements in today's directive that the general exposure to PM2.5 should be reduced (or at least maintained at a low level) are extended to also apply to nitrogen dioxide and are regionalised.

Noise pollution

It is estimated that 113 million Europeans are exposed to long-term, day-long noise exposure above 55 decibels. In addition, 22 million Europeans are exposed to high noise levels from railways, 4 million to high noise levels from aircraft and less than 1 million to high noise levels from industry. Many people do not know that long-term noise exposure has a significant health impact, even in the case of usual levels of noise in urban areas. In most European countries, more than 50% of people living in urban environments are exposed to road noise higher than 55 decibels in terms of the noise exposure for the whole day. According to the World Health Organization (WHO), long-term exposure to such noise levels is likely to have adverse health effects.

The EEA estimates that long-term exposure to environmental noise is responsible for 12,000 premature deaths and 48,000 new cases of ischemic heart disease across Europe each year. According to estimates, 22 million people are also affected by long-term, highly disturbing noise exposure, and 6.5 million suffer from chronic sleep disorders.

According to WHO's data, these health effects occur even below 55 decibel noise levels during the whole day, and below 50 decibel noise levels during the night - these are in the EU directive on environmental noise. defined reporting thresholds. Hence, these figures are certainly underestimates. In addition, the information provided by countries under EU law does not cover all urban areas, public roads, railways and airports, nor all noise sources. In the framework of the environmental noise directive, the noise burden on the population is monitored based on two data provision thresholds: one is the measure for the whole day period (Lden, i.e. day-evening-night noise index), which measures "disturbing" noise levels, and the other is for the night period relevant measure (Lnight, i.e. night time noise index), which is intended to measure sleep disturbance. These reporting thresholds are higher than those recommended by the World Health Organization, and there is currently no method in place to track a shift towards the latter, lower values.

Noise is also harmful to wildlife, both on land and in water. Noise pollution can cause a number of physical and behavioural effects on animals and increase their stress. Road traffic noise, for

example, can make it difficult for frogs and songbirds to communicate, especially during the breeding season. It can reduce their ability to reproduce or force them to leave their habitat.

Underwater noise from shipping, power generation, construction and other activities is also a problem. For example, research has reported hearing loss in whales, which can impair their ability to communicate with each other and forage.

Noise pollution from transport sources, such as road, rail or air transport, is associated with economic activities. Thus, as a result of the restrictions due to COVID-19, a significant reduction in the traffic noise level is expected in the short term. However, environmental noise levels are reported over a longer period of time, as health effects occur with long-term exposure. Thus, the short-term reduction of noise levels would not significantly reduce the annual noise level indicator used to measure the effects of noise.

A conceptual framework to classify noise interventions and health effects was developed by Brown and Van Kamp (2017) for considering noise interventions and related health effects (Fig 6). It shows where different categories of interventions fit along the system pathway between noise sources and human outcomes. It also shows different measurement points along the pathway where changes relevant to human outcomes can be measured. This framework provides a systematic and comprehensive basis for this, and any future work with respect to the effects of interventions in environmental noise of all source types.

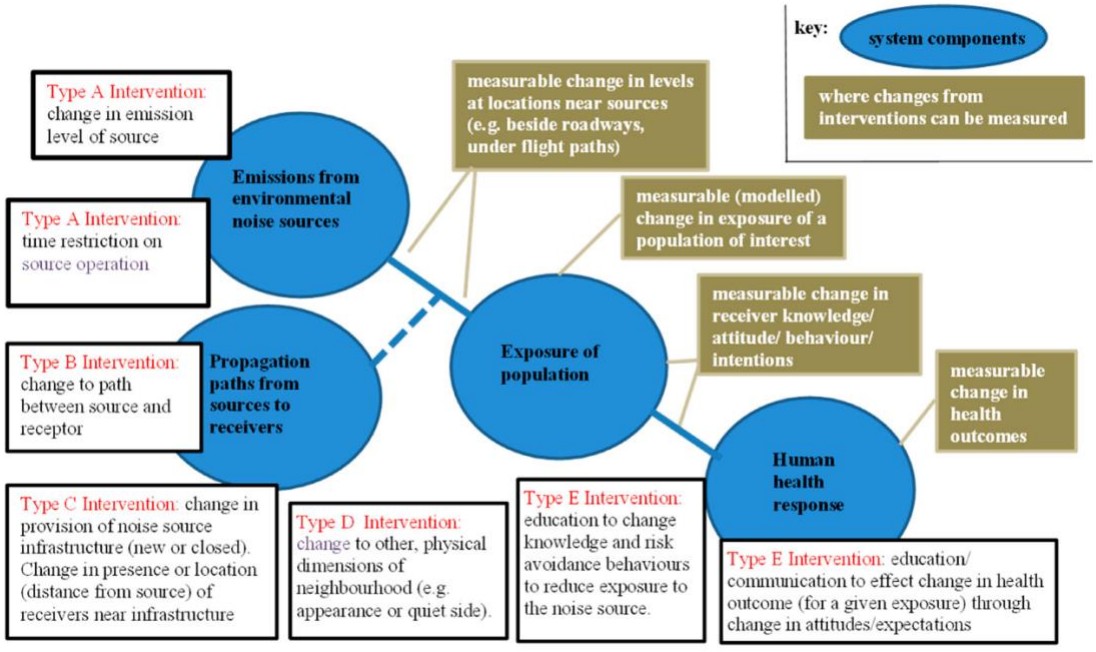


Figure 6 The conceptual framework for noise interventions developed by Brown and Van Kamp (2017). https://www.mdpi.com/1660-4601/14/8/873

Light pollution

Any light from an artificial source that does not only illuminate the target area, obscures the natural light sources of the sky and/or has a harmful effect on the environment, people, and the living world is called polluting. Compared to air pollution or water pollution, the concept of light pollution and its harmful effects are less common in the public mind. Perhaps because illuminated public spaces and neon signs have become an essential part of the developed, safe urban lifestyle, we are used to sleeping in darkened rooms and behind blinds. Many of us don't even think about how it could be otherwise, how light pollution affects our own lives, how it damages our environment.

We care very little about the fact that, among the polluting activities of man, we could fight light pollution in the simplest and most effective way. As a result of light pollution, the starry sky has disappeared from the head of the city dweller, and the cultural and physiological consequences of this are difficult to assess. However, there are some everyday effects, the phenomenon of dazzle has been encountered by everyone who has ever sat in a car. A poorly adjusted or brutally bright LED headlight, an excessively strong neon sign can easily blind the driver, which can lead to serious damage and accidents.

But it is not only when you are awake that light pollution can endanger you. For the balanced functioning of our body, it is necessary to sleep in complete darkness. Several studies have shown that strong, artificial lights stimulate the ganglion cells in the retina even when our eyes are closed, and as a result of the stimulation, our body produces less of the melatonin hormone. Lack of melatonin can cause permanent sleep disturbances and increase the risk of some cancers (breast, prostate, colon and liver). It doesn't matter what colour light our eyes encounter: lights with a high colour temperature (e. g. blue) are more harmful than those with a low colour temperature (e. g. yellow). We can protect ourselves against the light shining through our windows with blinds, blackout curtains or eye protection.

What effect does light pollution have on animals? Humans are able to protect themselves against light pollution using various methods, but animals are at a much greater risk. Artificial lights can radically change the lives of some animals. It affects their eating habits, communication, migration, and orientation.

Diurnal predators have an advantage, as they can hunt for longer, while rodents that prefer a nocturnal lifestyle have less time to obtain food. The eyes of the reptiles living in the city slowly get used to the light of the street lights, so the time they can devote to hunting is reduced.

The hatchlings of turtles breeding on the sandy coasts of the Caribbean Sea (e.g. Florida, Costa Rica, Mexico) can determine the direction of the sea based on the lights when they hatch. As a result of light pollution, thousands of small turtles die every year because they started in the wrong direction due to the false light.

The nocturnal life of insects has also been completely turned upside down by the rapid spread of artificial light sources. The evolutionary balance developed over millions of years, in which insects "specialized" in night and daylight found their place, was overturned in barely a hundred years. The usual light sources (Moon, stars) have been replaced by countless "fake stars" and "fake moons".

Every year, millions of insects are trapped in the light and die, and the feeding or mating time of many insects has decreased. As man's night becomes brighter and safer, entire species of insects are brought to the brink of extinction by artificial lights.

In addition to natural light conditions, the night is an important period for pollination of plants, but artificial lights distract insects from the pollination process, so light pollution also affects the reproduction of plants.

Above big cities, we can observe the phenomenon of artificial light passing over the horizon creating an artificially glowing cloud in the sky, i. e. the natural background brightness increases, and in extreme cases we cannot even see the natural light sources (stars, moon).

Migratory birds that fly (also) at night, for example, orientate themselves based on the stars, light pollution caused by humans confuses and diverts them, they fly in the wrong direction, they are stimulated to take unnecessary rests by an illuminated area.

From these few selected examples, we can see that the living world is endangered in a complex way by one of the most effective achievements of human civilization, artificial light.

Where is the greatest light pollution?

It is not surprising that the level of light pollution is the most severe in developed countries. If we look at the map of Europe, we can see that the most polluted areas are in Northern Italy (Poland) and Belgium, the Netherlands, Germany, but the area around London and Leeds in England is also quite bad. In North America, the line stretching from Boston to Washington has the highest light pollution rates, and in China, Beijing, Hong Kong and the eastern seaboard. The cities and larger settlements of the developed world are dominated by artificial light, according to 2016 research, 60% of the European population has no chance of seeing the Milky

Way in their own place of residence. This rate reaches 99 percent in Saudi Arabia or Singapore (Fig. 7).

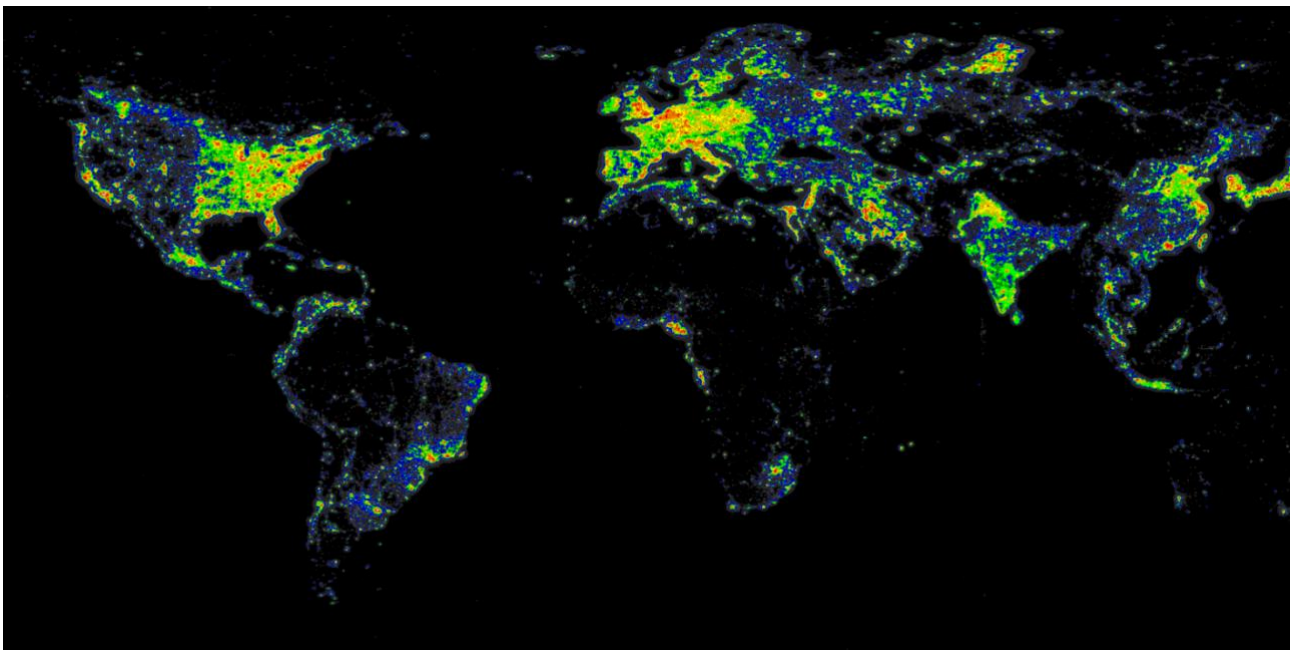


Figure 7 World map of heavy light pollution.

Source: https://www.researchgate.net/figure/The-light-pollution-map-in-the-year-2015-Serious-light-pollution-leads-that-observatory_fig1_327638779

Most city dwellers grow up and live their lives without seeing the starry sky. It is easy to get used to the presence of continuous, artificial light, even though it has many harmful effects.

Overexploitation of natural resources and the ecological footprint

We interpret natural resources broadly. First, because it is not appropriate to limit ourselves to those natural resources that are given and bought in the market. A very wide range of natural resources have no market, so no price, such as clean air, or the stratospheric ozone layer, etc., but this is not what is important from an economic point of view, but how important their production or consumption is the key question. The mineral resources and fossil energy carriers in the earth's crust are just as much a part of natural resources as the possibility of new organisms being created, or the ability of the biosphere to absorb pollutants. In relation to depleting resources, such as coal, oil or ore reserves, the problem arises that it is better to use them now or to reserve them for the future. The question, more precisely, is whether it is worthwhile, and if so, at what rate, the economic utilization of depleting natural resources. It is clear from the questioning that exhaustible natural resources differ from ordinary goods in that they are available in limited quantities and that they are not renewable. Consequently, the

extraction and use of a unit of a non-renewable natural resource has an "opportunity cost", which is equal to the value that we could get in the event of a future use, if we did not use it now, but only later.

When determining the rate of use of a depleting natural resource, we must also take this "opportunity" cost into account, that is, the price must cover not only the marginal costs of extraction, but also the "opportunity cost" in order to consider the use of the given depleting natural resource as optimal. Of course, in reality the picture is more complicated, since a natural resource is usually used for more than one purpose. As a result, countless substitution possibilities and their corresponding prices can exist at the same time. For example, petroleum is used not only for energetic purposes, but also for the chemical industry, and even within the energetic use, the substitution possibilities are different in the field of transport than in the field of industrial heat supply. Obviously, chemical industry use can bear a higher price than energy, etc.

It is very difficult to draw a sharp line between renewable and exhaustible resources, at least we can rarely talk about limits in principle. Renewable resources, such as the forest or the fish stock of the lake, can be depleted, and in some cases the depleting natural resource can become renewable if we take into account the surprises caused by technical development. The example of copper also shows this, since we could not only talk about a lack of copper, but with the spread of glass fibres there might occur a temporary surplus of copper. We could cite other examples where waste recycling and technical progress together offer solutions that almost do not require new primary raw materials for the operation of the economy. We are close to such a situation in the case of platinum or lead. In the case of other raw materials, today's techniques are also able to utilize ores with a low active substance content, which we would have previously considered infertile.

While in recent decades we have achieved significant results in slowing down the depletion of some resources that are traditionally considered exhaustible, the renewable capacity of resources that are otherwise considered renewable, such as rainforests or, for example, biological diversity, has been threatened. This is more dangerous than, for example, a shortage of raw materials or energy, because the catastrophes caused by them can be corrected in a few years or killing people, while the elimination of damage to biodiversity or the genetic stock of organisms would require millions of years.

Under normal conditions (meaning reasonable use), renewable natural resources are reproduced, such as fish in seas or rivers, wood in forests, etc. In relation to renewable natural

resources, the rate at which they can be used can also be raised. Taking into account the requirement of sustainable use, the scientific answer seems relatively simple: it is permissible to use renewable natural resources at the rate at which they are regenerated. In economic terms, the answer is a bit more complicated. Ideally, the ownership of the renewable natural resource is clarified. For example, a farm operates a fish-pond or a cooperative maintains a pasture. In this case, the so-called carrying capacity of the fish pond or the pasture determines how many fish can be kept in the pond and how much can be caught annually or, in the case of the pasture, how many livestock can be kept in the given area. According to the law of natural growth, growth or increment is a function of the resource pool. According to the law of biological growth, there is an optimal size pool (number of individuals or biomass) that provides the maximum sustainable yield. The owner of the pasture or the fish pond obviously strives to approach this state.

In the case of a renewable resource (e.g. fish stock, forest, pasture, etc.), the increase in the quantity of the resource depends on the one hand on the initial size/number of individuals of the natural resource and on the carrying capacity of the environment. The starting size determines the number of individuals suitable for reproduction, and the carrying capacity determines the abundance of available food. The growth of the resource can initially be rapid, if the environment provides abundant food for the relatively small number of individuals. As the number of individuals increases, it becomes more and more difficult for them to find food, food becomes scarce, which reduces the rate of biomass growth.

Past and current trends in resource use have led to high levels of pollution, environmental degradation and depletion of natural resources. European waste policy has a long history and traditionally focuses on environmentally sustainable waste management. The Roadmap for a Resource-Efficient Europe and the Circular Economy Package, which will transform the European economy into a sustainable one by 2050, should reverse this trend. The four new waste directives in the recently developed circular economy package introduce new waste management targets for prevention, reuse, recycling and landfilling. In the framework of the European Green Deal, the new circular economy action plan provides a forward-looking agenda to achieve a cleaner and more competitive EU and to fully contribute to climate neutrality.

Decoupling natural resource use and environmental impact from economic growth is one of the most important basic conditions for sustainable development. We use unsustainable amounts of the earth's natural resources. We must improve resource productivity ("do more with less") faster than the rate of economic growth. This is the idea behind "decoupling". By 2050,

humanity could devour an estimated 140 billion tonnes of minerals, ores, fossil fuels and biomass per year - three times the current appetite - unless the rate of economic growth is "decoupled" from the rate of natural resource consumption. Citizens of developed countries consume an average of 16 tons of these four key resources per capita (up to 40 or more tons per person in some developed countries). By comparison, the average person in India today consumes four tons per year.

With the growth of both population and prosperity, especially in developing countries, the prospect of much higher levels of resource consumption is "far beyond what is likely to be sustainable" if realized at all with limited world resources, warns this report by the International Resource Panel.

Already, the world is running out of cheap and high-quality sources of certain essential materials such as oil, copper and gold, whose supplies in turn require ever-increasing volumes of fossil fuels and freshwater to produce. Improving resource productivity ("doing more with less") faster than the rate of economic growth is the idea behind "decoupling," the panel says. However, this goal requires an immediate rethinking of the links between resource use and economic prosperity, supported by a massive investment in technological, financial, and social innovation, to at least freeze per capita consumption in rich countries and help developing countries follow a more sustainable path.

The ecological footprint

The ecological footprint is a value, an economic indicator calculation system that makes the environmental needs of a given country, region or activity measurable in a uniform manner. It expresses how much we use or overuse the resources of our Earth. It quantifies how many resources, agricultural land, water, and air are needed to maintain the standard of living of a given society, including the production of industrial goods and food, as well as the treatment or destruction of produced waste. Its calculation can also be performed backwards in time, based on past conditions and statistics, so the rate of development of economic processes and its impact on the natural environment can be modelled. Canadian ecologist William Rees created the first concept for calculating the ecological footprint in 1996, which was first developed by Swiss urban planner Mathis Wackernagel in his dissertation under Rees' supervision. Their calculations questioned the current consumption and production methods, as well as the sustainability and social fairness of their rate of development. The ecological footprint measures the environmental effects of human activity in 6 different areas:

1. Carbon footprint

This shows how much the given country, region, product or activity contributes to global warming and climate change. On an individual level, it means how much lifestyle and consumption habits pollute the air and burden the environment. The amount of CO_2 generated from the burning of fossil fuels and from agricultural and industrial processes is the environmental burden of the carbon footprint.

2. Fishing footprint

Estimated value based on fishing data for various marine and freshwater species and their reproduction needs. More than 55% of the Earth's ocean surface is covered by industrial fishing vessels. Overfishing has taken on extremely large proportions, its scale is well above the sustainability level, so controlling it and reducing it to a sustainable level is a priority issue for nature conservation. If some species disappear or their numbers are dramatically reduced, it leads to the proliferation of other species, thus disrupting the biological balance of the seas, which leads to unpredictable environmental effects.

3. Cropland footprint

It shows how much land is needed to produce food, including animal feed. This is also used to count the production areas of plants grown for the production of biofuels. This includes energy from the burning of solid biomass, but also liquid vegetable oils, (sunflower, rapeseed, soy, palm oil, etc.) lubricants and fuels, and bioethanol. They are considered renewable energy, although their monocultural cultivation raises several environmental protection problems.

4. Pasture footprint

The size of the area needed to support domestic animals kept for meat and dairy products, eggs and wool. The production of beef per kilo has one of the highest footprints on farmland, as the animal consumes large amounts of feed for years. The poultry and egg sectors are relatively smaller than this, but still several times higher than if plants or cereals were produced directly for human consumption on the given land.

5. Forest footprint

Estimated area based on the use of wood from felled forests. This can be logs, architectural timber, furniture and paper raw materials, as well as firewood

6. Footprint of built-up areas

The amount of land needed for human infrastructure (e.g. transport, housing, factories, water reservoirs, highways, etc.).

In addition to these six, we must also mention the *water footprint.*

This shows the amount of water used, which we consume directly and which we used indirectly to create the products produced and the services used. On an individual level, this includes drinking water, water used for washing, bathing, and garden watering, i. e. what our water meter shows. But it is much more than that. Here, for example, an urban resident living in a developed country consumes only 126 litres of water directly per day (household consumption). However, its water footprint can be as high as 5,000 litres per day due to indirect consumption, since it also includes meat consumption, cotton clothing, the water demand of agricultural plantations, and the water used for the production of services and products. Moreover, most of them seem to go unnoticed, as they often come from other countries.

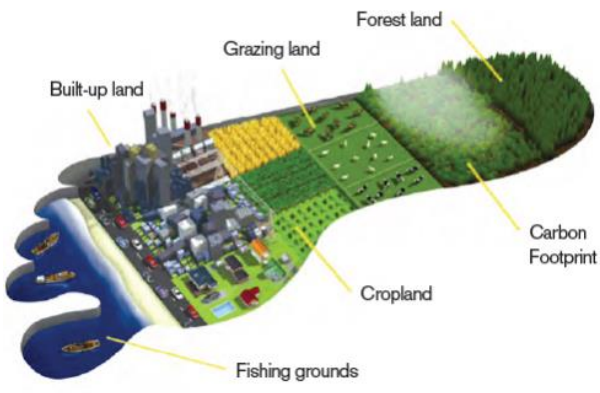


Figure 8 The ecological footprint

It is obvious only to few that, for example, avocados or coffee require a lot of watering, and how much water is actually needed for cheese, beef in hamburgers, or a fashionable T-shirt, and how much biocapacity is used. The water footprint consists of blue, green and gray water. Blue water is fresh underground and surface water used for products and services, green water is rainwater stored in the ground, and gray water is wastewater.

How to calculate the size of someone's ecological footprint? According to the level of the ecological footprint calculation, it can be global, national, regional, settlement and individual, i. e. macro- and micro-level.

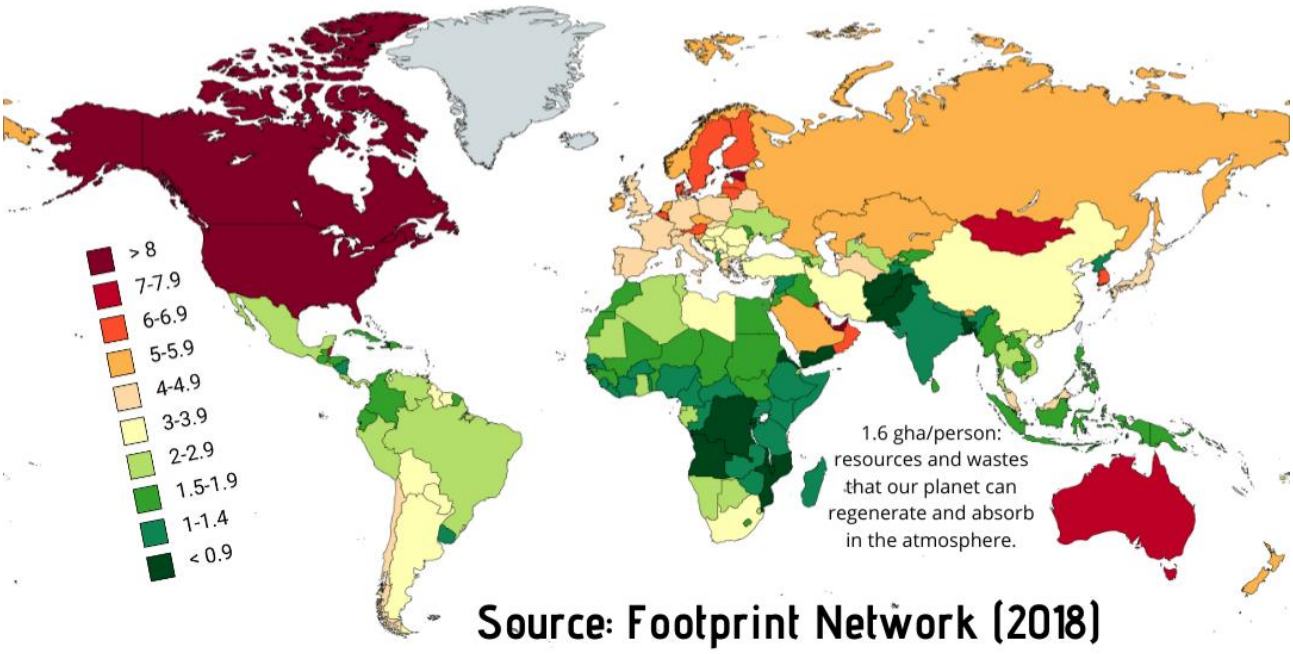


Figure 9 The ecological footprint map of the world.

Źródło: https://en.wikipedia.org/wiki/Ecological_footprint#/media/File:Ecological_footprint_2018.png

The ecological footprint is measured in global hectares (gha) - thus in a globally comparable, standardized unit, with the world's average productivity. The global hectare of land whose productivity is equal to the average productivity measured in hectares of all bioproductive areas of the Earth. It is like accounting: if the ecological footprint of the people living in an area exceeds the biocapacity of the region, they use more than what is available, then an ecological deficit arises. Then the demand for goods and services and environmental pollution exceed the level at which the ecosystems of the region can still regenerate. This regenerative ability of a region is called biocapacity, which refers to the capacity of a given biologically productive area to generate an on-going supply of renewable resources and to absorb its spillover wastes. If a region's biocapacity exceeds its ecological footprint, it has an ecological reserve. Unsustainability occurs if the area's ecological footprint exceeds its biocapacity. The individual ecological footprint is made up of many things. The most important of these are household energy consumption, the use of electricity, natural gas, and other heating materials, transportation and vacation habits, and eating habits. This includes how much waste someone produces, how much packaging they use, and what objects they surround themselves with.

In a broader sense, Internet habits, banking services, cultural consumption habits can also be classified here, that is, all areas of our lives are in some way part of the ecological footprint. On a global scale, industrial and technological development, the burning of fossil fuels, urbanization, and the desire for a prosperous lifestyle dramatically increase this value.

Unfortunately, the size of the ecological footprint increases every year. The richer a country is, the higher this number is in most cases. It would be ideal if this number were 1 gha, or it would be maximized around 4 gha.

Let's look at the 2019 ecological footprint data for some countries, Poland is on the 50th place with 4.44 gha and Hungary is in 85th place with 2.92 gha on the list. The size of the world's ecological footprint in 2019 is 1.8 gha (global hectares).

Luxembourg 15.82 gha

Qatar 10.8 gha

Australia 9.21 gha

United States: 8.22 gha

Austria 6.06 gha

Japan 5.02 gha

Poland 4.44 gha

Slovakia 4.06, gha

Hungary: 2.92 gha

Angola 0.93 gha

Uncontrolled deforestation

The rate at which forests are disappearing around the world is worrying. 420 million hectares of forest were lost due to deforestation between 1990 and 2020, according to the UN's Food and Agriculture Organization, FAO, which is an area the size of the EU. Deforestation means that forests are cut down so that the land can be used for other purposes, while forest degradation is a more gradual process where the forests' ability to produce benefits in the form of timber and biological diversity is lost.

These processes mainly take place in one of the three large forest plateaus in the Amazon in South America, in the Congo in Central Africa and in Southeast Asia. The opposite development occurs in the EU, where forests increased by 10 percent between 1990 and 2020. But deforestation is a global problem that the EU wants to tackle in order to combat environmental damage and climate change. What are the main causes of deforestation and

forest degradation? Deforestation and forest degradation can primarily be linked to human activity (FAO, 2020).

Agriculture is the main driver of deforestation in all regions except Europe. The conversion of forest to agricultural land is the main cause of clearcutting. According to the FAO, it causes at least 50 percent of global deforestation, mainly for the production of palm oil and soybeans.

Pasture for livestock accounts for almost 40 percent of global deforestation. In Europe, conversion to agricultural land accounts for approximately 15 percent of deforestation and 20 percent is due to pasture.

Urbanization, urban and infrastructure development, including the construction and expansion of road networks, is the third largest cause of global deforestation, and corresponds to a little more than 6 percent of the total. But it is the main cause of deforestation in Europe. Overexploitation of timber resources is another harmful activity including overexploitation of wood for fuel, for example, or illegal or unsustainable forest industries.

Climate change is both a cause and a consequence of deforestation and forest degradation. The extreme events they cause, such as forest fires, droughts and floods, affect the forests. In addition, reduced forests are harmful to the climate, as forests play an important role in clean air, regulating water cycles, capturing carbon dioxide, preventing loss of biodiversity and soil erosion.

EU consumption of goods produced on deforested land contributes to deforestation. Much of the tropical forest that is converted to agricultural land goes to produce goods that are traded globally. EU consumption accounts for approximately 10 percent of global deforestation, mainly for palm oil and soy, which account for almost two-thirds (Raleira, 2022). According to the EU Commission's impact assessment, these are the main products imported by the EU from deforested land:

Palm oil 34 percent

Soy 32.8 percent

Timber 8.6 percent

Cocoa 7.5 percent

Coffee 7 percent

Rubber 3.4 percent

Maize 1.6 percent

Deforestation and forest degradation affect the EU's environmental goals such as the fight against climate change and lost biodiversity, but also human rights, peace and security. This is why the EU wants to fight the loss of forests.

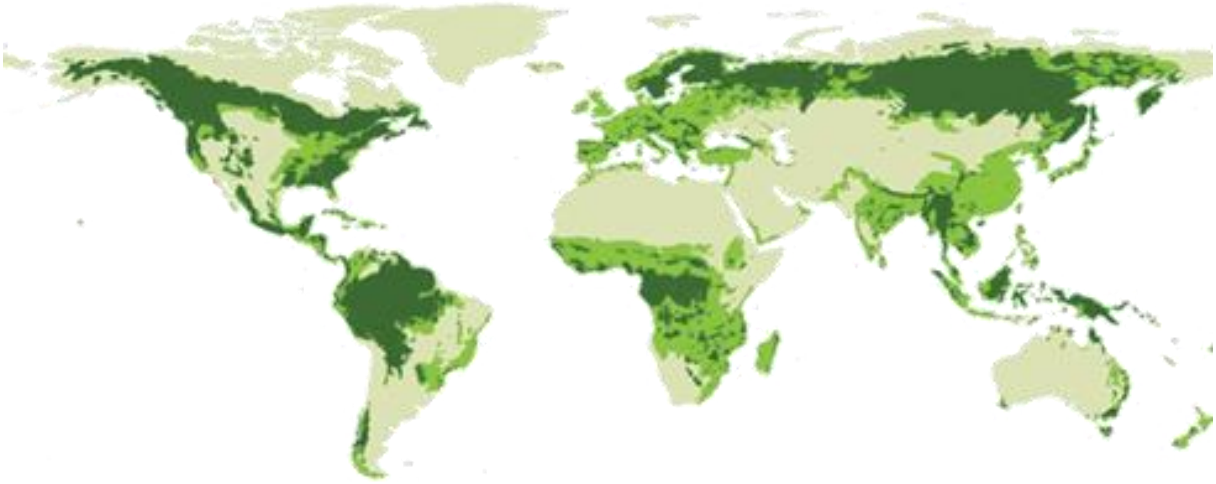


Figure 10 Vanishing forests. While forests covered around 50% of the Earth's land area 8,000 years ago, today only 30% of land is forested. Source:

Original forest cover Current forest cover

Maps courtesy of https://www.grida.no/resources/6959, created by grid-arendal

In September 2022, the European Parliament approved its position on the Commission's regulation on deforestation-free products, which will force companies to verify that products sold within the EU have not been produced on deforested land. Parliament wants to include more products on the list and ensure that human rights and the protection of indigenous peoples are respected. In July 2021, the European Commission presented its new forest strategy for the EU until the year 2030, the aim of which is to increase the quantity and quality of the EU's forests and promote their role as carbon dioxide sinks.

Too fast increase of human population

Never before have so many people lived on Earth at the same time. By the end of 2022, we exceeded 8 billion, while just over a decade ago, at the beginning of 2011, it was 7 billion. The population of our planet is now more than two and a half times the value in 1960 - when only 3 billion of us lived on Earth. It took more than 10,000 generations for the human population to reach 1 billion, and while 2 billion only took 130 years, 6 to 7 billion only took 12 years. During the lifetime of a single generation (and in the lifetime of those born after World War II), the number of the earth's population increased from 2 billion to 7 billion. The explosive

population growth is based on technical progress and better health care. All of this would not have been possible without the abundance of fossil fuels and oil. The utilization of coal has doubled, that of oil has increased the Earth's population sixfold. Today, the world is growing by more than 80 million people every year, and by 2040 it is expected that 9 billion of us will live on Earth (Adam, 2022).

Developing countries account for 97 percent of growth. If the Earth were a village of 100 inhabitants in 2016, there would be 60 Asians, 16 Africans and 10 Europeans. By 2050, the population of this "village" is expected to increase to 133, and among them 73 would be Asians, 33 Africans and 10 Europeans, that is, the proportion of Europeans and Asians would decrease, and that of Africans would increase (Gerland et al. 2014). In the last 50 years, the population of Ivory Coast has grown the fastest on the African continent, while in Asia India leads with an increase of 782 million, China's 111% population increase is below the world average due to birth control, and Japan's population has grown by only 36% in 50 years. India's population is expected to surpass China's by 2030 - by then, one sixth of humanity will live in India. In the next four decades, the world's population will continue to grow in the countries of Asia, Africa, South America and the Caribbean - these developing states will account for 97% of population growth until 2050 (Pew Research Centre, 2015). The population explosion lasts until the birth rate adjusts to the falling death rate. According to estimates, 4.2 people are born and 1.8 die in the world every second.

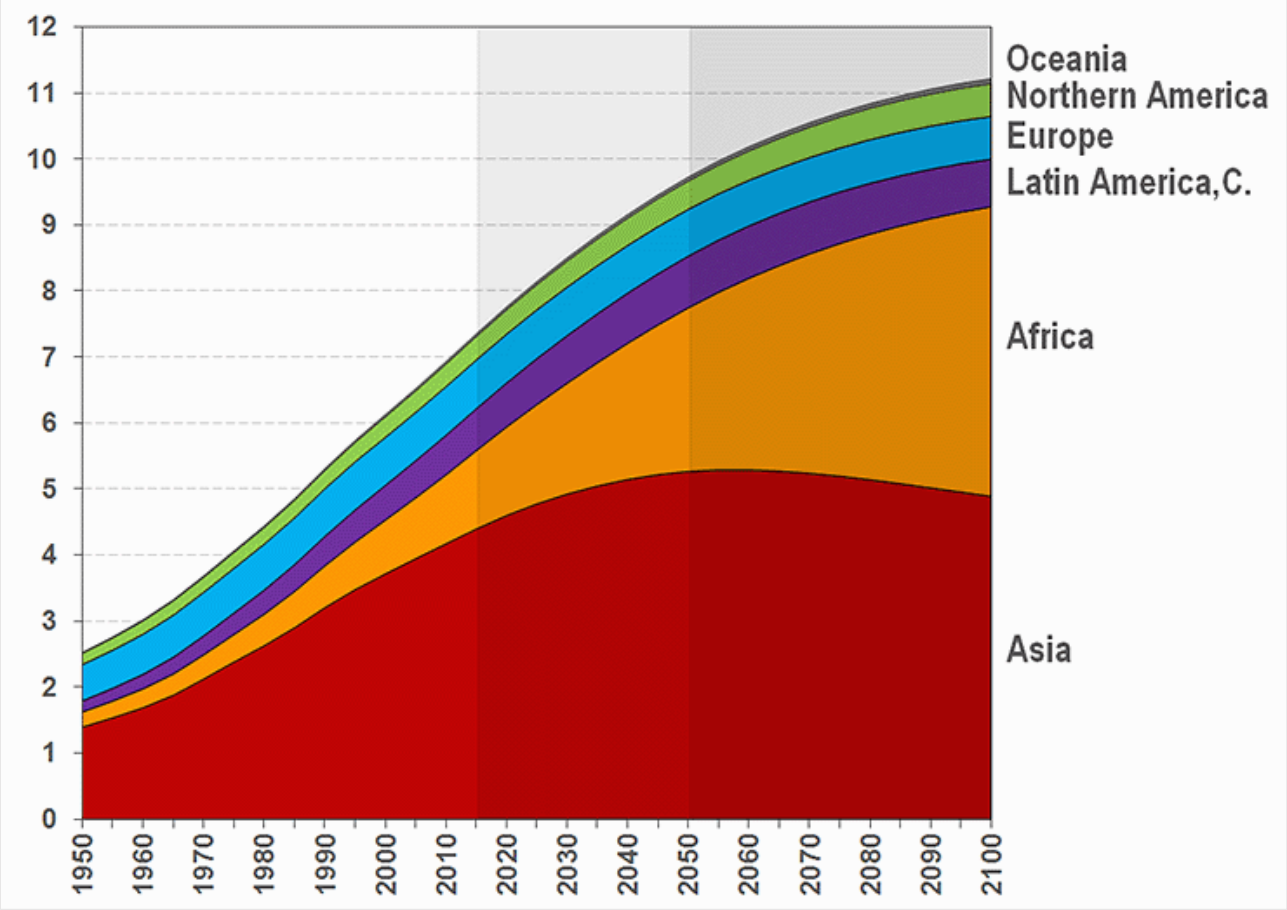


Figure 11 World population growth during the 150-year period between 1950 and 2100 was, and will be, almost entirely concentrated in Africa and Asia.

Source: http://www.demographics.at/distribution.html

However, the demographic explosion is not as universal as it seems to be. Europe's population is declining Europe's population has grown by only 21% in the last 50 years, while the US's population has increased by 72%. The population of the 27 member states of the European Union will continue to decrease by 2050, the demographic weight of the continent will fall from the current 12% to 7%, despite the fact that the number of immigrants is increasing. In 2005, immigrants accounted for 8.3% of the total population of the Union, or about 40 million people.

The aging of the population of some developed countries is a necessary consequence of population decline, although the momentum of a still young population in terms of the world average will ensure global population growth for the coming decades. In addition, life expectancy is increasing worldwide, from 70 to 80 years or above on average in the 21st century. According to a June 2012 report, population growth is pushing the world toward an ecological tipping point, followed by social and ecological instability. The finite resources of the Earth are equally burdened by the growing number of people, the increasing life expectancy and the overconsumption associated with the rising standard of living.

The global population will still grow in 2050, but more slowly than before. People will live longer, be better educated and move more. Some populations will grow while others will shrink. Migration is just one of the unpredictable future perspectives for Europe and the world. Population growth affects most global megatrends. The stabilization of the world's population - which is expected to occur in the second half of this century - will not solve the world's problems, but it can contribute to efforts for sustainable development.

A growing population leads to increased consumption of natural resources, environmental destruction and changed land use such as urbanization. Changes in global demographic trends will directly affect the local environment via climate change and resource consumption. In Europe, migration from countries outside the region's borders can compensate to some extent for the natural decline of its own population and workforce, but significant political action at regional and national levels will still be required.

The notion that overpopulation will be the main cause of global crisis is debated. It is not that there are too many of us on Earth, but rather that the lifestyles of the increasing number of industrial economies require more resources than the planet can produce. In more and more regions, the use of natural resources is influenced more by economic growth than by population growth. Global life expectancy at birth reached 72.8 years in 2019, an improvement of almost 9 years since 1990. Further reductions in mortality are projected to result in an average global longevity of around 77.2 years in 2050. Yet in 2021, life expectancy for the least developed countries lagged 7 years behind the global average. The COVID-19 pandemic has affected all three components of population change. Global life expectancy at birth fell to 71.0 years in 2021. In some countries, successive waves of the pandemic may have produced short-term reductions in numbers of pregnancies and births, while for many other countries, there is little evidence of an impact on fertility levels or trends. The pandemic severely restricted all forms of human mobility, including international migration.

The most important consequence of overpopulation that today, humans have changed ecological systems to an extent that was unprecedented. To sustain economic growth and meet the growing demand for food, resources, and space, vast natural areas of Earth have been converted to agriculture, plantations, and the built environment. In 2005, according to the Millennium Ecological Survey, 15 out of 24 "ecological services" are in decline, including freshwater resources, marine fish populations, and clean air and clean water. Biodiversity has declined by 12% globally since 1992, and by 30% in tropical areas. The most shocking finding of WWF's 2014 Living Planet Report is that populations of vertebrate species have shrunk by

half in the past 40 years. The rate of species extinction is estimated to be a thousand times greater today than it was before the start of the industrial age. The reason is simple: human intervention.

Food production and waste play a prominent role in the reduction of biological diversity, climate change and environmental pollution. If "everything stays the same", then a tenth of the tropical primeval forests will disappear worldwide in the next 35 years due to the areas that have been cultivated. Increasing deforestation, use of artificial fertilizers and methane emissions from farm animals will increase the greenhouse gas emissions of food production by almost 80% - emissions from food production alone reach or may even exceed the greenhouse gas emissions of the world economy indicated for 2050.

The environmental impact and damages of mining and oil extraction are getting worse, and more and more types of plastic are being produced from oil in polluting chemical factories. Once in the environment, plastic decomposes extremely slowly (500 years) or not at all, and dangerous substances are released during its combustion. The number of pieces of plastic floating in the Pacific Ocean has increased exponentially in recent decades. According to a report by the United Nations Environment Program (UNEP), about 6.4 million tons of waste enter the seas every year. The waste accumulates not only on the surface, but also on the seabed - in the shallow coastal strips and in the 4,500-meter-deep sea trenches. Ocean acidification - which has increased by 30% since the Industrial Revolution - poses a new threat to marine life.

Population forecasts for Hungary and Poland.

In 2005, about 316,000 immigrants lived in Hungary, the majority of whom were of Hungarian nationality. Hungary's population is also decreasing, by 14% by 2060, according to the KSH forecast, from 10.034 million at the end of 2008 to 8.538 million, i.e. by nearly 1.5 million. Update: the domestic population continues to lose weight, the rate of natural weight loss was 4.6% more in the first half of 2019 than a year earlier - according to the KSH, the country's population decreased to 9.773 million. The domestic population has lost a lot of weight since the outbreak of the epidemic in May 2020 - the number of deaths increased significantly (by 21%), and the number of births decreased slightly (by 1.6%) until April 2021 compared to the same period of the previous year. The population of the country will be around 8.7 million by 2050 and 7 million by 2100, according to the UN's forecast. The decrease in Poland is not that obvious, we can rathe speak about a slowing increase. From 1960 to 2021 the population of Poland increased from 29.64 million to 37.75 million people. This is a growth of 27.4 percent in 61 years. The highest increase in Poland was recorded in 1964 with 1.39 percent. The biggest

decrease in 2000 with -1.04 percent. In the same period, the total population of all countries worldwide increased by 160.2 percent. The average age in Poland rose by 3.35 years from 2012 to 2020 from 38.55 to 41.90 years (median value). Around 60 percent of the inhabitants live in the country's larger cities. This trend of urbanization is declining, decreasing by -0.3 percent per year (World Data Info).

Urbanization

That there is a positive relationship between urbanization and economic growth is considered, according to most urban researchers, as more or less a given. This is often illustrated with international comparisons that show a strong and unequivocal relationship between degree of urbanization and income level. Comparing different countries and continents with each other in order to find connections between cities, income and development can seem somewhat adventurous because in many cases it is like comparing "apples with pears" due to the different natural, social and economic conditions which prevail and which differ between different countries and continents. Urbanisation, urban growth and economic growth are thus considered to be linked to each other. However, this has its origins in recent centuries of development in the so-called developed part of the world. In the third world or in developing countries, however, these connections are not as pronounced. Instead, urbanization and strong urban growth in these countries have been associated with poverty and slums (Engström & Oskarsson, 2005). Modern urbanization began as part of a complex process called the industrial revolution, which included many economic and social elements.

The root causes are many and strongly intertwined. This period brings the population explosion, which initially creates a significant population surplus primarily in rural areas. The urban explosion is caused by the influx of this population into the cities, in which both "push" and "pull" factors played a role. The swollen rural population was faced with the fact that land was finite, and the concentration of estates in England, which was at the forefront of the process, increased significantly. We had to go: two directions were offered, on the one hand, the vast areas of the New World (at that time, the countryside there, not the cities), on the other hand, the new cities, where the nascent industry created jobs and a very modest living. These cities are not necessarily the ones that were significant in the past: new ones have often sprung up out of nowhere, and old ones have stagnated in development. By the way, concentration is not only manifested in the rapid growth of the urbanization rate, but also in the transformation of the city network: instead of many similar-sized, dispersed systems, a few large centres are emerging. For the first time since Rome, European cities crossed the one million mark, which

raised problems that were very difficult to deal with in the technical and public health conditions of the time. In Lewis Mumford's famous book (The City in History), he calls the cities born as a result of the industrial revolution the hells of paleotechnology - we couldn't give a more apt description.

Urbanization means an increase in the number and proportion of cities and city dwellers, this is the quantitative aspect of urbanization. The urbanization rate shows the proportion of city dwellers within the total population. This rate globally exceeded 50% for the first time a few years ago. Among the countries exceeding the 90% rate, we can mention e.g. Belgium, New Zealand, Australia, Argentina, Israel. In our country, approx. This rate is around 70%, 45% in China, and barely 30% in India. Another element of urbanization is urban transformation, this is the quality aspect. It means that the built-up area of the settlement is changing, the supply of the population, the infrastructure is changing, but at the same time the needs of the population are also changing (e.g. for cultural, health, entertainment-related services). The four stages of urbanization:

Stage One: City Explosion. People migrated *en masse* from the villages to the cities, on the one hand in order to take up work in the industrial sectors, and on the other in the hope of better living conditions. At that time, the carrying capacity of the villages was weak. The first stage in the development process of urbanization – the urban explosion – which means rapid urban growth. This is primarily related to the industrial revolution, and in general to the large-scale development of the modern economy and the start of development. It is clearly characterized by the concentration of the population, the masses of the villages begin to flow towards the cities, the cities grow rapidly, and the big cities are formed. Modern urbanization in the 18th and 19th centuries. it started in Western Europe at the turn of the century. In addition to industrialization, the stimulus of this period of urban growth was commerce (colonization). There was already a fairly developed urban network here, and thus not only did industry increase cities, but commercial capital also created industry. In North America, this process began in the 1860s and essentially relied on Europe, so the urban explosion was initially associated with the eastern Atlantic coast.

Nowadays, developing countries are on the road to modern urbanization. The urban explosion is elemental, and today the third world is the scene of rapid urban growth. It is characterized by the fact that urban population growth is about four times faster than in developed countries. The overpopulated, unsustainable huge masses of people from agriculture seek refuge in the cities, without either the employment opportunities or the supply conditions creating a suitable

opportunity for this. Immigrant masses also preserve their village habits, such as high population growth, which further increases the problems of big cities.

Second stage: the growth of the central city, the growth of the catchment area, and then the outflow of population from the city to the catchment area. Thus, this phase is still basically characterized by concentration, at the same time however, due to the development of industrial technology, changes in traffic conditions, and the differentiation of the needs of the population, signs of a movement in a different direction - relative decentralization - are also appearing. Initially, the growth of the central city is accompanied by the growth of the settlements in the catchment area, later, the growth of the central city becomes smaller and then stops, and a significant growth of the catchment area can be observed. Overall, movement in both directions is characteristic of this section. This urbanization period occurs in conditions of intense economic development. At that time, the great wave of industrialization had already ended, the urbanization process was characterized by the structural transformation of industry and the rapid growth of the role of non-productive sectors in employment. Signs of the territorial deconcentration of the population: within the metropolitan areas, population growth is transferred from the central areas to the suburbs, the development of small and medium-sized towns within the city network is increasing. There is a growing interest in suburban and surrounding settlements that offer a more pleasant environment. Infrastructure plays an increasingly important role. The developed infrastructure creates the basis for not only the central city, but also the areas of the urban agglomeration to be involved in the development. This phase in developed capitalist countries began at the end of the last century (with the appearance of urban agglomerations), unfolded from the 1930s and lasted approx. lasted until the 60s. Eastern and Central Europe entered this phase from the 70s.

Third stage: deurbanization: the decrease of the population of the central city, the increase of the population of the rural or semi-rural catchment areas. The proportion of people employed in the productive sectors is rapidly decreasing, with agriculture accounting for only a few percent of active earners employs. Most of the employed are found in the non-productive sectors. If we add to this the very rapid modernization of transport and telecommunication conditions, we can see that this phase of urbanization is also created as a necessary consequence of other circumstances. This urbanization phase was previously only detected in the most developed countries from the 60s onwards. This phenomenon was clear in the western part of Europe and in many areas of the USA, so we can see how, like other urbanization phenomena, this stage also reached Central and Eastern Europe, such as Poland.

Fourth stage: reurbanization: revitalization and modernization of city centres. It is characterized by the revitalization of city centres, the modernization of residential areas adjacent to the centre and, in connection with this, the repeated growth of the population of city centres. Regarding this stage, opinions are divided as to whether it will be created or not neither. In any case, the increase in increasing transport and other costs strengthens the movement in this direction. Differences in the urban development process of East Central Europe:

1. The industrial revolution started late, the structure of industrialization was different, the technology was different. The role of the driving sector was played, for example, by the food industry, which cannot really be characterized by urban concentration.

2. The industrial revolution in this region was slow and interrupted in time. Before World War I, the industrial areas appeared only as islands, but some sectors, such as the Polish textile industry and the Hungarian mill industry, developed very significantly. The most important manufacturing centre of the Austro-Hungarian Monarchy in 1910 was Budapest, despite this Hungarian society remained fundamentally rural and orderly. The mining and iron factory settlements only induced urban growth in a few places, and we can only speak of a real urban explosion in the case of Budapest. The city did not create industry, as in Western Europe, but industry started an often-imperfect urban development. After World War I, the centres after Budapest became peripheral in the new country (Debrecen, Szeged, Pécs, Győr). The first stage of modern urbanization, the urban explosion, thus got off to a bitter start in the region. Even in 1950, the entire region was essentially rural.

3. Urban and industrial development were completely intertwined. The urbanization process accelerated strongly from the 1950s, when large industrialization programs began in the countries of the region. The necessary capital was provided by the withdrawal of agricultural accumulation and the restriction of the population's consumption. Rapid industrialization initiated and spread the process of urban explosion. As a result of industrialization, the social structure of cities was transformed, many immigrants from villages arrived, the number of cities increased, and the number and proportion of the urban population increased very quickly. This phase of industrial boom lasted until the 1970s, after which it slowed down sharply. From World War II to the end of the 70s, the first phase of urbanization took place. The development of the second stage of urbanization has only just begun in the region, certain signs are shown

in the strengthening of the network of small and medium-sized towns, while the territorial location of the urban population becoming more decentralized.

In 2022, the degree of urbanization worldwide was at 57 percent. North America was the region with the highest level of urbanization, with over four fifths of the population residing in urban areas. The degree of urbanization defines the share of population living in areas that are defined as "cities". A definition of a city differs across various world regions - some countries count settlements with one hundred houses or more as urban, while others only include the capital of a country or provincial capitals in their count. On the other hand, less than half of Africa's population live in urban settlements. Globally, China accounts for over one fifth of the built-up areas of more than 500,000 inhabitants.

Though North America is the most urbanized continent, no U.S. city was among the top ten urban agglomerations worldwide in 2022. Tokyo-Yokohama in Japan was the largest urban area in the world that year, with 39.2 million inhabitants. New York ranked eleventh, with 20.9 inhabitants. Eight of the 10 most populous cities are located in Asia (Statista Research Department, 2022).[2]

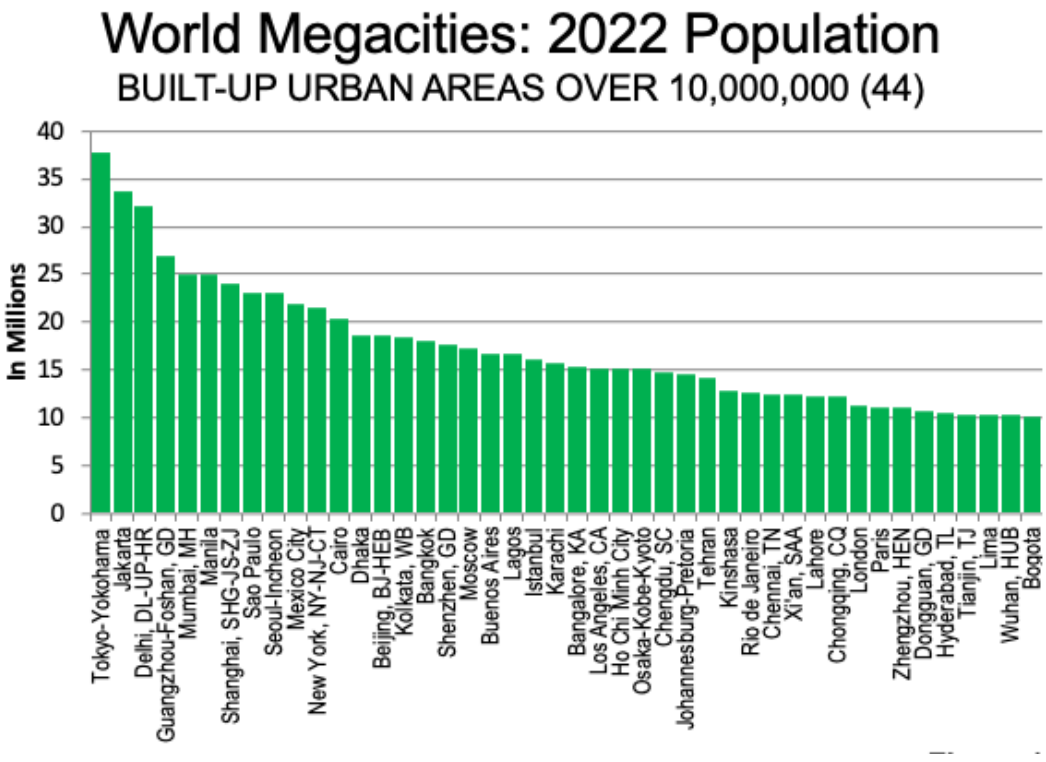


Figure 12 World megacities according to their population in 2022.

Source: https://www.newgeography.com/content/007523-demographia-world-urban-areas-2022-released

[2] https://www.statista.com/statistics/270860/urbanization-by-continent/

It may be hard to imagine how the reality will look like in 2050, with 70 percent of the global population living in cities, but some statistics illustrate the ways urban living differs from suburban and rural living. American urbanites may lead more “connected” (i.e. internet connected) lives than their rural and/or suburban counterparts. As of 2021, around 89 percent of people living in urban areas owned a smartphone. Internet usage was also higher in cities than in rural areas. On the other hand, rural areas always have, and always will attract those who want to escape the rush of the city.

Water pollution

Water is the most valuable commodity in the world. Although there are minerals of high economic value, water is essential for life and its development. The World Health Organization (WHO) defines polluted water as that whose "composition has been modified so that it does not meet the conditions for its intended use in its natural state." Water pollution can come from many sources, and almost all human activities can have an adverse effect on water. Water quality is affected by both direct point pollution (any single, identifiable pollutant source, such as a factory) and diffuse pollution (pollution from various activities without a single source, such as acid rain, pesticides, urban runoff), which are urban and rural they come from population, industrial and agricultural emissions. The main sources are diffuse pollution from agriculture and point pollution from sewage treatment and industrial emissions. When it comes to agriculture, the main pollutants are nutrients, pesticides, sediment, and microbes in faeces.

Currently, around 5 million people worldwide die from drinking contaminated water, a particularly serious situation linked to social exclusion, poverty, and marginalization. These are the main reasons:

Industrial waste: industry is one of the main factors that cause water pollution. Unfortunately, thousands of companies still do not know that this resource must be used properly, and they release large quantities of polluting products from their industrial processes. Rivers and canals are most affected by these bad practices.

Temperature increase: Although it may not seem like it, global warming also affects water pollution. When the temperature of the ecosystem is higher than normal, the water source decreases its oxygen content, causing a change in the composition of the water.

Use of toxic pesticides in agriculture: the vast majority of modern agricultural processes use fertilizers and chemicals for planting and food production. Well, these products are filtered through underground channels and in most cases these channels will eventually enter our water

supply network for consumption. This water is almost never treated and returned to a channel suitable for consumption.

Deforestation: excessive logging can cause rivers, lakes and other water sources to dry up. Furthermore, deforestation does not always include the removal of tree roots from riverbanks, which can cause sediments and bacteria to appear underground and thus contaminate this valuable resource.

Oil Spills Finally, we must not forget a practice that has traditionally caused water pollution in various parts of the world: oil spills and its derivatives. These leaks are caused by poor transportation of oil and leakage of gasoline and other products. These products are generally stored in underground storage tanks; In many cases, the water tank will leak and substances will leak into the surrounding body, including water sources suitable for food.

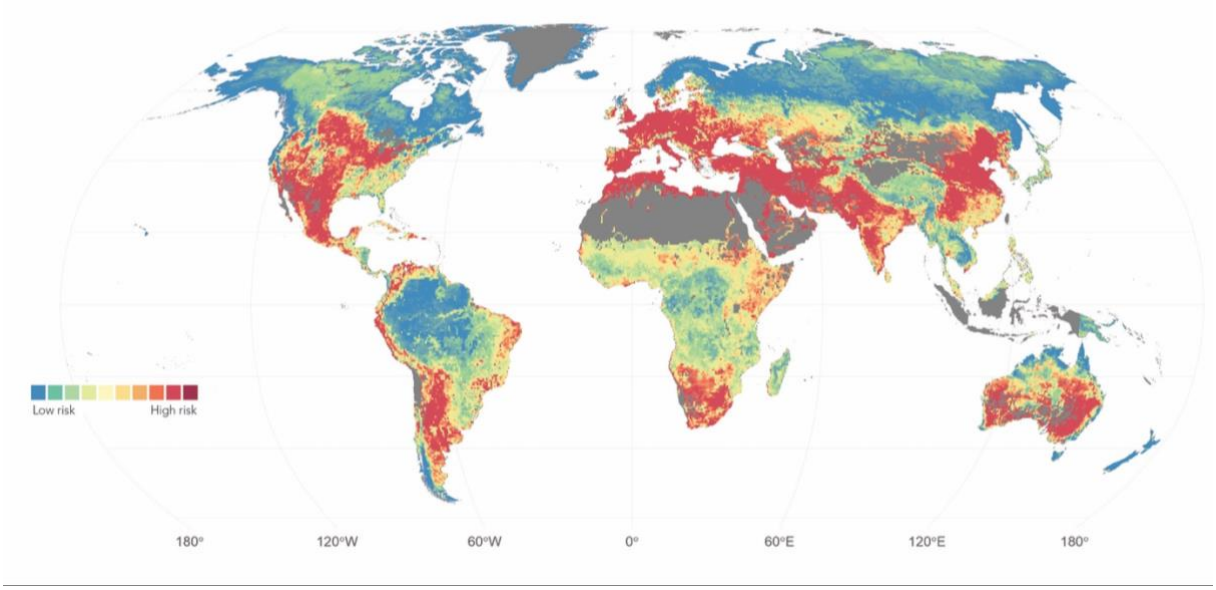


Figure 13 The World Bank report includes a global map of water quality risk based on 2000-2010 data for BOD, nitrogen, and salinity.

Source: World Bank[3]

There are various negative consequences caused by water pollution around the world. We can divide these causes into human and environmental. Let's see what they are:

Diseases: Drinking dirty water or using it for personal and environmental hygiene is linked to many diseases. The World Health Organization talks about diarrhoea, cholera, hepatitis A, dysentery, polio and typhoid. Prevention, by improving supply, sanitation and personal hygiene infrastructure, promotes the use of clean water for food and household hygiene.

[3] https://www.globalwaterintel.com/news/2019/34/agencies-plead-for-global-action-on-water-pollution

Mortality: unfortunately, dirty water has a higher risk. According to the World Health Organization, diarrheal diseases cause 1.5 million deaths each year. Among them, more than 840,000 are caused by lack of clean water and inadequate personal hygiene and sanitation. Simple, everyday things like washing your hands with soap and water or drinking a glass of clean water can prevent the spread of potentially deadly diseases. Without water, hygiene and sanitation, health is at risk. Deaths among minors are caused by the consumption of water in poor condition or lack of hygiene in an emergency.

Malnutrition: malnutrition is related to inadequate diet and infectious diseases because of the relationship between diet, health and care. In this way, a healthy diet meets nutritional needs, but also requires an adequate environment that provides health care services, sanitation facilities and appropriate sanitation measures, for which drinking water is essential.

Ecosystems: There are serious effects of fresh water in poor condition on the environment, as it affects habitats causing loss of aquatic biodiversity and facilitating harmful algal blooms or eutrophication.

Plastics in the environment

Eight million tons of plastic waste leak into the environment and oceans every year. This has led to documented damage to as many as 270 marine species caught in plastic debris or ghost nets. The microplastics affect both humans and marine animals. By 2050, the researchers expect that nine out of ten seabirds will have eaten plastic. A powerful global agreement is now required to cope with the plastic crisis, according to WWF.

It is urgent. We are facing a plastic crisis that risks having major environmental and health effects. What we see is the tip of an iceberg. Therefore, the WWF call on the world's leaders to work for a globally binding agreement now. The goal is to stop the release of plastic into the environment and achieve 100 percent recycling and reuse of plastic waste by 2030. WWF launched the report "Solving Plastic Pollution Through Accountability" with the requirement "No plastics in nature". WWF shines the spotlight on the lack of responsibility in the entire chain from production to plastic waste. A positive step in the right direction is the EU's upcoming ban on certain disposable items by the year 2021 - but tougher measures must be taken generally on a global level. Everyone must take responsibility, including extended producer responsibility.

Manufacturers and companies throughout the value chain must take a holistic approach and reduce the use of virgin plastic. Plastic that is produced should be of high quality with a value

on the recycling market. The consumption of virgin plastic must be reduced, and the resource better taken care of in waste management systems.

The plastic pollution is estimated to cost 7 billion Euros each year in the form of lost income for the fishing industry, trade and tourism. 99 percent of plastic's raw materials come from oil and fossil energy, and emissions are predicted to increase by 50 percent as production increases.

How much plastic is produced?

Over the past 60 years, plastic has become an increasingly large part of our lives and the economy. Production increased from 1.5 million tons in 1950 to 335 million tons in 2016. This corresponds to approximately 43 kg of plastic per person per year. Production is expected to double by 2030. As much as 40 percent of plastic production is used for disposable packaging.

Countries that produce the most plastic waste (million tonnes/year):

USA: 70.8 million tons, China 54 million tons, India 19.3 million tons, Brazil 11.3 million tons, Germany 8.3 million tons, Great Britain Japan 7.14, Canada 6.7, Mexico 6.1 million tonnes and France 4.4 million tonnes. Sweden produces 990,000 tonnes of plastic waste per year - of which around 300,000 tonnes come from households. Each American generates 214 kg, a Swede 100 kg, a Chinese 39 kg. When producing 1 kg of plastic from fossil raw materials (over all plastic production), approximately 2 kg of oil is required. This corresponds to an emission of approx. 6 kg of carbon dioxide (source SNV).

What is happening in the EU?

The EU member states have reached an agreement with the Commission and the EU Parliament on the banning of certain disposable items such as plastic cutlery, plastic plates, straws, and food packaging in certain types of plastic. Some measures against single-use plastic came into effect from 2021. Extended producer responsibility is important here.

Where does the plastic waste end up?

Every minute, a truck full of plastic waste is dumped into the oceans, which equates to 8 million tons of plastic per year. Much of the plastic in the sea settles on the bottom and in the water masses and is therefore not visible to the eye. Globally, there are five large plastic currents (gyros) in the oceans, two in the Pacific, two in the Atlantic and one in the Indian Ocean. 80 percent of the plastic debris that reaches the oceans comes from land-based sources. In the Mediterranean, the concentration of microplastics is the highest in the world. 90 percent of

plastic waste is transported via ten rivers in Africa or Asia (Helmholtz Center for Environmental Research in Germany) – including the Ganges, in India and the Yangtze, in China.

How much is recycled? Only 14 percent of all plastic is recycled globally today – in Sweden, 46 percent of plastic packaging is recycled.

How are the animals affected in the sea? Both aquatic and terrestrial animals can get stuck in plastic debris, get injured or die. Hundreds - such as mammals and seabirds - have already swallowed microplastics or larger plastic particles, stuck in ghost nets, plastic lines or other plastic waste. Tips for everybody to reduce plastic use:

- Avoid single-use plastic, say no to straws and lids to disposable cups
- Bring your own mug for the take-away coffee. Buy less convenience food that comes in plastic packaging
- Bring your own bag when you shop - avoid plastic bags in the shops
- Choose fewer products in the store that are packaged in plastic
- Avoid cosmetics, hygiene products and cleaning products that contain microplastics
- Choose clothes and textiles made of natural materials rather than synthetics. Wash synthetic clothes less often and air them instead
- Leave plastic packaging for recycling

In the latest report[4] of WWF the organisation calls for collective global action, since the current trajectory for plastics growth shows that the crisis is expanding, we can change this with a single approach taken across all sectors – a matter of accountability.

WWF calls on all governments to:

- Agree to a legally binding international treaty to eliminate plastic pollution from leaking into the oceans, thereby significantly contributing to Sustainable Development Goal 14.1.
- Establish national targets for plastic reduction, recycling and management in line with global treaty commitments, including transparent reporting mechanisms that recognize the trans-boundary nature of the problem.

[4] https://wwwwwfse.cdn.triggerfish.cloud/uploads/2019/03/plastrapport-2019-wwf-international-solving-plastic-pollution.pdf

- Deploy appropriate policy instruments to incentivize the creation and use of recycled plastics over new plastics, and the innovation of viable alternatives to plastics that have smaller environmental footprints.
- Collaborate with industries and civil society groups to ensure a systems-based approach that addresses plastic production, consumption, waste management and recycling as a single system, and refrain from individual, fragmented or symbolic policy actions.
- Invest in ecologically sound waste management systems domestically and in countries where national plastic waste is exported for disposal, thereby locking in long-term economic social and environmental benefits.
- Legislate effective extended producer responsibility as a policy mechanism for all plastic producing sectors to ensure the greater accountability of companies in the collection, reduction, reuse, recycling and management of the plastic waste originating in their trade chains.
- Implement sufficient monitoring and compliance measures for all policies related to the production, collection and management of waste by all stakeholders in the plastic system.
- Work at appropriate subnational levels and invest in city approaches to establish robust management plans and transparent accounting mechanisms that prevent plastic leakage into water systems or other mismanaged waste disposal mechanisms.

Wild, illegal landfills

On average, the concept of municipal waste is defined as the garbage that cannot be placed in the selective waste collector. The picture is a bit more complicated than that. Municipal waste can be organic or inorganic, and is generated in residential buildings, public institutions, and public areas. It is also interesting that although the composition of waste varies, countries with a given level of development produce waste with an almost identical composition in a given period, just as the average amount of waste per inhabitant is almost the same according to economic performance. The composition of waste is greatly influenced by the transformation of consumption habits. Due to the spread of plastic packaging materials, the volume of waste has increased significantly in recent years. And unfortunately, more and more organic food and other waste appear in the material stream. The waste that cannot be recycled is placed in a

landfill. A landfill is an activity subject to a permit. This means that whoever deposits waste must have a permit from the county administrative board or the land and environment court. Today, only waste that cannot be recycled or reused in a cost-effective manner is put in landfill, for example inert waste and hazardous waste. If you store material on your property that is not temporarily stored for later treatment, you must remove the waste within one year. If, however, you plan to treat the waste, you have three years. If you as a property owner or operator do not follow the time frames, the storage of the waste is seen as a landfill, which is illegal. Sometimes waste is dumped illegally. Then it is usually the property owner's responsibility to remove the waste.

Illegal disposal of garbage causes serious problems at the national level. The amount of waste deposited in forests, forest edges, fields, public and private areas is increasing. Even in nature protected areas, piles of garbage appear again and again, despite heavy taxpayers' forints being transported. Typically, mixed municipal waste is dumped illegally in forests and roadsides, but hazardous waste, tires, construction debris, and green waste can all be found.

Illegally disposed waste causes serious and often permanent damage to the environment. For example, a plastic bag takes 100-200 years to decompose, a disposable diaper takes 550 years, and a cigarette butt takes 10-12 years. In the case of improper storage, handling or disposal, substances released into the environment can cause pollution of the air, soil, and surface and underground waters. But it's not just that untreated waste damages the environment and offends our sense of beauty, the environmental damage done in the present is even more important from the point of view of the future. When we make the decisions of the present and act accordingly, we are also responsible for the future generation.

Heavy dependence on fossil fuels

Countries' continued dependence on fossil fuels endangers food safety and increases the risk of infectious diseases and heat-related morbidity. This is shown by the latest Lancet report on the impact of climate change on health. At the same time, the report offers solutions to the challenges: despite the magnitude of the challenges, a rapid transition to clean energy types can save lives.

Ahead of the UN's major climate summit COP27 in Egypt, a number of UN reports have been released as usual to describe the current situation and thus set the agenda for future climate work. Another annual report released at the same time is the one published by the medical journal The Lancet since 2015: Lancet Countdown on health and climate change.

This year's report has the theme "health in the hands of fossil fuels", where it is emphasized that humans have a dependence on fossil fuels which reinforces the health effects we already see. It thus goes along the same lines as last year's report, which emphasized that it was "code red for a healthy future".

Combustion releases carbon dioxide

All combustion produces carbon dioxide, which contributes to the greenhouse effect. The emissions of carbon dioxide cannot be cleaned, but are directly proportional to the use of the energy. However, carbon dioxide emissions differ between different fuels. Burning coal gives rise to higher emissions of carbon dioxide per unit of energy than burning oil and oil products such as petrol and diesel.

Combustion also releases substances harmful to the environment and health. These can be substances such as sulfur dioxide, nitrogen oxides, particles, polyaromatic hydrocarbons and harmful volatile organic compounds (VOCs).

Natural gas

Natural gas produces the lowest emissions of carbon dioxide per unit of energy compared to other fossil fuels. However, there are risks of other climate impacts. Natural gas mainly consists of the gas methane, which has a climate impact that is 34 times higher than carbon dioxide (based on the UN Climate Panel's 2013 report). It is difficult to completely avoid leakage of the gas. The leaks can mean that the climate advantage of natural gas is reduced compared to, for example, petrol or coal.

Natural gas has the advantage that it provides a clean combustion with low emissions of substances harmful to the environment and health. Natural gas is increasingly being replaced with biogas, which is also methane but of renewable origin. Even for biogas, it is important to minimize leakage.

Coal and fuel oil

The use of coal for heating has almost ceased in Scandinavia, but very much dominant in Poland and even in Hungary. The use of coal is still high in steel production, with carbon dioxide emissions as a result. New technology for steel production is therefore being developed.

Internationally, new coal-fired power plants are still being built, in some countries that have large coal resources of their own or that have large-scale energy systems based on the import of coal. The prices of electricity from solar cells and from wind power have fallen rapidly in

recent years. An increasingly large part of the investments in new electricity production today is about solar and wind power. It is often actually more economically beneficial to invest in such renewable sources compared to coal. In many places, however, there is a long tradition of using coal, a tradition that can be difficult to break. A global tax on fossil fuels could bring about rapid change, but it is difficult to agree on one internationally.

Peat - is it a fossil fuel?

Peat is a middle ground between fossil and renewable fuel. Peat is formed in wetlands when new moss grows on top of older moss. The older moss gets deeper and deeper, partially breaks down, and turns into peat. Large amounts of carbon are stored in the peat. Peat is counted in most contexts as a fossil fuel, even though it is newly formed much faster than coal, oil and natural gas.

Energy efficiency can be achieved through technical measures and through behavioural changes. Efficiency can be achieved, for example, through improved insulation of buildings or by choosing more energy-efficient installations and devices, including for lighting and ventilation. Training of operating and maintenance personnel is important for equipment to be used in an energy-efficient manner. In industry, you can switch to technology that uses energy more efficiently, for example in engines and where compressed air is used.

Insufficient development of renewable energy sources

One of the key factors of sustainability is the construction and use of renewable energy systems, which constitute the natural link between sustainable land use, multifunctional organic agriculture, food-production, waste management, water resources management, waste to energy programmes, infrastructure development, transport, planning of settlement structures and social welfare systems (Hartel et. al. 2014). Thus, the production and use of renewable energy (with particular emphasis on bio-energy, solar power, wind and geothermal energy) is the key for all aspects of sustainability, including economic viability (Fig. 3). Agricultural lands occupy 37% of the earth's land surface. Agriculture accounts for 52% of methane and 84% of global anthropogenic nitrous oxide emissions. The best way to reduce these greenhouse gases is the substitution of fossil fuels for energy production by agricultural feedstocks (e.g. crop residues, dung and dedicated energy crops) and all other renewable energy sources, which can be included into one holistic energy supply system, substantially reducing the costs of running agricultural enterprises. In agriculture it is possible to establish combined production structures, which include organic, chemical-free crop production, the use of bio-energy forests and other

dedicated energy crops as biological filters, the application of biologically cleaned waste water, free from heavy metals, as crop nutrient through irrigation and the use of waste water sludge and fermentable organic waste for production of biogas. Dedicated bio energy crops may increase the soil carbon sequestration, hereby contributing to the reduction of global warming. In this way complete ecological cycles can be created, which utilize all energy sources in an optimal way and minimize or, finally, eliminate waste production. In all cases the best solutions are the integrated food-energy systems, where the complex life cycle analysis, food production involving both arable farming, fruit and vegetable production, animal husbandry and food processing, forestry, nature conservation, waste management and the cultivation of dedicated bio energy crops, the use of other, complementary renewable energy sources such as solar PV, wind, geothermal and/or hydroelectric power constitute one holistic system, suitable both for smaller local and larger, regional economies (Némethy and Molnár, 2014).

An EU directive on energy labeling states that certain types of goods must have a label showing their energy use, making it easier for consumers to determine which products have good energy performance. Together, the eco-design and energy labelling requirements drive the development of more energy-efficient products and reduce energy use within the EU. Products that are covered are, for example, lamps, white goods, TVs and heat pumps.

Bioenergy carriers

Bioenergy carriers have become an increasingly important source of energy in recent years, if we consider all sources of biofuels. The use of bioenergy reduces CO2 emissions and improves the security of energy supply. In Sweden, for example, the use of bioenergy in 2003 was 378 PJ (105 TWh), or 42 GJ/person. Today, the center of attention is the installation of multifunctional energy forests. The most common are willow and other woody plantations, which provide an ideal habitat for wild animals, but are also suitable for cleaning and using sewage and sewage sludge. More than any other sector of agriculture, the bioenergy sector develops systems that facilitate the circulation of nutrients. 90% of Swedish bioenergy comes from forestry. In the Scandinavian countries, two-thirds of district heating comes from biofuels (Regeringskansliet, 2008). The most advanced versions of biomass-dependent cogeneration power plants (CHP = Combined Heat and Power) not only produce electrical energy and heat suitable for district heating, but also use the excess heat for district cooling (trigeneration systems). As a result, the demand for biomass increased by leaps and bounds, so much so that in 2004, 5% of the biomass needed for bioenergy production in Sweden had to be imported.

Bioethanol, biodiesel and second generation and subsequent biofuels

The E85 fuel mixture common in Sweden and the USA contains 85% bioethanol and 15% gasoline. The dry material remaining from the production of bioethanol can mostly be used as feed with a high protein content. Biodiesel fuels are vegetable oil or animal fat-based alkyl esters containing long carbon chain components (for conventional diesel engines) or vegetable and waste oils (for converted diesel engines). Biodiesel can be used pure or mixed with petrodiesel in any proportion. One of the most promising second-generation biofuel technologies, ligno-cellulosic processing, is already quite advanced. Other technologies for converting biomass into liquid biofuels (BtL) include Fischer-Tropsch biodiesel and the bio-DME (dimethyl ether) method. Demonstration plants operate in Germany and Sweden. The CARS 21 high-level group rated second-generation biofuels as particularly promising and recommended special support for their development.

Biogas

Biogas is a gas mixture (45-70% CH4, 30-55% CO2, 2-7% N2, 1-5% H2, 0-0.1% H2S, NH3, CH3SH and other residual gases). In Sweden, biogas is produced by fermenting sewage sludge, agricultural and food industry waste, animal manure and compostable household waste. Biogas is used for heating and (primarily) for driving vehicles. Most of the buses in Stockholm, Jönköping, Gothenburg and Malmö run on biogas.

Hydropower and wind farms

A technical facility that converts the mechanical energy reserves of watercourses, lakes, and seas into electrical energy (formerly directly into mechanical energy). As a collective term, it includes all the artefacts and equipment that are necessary for the production of electricity. In order to increase the usable energy, the water is dammed, possibly stored, and dropped on the turbines at the hydropower plant, which drive a generator to produce electricity. Hydropower is one of the most important alternative energy sources in countries with suitable geographical conditions and technological development. In Sweden, e.g. the country's hydropower resources are fully developed and provide 46.9% of the electricity production. The Swedish Environmental Protection Act (Miljöbalken) regulates the use of energy from rivers very strictly, as large-scale dam construction can destroy valuable habitats. Despite this, the development of "green", small-scale hydropower plants is ongoing, as their negative impact on the environment is not significant. Wind energy accounted for only 1.4% of electricity production in 2008, but it doubled between 2006 and 2008 and continues to grow. The

installation of wind power plants is also regulated by the Environmental Protection Act and the Construction Act.

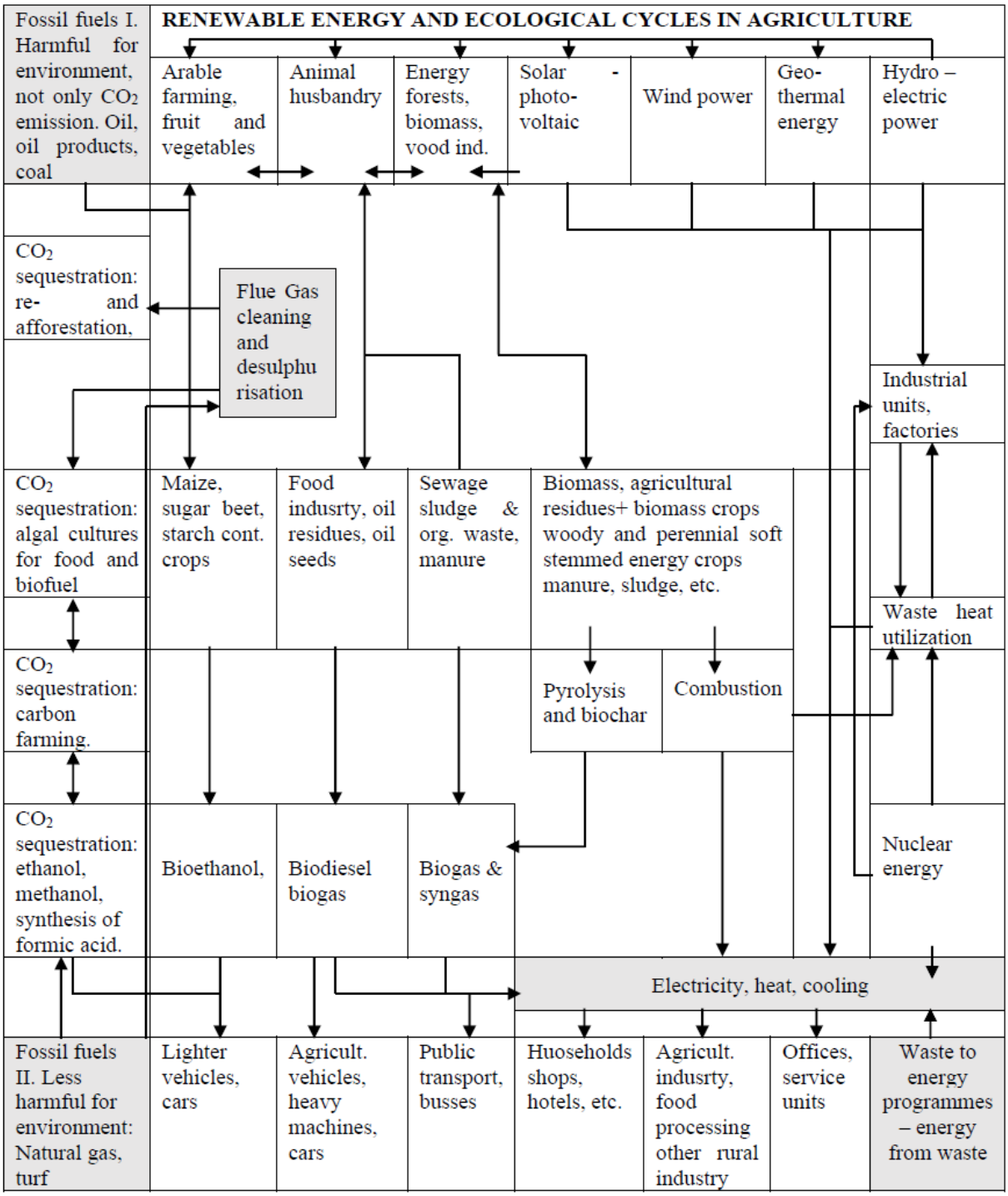


Figure 14 The relationship of fossil fuels with complex renewable energy systems and the capture of pollutants from their utilization, the integration of nuclear and hydropower, and the integration of carbon sequestration (carbon capture) methods into one system.

Due to the nature of the water system, the falls of the rivers in Hungary are incredibly low - they flow out of the mountainous areas into the great plain area - and can be classified as one of the rivers with the lowest falls in the world. Under such conditions - from an economic point

of view - there is not much hope for energy utilization, therefore e.g. the planned power plants, which had actually been planned decades ago after the First World War, were not really able to be implemented.

Pyrolysis (thermal decomposition) of organic materials

Thermal decomposition (pyrolysis) is the chemical decomposition of organic waste in a properly designed reactor under controlled conditions under the influence of heat in an oxygen-poor or oxygen-free medium. Different products are produced from organic waste during thermal decomposition:

- pyrolysis gas;
- liquid product (oil, tar, decomposition water containing organic acids);
- a solid final product is produced. (pyrolysis coke).
- Their composition, ratio and quantity depend on the composition of the treated waste, the operating conditions and structural solution of the reactor. Thermal decomposition can be carried out at several temperatures:
- low and medium temperature processes (450-600 °C);
- high-temperature processes (800-1100 °C);
- high-temperature slag melting processes (≺1200 °C).

The final product produced during pyrolysis is primarily used as an energy carrier (fuel gas, fuel oil, coke), less often as a secondary raw material for the chemical industry (e.g. converting the gas product into synthesis gas for the production of methanol) and occasionally for other purposes (soil improvement with solid, carbon-rich residue; wood preservation with aqueous residue; granulated slag melt as construction additive, etc.) can be utilized.

Both in Hungary and Poland there is a strong political intention to increase the share of renewables in the energy mix. In 2020, the share of renewable energy in the total domestic energy consumption from all energy sources in Hungary was 13.9 percent. With this, Hungary not only reached, but also exceeded the 13 percent share required by the EU directive, according to the summary report of the Hungarian Energy and Utilities Regulatory Office (MEKH), which examines domestic renewable energy use between 2010 and 2020. The sources of growth were mainly solar energy production and biofuels.

In Hungary, in 2020, the installed capacity of power plants producing electricity on a renewable basis was 3,027 megawatts, which was a considerable increase of 32.15 percent compared to the previous year. This is mainly due to the fact that in 2020 the total installed capacity of solar panels (including household-sized equipment) increased the most: from 1,400 megawatts at the end of 2019 to 2,131 megawatts by more than half by the end of 2020.

In 2020, a total of 5,548 gigawatt hours of electricity were produced in Hungary using renewable energy sources, 18.73 percent more than the previous year's 4,673 gigawatt hours. Solar energy-based production increased by more than 60 percent. In addition, biodegradable, municipal waste-based electricity production increased by 21.9 percent, as well as hydroelectric power generation by 0.13 percent and biogas-based electricity generation by 0.91 percent. The expansion of solar energy-based power generation continued, in 2020 it already represented more than 44 percent of the renewable-based electricity generation mix.

As reported by Bloomberg, Poland, Europe's coal heartland is now the hottest market for green power. Poland plans to increase its renewable power capacity by 65% between 2020 and 2024, with most advances gained through the development of offshore wind farms. The country is finalizing its 2040 energy policy and looks to partner with the world's largest Renewable Energy companies to develop the market.

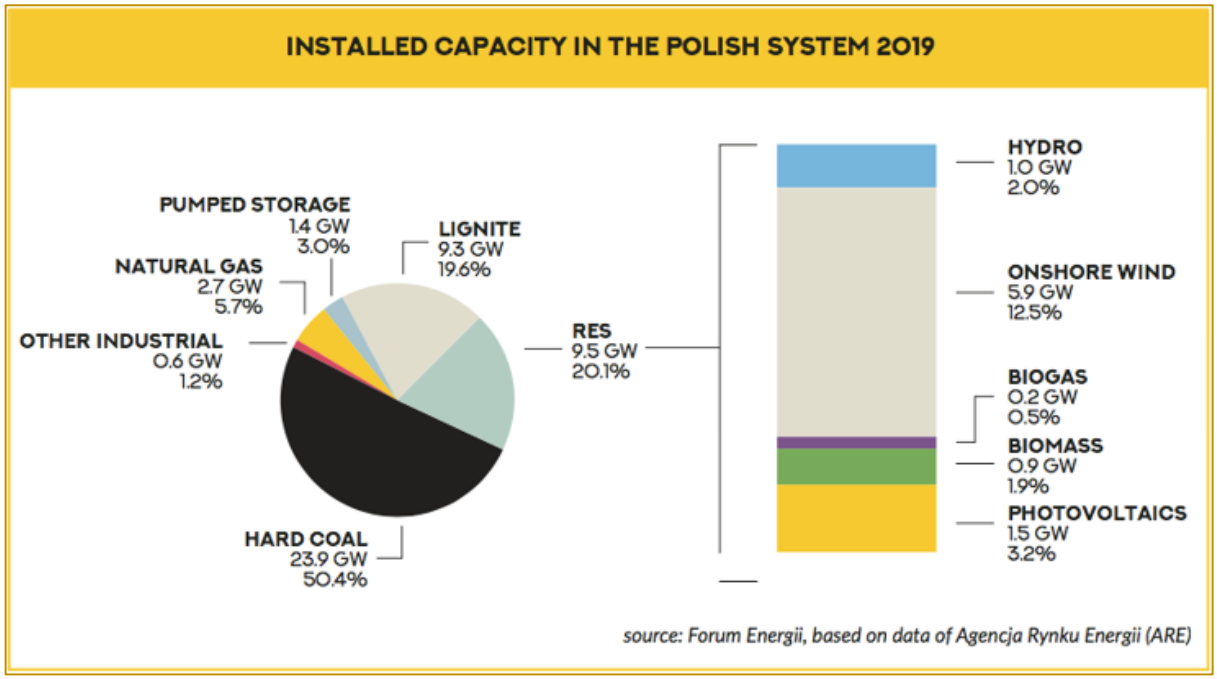


Figure 15 Installed gross energy production capacity of Poland in 2019.

Source: https://www.trade.gov/energy-resource-guide-poland-renewable-energy

In 2008 all EU member states agreed to reach a minimum 15% share of renewable energy by 2020. At that time, Poland had not exceeded an RE balance of 8% and the country did not achieve the 2020 goal, only producing 12.2% from renewable energy sources (RES). Poland's RES capacity amounted to 9,500 MW in June 2020, and it grew by 368 MW throughout the year. Sixty five percent of this capacity was generated from wind power, followed by biomass, hydro, photovoltaics and biogas. In 2020, photovoltaics exhibited the largest growth reaching 3,661.7 MW installed - an increase of 7 percent on a monthly basis. Renewable energy laws strongly support prosumer activities, and individual producers of u to 10KW power from newly installed RES system are guaranteed tariffs for 15 years. For larger producers, an auction system was introduced. Each year, Poland's Ministry of Economy announces the consumption levels expected from renewable energy and provides reference prices for each group. According to the assumptions of the National Plan for Energy and Climate for 2021-2030, Poland's share of energy from renewable sources is expected to increase from 17.6 percent in 2025 to 21 percent in 2030.

Extinction of species (reducing biodiversity)

Biodiversity means that we have a landscape with many different natural types, different species and a large genetic variation within species. It is about wild plants, animals and fungi and their habitats, even on microscopic level, and also about cultivated plants and farm animals. Biological diversity is associated with a number of different values. A species can be attributed a positive existence value regardless of whether it is beautiful, useful or has some other human-assigned attribute. Even those who attach great importance to such aspects, however, usually make exceptions for parasites that are carriers of fatal diseases that affect humans and animals. Certain species or species-rich environments can also be considered to have aesthetic values. This can apply to striking examples such as the megafauna of the African savannah or a magnificent Swedish mountain environment, but also to more everyday examples such as a forest or pasture close to urban areas. Sometimes this aesthetic value is so high that it can form the basis of viable tourism, but often it is a bonus effect linked to other activities and experiences. However, the dominant values linked to biodiversity are those related to the role of ecosystems as sources of raw materials or, more generally, providers of ecosystem services. In the former case, it is about concrete things such as food, wood and other fibrous raw materials, in the latter about basic ecological processes such as regulation of the climate at local and global level, pollination of useful plants, regulation of organisms harmful to crops and

domestic animals, filtration of water and a long list of other more or less collective goods that are often taken for granted.

The educational value of biodiversity should not be underestimated either. Nature films or articles in the daily press about a newly discovered butterfly species contribute to a general interest in the environment, which affects the scope for environmental policy both in this and in other areas.

Unfortunately, economic driving forces have generally meant a prioritization of business activities over environmental concerns. This at the expense of the protection and restoration of nature, with negative effects on ecosystems and ecosystem services as a result. Although the value of nature is recognized at more and more political levels worldwide, many environmentally harmful subsidies remain, linked to, for example, agriculture and fossil fuels. Among other things, these can lead to deforestation, overfishing and waste of water resources.

The five main direct drivers of biodiversity loss over the past 50 years are:

- changed use of land and water,
- direct overexploitation of species through hunting and fishing,
- climate change,
- pollution and
- spread of alien / invasive species.

Impacts on ecosystems and loss of biodiversity have a negative impact on ecosystems' ability to deliver many ecosystem services. The direct influencing factors are driven by a number of underlying, indirect factors which in turn relate to economic and social values and behavioural patterns.

Sustainable Development Goals (SDGs)

The other part of the survey examined the attitude of the population to the Sustainable Development Goals. At a historic UN summit in New York in September 2015, world leaders committed to ending poverty, tackling climate change, and fighting injustice. The 2030 Sustainable Development Framework offers a better future for our planet as a whole and for billions of people worldwide. The 2030 Sustainable Development Framework is universal and indivisible and calls on both developing and developed countries to act, as well as people, to end poverty, tackle inequality and tackle climate change by 2030.

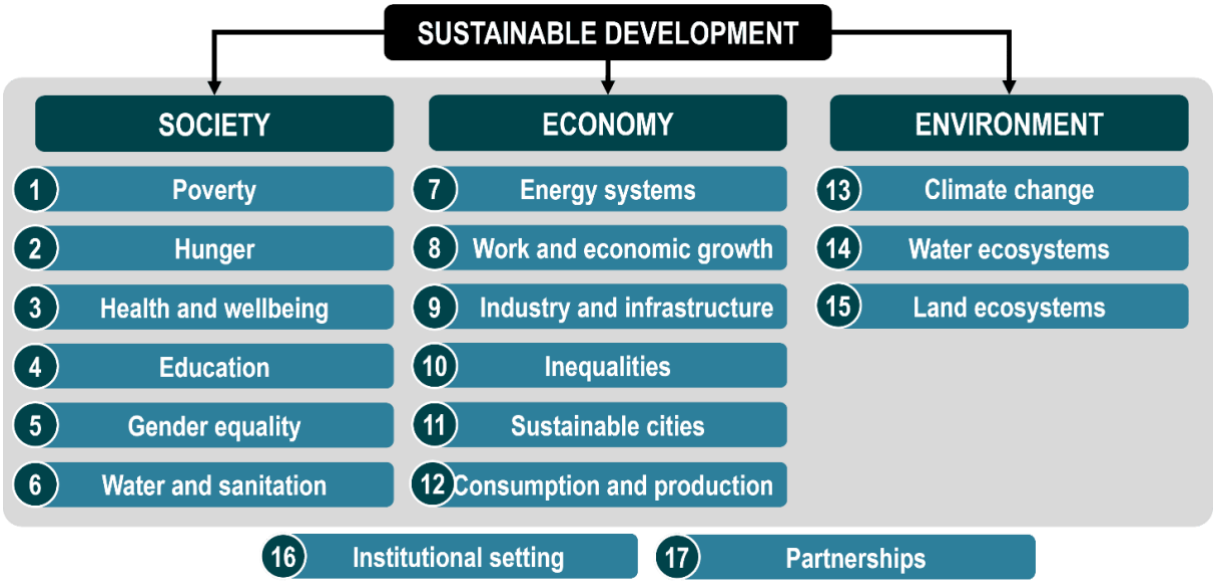


Figure 16 The connections of sustainable development goals

The 17 Sustainable Development Goals (SDGs), unanimously adopted by 195 countries, have set a new universal standard for development by ensuring that no one is left behind. The objectives and indicators behind the SDGs provide a benchmark for measuring the success of progress.

1. Eliminate all forms of poverty
2. Erase hunger, guarantee food security
3. Establish good health and well-being for all age groups
4. Provide quality education and support lifelong learning
5. Enforce gender equality
6. Improve the supply of clean water and sanitation
7. Produce affordable and clean energy
8. Create decent work and economic growth
9. Increase sustainable industry, innovation, and infrastructure
10. Reduce inequality both on national and international level
11. Mobilize for the development of sustainable cities and resilient communities
12. Ensure responsible consumption and production
13. Organize climate action

14. Develop and protect life below water
15. Advance life on land
16. Guarantee peace, justice, and strong institutions
17. Build partnerships for the Goals

Recent events with adverse impact on sustainability

However, there are other important facts, which had definitely adverse impacts on the short-term viability of sustainable development strategies:

1. Global extreme poverty rose for the first time since 1998, from 8.4 percent to 9.5 percent between 2019 and 2020.
2. Between February 1 and December 31, 2020, governments around the world introduced more than 1,600, mostly short-term, social protection measures during the fight against the new coronavirus pandemic.
3. Due to the pandemic, it is likely that the number of children with developmental delays will increase, which already affects one in five children.
4. The pandemic has hindered or reversed the progress achieved in the field of health care, which hides great dangers outside of the pandemic as well. About 90 percent of countries still report one or more gaps in essential health care.
5. The impact of the new coronavirus pandemic on education: a "generational disaster". Another 101 million children and young people fell below the minimum reading level, reversing the educational gains of the previous two decades.
6. The new coronavirus pandemic also had a negative impact on the achievement of gender equality, as violence against women and girls intensified, the number of forced marriages is expected to increase, and a disproportionately greater number of women lost their jobs and their workload at home increased.
7. 759 million people were left without electricity and a third of the global population lacked access to clean cooking fuels and technologies in 2019.
8. Economic recovery has already begun, led by China and the United States of America, but economic development in many countries is not expected to return to pre-pandemic levels until 2022 or even 2023.

9. The world fell short of the goals set for 2020 in terms of protecting species diversity and 10 million hectares of forest were cleared every year between 2015 and 2020.

10. While official development aid increased in 2020, reaching US$161 billion, it falls well short of what is needed to combat the novel coronavirus outbreak and the long-ago target of 0.7 percent of gross national income.

11. In 2020, 132 countries and provinces reported the implementation of their national statistical plans, of which the plans were fully funded in 84 countries. At the same time, national statistical plans were fully funded in only 4 of the 46 least developed countries.

12. The Russian – Ukrainian war caused a worldwide crisis in terms of energy supply, food security and the partial or total abandonment of climate change actions. As a result of the Russian-Ukrainian war, energy prices have risen across the continent. The European Union is seeking to radically reduce its dependence on Russian coal, oil and natural gas. Obviously, sanctions against Russia have already led to energy shortages. The Union is now looking for new sources of liquefied natural gas, so-called LNG, which means that European countries will have to build new LNG import terminals. Meanwhile, some countries plan to maintain coal import levels in order to operate their coal-fired power plants at full capacity.

The population in Hungary and Poland is quite well aware of these problems as far as their everyday life and security are concerned. However, there are serious gaps in knowledge on the system level in terms of deeper understanding of the meaning of ecological consequences and priorities regarding the use of natural resources and the relevance between the ecological footprint and their daily needs.

European Green Deal

On December 11, 2019, the European Commission published its communication on the European Green Deal a roadmap aimed at resetting the Commission’s commitment to tackling climate and environmental-related challenges. The communication was presented as the EU's new growth strategy, which aims to make the union climate-neutral, fair, and prosperous, and economically modern, resource-efficient, and competitive. It highlights the need for a comprehensive and sector-wide strategy where all relevant policy areas contribute to the final climate goal. The package consists of closely related initiatives in the areas of climate, environment, energy, transport, industry, agriculture, and sustainable finance. One of the key

components of the European Green Deal is ensuring a just transition for all, with actions in this area promoting the importance of environmental sustainability for people and the economy. The European Green Deal will operate through a regulatory and legislative framework that sets clear targets aiming to reach a 50% - 55% cut in emissions by 2030 (in compared to 1990 levels) alongside incentives to encourage private sector investment, with action plans for key sectors and goals such as stopping species loss, reducing waste, and making better use of natural resources. The entire EU budget will be subject to checks to ensure that it is spent in a way that benefits the environment, with a detailed roadmap of "50 actions for 2050" for other sectors. To achieve the ambition established by the European Green Deal, there are significant investment needs. Achieving the current 2030 climate and energy targets will require 260 billion euros of additional annual investment 27, about 1.5% of GDP 28 in 2018. This flow of investments will need to be sustained over time (Sustainable Business, 2021). The magnitude of the investment challenge requires the mobilization of both the public and private sectors.

However, the European Green Deal programme has a much wider range of action by supporting ASEAN and its Member States in their adaptability and resilience to the impacts of climate change, protect its rich biodiversity and strengthen its disaster preparedness and response. The project has been backed by an initial €30 million grant from the EU budget and will be implemented in synergy with the European Green Deal and the ASEAN Community Vision 2025.

Figure 16 The European Green Deal

Within the so called 55% package the EU's main areas of action are collected to reduce greenhouse gas emissions and the decision-making process for turning the proposals into EU legislation. The purpose of the 55% package is to translate the ambitions of the Green Deal into legislation. The package is a set of proposals for the review of climate, energy and transport-related legislation and for new legislative initiatives to adapt Union law to the EU's climate goals. The package contains the following elements:

1. a review of the EU emissions trading system, including the extension to shipping, and a review of the rules on aviation emissions and the establishment of a separate emissions trading system for road transport and buildings
2. a review of the regulation on the allocation of responsibilities regarding member states' reduction targets in sectors outside the EU emissions trading system
3. a review of the regulation on the inclusion of emissions and removals of greenhouse gases from land use, land use change and forestry (LULUCF)
4. an amendment to the Regulation on setting standards for carbon dioxide emissions for passenger cars and light trucks
5. a review of the Renewable Energy Directive
6. a recast of the Energy Efficiency Directive
7. a revision of the energy tax directive
8. a limit adjustment mechanism for carbon dioxide
9. a revision of the Alternative Fuels Infrastructure Deployment Directive
10. the Re Fuel EU initiative, aviation, for sustainable aviation fuel
11. Fuel EU, shipping, for a green European shipping area
12. a social climate fund
13. a review of the directive on the energy performance of buildings
14. a reduction in methane emissions in the energy sector
15. a review of the third energy package for gas

Methods

The core of the research project was to collect information from Hungarian and Polish respondents from all age groups and a wide social background concerning the most important issues of sustainable development to assess their general knowledge, perceptions, concerns, and priorities regarding the global problems of sustainability. This information can help in developing education programmes for the general public for improving their knowledge and raising their awareness in this area. The method used was 1000 online questionnaires, with fairly easy answers to complicated questions. The main assumption was that people have a general understanding of sustainability problems, but this can be attributed mostly to information through mass media and social media, which is not always sufficient and often politically biased. Although the survey had a fairly large target group, the fact, that the online method was applied excluded those who do not use computers or are at a very low level of literacy and IT skills. Furthermore, the main part of the Hungarian respondents are above secondary school level, many of them students, technicians, teachers or officials in local governments, social workers and qualified farmers – those, who could use Internet resources with confidence. Their age groups – taking into account the organisations and their target groups where the survey took place – varied between 20 and 45 years. The Polish respondents might have been chosen more randomly.

Results of the survey

The present sustainability survey of 1000 respondents from Poland and Hungary shows that a large majority of people say that protecting the environment is important to them personally, with over 75% rating it as very important. The target group in this case included from medium (even professional craftsmen and traders) to highly qualified people, taking into consideration the fairly advanced level of questions and the limitations of the online survey. Over three-quarters agree that environmental issues have a direct effect on their daily life and health, and more than eight in ten are worried about the impact of chemicals in everyday products. The most effective ways of tackling environmental problems are to 'change the way we consume' and 'change the way we produce and trade', according to the survey. The findings also indicate that Hungarians want more done to protect the environment – with responsibility to be shared by small, medium, and big business, government organisations and the EU, as well as citizens themselves. It is important to emphasize, that the energy and overall economic crisis caused by the war between Russia and Ukraine has enormously raised the environmental and political awareness of the general public probably even more, than the pandemic. Not surprisingly, energy and food safety issues are among the most important areas of public interest today. Although a part of the questions appeared to be self-explanatory, the respondents had to think about the level of key variables and the degree of importance. From the answers it is obvious, that almost all problems were considered as very important. It is also typical, that the majority of respondents chose the next highest level of importance avoiding herewith an answer, which would indicate an attitude that changes must be made "at any price"…

Key issues of sustainability in terms of environmental protection – ecosystem conservation

Question: Please rate it on a scale of 1 to 5, where 1 is unimportant and 5 is a key issue - do you fully agree with how relevant the following topics are to you as a European citizen?

1. climate change
2. air pollution
3. noise
4. light pollution
5. overuse of natural resources

6. uncontrolled deforestation
7. too fast increase of human population
8. urbanisation
9. water pollution
10. plastic litter in the environment
11. illegal ‘wild’ garbage dumps / landfills
12. heavy dependence on fossil fuels
13. insufficient development of renewable energy sources
14. extinction of species (reducing biodiversity)

Generally, in the Hungarian survey over 90% of all respondents rated all areas at 4 while the answers of the Polish respondents varied much more: at least 60% of respondents rated all areas at 4 and 5, while less than 40% gave lower scores. Among the Polish respondents, air pollution, waste management problems, overuse of natural resources, slow development of renewable energy systems were defined as the most crucial issues of sustainability. Interesting, that climate change was not rated as highly as it could have been expected, but even here more than 30% gave a score of 4 and 32% rated the issue at 5. In this subject area, the same question was asked concerning the relevance of these key environmental issues on the personal life of the respondents:

Question: Please rate it on a scale of 1 to 5, where 1 means no effect and 5 means a very strong effect - so how do the following issues affect you?

Here the answers shoved a slight difference compared to the attitudes concerning the global problems, which is understandable taking into consideration the personal circumstances of the respondents.

Over 90% of the Hungarian respondents gave a score of 4 to all points, while this value for the Polish group varied much more: about 30% gave a score of 4 and 5, over 20% scored all questions around 15 – 25%.

Thus, even in the Polish group the majority of the respondents found the sustainability issues very important or extremely important in general terms, while concerning their personal lives a higher percent gave a medium score of 3.

Analysing the answers to single questions more in detail, the following results were obtained.

Climate change

According to earlier research, education and social status greatly influence climate awareness, this topic is of most interest to educated young people. Since in the Hungarian group the percentage of the more educated young generation was probably higher than in the Polish group, very few choose grade 1 or 2, only 3% choose grade 3 while the main part (91%) of them choose grade 4 for climate change issues – only a few (6%) took the highest level, grade 5 – probably a more critical approach regarding a probable investment and output ratio (Fig. 16).

The Polish public gave a more detailed and more divided opinion concerning climate change as the main global problem of our age: 2.9% choose grade 1, 9.7% choose grade 2, the medium grade 3 was chosen by 24.8%, grade 4 – important – was selected by 30.5% while the very important grade 5 was chosen by 32.2% of the respondents. The majority of the Hungarian and the Polish respondents classified climate change as important or very important (Fig. 17).

It is interesting, that people gave slightly different answers concerning the relevance of the climate change regarding their personal circumstances. In Hungary a recent study revealed (Medgyesi and Schneider, 2020) that the legal status of the settlement, as well as the climate attitudes and perceptions examined according to the counties showed significant regional differences, especially along the demographic variables. These arose from different perspectives, lifestyles, talents, experiences and problems. People living in the eastern part of the country and in lowland areas tend to feel changes in the weather, and extreme weather - according to their own admission - affects them to a greater extent. Based on the legal status of settlement, the same characterizes people living in villages and large towns. In particular, those living in the north-eastern part of the country, in villages and large towns, are those who think more environmentally. People living in cities with more than 100,000 inhabitants and in Budapest have a more permissive attitude, and the effects of climate change affect them less than the residents of villages and large towns. It can be concluded that financial situation and education (which is usually higher in big cities) are an advantage in adaptation. In Hungary, the opinion of the respondents did not differ markedly from the global relevance of climate change or the impact of climate change on their personal lives (Fig. 18).

In Poland, a study was conducted in November 2020 for the Ministry of Climate and Environment. In the opinion of over ¾ of the respondents, the current climate changes bring mostly negative effects, only 6% believe that these are positive. 67% of respondents believe

that climate change will harm them moderately or more. The recent survey mirrors in in quite good agreement with this earlier research, particularly in case of climate change impact on the closer, private life conditions of the respondents (Fig. 19). It seems to be obvious, that people in Poland are more dependent on fossil energy, predominantly coal, even if great efforts are being made to reduce the CO_2 emissions by increasing the share of renewable energy sources in their energy mix, predominantly solar energy and in some places wind. Concerning the average population, this knowledge is not so widespread or the opinions are strongly divided due to fears of unemployment and energy shortage if coal mines are closed.

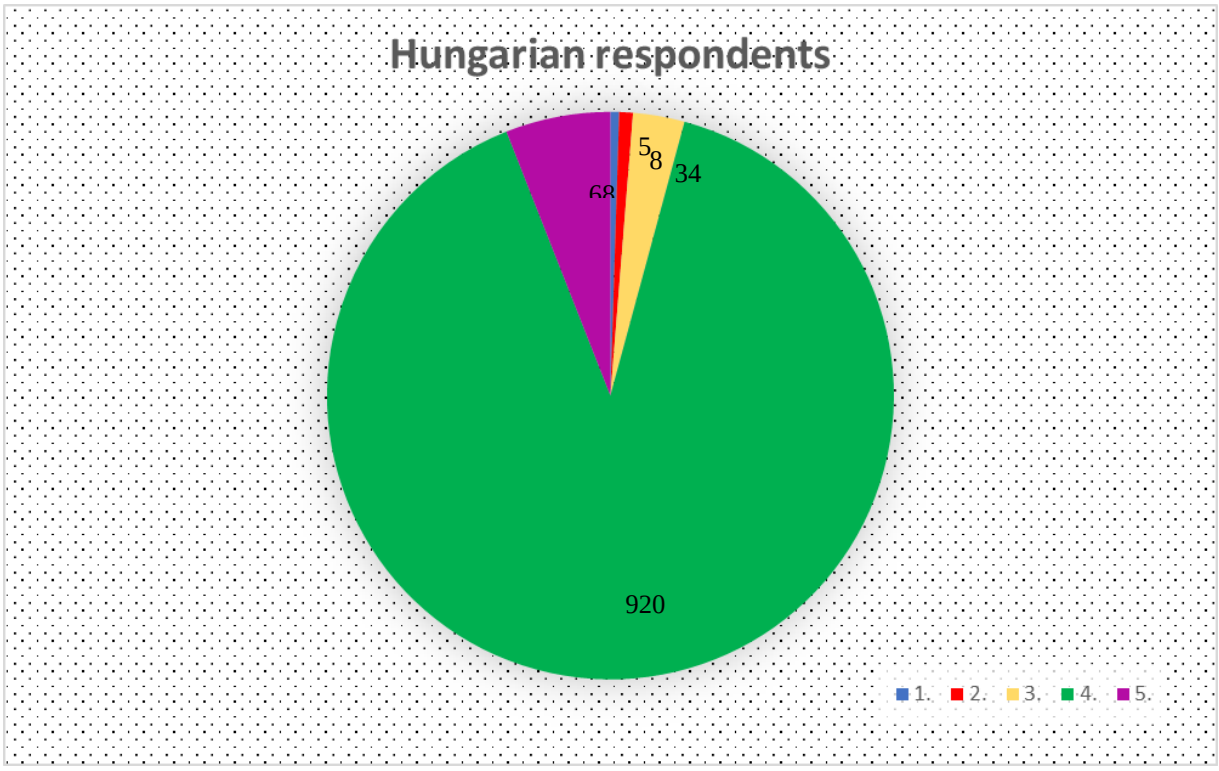


Figure 16 Answers of Hungarian respondents on the importance of climate change on a scale of 1 – 5. The number of respondents 1020.

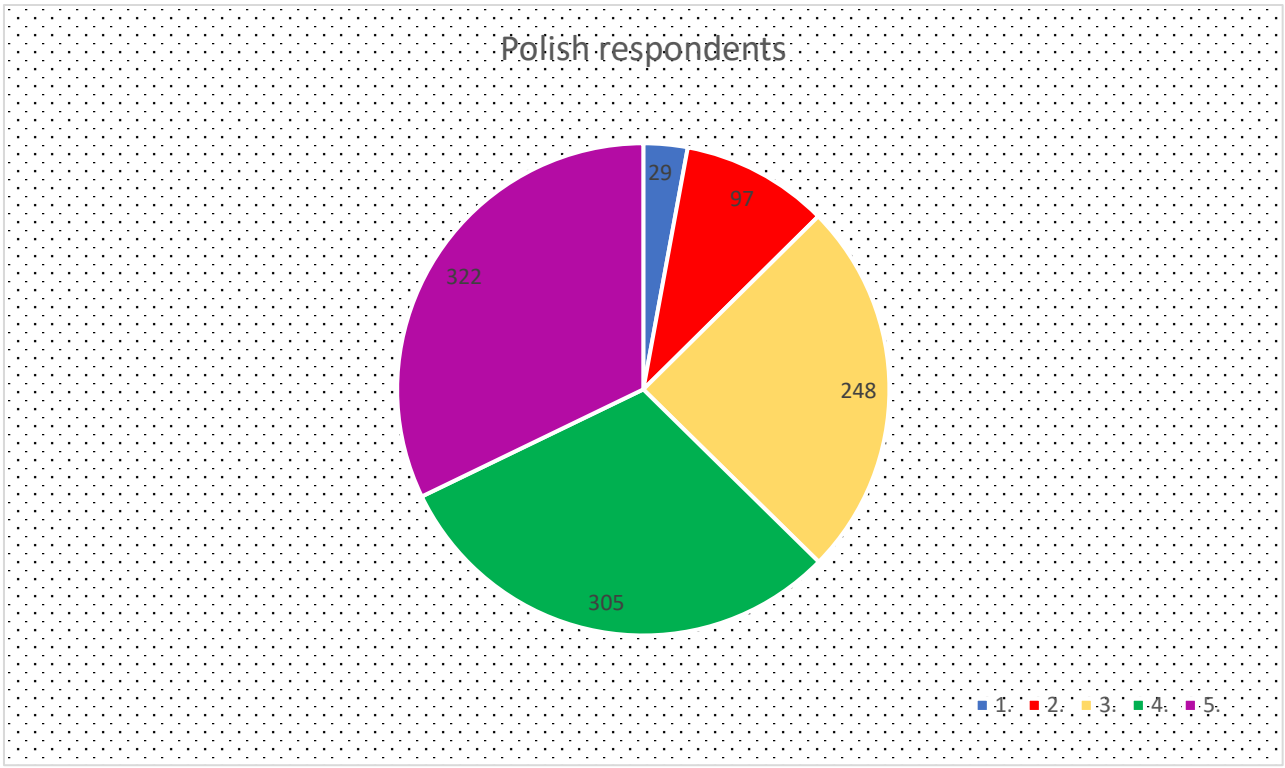


Figure 17 Answers of Polish respondents on the importance of climate change on a scale of 1 – 5. The number of respondents 1001.

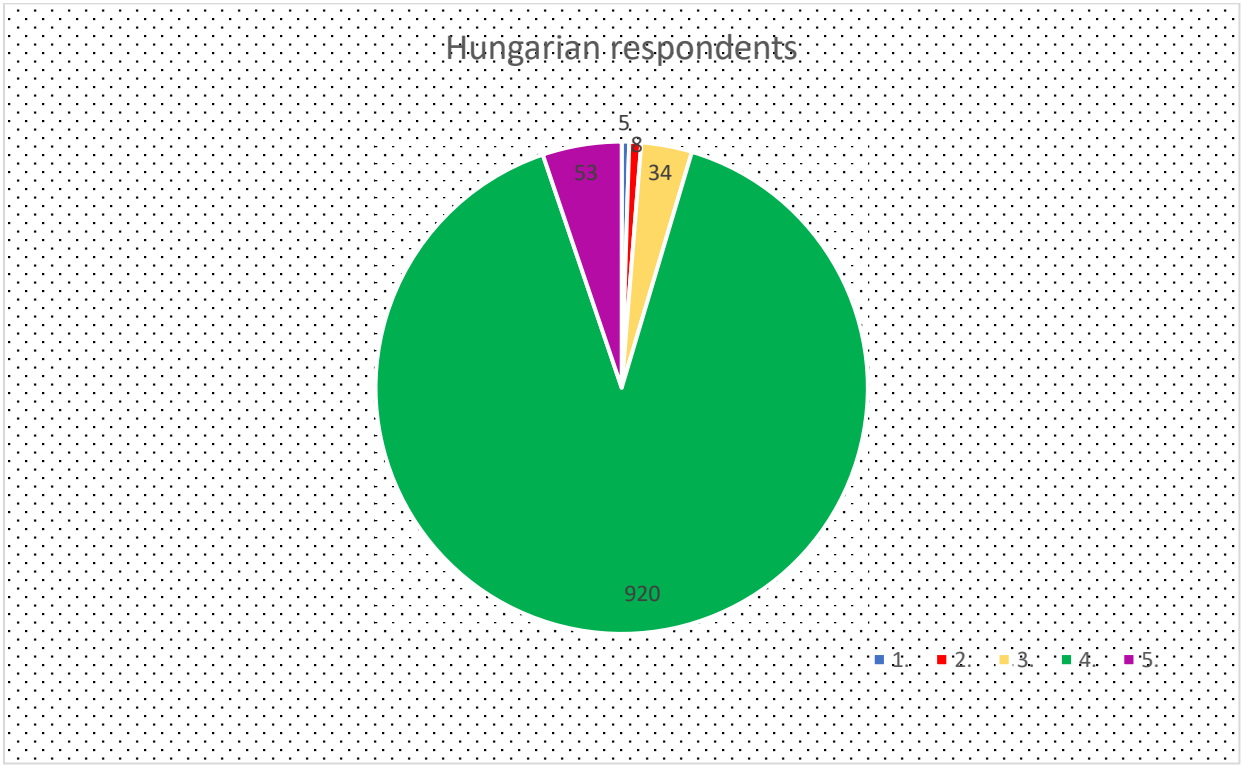


Figure 18 Answers of Hungarian respondents on the importance of climate change on a scale of 1 – 5 concerning their personal circumstances. The number of respondents 1020.

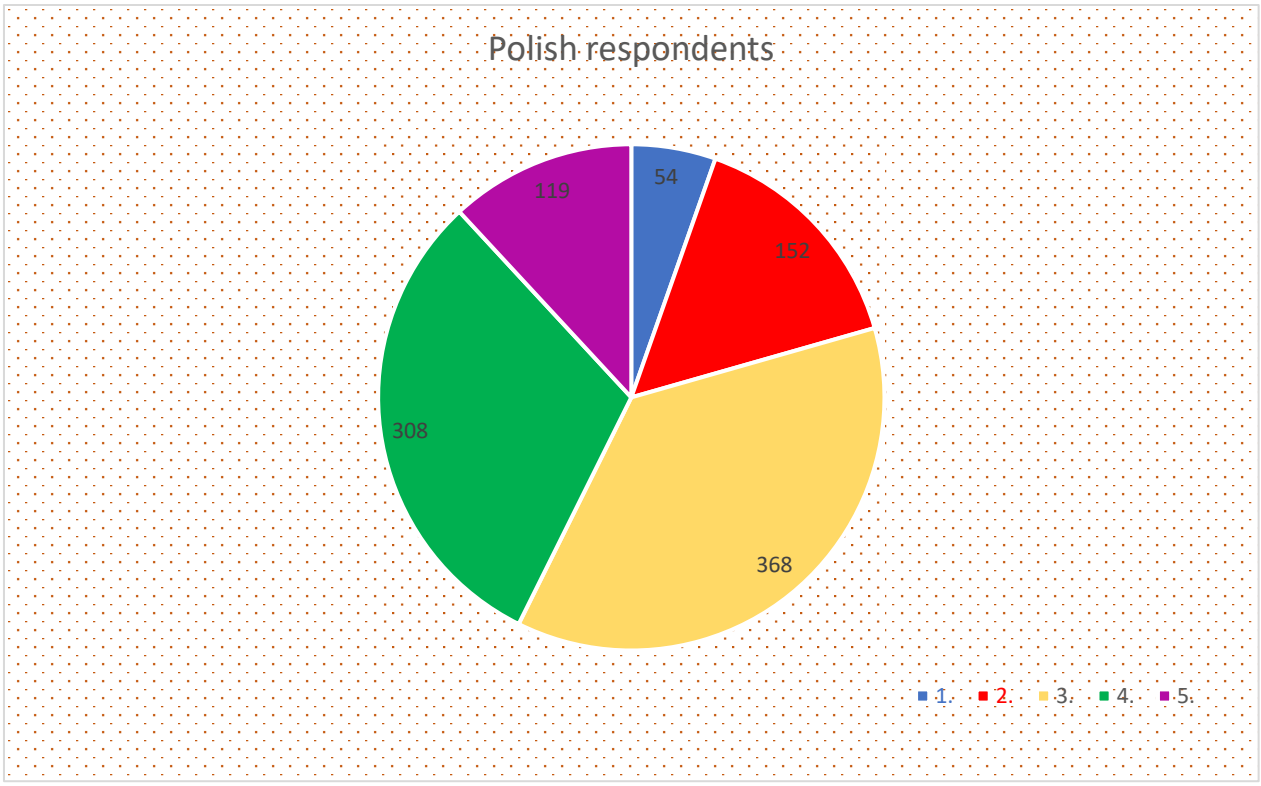


Figure 19 Answers of Polish respondents on the importance of climate change on a scale of 1 – 5 concerning their personal circumstances The number of respondents 1001.

Air pollution

The answers to this question mirror the awareness of both the Hungarian and the Polish respondents. The nature of air pollution is such that the operation of the person or equipment causing the pollution does not appear to be immediately harmful, or it appears to be temporarily bearable for financial reasons. For example, the majority of vehicles currently in operation run on fossil fuel, and the incentive to use electric or hydrogen fuel with a tax on fuel or a discounted transport pass has not proven to be effective enough so far. Replacing the engine of fossil-fuelled vehicles seems to be a favourable and less costly procedure, as is the case with buses in Sweden or Germany, a method, which is being more and more accepted even in Poland and Hungary. However, regarding the heating options, solid fuel heating is the most problematic, as partly the combustion equipment and partly the design of the apartment also contribute to the degree of heating. This is a major problem both in Poland and Hungary, where the traditional fossil fuel (coal and firewood) heating is still dominant. Under energy-poor conditions, social housing renovation would be necessary, this would significantly reduce the performance requirement itself, and on the other hand, the amount of social support expected in the future. After the renovation of the building, the required (already smaller) heating power demand can be precisely determined. In the field of heating equipment, a change of attitude and supporting

tenders are also necessary, because it would be an exaggeration to call a small iron stove a designable heating equipment for a permanent apartment. But the efficiency of even a small iron stove could be improved, e. g. with a heat drum or other filters, which should also be presented in the commercial circulation. In Poland, auto-fed solid firing is being promoted, which has significantly better emission data.

It would be necessary to rethink district heating, which was originally invented to utilize the unnecessary, waste condensation heat of thermal power plants. However, due to the rapid increase in today's needs, gas-fired boilers have also been installed, which work with a worse efficiency than if local gas boiler home heating had been implemented. The efficiency of the large boilers kept in operation to cover the demand for hot water in the summer is also extremely low, so in some places they switched to making hot water with solar collectors. At the same time, it seems that renewable energy (waste heat or e. g. geothermal energy) should also be included in district heating.

The answers of the Hungarian and Polish respondents were overwhelming regarding the relevance of air pollution. The majority (90%) of the Hungarians scored 4, only 7% choose mark 5 while 3% selected grade 3 for the relevance of air pollution.

The picture at the Polish group was much more coloured, but here 1.5% thought that air pollution was not a relevant issue, 6.0% gave a score of 2, 18.4% selected grade 3, while 41% choose grade 4 and 33% choose grade 5. It is obvious, that air pollution affects many people, town dwellers are particularly exposed while the people of the countryside are less affected. Smog is a typical phenomenon on larger cities. Although a lot of efforts is being made to reduce air pollution, most of the air pollution across Poland is the result of the country’s dependence on coal to power its homes and economy. The country’s coal industry remains an important part of the local economy. Poland is the second largest coal-mining country in Europe, after Germany.

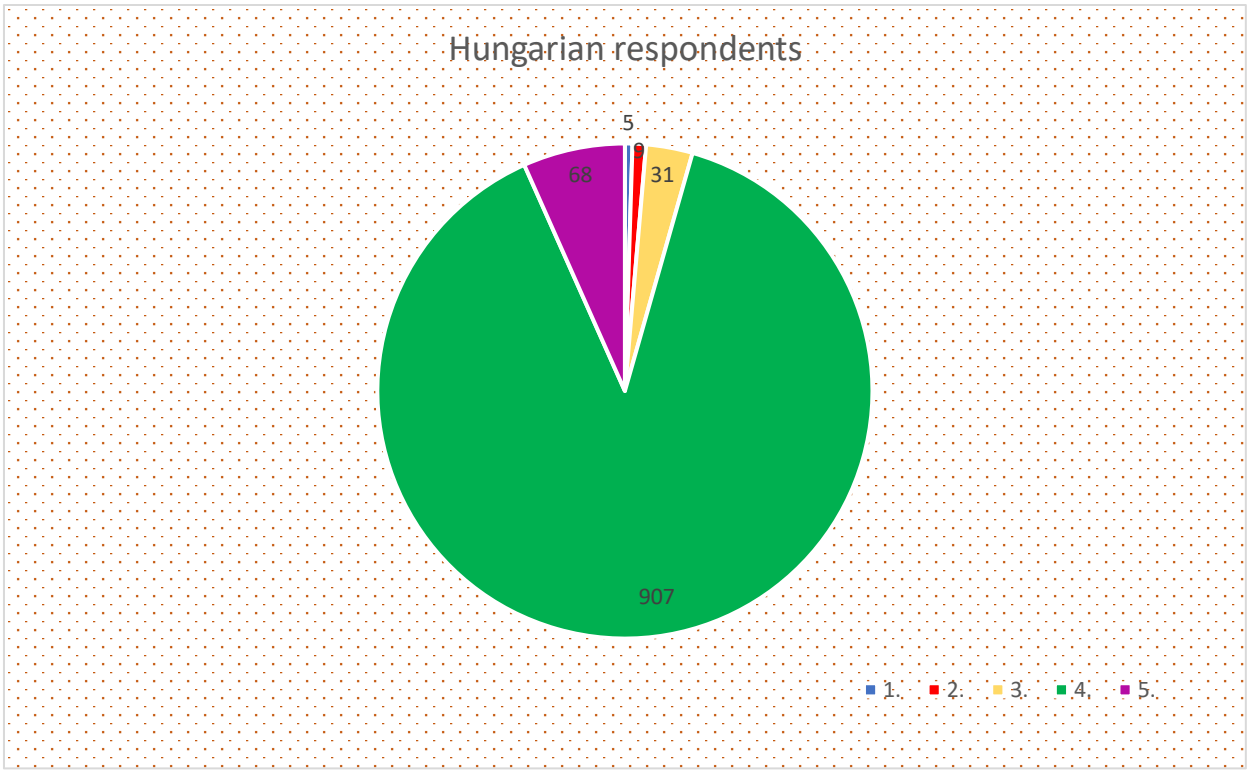


Figure 20 Answers of Hungarian respondents on the importance of air pollution on a scale of 1 – 5 generally concerning Europe. The number of respondents 1020.

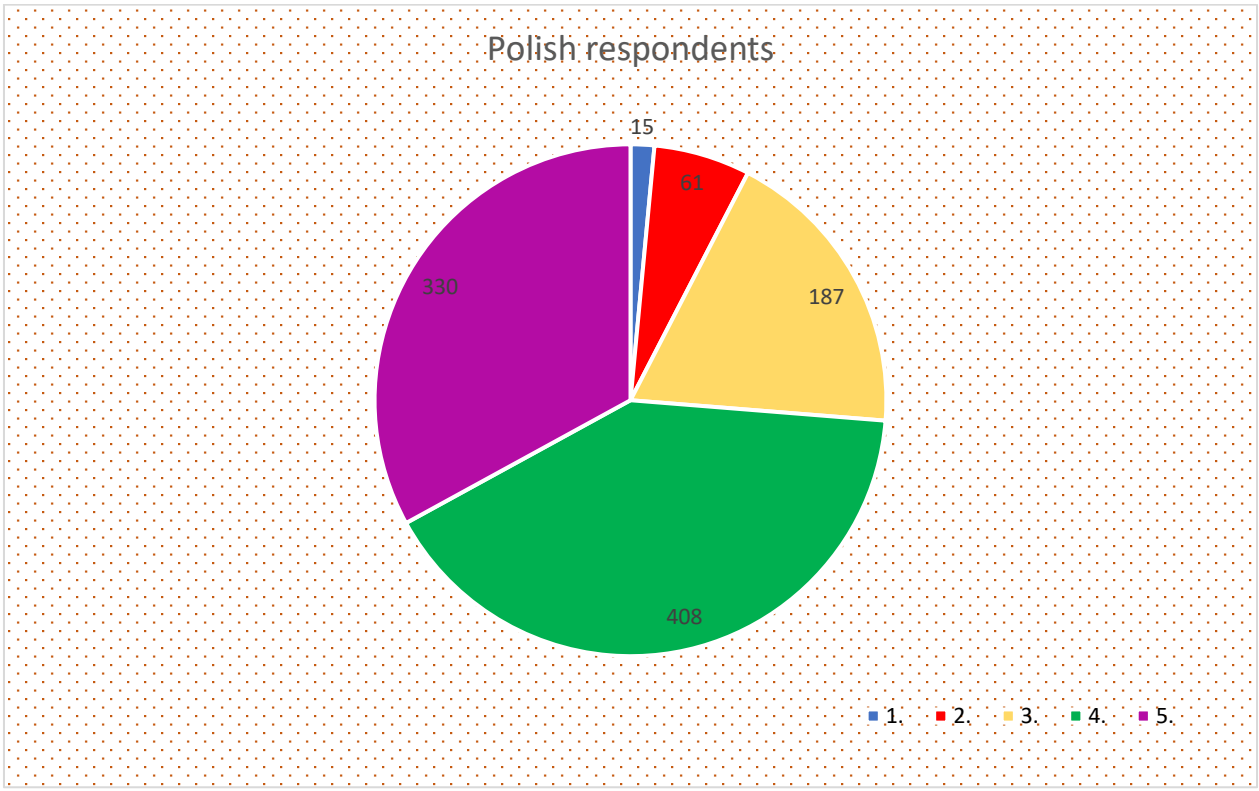


Figure 21 Answers of Polish respondents on the importance of air pollution on a scale of 1 – 5 generally concerning Europe. The number of respondents 1001.

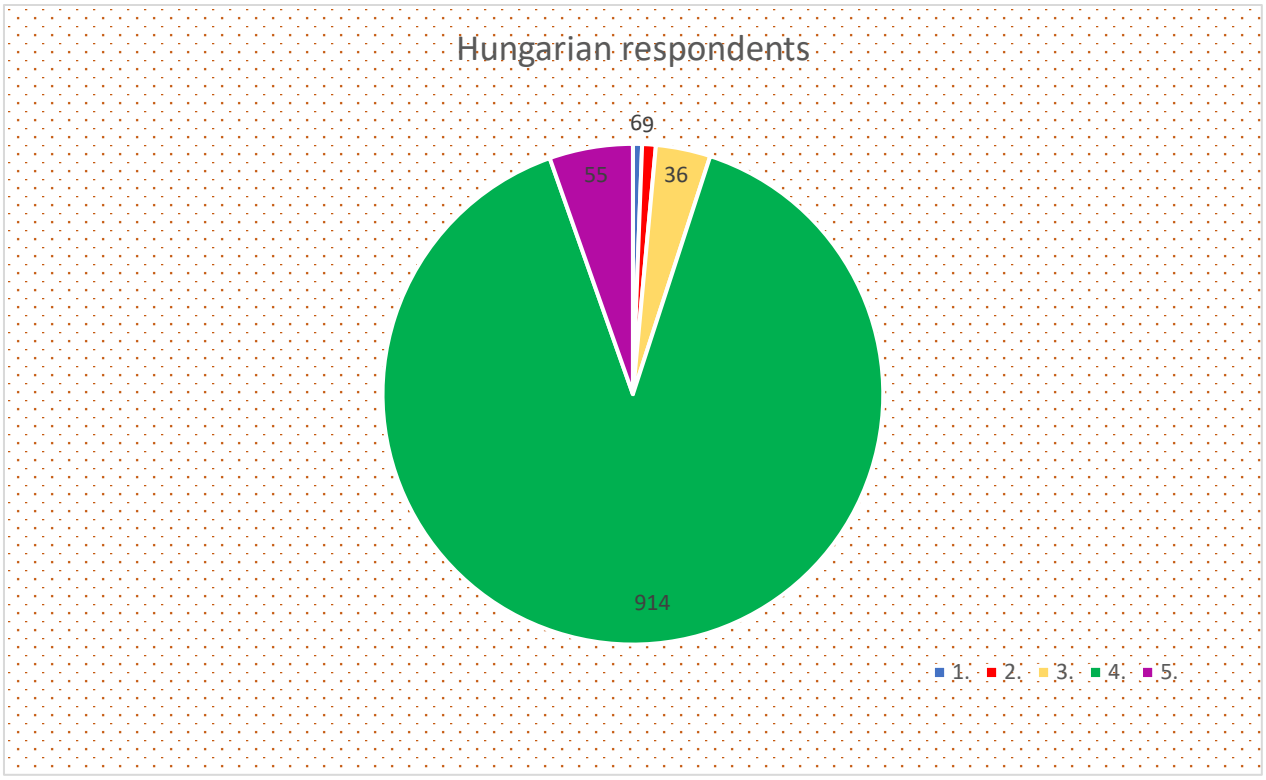


Figure 22 Answers of Hungarian respondents on the importance of air pollution on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1020.

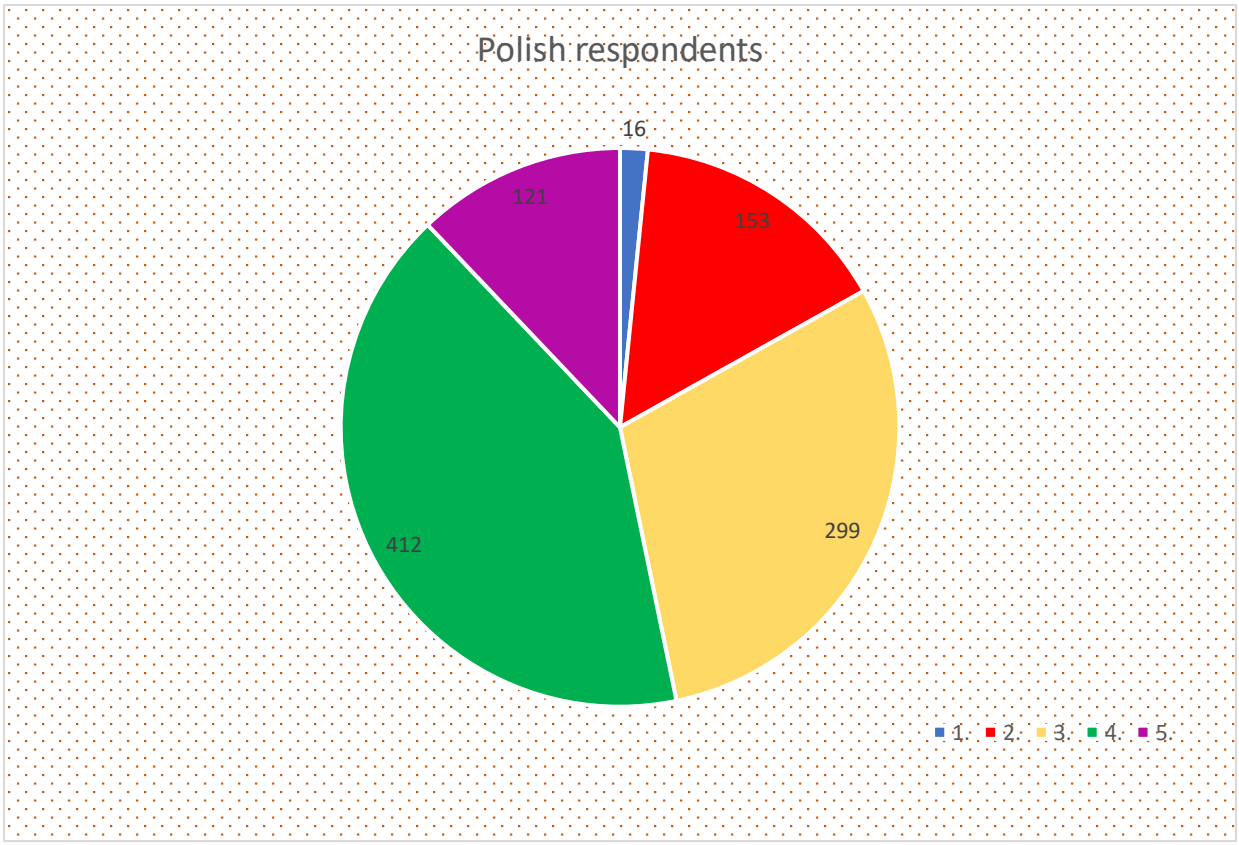


Figure 23 Answers of Polish respondents on the importance of air pollution on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1001.

The situation is slightly better in Hungary, but air pollution and smog affect larger cities there similarly. Anyway, in both countries air pollution is considered as a major environmental problem both globally and locally, even if the answers might be slightly biased due to the fact that the use of renewable energy sources is still not sufficient.

Since there is an obvious connection between air pollution and climate change, more than 90% of the Hungarian respondents scored 4 out of five for the relevance of air pollution (Fig. 20; including smog, which is typical in larger cities) while the Polish group was more divided, probably due to the fact that there might have been a larger percentage of countryside residents (Fig. 21).

Regarding the answers of the Hungarian respondents when the impact of air pollution on their personal life was concerned, there were no significant differences between the global aspects and their personal considerations (Fig. 22). As previously mentioned, the main part of the Hungarian respondents are living in medium to large towns, and probably more than 50% are inhabitants of Budapest (although this is only estimation based on the organisations and individuals where the questionnaires we sent).

The Polish group showed a larger difference between the general, European relations and their personal circumstances. Here 1.6% of the respondents scored 1, surprisingly many, 15% choose grade 2, 29.9% selected grade 3 and the majority, 41.2% choose 4 while 12.1% voted for grade 5 (Fig 23).

Noise

Noise pollution is very widespread, but mostly affects the population of the towns, people living close to large highways, industrial areas or airports. The noise level is usually defined by characterizing the volume and time course of the noises coming from the environment, from which the noise level measured in decibels (dB) can be calculated. In the noise measuring equipment, a microphone first converts the sound pressure of the incoming noise into an electrical signal, and then this signal is made suitable for reading on the instrument with the help of amplifiers and filters. As a result, they get the sound pressure level-frequency relationship, from which it can be seen at which frequencies and at what intensity noise can be detected. By the way, above the noise limit of 65 dB, we are already talking about noise pollution. Unfortunately, noise pollution is getting bigger and bigger, and more and more diseases are developing due to the harmful effects of noise. Noise has a harmful effect on the hearing organ, temporarily causing tinnitus, and in case of a long-term value above 85 dB, it

can cause permanent hearing damage. As a psychological effect, sleep disturbance can occur even with relatively low noise, higher intensity levels can lead to increased reaction time and irritability. Noise primarily makes concentration and problem-solving thinking difficult, and constant noise exposure can lead to fatigue and performance degradation. The constant noise causes problems especially at night because it is not possible to have a restful sleep at a volume higher than 20-30 decibels.

Today, around two million people in Hungary live in noise-polluted areas. Although the use of earplugs can somewhat filter out noise at night, where the source of noise is the traffic of heavy vehicles, in addition to the sound, the level of vibration also hinders peaceful rest.

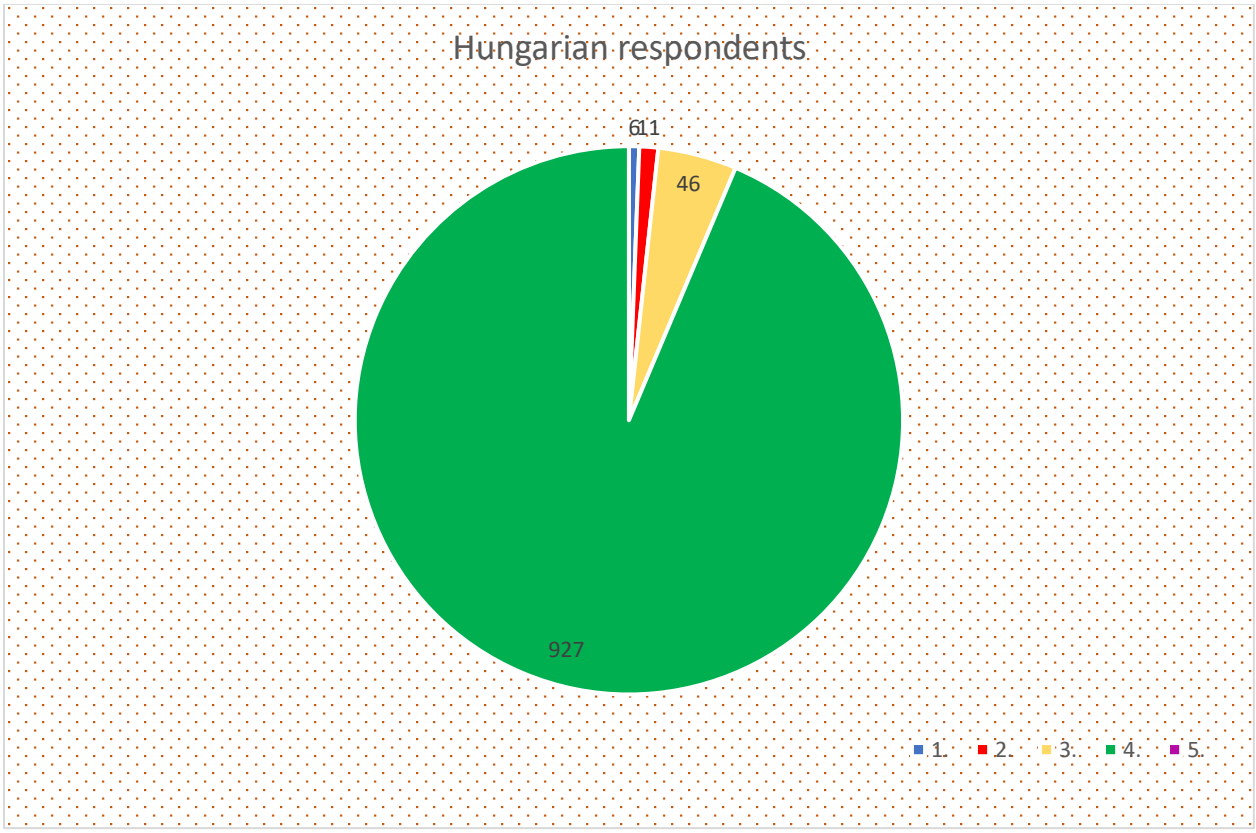


Figure 24 Answers of Hungarian respondents on the importance of noise pollution on a scale of 1 – 5 generally concerning Europe. The number of respondents 1020.

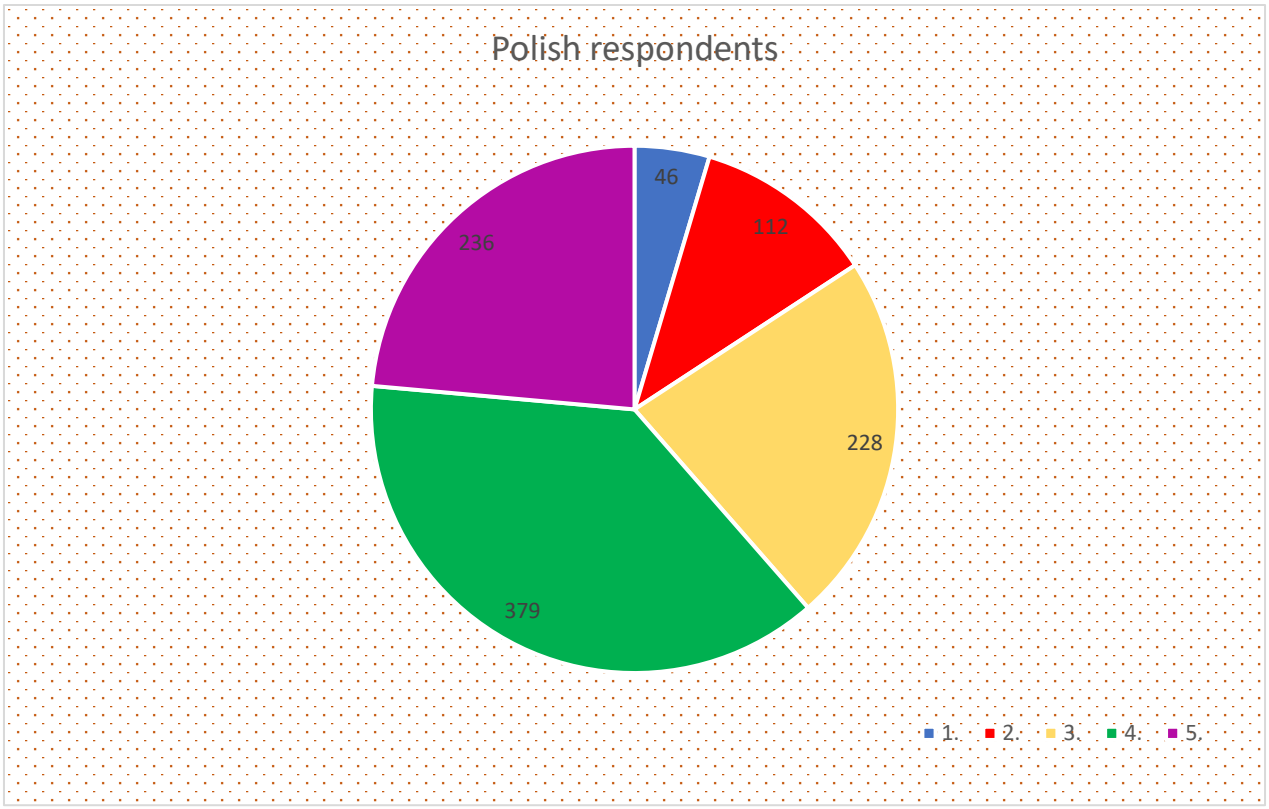


Figure 25 Answers of Polish respondents on the importance of noise pollution on a scale of 1 – 5 generally concerning Europe. The number of respondents 1001.

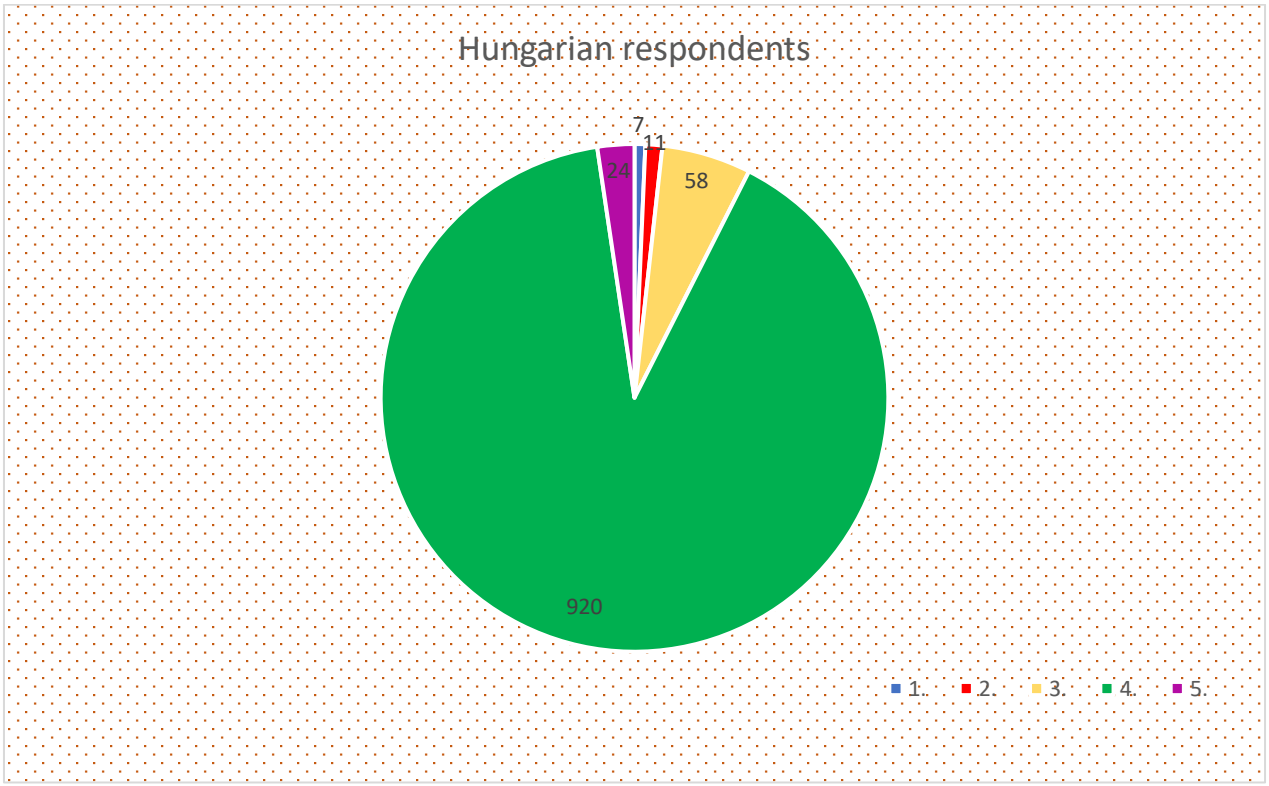


Figure 26 Answers of Hungarian respondents on the importance of noise pollution on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1020.

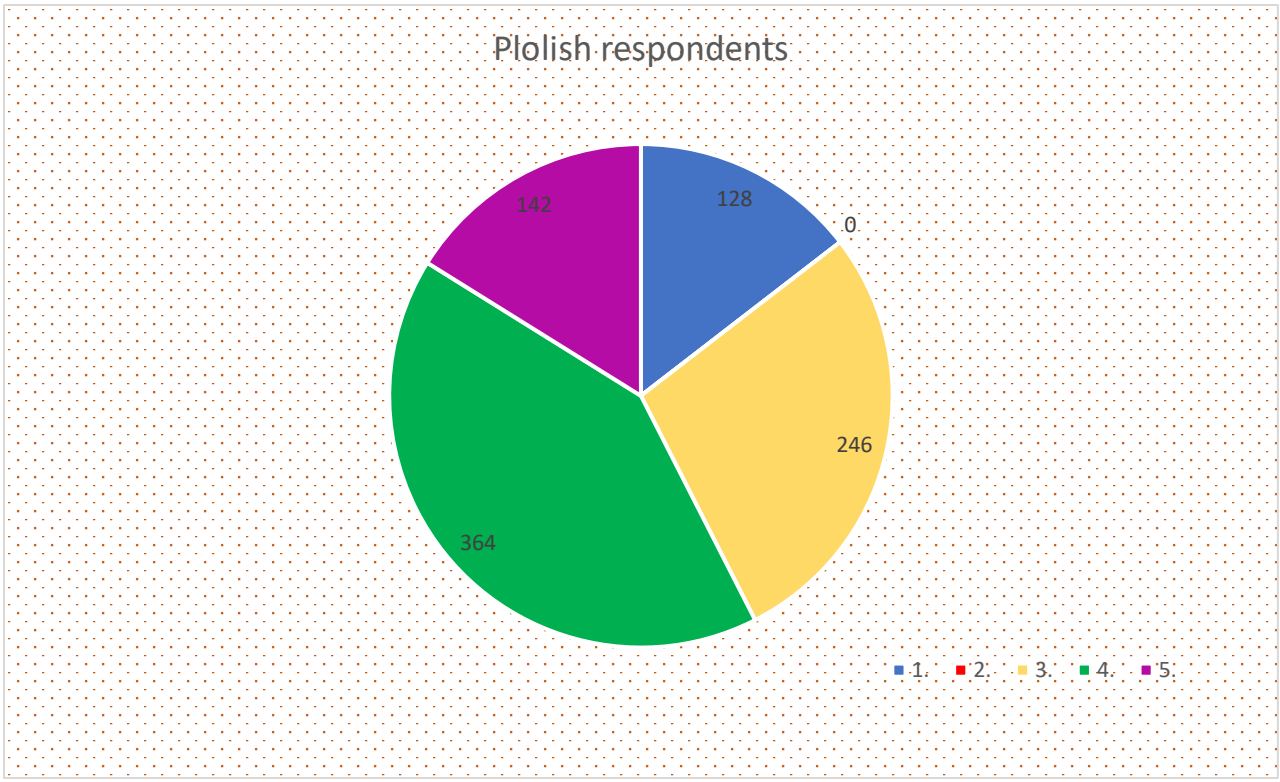


Figure 27 Answers of Polish respondents on the importance of noise pollution on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1001.

According to the limit currently considered acceptable, 55 decibels is the sound level during the day, which does not cause direct health damage.

The difference between the Hungarian and the Polish group is substantial, even if the majority from both countries consider noise pollution as a serious problem. Only 0.5 % of the Hungarian respondents choose grade 1, only few, 1% selected grade 2, similarly only 4% choose grade 4 while the overwhelming majority of 92% selected grade 4 and 3% voted for grade 5. The Polish respondents were more divided in terms of the adverse impact of noise pollution generally in Europe. Although only 5 % thought that air pollution was almost irrelevant scoring grade 1, slightly more, 10% considered air pollution as slightly relevant, 23% voted for grade 3, while 38% choose grade 4 and 24%.

Regarding the answers of Hungarian and Polish respondents concerning the adverse impact of noise pollution on their personal life compared with the answers when whole Europe was taken into consideration, there are no major differences in the Hungarian population (Fig. 26) while some differences occur among the Polish respondents (Fig. 27). In the Polish group nobody voted for grade 2 on the personal scale while in the European context 11% voted for grade 2 – “slightly important”, 23% choose grade 3 similarly to the personal level, where the value was 23%, on the European level 38% choose scored 4 while on the personal scale 36% selected this

value and grade 5 was chosen by 24% on the European level while on the personal level only 14% voted for this value.

Light pollution

Light pollution: artificial disturbing light that shines above the horizon or not exclusively on and in the direction of the surface to be illuminated, or at the wrong time, causing glare, artificial lighting of the sky or harmful physiological and environmental effects, including negative effects on wildlife. In many countries, the use of light in the evening and at night is regulated in order to reduce pollution to the environment. In Hungary, the severe light pollution has already triggered the construction of legal instruments. In addition to the protection of the environment and astronomical research, some countries have also introduced restrictions for the sake of traffic safety (scanning disco lights, advertisements placed near traffic lights, etc.). Hungarian law is based on neighbouring law rules. These rules can be found in the Civil Code. The Civil Code 5:23 am. § states: "During the use of the thing, the owner is obliged to refrain from any behaviour that would unnecessarily disturb others, especially neighbours, or endanger the exercise of their rights." Disturbance with light pollution is therefore a trespass, similarly to noise, smell, etc. for interference. For the first time in Hungary, the municipality of Dág created a regulation aimed at preventing light pollution.

In Europe, up to 66 percent of the population lives under the night sky polluted with light. In turn, in Poland 96.8 percent of the sky is polluted with light. "Only the most remote areas are not polluted, farthest away from the cities: the Carpathians and the Sudetes". Warsaw is characterized by higher light pollution than Fukuoka in Japan. Outdoor lighting in Warsaw was characterized by a higher value of light illumination and greater stimulation of photoreceptors sensitive to long and medium waves. In Poland, only the southern part of the Polish Carpathians can be considered as an area totally free of light pollution.

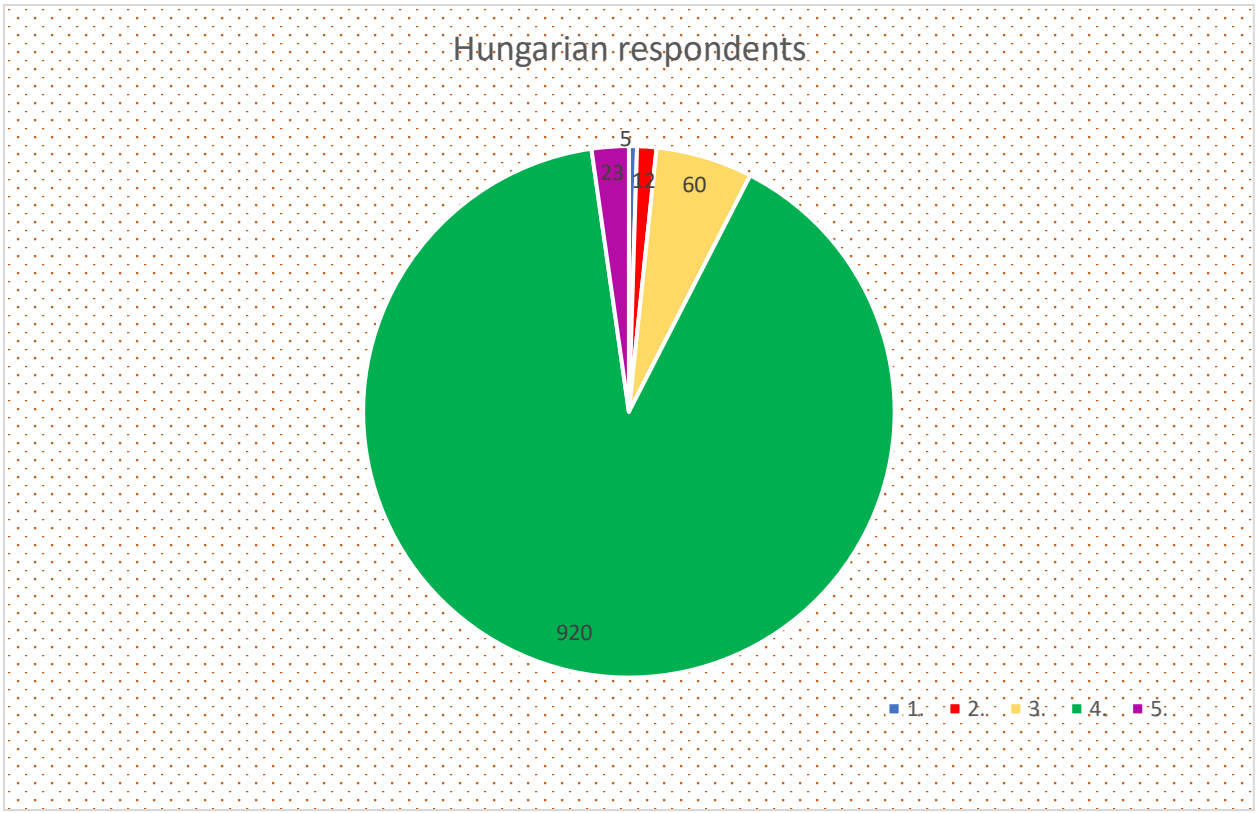


Figure 28 Answers of Hungarian respondents on the importance of light pollution on a scale of 1 – 5 generally concerning Europe. The number of respondents 1020.

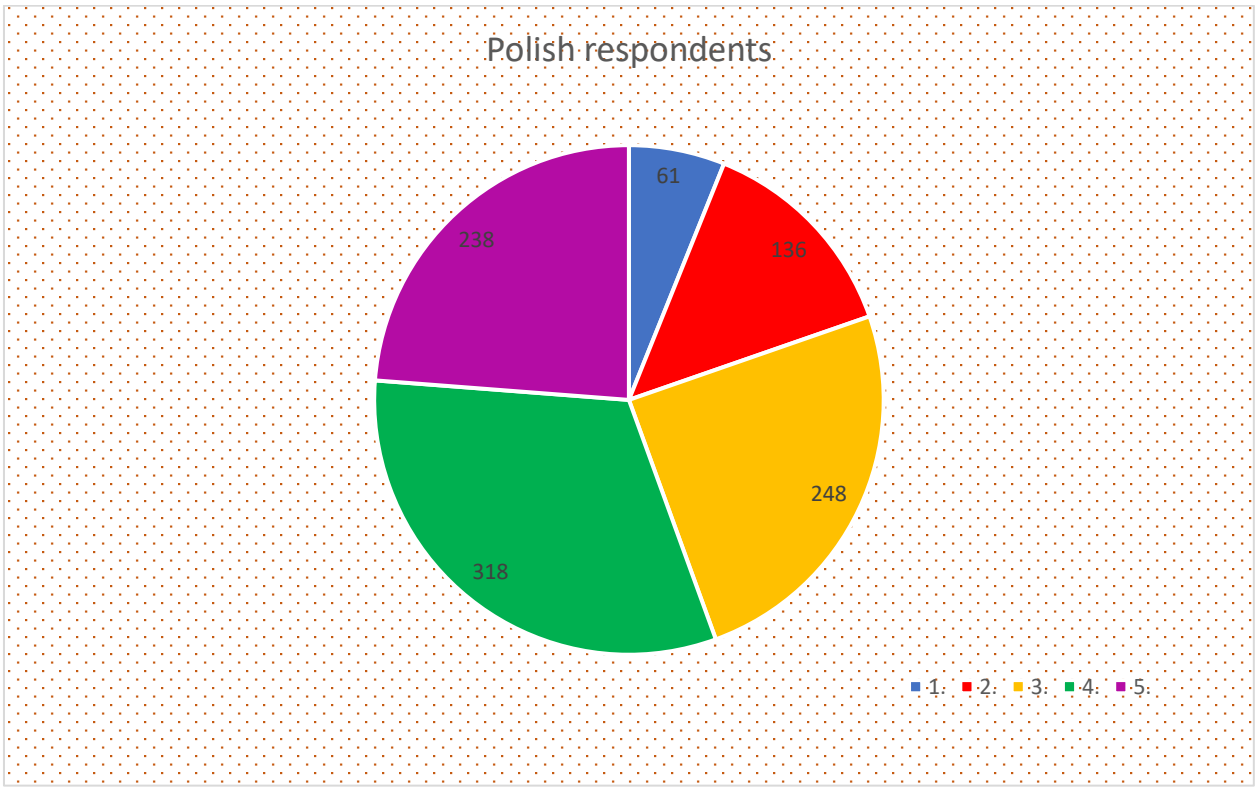


Figure 29 Answers of Polish respondents on the importance of light pollution on a scale of 1 – 5 generally concerning Europe. The number of respondents 1001.

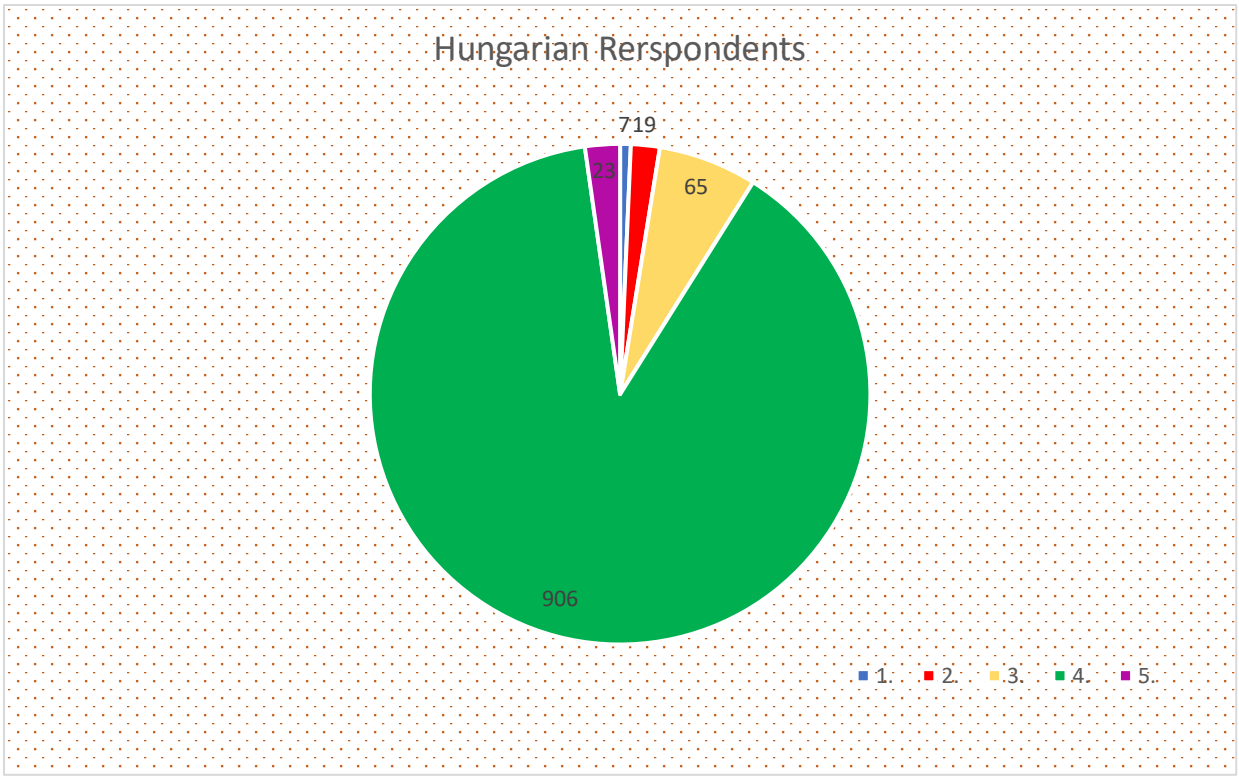


Figure 30 Answers of Hungarian respondents on the importance of light pollution on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1020.

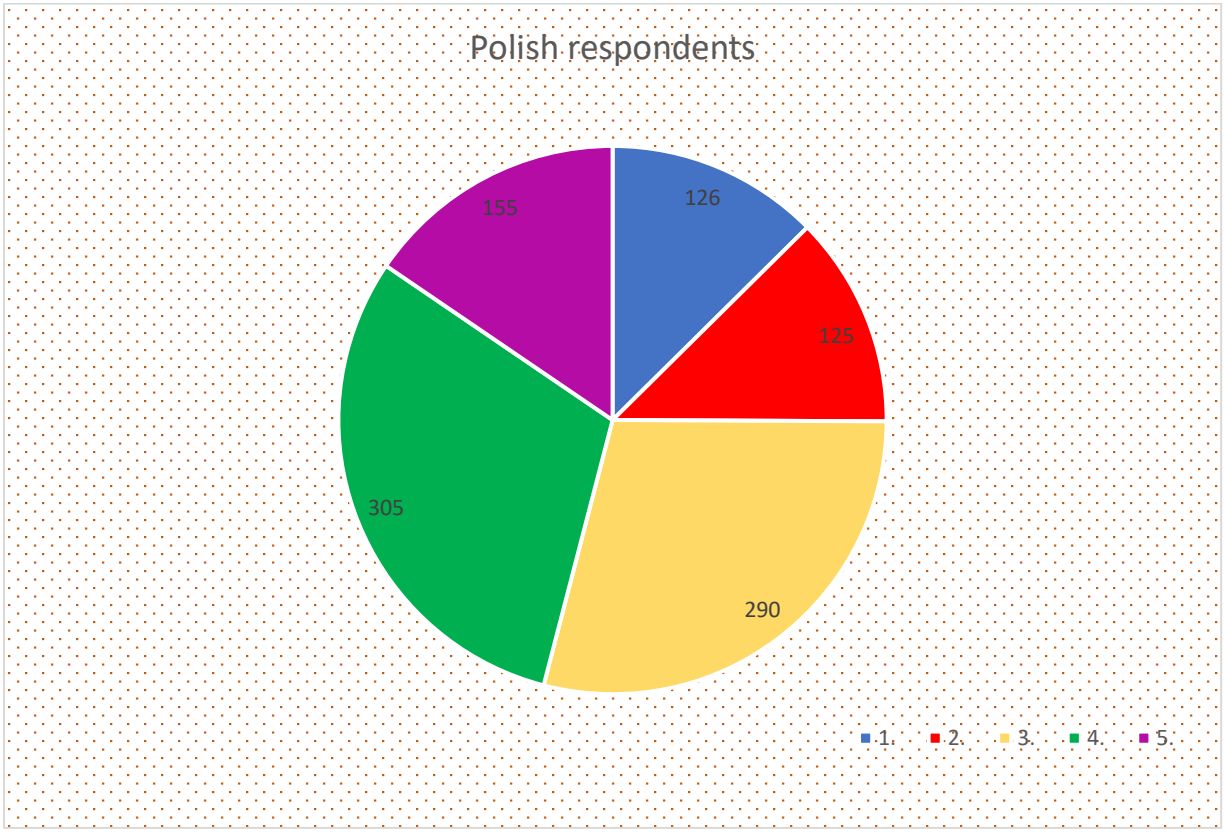


Figure 31 Answers of Polish respondents on the importance of light pollution on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1001.

The respondents of the survey appear to be quite well aware of problems caused by light pollution, taking into account the fact that the main part of them are city dwellers (particularly in Hungary) but even in Poland, there the light pollution seems to be even more pronounced.

However, the Hungarian respondents (Fig. 28) – similarly to the previous issues – scored mostly level 4 while the picture is more differentiated in the Polish group (Fig. 29). Only 0,5% of the Hungarian respondents valued the light pollution at level 1, only 1 % scored level 2, while 6 % choose level 3, and the majority, 90% voted for level 4 and 2.5% valued the adverse effects of light pollution at level 5 in the general, European context. The result of the Polish group was much more variable, although even here a large majority considered light pollution as a serious issue: only 6% scored 1 as not relevant, 13% set a value 2, while 25 % choose level 3 and 32% choose level 4 and finally 24% scored 5.

The difference between the general, European concerns and the personal level concerning light pollution is not significant in the Hungarian group (Fig. 30) while in the Polish population there are significant differences, since on the personal level twice as many people (12%) scored grade 1, less (12%) scored grade 2, little more than in the European scale, 29% selected grade 3, while 30% voted for grade 4 and 15% selected grade 5.

Although the results indicated a public concern regarding the light pollution, it is still one of the least known polluting factors, which has a major impact on our environment. The excessive presence of artificial light in the night environment affects animals and plants, influencing their growth, interactions and threating the balance of the entire ecosystem. It also prevents astronomers from observing a clear starry sky. And, of course, it represents a waste of energy.

Overuse of natural resources

In Hungary, the economic growth of the past decade is not sustainable because it destroys the quantity and quality of natural resources to a degree that far exceeds the EU average. Although Hungary has an advanced institutional system in comparison to the EU, suitable for achieving sustainable development goals, the signals and proposals of these institutions are not sufficiently used in economic and political decision-making. Regarding public awareness, this might be biased by political mind-shaping activities particularly strongly pronounced in mass media. The focus of investments is on the development of classic economic factors (assets and workforce), the often mentioned "concrete", while the development of human and social capital receives little attention and resources. Natural capital is a particular loser of trends that do not

serve the development of sustainability. Natural resources are consumed through three main channels.

1. Human activity is taking over more and more territory, so the area available for ecosystems is rapidly decreasing.
2. The material flow (e. g. through the extraction, use and treatment of raw materials and energy carriers) during which natural resources are ultimately transformed into pollution and waste.
3. Climate conditions are changing as a result of various human interventions.

Hungary's past decade was characterized by extremely poor performance in these three areas and, in comparison with the European Union, it was one of the most influential in the direction of the recovery of natural capital. Fully natural ecosystem can be found on only two percent of Hungary's territory. A narrow third is suitable for the production of certain ecosystem services (forests, tree plantations, lawns, vineyards, orchards). Two-thirds of our territories are arable and uncultivated or built-up areas, which have no or negligible contribution to ecosystem services. The public awareness of these issues should be emphasized, sine many aspects of environmental protection and sustainable development are dependent on the behaviour of the population.

In Poland the situation in many aspects is similar. Although Poland and Poles are getting closer to Europe at the level of wealth, the country has not developed rational and pro-ecological rules for using natural resources. There is no coherent raw material policy in Poland. These issues are almost absent from strategic documents, there is no single decision-maker responsible for this sector of the economy as a whole. Since Poland is extremely rich in mineral resources, it is necessary to develop a modern geological and mining code that will regulate all issues related to the exploration, exploration and exploitation of mineral deposits and the use of post-mining areas. Furthermore, other non-renewable natural resources such as soil should be taken into consideration.

Nevertheless, there is an increasing public awareness about the overuse of natural resources in Hungary and Poland, and this is mirrored in the present survey. The Hungarian respondents again produced a fairly uniform opinion, but the Polish group shows a more differentiated picture, partly due to the awareness concerning the vast natural resources of the country.

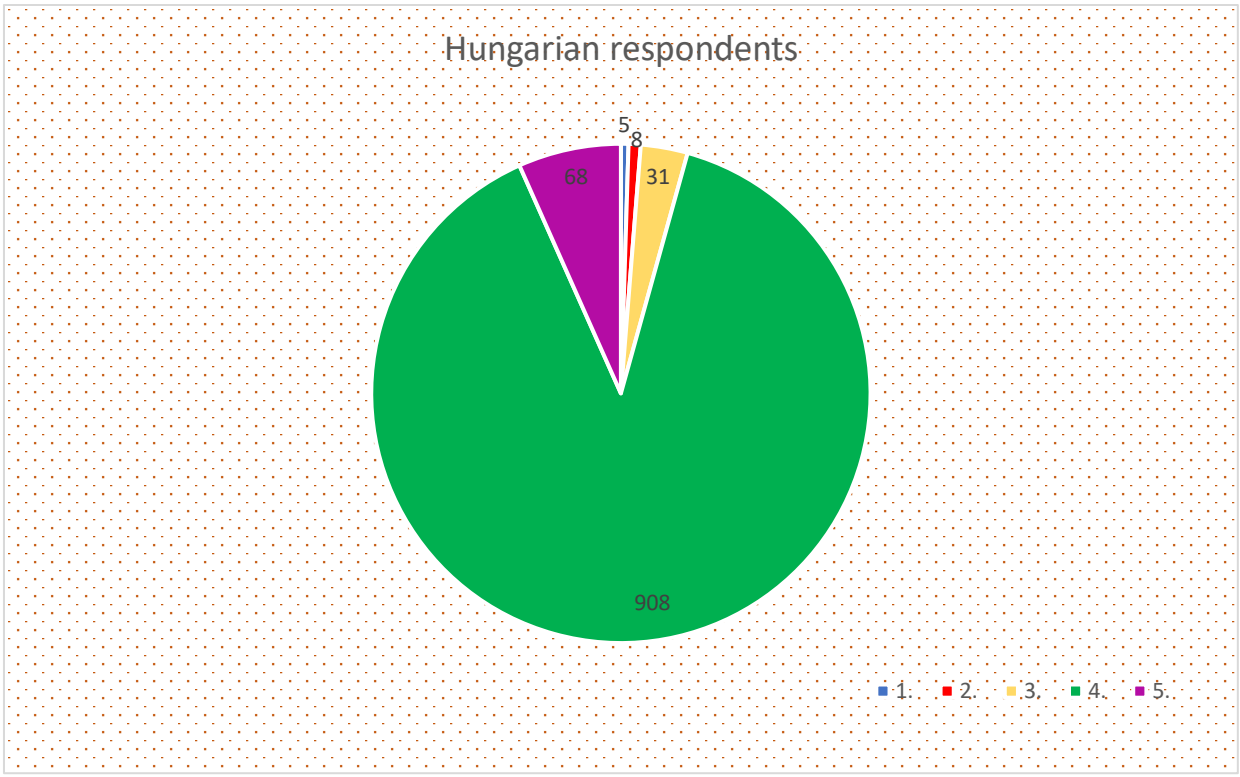


Figure 32 Answers of Hungarian respondents on the importance of overuse of natural resources on a scale of 1 – 5 generally concerning Europe. The number of respondents 1020.

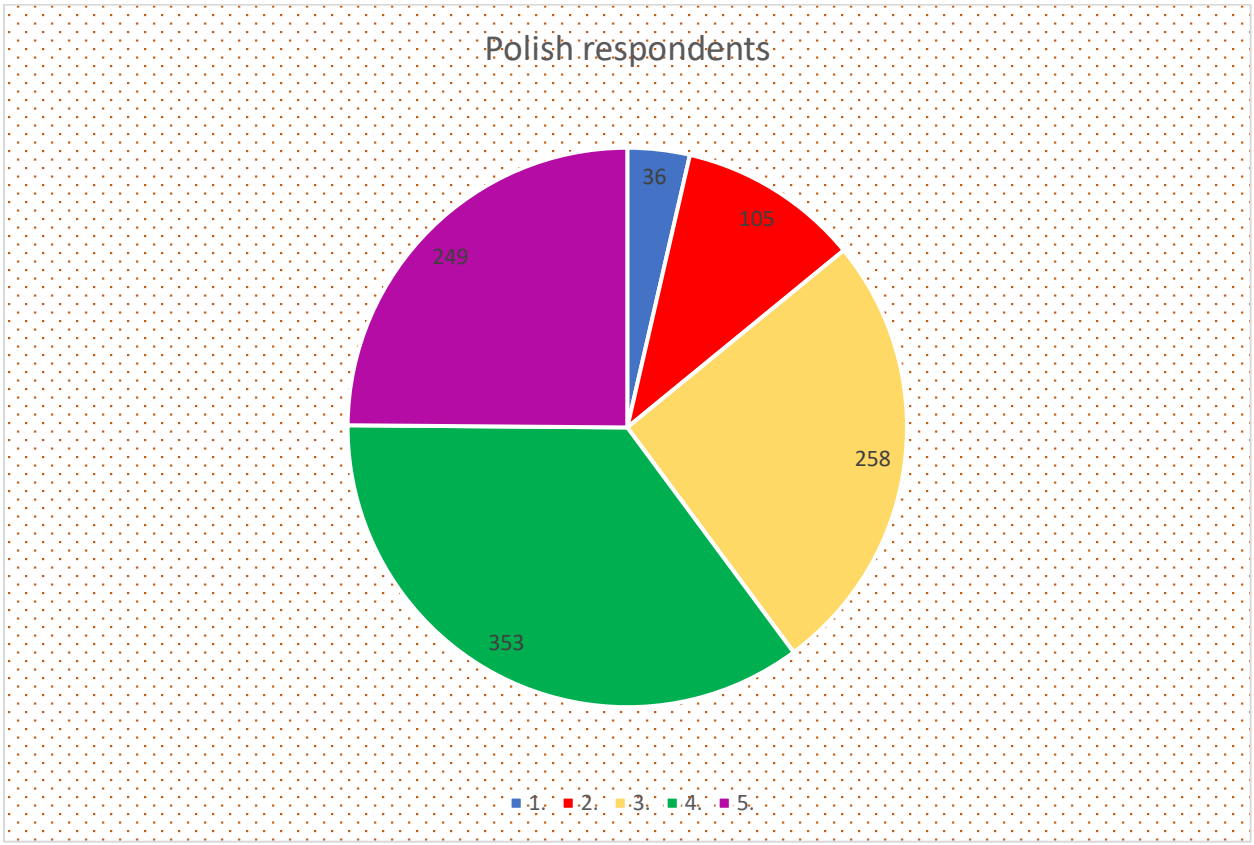


Figure 33 Answers of Polish respondents on the importance of overuse of natural resources on a scale of 1 – 5 generally concerning Europe. The number of respondents 1001.

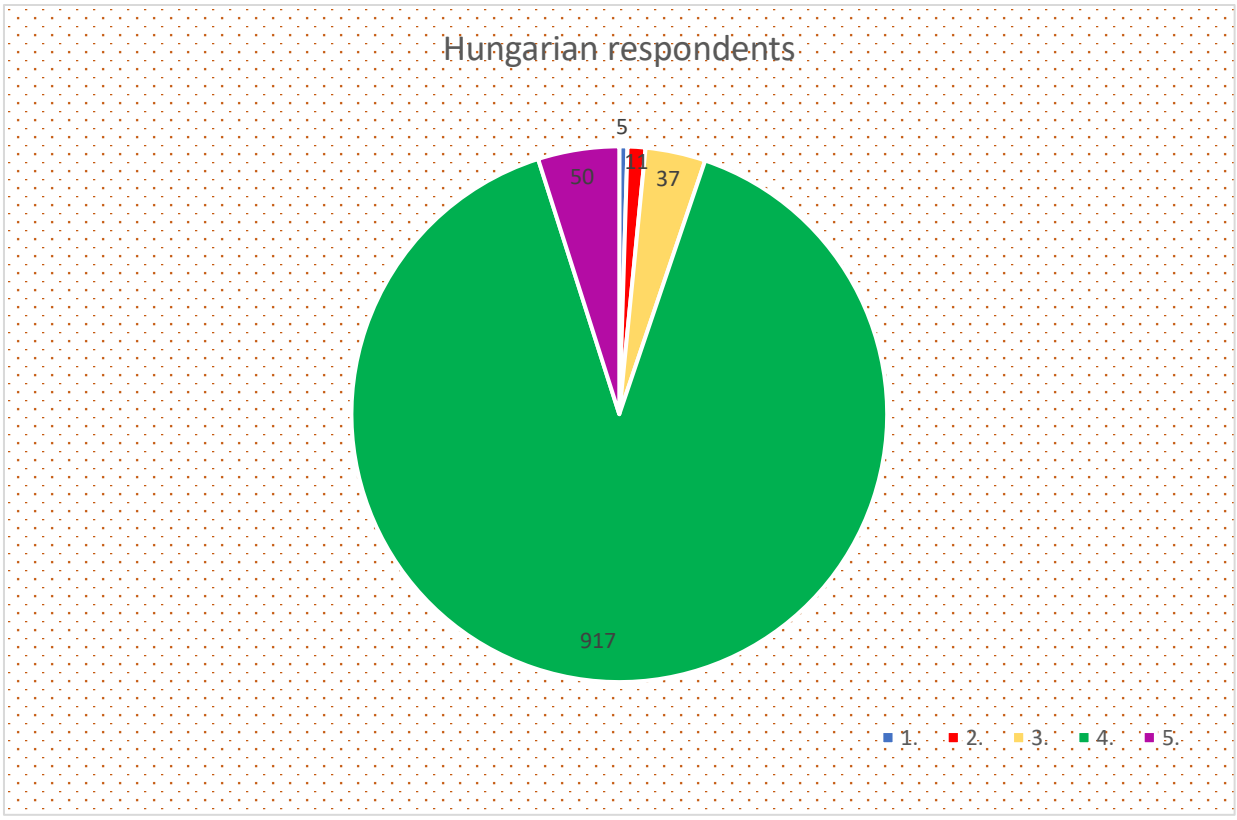


Figure 34 Answers of Hungarian respondents on the importance of overuse of natural resources on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1020.

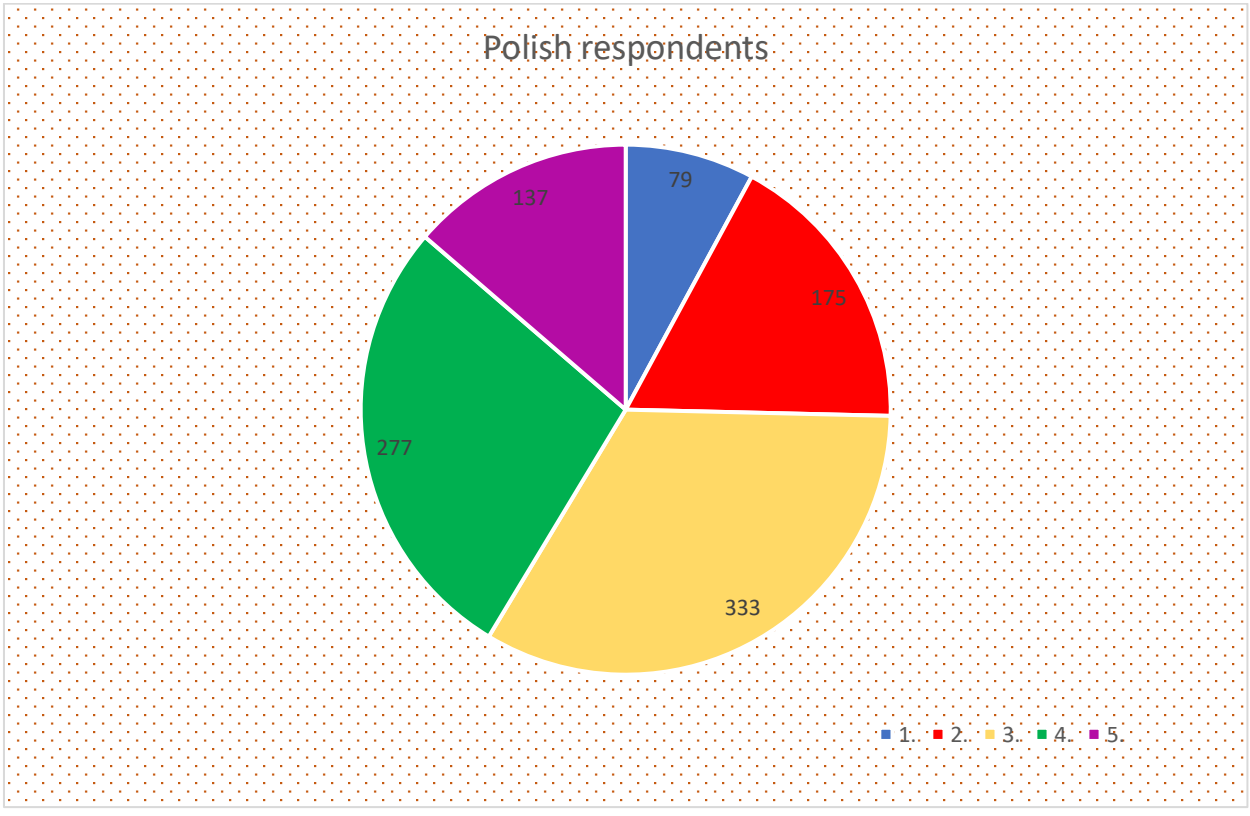


Figure 35 Answers of Polish respondents on the importance of overuse of natural resources on a scale of 1 – 5 regarding their personal circumstances. Number of respondents 1001.

The answers to this question confirm that there is a clear concern among both the Polish and the Hungarian population regarding the over-exploitation of natural resources both in Hungary and in Poland. However, it should be emphasized, that in this aspect there is a vast difference between the two countries: Poland has even today – despite the dark years of the soviet occupation and the adverse impact of the communist system – vast natural (mineral) resources, most of these are still far from exploitation. However, other natural resources, such as surface waters, soil, natural landscapes and vegetation are vulnerable resources, sensitive for both overuse and pollution.

The Hungarian respondents concerning the overuse of natural resources generally in Europe (Fig. 32) scored mostly level 4 while the picture is more differentiated in the Polish group (Fig. 33). Only 0,5% of the Hungarian respondents valued the overuse of natural resources at level 1, only 1 % scored level 2, while 3 % choose level 3, and the majority, 89% voted for level 4 and 6% choose level 5 in the general, European context. The result of the Polish group was much more variable, although even here a large majority considered the overuse of natural resources as a serious issue: only 4% scored 1 as not relevant, 10% set a value 2, while 26% choose level 3 and 35% choose level 4 and finally 25% scored 5.

The difference between the general, European concerns and the personal level concerning overexploitation of natural resources is not significant in the Hungarian group (Fig. 34) while in the Polish population (Fig. 35) there are significant differences, since on the personal level many people (8%) scored grade 1, more (17%) scored grade 2, little more than in the European scale, 33% selected grade 3, while 28% voted for grade 4 and 14% selected grade 5.

Uncontrolled deforestation

In recent years, the legislative background of forest management in Hungary has changed significantly: the Orbán government in 2013, the so-called The Land Transfer Act treats forestry as part of agriculture. This was supplemented and amended by CCXII of 2013. Act, then LX of 2021. law, according to which a forest owner in Hungary must have a higher degree in agriculture or accredited farmer qualification or a forest cultivation qualification. The complete list can be found in 504/2013. (XII. 29.) is included in Annex 1 of the Government Decree. The tasks related to the forestry sector are currently divided between the Ministry of Agriculture, the National Food Chain Safety Office, the National Land Centre and government offices. At first glance, Hungary is not doing badly: the forest population has doubled in a hundred years: double the one million hectares in 1920, more than 2 million hectares are by

definition forest - the question is, of course, what is the reality behind the beautiful numbers. In today's Hungary, only the Kékes forest reserve is considered a primeval forest, but there are also some very old forests left - for example, in the neighborhood of Normafa in Budapest - which deserve to be preserved.

It is equally important to switch from traditional, clear-cut, regenerative cutting methods to more natural forest management in a part of the forests - which helps to preserve the diversity of the forests' fauna and increases their resistance to climate change. Where the forests have already been completely transformed or eradicated, the most important task is their restoration, which of course takes many decades.

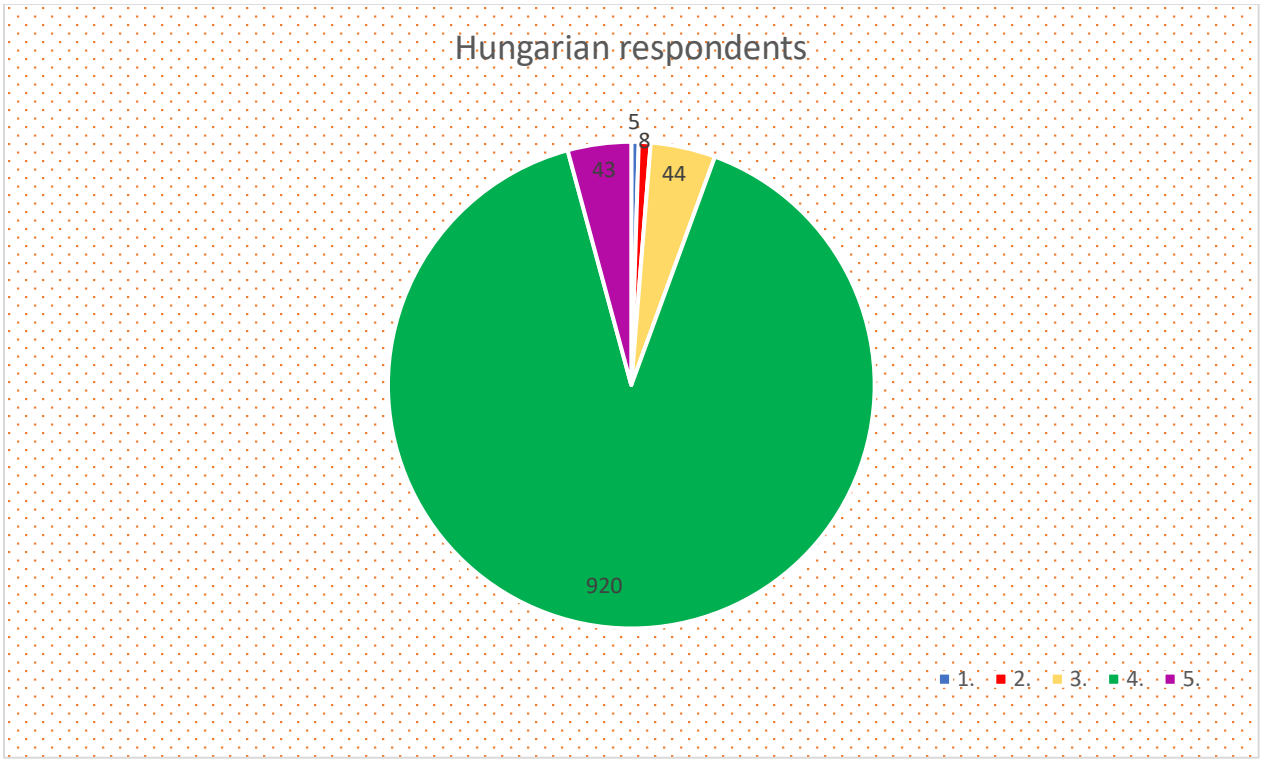


Figure 36 Answers of Hungarian respondents on the importance of uncontrolled deforestation on a scale of 1 – 5 generally concerning Europe. Number of respondents 1020.

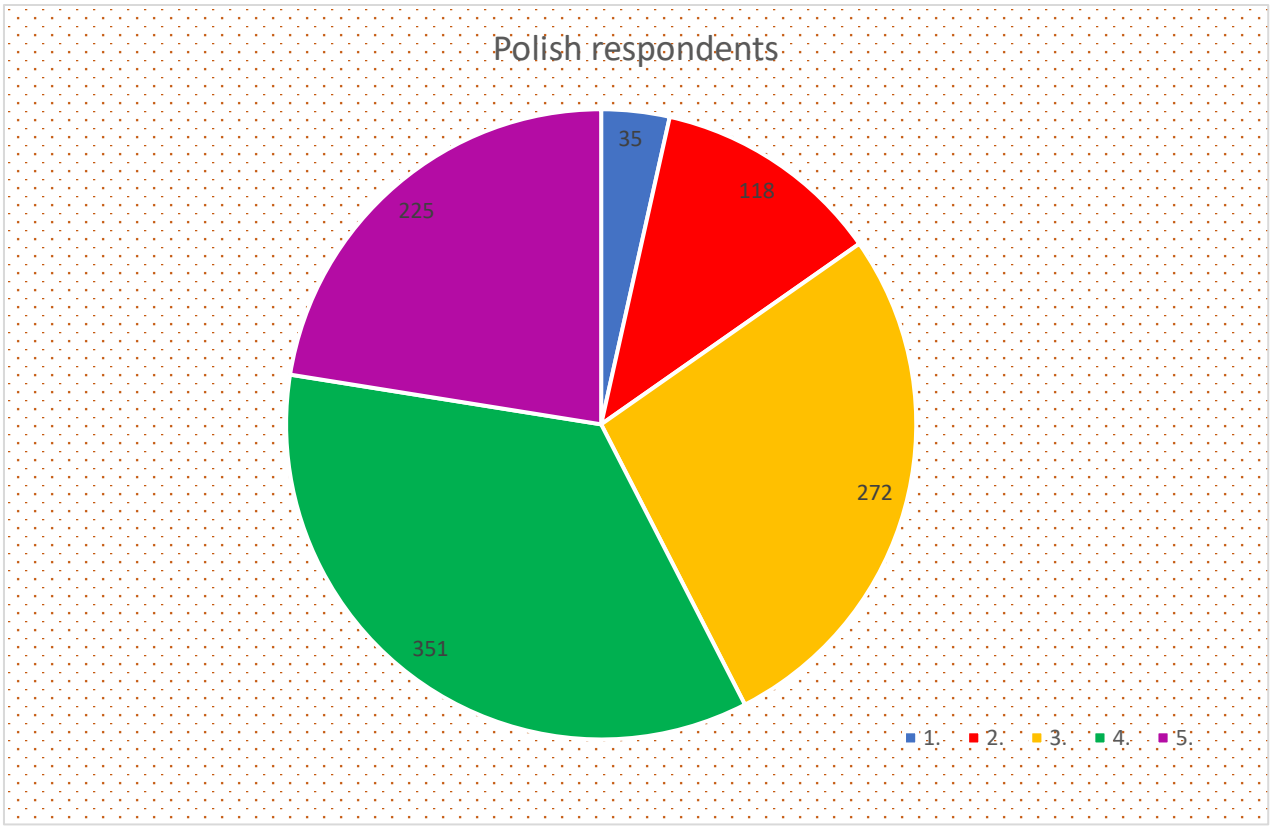


Figure 37 Answers of Polish respondents on the importance of uncontrolled deforestation on a scale of 1 – 5 generally concerning Europe. Number of respondents 1001.

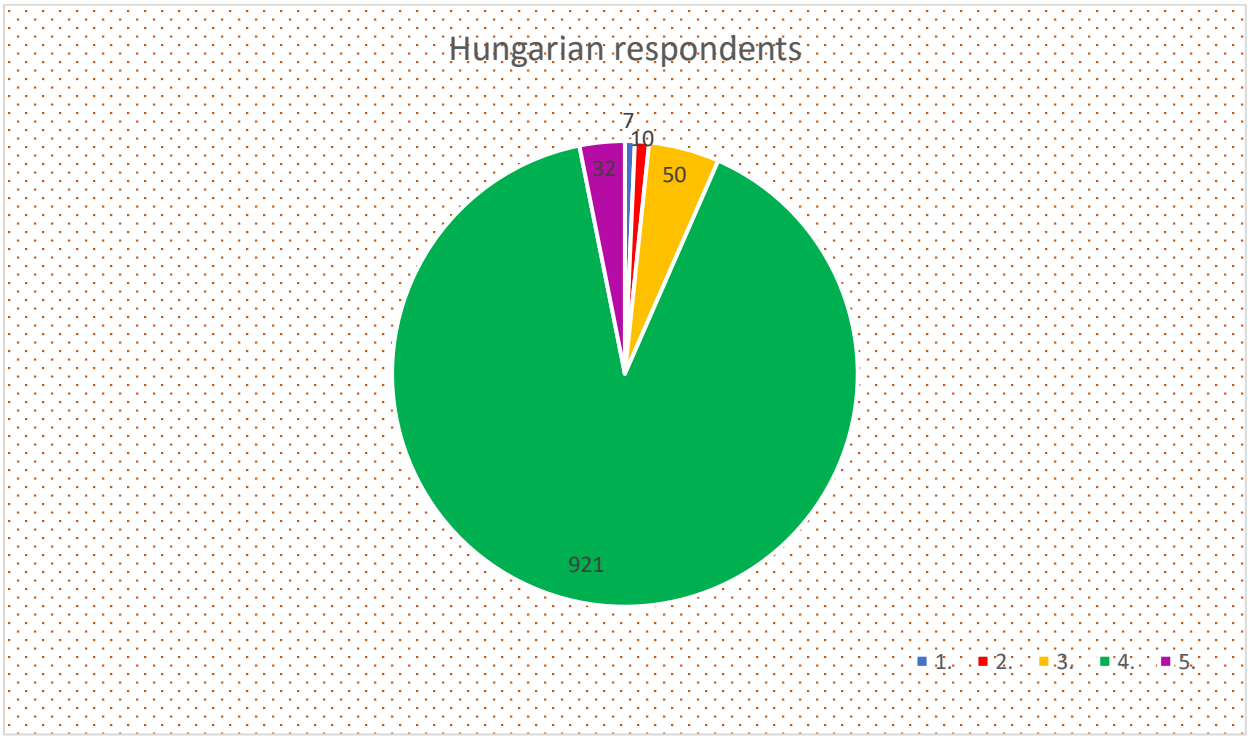


Figure 38 Answers of Hungarian respondents on the importance of uncontrolled deforestation on a scale of 1 – 5 concerning their personal circumstances. Number of respondents 1020.

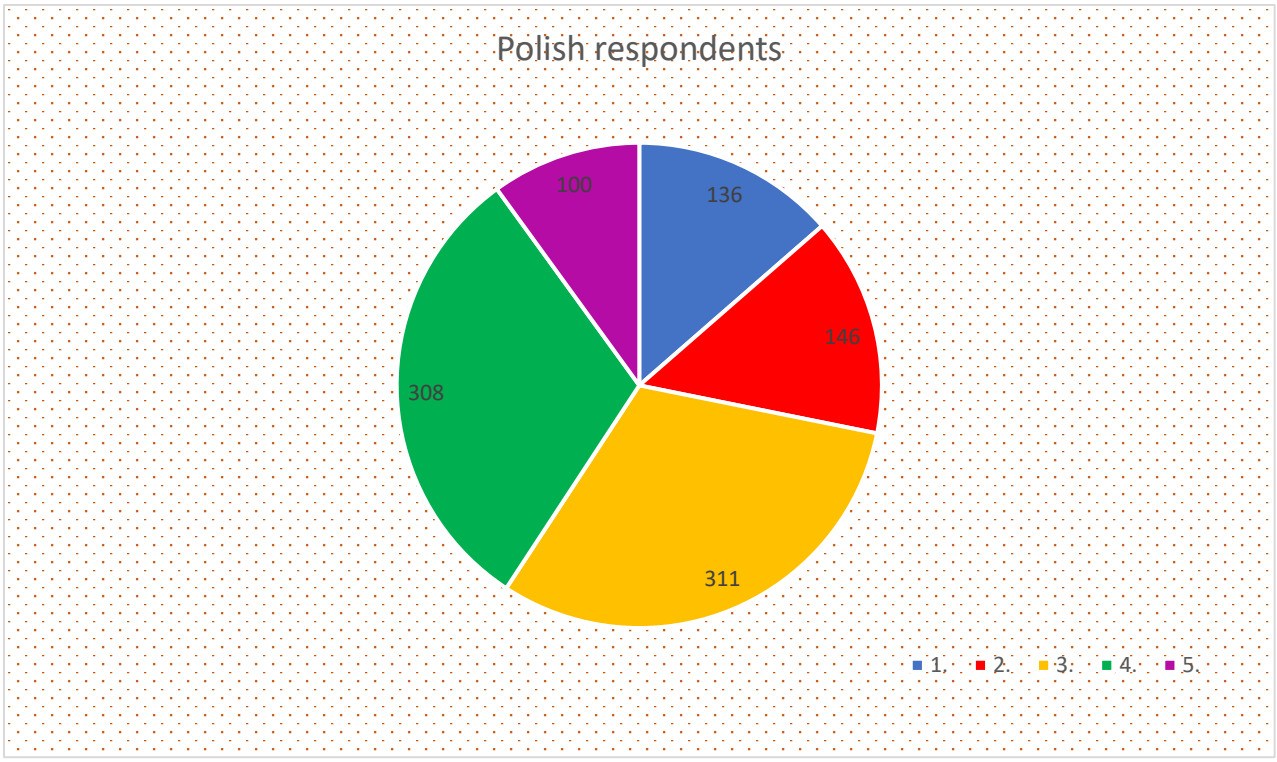


Figure 39 Answers of Polish respondents on the importance of uncontrolled deforestation on a scale of 1 – 5 concerning their personal circumstances. Number of respondents 1001.

Poland has vast forest areas. The assumptions of greening forest management in Poland were also reflected in the Principles of Forest Farming, in force since 1 January 2012. This document also assumes that forest cultivation and management is subordinated to the main objective: to preserve the existing forests and to increase their area by "gradually achieving states of dynamic balance in forest ecosystems, shaping non-productive functions of the forest and friendly links of forest management with the socio-economic environment [and] ensuring the production of timber and non-timber crops'. Thus, the adaptation of the production function to environmental conditions and the emphasis on restoring natural processes in forests are clearly indicated in the key document constituting the basis for forest management in Poland. In the Polish system, sustainable and multifunctional forestry is associated with the development of all forest functions, i. e. the combination of production and non-production functions (protective and socio-cultural). In practice, this means that apart from economic, typical forest complexes, there are also natural forests (maintained in an unchanged or slightly changed state - e. g. in national parks and nature reserves), but also plantations whose task is to relieve typical forests of production (supply of wood).

The public opinion in Hungary regarding deforestation is clearly visible from the survey, even if the majority of respondents scored 4 on the scale of 1 – 5 both in European / global context (Fig. 36) and concerning the private circumstances (Fig. 38) of the respondents, they are aware

of the new government programmes regarding reforestation and afforestation in order to regain lost forest areas and restore degraded ones. As everybody, particularly better educated people, are well informed about the extensive deforestation of the tropical rainforests, the loss of biodiversity and the global impact on climate, it is not surprising, that people value these issues as very important.

Even the opinions of the Polish respondents mirror a high level of concern in general terms on the European / global scale (Fig. 37) 3% scoring 1, only 12% choose 2, the medium score of 3 was chosen by 27%, and 35% selected level 4 while 23% voted for level 5. Thus, on the European / global level 85% of poles (scoring 3, 4 and 5) felt that deforestation was a serious threat to the environment.

Regarding the impact of deforestation on the personal lives of the Polish respondents, their answers differ compared to those on the European/global level: 14% thought that deforestation does not affect them to a particularly notable degree, 15% scored 2 to mark a slight relevance, 31% choose grade 3 and 30% scored 4 while only 10% choose the highest level of 5.

Too fast increase of human population

Although global population has increased rapidly – particularly over the past 100 years, there are many signs that this growth is temporary. According to the latest UN projections, a transition from rapid growth to a new equilibrium can be expected. As previously mentioned, the most rapid increase in population can be observed in the so called “third world countries” with often low social standard, shortage of natural resources, inferior sanitary conditions and political problems, military conflicts and exposition to the most adverse impacts of climate change such as desertification, soil degradation, loss of biodiversity and even serious shortage of drinking water. At the same time, most European countries and the more developed economies are facing an ageing population and decrease in the number of births.

Hungary

The population of Hungary in the XX. In the 20th century, continuous variability, alternation of demographic peaks and valleys was typical. Until the First World War, the dynamics of population growth was very significant thanks to the favourable population movement rates and the migration gain from Budapest, which offset the overseas emigration in the central part of the country. The decrease in fertility started already at the turn of the century, but it was not significant until the Second World War. The first major turning point occurred at the beginning of the global conflagration, the death rate rose, fertility dropped drastically due to the absence

of the young male population and, in connection with this, the entry of women into work. The most drastic decline occurred in Budapest. After the war, the number of births increased again, but it did not reach the level before the world burned, in fact, this is when the demographic decline of Hungary and Europe began. Thanks to the social and health measures taken during the Horthy era, the life expectancy at birth increased spectacularly, the death rate decreased continuously, however, the birth rate decreased to a greater extent, so this period can be characterized by a slowdown in population growth. Masses of refugees arrived in the motherland due to the Trianon Peace Dictate, which resulted in a housing shortage in the larger cities and administrative centres, the most serious situation was in the capital, partly as a result of this, the one-handedness in Budapest became common. The darkest period of Hungarian history in the 20th century, the Second World War, brought another turn. The decline in fertility was not significant in contrast to the period of the First World War, however, the death rate increased drastically due to combat events, sieges and the emergency period. Between 1944 and 1945, the country lost approximately half a million citizens from today's territory, of which 200,000 were victims of the Holocaust. With the advent of peace, the death rate decreased significantly, and the birth rate increased, partly due to psychological reasons, so population growth accelerated. In the second half of the 1940s, the country lost hundreds of thousands more citizens (emigration of Germans, emigration of Jews to Israel, and people fleeing the Soviet troops to the west), but this loss was compensated by the immigration of Hungarians from across the border and natural reproduction. The period between 1949 and 1956 is one of the most well-known periods of the modern Hungarian population statistics. During the era named after Anna Ratkó, Minister of Public Welfare and then Minister of Health, the death rate fell to an unprecedented level, partly due to the general expansion of social insurance, and due to the introduction of the childlessness tax and the strict observance of the abortion ban, the number of births increased spectacularly, so that natural reproduction matched Hungarian conditions reached a very high level, the country's population grew by 100,000 people every year. Those born in this period are called the “Ratkó children”, and their generation is conspicuous in the early days of Hungary. In 1956, the ban on abortion was lifted, and after the revolution was crushed, the childlessness tax was abolished. Due to mass abortions (between 1960 and 1973, there were more abortions than births!) and the spread of contraception, fertility dropped significantly in the 1960s, since then, apart from the minor demographic peak between 1974 and 1977 population reproduction has not been ensured for nearly half a century. In 1962, Hungary had the lowest total fertility rate in the world. Since the 1960s, the death rate has started to increase due to aging and social causes (overwork due to the second economy, stress,

alcoholism, the highest suicide rate in the world, etc.). The modest population increase of the Kádár era was revived only between 1974 and 1977 due to the birth of the Ratkó grandchildren and the tightening of abortion. Since 1981, the ever-increasing number of deaths could no longer be offset by the ever-decreasing number of births, this trend has continued ever since. In the 1980s, natural loss was also aggravated by emigration, the country lost nearly 200,000 people to emigration in the mentioned decade. The population decline has accelerated since the regime change, which reached its lowest point in 1999, and since then there has been a slight improvement with minor interruptions. The country's migration balance has been positive since 1988, thanks to those who arrived since then, the country's population fell below the psychological 10 million only by August 2010. Without the immigration of Hungarians from across the border, the country's population loss would exceed 1,000,000 people.

This situation is widely known among the Hungarian people. The reason for the concerns regarding the increase of the human population can be more attributed to the migration crisis from the conflicts zones of the Middle-East, Africa and several countries of Asia. There is a continuous threat on the southern borders of Hungary due to the accumulation of violent hordes of illegal migrants, which is a growing problem and needs to be addressed on European Union level. Thus, the opinion of the Hungarian respondents is very similar in both cases regarding the European / global level (Fig. 40) and the impact or, rather threats of their personal lives (Fig. 42).

Poland

For several dozen post-war years, the population of Poland grew steadily, mainly due to high natural increase. Migration had relatively little influence on this, and throughout the post-war period, emigration prevailed over immigration. In 1990, the population of Poland exceeded 38 million, after which further growth was halted. This was the result of the political changes of 1989. Unemployment appeared and the resulting economic difficulties of the society significantly reduced the number of births. Among the working people, especially young people, the model of life was changing, in which more and more time was occupied by a professional career, and less and less time by a possible family and raising children. The result of this was that from 1997 the population of Poland began to decline slightly. Later, increased emigration after Poland's accession to the European Union also contributed to this.

It was only from 2008 that the number of inhabitants began to increase again. This was a consequence of, on the one hand, the increased birth rate and, on the other hand, the collapse of the emigration wave. At the end of 2011, the population of Poland reached its maximum so

far value of 38 million 538 thousand. Since then, the numbers have dwindled again for economic, demographic, and cultural reasons. Demographers predict that this downward trend will continue for many years to come and, for example, in 2035 Poland will have only about 36 million inhabitants.

Obviously, the Polish respondents are also well aware of the demographic situation in their country, and this is visible from their answers: 6% scored 1 and 15% scored 2, while 27% choose 3 and 33% voted for 4, and 19% choose 5 on the European/global level (Fig. 41). The numbers differ slightly when their personal lives are concerned: 14% scored 1 and 2, 32% choose 3, 29% choose 4 and 11% selected 5 (Fig. 43).

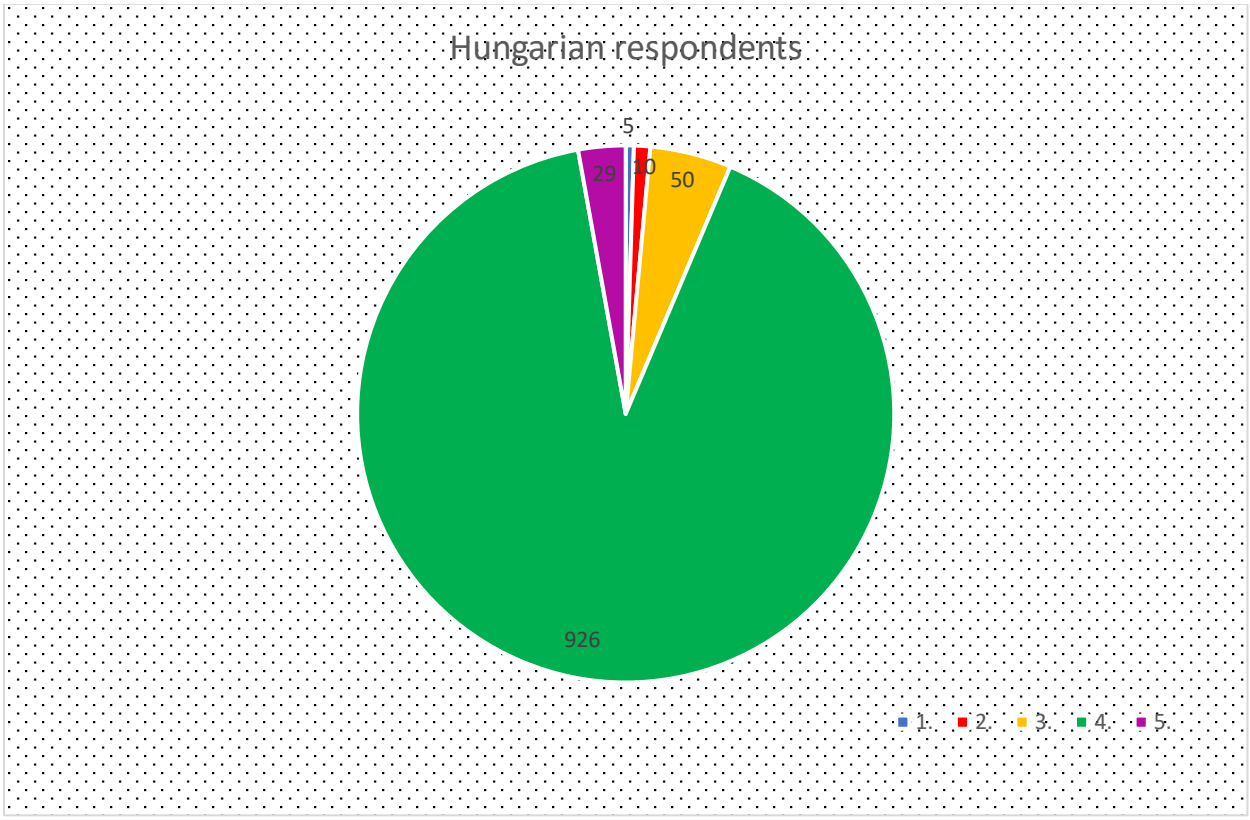


Figure 40 Answers of Hungarian respondents on the importance of fast growth of human population on a scale of 1 – 5 generally concerning Europe. Number of respondents 1020.

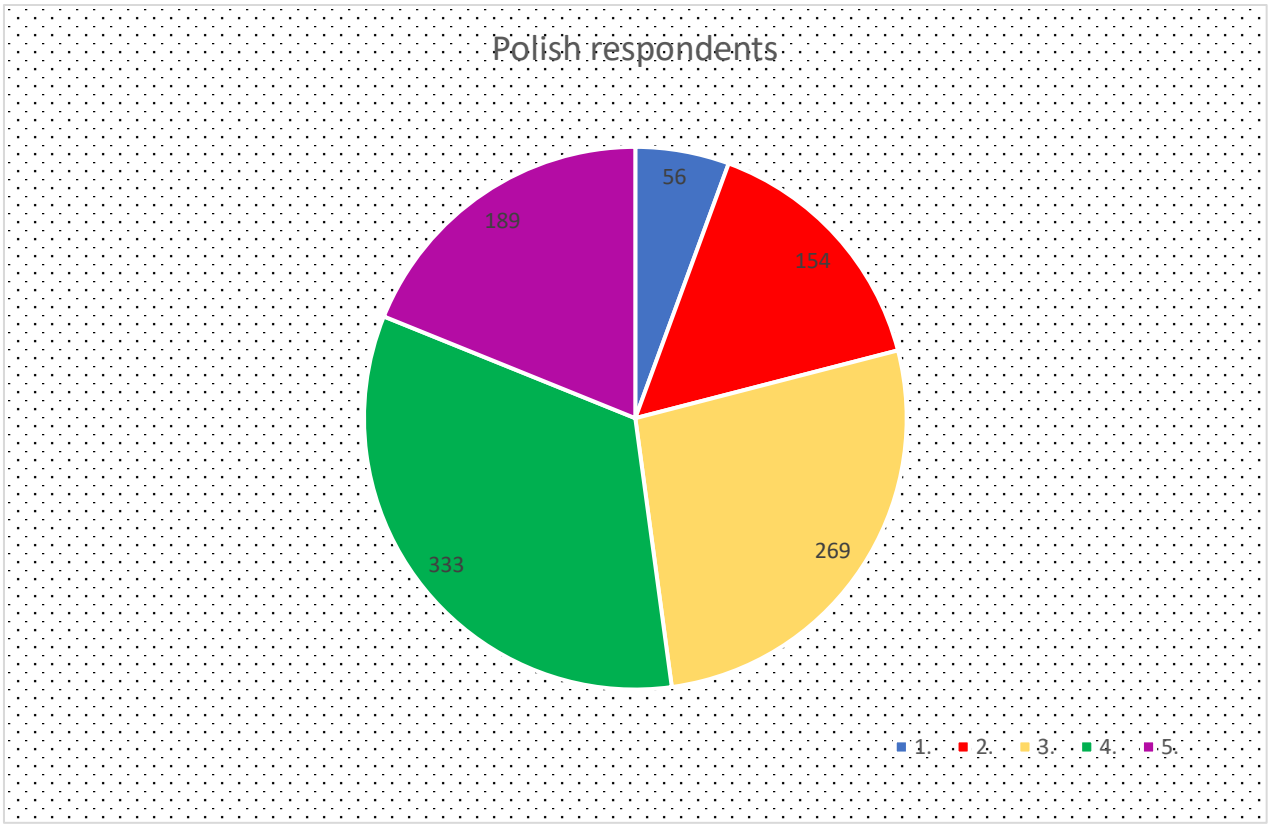


Figure 41 Answers of Polish respondents on the importance of fast growth of human population on a scale of 1 – 5 generally concerning Europe. Number of respondents 1001.

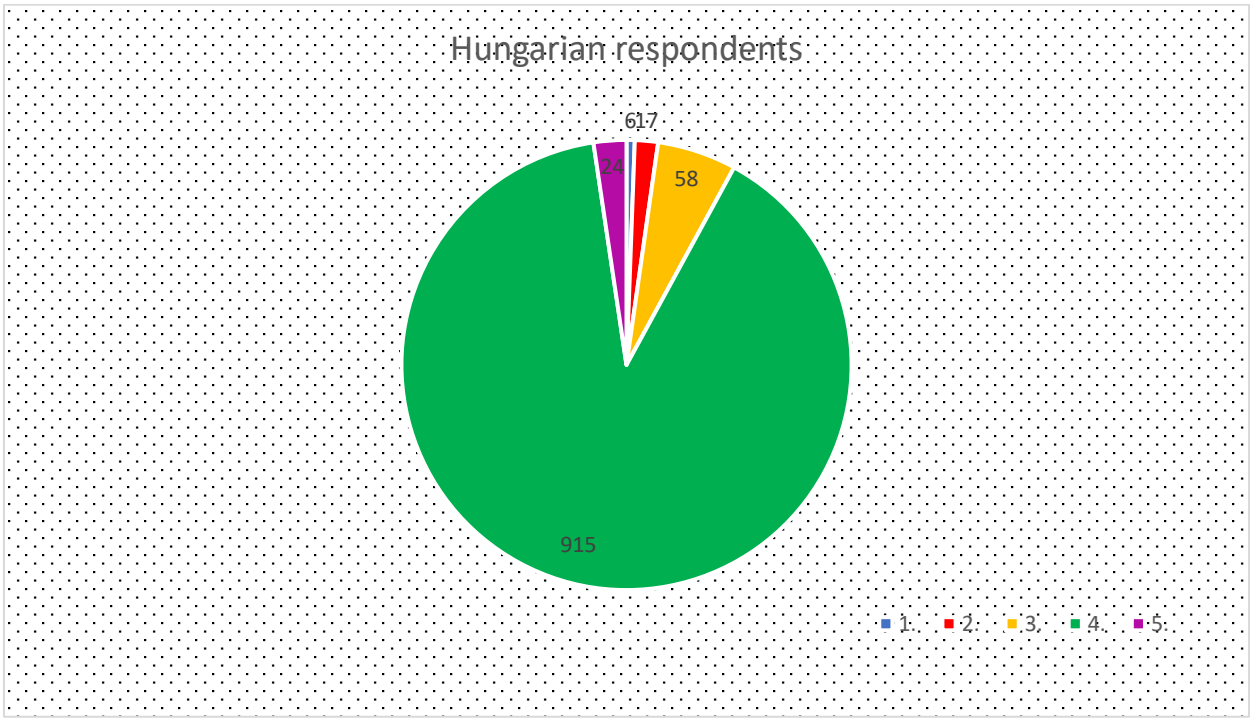


Figure 42 Answers of Hungarian respondents on the importance of fast growth of human population on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1020.

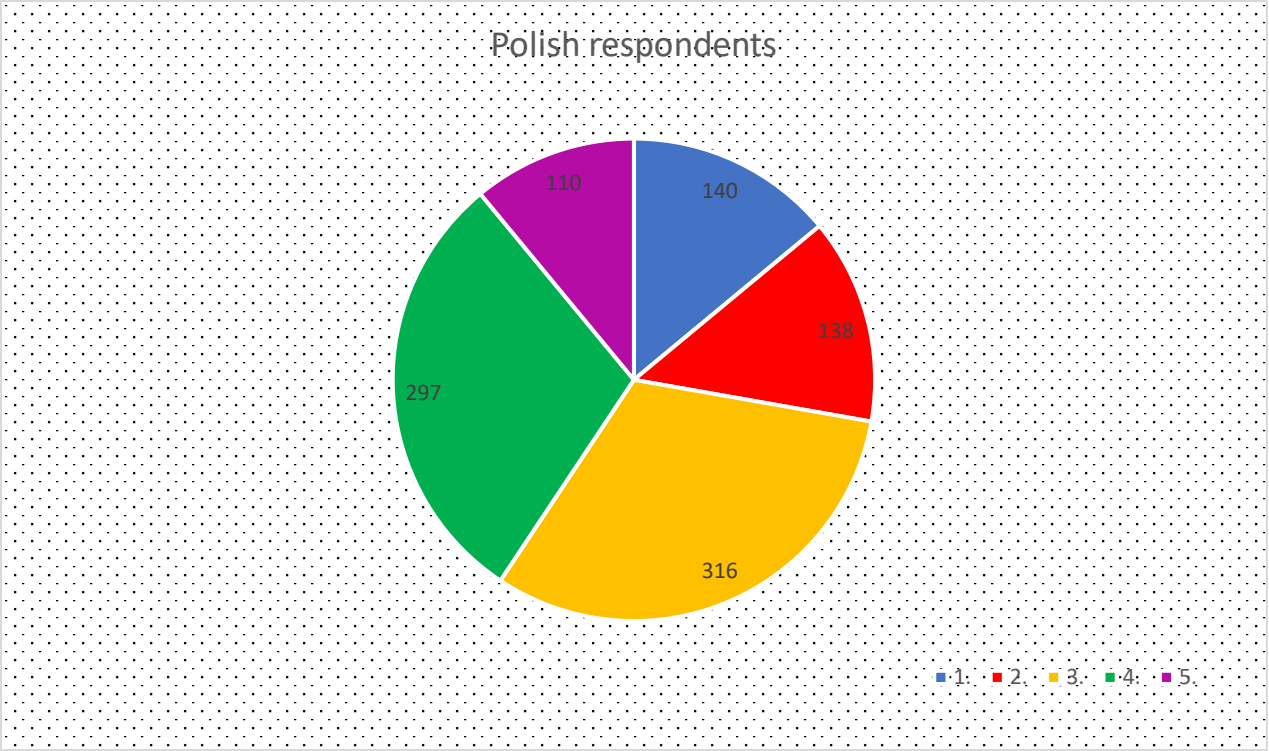


Figure 43 Answers of Polish respondents on the importance of fast growth of human population on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1001.

Urbanisation

In the urban-rural relations system, everything that we know globally as the center-periphery-semi-periphery often condenses, since the big cities (especially the metropolises also known in the West) willy-nilly treat the countryside as a source of human and natural raw materials, if you like, as a colony, as an opportunity to be exploited.

Hungary

Along with the Czech Republic, Hungary is the only Eastern European country where the proportion of urban residents was higher than that of rural residents already in 1950: the then 53 percent was higher than both the 39.7 percent Eastern European and the 51.7 percent European average. By 2018, with 71.4 percent, Hungary slowly managed to stabilize between the two averages (Europe: 74.5%, Eastern Europe: 69.6%), and according to the UN, the country will maintain this until 2050 - at which time the 81.8 percent Hungarians will live in cities (Europe: 83.7%, Eastern Europe: 79.4%).

An even bigger problem for Hungary's rural areas is that, in addition to the percentage of their population, the total population is also expected to decrease in the coming decades. Based on UN data, in today's Hungary there are 2.78 million rural residents for every 6.91 million urban

residents, and in 2050, 6.78 million urban and 1.5 million rural Hungarians will live side by side. The prerequisite for survival of the Hungarian countryside, which traditionally lives on agriculture, the government of the day should not support the strengthening and growth of the large estate system, since meeting the food needs of the city dwellers can even bring income to the rural dwellers, especially the small farmers. (Of course, this is also worth it if it takes place in harmony with nature, the pledge of our future). The fundamental problem in rural development is that it affects agricultural subsidies, but agriculture affects only 3-400 thousand people in terms of livelihood, but in the case of the countryside we can talk about more than 4 million inhabitants.

Poland

The situation is different in Poland. According to the data of the World Bank, the rate of urbanization in Poland in the 20th century was systematically growing, reaching its apogee - almost 62 percent at the turn of the 21st century. Since then, i. e. for almost two decades, stagnation or even a slight decrease (to the level of about 60 percent) has been observed. Compared to other developed countries, where the urbanization rate has already exceeded 80 percent, this is a very low result. The World Bank forecasts that soon the proportion of the population living in cities in Poland will start to grow again, reaching around 70 percent in 2050, which would still be 20 percentage points below the UNCTAD [United Nations Conference on Trade and Development] projection for developed countries in 2050. Poland, although recently classified as a developed country, is in this respect still closer to developing countries and those in transition. A major problem of Poland in the field of urbanization is the lack of consistent planning of the development of urban space and urban functional areas, and the resulting chaotic, non-optimized urban development and the phenomenon of urban sprawl. Although awareness of the importance of urban greenery and the concept of green infrastructure is growing, there are still clear gaps in planning. Tree stands are hastily cut down, and growing urban areas are concreted.

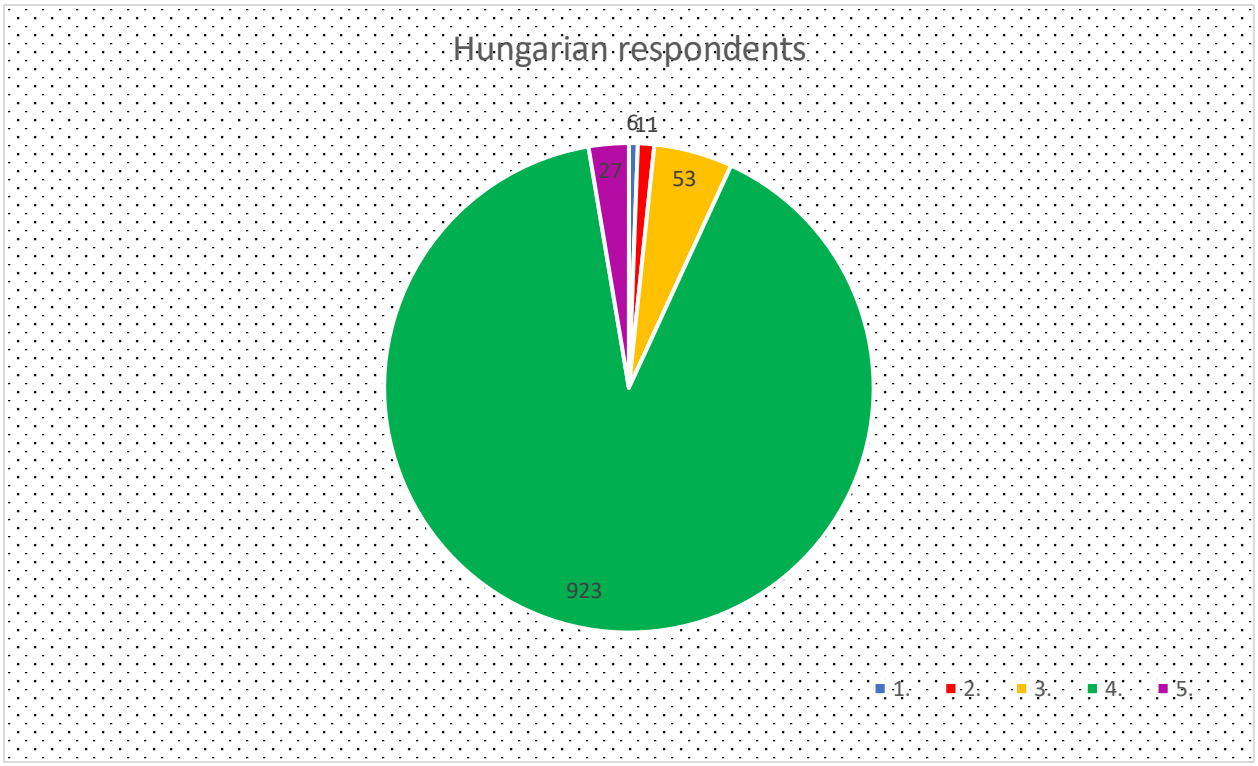


Figure 44 Answers of Hungarian respondents on the importance of urbanisation on a scale of 1 – 5 generally concerning Europe. Number of respondents 1020.

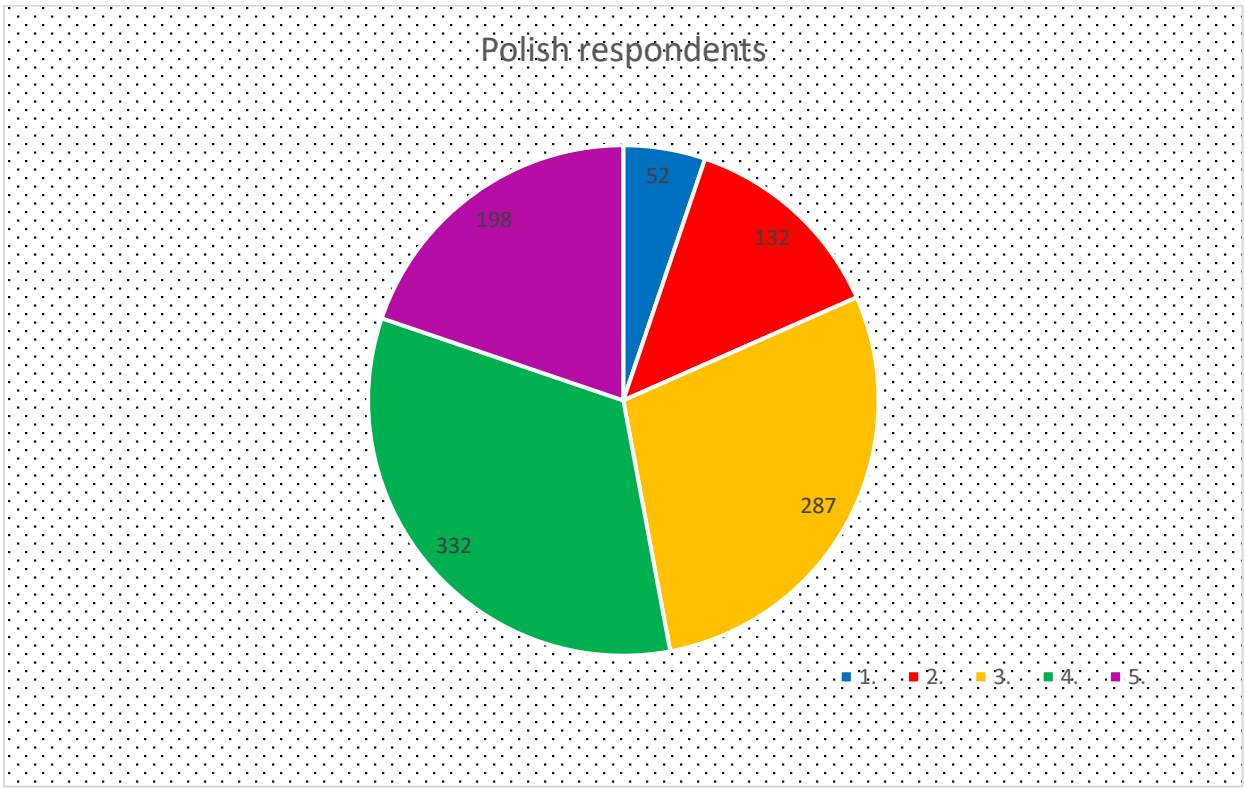


Figure 45 Answers of Polish respondents on the importance of urbanisation on a scale of 1 – 5 generally concerning Europe. Number of respondents 1001.

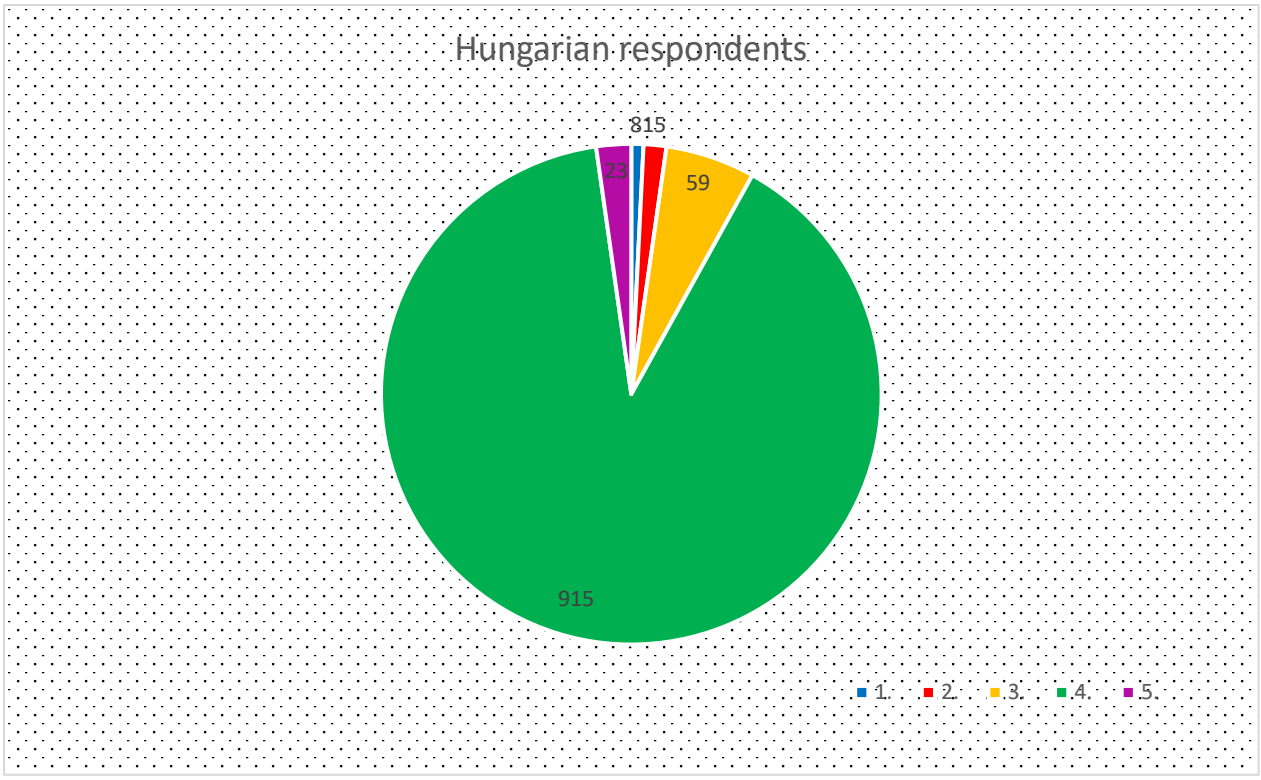


Figure 46 Answers of Hungarian respondents on the importance of urbanisation on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1001.

Figure 47 Answers of Polish respondents on the importance of urbanisation on a scale of 1 – 5 regarding their personal circumstances. The number of respondents 1001.

This has adverse effects on both the environment and the well-being of city dwellers. Soil sealing leads to its degradation and reduction of water retention, and insufficient areas of greenery, especially high greenery, translate into the intensification of the phenomenon of urban heat islands. The consequences of such phenomena will be particularly severe in the conditions described above of the intensifying effects of climate change - heat waves and the deteriorating hydrological situation of the country (floods, droughts, lowering of the groundwater level).

The answers of the Hungarian respondents mirror their growing concern regarding the urbanisation, which in Hungary can result the depopulation of the countryside and settlements of less than 500 inhabitants will vanish. There are no significant differences between the answers concerning the European level (Fig. 44; 0.6% choose 1, 1% choose 2, 5% selected 3, 92% selected 4 and 2.4% voted for 5) and their personal circumstances (Fig. 46; 0.8% choose 1, 1.2% choose 2, 5% selected 3, 91% selected 4 while 2% scored 5).

The answers of the Polish respondents showed a greater variation, although the majority even here was worried about the trends in urbanisation worldwide (Fig, 45; 5% scored 1, 13% choose 2, 29% choose 3, 33% scored 4 and 19% voted for 5) and to a slightly lesser extent even from their personal point of view (Fig. 47).

In the spirit of sustainable development, in addition to the development of cities, rural areas with declining populations should not be neglected either, the relationship between the two must be strengthened, namely along their existing economic, social, and environmental connections.

Water pollution

As previously described in the introduction, water pollution is one of the most severe environmental problems. When we talk about water pollution, we are talking about an environmentally damaging activity that is caused by humans and which has very serious negative effects on both animal and plant life. In addition, this includes the appearance of any substance in natural water that becomes unfit for human consumption, and the possibility of natural life processes taking place in it is reduced or impossible. The situation is that the above is an increasingly common phenomenon worldwide, but we can do something about it even as private individuals!

Hungary

Only 40% of European surface waters are healthy, and less than 20% of Hungary's waters are in good ecological condition. If the situation does not improve, the emblematic species and habitats of domestic waters will be endangered. The surface waters are also in a bad ecological state compared to Eastern Europe, for example Romania. Groundwater in Hungary is in better condition than surface water from a quantitative and chemical point of view. At the same time, Hungary belongs to the last five member states of the EU in terms of the good quantitative status of groundwater. This means that Hungary's groundwater can easily be endangered in the future due to their overuse and the deterioration of the related surface wetlands. In order to improve the condition of surface waters, Hungary requested from the European Commission a temporary exemption in almost all cases, and undertook to achieve a good condition after 2027 at the earliest.

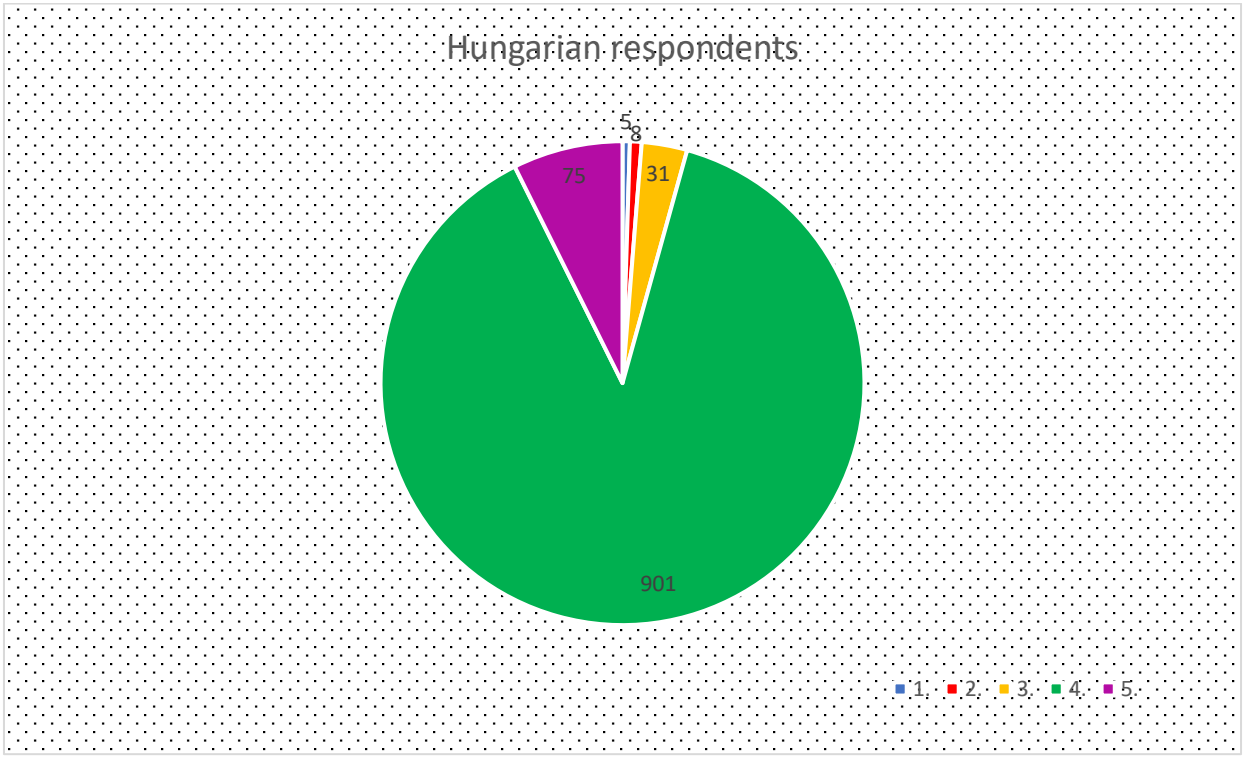


Figure 48 Answers of Hungarian respondents on the importance of water pollution on a scale of 1 – 5 generally concerning Europe. Number of respondents 1020.

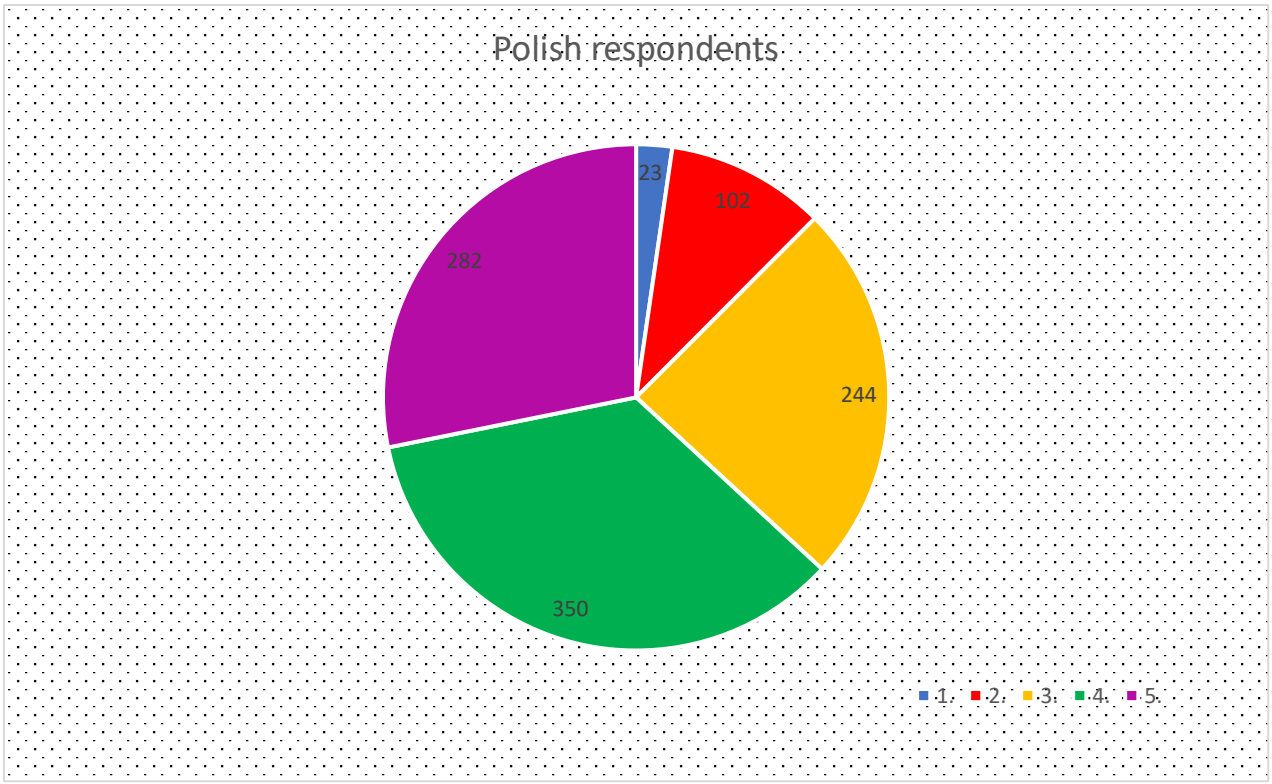


Figure 49 Answers of Polish respondents on the importance of water pollution on a scale of 1 – 5 generally concerning Europe. Number of respondents 1001.

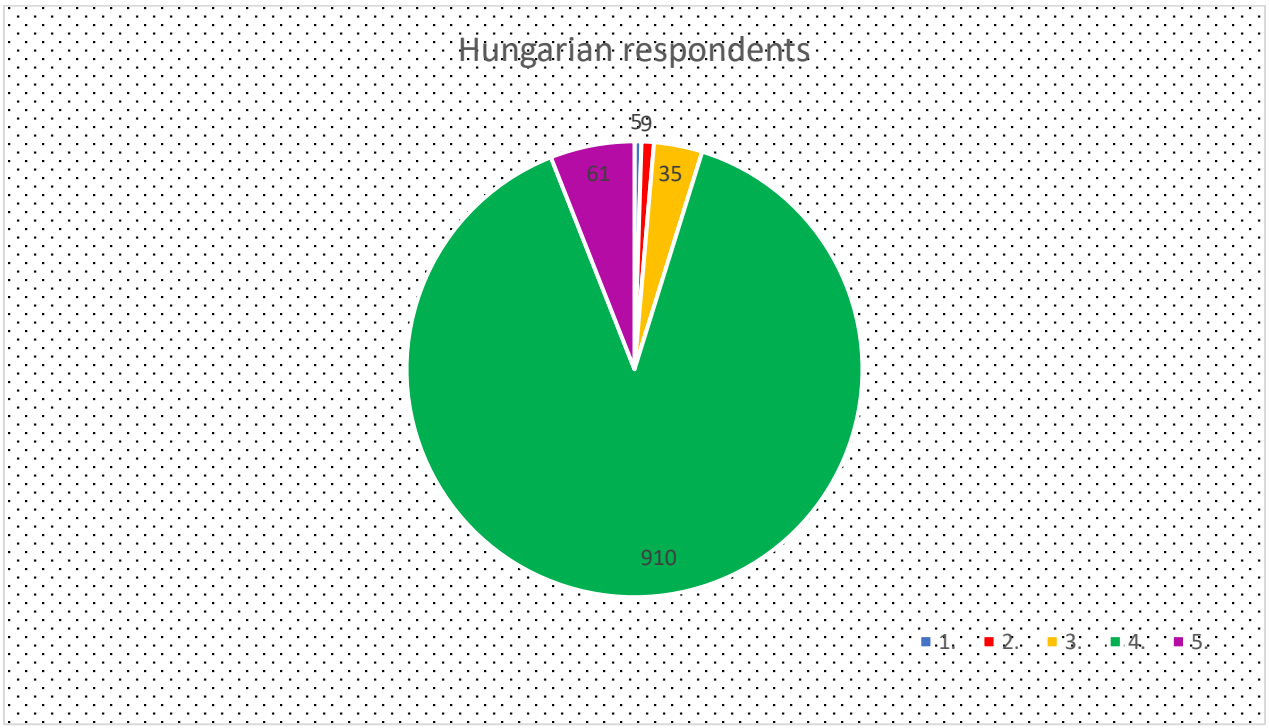


Figure 50 Answers of Hungarian respondents on the importance of water pollution on a scale of 1 – 5 generally concerning their personal circumstances. Number of respondents 1020.

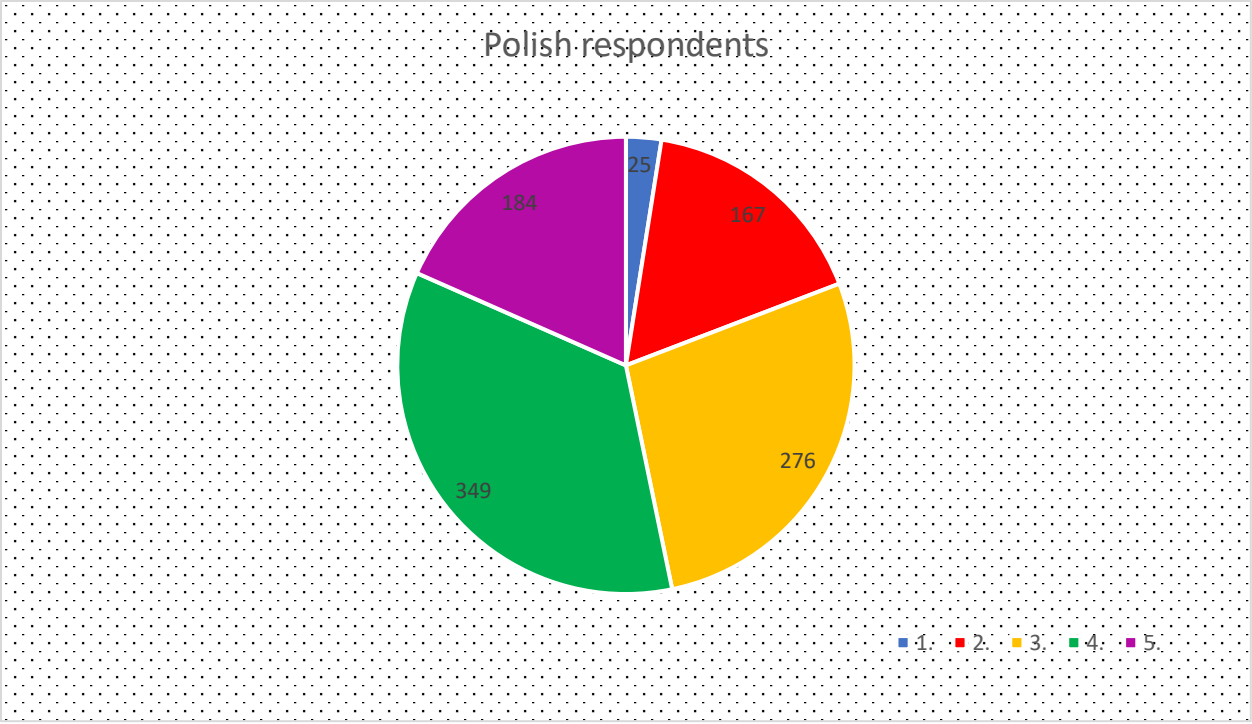


Figure 51 Answers of Polish respondents on the importance of water pollution on a scale of 1 – 5 generally concerning their personal circumstances. Number of respondents 1001.

Poland

According to the data of the Chief Inspectorate for Environmental Protection, only 1% of rivers in Poland are in good or very good condition. Other reports, unfortunately, do not bring more optimistic news. Few of us realize how much pollution of surface and deep waters affect the standard of living, and especially the future of the entire society. The Water Framework Directive in force in the European Union obliges the Member States to improve their quality. Therefore, Poland faces a really great challenge.

It may come as a surprise that in international statistics Poland is listed as a country poor in water resources, which are estimated at 60 billion m^3 (and only 40 billion m^3 during drought). For comparison, in France this value reaches even 206 billion m^3, and in Germany 188 billion m^3. Regular water deficits are already observed in the south of the country. What's worse, Poland have several times lower resources of fresh water per capita than Austria, Belgium, Slovakia, Hungary or Sweden.

Water abstraction has been steadily decreasing over the past years, but it is still quite high. The population is mainly supplied with better-quality groundwater (the use in 2022 was 1.5 km^3), while surface waters mainly cover the resources of the economy (6.9 km^3 in 2022).

Unfortunately, data on water quality in Poland are definitely unfavourable. According to GIOS data collected in 2014-2019 from the area of over 4.5 thousand rivers, only 1% had good water status. Out of just over 1,000 national lakes, 11.5% had a good status and 88.5% a bad one! As far as the purely ecological situation is concerned, as many as 32% of rivers were in the category of "bad or poor status", and 60% in the category of "moderate status". As many as 69.5% of lakes monitored by the Chief Inspectorate of Environmental Protection had a chemical condition below good.

The answers of both Polish and Hungarian respondents express their concern about the environmental status of their surface and ground waters. The answers of the Hungarian respondents mirror their growing concern regarding water pollution, but there are no significant differences between the answers concerning the European level (Fig. 48; 0.5% choose 1, 1% choose 2, 3% selected 3, 89% selected 4 and 7.5% voted for 5) and their personal circumstances (Fig. 50; 0.8% choose 1, 1% choose 2, 3% selected 3, 90% selected 4 while 2% scored 5).

The answers of the Polish respondents showed a greater variation, although the majority even here was worried about the trends in urbanisation worldwide (Fig, 49; 2% scored 1, 10% choose 2, 25% choose 3, 35% scored 4 and 28% voted for 5) and to a slightly lesser extent even from their personal point of view (Fig. 51).

Plastic litter in the environment

In addition to the short life cycle and extremely long decomposition time of many plastic products, it is also a serious problem that after use, most of them end up in municipal waste (or even worse places) and not in selective collectors, so the circular economy loses a huge amount of valuable raw materials while a lot of extra waste is produced.

Plastic pollution has become one of the most pressing environmental problems of our time. We cannot keep up with the ever-increasing production rate of disposable plastics, and we are unable to properly handle the enormous amount of waste generated. More than 8 million tons of plastic enter the ocean every year, and according to calculations, by 2050 there will be more plastic than fish in it, and 99% of seabirds have consumed plastic by now. It is estimated that the seas currently contain more than 51 trillion microplastic particles – 500 times more than the number of stars in our galaxy. Microplastics are found everywhere in the world, even in the once pristine Arctic, there are about 300 billion pieces of this particle. Henderson Island in the Pacific Ocean has the highest concentration of plastic pollution.

Hungary

In Hungary alone, we use more than 1.5 billion PET bottles every year, perhaps it is even more illustrative if we say that 180,000 of them are sold every minute. It's even more worrying when you consider that some global companies easily overtake an entire country in terms of plastic. Hungary is no exception, there are also a lot of microplastics in domestic rivers. Microplastics that enter rivers can also be deposited in riverbeds and floodplains and can pose a significant environmental risk. It enters the body of soil-dwelling animals and animals that feed on the bottom of rivers, and then through the food chain into the ecosystem as a whole, including the human body. Harmful substances and dirt can bind to their surface. Due to the significant environmental risk of microplastics, researchers in Szeged are also planning to map the pollution along the Tisza and Danube rivers and their tributaries.

Poland

In Poland, approximately 3.5 million tons of plastic are used annually, one third of which is used for the production of packaging. Of those that go to our households, only 40 percent can be recycled. Limiting plastic is also a problem for the western neighbours. Behind the Oder River, the level of plastic packaging consumption has been growing continuously since 2009. In 2018, it amounted to approx. 3.2 million tonnes - twice as much as in 1997. And all this despite the fact that 96% of Germans are in favour of reducing the use of plastic packaging.

Regulations designed to reduce the consumption of plastic bring too modest results. The failure of the fight against plastics is admitted to some extent by the authorities of the European Union.

Due to the difficult economic situation, energy crisis and high prices of energy carriers, plastic waste ends up more often than before as fuel for burning in household stoves, instead of being recycled. The consequences of burning waste in domestic stoves are disastrous not only for the economy, but also for health and the environment. Low emission, which is created after burning a plastic bottle, releases toxic, often carcinogenic compounds. In humid, winter air, such pollutants disperse poorly, so the surroundings of the building are most often poisoned. The effect of burning plastics containing PVC or dyes in the form of prints at low temperature is therefore clouds of smoke hovering over the houses. According to estimates, about 44,000 people die annually in Poland due to air pollution.

Ecology and health often lose to convenience. Participants of a recent focus study stated quite clearly that the transport of their own packaging is too burdensome. This would require carrying bags or containers to work or separate shopping trips after visiting their home first.

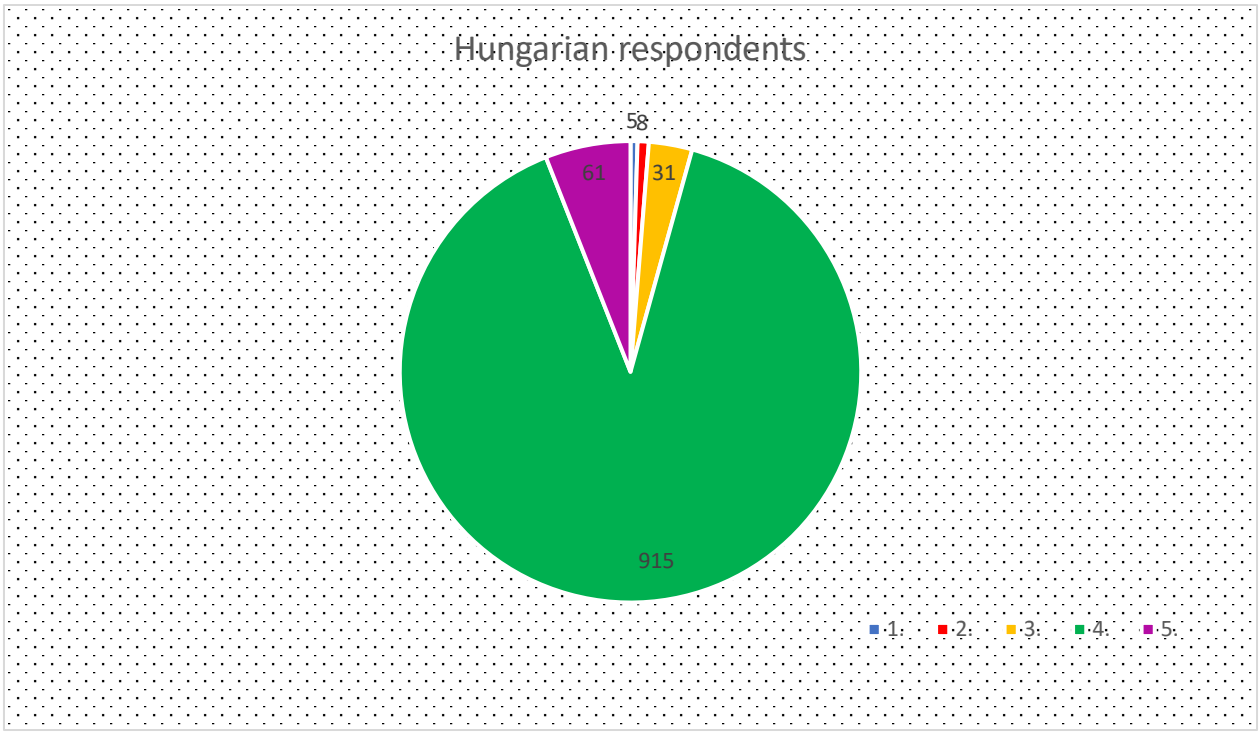


Figure 52 Answers of Hungarian respondents on the importance of plastic pollution on a scale of 1 – 5 concerning Europe. Number of respondents 1020.

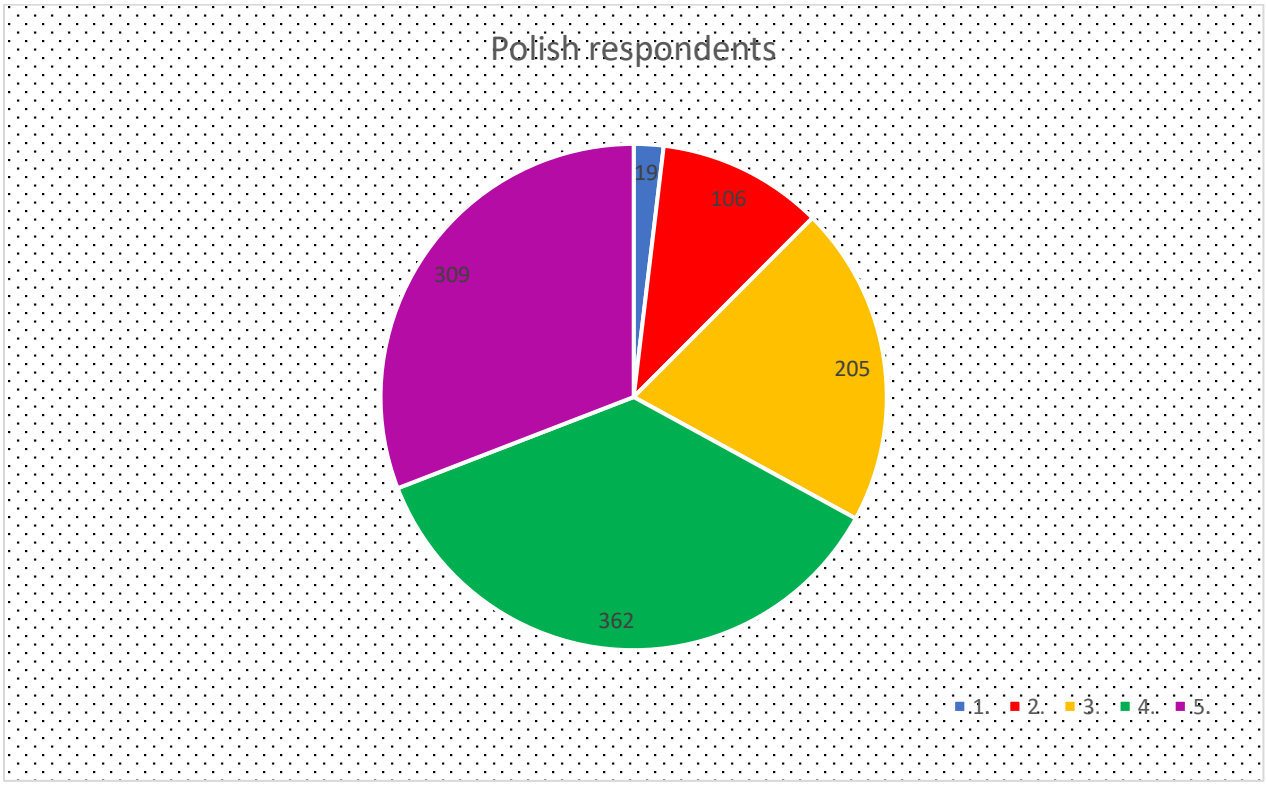


Figure 53 Answers of Polish respondents on the importance of water pollution on a scale of 1 – 5 concerning Europe. Number of respondents 1001.

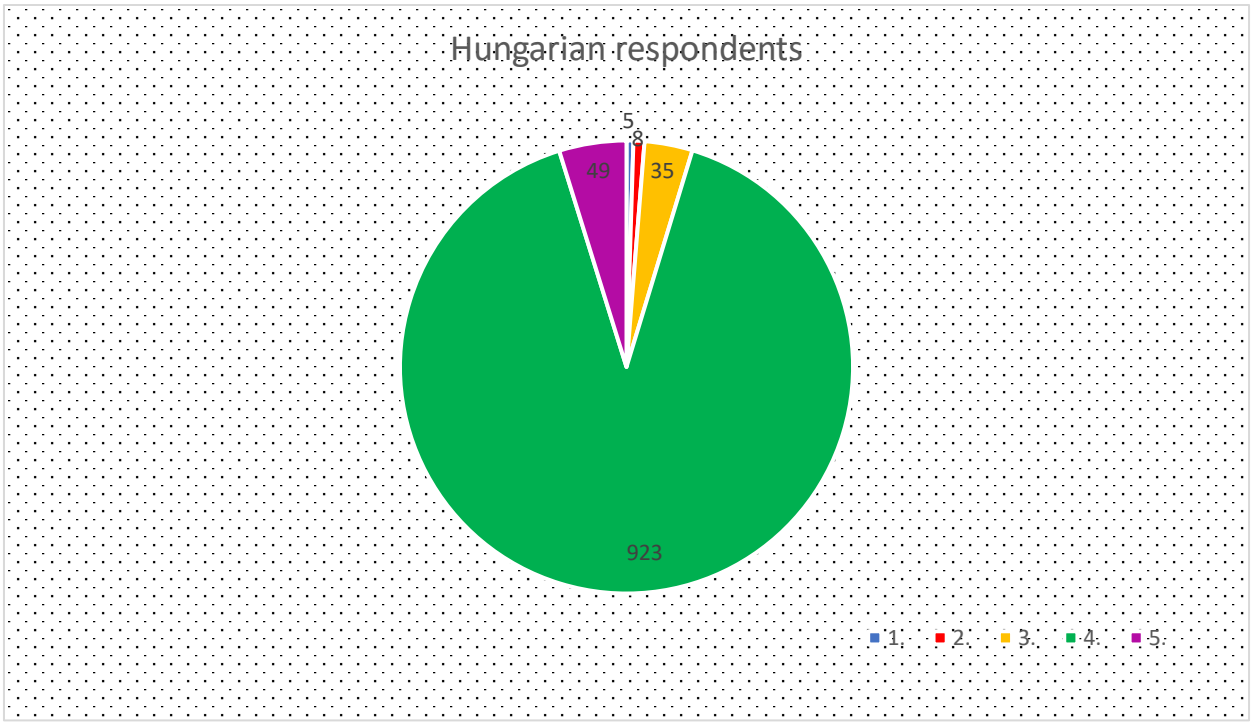


Figure 54 Answers of Hungarian respondents on the importance of plastic pollution on a scale of 1 – 5 generally concerning their personal circumstances. Number of respondents 1020.

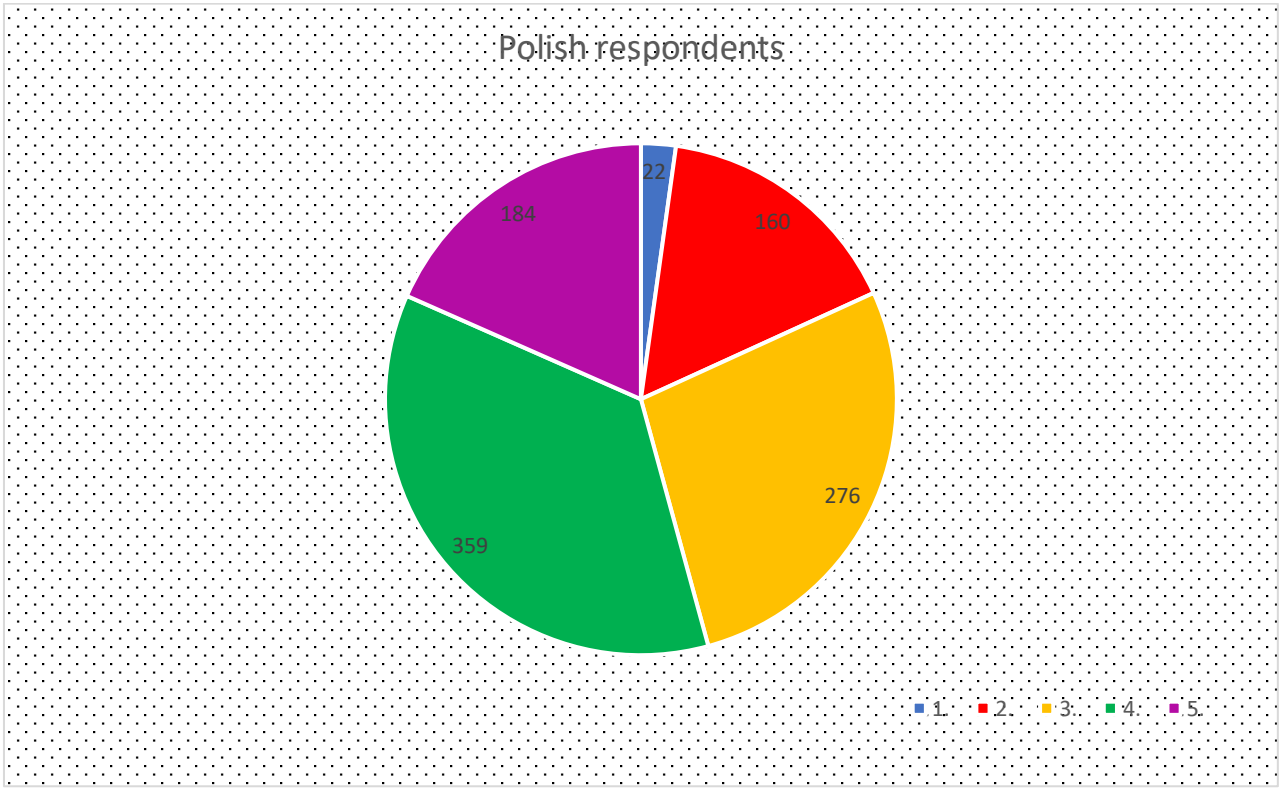


Figure 55 Answers of Polish respondents on the importance of plastic pollution on a scale of 1 – 5 generally concerning their personal circumstances. Number of respondents 1001.

The answers of the Hungarian and Polish respondents are as expected taking into consideration the answers to the previous questions regarding issues of environmental pollution. The

Hungarian respondents answered similarly to both the European (Fig. 52) and the personal level (Fig. 54) of plastic pollution, which is understandable due to the almost daily appearance of this issue in the media and the fact, that many inhabitants, who are living in the vicinity of major watercourses are exposed to plastic pollution not only from domestic but even from foreign sources from the neighbouring countries.

Although the answers of the Polish respondents show a more variable picture, even in their case the vast majority is concerned about the presence of plastic in the environment. Their choices for the European context were the following: 2% choose level 1, 11% scored 2, 20% choose 3, 36% choose 4 and 31% voted for level 5. This did not differ markedly from their answers when their personal lives were concerned: 2% choose grade 1, 16% selected grade 2, 28% choose grade 3, 36% voted for grade 4 while 18% scored 5.

Illegal ‘wild’ garbage dumps / landfills

Illegal waste disposal causes serious problems in most countries, unfortunately it is no different in Hungary and Poland. The problem is not new and must be tackled, but it is not an easy task. It is a very disheartening sight to stumble upon areas contaminated with illegally dumped waste. A staggering amount of 328,000 cubic meters of waste is dumped illegally in Hungary alone. Furthermore, illegal landfills re-produce from time to time, which is why it is a constantly current problem in Hungary. According to experience, where illegal waste is placed once, the waste appears again, in many cases in larger quantities than the first time. Therefore, one of the biggest challenges is to create a system that will prevent further illegal dumping. The collection and disposal of garbage placed on the roadside and at rest areas costs an average of more than one billion forints (2.6 million Euro) each year.

The Government of Hungary launched the "Let's clean up the country!" campaign in 2020. program, committed itself to the elimination of illegal landfills and the prevention of further illegal waste disposal. Capital and county waste management authorities were established within the framework of the Program.

In Poland the expansion of illegal wild landfills and garbage dumps is also a major problem. At the end of December 2021, the size of illegal landfills in Poland exceeded 200 ha. This is as much as the area of over 300 football fields, according to the data of the Central Statistical Office. In 2021, as many as 12,778 illegal garbage dumps operated in the country, and over 10,000 of them were liquidated. At the end of 2021, there were as many as 2,246 of them in

Poland - 238 more than on December 31, 2020, according to the data of the Central Statistical Office. Research shows that the area of uncontrolled areas is increasing.

Researchers emphasize that the growing area of illegal landfills in Poland is a huge threat to the natural environment. "It's a simple way to degrade the ecosystem and contaminate groundwater," they thunder. As experts point out, wild landfills are not only an aesthetic problem, but can also pose a serious threat to humans. In September, regulations increasing the fine for littering entered into force - now they can amount to PLN 5,000. The authorities are constantly appealing for people who come across illegal dumps to report it to the relevant services, which will take action to remove dangerous objects and punish the perpetrators.

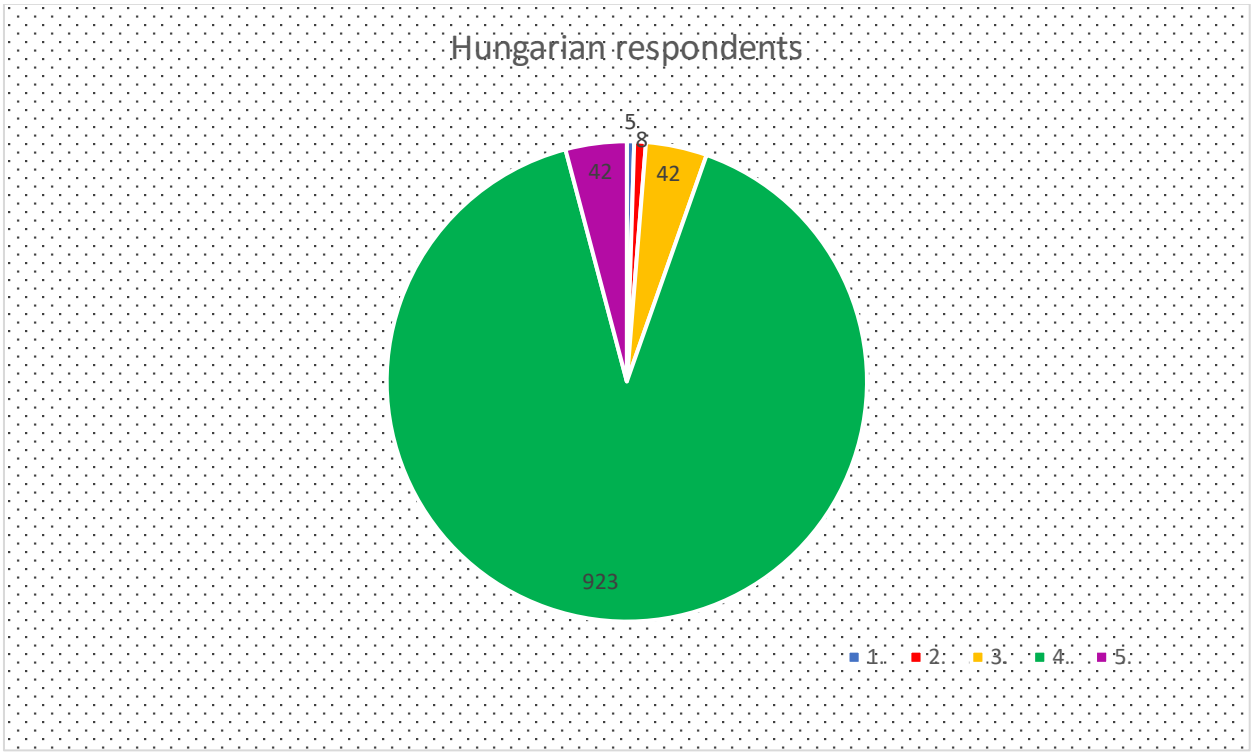


Figure 56 Answers of Hungarian respondents on the importance of problems with illegal landfills on a scale of 1 – 5 concerning Europe. Number of respondents 1020.

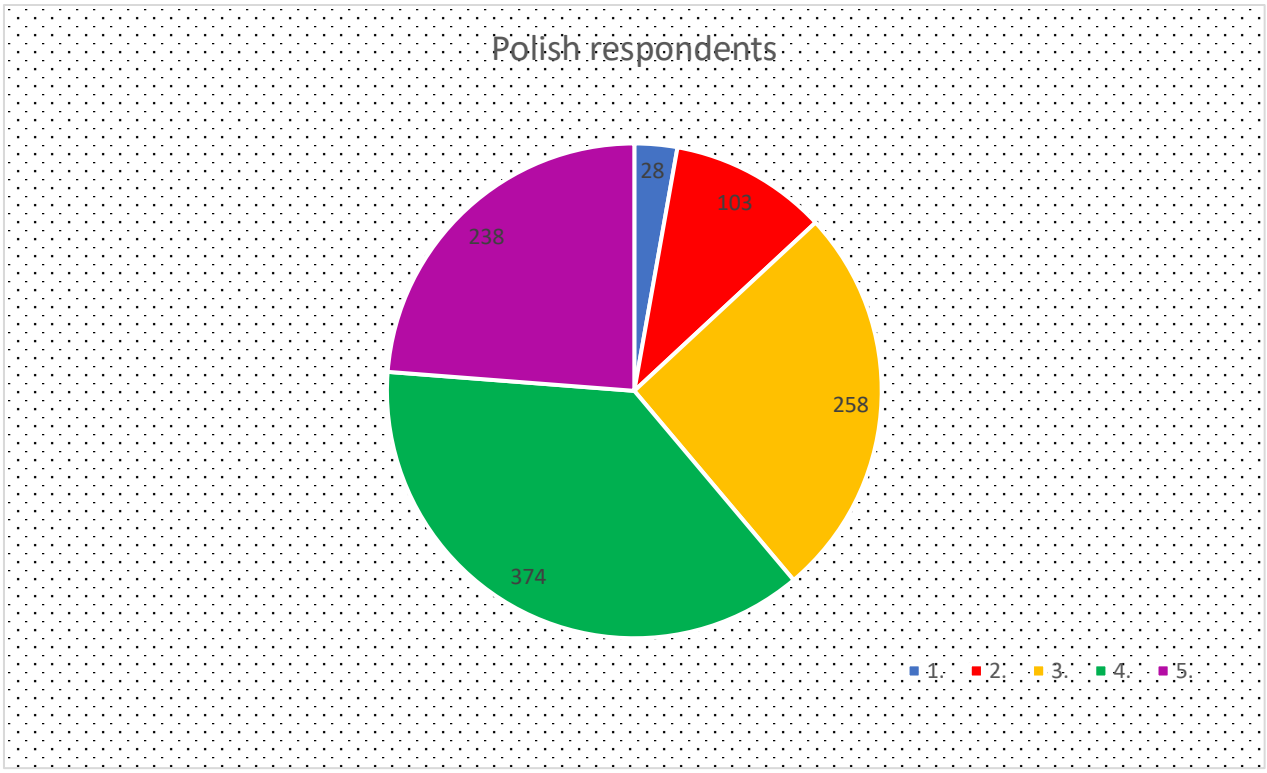


Figure 57 Answers of Polish respondents on the importance of problems with illegal landfills on a scale of 1 – 5 concerning Europe. Number of respondents 1001.

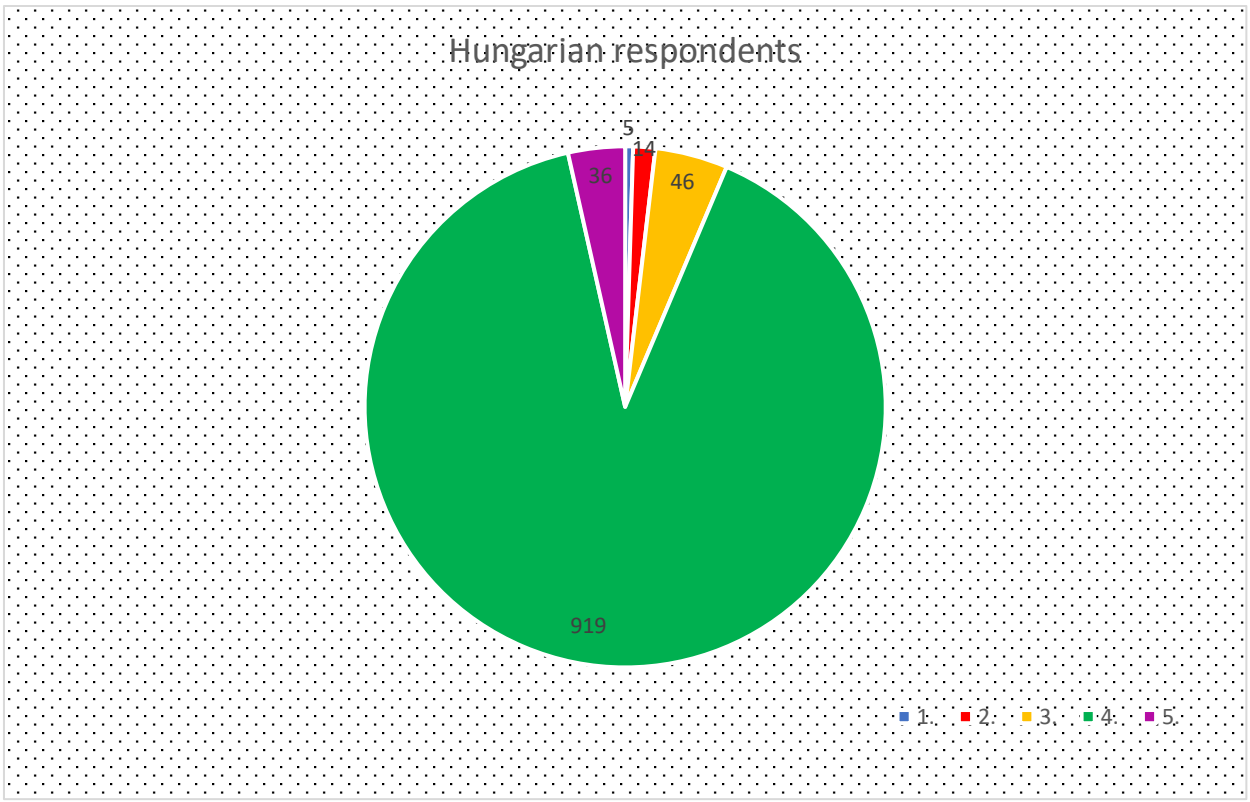


Figure 58 Answers of Hungarian respondents on the importance of problems with illegal landfills on a scale of 1 – 5 concerning their personal lives. Number of respondents 1020.

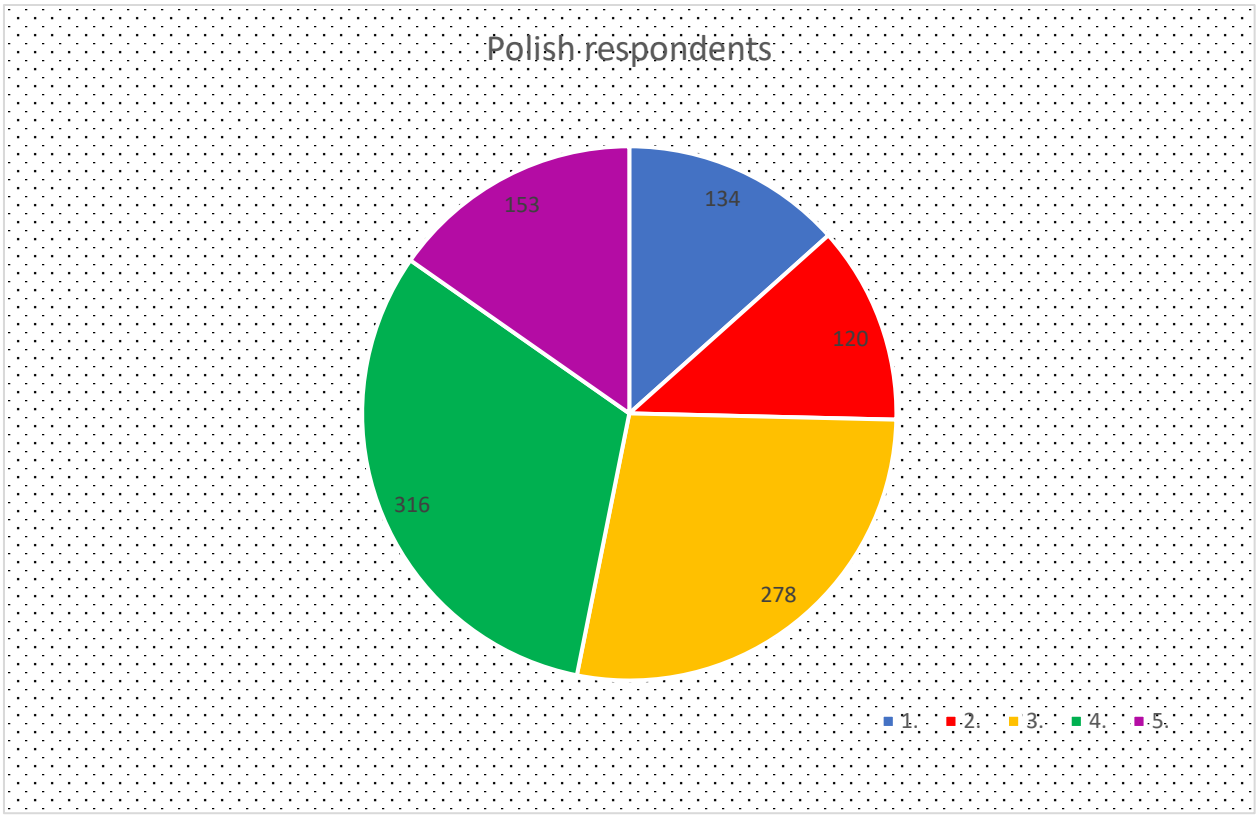


Figure 59 Answers of Polish respondents on the importance of problems with illegal landfills on a scale of 1 – 5 concerning their personal lives. Number of respondents 1001.

The answers at the Hungarian group are as usual, the majority (over 90%) voted for grade 4 and there are no significant differences between the answers given to the question concerning the European/global level (Fig. 56) or the private lives of the respondents (Fig. 58). The picture is more divided on the polish scene: regarding the European context (Fig. 57) 3% of the respondents scored 1, 10% scored 2, 26% choose 3, 37% choose 4 and 24% selected 5 while regarding the impact of illegal landfills on the personal lives of the respondents (Fig. 59), the answers were significantly different: 13% scored 1, 12% scored 2, 28% choose 3, 32% choose 4 and only 15% selected 5. This difference might be explained that in this group of respondents the major part might have been town dwellers while those, who live in peri-urban areas or on those parts of the countryside where there is a higher risk of illegal garbage dumping (i. e. underdeveloped industrial areas, socially deprived territories) are more exposed to this problem.

Heavy dependence on fossil fuels

We have already evaluated many aspects of use of fossil fuels in connection with climate change, air pollution, water pollution, public health and generally all environmental problems, since pollutant discharge to the environment due to fossil fuels is a major component of unsustainable living and a far too big ecological footprint.

Hungary, in view of the recent energy crisis, has intensified its efforts to become independent of Russian fuels and increase the renewable energy and nuclear energy in the energy mix of the country. In the past year, Hungary's total energy supply was 54.3 percent dependent on imports, according to a report prepared by the Hungarian Energy and Public Works Regulatory Office (MEKH) based on preliminary data for 2021, the figure a year earlier was 56.2. However, the import exposure remains high despite the reduction. The value of the indicator improved due to the fact that domestic energy consumption increased, and the use of existing domestic supplies was significant. The amount of gross electricity produced from renewable sources increased by 25.9 percent, and the amount of heat produced from renewable sources increased by 6.1 percent compared to 2020. Primary energy production from solar energy jumped by 52.9 percent. Nearly two-thirds of the gross electricity produced, a total of 63.5 percent, came from carbon-neutral sources, i. e. 44.3 percent from nuclear and 19.3 percent from renewable energy carriers. Compared to 2020, the amount of electricity from renewable sources increased by 25.9 percent, that of nuclear energy by 0.4 percent, and that from fossil energy sources by 1.4 percent.

Poland is the most coal-dependent country in the European Union. Moving away from coal in the energy sector by 2030 would save Poland at least EUR 141 billion, according to a report by the Institute of Energy Economics and Financial Analysis (IEEFA). Poland's Energy Policy until 2040 (PEP 2040) includes a transition plan for coal regions, a nuclear energy program and new offshore wind energy projects. On March 1, 2022, the Council of Ministers adopted a resolution on Poland's raw materials policy. According to it, the share of coal in electricity generation is expected to decrease in 2030 to 56-60%. Fossil fuels will soon be a thing of the past. Poland must strive to increase the share of renewable energy sources, also for the sake of energy security of the state. What is Poland's energy independence based on? This is a key issue in the context of the Russian invasion of Ukraine.

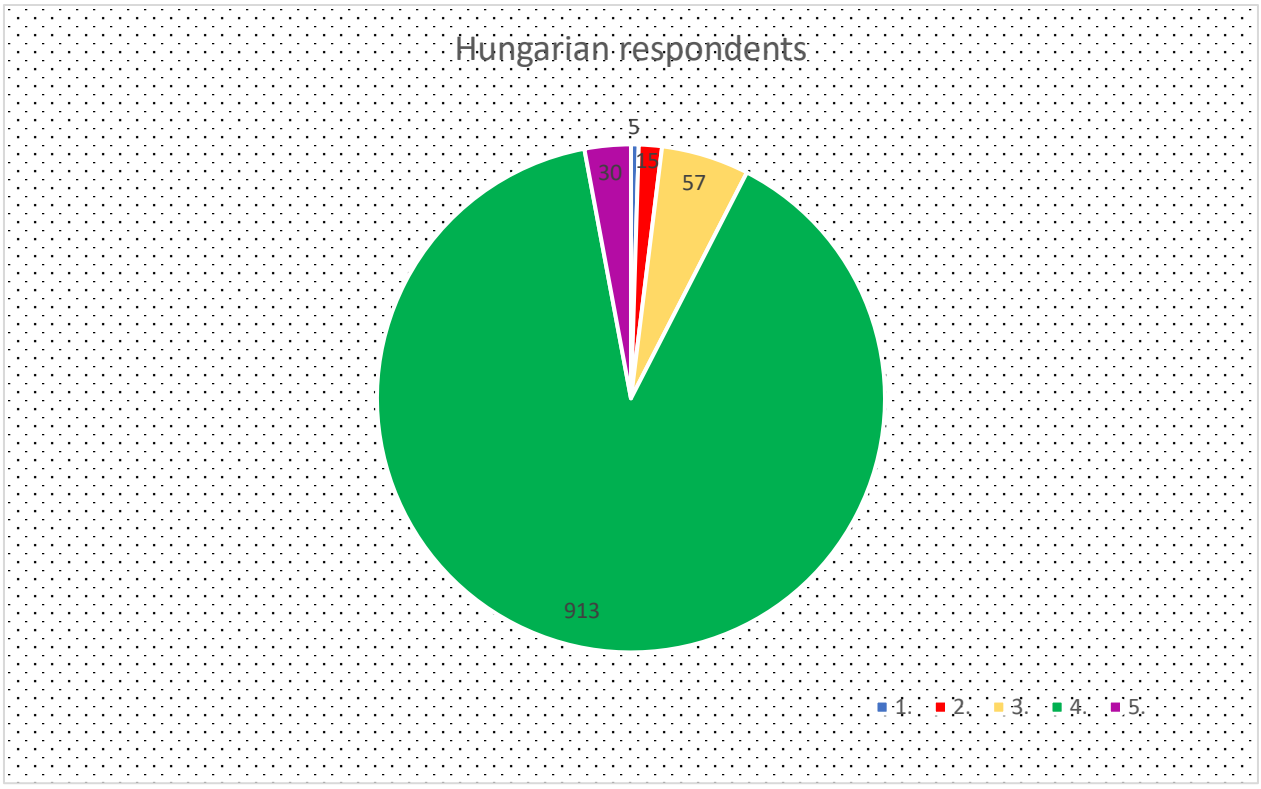


Figure 60 Answers of Hungarian respondents on the importance of too heavy dependence on fossil fuels on a scale of 1 – 5 concerning Europe. Number of respondents 1020.

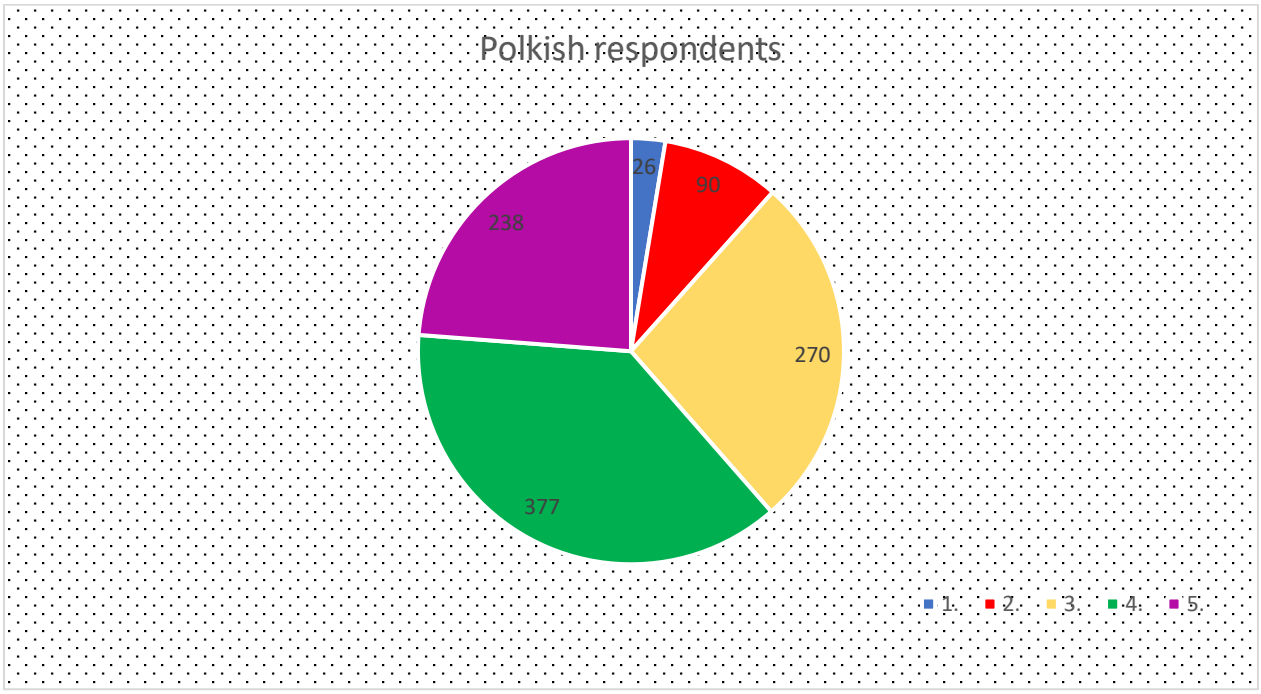


Figure 61 Answers of Polish respondents on the importance of too heavy dependence on fossil fuels on a scale of 1 – 5 concerning Europe. Number of respondents 1001.

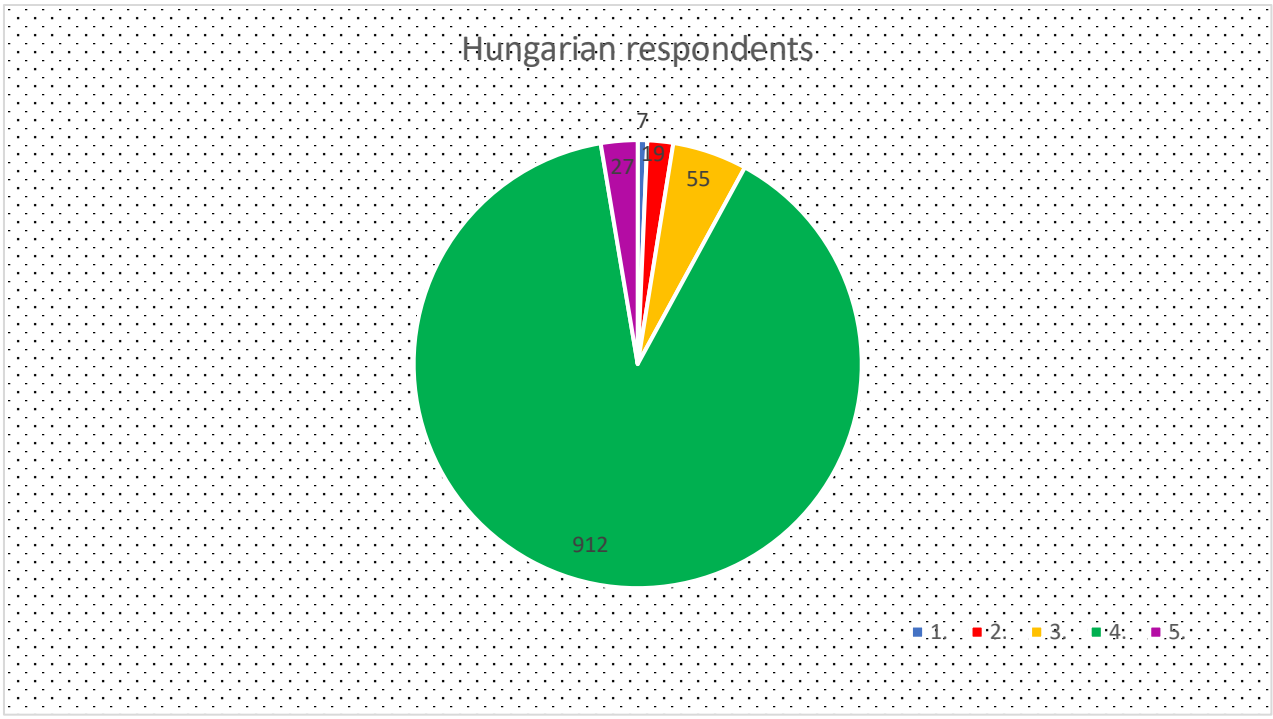


Figure 62 Answers of Hungarian respondents on the importance of too heavy dependence on fossil fuels on a scale of 1 – 5 concerning their personal lives. Number of respondents 1020.

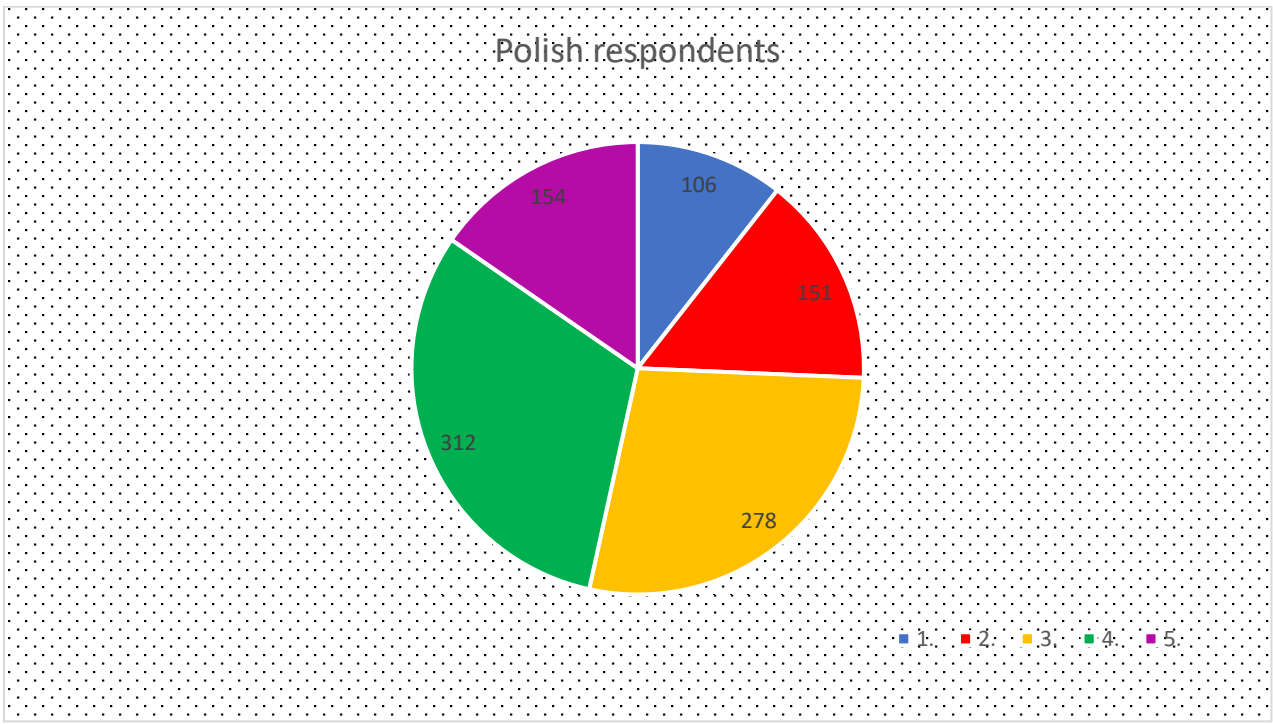


Figure 63 Answers of Polish respondents on the importance of too heavy dependence on fossil fuels on a scale of 1 – 5 concerning their personal lives. Number of respondents 1001.

The answers at the Hungarian group are as usual, the majority (over 90%) voted for grade 4 and there are no significant differences between the answers given to the question concerning the European/global level (Fig. 60) or the private lives of the respondents (Fig. 62). The picture

is more divided among the Polish respondents: regarding the European context 3% of the respondents scored 1, 9% scored 2, 27% choose 3, 37% choose 4 and 24% selected 5 while regarding the impact of heavy dependence on fossil fuels on the personal lives of the respondents, the answers were significantly different: 11% scored 1, 15% scored 2, 28% choose 3, 31% choose 4 and only 15% selected 5. This difference might be explained that Poland's dependence on fossil fuels, particularly on coal is still substantial and in the mining regions there is a fear of job losses due to the future closure of coal mines.

Insufficient development of renewable energy sources

This is almost a control question to the former which concerned the heavy dependence on fossil energy sources. It is obvious, that the way out of fossil dependence is via the fastest possible development of renewable energy sources and, due to a vast technological development, which guaranteed much safer nuclear energy power plants, the renaissance of clean nuclear energy.

Between 2004 and 2013, the share of renewable energy in Hungary rose from 4.4 to 16.2%, and in 2012 and 2013 it already exceeded the 14.65% target set for 2020. After that, the value of the indicator decreased, to 12.6% by 2019, which is very unfavourable and a process that goes against the trends of the European Union. Within the total energy production, the amount of energy produced from renewable energy sources and waste increased from 71 to 127 PJ between 2005 and 2019. Renewable energy sources are used primarily in the production of heat and electricity, and to a lesser extent as biofuel. In our renewable energy production, it is very significant, although the dominance of biomass has moderated in recent years. Its share in total renewable production decreased from 91 to 68% between 2005 and 2019. In the indicated period, the largest expansion was characterized by the production of biofuels, which increased from 0.1 PJ to 20 PJ, and its share increased from 0.1% to 16%. The share of other energy sources is 17%. Since 2005, the share of biogas-based energy production has increased from 0.4 to 3.0%, geothermal energy from 5.1 to 5.2%, solar energy from 0.1 to 4.6%, wind energy from 0 rose from .0 to 2.0%. However, the share of hydropower decreased (from 1.0 to 0.6%), although its production increased in terms of volume.

December 2021 in Poland brought a spectacular increase in electricity demand from 14.9 TWh in November to 16.2 TWh. It was the highest monthly energy consumption recorded in ENTSO-E statistics. This has its economic and environmental consequences, which become more obvious when we look at the monthly trends from the perspective of the whole year, and even from the perspective of the last three years disrupted by the pandemic. Taking into account

the whole of 2021, the domestic demand for electricity increased by 5.7 pp. compared to last year. Coal-fired power plants (76%) had a dominant share in energy production in December, including lignite (28.3%) and hard coal (47.7%), with lignite growing by 3.8 pp., and a stone drop of 2.8 pp. The third source of energy were wind farms, which accounted for 11.6% of the total. (decrease by 0.2 pp., despite an increase in generation m/m by almost 100 GWh).

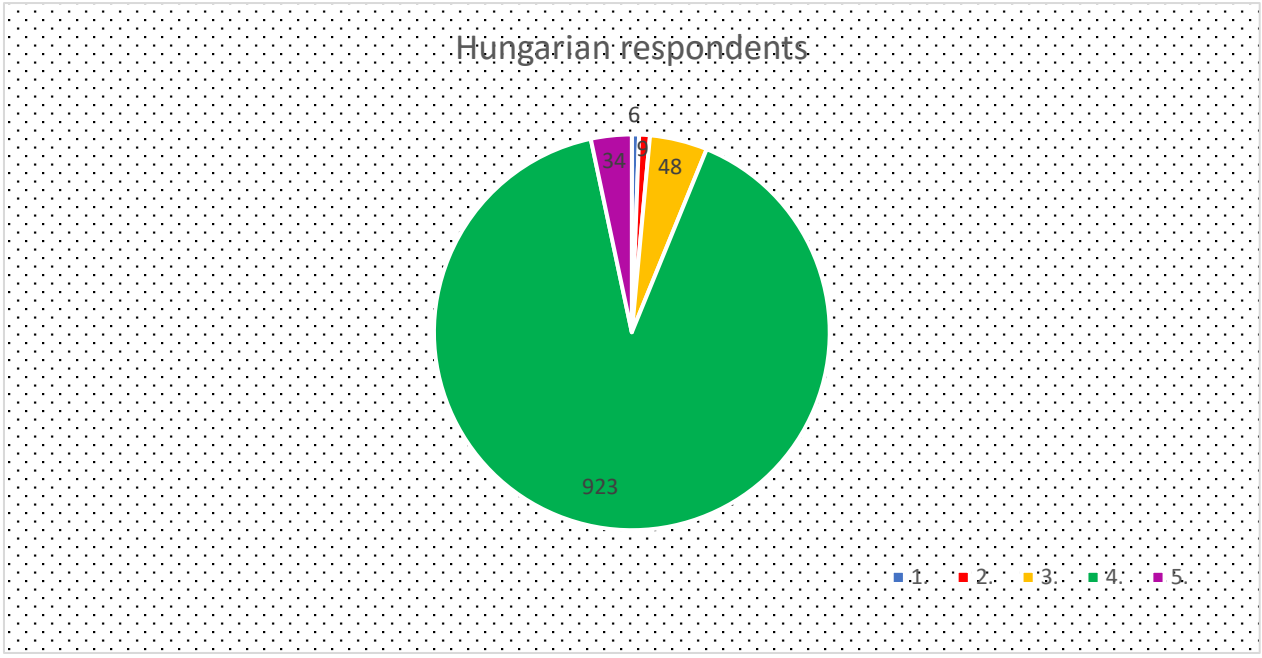


Figure 64 Answers of Hungarian respondents on the importance of insufficient development of renewable energy sources on a scale of 1 – 5 concerning Europe. Number of respondents 1020.

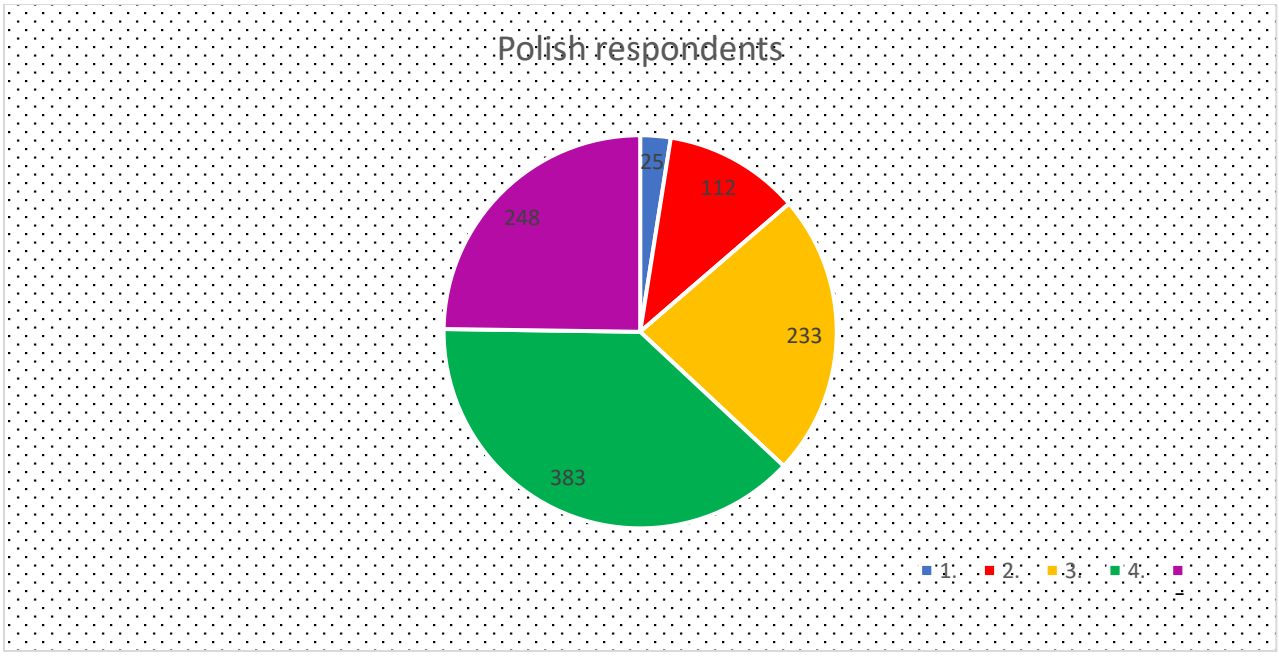


Figure 65 Answers of Polish respondents on the importance of insufficient development of renewable energy sources on a scale of 1 – 5 concerning Europe. Number of respondents 1001.

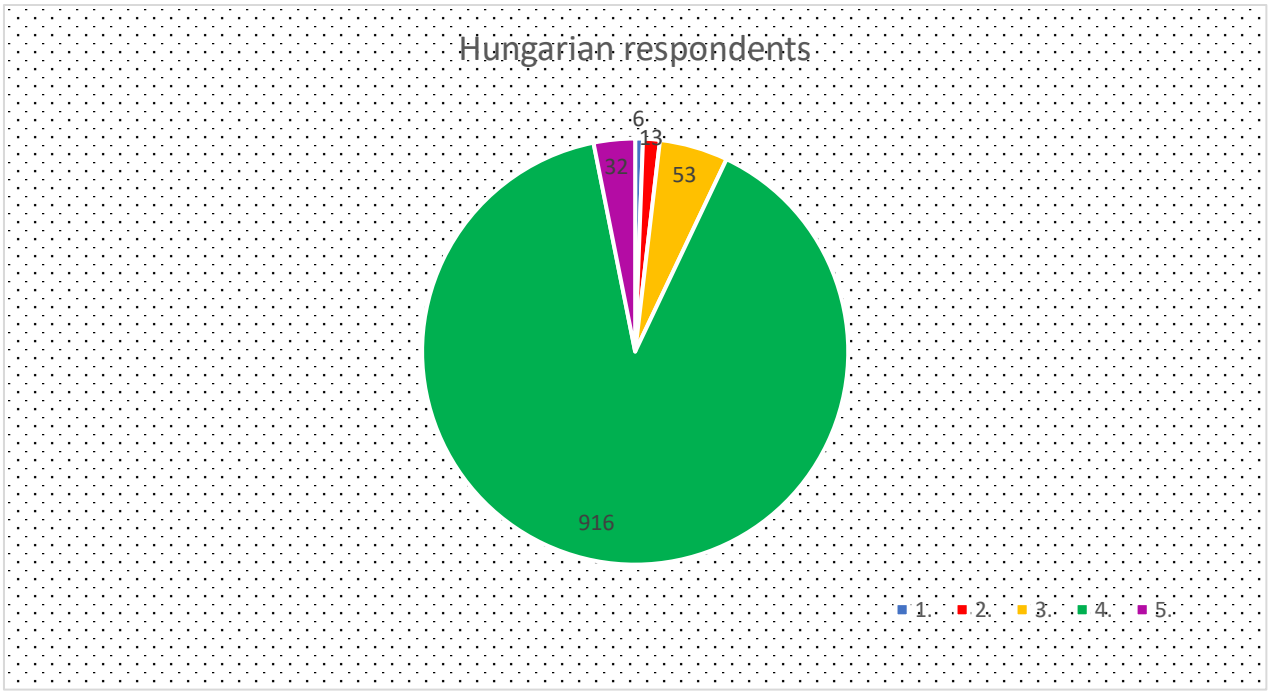


Figure 66 Answers of Hungarian respondents on the importance of insufficient development of renewable energy sources on a scale of 1 – 5 concerning their personal lives. Number of respondents 1020.

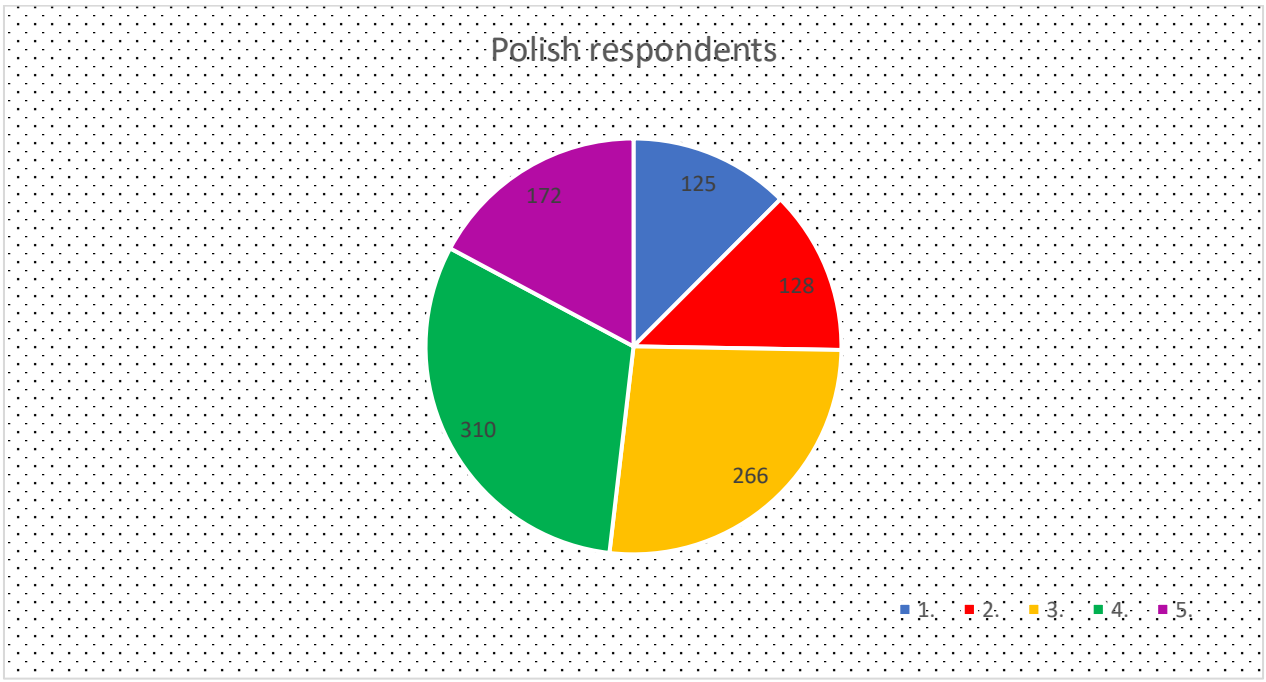


Figure 67 Answers of Polish respondents on the importance of insufficient development of renewable energy sources on a scale of 1 – 5 concerning their personal lives. Number of respondents 1001.

Since this question is very closely related to the previous one, it is not surprising that the answers are more or less identical. The answers of the Hungarian group are as usual, the majority (over 90%) voted for grade 4 and there are no significant differences between the answers given to the question concerning the European/global level (Fig. 64) or the private lives of the respondents (Fig. 66). The picture is more divided among the Polish respondents:

regarding the European context 3% of the respondents scored 1, 11% scored 2, 23% choose 3, 38% choose 4 and 25% selected 5 while regarding the impact of heavy dependence on fossil fuels on the personal lives of the respondents, the answers were significantly different: 12% scored 1, 13% scored 2, 27% choose 3, 31% choose 4 and only 17% selected 5. This difference might be explained that Poland's dependence on fossil fuels, particularly on coal is still substantial and in the mining regions there is a fear of job losses due to the future closure of coal mines.

Extinction of species (reducing biodiversity)

Even now, Hungary is abundant in plant and animal species, more than 80 plant species and dozens of fish species cannot be found anywhere else on Earth. Thoughtless developments seriously threaten the habitat of many protected species. Linear installations lead to the fragmentation of habitats, increasingly intensive agriculture narrows the habitat of species associated with grassland habitats, and certain investments planned on rivers may pose a threat to floodplain forests and fish species of European Union importance. WWF calls on the Government to treat the fulfilment of the National Basic Plan for Nature Conservation as a priority task in the Year of Biodiversity. For this, it is not only necessary to secure resources, but also to have a strong, independent nature conservation institutional system.

In Poland, attaching a great importance to the protection of biodiversity is forced by the fact that in the 20th century and in the first decade of the 21st century, the otherwise natural processes of extinction of species and shrinking of their ranges accelerated extremely as a result of human activity. The negative changes they cause in many places threaten the stability of ecosystems, threaten the disappearance of valuable natural habitats and species, and may significantly limit the development opportunities of these areas.

The Red Book series in Poland is a register of selected endangered animal and plant species in Poland, created on the model of the international Red Book of Threatened Species. It contains a list of endangered animal and plant species with a detailed description and distribution maps. It also defines the degree of threat to individual species, their rarity and the applied and proposed methods of protection. For Poland, the Red Book of Animals and the Red Book of Plants are being developed by the Institute of Nature Conservation of the Polish Academy of Sciences in Krakow, in cooperation with several dozen scientists from all over Poland. Furthermore, the Red Lists of Threatened Species contain a full register of endangered species along with their classification into the appropriate category of threat, but unlike the Red Books,

they do not describe individual species. The latest edition of the Red List of Plants of Poland entitled The Polish red list of ferns and flowering plants, published by the Institute of Nature Conservation of the Polish Academy of Sciences, dates from 2016.

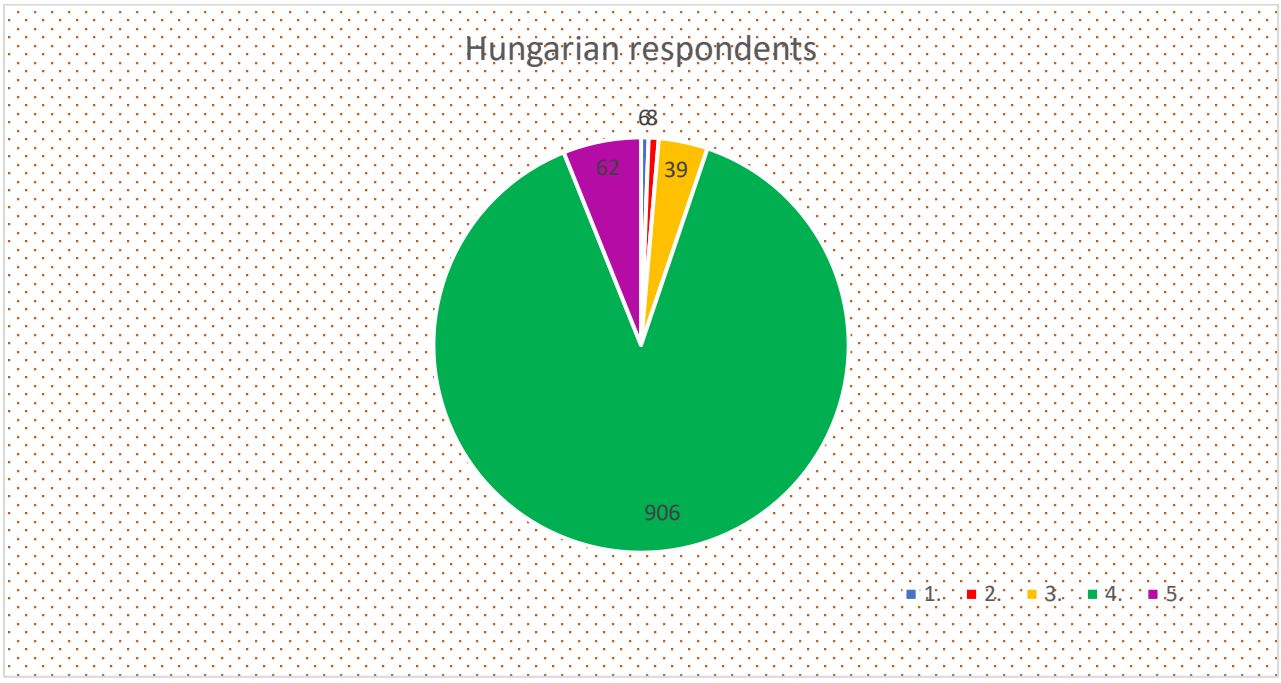


Figure 68 Answers of Hungarian respondents on the importance of loss of biodiversity on a scale of 1 – 5 concerning Europe. Number of respondents 1020.

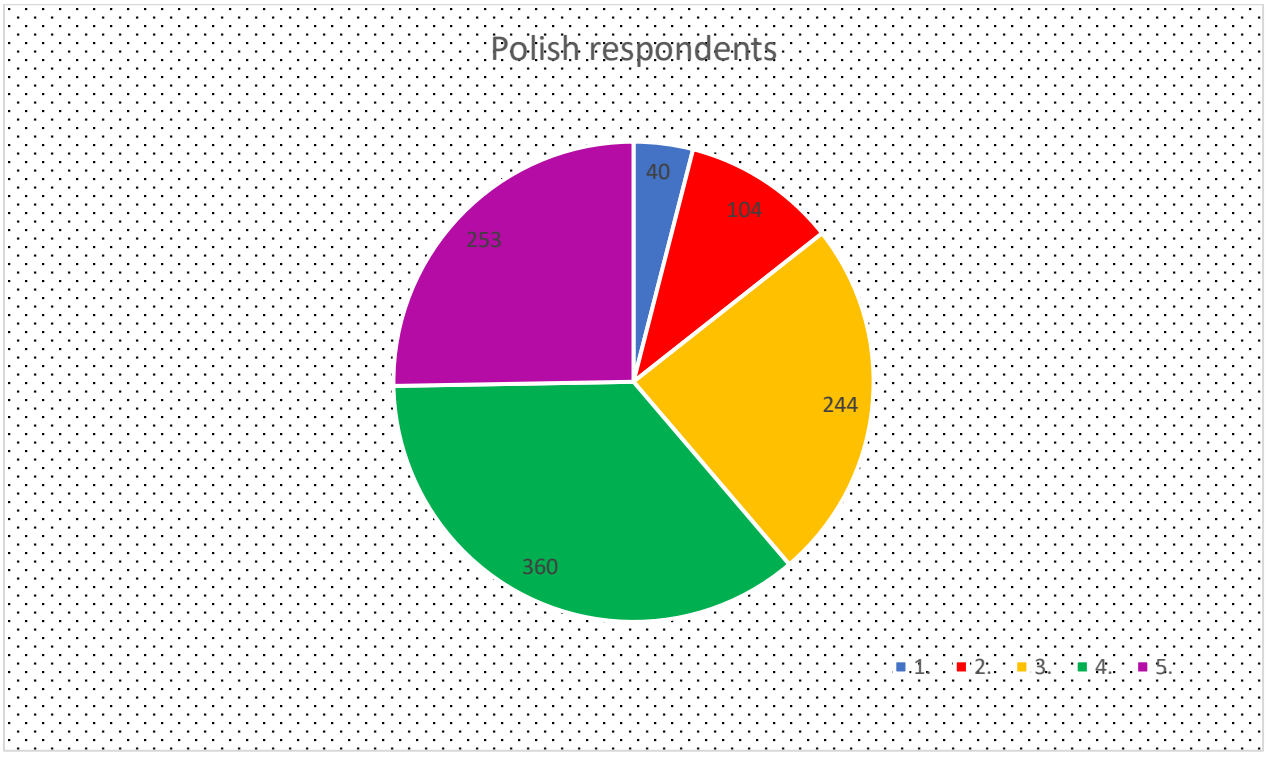


Figure 69 Answers of Polish respondents on the importance of loss of biodiversity on a scale of 1 – 5 concerning Europe. Number of respondents 1001.

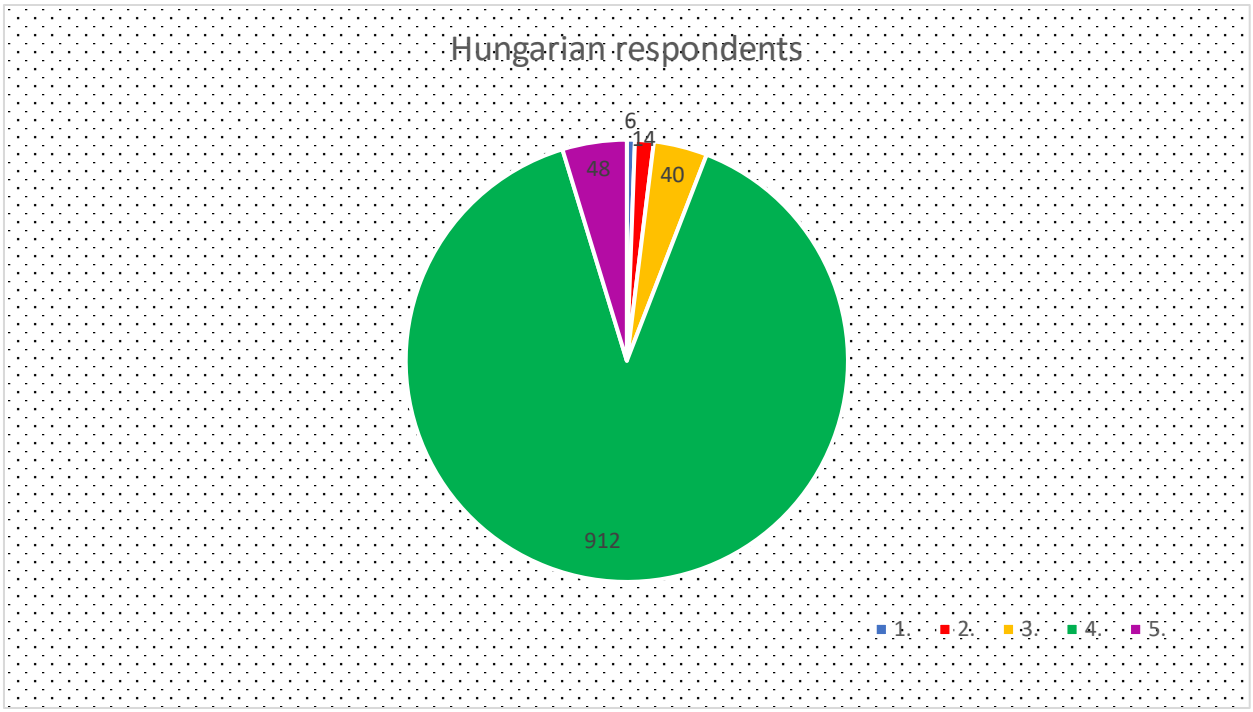


Figure 70 Answers of Hungarian respondents on the importance of loss of biodiversity on a scale of 1 – 5 concerning their private circumstances. Number of respondents 1020.

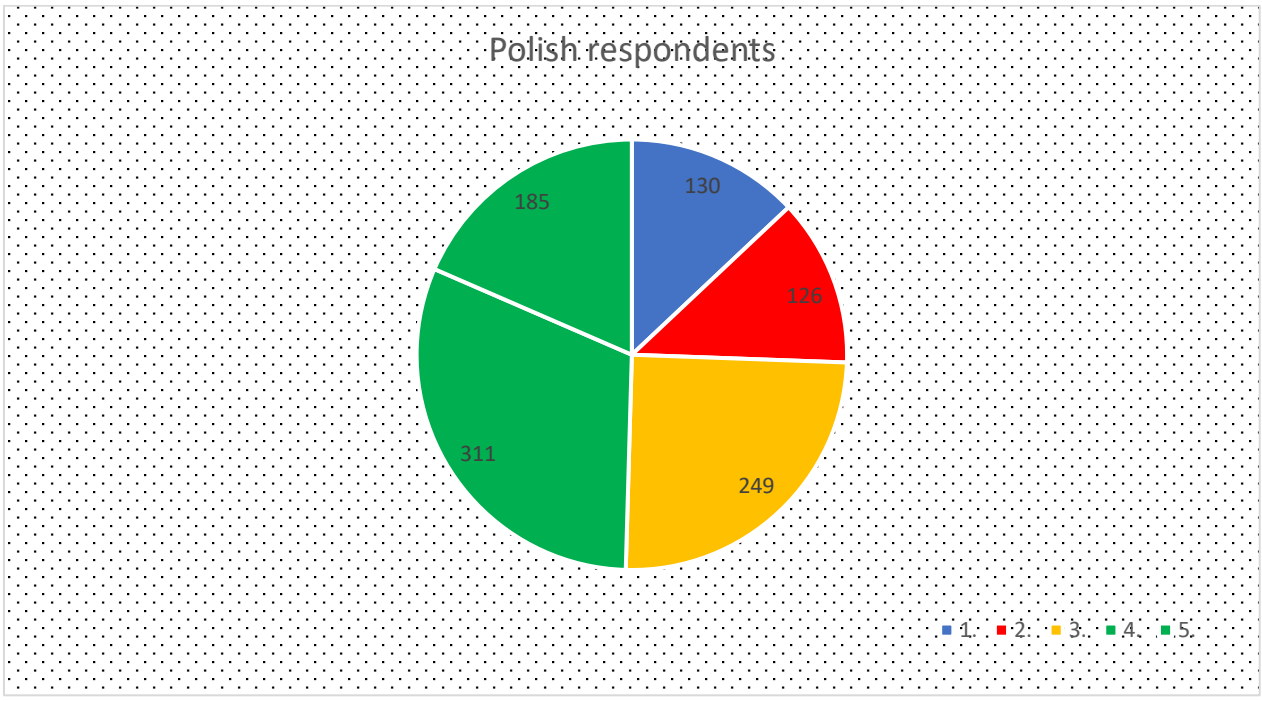
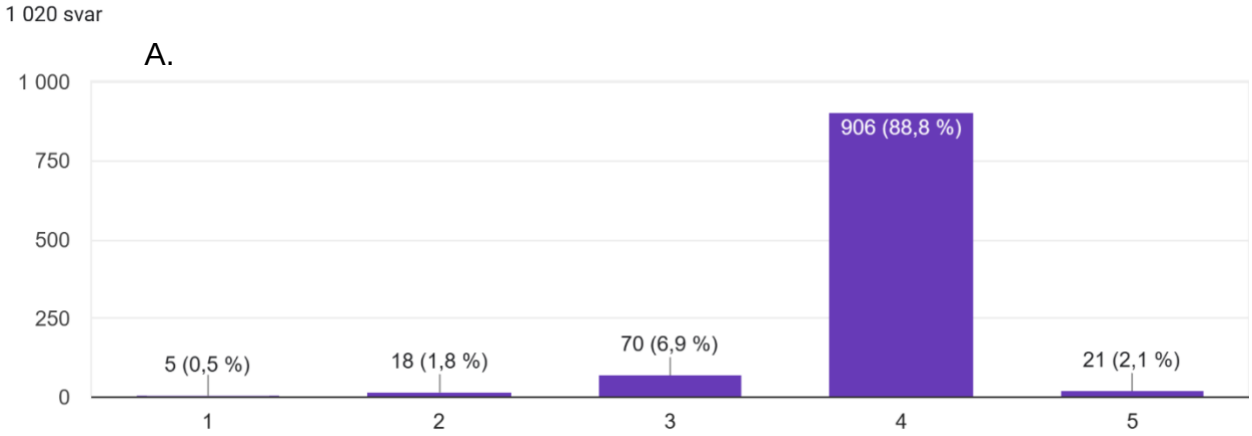


Figure 71 Answers of Polish respondents on the importance of loss of biodiversity on a scale of 1 – 5 concerning Europe. Number of respondents 1001.

The last question regarding biodiversity is very closely related to all the previous previous questions, since the loss of biodiversity is the synthesis and the consequence of all the environmental problems. The answers of the Hungarian group are as usual, the majority (over 90%) voted for grade 4 and there are no significant differences between the answers given to

the question concerning the European/global level (Fig. 68) or the private lives of the respondents (Fig. 70). The picture is more divided among the Polish respondents: regarding the European context (Fig. 69) 4% of the respondents scored 1, 10% scored 2, 24% choose 3, 36% choose 4 and 25% selected 5 while regarding the impact of loss of biodiversity on the personal lives (Fig. 71) of the respondents, the answers were significantly different: 13% scored 1, 12% scored 2, 25% choose 3, 31% choose 4 and only 18% selected 5. The difference between the sensitivity to global and local problems proved to be statistically significant in some cases: in many aspects global environmental problems overall worry the respondents more than local or national environmental problems, unless their living space directly affected with visible impacts for everybody. The problems causing the greatest concern were air and water pollution, the pollution of the oceans with plastic waste, while people were less concerned about the local garbage problem – probably due to a much wider media coverage.

The 3rd question was a self-assessment of the respondents concerning their knowledge about sustainable development (Fig. 72 A and B).



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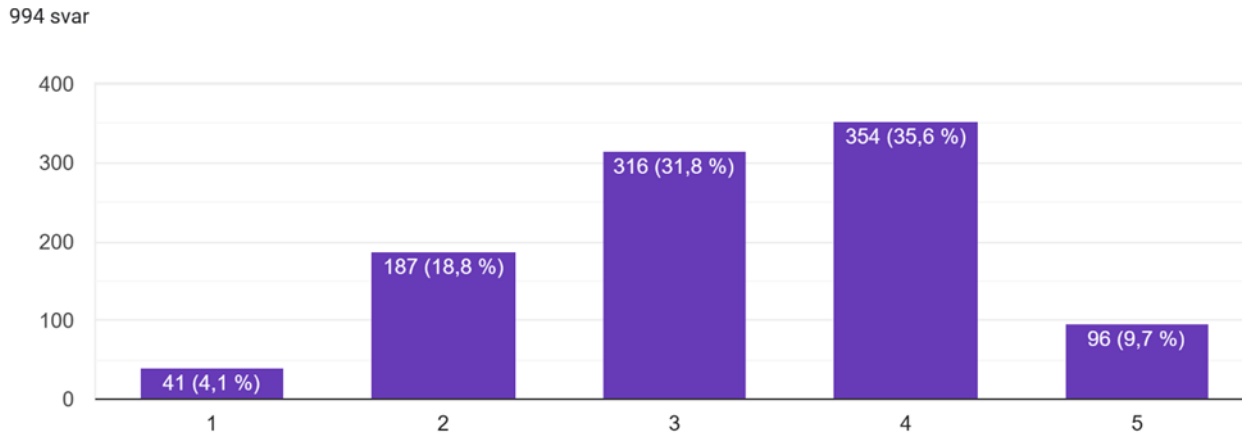

Figure 72 Answers to the question: Please rate your level of knowledge about sustainable development, its objectives and related principles on a scale from 1 to 5, where 1 means you have no knowledge and 5 means you have complete knowledge. A = Hungarian B = Poli

1. Sustainable development goals

Regarding the relevance of Sustainable Development Goals, the evaluation of Hungarian respondents shoved again a majority of very important (4) scores, while the Polish respondents had a more variable distribution of answers, even here, the majority gave 3, 4 and 5 scores to all of the SDGs.

2. Self-assessment of respondents regarding their knowledge of the European Green Deal

Regarding the knowledge of respondents about the European Green Deal, the answers of the Hungarian group (A) were at level 4 (88.4 %) while the Polish group (B) showed a more variable distribution of answers. The differences between the Hungarian and the Polish respondents might indicate a bias probably due to the composition of the respondents regarding their social status, age, and use of Internet.

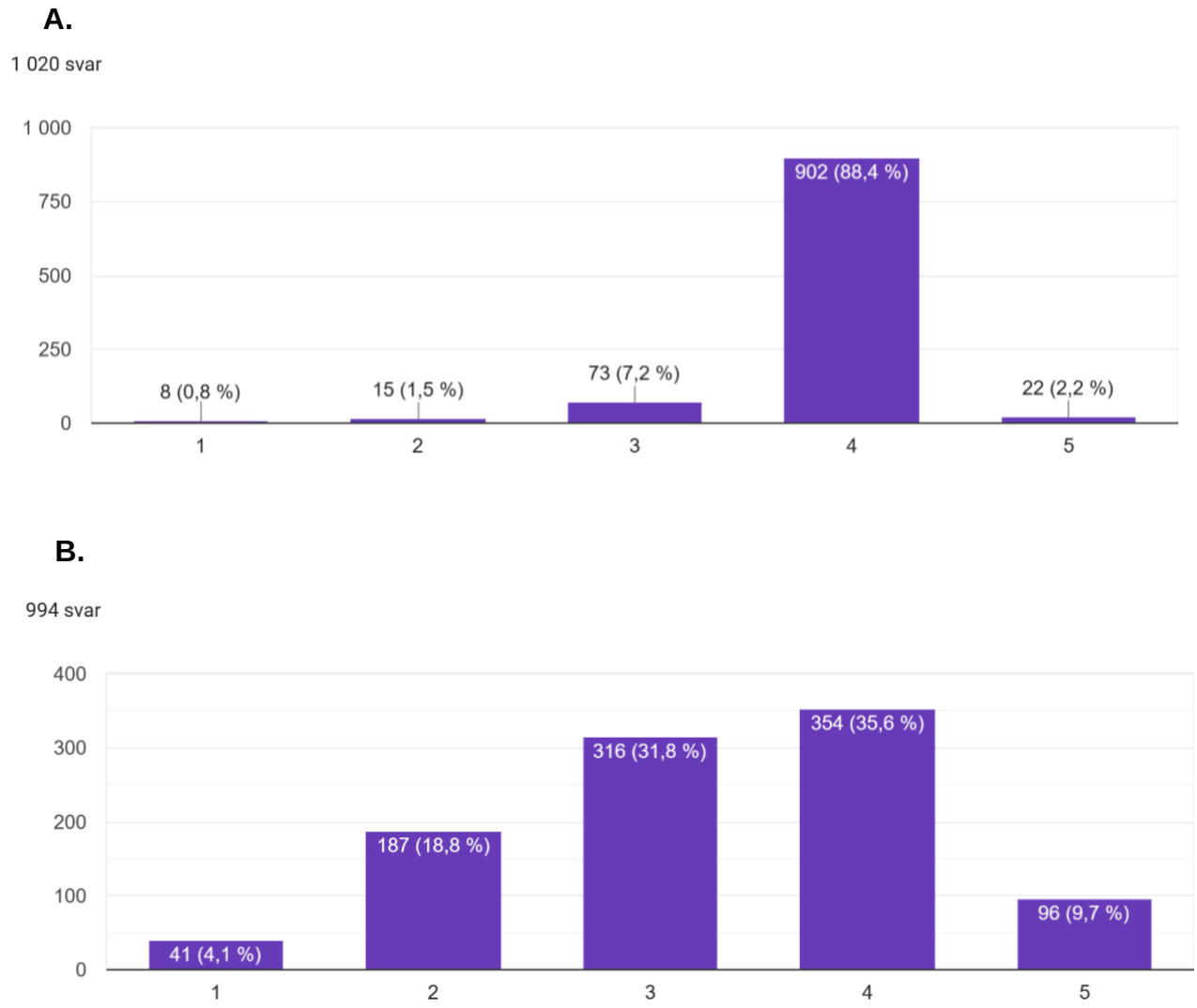

Figure 73 Please rate your level of knowledge about the European Green Deal on a scale from 1 to 5, where 1 means no knowledge and 5 means full knowledge.

It is likely, that the majority of the Hungarian respondents came from Budapest, quite a large percentage of them were students at college or university. It is also interesting, that the Hungarian respondents gave a score 4 to the question concerning the trust in the political decision makers' ability and intention of using European Union funds for realizing the sustainable development goals and compliance with the European Green Deal. Among the Polish respondents this number was more variable, but their majority approved the actions of their political leaders, although the answers were divided from 3 to 5 providing a fairly positive evaluation (Fig. 19).

3. *Efficiency groups/organisations/authorities of using EU-funds for environmental protection and conservation.*

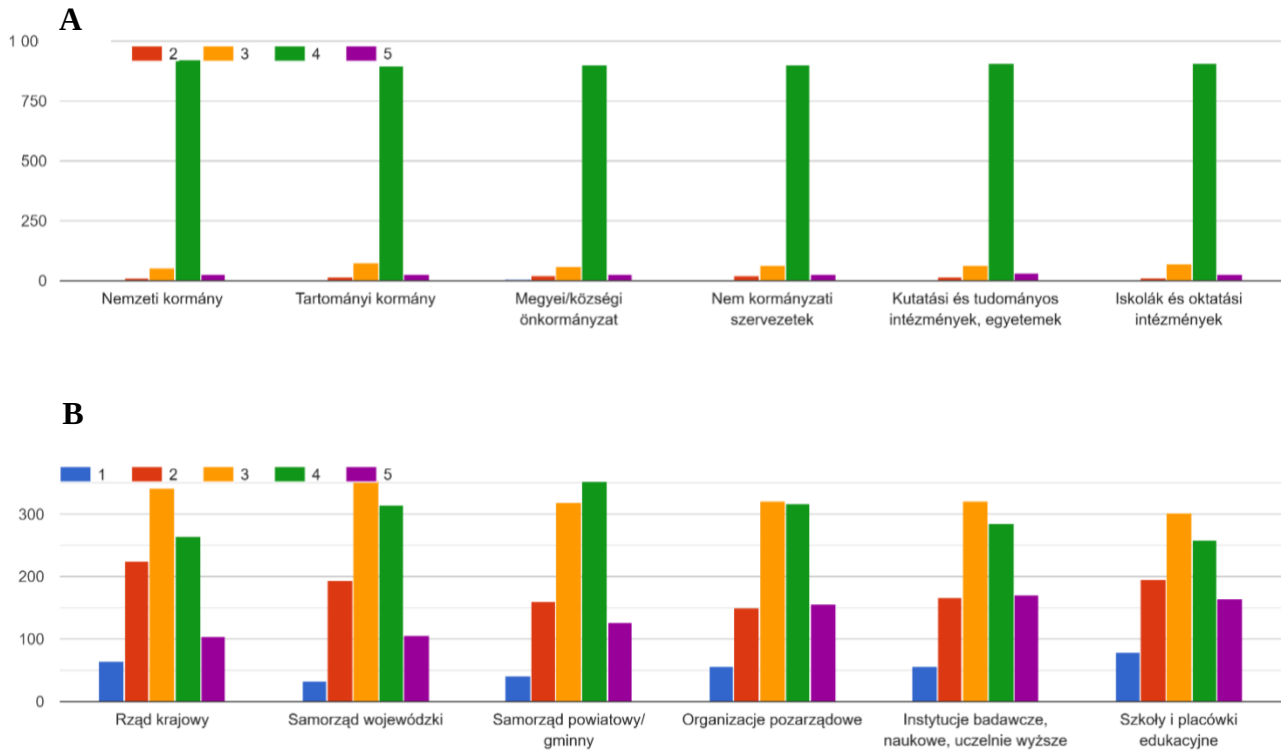

Figure 74 Question: Please rate the effectiveness of the use of EU environment protection/nature protection funds by the groups/organizations listed below on a scale from 1 to 5, where 1 means no and 5 means very good and effective use. Hungary A, Poland B

4. *Preferences of shopping – freedom of choice and price*

Here we need to look at the principles of environmentally conscious shopping behaviour. The most important parameters embrace the factors, which may govern our choices, such as opinion of other buyers, local product, healthy or not – in many cases organic or not, local / national product or import, energy saving or not, etc. The freedom of choice is there, but it is greatly influenced by the knowledge of the buyer and the price of the product.

Let's listen to our actual needs, i. e. don't buy things unnecessarily. After all, everything we buy was created at the cost of material and energy consumption, so that in the end (after a shorter or longer time) it becomes waste. Advertisements and promotions all tempt us to buy, even if we don't really need it. They persuade us to replace our functional devices, since we can buy a much better, more fashionable device "only here and only now" for less. Promotions are also important to retailers because they lure people into the store, and once they're there, they're sure to buy something else.

It is therefore a very important step to assess our own needs in the first instance - this is made difficult by advertisements and social pressure, which want to awaken more and more

fabricated needs in us - which we can do, for example, by creating a weekly menu and shopping list. In addition, you need to understand the mechanisms of advertising and promotions. How do they want to affect us? Why do they keep changing the layout of the stores? Is there really a discount, or are they just trying to make us believe? If we get to know the little tricks, they use to encourage us to make unnecessary purchases, it will be easier to defend against them.

Material. When we buy something, we should pay attention to what it is made of and how it is made, how it is packaged, how far it came from, how durable it is, who made it, how much and what kind of (e. g. dangerous) waste will be generated when we no longer use it. It is very difficult to make a perfect decision, because it is rarer that we can meet all aspects - and we can even afford it. Eco-friendly shopping is always a matter of consideration, so here are some points to consider.

Distance. Let's get used to consuming domestic products! In the era of globalization, many products arrive in domestic stores from distant countries or contain raw materials from long distances. The transport of products – especially by road and air – involves an alarming level of environmental pollution. According to a study by the Ökoinstitut in Freiburg, a fruit yogurt available in Germany travels an average of 3,800 km before the raw materials reach the processing plant and then on to the consumer. In addition to giving preference to local, domestic products, it is not only that we support local industry and jobs, but also that if transport distances are reduced, environmental pollution will be significantly less.

Nowadays, there are several "goods intermediaries" between the producer and the consumer (e. g. processor, wholesaler, retailer), which makes their relationship impersonal. Therefore, an important principle of environmentally conscious consumption is also to support efforts that aim to shorten this chain. Such are the local community systems, such as the "box systems" successfully used in many parts of the world. The essence of these is that the community of customers enters into a contract with an agricultural producer (mostly an organic farm), which supplies a specified quantity of vegetables and fruits (small or large boxes) on a regular basis (weekly, fortnightly) to a member of the community, who undertakes the temporary storage of the crops. The others can receive their own boxes from him. In return, members of the community can visit the farm and even take on seasonal work there. The system thus ensures mutual benefits: the buyer regularly gets goods from a known source at a predetermined price, and the producer can be certain that he can sell his produce favourably. The so-called organic markets are also spreading, here too you can get domestic seasonal products directly from the

producers. Another positive initiative is "Pick yourself", when we can visit the producers ourselves and harvest the fruits.

Packaging. 30-50% of household waste is packaging waste, which means more than 100 kg per person per year, which mainly consists of lightweight plastic and paper. The advantage of the products available in stores is covered by a significant amount of excess packaging, which ends up in the trash almost immediately after reaching households. Apart from the tube of toothpaste, it is often protected by a cardboard box, bonbons are hidden among shiny and flashing papers, pop plastic and kilometers of bows, each slice of flat cheese is covered with plastic film, and the fruit is offered on a foamed tray wrapped in a variety of plastic films. This exaggerated packaging helps to make the product salable, but during their production they waste a lot of raw materials and energy, and then end up multiplying the mountains of waste. Let's not forget that as consumers we actually pay twice for the packaging material: first in the store - since it is included in the price of the product - and then in the form of a garbage fee. The environmentally conscious customer prefers packaging-free products. If this is not possible, reusable packaging (e.g. glass with a deposit fee), and if this is not available, then single-use, recyclable packaging materials (primarily glass, metal, paper).

Life. Choose products that we can use as often and for as long as possible. Environmentally conscious consumption is not about quantity, but about quality. When purchasing, consider the offered warranty period (the longer the better), the repairability and whether it can be recycled as waste. Durable products usually cost more than their lower-quality counterparts, but they pay off in the long run. A high price does not necessarily mean better quality! Before buying, we always inquire about customer experiences. In the age of the Internet, we can easily access this information.

Product markings. Look for environmentally friendly products and packaging, but be careful with these as well, since the labels "eco", "bio", "environmentally friendly" are used everywhere today. Always think about what these indicators mean in the case of the given product and packaging. According to surveys, Hungarian consumers have the ability to buy environmentally friendly products and are willing to pay a few percent more for them. However, the real trouble begins when manufacturers - taking advantage of the growing ecological sensitivity of consumers - provide false or misleading information about their products. But even if the advertisement has real content, it should not give consumers the baseless impression that the product does not pose any danger to the environment (as if there is an environmentally friendly car), and the more environmentally friendly the consumer is, the more he consumes" from the

product. Environmentally friendly products only make sense if they authentically help consumers find their way around. If the logo really indicates that the production and entire life cycle of the product has been designed to cause as little damage to the environment as possible, then it makes sense for the customer to look for products marked with the logo, and as demand increases, manufacturers and retailers will also be interested. in order to increase the offer of environmentally friendly products and services. If all these conditions are met, environmentally friendly signs can really contribute to improving the state of the environment.

On the market, we can find several product designations. The three large groups of labelling are the following: trademarks certified and issued by an official body (e.g. the domestic Environmentally Friendly Product trademark); the trademark issued by the manufacturer (at his own risk) (e.g. the freon-free sign on the refrigerator); a signal issued by a third party based on a set of criteria (e.g. UTZ).

Ethical consumption. One of the major disadvantages of globalization is that producers and consumers can be separated by continents, so the customer has absolutely no insight into the conditions under which the products that end up on his table were produced. Our consumer society as we know it today is due to this detachment, because if we could see first-hand the harmful effects of our consumption on the living conditions of our fellow humans, the natural environment, and the animal world, we would most likely not buy so much. Cheap mass products also have a high price, but we don't pay it - or only indirectly. We owe fast fashion, for example, to the fact that Asian workers (mainly women and even children) work 12-16 hours a day for starvation wages. Palm oil is also practically found in more and more food and cosmetic products. However, for their production, 5 Margaret Island rainforests are cleared by burning every day, thereby increasing climate change and the extinction of many animal species. One of the main representatives of ethical consumption is an association based in Great Britain, which examines one product group at a time in the Ethical Consumer magazine. More specifically, it examines how ethical business policies the companies producing the given product group pursue in terms of environmental, animal protection, human rights and some other social aspects. For example, they investigate how often and how much the company has to pay environmental fines, whether it distributes products produced using animal experiments, and whether it has interests or investments in countries where dictatorships are in power? Experience usually shows that multinational companies in most cases have a less ethical business policy, which is why it is worth choosing products from smaller, local companies.

Thus, the conscious buyer takes into account not only environmental protection but also ethical aspects.

The importance of individual action. We often hear the argument that what matters is the individual's choice, once the manufacturers stick to their products and the retailers do not change their offer. We can answer this by saying that everyone is responsible for what they choose. Anyone who cares about protecting the environment should do what they can, even if they don't yet see the effects of their actions. Change will only happen if enough of us vote with our actions in favour of protecting the environment. We will only be many if everyone individually says yes. There have been several boycotts in the world that have become truly mass and therefore successful. The Nestlé company first came under fire in the 80s for its irresponsible advertising of baby formula. Aggressive campaigns were carried out especially in developing countries. They distributed free samples, visited maternity wards in hospitals and supported them, creating the impression that formula is healthier than breastfeeding. "Replacing" breast milk with formula in areas where there is not enough clean drinking water is very dangerous. As a result of the multi-year boycott, the World Health Organization created a code of ethics for the marketing and advertising of breast milk substitutes. However, it came into focus again in the 2010s, when Greenpeace called on customers to sign petitions and send e-mail messages to Nestlé to stop using palm oil, the production of which endangers the rainforest and its inhabitants. As a result of the pressure, Nestlé changed its business policy.

European consumers order more online and try to shop locally as often as possible, according to a survey by the European Commission, which measured consumer experiences in 23 economic sectors during the Covid-19 epidemic. According to a report published in March, consumers made more green decisions during the pandemic, meaning they were willing to pay more for environmentally friendly products. This also confirms that sustainability and environmental awareness are increasingly attractive buzzwords when shopping, which businesses try to convey to consumers with so-called "green statements". However, the question is whether everything is as green as it seems.

The difference between the Hungarian and Polish respondents is large in this case, the main part of the Hungarian group answered yes to questions – probably because they did not consider them contradictory (Fig. 75).

Ironically, concerning their willingness to pay more for an environmentally friendly product, the Hungarian respondents were much more uncertain, almost everybody (96.1%) answered that it was difficult to decide… The Polish respondents were more resolute, in their case only 30.6% was uncertain, 37.1% refused to pay more for an eco-product, while 32.4% was ready to pay more money for an environmentally sustainable product (Fig. 76).

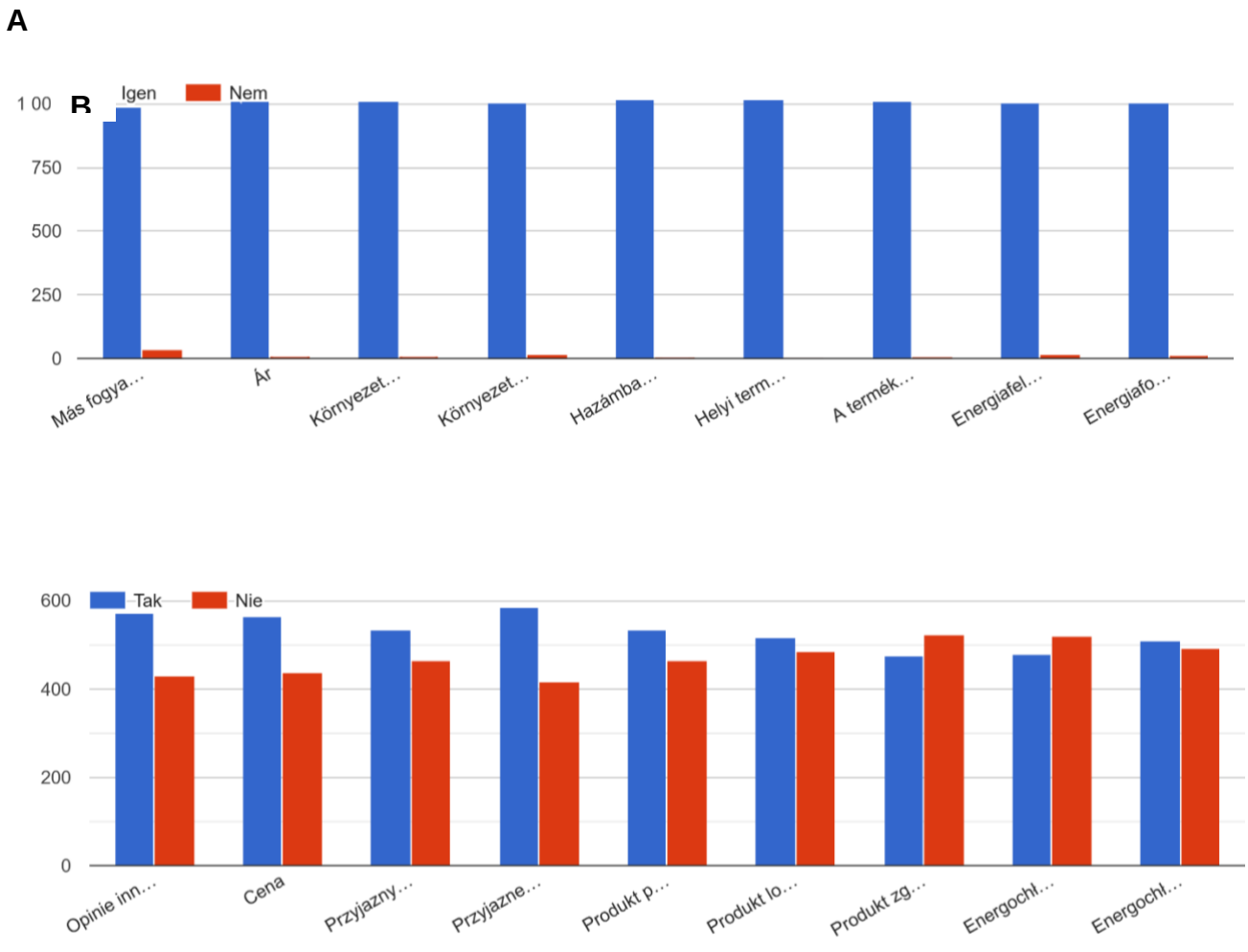

Figure 75 Answers to the following question: What are your preferences when shopping? Please select YES or NO. A = Hungarian, B = Polish respondents.

B

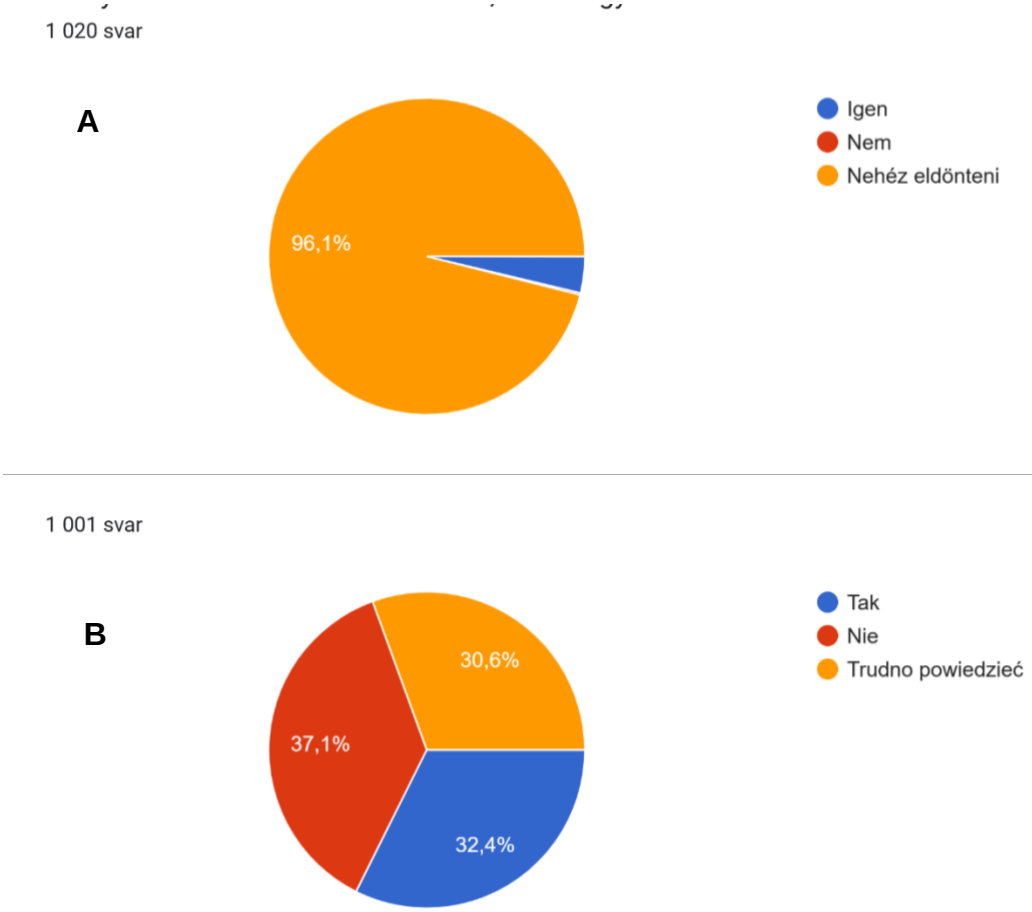

Figure 76 Are people willing to pay more for sustainable products? Question: Are you willing to pay more for a product/service if it is definitely a more environmentally friendly choice? YES or NO or hard to decide

5. *Political approach – relevance of environmental commitment at elections*

It is likely, that opinions about the extent to which environmental protection aspects prevail in national, regional, and local government decisions are not based on specifics, but on general impressions. The social background of various actions related to environmental protection is similar. Both political action and environmentally conscious everyday behaviour are more common in a population with higher education and higher social status. While political activity is usually the highest in capital cities, everyday environmental awareness occurs in the highest proportion among people living in county seats. Political action and environmentally conscious behaviour are more common among those who are more affected by environmental problems and also among those who spend their leisure time in nature more often.

More recently still, states began to horizontally integrate environmental concerns into other policy areas, to set up mechanisms for public participation in selected environmental policy decisions and to commit to national goals for the reduction of greenhouse gas emissions.

Overall, states have developed a host of coordinated activities to manage and steer societal-environmental interactions on various scales. In a 2016 special issue of Environmental Politics, scholars reserved the term ‘environmental state’ for this most recent incarnation of the modern state. According to their definition, an environmental state is ‘a state that possesses a significant set of institutions and practices dedicated to the management of the environment and societal-environmental interactions. It has specialized administrative, regulatory, financial and knowledge structures that mark out a distinctive sphere of governmental activity, while the environment and what governments should do about it has become an issue of ongoing political controversy’ (Duit et al. 2016, p. 5–6).

The question regarding the importance of environmental consciousness of elected politicians was important or very important for the overwhelming majority of Hungarian but only a slight majority for the Polish respondents (Fig. 77).

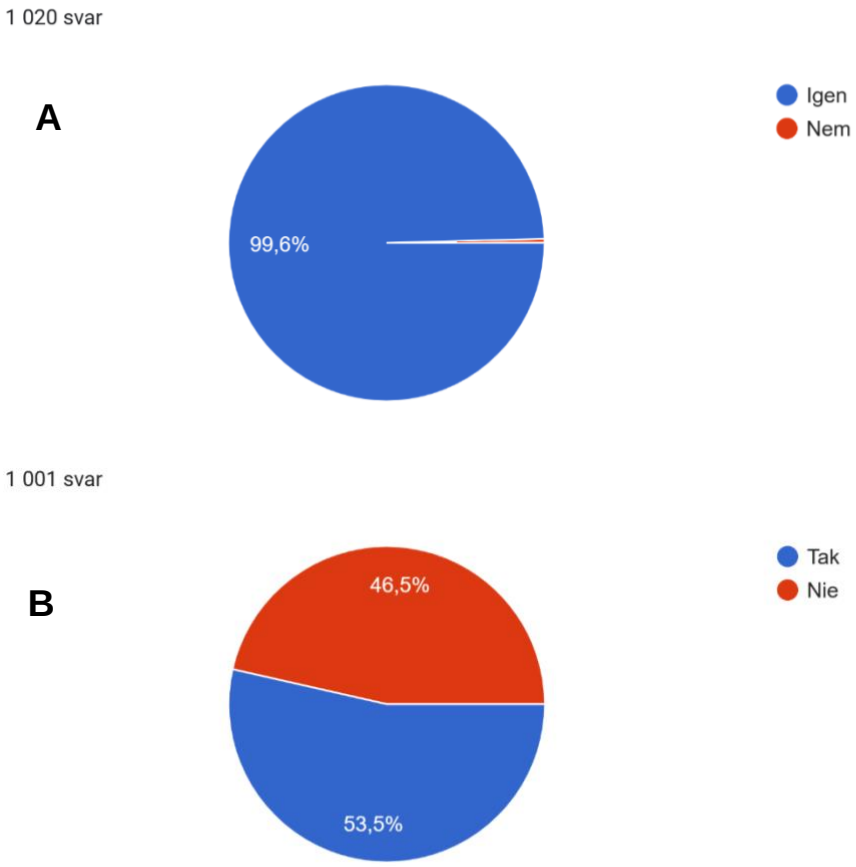

Figure 77 The importance of environmental consciousness of elected politicians. Question: When you decide on your political likes/dislikes, which represent your vote in an election, do you take into account the attitude of the politician/party concerned to enviro

Conclusions and recommendations

Based on the results of the survey, education in sustainable development from a regenerative viewpoint in all levels will have to be one of the key strategic programmes to realize the implementation of viable sustainable development strategies through a participatory approach in terms of renewable energy use, waste management, sustainable consumption patterns, nature and heritage conservation, mitigation of adverse impacts of climate change, circular economy, and resilient social environment. The education must be organised both on formal and informal forms for the following target groups on the adequate levels:

- students of higher education on BSc and MSc levels
- students eligible to college or university education
- students of accredited vocational education programmes
- trainers – "training of trainers" programmes: coaches and mentors
- primary and secondary school teachers
- adult education programmes – lifelong learning, multiskilling
- companies and local/regional governments - special tailored education programmes
- other groups in society participating in informal education (exhibitions, events, public study circles, heritage associations, etc.)

The aim of the training programmes is to impart practice-oriented knowledge based on the achievements of applied scientific research, with the help of which the graduates/ participants will be able to prepare long-term plans and analyses for the practical implementation of the principles of sustainability, working alongside their narrow environment, even in the context of a company, municipality or state authority, or relevant civil organisations.

The key subject areas to be developed as education programmes:

- Earth System Science
- Ecosystem Services
- Management of natural resources
- Sustainable food production
- Multifunctional agriculture

- Circular Economy
- Climate Change and mitigation of its adverse impacts
- Sustainable tourism
- Local production
- Renewable energy sources
- Choice of products and conscious consumption

Examples for course and programme contents in sustainability

Here we give some examples for courses to two main target groups: one are the trainers, who need the key competences to educate the general public, to reach out the those people, who do not have a sufficient level of education to understand the complex problems of sustainability, and require a very gentle and didactic approach to develop the right attitude to these issues. These are the trainers, and the course category is the **"Training of Trainers"** i. e. people with at least higher technical education, but preferably higher education qualifications on BSc / BA or MSc / MA level. This part is more elaborated, and consists of advanced post graduate courses in Earth System Science, applied environmental science and management of natural resources, circular economy and waste management and a whole series of MOOC (Massive Open Online Courses) in the relevant subject areas.

The other courses (here only two examples are given, one for the Hungarian and one for the Polish public) are for a target group with relatively low education, usually not more than medium level vocational education. This category, directly based on the results of the recent survey is called **"Capacity Building Courses".**

Earth System Science (EARTHSS)

EARTHSS 1. Introduction to Earth System Science. 4 Units.

Covers the origin and evolution of the Earth, its atmosphere, and oceans, from the perspective of biogeochemical cycles, energy use, and human impacts on the Earth system.

EARTHSS 2. Oceanography. 4 Units.

Examines circulation of the world oceans and ocean chemistry as it relates to river, hydrothermal vent, and atmospheric inputs. Geological features, the wide variety of biological organisms, and global climate changes, such as greenhouse warming, are also studied.

EARTHSS 3. The Atmosphere. 4 Units.

The composition and circulation of the atmosphere with a focus on explaining the fundamentals of weather and climate. Topics include solar and terrestrial radiation, clouds, and weather patterns.

EARTHSS 4. Physical Geology. 4 Units.

Introduction to Earth materials and processes. Topics include rocks and minerals, plate tectonics, volcanoes, earthquakes, Earth surface processes, Earth resources, geologic time, and Earth history. Laboratory work involves hands-on study of geologic materials, maps, and exercises pertaining to geologic processes. Materials fee.

EARTHSS 5. Introduction to Global Climate Change. 4 Units.

Introduction of scientific, technological, environmental, economic, and social aspects underlying the threat and understanding of global climate change. Human and natural drivers of climate. Impacts of climate on natural, managed, and human systems, including their vulnerability and ability to adapt.

EARTHSS 6. Hurricanes, Tsunamis, and Other Catastrophes. 4 Units.

Introduction to the basic science and state of predictability of various natural catastrophic events including earthquakes, volcanic eruptions, tsunamis, landslides, floods, hurricanes, fires, and

asteroid impacts and their interactions and implications with human society nationally and globally.

EARTHSS 7. Introduction to Modelling the Earth System. 4 Units.

Simulate the Earth's system using computer models. Covers the interaction of the air, land, and ocean, and explores how changes to one part of the environment affect the complete Earth system. Utilizes technological tools to understand scientific principles.

EARTHSS 8. On Thin Ice: Climate Change and the Cryosphere. 4 Units.

Introduction of the basic science that governs the cryosphere and its interaction with the climate system. Covers some of the significant economic, sociological, and political consequences of the recent melting of the cryosphere driven by anthropogenic climate change.

EARTHSS 9. Air Pollution: From Urban Smog to Global Change . 4 Units.

Air pollution occurs on regional to global scales. A wide range of air pollution sources and physical, chemical, and meteorological sciences behind air pollution are introduced. The consequences of air pollution to our society are also discussed.

EARTHSS 10. The Sustainable Ocean. 4 Units.

An introduction to sustainability as it relates to marine resources and conservation. Topics include the scientific basis of our understanding of marine ecosystems, and the political, social, and cultural principles that govern resource protection.

EARTHSS 10A. Earth System Chemistry. 4 Units.

To understand the cycling of matter on Earth, we need to learn about the chemistry of elements and molecules in the environment. Introduces students to the understanding of how chemical principles apply in context to their everyday lives.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment.

EARTHSS 10B. Earth System Biology. 4 Units.

Earth System Science is a highly interdisciplinary field that requires knowledge of various components of the Earth as a system, including the biosphere. Students are introduced to several fundamental principles of biology, from the smallest cells to the largest ecosystems.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment.

EARTHSS 10C. Earth System Physics. 4 Units.

Covers the fundamental physical forces and laws that affect the Earth system, such as electromagnetic radiation and energy transfer, atmospheric and ocean dynamics. Also covers aspects of physics related to environmental issues, such as electricity generation and transmission.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment.

EARTHSS 11. New Student Seminar. 1 Unit.

Weekly meetings led by faculty, current students, and staff, to provide information on the Department of Earth System Science, campus resources, and special programs and opportunities. Designed for students who recently joined the Earth System Science and Environmental Science majors.

Grading Option: Pass/no pass only.

Restriction: Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment. New students only (freshman, transfer, and change of major).

EARTHSS 12. Land Interactions. 4 Units.

The role of terrestrial processes in the Earth system. Provides an introduction to ecosystem processes that regulate the cycling of energy, water, carbon, and nutrients. Analysis of the impact of human activities. Materials fee.

Corequisite: CHEM 1C

Restriction: Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 13. Ocean Biogeochemistry. 4 Units.

Overview of oceanography for those interested in Earth System Science. Focus is on physical, chemical, and biological processes that drive biogeochemical cycling in the oceans. Coastal systems are also reviewed, with an emphasis on California waters.

Prerequisite: CHEM 1C

Restriction: Earth System Science Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment.

EARTHSS 14. Earth's Atmosphere. 4 Units.

Composition, physics, and circulation of Earth's atmosphere with an emphasis on explaining the role of atmospheric processes in shaping the climate system. Topics include atmospheric composition, the global energy balance, radiative transfer and climate, atmospheric circulation, and climate sensitivity.

Prerequisite or corequisite: (MATH 2B or MATH 5B) and (PHYSICS 3B or PHYSICS 7C)

Restriction: Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 15A. Sustainable Energy Systems. 4 Units.

Addresses how modern energy services can be provided sustainably and the challenges and barriers that must be overcome. Major environmental issues are discussed, such as climate change, air pollution, and resource demands.

Prerequisite or corequisite: EARTHSS 10C or PHYSICS 3C or PHYSICS 7E

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 15B. Sustainable Food and Water Systems. 4 Units.

Explores the biophysical underpinnings of food production, the history of agricultural development, and a range of environmental issues facing agricultural systems, including water management, climate change, and land use.

Prerequisite or corequisite: EARTHSS 10B or (BIO SCI 93 and BIO SCI 94)

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 16. Special Topics in Earth System Science. 1-4 Units.

Devoted to current topics in the field of Earth System Science. Topics addressed vary each quarter.

Prerequisite: (EARTHSS 14 and EARTHSS 15A and EARTHSS 15B)

Repeatability: May be taken for credit for 12 units as topics vary.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 17. Paleoclimatology. 4 Units.

Explores past changes in Earth's climate. Topics include tools and techniques used to reconstruct past climate from natural archives; records and mechanisms of past climate changes throughout Earth history; and lessons learned from the paleo-record for predication of future climate.

Restriction: Earth System Science Majors have first consideration for enrolment.

EARTHSS 18. Global Climate Change and Impacts. 4 Units.

Observations over the 20th century show extensive changes in atmospheric composition, climate and weather, and biological systems that have paralleled industrial growth. Evidence of globally driven changes in these biogeochemical systems is studied, including projected impacts over the 21st century.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 19. Earth System Science Laboratory and Field Methods. 4 Units.

Introduction to methods used to measure exchange of gases and energy between the atmosphere and terrestrial ecosystems. Laboratories include data acquisition and isotopic and chromatographic analysis. Field measurements at UCI's Marsh Reserve include microclimate, hydrology, trace-gas exchange, and plant growth. Materials fee.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 20. Aquatic Field Methods. 4 Units.

Students design sampling plans, conduct field research techniques, and carry out data analyses that are relevant to aquatic field research. Aquatic field sites covered in the course include marine, estuarine, and fluvial systems. Materials fee.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 21. Introduction to Environmental Data Science. 4 Units.

Analysis and interpretation of geophysical data, including functional fitting, probability density functions, and multidimensional time-series methods, with applications in atmospheric, oceanic, and biogeochemical sciences.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 22. Analysis, Modelling, and Visualization of Multidimensional Environmental Data. 4 Units.

Students learn programming and numerical methods in Python with applications in Earth System Science and ecology. Topics include regression, uncertainty and significance, the development of simple box models, and the visualization of multi-dimensional climate and satellite datasets.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 23. Atmospheric Dynamics. 4 Units.

Fluid dynamical processes that determine the large-scale flow of the atmosphere and ocean. Most important are interactions between the density stratification and the Coriolis force associated with Earth's rotation. Topics include circulation, vorticity, planetary waves, and their role in climate.

Restriction: Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 24. Weather Analysis. 4 Units.

Provides an overview of weather systems in midlatitudes and tropics. The fundamental dynamics possible for these weather systems are described. Elementary weather analysis and forecasting techniques are introduced.

Restriction: Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 25. Physical Oceanography. 4 Units.

Physical processes that determine the distribution of water properties such as salt and temperature. Fluid-dynamical underpinnings of physical oceanography. Wave motions. The wind-driven and thermohaline circulation. Similarities and differences between ocean and atmosphere dynamics.

Restriction: Earth System Science Majors have first consideration for enrolment.

EARTHSS 26. Terrestrial Hydrology. 4 Units.

Comprehensive treatment of modern conceptual and methodological approaches to hydrological science. Combines qualitative understanding of hydrological processes with quantitative representation, approaches to measurement, and treatment of uncertainty. Components of the hydrological cycle and their linkages within the coupled Earth system.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 27. Soil: It's the Good Dirt. 4 Units.

An introduction to the critical role soils play in sustaining land ecosystems and humans. Covers how soils form and how human actions contribute to the pollution and loss but also the health and productivity of soils.

Restriction: Environmental Science and Policy Majors only. Environmental Science Majors only. Earth System Science Majors only.

EARTHSS 28. Fundamentals of GIS for Environmental Science. 5 Units.

Introduction to Geographic Information Systems (GIS). Topics include fundamentals of cartography, creating/editing GIS data, linking spatial and tabular data, georeferencing, map projections, geospatial analysis, spatial statistics, and the development of GIS models. Examples from hydrology, ecology, and geology.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 29. Satellite Remote Sensing for Earth System Science. 4 Units.

Satellite remote sensing data are increasingly used to study the Earth system. Provides an overview of the principles behind remote sensing, and the types of satellite data available for study of the oceans, land, and atmosphere.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 30. Advanced Geology. 4 Units.

Introduces students to the geological processes which have formed and continue to shape the Earth. Topics include geological time, minerals and the rock cycle, plate tectonics and associated geological hazards, earth resources, and earth surface processes. Materials fee.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment. Environmental Science Majors have first consideration for enrolment. Earth System Science Majors have first consideration for enrolment.

EARTHSS 31. Air Quality Management. 4 Units.

Fundamental science and terminology of regional air quality issues and developing and implementing the strategies used to prevent and mitigate air pollution impacts. Topics include setting regional air quality goals, applying measurements and numerical models, cost/benefits analysis, evaluation and enforcement.

Restriction: Environmental Science and Policy Majors have first consideration for enrolment.

II. Circular Economy: Transition for Future Sustainability

By shifting your organization to a Circular Economy, you can ensure growth over time while treating waste as a design flaw. In a Circular Economy, a specification for any design is that the materials re-enter the economy at the end of their use, therefore increasing profits while ensuring sustainability, longevity, and societal wellbeing. By doing this, we take the outdated linear system and make it circular with increased resiliency for the environment and business infrastructure. This course provides a fundamental yet multidimensional understanding of the meaning and evolution of a circular economy, including the roles of material science, economic and institutional structures, and technology. We will begin with a global perspective of circularity and its measurement and assessment at this scale, carefully comparing and contrasting biotic and abiotic cycles. We will then look at circular economies through a systems

approach, examining frameworks and policy at an institutional level and making use of analytical tools that allow us to evaluate circularity. Finally, we will explore innovation and evolution in this area with a focus on circular economies at corporate and social levels, looking at specific examples like water, metals, and waste recycling.

In the Circular Economy course, you will understand the foundations of circular economy and how you can apply it in your organization. Further, you will:

Define the different ways of reaching a circular economy through technology and material science and how to quantify circularity.

Develop strategies for a more equitable distribution of costs and benefits.

Determine institutional and economic structures and policies that enable the possibility of a circular economy policy.

Explore successful and unsuccessful case studies in sustainability and circular economies.

Further apply the importance of recycling plastics and electronics to tackle environmental concerns and e-waste.

Gain an understanding of how material transport plays an influential role in sustainability.

Study the circular economy lifecycle and apply the best energy alternatives for circular economies.

Uncover the importance of co-mingled waste.

A wide range of professionals may benefit from this program, including:

Industry leaders in sustainability, managers and engineers in companies that want to be more sustainable, academics and policy leaders in sustainability

Industry analysts and investors

Climate Consortium

Industries and sectors that are very materials-intensive

Managerial level audience (every industry including finance)

Major companies in English-speaking, Spanish-speaking, and Portuguese-speaking markets

III. Resource Recovery and Solid Waste Management

Objectives

The purpose of the course is to provide in-depth knowledge on strategies and solutions for solid waste management. The course addresses technologies for efficient waste disposal as well as strategies for waste reduction and resource recovery.

Learning outcomes

After completing the course, the student shall be able to:

1. Discuss the main challenges of managing society´s solid waste.

2. Identify and analyze the different ways solid wastes are generated, collected, transported and characterized.

3. Compare and appraise different strategies and methods for solid waste reduction, reuse, and recycle.

4. Identify and analyze individual management options for specific types of wastes with the fastest growing streams e.g. e-waste.

5. Identify and critically examine ways to optimize the value-chain for solid waste management.

Course content

The course covers the whole value chain of solid waste management including collection, transportation, separation and treatment. The global environmental issues related with the management of certain solid wastes e.g. e-waste and plastics, are presented. The goals of the 3R´s (reduce, reuse and recycle) in preventing waste and conserve natural resources are explained and discussed as an effective concept to reach a sustainable development.

Tuition

Web-based teaching and assignments

Specific requirements

120 credits of which 90 credits engineering and/or natural science. In addition Swedish course B/Swedish course 3 and English course B/English course 6 are required. For courses given entirely in English exemption is made from the requirement in Swedish course B/Swedish course 3.

Examination

Assignment (INL1) 3 credits, grades Excellent (A), Very good (B), Good (C), Satisfactory (D), Sufficient (E), Insufficient, complementary work possible (Fx), Insufficient (F), (Learning outcomes: 1-5)

Project (PRO1) 4.5 credits, grades Excellent (A), Very good (B), Good (C), Satisfactory (D), Sufficient (E), Insufficient, complementary work possible (Fx), Insufficient (F), (Learning outcomes: 1-5)

A student who has a certificate from MDU regarding a disability has the opportunity to submit a request for supportive measures during written examinations or other forms of examination, in accordance with the Rules and Regulations for Examinations at First-cycle and Second-cycle Level at Mälardalen University (2020/1655). It is the examiner who takes decisions on any supportive measures, based on what kind of certificate is issued, and in that case which measures are to be applied.

Suspicions of attempting to deceive in examinations (cheating) are reported to the Vice-Chancellor, in accordance with the Higher Education Ordinance, and are examined by the University's Disciplinary Board. If the Disciplinary Board considers the student to be guilty of a disciplinary offence, the Board will take a decision on disciplinary action, which will be a warning or suspension.

MOOC series

Massive open online courses, abbreviated MOOCs, are massive open online courses, and we include web courses that provide unlimited participation and online access to a university lecture via the Internet, usually free of charge. Early MOOCs often emphasized features associated with open access—such as open access to content, structure, or learning objectives—with the goal of supporting the reuse and reprocessing of resources. Many later created MOOCs also apply closed licenses to the educational materials, so that students can access them for free, but all this is subject to registration.

Compared to traditional teaching materials (textbook, presentations, case studies), MOOC provides users with short lesson videos and numerous interactive forums (self-tests), thereby supporting knowledge sharing, group work, and communication between students, teachers, and teaching staff. The MOOC appeared in 2008 and became a popular way of learning in 2012, and can be considered a current and widely researched development in distance education. Based on traditional distance education, MOOC can even be integrated into the framework of modern distance education and e-learning as a next technological building block. This approach could still be applied to "mass" course visits by thousands of students, but we do not get a satisfactory explanation for the keywords "open and free".

MOOC Land and Water Management courses and programmes for professionals

Agriculture contributes significantly to global warming through large scale greenhouse gas emissions. And many agriculture systems are vulnerable to climate change. Without adaptation global food production could significantly reduce, affecting food security. Coordination of the consumption of scares water resources between the various competing actors is needed. This requires a combination of physical, technical, and social sciences.

Programme: Sustainable and Inclusive Landscapes

Why to follow this programme?

We’re facing a number of complex and interrelated problems such as rising food prices, economic downturn, climate change, and increased competition on the use of natural resources.

Integrated landscape approaches have the power to help us solve these problems. They offer new insights and opportunities for sustainable development, but demand new skills and knowledge.

To achieve the Sustainable Development Goals (SDGs), diverse landscape stakeholders need to find a common ground and learn to understand plural and complex landscape issues, processes and perspectives.

Join this online programme to understand what changes and skills are needed to make these changes and what your role in this should be. Thinking from a spatial perspective, this programme focuses on the multi-functionality and cross-sector nature of landscapes.

What you'll learn

Understand how landscapes are vibrant and dynamic multi-functional spaces in which competing claims on resources exist alongside interdependencies among sectors, ambitions and inhabitants

Develop leadership skills to mobilise resources and motivate stakeholders to achieve SDG-focused sustainable change

Gain critical insights and develop the skills to capitalize on investors motivation to invest and the need for innovative financing in landscapes

In this Professional Certificate Programme you will learn about four major elements in landscape thinking:

Integrated Landscape Finance

Landscape Governance

Landscape Leadership

Climate change and climate action

The programme consists of online courses in which you will learn that the application of landscape approaches to address complex developmental and environmental challenges requires a shift in mind-set, perspective and skillset.

The courses in this programme have been developed to enhance your ability to think beyond the sector and in a more integrated and transformative manner. The courses will equip you with the skills and tools needed to transform your landscapes and teach you how to integrate the necessary climate action. Not only will you be able to analyse, you will learn how to bring knowledge into action in order to promote climate smart landscapes on a local scale and/or across the world.

The Sustainable and Inclusive Landscapes programme is developed and delivered by a network of globally active partners under the momentum and umbrella of the Global Landscapes Forum

Content of the Programme

This online programme consists of four MOOCs who can be taken in any desired order. Your time investment will be about 2-3 hours per week per online course, and the average length is 4 weeks per MOOC. Of course, you can study in your own time, at your own pace, so you can adjust the duration.

MOOC Landscape Leadership: Catalyse Sustainable Development in Landscapes

Learn how to become a landscape leader! Get the skills to mobilise resources, manage and resolve conflict and facilitate and motivate stakeholders to achieve SDG-focused sustainable change.

Why follow this course?

Achieving sustainable and productive landscapes and the Sustainable Development Goals (SDGs) calls for bold and innovative leadership. Governments, the global private sector, universities and international NGOs are seeking landscape leaders to stimulate and facilitate change.

If you're reading this page, there's a strong chance that you see challenges in the society and region around you. There's also a strong chance that you have the energy and ability to impact change for the better. This course is your key to unlocking the knowledge and skills you need to kick-off and lead the changes you want to see in your landscape and work.

You will learn what true leadership in a landscape really is. You will learn from real-life leaders how they designed and facilitated change to better their landscape. You will be taken through challenging global cases and build your skills to lead change in landscapes. You will interact with other emerging landscape leaders who want to share and learn how change at the landscape level can be achieved. After this course, you will be ready to look at your landscape and know how to lead the way forward.

After signing up for this course, you will straight away be brought to the landscape. You'll see leaders in action and be quizzed on what you would do in their situation. Through highly interactive activities, you'll learn about stakeholder dynamics and how those dynamics and competing claims often lead to conflict. But, you'll learn how to facilitate and inspire stakeholders and develop a repertoire of tools and methods to manage and resolve conflict toward sustainable change.

Sustainable and Inclusive Landscapes Professional Certificate Programme

Developing your leadership skills and knowledge is the first step. The Online programme Sustainable and Inclusive Landscapes lets you harness the power of place and advance your career as a landscape leader. The programme consists of the following courses:

Landscape Leadership: Catalyse sustainable development in Landscapes

Landscape Finance: Investing in Innovation for Sustainable Landscapes

Landscape Governance: Collaborating Across Sectors and Scales

Climate Action in Biodiverse Landscapes

What you will learn

Understand the relation between landscapes and leadership

Understand the requirements of distributed landscape leadership

Prioritise leadership skills needed for facilitating change in your landscape

Decide what to do when leadership gets difficult

Manage conflicts and get to negotiated solutions

Cultivate innovation in your landscape

MOOC Landscape Finance: Investing in Innovation for Sustainable Landscapes

Bridge the gap between finance and landscape! Learn to navigate the web of landscape financial flows, mechanisms and requirements toward developing cutting-edge business cases and models for sustainable development in landscapes.

Why to follow this course?

Landscape approaches call for innovative interventions that cut across sectors and scales. Public and private funders are ready to invest but there are gaps to bridge. Integrated landscape investments, which enable bankable projects to be realized, need to be built on shared understandings and motivations between landscape inhabitants and leaders and the world of finance.

Are you from the finance world and want to think from a landscape perspective? Or, are you working in or for a landscape and want to mobilise resources? Join this open online MOOC and bridge the gap between finance and landscapes. Gain critical insights and develop the skills to capitalize on investors motivation to invest and the need for innovative financing in landscapes

You'll hear from financial experts about their experiences with stimulating game-changing investments. You will learn about multi-sector, multi-stakeholder investments that manage and affect multiple landscape functions.

Join the course now and jump right into breaking down complex language and concepts in a light and highly interactive manner. Learn about plural values and how they can be achieved with the right investment. Learn too how to stimulate, secure and coordinate the execution of that investment. During this course, you'll also learn to develop integrated investment strategies to support landscape leaders and investors in their related efforts.

Sustainable and Inclusive Landscapes | Online pogramme

Developing your leadership skills and knowledge is the first step. The Online programme Sustainable and Inclusive Landscapes lets you harness the power of place and advance your career as a landscape leader. The programme consists of the following courses:

Landscape Leadership: Catalyse sustainable development in Landscapes

Landscape Finance: Investing in Innovation for Sustainable Landscapes

Landscape Governance: Collaborating Across Sectors and Scales

Climate Action in Biodiverse Landscapes

What you will learn

How integrated landscape investments can add financial value

What sources of capital are available for integrated landscape investments

Which types of financial mechanisms can support integrated landscape investments

How to use blended finance to support integrated landscape investments

Coordinate finance at a landscape scale, considering institutional needs

MOOC Soil4Life: Sustainable Soil Management

Soil is the earth's fragile skin that anchors all life. We depend on soil to build our homes and cities, to grow crops for food and raise livestock, to support transportation and enable recreation. Yet we disregard this crucial and precious resource that lies right under our feet. Learn why soil is so important, how it's being threatened and what we can do to protect this natural resource so vital to our lives.

Why to follow this course?

This introductory environmental studies course will explore the importance of soil to life on earth, the issues, processes and societal challenges underlying soil degradation – and what can be done to ensure sustainable soil management for the future. The threats to our soil span deforestation, erosion, overgrazing, use of agrochemicals, compaction, pollution and climate change. Learn what you can do to make a difference in protecting this vital natural resource.

What you will learn

After successful completion of this course, you will be able to:

- Understand that soils and sustainable soil management are critically important to life on earth.
- Appreciate how soils form, their functions and basics of soil degradation.
- Recognize the threats to and how to care for soil water relations, soil fertility and soil biodiversity.
- Investigate the effects of and solutions for soil erosion, soil compaction, soil pollution and soil salinisation.
- Comprehend the socio-economic and policy aspects of sustainable soil management.
- Contribute to discussions and guided-activities about how we all can help protect soil for life.

Practical information

The level of the course is Introductory. The prerequisites are secondary school or a first/second year BSc.

The total effort for this course is estimated at 80 hours for an average learner. So, if you have 8 to 10 hours per week to spend, it will take you about 7 weeks. However, since the course is run in a self-paced mode, you can progress through the modules at your own speed.

MOOC Food and Nutrition Security in Urbanizing Landscapes

Our landscapes are urbanizing, which has a serious impact on food and nutrition. Learn to look beyond the sectoral and administrative boundaries of your work and see how the rural and the urban connect around food. Look at your landscape from a spatial and integrated food systems perspective to identify key counterparts with whom to collaborate and break the rural-urban divide. Join Wageningen University & Research and start creating food and nutrition security ("FNS") in your landscape.

Why to follow this course?

Food and nutrition insecurity in an urban world

Our landscapes are changing. As towns and megacities expand, they increasingly place claim on limited natural resources, such as water and land. In turn, this competition for resources places rural areas under pressure, further aggravated by climate change and rural-urban migration. Yet, these areas are essential for producing food for a growing population. These changes in the landscape have a serious impact on food and nutrition.

Overnutrition is on the rise in one part of the landscape, resulting in lifestyle related diseases, such as obesity, type II diabetes and heart disease. At the same time undernutrition persist in other areas, causing a.o. increased mortality and poor childhood development. While some consumers are stuck in food deserts, with limited to no access to fresh produce, producers may have difficulty finding profitable markets. City governments and urban planners can play a key role in addressing these issues by putting food on the urban agenda, yet many cities lack a food agenda.

Strengthen rural-urban linkages in your landscape

Although urban, peri-urban and rural parts of the landscape are inextricably linked, urban development and rural development often occur in isolation of one another. In this course, co-produced with the Global Landscapes Forum and the UN Environment Program, you will learn to look beyond the boundaries of your personal expertise and geographic location. Taking on an integrated spatial and food systems perspective opens up possibilities to bring about structural change.

You will become acquainted with a variety of tools to analyse food and nutrition issues and their relation to your rural-urban landscape, which can help you to:

Raise awareness on the importance of a systems approach to FNS in your landscape

Think of ways to strengthen or create structural collaboration between rural and urban stakeholders

Jointly work towards FNS

You will bring your learnings together in a compelling story to mobilise key stakeholders in your rural-urban landscape. You will also explore your role to contribute to breaking the rural-urban divide.

Is this course for you?

So, whether you are a researcher, an advisor working for an international NGO or multilateral agency (f.e. Food & Agriculture Organisation (FAO)), a nutrition officer or an urban planner, a member of a farmer's association or a policy maker, join this course – created in collaboration between GLF, WUR and UNEP – and start addressing food and nutrition insecurity in your urbanising landscape.

What you will learn

Key concepts and issues around food and nutrition in urbanizing landscapes

The role of rural-urban dynamics and how they manifest in the landscape

A variety of tools for a basic analysis of a city region food system

Inspiration for advanced tools for city region food system analysis

Guiding principles for good landscape governance and the role of food policy within

The importance rural-urban collaboration to achieve food and nutrition secure landscapes

Identify entry points for sustainable change

How to mobilise key stakeholders towards a common vision

What your role as landscape professional can be to contribute to food and nutrition security in your urbanising landscape

MOOC Drones for Agriculture: Prepare and Design Your Drone (UAV) Mission

Take a dive and expand your knowledge about drones and drone technology. Learn how to prepare and execute a flight mission with an Unmanned Aerial Vehicle (UAV) and how to use, process and understand the collected drone data for your own applications.

Why to follow this course?

We are all getting familiar with the image of a drone in the sky. Although flying a drone is fun, drones are not toys. More and more UAVs or drones are used by governments and companies to gain answers and insights on nature, agricultural and metropolitan challenges among other fields. For example, small Drones/UAVs are employed in agriculture for crop observation, crop monitoring, field analysis and map generation through aerial surveys. And with the available software and 'mission planning tools' market growing, so is the demand for knowledge and understanding about their usage and limitations.

Our top professors of the 'Information Technology Group' and the 'Laboratory of Geo-Information Science and Remote Sensing group' of Wageningen University & Research will teach you whether it makes sense to use drones for your application, challenge or question. You will learn how to plan an end-to-end mission (from image acquisition to data visualization) for your specific drone application and how to execute a drone mission safely. Afther finishing this online course you will have gained full understanding of the aerial mapping workflow and how to implement it in a programmable small drone. You will know which steps you need to take to gain the valuable insights you are looking for.

Do I need a drone to complete this course?

No! You do not need a drone to complete this course. For all the assignments and exercises we will provide the necessary material (in case it is needed). We expect to pick your curiosity with this course and hopefully nudge you into buying one and joining the community.

Is this course for you?

Although the course was initially made for agriculture technicians, researchers or graduate students from multidisciplinary technical fields, everyone that aims to learn how to use an off-the-shelf small drone for generating a high-resolution image from a field, or has a general high interest in drones, is very welcome.

What you will learn

- Learn to decide whether it makes sense to use a drone for your application or challenge

- Design a process from acquisition to data visualization and evaluation for your specific drone application
- Learn about the available airborne technology and software
- Understand what UAV international legislation and regulations are concerning drones
- How to make an aerial surveying workflow
- How to make the required flight preparations and create- and execute a safe mission setup
- You will learn about mission planning and the available open source and commercial tools
- You will gain understanding about aerial imaging product delivery

MOOC Agricultural Water Management: Water, Society and Technology Interactions

Would you like to meet the increasing food demands around the world by contributing to optimisation of water governance and technologies? At Wageningen University & Research, the No. 1 agricultural university of the world, we approach water management from both a technical and a social perspective. Because properly deploying water technologies for successful water management requires social and institutional agreement. Join us and learn the fundamentals of agricultural water management.

Why follow this course?

Increasingly scarce natural resources

Worldwide, a variety of processes puts more pressure on water resources every day. Global climate change causes temperatures to rise and precipitation patterns to change. A growing degree of urbanization causes people to move from the countryside to the cities. This results in increased competition over water resources, like rivers and groundwater, between cities and their surrounding areas. Furthermore, population growth and rising global welfare create an increased demand for food.

The growing demand for food must be obtained using existing agricultural land, since we are already dealing with scarcity of new farmland. Yet, the potential of increased production in the existing rain-fed agricultural areas is low.

Sustainable water management; various perspectives to consider

The combination of the processes described above create an urgent need for improved agricultural water management, agriculture being the dominant water user worldwide. In our search for sustainable solutions the management and governance regarding irrigation and drainage should take a number of water related aspects into account, among which:

- the different perspectives of involved uses and users
- including various spatial levels, from farm, to scheme, to river basin
- minding the effects on both upstream and downstream water users
- each of which must be combined with the right quantity and quality of water

Putting theory into practice

In this MOOC we will focus on the role agricultural water management plays in this global context of sustainable water and food supplies. The online course consists of several learning modules, combined with a case study.

- Water Technology - drip irrigation
- Water Technology - drip irrigation

We start by taking a deep dive into practical and technical aspects, from crop characteristics and irrigation water requirements to actual field practices.

Subsequently, we explore the institutional perspective, from models of rural development to water management demands.

MOOC Solid Waste Management

Solid waste management (SWM) is a crucial function of local governments around the world, and directly affects public health, the environment, and livelihoods. However, rapid urbanization and population growth place multiple pressures on solid waste management systems, particularly in cities in low- and middle-income countries. In particular, the urban poor are most affected by lack of access to basic SWM services, such as waste collection and disposal.

Yet, the sector also provides numerous opportunities: Improving solid waste management provides a cleaner and healthier environment; improves livability for all city residents; and attracts new investment and tourism, which improve a city's economic competitiveness, creating jobs, and new business opportunities. SWM also contributes to new sources of energy thus tackling climate change challenges. In these ways, SWM is directly relevant to the World Bank's goals of ending extreme poverty and boosting shared prosperity.

Historically, the highest expenditures of local governments is in the SWM sector but – particularly in low- and middle-income country cities – the bulk of expenses goes towards collection and transport instead of treatment and disposal. Another challenge is ensuring the financial sustainability of SWM projects and cost recovery once SWM infrastructure has been created. The world is generating increasing amounts of waste, with large amounts (primarily plastics) ending up in the oceans. However, there is also a paradigm shift from thinking about waste as something to be disposed – "out of sight out of mind" – to a resource that can be used for energy generation, reduce the use and costs associated with virgin resources, and improve our climate change efforts.

Given this background, this e-learning course is designed to look at the SWM sector, with a focus on MSW, from several angles in order to simplify concepts and promote understanding of this sector.

World Bank operations and client teams working on a variety of urban-related lending projects, having an interest in learning about the complexities of the solid waste sector, its challenges, and opportunities for improvement.

MOOC Waste Management and Critical Raw Materials

How can we ensure the continuous supply of the increasingly scarce raw materials that are needed to make the products we use every day? In this course, we will look at the potential benefits of circular procurement and how recycling technologies and more efficient ways of collecting and recycling critical raw materials (CRMs) can make your business and production more resource resilient.

A good number of the materials found in everyday products are now referred to as "critical". This means that there is a risk of failure in their supply and that they are also critical in terms of economic importance.

Many metals, for instance, are already critical or could become critical in the near future due to their limited availability and the growing demand for products worldwide. Think of the newest electronic products that contain critical metals such as gallium, which is used in integrated circuits; beryllium, used in electronic and telecommunications equipment and permanent magnets and germanium found in infra-red optics.

Innovative product design and reusing, recycling and remanufacturing products can help to deal with a raw materials shortage. But this can only provide an integrated solution if we keep CRMs in the loop through smarter CRM management. The starting point is to identify CRMs in products. It is not always clear what materials are in which products. It is, therefore, necessary to keep all metals in the loop for as long as possible.

Scarcity in the supply chain can not only damage businesses but also negatively impact economic development and the environment. For this reason, the course will also discuss environmental issues and electric and electronic waste regulations.

This course will be of value to a wide range of professionals working in or interested in this field. These include professionals involved in producing products containing CRMs (such as electronics) as well as local or national government officials tasked with organizing waste management and recycling for these products. Students interested in the field of waste management will also find this course helpful for their studies in electronics, industrial design, and industrial ecology.

What you'll learn:

- Current challenges and opportunities in resource resilience

- Environmental problems caused by waste mismanagement of products that contain CRMs
- Waste collection methods and efficient collection of waste in households and at companies
- Remanufacturing, refurbishment, re-use and recycling processes of products which contain CRMs
- Waste prevention through chain optimization
- Benefits of circular procurement to keep critical raw materials in the loop through smart waste management
- How product design can support efficient recycling and remanufacturing
- How to uncover new business models to reduce waste and to make your business more resource resilient

Course Syllabus:

Week 1: Urgency and challenges with CRMs and waste. How can we find out what CRMs are in products, and how can we get them back? The effects of materials shortage, future development and geo-politics on raw materials. Current waste management of products containing CRMs in general, waste management of commercial and household waste, regulation of electric and electronic waste (WEEE). Environmental problems such as leaching heavy metals from incinerator ashes and landfills. Partial metals retrieval from incinerator ashes.

Week 2: Different collection systems for recycling and remanufacturing/refurbishment, recycling psychology and the separate waste collection of commercial and household waste.

Week 3: Recycling technology: pre-processing, metallurgy and its challenges. Recycling economics and the problem of <1% (most) CRMs recycling.

Week 4: Remanufacturing and refurbishment systems: return of product (reverse logistics), disassembly and repair of the product, market demand and economics.

Week 5: Product design using better recycling or remanufacturing and refurbishment. Substitution of materials.

Week 6: New business models to generate profits from products that last longer. Circular procurement for government and companies.

Prerequisites

Secondary school (high school) chemistry; basic business concepts.

MOOC Sustainable Packaging in a Circular Economy

It has become almost impossible to imagine what our lives would be like without the many benefits of packaging - just think about the different packaging and single-use items you use on a daily basis. Yet as our global population grows in size and affluence, both our collective demand for packaging materials and the waste we generate as a result will increase dramatically.

Currently, large amounts of packaging waste escape formal collection and recycling systems and eventually end up polluting the environment. Moreover, their material value is forever lost to the economy. The Ellen MacArthur Foundation estimates that uncollected plastic packaging waste alone is worth somewhere between 80 to 120 billion dollars a year.

So how can we improve packaging systems in order to capture this wasted potential? Clearly, the way we currently design, recover, and reuse packaging urgently needs a rethink!

In this course, you will learn about the design of sustainable packaging systems. To do so we will explore the design and business strategies of the circular economy.

Contrary to our current industrial model, which extracts, uses and ultimately disposes of resources, a circular economy is regenerative by design. This means that products and services are reimagined from a systems perspective in order to minimize waste, maximize positive economic, environmental and social impacts, and keep resources locked in a cycle of restoration.

This course is for you if you are interested in learning about sustainable packaging design. You'll also benefit if you are a professional in the packaging industry and want to learn how to find circular opportunities in your work. Students - particularly in design - will be able to broaden their knowledge of circular design and business strategies.

What you will learn:

- Business strategies that support these systems
- Opportunities of designing with renewable, bio-based materials
- Best practices through case studies with industry frontrunners
- How circular design principles can be applied to create 'closed loop' packaging systems

This is a Massive Open Online Course (MOOC) that runs on edX.

Prerequisites

Intended for students and professionals with basic knowledge of the circular economy with an interest in packaging, or students and professionals experienced in packaging looking for circular opportunities. If you want to learn the basics of a Circular Economy we invite you to take a look at the Circular Economy: An introduction MOOC before the start of this course.

MOOC Ecological and energy transitions in southern countries

Syllabus

A MOOC to Respond to these Questions

This free online training offers complementary perspectives from several specialists of issues related to climate change and the development of Southern countries. They will share their very practical understanding of the current crises and the answers that can be provided. Participants will learn from studies by:

• Researchers from the prestigious École Normale Supérieure in Paris

• Field experts from the Agence Française de Développement, a funding agency that has been committed to helping developing countries for 75 years,

• Carbone 4 founder Alain Grandjean, who will share his experience, in particular on the economic and financial aspects.

Here is the program:

1. Our development model is ecologically unsustainable
2. The dominant economic models hinder the energy and ecological transition
3. The energy transition path: decarbonizing GDP
4. The model of an ecological transition to new prosperity
5. Governance of the energy and ecological transition
6. Financing the energy and ecological transition

MOOC greening the economy: sustainable cities

About the content

How can we shape urban development towards sustainable and prosperous futures? This course will explore sustainable cities as engines for greening the economy. We place cities in the context of sustainable urban transformation and climate change. Sustainable urban transformation refers to structural transformation processes – multi-dimensional and radical change – that can effectively direct urban development towards ambitious sustainability and climate goals. We will connect the key trends of urbanization, decarbonisation and sustainability. We will examine visions, experiments and innovations in urban areas. We will look at practices (what is happening in cities at present) and opportunities (what are the possibilities for cities going forwards into the future). We bring together a collection of diverse short films and key short readings on sustainable cities as well as interactive forums and a practical assignment to create an online learning community. This course provides key examples of activities to promote sustainable cities in Scandinavia, Europe and around the world. We utilize films and reports by WWF, the Economist Intelligence Unit, ICLEI – Local Governments for Sustainability, UN-Habitat, C40 Climate Leadership Group, Arup, Sustainia, the Rockefeller Foundation, and ongoing research projects. This course is produced by Lund University in cooperation with WWF and ICLEI. It is available for free to everyone, everywhere! The International Institute for Industrial Environmental Economics (IIIEE) at Lund University is an international centre of excellence on sustainable solutions. The IIIEE is ideally suited to understand and explain the interdisciplinary issues in sustainable cities and greening the economy utilising the diverse disciplinary backgrounds of its international staff.

Syllabus

- **Week 1** - Sustainable Urban Transformation

By studying this module you can gain an increased knowledge and a deeper understanding of sustainable urban transformation and sustainable cities

- **Week 2** - Infrastructure and Planning

By studying this module you can gain an increased knowledge and a deeper understanding of the role of infrastructure and planning in creating sustainable cities.

- **Week 3** - Urban Living Labs

By studying this module you can gain an increased knowledge and a deeper understanding of urban living labs and the role of experiments in sustainable cities.

- **Week 4** - Future Urban Visions

By studying this module you can gain an increased knowledge and a deeper understanding of visions for sustainable cities.

- **Week 5** - Sustainable Urban Lifestyles

By studying this module you can gain an increased knowledge and a deeper understanding of the relationship between sustainable urban lifestyles and sustainable cities.

MOOC Innovation and design for global grand challenges

About the content

The purpose of this course is to introduce you to current global challenges in conservation and development, including changes in both sectors. This course will inspire you to rethink assumptions to address global challenges in conservation and development, and introduce you to new models and approaches that harness technological, behavioral, and financial innovation. This course will equip you with the insights, skills and approaches necessary to successfully overcome these obstacles. In addition, this course will provide participants with the tools, models, and approaches to address global grand challenges in conservation and development, to question fundamental assumptions, and to create and execute new solutions. Course participants will be trained in the processes around innovation and design to address global grand challenges. This includes content focused on constructing innovation pipelines, principals of design and engineering unique to the developing world and to conservation (Design for the Other 90%), on harnessing and developing disruptive technologies, principles of behavior and marketing, and on overcoming the challenges with setting up social ventures. The course format will facilitate the development of a global community of innovators who will help solve the current and future grand challenges our planet faces in conservation and development, and will encourage thinking about how to do so that rethinks traditional assumptions and approaches within both conservation and development. This course will leverage the incredible idealism and interest in social entrepreneurship, design, and innovation among the millennials, in the US and abroad, and is intended to appeal to those interested in the maker movement. It also seeks to engage individuals in the developing world who are closest to the problems of conservation and development, who would benefit from the approaches taught in the course, and who can leverage their own knowledge of local culture.

Syllabus

Week 1 - Welcome and Course Overview

This course will focus on new approaches to development problems that harness technological and financial innovations, coupled with entrepreneurship, to improve the scale, sustainability, and efficacy of development and conservation approaches. Specifically, t...

Week 1 - Grand Challenges of Development

Most stereotypes of the developing world paint a simple picture of a subsistence farmer with impoverished children. However, when we dig deeper into the data, we find the developing world exhibits substantial complexity that belies traditional stereotypes. In ...

Week 2 - Grand Challenges in Conservation

We are in the middle of a period of extraordinary change on the planet, a sixth great mass extinction. Unlike the previous mass extinction events, this is the first extinction in Earth's history that is driven by the actions of a single species. During this pe...

Week 3 - Exponential Technology and Open Source Innovation

The democratization of science and technology has given us powerful new tools to apply to the grand challenges identified in previous modules. Technology has gained exponentially in processing power, memory capacity, sensor density and number, pixel capacity, ...

Week 4 - Behavioral Innovation, Financial Innovation, and Design

Behavior is the cutting edge of adaptation. It can be the fastest way to meaningful change and also the biggest barrier against it. Behavioral innovations such as incentives and rewards, harnessing competition and gamification, knowledge gaps, social pressure ...

Week 5 - Entrepreneurship

Once you have your idea or innovation, how do you translate it into an enterprise (entrepreneurship) or a startup within a company or institution (intrapreneurship)? How do you influence other companies to adopt your novel approach (extrapreneurship)?

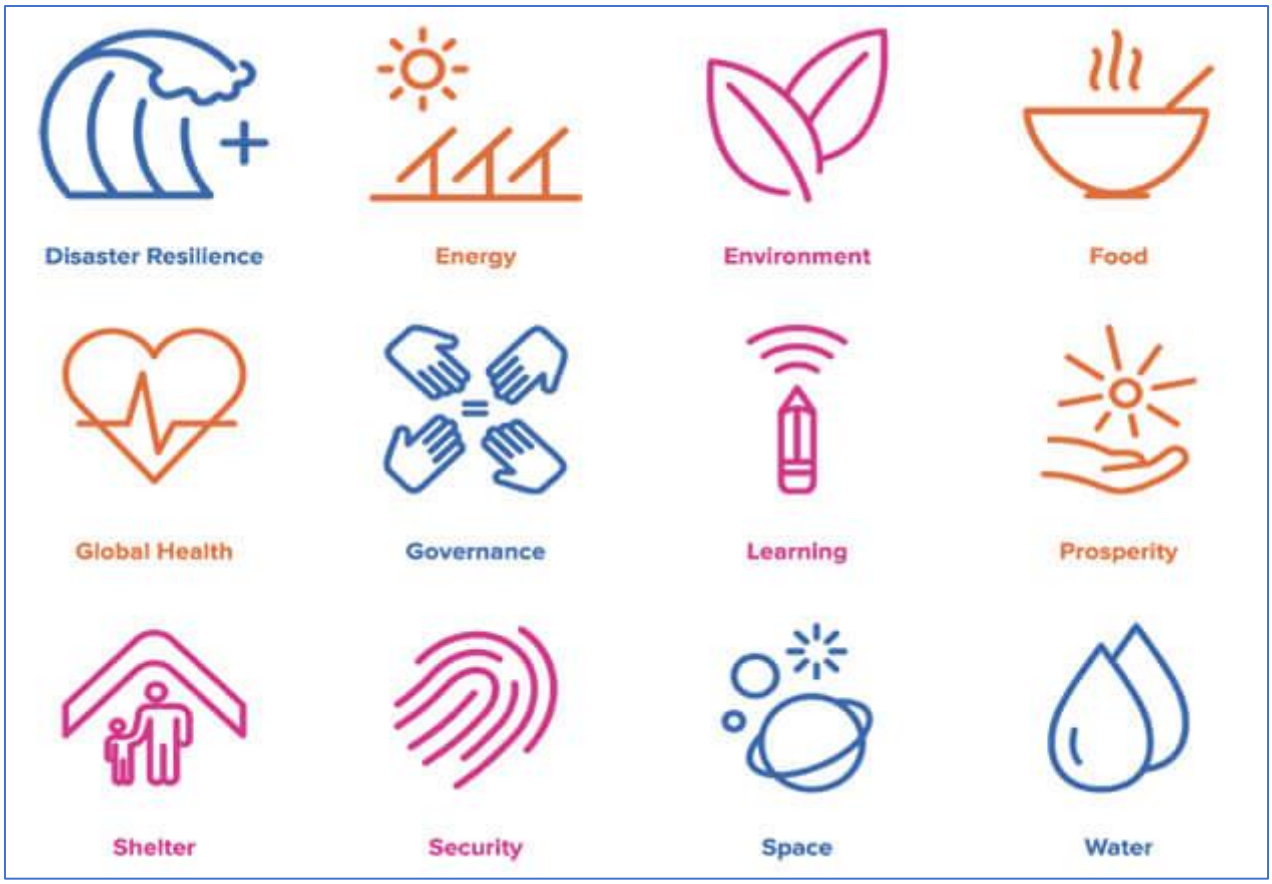

Figure 78 Mindset of multidisciplinary yet practical approach to sustainability.

Source: https://www.my-mooc.com/en/mooc/innovation-and-design-for-global-grand-challenges/

MOOC Strategy and sustainability

About the content

Business and environmental sustainability are not natural bedfellows. Business is about making money. Sustainability is about protecting the planet. Business is measured in months and quarters. Sustainability often requires significant short-term costs to secure a sometimes uncertain long-term benefit. To some activists, all executives are exploitative, selfish one percent. To some executives, all activists are irresponsible, unyielding extremists. And yet engaging with the issue isn't optional – all businesses must have a strategy to deal with sustainability and, like any strategy, this involves making choices. This Strategy and Sustainability course based on Rosenberg's recently published book by Palgrave (http://www.palgrave.com/la/book/9781137501738) that encourages learners to filter out the noise and make those choices in a hard-nosed and clear-eyed way. Prof. Rosenberg's nuanced and fact-based point of view recognizes the complexity of the issues at hand and the strategic choices businesses must make. He blends the work of some of the leading academic thinkers in the field with practical examples from a variety of business sectors and geographies and offers a framework with which senior management might engage with the topic, not (just) to save the planet but to fulfill their short, medium and long-term responsibilities to shareholders and other stakeholders. This course promises to be both engaging and thought-provoking, aimed at anyone who wishes to gain a deeper understanding of a subject that is no longer perceived as a choice but a necessity for future managers and business leaders alike.

Syllabus

Week 1 - Course Overview & Week 1: Business & the Environment

Welcome! Before starting today's video lectures, please have a look at the course syllabus below. In this first session, we'll explore six fundamental differences between how, in my view, CEOs and board members think about the impact of business on the environ...

Week 2 - Week 2 - Strategic Issues

This session calls out the strategic issues in which environmental sustainability plays a key role, such as securing a license to operate, dealing with competition, and shaping consumer and societal perception. Learning Objectives: To dig into the different wa...

Week 3 - Week 3 - Strategic Options

This session first introduces the idea of environmental sensibility which will be different for companies in different business sectors and in different parts of the world. It then develops six strategic approaches that businesses might follow according to the...

Week 4 - Week 4 - Environmental Interest Groups

Part of the issue in choosing a strategy to deal with environmental issues is to fully understand the broad spectrum of environmental interest groups. This session explores how the movement took off, distinguishing between four types of groups and examining ho...

Week 5 - Week 5 - Differences Across Industries and Around the World

This session explores differences across business sectors including automotive, oil & gas, fast-moving consumer goods, mining, and IT/consumer electronics. We will also contrast the situation in the United States with Europe, China, India, and Africa. Learning...

Week 6 - Week 6 - How to develop a sustainability strategy

This session presents an integrated framework for working through the issues introduced in the other sessions in order to develop a strategy. This involves understanding the firm's past and present, looking ahead with a 10–20-year time horizon; quantifying, to...

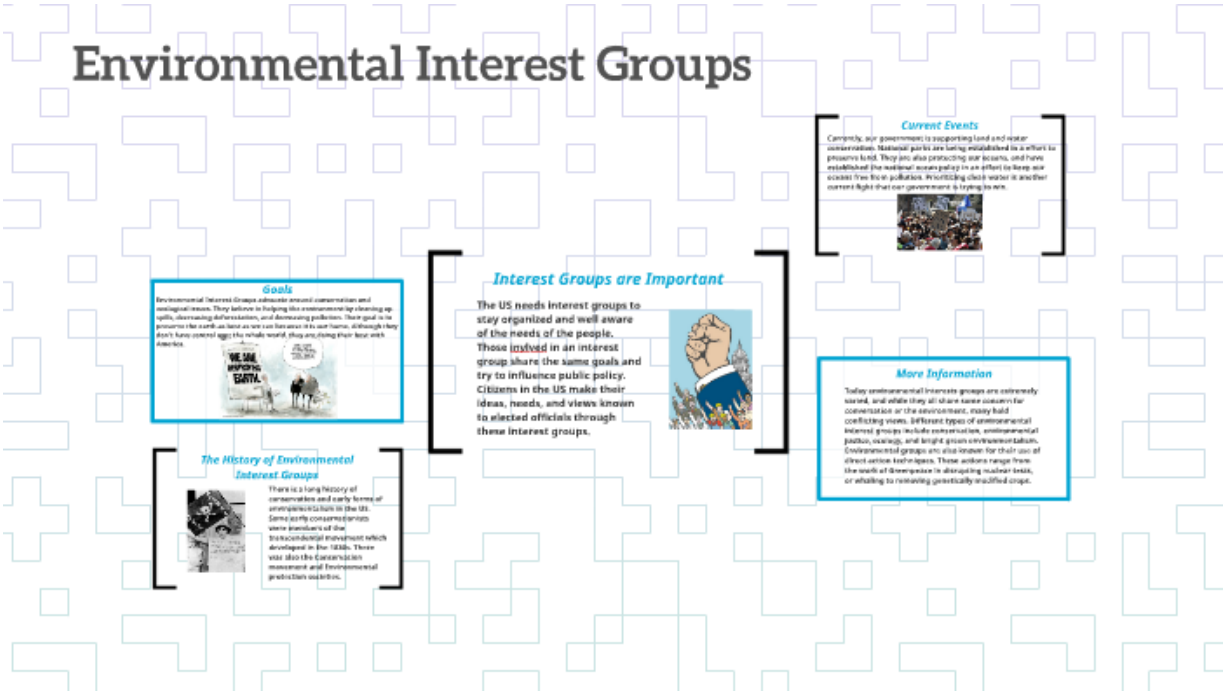

Figure 79 Environmental Interest Groups.

Source: Environmental Interest Groups by Rebeca Gordon (prezi.com)

MOOC Commons for future

About the content

Learn Management Basics & Tools to decarbonize radically our society.

Access all the contents provided to Masters 2 students during the course Energy, Business, Climate & Geopolitics.

Learn Essential Knowledge on Energy & Climate

Basic knowledge on sources & mix of energy, its key role in economic development and in international relations, causes & consequences of Climate Change documented by the IPCC, the target & implications of the Paris Agreement .

Acquire new Skills & Management Frameworks

Essential tools such as Individual Carbon Footprint, Company Carbon Accounting, the Net Zero Initiative, identification of Business & Climate Antagonisms, development of Scenarios and other major strategic frameworks.

Build Climate Strategies with Business Cases

Analyse the limits of current corporate claims & strategies and develop ambitious business pivots and implement them to reduce emissions at the .

The course is not online native (like MOOCs & YouTube videos), still we thought the 30h course content would be more useful online, open and shared with everyone as soon as possible :)

Prerequisite

The course is designed for in-class lectures with 20-50 Masters students: the content is dense and the animation highly interactive.

Syllabus

- Basics on Energy
- Energy access & Climate Change
- The Climate Fresk
- The Energy Big Picture
- Climate Strategy

- Carbon Acounting
- Case - Carbon & Business Review
- Case - Low-Carbon Society
- Case - Rethink Value Proposition
- Business Case Presentation

MOOC Living heritage and sustainable development

About the content

How is intangible cultural heritage – or 'living heritage' – related to sustainable development? How is it relevant for addressing today's development challenges in areas such as health, education, gender, natural disasters and conflict? Why is it important to keep this heritage alive? Communities around the world are transmitting their living heritage, which gives meaning to their lives, strengthens resilience, and contributes to their well-being. In this way intangible cultural heritage and sustainable development are closely linked. The international community made a commitment to safeguarding living heritage when it adopted the Convention for the Safeguarding of the Intangible Cultural Heritage in 2003 and it set itself ambitious goals by adopting the 2030 Agenda for Sustainable Development. This course helps to understand the connections between the two.

By taking this course students and other interested learners and professionals will gain a better understanding of intangible cultural heritage and its relationships with sustainable development, exploring examples and experiences of communities from around the world. By joining the course learners are invited to rethink development from a culture perspective!

Prerequisite

This course is for:

Anyone new to the concept of intangible cultural heritage who wants to understand what intangible cultural heritage is, why it is important to people's wellbeing and what role it plays in the lives of people, including young people;

Graduate students and advanced undergraduate students interested in the key concepts and practices of sustainability and global issues;

Key actors engaged in the field of sustainable development at a local, regional or international level , including those who work in corporate sustainability and responsibility and who want to understand the relationship between intangible cultural heritage and sustainable development;

Practitioners and professionals engaged in living heritage safeguarding , who want to refresh their knowledge on the key concepts of safeguarding of intangible cultural heritage and want to learn more about the relationship between living heritage and sustainable development.

Syllabus

Module 1: What is intangible cultural heritage?

Chapter 1: Intangible cultural heritage as living heritage

Chapter 2: Key concepts of the Convention for the Safeguarding of the Intangible Cultural Heritage

Chapter 3: The Convention's Lists and Register

Chapter 4: The Convention for the Safeguarding of the Intangible Cultural Heritage and other related UNESCO conventions

Module 2: Communities and their intangible cultural heritage

Chapter 1: Who are the communities?

Chapter 2: Why are communities at the centre of intangible cultural heritage safeguarding?

Chapter 3: Community participation

Chapter 4: Community-based approaches

Module 3: Safeguarding intangible cultural heritage

Chapter 1: Transmission and safeguarding

Chapter 2: Safeguarding measures

Chapter 3: Inventories and safeguarding plans

Chapter 4: Ethics in safeguarding intangible cultural heritage

Module 4: Intangible cultural heritage and gender

Chapter 1: Intangible cultural heritage shapes gender identities

Chapter 2: Dynamic gender roles - dynamic living heritage

Chapter 3: Gender-responsive approaches to safeguarding intangible cultural heritage

Module 5: Intangible cultural heritage for sustainable livelihoods and inclusive social development

Chapter 1: Intangible cultural heritage and the 2030 Agenda for Sustainable Development

Chapter 2: Intangible cultural heritage and education

Chapter 3: Intangible cultural heritage and health

Chapter 4: Intangible cultural heritage and income generation

Chapter 5: Intangible cultural heritage, food security and agriculture

Module 6: Intangible cultural heritage for resilience, environmental sustainability and peacebuilding

Chapter 1: Intangible cultural heritage, natural disasters and climate change

Chapter 2: Intangible cultural heritage in conflict-related emergency situations

Chapter 3: Intangible cultural heritage and preventing and solving disputes

Conclusion: Intangible cultural heritage for building a sustainable future for humanity

MOOC Work and employment for a sustainable future

About the content

What does it take to achieve SDG 8 and realize decent work for all? What is the link between employment, work, income and wealth? How will automation affect the future of work?

This course is self-paced – you can enroll immediately and complete the course materials at any time before August 31, 2021.

National economies have grown substantially since the Industrial Revolution of the 19th century, yet people have not necessarily seen an increase in opportunities to find decent work or earn a decent income. In fact, in some places, the increased productivity and rising profits associated with automation have directly impacted the availability of decent jobs. According to the International Labour Organization, more than 204 million people were unemployed in 2015, and more than 600 million new jobs are needed by 2030 just to keep pace with the growth of the working-age population. We also need to improve working conditions for the 780 million women and men who are employed but not earning enough to lift themselves and their families out of poverty. In addressing these core issues we will not only see increasing decent work opportunities but also more robust, inclusive and poverty-reducing growth.

This course explores the past and future of work in the context of the SDGs, particularly SDG 8: Decent Work and Economic Growth. It examines the state of income and employment around the world, barriers to employment, policies to promote economic opportunity, and the future of work in our rapidly changing world. Encouraging entrepreneurship and job creation are key to achieving the SDGs, as are effective measures to eradicate forced labour, slavery, and human trafficking. With these targets in mind, the world can achieve full and productive employment and decent work for all women and men by 2030.

This seven-module massive open online course (MOOC) provides an in-depth look at the issues of inclusive and sustainable economic growth, full and productive employment, and decent work for all. The topics covered include structural shifts in economies and work; informality, gender, and child labor; the modern welfare state; the future of work; and more. The course concludes with a special module by the ILO on realizing decent work for all and achieving SDG 8.

You will learn about:

- The link between employment, work, income and wealth

- Global perspectives on changes to formal employment
- The challenges of child labor, gender disparity and informal employment
- Modern welfare state and novel policy instruments
- Structural and institutional models for the future of work
- Artificial Intelligence and the future of work
- What it takes to achieve SDG 8 and realize decent work for all, featured in a special module by the ILO

Prerequisite

This course is for

Policy professionals who want to understand frameworks for SDG planning

Development practitioners seeking knowledge on goals-based development

Advanced undergraduates and graduate students interested in economics, development, and other key concepts related to the SDGs

Syllabus

Module 1: Decent Work for Sustainable Development

1.1 Introduction to SDG 8: The Link between Work and Sustainable Development

1.2 Employment, Decent Work and Social Justice for Sustainability

1.3 Link between Employment, Work, Income and Wealth

1.4 Measuring Decent Work and SDG 8

1.5 Implosion Points, Demographic Change, Changing Nature and Locations of Jobs and Incomes

Module 2: Transitions in Employment and Work

2.1 A Structural Shifts in Economies and Work

2.1 B Structural Shifts in Economies and Work: Skill Bias

2.2 Work in a Post Manufacturing World

2.3 A Macroeconomic Context of Diminishing Returns to Labor

2.3 B Macroeconomic Context of Diminishing Returns to Labor: Social Democratic Model

2.4 Disaggregating Productivity Gains

2.5 Global Perspectives on Changes to Formal Employment

Module 3: Challenges of Work: Informality, Gender and Child Labor

3.1 Informal Employment: Definitions and Debates

3.2 Global Data: Size, Composition and Characteristics

3.3 Urban Informal Self-Employment

3.4 AInformal Self Employment: Informal Enterprises

3.4 BInformal Self Employment: Dependent Contractors

3.5 Challenges for Policy for Informal Workers and Enterprises

3.6 Formalization and Decent Work

3.7 Women in the Informal Workforce

3.8 Child Labor

3.9 Case Study: Modern Slavery and Children

Module 4: Current Policy Responses

4.1 Tracing the Rise of a Modern Welfare State

4.2 Features of a Modern Welfare State

4.3 New Policy Instruments

4.4 Developing Policies for the Education to Work Pipeline

Module 5: Structural and Institutional Models for the Future of Work

5.1 The New Dilemma of Development

5.2 The Knowledge Economy and Its Future

5.3 Labor and Capital

5.4 Finance and the Real Economy

5.5 The Capable Agent: Education

Module 6: Future of Jobs and Work

6.1 Automation, Work and Wellbeing: Lessons from History

6.2 The Political Economy of Automation

6.3 Skills and the Jobs of the Future: Implications for Education and Training

6.4 Artificial Intelligence and the Future of Work

6.5 Challenge and Opportunities for Stable Inclusive Societies

Module 7: Special Module in Partnership with the ILO: Achieving SDG 8 and Realizing Decent Work for All

7.1 Promoting Full and Productive Employment

7.2 A Transformative Agenda for Gender Equality at Work

7.3 International Labour Standards

7.4 Labor Market Governance and Social Dialogue in the Face of Rapid Changes

7.5 Policies to Realize the Fundamental Principles and Rights at Work

7.6 Universal, Adequate and Comprehensive Social Protection

MOOC Politics and economics of international energy

About the content

Energy issues have always been important in international relations, but in recent years may have become even more important than in the past due to the widespread awareness of existing limits to energy sources and negative climate impacts. The course discusses global trends in energy consumption and production, various available scenarios for potential developments in the coming decades, the availability of oil reserves and the evolution of the oil industry. It then discusses natural gas and highlights the differences between oil and gas. It will also discuss renewable energy sources, nuclear energy and EU energy policy.

The course aims at providing students whose main interest is in international relations a background on energy resources, technology and economic realities to allow them to correctly interpret the political impact of current developments. It also aims at providing students, who already have a technical background in energy science or engineering, with the broad global view of energy issues that will allow them to better understand the social, economic and political impact of their technical knowledge.

The course is divided into 8 sequences. Each sequence is largely illustrated with different types of contents: video either produced by the professor or extracted from professional and academic sources, interviews with specialists of the field, animated graphics and diagrams, international companies scenarios, press and scientific articles. Here are the 8 sequences:

Syllabus

Week 1 - Week #1 : Introduction to global energy trends and scenarios

This module presents the Introduction to global energy consumption, Energy scenarios, Energy transition and poverty

Week 2 - Week #2 : Oil formation, exploration and production

This module presents the Introduction to oil formation and exploration, Oil extraction methods, Environmental management in oil production

Week 3 - Week #3 : Global oil reserves and resources

This module presents the Introduction to liquid fuels, Definition and issues about oil reserves, Oil production and the impact of non-conventional oil

Week 4 - Week #4 : The economics of natural gas

This module presents the Introduction to natural gas, The international gas market, New gas developments

Week 5 - Week #5 : The geopolitics of natural gas

This module presents the Introduction to geopolitics of gas, Geopolitics in the Far and Near Est

Week 6 - Week#6 : Renewable energy sources

This module presents the Introduction to renewable energy, Types of renewable energy, Renewable energy integration, Energy efficiency

Week 7 - Week #7 : Nuclear Energy

This module presents the Introduction to Nuclear Energy, Nuclear Energy for electricity generation, Safety of Nuclear Energy

Week 8 - Week #8 : Dilemmas of (European) energy policy

This module presents the Introduction to energy policy, The three pillars of EU energy policy

Prerequisite

The course is very accessible to a wide public. But it will also provide a lot of resources for those who have an advanced level, like professionals and opinion leaders with an interest in international energy relations and policies. Energy is prominently present in the media almost every day and having a sound understanding of the nexus between technical and political considerations is essential to politicians, diplomats, journalists as well as executives of energy companies to correctly evaluate their options and strategies.

MOOC Tourism and travel management

About the content

Do you want to learn about an industry that is dynamic, fun, evolving, and always challenging? At its peak, tourism supported over 300 million jobs globally and in 2018 generated US$1.65 trillion in international receipts.

By taking this course, developed around one of the world's premier destinations, Queensland in Australia, you will experience challenges, and solutions, reflective of the ever-changing global tourism and travel industry. Tourism is an aspiration for millions of people globally, and has proven to be a highly resilient sector, which is vital to many economies.

This course will provide you with substantive insights into the management challenges facing destinations and operators. It will show you the proper steps to follow forresearch-informed resolutions. The course comprises seven modules, with each module co-delivered by two or more expert academics. Developed in partnership with Tourism and Events Queensland, the statutory marketing authority for tourism in Queensland, several modules have been shot on-location across Queensland's premier tourism destinations. The course features case studies of leading tourism and hospitality companies and interviews with prominent industry professionals. In addition, you'll hear from public sector officials representing government, peak industry bodies, destination management and marketing organisations, hotels and resorts, attractions, tour operators, transport and local communities.

Eleven leading academics share their expertise taking the learner through a visceral journey of self-discovery and exploration of various aspects of tourism planning, management of services and experiences, the changing role of technology in decision-making, and management of workforce and risk in tourism.

The course is particularly designed for:

- Professionals working in the tourism (hospitality, events, sport and leisure) industries
- Students learning about these industries for the first time
- Individuals who have an avid interest in tourism

Syllabus

- Understand the complexity of challenges faced by the tourism industry
- Examine tourism and travel management principles

- Create resolutions and strategies to address tourism issues and challenges

MOOC Tourism Management at UNESCO World Heritage Sites

What you will learn

At the end of this course, you will be able to:

- Provide better experiences, understanding and management of tourism in World Heritage Sites.
- Access a wide theoretical overview of topics, theories and issues related to tourism and contextualize them within the field of cultural, heritage and sustainable tourism.
- Apply the theories to concrete examples of tourism management in heritage sites from all around the globe. A particular focus will be given in each chapter to the case study of tourism destination and World Heritage Site of Archaeological Site of Al-Hijr (Madâin Sâlih) thanks to the participation and collaboration of the RCU (The Royal Commission for AlUla) and AFALULA (French Agency for AlUla Development).

Description

The very term "Heritage" suggests that something of value has been transmitted through generations up to ours, and that such generations were and are able to access it as its heirs. In the case of World Heritage Sites, we need to balance and orchestrate preservation: the current generation should be able to visit and somehow enjoy heritage in a way that will allow future generations to benefit from and have access to it. Sustainability is a major part of the solution.

Since its establishment in 2002, the international UNESCO UNITWIN Network "Culture, Tourism, Development" has been working with its members – highly profiled researchers and professors – towards the goal of how tourism can coexist with, protect and sustainably enhance the outstanding value of the heritage belonging to all of humanity. It wants to share its knowledge in a spirit of solidarity among universities, decision makers, non-governmental organizations, civil society and the private sector.

For 2021, the MOOC series "Tourism Management at UNESCO World Heritage Sites" is releasing its third volume, providing new insights and numerous case studies from all around the world in all of its six chapters.

Format

An Arabic translation of this page is available by clicking on this link.

The course consists of six chapters, released one per week. During each chapter, learners will be able to gain knowledge about different aspects of Tourism Management at UNESCO World Heritage Sites thanks to ad-hoc documents and videos produced by members of an international network of prominent universities.

Participants will also have the opportunity to assess their understanding and learning progress through quizzes, as well as through various activities, discussions, and peer-to-peer evaluated activities.

During the six weeks, from May 24 until July 2, 2021, the pedagogical team is available to answer questions and give advice to the participants. Afterwards, you can still register to the course, watch videos, read the theoretical texts, answer quizzes, track your progress and discuss heritage tourism with an international community of people interested in tourism management at world heritage sites, but without the support from the pedagogical team.

The course remains available with all materials for enrolled students to use until the end of 2022.

Prerequisites

The MOOC is open to everyone wishing to learn more about how tourism works at UNESCO World Heritage Sites. It has, however, a special focus on professional figures such as academics, site managers, state agencies, policy makers, students and other professionals involved in tourism.

It is NOT necessary to have completed the first and second volume of this MOOC in order to register to the current course. For interested first-time participants, the "Tourism Management at UNESCO World Heritage Sites" MOOC manuals, which gather all chapter documents of the previous volumes, will be available for download at the start of the course.

Assessment and certification

The assessment process is based on weekly quizzes, where participants can test their knowledge, and peer-reviewed online activities in which to put the newly gained notions into practice. Learners successfully completing the course (with a score of 80% or higher) will then receive a free course completion certificate.

Certificates will be issued during the following months: July 2021, December 2021, March 2022, June 2022, September 2022, December 2022.

Course plan

Week 1: The 1972 and 2003 UNESCO Conventions and the Concept of Outstanding Universal Value (OUV)

Week 2: UNESCO World Heritage Sites. Site Management Systems

Week 3: Local Communities' Involvement and Sustainable Tourism

Week 4: Marketing

Week 5: Interpretation. Stories and Memories

Week 6: Information and Communication Technologies (ICTs). Orchestrating Them for Heritage Tourism

B. Capacity Building Courses

Capacity-building is defined as the process of developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities need to survive, adapt, and thrive in a fast-changing world. An essential ingredient in capacity-building is transformation that is generated and sustained over time from within; transformation of this kind goes beyond performing tasks to changing mindsets and attitudes. Sustainable Development Goal 17: Revitalizing the Global Partnership for Sustainable Development, the United Nations is committed to transformation from within. Goal 17 includes targets for capacity-building, including increasing technology and innovation in least developed countries and improving data collection and monitoring for the achievement of the SDGs themselves. Universities in particular can serve as centres of capacity-building through research, innovation and data collection and analysis.

COURSE I.

Introduction to energy saving and renewable energy in Poland

In Poland, regarding the results of this survey, many people seem to be concerned about their energy security, and quite a substantial part of the population appear to be uncertain about the viability of renewable energy solutions. With today's global energy crisis resulting in high prices and shortages that are hurting consumers, businesses and entire economies, it has never been more important to use energy more wisely. We can do this through simple changes in behaviour and habits to consume less energy in our daily activities. We can also save energy by investing in more energy efficient products that reduce both our energy bills and our environmental footprint.

Concerning renewable energy issues, different factors, such as socio-cultural, institutional, and technological barriers, persist among the public, owing to the poor dissemination of RE technologies education. Another barrier is the lack of creative methods for harnessing other RE sources and the high cost of harnessing the existing ones via available technology for the common people. Moreover, some of the existing technologies cannot satisfy the total energy needs of the public; thus, they are not cost effective either. To overcome the barriers, new and creative technological advancements must be explored to harness energy from new sources by employing cost-effective technologies, thereby contributing significantly to meeting global energy needs. One strategy for meeting this objective is the introduction of RE concepts in the education spectrum from secondary school and to disseminate the idea among the less educated part of the general public so that many future holistic citizens are informed of the grave necessity of RE technologies to motivate them to devise new creative and technological innovations in this field.

COURSE II.

Waste management for everybody – saving environment, money, and health.

A capacity-building course for the Hungarian society

Based on the results of the survey and the extensive literature studies regarding the waste problems in Hungary, it seems to be an obvious choice to develop a capacity building introductory education programme for the general public, even for those, who do not have the possibility and capacity to access information in another way. There are many unsolved tasks in waste management in Hungary, from selective collection to replacing single-use plastics and composting residential green waste. Although, in addition to the popular demand for climate protection, several new European Union directives also urge solutions.

Poorly managed waste is contaminating the world's oceans, clogging drains, and causing flooding, transmitting diseases, increasing respiratory problems from burning, harming animals that consume waste unknowingly, and affecting economic development such as through tourism. Without urgent action, these issues will only get worse. First, rapid urbanization, population growth, and economic development will push global waste generation to increase by 70% over the next 30 years. This course is an introduction to shed light on issues and good practices what everyone should know.

Recommendations for Sustainable Development Education Models

I. UNESCO

UNESCO is the United Nations leading agency for ESD and is responsible for the implementation of ESD for 2030, the current global framework for ESD which takes up and continues the work of the United Nations Decade of Education for Sustainable Development (2005-2014) and the Global Action Programme (GAP) on ESD (2015-2019).

Education for sustainable development (ESD) is UNESCO's education sector response to the urgent and dramatic challenges the planet faces. The collective activities of human beings have altered the earth's ecosystems so that our very survival seems in danger because of changes more difficult to reverse every day. To contain global warming before it reaches catastrophic levels means addressing environmental, social and economic issues in a holistic way. UNESCO's ESD for 2030 education programme aims to bring about the personal and societal transformation that is necessary to change course.

Acting as a global advocate and aiming to strengthen capacities of governments to provide quality Climate Change Education (CCE), UNESCO produces and shares knowledge, provides policy guidance and technical support to its Member States and implements projects on the ground. UNESCO encourages innovative approaches and enhances non-formal education programmes through media, networking and partnerships.

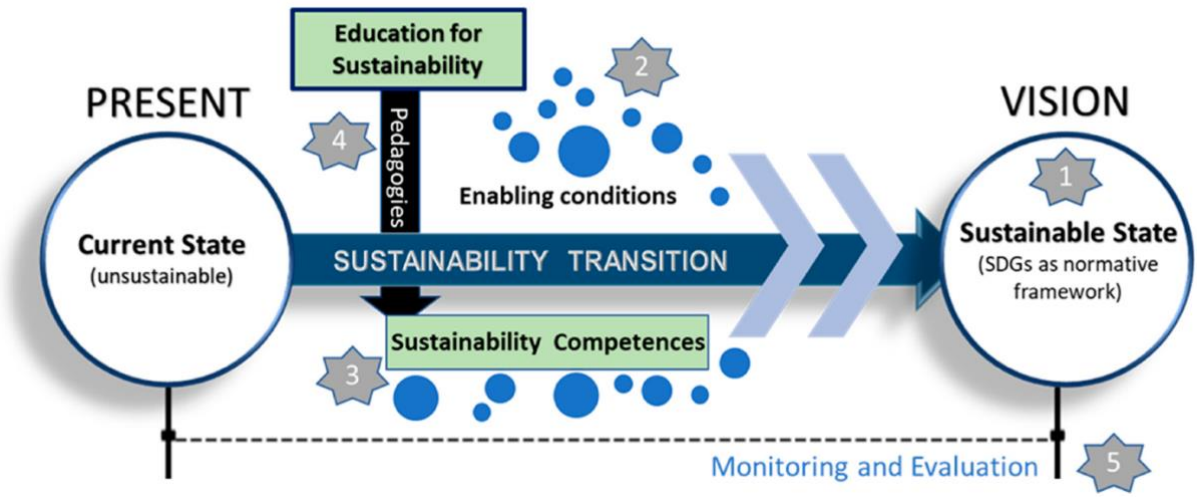

Figure 80 Educational framework for sustainability transformation and main steps: (1) A participatory vision of sustainability, (2) enabling conditions for sustainability, (3) competences for sustainability transformation, (4) pedagogies and learning strategies f

UNESCO supports countries to develop and expand educational activities that focus on sustainability issues such as climate change, biodiversity, disaster risk reduction, water, the oceans, sustainable urbanisation and sustainable lifestyles through ESD. UNESCO leads and advocates globally on ESD and provides guidance and standards. It also provides data on the status of ESD and monitors progress on SDG Indicator 4.7.1, on the extent to which global citizenship education and ESD are mainstreamed in national education policies, curricula, teacher education and student assessment.

Climate change education is the main thematic focus of ESD as it helps people understand and address the impacts of the climate crisis, empowering them with the knowledge, skills, values and attitudes needed to act as agents of change. The importance of education and training to address climate change is recognized in the UN Framework Convention on Climate Change, the Paris Agreement and the associated Action for Climate Empowerment agenda which all call on governments to educate, empower and engage all stakeholders and major groups on policies and actions relating to climate change. Through its ESD programme, UNESCO works to make education a more central and visible part of the international response to climate change. It produces and shares knowledge, provides policy guidance and technical support to countries, and implements projects on the ground.

Website: https://www.unesco.org/en/education/sustainable-development/need-know

II. The Sustainable Self Model by Paul Murray

Achieving a sustainable society is the biggest issue of our time. It is not an issue confined to a particular subject area or to certain jobs. It is a way of thinking and behaving that will need to be embedded in all aspects of all of our lives. The Sustainable Self is the perfect resource for lecturers, trainers, students and professionals of any discipline who need to teach or learn about sustainability. There is widespread agreement that we need to live more sustainable lives. But when up against entrenched habits and everyday obstacles, it can be difficult to turn good intentions into action. This model will enable educators to develop practice-based, complete curricula for public education according to the principles of participatory approach for effecting a personal transformation towards sustainability, showing you how to align your personal and professional actions with your values and beliefs. Full of activities that can be done individually or in groups, it is supported by additional interactive learning resources online, not forgetting the comprehensible and target-group adapted approach, where individuals will be empowered to build up their knowledge and skills based on their own conditions. Thus, this approach offers

a set of tailored education programmes with attractive elements of gamification, economic motivation, increasing self-esteem – all based on a "learning by doing" principle and the novel 'edutainment' tools (Fig. 81).

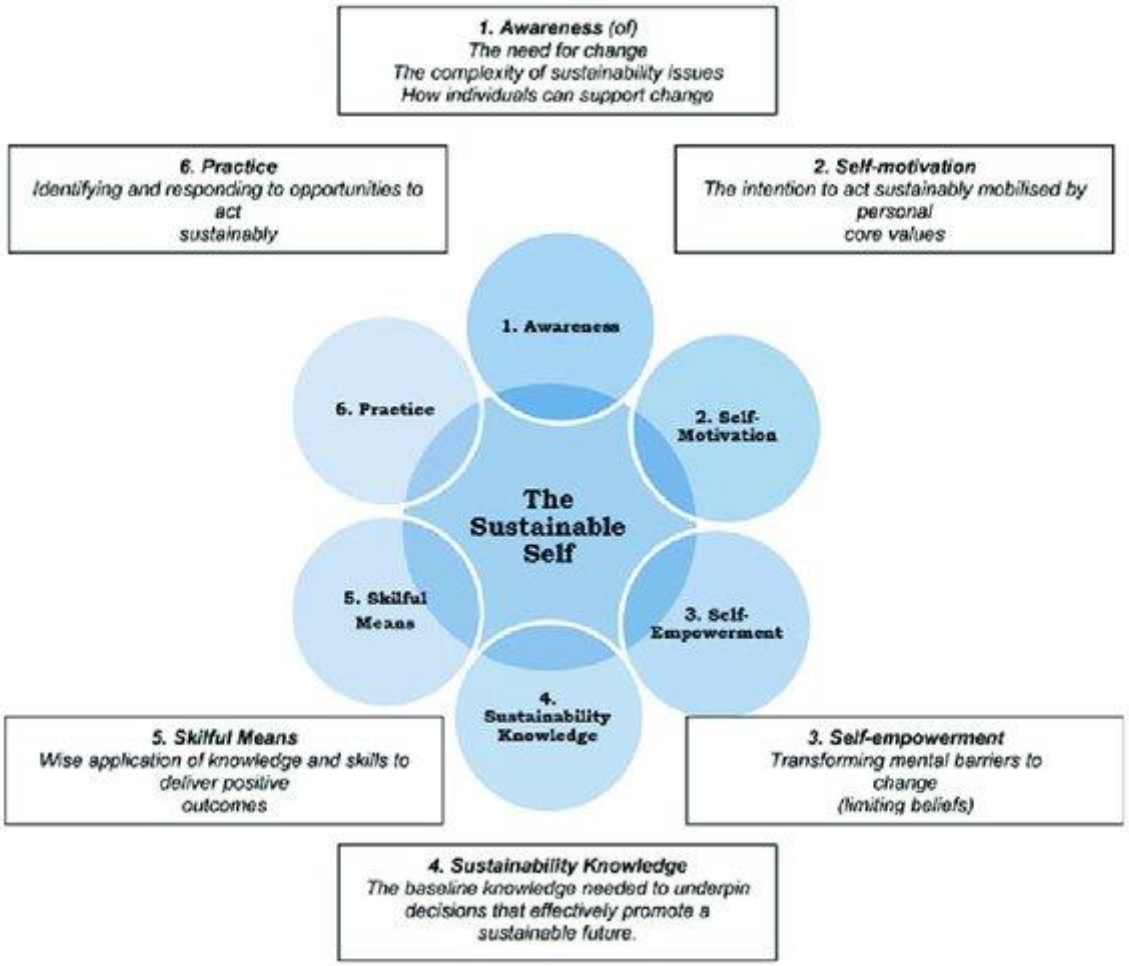

Figure 81 The Sustainable Self Model of PSD

Source: Environmental Education Research 20(5) https://doi.org/10.1080/13504622.2013.836623

References

Adam, D. (2022). The World Population Just Hit 8 Billion, and Here's How It Will Continue to Grow - A United Nations model predicts a slower rate of population growth than was previously estimated. Scientific American, November 15, 2022.

https://www.scientificamerican.com/article/the-world-population-just-hit-8-billion-and-heres-how-it-will-continue-to-grow/

Adams, J., Mark Maslin, M., and Thomas, E. (2016). Sudden climate transitions during the Quaternary. Progress in Physical Geography 23,1 pp. 1–36.

https://doi.org/10.1177/030913339902300101

ALTEO (2021). ALTEO Sustainability Barometer (In Hungarian)

https://alteo.hu/fenntarthatosag/tarsadalmi-szerepvallalas/alteo-fenntarthatosagi-barometer/

Anisimov, O. A. (2007). Potential feedback of thawing permafrost to the global climate system through methane emission. Environ. Res. Lett. 2 045016

https://doi.org/10.1088/1748-9326/2/4/045016

Anisimov, O., Zimov, S. (2021). Thawing permafrost and methane emission in Siberia: Synthesis of observations, reanalysis, and predictive modeling. Ambio 50, 2050–2059 (2021). https://doi.org/10.1007/s13280-020-01392-y

Bertram C, Luderer G, Popp A et al (2018) Targeted policies can compensate most of the increased sustainability risks in 1.5 °C mitigation scenarios. Environ Res Lett 13:064038. https://doi.org/10.1088/1748-9326/aac3ec

Björnberg, K.E., Karlsson, M., Gilek, M., Hansson, S. O. (2017). Climate and environmental science denial: A review of the scientific literature published in 1990–2015, Journal of Cleaner Production, Volume 167, 2017, Pages 229-241, ISSN 0959-6526

https://doi.org/10.1016/j.jclepro.2017.08.066

Brown, A. L. and Van Kamp, I. (2017). WHO Environmental Noise Guidelines for the European Region: A Systematic Review of Transport Noise Interventions and Their Impacts on Health Int. J. Environ. Res. Public Health 2017, 14(8), 873.

https://doi.org/10.3390/ijerph14080873

Cars, G. and Engström, C-J. red. (2007). Stadsregioners utvecklingskraft – trender och nya perspektiv. In Swedish. Forskargruppen för stadsregioner och utvecklingskraft 2008:1

Kungliga Tekniska Högskolan, Institutionen för Samhällsplanering och Miljö

Chen, L., Msigwa, G., Yang, M. et al. (2022). Strategies to achieve a carbon neutral society: a review. Environmental Chemistry Letters 20, 2277–2310 (2022). https://doi.org/10.1007/s10311-022-01435-8

Council of the European Union (2022). 'Fit for 55': Council agrees on stricter rules for energy performance of buildings (press release, 25 October 2022)

https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/

Duit, A., Feindt, P.H., and Meadowcroft, J. (2016). Greening Leviathan: the rise of the environmental state? Environmental Politics, 25 (1), 1–23. https://doi.org/10.1080/09644016.2015.1085218

Ellis, E.C. (2015). Ecology in an anthropogenic biosphere. Ecological Monographs. Ecological Society of America. Volume 85, Issue 3. Pages 287-331

https://doi.org/10.1890/14-2274.1

Engström, C. J. & Oscarsson, G. (2006). Vi behöver en nationell strategi – och det behövs

inverteringar – nu. I Tidskriften PLAN Nr 1-2, 2006. Stockholm: Föreningen för samhällsplanering. In Swedish.

European Commission (2019). Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee

and the Committee of the Regions: The European Green Deal. COM/2019/640 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:640:FIN

European Commission (2020). New Eurobarometer Survey: Protecting the environment and climate is important for over 90% of European citizens. Eurobarometer: Protecting the environment and climate. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_331

FAO. 2020. Global Forest Resources Assessment 2020: Main report. Rome.

https://doi.org/10.4060/ca9825en

Gerland P., Raftery A.E., Ševčíková H., Li N., Gu D., Spoorenberg T., Alkema L., Fosdick B.K., Chunn J.L., Lalic N., Bay G., Buettner T., Heilig G.K. and Wilmoth J. (2014). World Population Stabilization Unlikely This Century. Science 346:234-237.

Hartel, T., J. Fischer, C. Campianu, A. Milcu, J. Hanspach, and I. Fazey (2014): The importance of ecosystem services for rural inhabitants in a changing cultural landscape in Romania. Ecology and Society 19(2): 42. http://dx.doi.org/10.5751/ES-06333-190242

Hilaire, J., Minx, J.C., Callaghan, M.W. et al. Negative emissions and international climate goals—learning from and about mitigation scenarios. Climatic Change 157, 189–219 (2019). https://doi.org/10.1007/s10584-019-02516-4

Kidell, G. and Åberg, H. (2021). Regenerativa verksamheter i ett ekonomiskt hållbart perspektiv. (Regenerative activities in an economically sustainable perspective. In Swedish). Linköping University, Faculty of Arts and Sciences. Linköping University, Department of Management and Engineering, Business Administration.

https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1569281&dswid=1302

Maximillian J, Brusseau ML, Glenn EP and Matthias AD (2019). Pollution and environmental perturbations in the global system. In: Environmental and pollution science, Academic Press, pp 457–476. https://doi.org/10.1016/B978-0-12-814719-1.00025-2

Medgyesi, M. and Schneider, M. (2020). Környezettel, környezetvédelemmel kapcsolatos lakossági attitűdök. (In Hungarian. Public attitudes related to the environment and environmental protection.) TÁRKI Social Research Institute, Budapest. https://www.parlament.hu/documents/1238941/0/NFFT_ISSP_Kornyezet+%282%29.pdf/27fa46aa-0802-27c3-26b3-d6d3caa4f4d1?t=1614160900123

Mihály, Sz., Remetey-Fülöpp, G., Kristóf, D., Czinkóczky, A., Palya, T., Pásztor, L., Rudan, P., Szabó, Gy., & Zentai, L. (2021). Earth observation and geospatial big data management and engagement of stakeholders in Hungary to support the SDGs, Big Earth Data, 5:3, 306-351, https://doi.org/10.1080/20964471.2021.1940733

Millot A, Maïzi N (2021). From open-loop energy revolutions to closed-loop transition: What drives carbon neutrality? Technological Forecasting and Social Change 172:121003. https://doi.org/10.1016/j.techfore.2021.121003

Murray, P. (2011). The Sustainable Self - A Personal Approach to Sustainability Education

Taylor & Francis. https://doi.org/10.4324/9781849775212

Nemes Nagy, J. (1997). Regional Science Studies. vol. 4. Regionális Tudományi Tanulmányok 4. kötet Budapest, ELTE, In Hungarian.

Nerini, F., Sovacool, B., Hughes, N. et al. (2019). Connecting climate action with other Sustainable Development Goals. Nat Sustain 2, 674–680.

https://doi.org/10.1038/s41893-019-0334-y

Pew Research Center (2015). The Future of World Religions: Population Growth Projections, 2010-2050. Why Muslims Are Rising Fastest and the Unaffiliated Are Shrinking as a Share of the World's Population.

Raleira, R. (2022). EU Regulation for deforestation-free products: Where do we stand? Aid environment.

https://aidenvironment.org/eu-regulation-for-deforestation-free-products-where-do-we-stand/

Stansberry, K., Anderson, J., and Rainie, L. (2019). Humanity is at a precipice; its future is at stake. PEW Research Center, https://www.pewresearch.org/internet/2019/10/28/3-humanity-is-at-a-precipice-its-future-is-at-stake/

SB Sustainable Business (2021). European Green Deal: a brief summary.

https://sbsustainablebusiness.com/wp-content/uploads/2021/05/ebook-2-ing.pdf

UNEP (2011). Decoupling Natural Resource Use and Environmental Impacts from Economic Growth. A Report of the Working Group on Decoupling to the International Resource Panel.

Fischer-Kowalski, M., Swilling, M., von Weizsäcker, EU, Ren, Y., Moriguchi, Y., Crane, W., Krausmann, F., Eisenmenger, N., Giljum, S., Hennicke, P., Romero Lankao, P., Siriban Manalang, A., Sewerin, S.

file:///C:/Users/User/Downloads/decoupling_report_english.pdf

World Data Info (2023). Population growth in Poland.

https://www.worlddata.info/europe/poland/populationgrowth.php

Important websites

https://www.parlament.hu/documents/1238941/0/1905_NFFT_intrend_A4_beliv_final.pdf/1c122bb0-8efe-d3bd-a264-53b988b52a07?t=1565599853059

https://www2.deloitte.com/hu/hu/pages/energia-energiahordozok/articles/sustainable-actions-index-2022.html

https://www.ksh.hu/docs/hun/xftp/idoszaki/fenntartfejl/2021/fenntarthatos_fejlodes_indikatorai_2021.pdf

https://demnet.hu/magyarorszag-fenntarthatosag-1/

https://www.greenpeace.org/hungary/

https://mtvsz.hu/dynamic/fenntart/ff_magyarorszaghelyzete.pdf

https://www.eea.europa.eu/policy-documents/review-of-the-european-union

https://esdac.jrc.ec.europa.eu/resource-type/scientific-technical-reports

https://think2030.eu/publications/european-green-deal-barometer-2022/

https://www.nature.com/subjects/environmental-sciences/srep

https://www.ren21.net/gsr-2022/

https://news.un.org/en/?gclid=CjwKCAiAkfucBhBBEiwAFjbkr2VGH12KiKIyj839RIeM20EYr3-8xgIv7rsVU9e1_rTwQbWdZOAE1xoCEGsQAvD_BwE

https://www.undp.org/press-releases/worlds-largest-survey-public-opinion-climate-change-majority-people-call-wide-ranging-action

https://en-roads.climateinteractive.org/scenario.html?v=22.11.0

https://www.vg.hu/energia-vgplus/2022/08/az-unios-iranyelvnel-zoldebb-magyarorszag

Commentary and Analysis

WWF: The Road to a Sustainable Europe

Wikipedia: European Green Deal

Balkan Insight, 22/07/2019: European Green Deal Could Transform EU Politics

IFRI: Édito Énergie, 08/10/2019: The War on Carbon. Five Priorities for the European Green Deal

Social Europe, 04/11/2019: Europe's Green Deal is turning red

Bruegel: Policy Contribution, 05/11/2019: How to make the European Green Deal work

CER: Press Release, 12/11/2019: Rail's priorities for the European Green Deal

Reuters, 26/11/2019: What is von der Leyen's European Green Deal?

UITP: News, 27/11/2019: The new EU Green Deal: Towards a climate-neutral Europe with public transport

Greenpeace: Press Release, 29/11/2019: Leaked European Green Deal is not up to the task, Greenpeace

New Statesman, 03/12/2019: Europe's Green Deal is a tepid response to the climate crisis

EurActiv, 04/12/2019: Buildings must be at the heart of the European Green Deal. Here's why

Euronews, 06/12/2019: The EU's 'Green Deal' can't be business as usual. Tackling the climate crisis must come first

EPRS: At a Glance, December 2019: European Green Deal

European Commission: The European Green Deal – our new growth strategy: Op-ed by Commission President von der Leyen, 11 December 2019

Deutsche Welle, 11/12/2019: EU Green Deal can spark a decarbonization revolution

EurActiv, 11/12/2019: EU Commission unveils ‘European Green Deal’: The key points

Euro|topics, December 2019: A climate-neutral Europe by 2050?

Politico, 12/12/2019: Spot the difference: Draft vs. final Green Deal plan

Politico, 12/12/2019: Ursula von der Leyen’s risky climate gambit

Euro|topics, December 2019: Von der Leyen's ;Green Deal': who foots the bill?

The Conversation, 16/12/2019: ‘Green Deal’ seeks to make Europe the first climate-neutral continent by 2050

CEPS: In Brief, 16/12/2019: Can Europe offer a Green Deal to the world?

Transport&Environment: Blog, 16/12/2019: Is the Green Deal the real deal?

EUObserver, 17/12/2019: Why Poland couldn't sign up to Green New Deal

ECFR: Commentary, 17/12/2019: The Green Deal will make or break Europe

Foreign Policy, 17/12/2019: Green Deal, Greener World

Deutsche Bank: Research, 17/12/2019: The European Green Deal: It all sounds very nice, but…

ECF: News, 17/12/2019: The European Green Deal – A huge opportunity for cycling

EPC: Commentary, 17/12/2019: EU trade policy: Global enforcer for the European Green Deal

IEEP: News, 19/12/2019: What the Green Deal means for Europe’s biodiversity

ECFR: Commentary, 20/12/2019: European Green Deal: Bring in the Western Balkans

The Brussels Times, 30/12/2019: European Green Deal: Good for Europe but will it save the planet?

Bruegel: Opinion, 03/01/2020: The Green Deal is not just one of many EU projects, it is the new defining mission

CAPReform.eu, 12/01/2020: Agriculture in the European Green Deal

Social Europe, 14/01/2020: Where is the ‘deal’ in the European Green Deal?

EurActiv, 21/01/2020: A Green Deal that works for everyone – Making the renovation wave a reality

Bruegel: Opinion, 03/02/2020: Berlin will make or break the European Green Deal

Delors Institute: Policy Brief, 04/02/2020: Making the Green Deal a European success Coalition, narrative, flagships

GMFUS: Blog, 05/02/2020: The European Green Deal Brings Opportunities and Challenges for U.S.-EU Cooperation

VoxEurop, 05/02/2020: European Green Deal: What about social objectives?

Deutsche Welle, 06/02/2020: Will trains play a key role in the European Green Deal?

The Guardian, 07/02/2020: The EU's green deal is a colossal exercise in greenwashing

EPRS: Briefing, March 2020: The European Green Deal [What Think Tanks are thinking]

List of figures