



# GLOBAL MEGATRENDS AND IMPLICATIONS FOR THE SLOVAK REPUBLIC



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## Introduction

Slovakia is a globally small yet very open economy bound to the world through various economic and social links. They enable the flows of materials, financial resources, innovations, ideas, but also waste and emissions. Global competition for resources increases, at the same time consequences of global phenomena can be seen, such as a decrease in biodiversity and climate change. As a consequence of this development the environmental, economic and social situation of Slovakia is and in coming decades will be significantly affected by the future form of the European Union, globalisation and various inter-linked external and internal factors. Both in theory and practice, analyses of trends and megatrends are increasingly used to better understand the structural causes, state and development of the environment. The first study focused on global megatrends (GMT) was issued by the European Environment Agency (EEA) in 2010, which was followed by an analysis from 2015 (as part of the regular five-year assessment report (The European Environment State and Outlook 2015 - SOER 2015)).

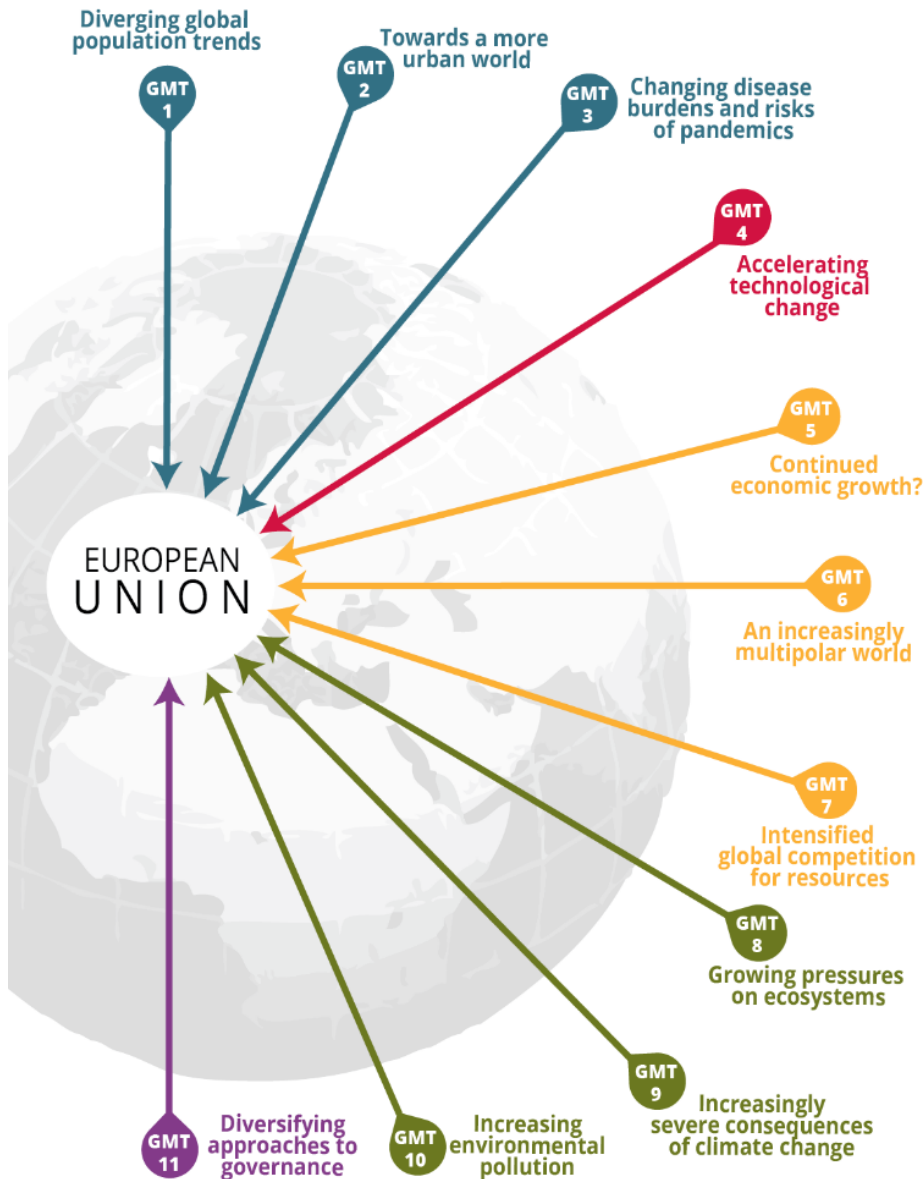
EEA defines 11 megatrends (MT) in five clusters<sup>1</sup>, which are considered crucial for the definition of long-term environmental outlooks and challenges in Europe (Fig. 1). The first cluster is **social**. It includes three main GMTs, i.e. diverging global population trends, towards a more urban world, and changing disease burdens and risks of pandemics. The second cluster is **technological** (accelerating technological change), the third one is **economic** (continued economic growth, an increasingly multipolar world, intensified global competition for resources). The fourth and crucial cluster is **environmental**. It includes three crucial GMTs, i.e. growing pressures on ecosystems, increasingly severe consequences of climate change, increasing environmental pollution. **The last** and still complicated for definition is the cluster of governance and diversifying approaches to governance.

**Trend** in its basic definition is a general direction in which something is developing or changing, or a certain pattern describing the gradual development or change of situation. Trend analysis represents the basis of many branches of research and forecasting. The term “trend” in economy specifies the tendencies of financial markets to move in a certain direction over time. Statistics has a method of trend estimates dealing with data interpretation. A series of measurements of a certain process is designated as a time series, and tendencies in data development are investigated.

In the area of examination of complex social and environmental systems, there is an effort to move from examining individual trends to their complex assessment and predictions by means of the **megatrend concept**. Megatrends can be defined as a set of interacting trends acting in large scale (globally), with large local impacts. They represent interdependent social, economic, political, environmental or technological changes. Global megatrends are among the system characteristic features of the current environmental challenges.

<sup>1</sup> [www.eea.europa.eu/soer#tab-global-megatrends](http://www.eea.europa.eu/soer#tab-global-megatrends)

**Fig. 1** Eleven main global megatrends identified by the EEA, *Source: SOER 2015.*



In 2016, the Centre of Social and Psychological Sciences of the Slovak Academy of Sciences in cooperation with the Ministry of Environment of the Slovak Republic (MoE SR), Slovak Environment Agency (SEA) and professionals from several areas prepared an assessment of GMT in the perspective of the Slovak Republic. The analysis of the Slovak Republic is based on the framework of 11 main global megatrends defined by the European Environment Agency and focuses on three main questions:

1. How much the 11 identified megatrends affect/impact the situation in the Slovak Republic?
2. What is the influence/contribution of the Slovak Republic to global megatrends?
3. What are/will be the environmental, economic, and social implications related to the identified megatrends?

This report represents the summary of results of the megatrends research project. The whole report and results were published in 2016 under the title *“Global megatrends: Assessments and challenges from the view of the Slovak Republic”*, and it is available in printed version as well as a text on the web.<sup>2</sup>

## GMT 1 Diverging global population trends

According to demographic studies, in the next years a continuing growth of world population can be expected; according to UN data, in 2050 it should reach 9.6 billion people. However, globally there are significant differences in the population development. Fertility, mortality, and migration significantly affect the development of population in Slovakia. In general, the less developed countries have a higher

<sup>2</sup> Lubyová, M. a Filčák, R. (eds).2016. *Global megatrends: Assessments and challenges from the view of the Slovak Republic*. Bratislava: Centre of Social and Psychological Sciences of the Slovak Academy of Sciences. [www.prog.sav.sk](http://www.prog.sav.sk)



fertility and at the same time, a higher mortality. In more developed countries, fertility decreases, and thanks to the better living standard and healthcare, mortality also decreases. In least developed countries high fertility prevails – according to the UN data at a level of 4.3 children per woman, whereas in more developed countries fertility is much lower – only 1.7 children per woman. Differences can also be observed within Europe. The countries of Northern Europe have higher fertility – 1.9 children per woman, whereas the countries of Eastern Europe only 1.4 children per woman.

According to the latest information, in Slovakia 1.4 – 1.5 children per one woman. The decrease has been gradual. It started in the 1990s, and it reached the lowest level below 1.2 children per woman in 2002. We have gradually got to the countries with the lowest fertility in the world.

The demographic situation is also affected by age, where the European countries are globally among the countries with the highest life expectancy. The average life expectancy of men in southern countries - in Italy, Spain, but also in Sweden, is 80 years. For women in Spain, Italy, and France, the average life expectancy is **85 years**.

Currently, Slovakia is one of the European countries with the lowest life expectancy. In the last 25 years, however, mortality has also been decreasing in Slovakia, which increases the average life expectancy. For men, it has increased by 6 years to 73, for women from 75 to 80. This development should continue. According to population prognoses (e.g. EUROPOP 2013, Bleha, Šprocha, Vaňo 2013a), in 2050, life expectancy at birth for men could exceed 80 and for women it could reach a level of 86.

As main causes of the current bad situation in mortality conditions in Slovakia can be designated the generation loading of population by adverse previous development (in particular till the early 1990s), higher male mortality already from middle working age and female mortality in post-working age, and last but not least, a relatively low dynamics of mortality decrease after the year 1989.

The current and expected population development in Slovakia will lead to significant changes in the state and structure of the population. Increases of population will decline, gradually they will change into decreases. As such development will also occur in the case of total increase of population, it means that we can expect the decrease of the absolute number of inhabitants. Changes will occur in all demographic characteristics of the population, the most significant changes (as regards the scope and importance) are, however, expected in the age structure of the population. Both the natural and migration population movement will also cause changes in its distribution. In Slovakia, there will be areas with an increase of population and increasing concentration (in particular the northern and eastern parts), as well as the areas where the number and concentration of the population will decrease (in particular central and southern Slovakia).

The number of population will rise for several additional years. An increase from the current 5.42 million (in 2014) to 5.48 to 5.55 million is expected. Historically, it will be the highest number of population in Slovakia; it should occur between the years 2025 and 2030. Then, the decrease of population lasting several decades will follow. By 2060, a decrease of population just above the limit of 5 million is expected. (Bleha, Šprocha, Vaňo 2013a).

According to the EUROSTAT's forecast, the ageing of population in Slovakia will be the most intense among all EU28 countries. In almost 50 years, Slovakia will change from the one of the youngest countries of the European Union (currently the third youngest country after Ireland and Cyprus) to one of the oldest (in 2060, only Portugal will have an older population than Slovakia in EU28). By 2060, the average age of the population of the Slovak Republic will increase by 10 years and it will be close to a level of 50 years.

The changes in count, increase, distribution and age composition of the population, which are caused by changes in the reproduction and family behaviour of the population, will have a serious impact on the social development – mostly on the labour market, social insurance, healthcare, and social services, as well as on the environment.

First of all, a higher number and changing age structure of the population means a higher pressure on the environment. More people in working and post-working age mean a higher consumption of natural resources, including energies connected with waste production, as well as growing demands for living, transport, and infrastructure. After the year 2030, the population should stabilise and decrease. However, the issue of migration remains an unknown variable. The spatial distribution of the population is another factor. The population will further decrease in central and southern Slovakia, in town agglomerations it will increase. Already today, the implications for public policy include the question how big investments in the environmental infrastructure in regions are advisable and how to cope with the growing pressures on the environment in urban and peri-urban areas (see also GMT 2).

## **GMT 2 Towards a more urban world**

Urbanisation processes have been under way in developed countries virtually since the period of the Industrial Revolution. In 1950, less than 30% of the world population lived in towns, whereas by 2000 the share of the urban population increased to more than 46 %, and since 2008, the urban population has represented the majority of the world population. In 2015, 54 % of the world population lived in towns, and according to the UN's forecast, the share will further increase. Europe has made the biggest progress in the process of urbanisation from among the continents. The north of Europe is most urban, with a share of the urban population of just above 80 %, and Western Europe with a share of the urban population just below 80 %. In Southern and Eastern Europe, the share of the population living in towns is lower, reaching 70 %.

Slovakia is among the countries with a lower rate of urbanisation in Europe with a traditionally relatively high share of population living in rural municipalities. In 2015, in Slovakia, 53.6 % of inhabitants lived in towns and 46.4 % of inhabitants lived in municipalities. The process of suburbanisation started only after the year 1990 as part of society transformation after political changes. Intense suburbanisation takes place in particular in the background of Bratislava. De-industrialisation of certain regions and areas was among the drivers. It improved the quality of the environment; on the other hand, it destroyed job opportunities.

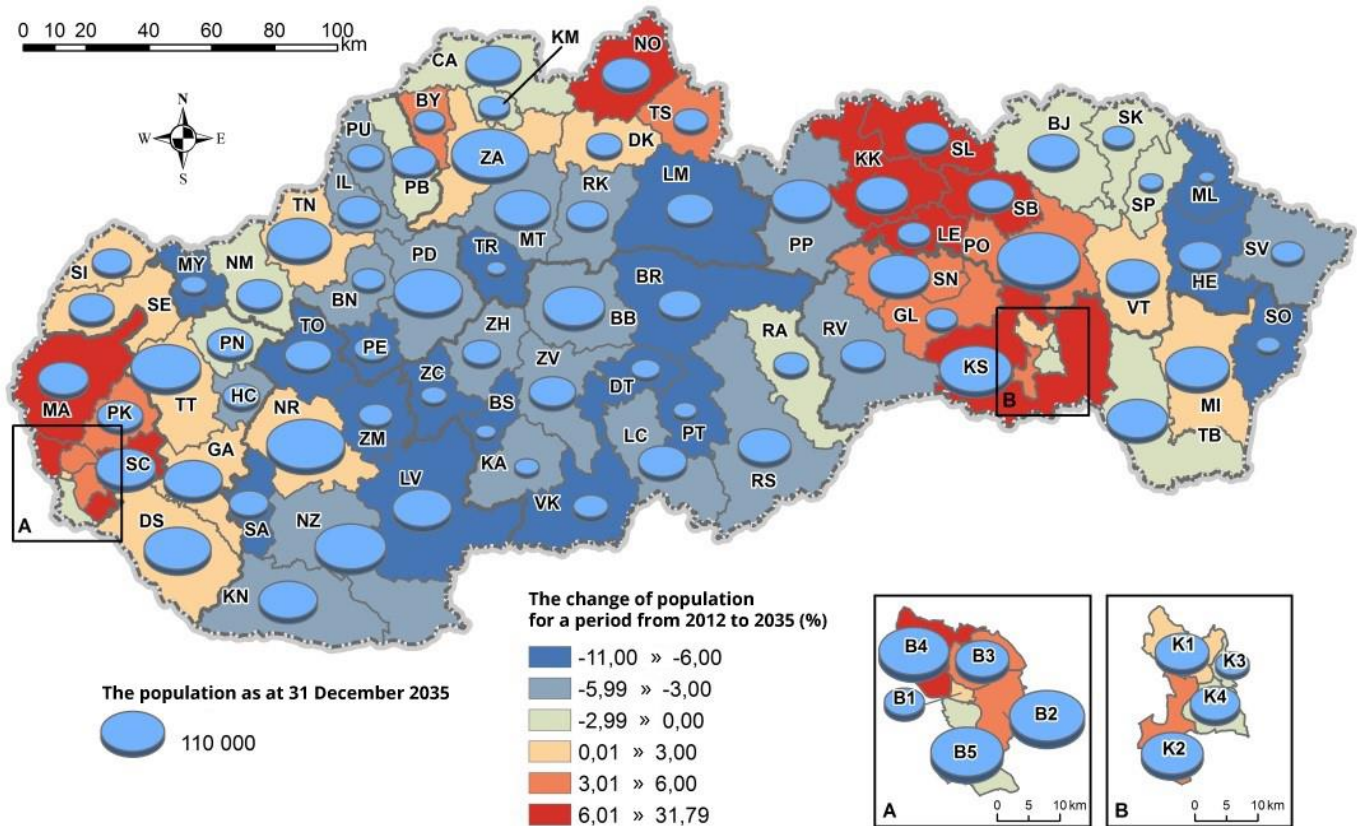
Similarly to demographic changes, the process of suburbanisation also started suddenly, without gradual preparation. Therefore, it causes several problems, in particular in construction of infrastructures (environmental, transport, technical, and civic) as well as in the area of population record-keeping and the related tax re-distribution.

Both the natural and migration population movement will also cause changes in its distribution. In Slovakia, there will be areas with an increase of population and rising concentration, as well as areas where the number of population and its concentration will decrease. All the above changes and movements will have a significant impact on the social and economic development, including environmental impacts.

The changes of population distribution will be uneven in the Slovak Republic as a consequence of different development of both reproduction behaviour and migration. The population distribution will also be affected by the slowly continued process of urbanisation (16.4 % of the inhabitants in the Slovak Republic lived in rural municipalities with up to 1000 inhabitants in 1996, whereas only 15.6 % in 2014).

In general, three areas with an increase of population will be created in Slovakia; the increase should last at least 20 years (Bleha, Šprocha, Vaňo 2013b). They include the area in the north of central Slovakia (the districts Námestovo, Tvrdošín, and Bytča), the western part of Eastern Slovakia (a strip of districts from the district Kežmarok and Stará Ľubovňa in the north up to the district Košice-okolie in the south), and the surroundings of the capital Bratislava (all districts in the Bratislava region except for the district Bratislava I). The main source of the increase of population in the surroundings of Bratislava is and will be migration, whereas in Central and Eastern Slovakia it will be fertility. Religiosity can be seen behind the progressive development of the population in the north of Central Slovakia, whereas in the districts with an increase in Eastern Slovakia the factor of ethnic composition of the population is added. The other regions of Slovakia will record a decrease of population in coming decades, which will have various intensities. The biggest decreases are expected in the south of central and western Slovakia (districts Poltár, Veľký Krtíš, Levice, Banská Štiavnica, Detva, and Žarnovica), as well as in the districts Myjava, Brezno, Humenné, and Sobrance. In certain smaller regions at a level of municipalities or groups of municipalities (in particular in some districts in the south of Central Slovakia and North-Eastern Slovakia), the decrease of population will be so significant that we can talk about depopulation connected with considerable population ageing.

Population ageing combined with the expected decrease of population in the future in particular in certain rural areas may also bring several negative impacts on the development of local ecosystems. They include in particular grass-herb communities (meadows, pastures etc.), will be exposed to secondary succession (growth of self-seeded trees) due to gradual termination of traditional management (mowing, pasturing). This will lead to an essential change of the (traditional) landscape pattern. The decreasing and ageing population also means a lower buying power, which can be seen already today in water management. Expensive investments in waterworks and sewerage systems lose profitability due to low consumption. This also opens the question of investments in waste infrastructure and how these factors should be analysed in the context of investment efficiency.



Source: Bleha, Šprocha, Vaňo 2013b

### GMT 3 Changing disease burdens and risks of pandemics

Through/over the ages, the mankind was attacked by various diseases, often connected with environmental factors such as quality and availability of drinking water or waste management. The diseases such as cholera, plague, typhus represented a problem that caused death of thousands of people. When antibiotics were discovered, it was expected, that the situation would change and people would become almost immortal. But diseases developed, new ones, that we have no medicines for, appeared.

Diseases are transmitted in various forms. Travelling, which is easier every year - thanks to the development of new transport modules - essentially contributes to the acceleration of the process of their spreading. Thus, the spreading of infectious diseases is also faster. Other factors affecting health of the population include air pollution, water pollution, poor hygienic conditions, food shortage, sleep shortage, changed climate conditions, incorrect food patterns, unsuitable use of chemicals and also inadequate physical activity – either shortage or excess.

According to the World Health Organization (WHO), 12.6 million people on Earth died as a consequence of poor living conditions in 2012. This represents almost each fourth death. Taking into account the



deteriorating environment, this number will grow in the following years and there are concerns that not only directly proportionally. There are countries and areas with high risks. In China, air is strongly polluted in many territories as a consequence of significant development of economy; African countries suffer from water shortage. Paradoxically, also the inhabitants of Slovakia participate in it; as regards Asia, by importing goods. An increasing amount of flowers on our market is imported from Kenya, Africa.

According to WHO, 23 % of all deaths and 26 % of deaths of children up to 5 years are caused by changed environmental conditions. Main consequences include cerebrovascular accidents, ischemic heart diseases, diarrhoea, and cancer. These occur to a much greater extent in the countries with a lower GDP, with the exception of certain non-communicable lifestyle diseases, such as cardiovascular diseases, respiratory system infections, and cancer.

A new trend in the development of diseases has been created in the last decade, within which the number of diseases caused by infections, parasites and nutrition deficiencies decreases (from 30 % to 20 % from the total number of diseases that are caused by the changed environment) to non-transferable diseases. Creation of better hygienic conditions in the developing countries, where people obtained better access to clean water and sewerage, and a lower number of households using solid fuels for cooking could be the reason. However, the highest number of deaths due to diseases caused by poor living conditions still remains in Sub-Saharan Africa.

Globally, however, the number of deaths per year decreased both in relative and absolute numbers. According to WHO, 13.3 million people died due to diseases resulting from poor living conditions in 2002, whereas only 12.6 million in 2012. The total decrease was from 57 million of deaths in 2002 to 55.6 million in 2012. This can be a consequence of better living conditions and also a higher level of healthcare. The most frequent causes of deaths in Slovakia include circulatory system diseases, tumour diseases, and injuries.

Slovakia is in the group of Central European countries with a mortality rate of 712 ill individuals per 100,000 inhabitants. The differences between neighbouring countries such as Poland, the Czech Republic, and Hungary amount to only tens of cases but in comparison with the countries such as France or Spain, the difference is huge. In France, 223 ill individuals die annually per 100,000 inhabitants. The number in our country is three times higher.

In Slovakia, we can see a relation between certain diseases and poor environment. In the surroundings of large polluters, certain diseases occur more frequently, for example, in the surroundings of the Upper Nitra region, where mines are situated and many people work or have worked in the mining industry, there are more diseases of respiratory system affecting the upper respiratory tract – either in the form of asthma or cancer (data from the General Health Insurance Company).

As a consequence of environmental changes taking place on Earth, several trends can be expected. Primarily, it is the climate change and the related risks. Many diseases spread at higher temperatures faster and easier or stay active longer. For example, temperature increases as a consequence of climate changes, which weakens the organism **and** cannot defend against diseases then. Floods can also occur

and can contribute to the reproduction of fungi, bacteria and also stinging insects. The latest case happened when - probably due to climatic changes - *Bacillus anthracis* bacteria came to life; they cause a disease of spleen. It is also called the anthrax. The bacteria surviving in the frozen soil recovered as a consequence of high temperatures – up to 35°C, which is by 10°C more than average – in northern Siberia near the Arctic Circle. Reindeer were infected, thousands of them died, and later on, consumers of reindeer meat were infected also after eating reindeer meat also people got sick. In northern Italy, occurrence of mosquitoes transmitting malaria was recorded. There are scenarios of the shift of the malaria zone to northern Europe already in the next decade.

These threats are combined with an increased mobility. People travel much more, and thus, they are confronted with diseases that are not known by their immune system and they are infected by the diseases much easier. Subsequently, they transfer them to their original country, where without sufficient measures, the disease will start spreading. The climate change will also affect such factors as the spread of invasive plants and the related risks, more frequent and less predictable floods and impacts on human health.

The increasing emissions from transport and the related quality of air represent a problem. Mainly the presence of particulate matter (PM) in the air and ozone will affect the development of diseases. These risks increase along with the trends of urbanisation and concentration of population described by GMT 2.

According to the OECD “by 2050 the air pollution in towns should become the main environmental cause of mortality throughout the world, more frequent than water pollution and insufficient hygiene”. It is expected that, by 2050, the number of premature deaths as a consequence of exposure to particulate matter in the air will double and reach globally 3.6 million a year, where the territory of China and India will be affected most. As a consequence of ageing and high urbanisation of their population, the OECD countries will be in second place after India according to the number of premature deaths as a consequence of tropospheric ozone. Air pollution becomes the essential environmental factor connected with diseases, which can be prevented, as well as with premature mortality also in the countries of the European Union. It causes ten times more victims than traffic accidents. In 2010, it caused more than 400,000 premature deaths, as well as serious – however - avoidable diseases and difficulties, including the diseases of the respiratory system (such as asthma), or outbreak of cardiovascular problems.

The sufficient amount of drinking water is the primary precondition for healthy human life. If it is not provided, the impact on people can be seen directly - damage to health as a consequence of water shortage or its low quality, as well as indirectly, when functions of ecosystems are disturbed including their ability to provide ecosystem services used by people. A similar situation occurs in case of water unsuitable for bathing, when the water has direct effects on human health causing skin diseases, conjunctivitis, etc. The negative impact, like for most other negative environmental phenomena, is more significant in case of so-called sensitive population groups – children, elderly people, chronically ill people etc.

## GMT 4 Accelerating technological change

The world is significantly affected by the technological progress, whose speed, in particular in the area of biotechnology and nanotechnology, as well as informatisation is spectacular, thus it is difficult to analyse and predict it.

Biotechnologies use knowledge from biology which is later applied in agriculture and food industry, pharmacology, and medicine. It is used for example in food production (beer, dairy products), in waste disposal, revitalisation of polluted soil, and also in production of pharmaceuticals. Gene manipulations also take place within the biotechnologies. Such genetically modified organisms (GMOs) are used in agriculture (maize, soya), food industry, and medicine.

Nanotechnologies work with substances at an atomic and molecular level with the objective to create new substances with requested properties – e.g. extremely strong or with good electrical conductivity. They are used in physics, chemistry, biology, in the production of materials, or even in the production of pharmaceuticals.

New technologies contribute to an increase in the quality of life on Earth and undoubtedly, they belong to inseparable parts of our life. They help people by creating new capacities that are not available, solve situations that were considered irresolvable. The optimistic opinions rely on the technological progress, which could avert some threats and reduce the effects of the other ones. However, new technologies can also mean threats to the world. Therefore, it is important to study exactly the side and long-term effects of new procedures in terms of human health and environment.

In the area of nanotechnologies, we are still at the beginning of examination of possible environmental impacts. For example, scientists start working on determining the potential and possible risk related to special physical and chemical features of engineered nanoparticles (ENPs).

In the area of GMO, risk is represented by unwanted side effects on plants, which can subsequently affect the safety of food. One type of genetically modified maize MON 810 has been grown commercially, under very strict security conditions in the EU since 1998. It has been grown in five States on about 1.5 % of the total area used in the EU for maize growing. The problem, however, consists in the growing pressure for the use of GMO and in the monopolization of the market with seeds, where we globally witness an increasing dependence on several commercial companies and liquidation of domestic seeds.

Within Europe, more than 100,000 chemical substances are traded, and a rapid growth of the number of new substances available on the global market is recorded; their use can be connected with a significant risk of environmental pollution, their monitoring in the environmental components is not ensured sufficiently. Water and soil pollution by pharmaceutical residues is getting a new environmental issue.

People are exposed to a sharply increasing quantity of substances and physical factors with mostly unknown impacts on the environment and health. In addition to new chemical substances, they also include biological factors, light pollution, and electromagnetic fields. Chemical substances can have long-

term effects, in particular in case of persistent organic matters and bioaccumulation chemical substances. The concerns regarding the influence of the appearing new chemical substances still persist.

## GMT 5 Continued economic growth

The economic growth causes many environmental problems but it also can represent solutions. It is traditionally understood as the basis of an increase in the living standard of the population and creation of jobs, which is also related to income of the population. However, economic growth stops being understood as just a goal alone. It should rather create preconditions for meeting the objectives in the complex term of “well-being”. The economic performance affects income of households and the resulting level of consumption. Economic growth is conditioned by the structure of the population and labour force, in particular the share of the population able to work. The decreasing share develops pressure on an increase in tax burden and drains the resources that could be used for development.

Economic development in the world does not take place at a uniform speed. In terms of economic power, the decreasing weight of Europe and of the European Union in the global product is obvious. The continued economic growth in the so-called BRICS countries (Brazil, Russia, India, and China), however in particular in China, which has got ahead of the USA as the biggest world producer, is a contributing factor. The share of the most advanced economies in the world – the OECD countries - represented in 2000 about 60 % of the world GDP, ten years later only 51 %, and in 2030 a drop to 43 % is expected.

The development of Slovakia as a small open economy, a member of the European Union and OECD, is to a considerable extent determined by the globalisation process, world and European trends. The centre of economic development is moving from Europe and North America to Asia. A decreasing share in the global product will be characteristic for OECD countries. Total Factor Productivity will be the main driver of long term growth of productivity (TFP). It is connected with the accumulation of non-physical forms of capital – human and social. The increasing income inequality inside the national economies represents an adverse trend.

The purchasing power and number of population is an important factor in terms of the environment. They determine the consumption of natural resources and production of wastes and emissions. The European Union, and in this context Slovakia, too, solve contradictions between the growth and consumption by moving to the system of production and consumption quality based on the concept of circular economy or green economy. Growth should be reached with concurrent reduction of the quantity of resources consumed and wastes.

The discussion how to measure it is the precondition for understanding the quality of growth. From simple calculation of performance, towards assessment of well-being by means of HDI – *Human Development Index* of the United Nations, or BLI – *Better Life Index* of the Organisation for Economic Cooperation and Development (OECD, 2015). For 2016, using equal weights for all dimensions, the BLI puts Slovakia within the OECD in 24th place (Czech Republic 21st, Poland 27th and Hungary 32nd, first places are occupied by Norway, Australia, Denmark, Switzerland, and Canada). According to HDI (UNDP, 2014),



Slovakia is the 35th from among 188 countries, the Czech Republic is the 28th, Poland the 36th, and Hungary the 44th. Norway, Australia, and Switzerland are on the top of the ranking.

The following challenges will be important for Slovakia in the future. The demographic development and ageing will manifest themselves in Slovakia more expressively than in other European countries, with adverse impacts on public finance connected with increased healthcare and pension security expenditures. *Structural reforms* and also economic calculations of efficiency of spending resources on the development of the environmental infrastructure will be necessary in these areas to ensure the sustainability of the public finance.

In terms of the structure of the Slovak economy, the process of *reindustrialisation* is characterised by high dependency on the automotive industry. It can contribute to maintaining the employment at a national level but it also is increasingly automated and needs fewer workers and more materials and resources.

The fast economic development globally encountered limits of resources, however, in particular the environmental and social impacts of the economic activity. Therefore the current problem is to define the qualitative characteristics of growth, and how to assess development using indicators, which, in addition to economic results, also contain environmental impacts – *eco-efficiency* or complex well-being indicators including a variety of aspects of the quality of life. In these indicators, Slovakia falls in the framework of V4 but it also lags behind the progressive countries of the European Union.

## GMT 6 An increasingly multipolar world

The end of Cold War also meant the end of one era of power distribution in the world. Decades before the year 1989 both the theorists of international relations as well as journalists and the general public spoke and wrote about the **bipolar** world. The United States of America (USA) and the former Union of Soviet Socialist Republics (USSR) represented two power centres with their own influence spheres. The division was especially obvious in Europe, where it directly affected the development of the old continent.

The collapse of the USSR and its gradual disintegration meant, however, that only one Great Power, the USA, remained on the global map. The Russian Federation as a successor of the USSR has retained the weapons arsenal, in particular the nuclear weapons, whose holding is considered a symbol of Great Power. However, due to economic problems its weight and engagement in global issues has descended. Thus, most of the years in the 1990s the USA were the only Great Power and international relations experts agree upon calling this period **unipolar**.

However, since the beginning of the 21st century, the world has been further changing, which can be described by three items: 1) a decline of power and position of the USA in the world, 2) a growth of power, and in particular the economic power of other countries, 3) and the growth of power of other actors that are not national states. These can include regional groupings, such as the European Union

but also the Islamic State (ISIS) or Al-Qaeda, international institutions (International Monetary Fund, World Bank), some theorists of international relations talk even about global media (CNN, BBC) or movements (Occupy, 99 %).

The poles, i.e. power centres, are distributed at several places of the world. Two groupings of countries are mentioned most frequently, besides the USA: the European Union and the block of BRICS countries, derived from the first letters of Brazil, Russia, India, China, and South Africa. There is another opinion, still close to the multipolar perception of the world, that the world is **interpolar** (Grevi 2009, Renard and Biscop 2010). This part of literature accepts the statement that there are several power centres, however, it emphasises the task of globalisation and mutual interconnection of the centres. The geographic vicinity or distance stops playing an important role in this approach, and a strong interconnection means that the countries cannot defend from global threats.

At the beginning of the 21st century, the political and economic power in the world is distributed among several actors. The bipolar division of the world has been definitely finished, and whether we endorse the new system's characteristics and arrangement as multipolar or non-polar, this system creates new challenges for environmental policy issues. The consequences for the solving of global problems are unambiguous: achievement of agreements is more time-consuming and demanding, much more actors and interests take part, and therefore, the pace of solving the global challenges, such as climate change, is relatively slow.

In the modern international policy, the fight for resources is superordinated to the traditional values, such as democracy, transparency or respect for human rights. Traditional actors of international relations, i.e. countries or groupings of countries, gradually get out of the way to the actors representing multinational or global groupings of capital. The experience of the Slovak Republic in the process of transformation indicates that to face new challenges in the area of a multipolar world, membership in the European Union is crucial. Slovakia, as a small and open economy needs a strong framework of international cooperation and support, and at the same time, the resources for the implementation of measures facing the global challenges, such as climate change.

## **GMT 7 Intensified global competition for resources**

In the last decades, world economies have undergone structural changes manifesting themselves in particular as the shift from the agricultural arrangement of production systems primarily depending on the production and consumption of biomass necessary to satisfy the energy and material needs, to urban industrial economies. This is supported by a global increase of population – in the last century it has increased about four times, with the concentration of population increase in particular in towns, and the consumption of biomass was increased only slightly, more than 2.5 times.

However, in the same period, the consumption of materials other than biomass was increased more than 20 times which suggests that the technological progress and population growth create an increasing pressure on the available resources and it is reasonable to expect its continuation in the future, too.

The reasons also include the expected significant increase in the number of population on Earth, which should reach 9.6 billion people in 2050 according to the UN (2013).

As regards the currently known resources, building raw materials should be available within the range of 70 – 140 years<sup>3</sup>, as regards other raw materials, the availability is at a level of minimum 200 years for energy raw materials, up to more than 8 thousand years for ores.

The dependency of the Slovak economy on the import of mineral raw materials is considerable taking into account the limited volumes of mineral resources and their non-conformity with the structure of demanded resources. As much as 85 % of final use (including export) of mineral raw materials in Slovakia is satisfied by imported resources. In the period 1999 – 2014, as much as 83 % of imported production in monetary expression came from Russia, the majority share was represented by oil and natural gas. Runners-up included the Czech Republic (5.9 %) and Ukraine (4.6 %), from which we import coal, lignite, and in the last years, also natural gas or iron ore, and from Ukraine also coal.

In the following years, it will be necessary to continue in the diversification of the countries of origin of the imported resources, in particular energy raw materials, and to support the expansion of technologies on the basis of renewable energy sources to provide the energy stability and self-sufficiency of Slovakia.

A crucial role will also be played by the access to food resources, both in terms of quantity and quality, when the issues of provision of food self-sufficiency of the growing population and food security, assurance of sustainable food production on the decreasing agrarian areas with the use of modern technological procedures (biotechnologies), optimisation of production procedures by minimising waste production, and innovations in the area of packing materials get in the spotlight.

Water is a specific and important source for Slovakia, where the growing global and local shortage can be seen. The reason is its geographic distribution on continents and in individual countries. According to the scenarios of climate change, water shortage will be increasingly obvious even within the European Union, in the south. In global consumption plans, Slovakia has a special position. The global consumption of water per person and day rises every year, whereas in our country the consumption gradually decreases. The national average is less than 80 litres per person and day. The quantity of 80 litres per person and day is set as a hygienic minimum for determining the need of water for Earth population. Water companies in Slovakia even register water consumption below 60 litres per person and day in municipalities. These trends are closely related to the demographic and social GMTs and the issue of investments in the water infrastructure. At the same time, within a short period, water can become a demanded commodity in international trade, and pressures on solidarity within the EU will be growing. Recently, Slovakia has prohibited its export but in the future, it will need a clear strategy of treating this crucial resource.

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<sup>3</sup> Depending on the mining yield of deposits and without taking into account the growth of consumption of mineral raw materials in connection with the expected economic growth, which seems to be rather an optimistic estimate.

## GMT 8 Growing pressures on ecosystems

Biological diversity (biodiversity) represents the variety of all forms of life, i.e. ecosystems, species and genes and their mutual relations. It has its own intrinsic value, and in addition it provides the society with a wide spectrum of ecosystem services, which we depend on. Biodiversity and in particular ecosystems represent the basis of our being and living. They provide many direct or indirect services of life, such as food, water, and materials for the development of the society. They support the creation of natural resources, contribute to regulation of many phenomena and processes taking place in the country and also provide several cultural and leisure possibilities.

Even despite the irreplaceable importance of ecosystems they are continuously globally endangered and degraded. If the current policies are not changed, it is expected that by 2050, the global biodiversity of dry land will have dropped from 68 % to about 60 % (measured by the MSA index). The biggest drop can occur in Japan and Korea, Europe, South Africa, and Indonesia. In Europe, almost a fourth part of wild species is currently endangered by extinction, and the state of the majority of ecosystems has worsened so much that they cannot provide their precious services anymore. Their impairment causes huge social and economic losses to the EU. Almost 30 % of the EU territory is characterised by strong fragmentation. Only 17 % of habitats and 17 % of species of Community importance show a favourable conservation status. A significant share of habitats and species is in unknown status, the least known status is that of sea habitats and species. As many as 45 % of original forests of Earth have become extinct forever, most of them in the previous century. According to the study *The Economics of Ecosystems and Biodiversity (TEEB)*, the global annual loss of ecosystem services only for terrestrial ecosystems represents EUR 50 billion. It is estimated that if no change occurs, the loss of terrestrial biodiversity itself can reach as much as 7 % of the global gross domestic product by 2050.

The situation in Slovakia is also unfavourable. According to the MoE SR (2014), about 17.6 % of non-vascular plants are endangered (including mushrooms), 42.6 % of vascular plants are endangered (in all categories), or 30.3 % (in the categories CR, EN, and VU). About 8.4 % of invertebrates in the Slovak Republic are endangered (or 5.4 % in the categories CR, EN, and VU). As regards vertebrates, up to 59 % of them are endangered (or 23.5 % in the categories CR, EN, and VU).

Forests cover more than 40 % of the territory of the Slovak Republic, the agricultural land about one half, protected areas including protective zones represent about the fourth part. The health condition of forest ecosystems is worse than the European average. Based on the degree of defoliation it can be stated that as many as about 60 % of forest ecosystems of Slovakia are endangered or damaged, which makes them much more threatened by climate influences and biotic factors. According to the report *Conservation status of habitats and species of Community interest in the period of 2007 – 2012 in the Slovak republic*, the most endangered habitats in European scale include salt meadow habitats, wetlands (sensitive to changes of water regime and insufficient management), and sand habitats (they are endangered by afforestation and succession). Water habitats (mountain water courses, standing waters) depending on the dynamics of water courses and adequate quality, moors and bush habitats depending on occasional and targeted management, and grasslands requiring regular management are assessed as favourable



to unfavourable/poor. The overall state of forest habitats which is the most numerous group of habitats in Slovakia, is in most cases favourable. Rocky and scree habitats and caves represent the relatively least endangered group.

The factors causing the endangering of ecosystems of Slovakia are various. They can be divided into two groups, natural, conditioned by evolution processes, and anthropogenic – conditioned by people and their activities. Anthropogenic factors represent much higher risks (air, water, and soil pollution, unsuitable procedures of management, climate change, construction of infrastructure, urbanisation, industrialisation, spread of invasive alien species) because human actions in the environment are often uncontrollable, they are not isolated but interacting. The degradation of ecosystems speeded up by the climate change leads to a threat to food security, increases health risks and has many direct and indirect impacts on the society. To solve the unfavourable trends of threat and degradation of ecosystems, it will be important to solve the quality of economic growth and improve the political and legislative system of their protection. The most important causes of the loss of biodiversity (a change of habitats, the excessive use of natural resources, introduction and spread of invasive alien species, and climate change) have an increasing tendency.

Although more detailed calculations are missing in the Slovak Republic, in the past the society did not take into account the importance of biodiversity and healthy ecosystems sufficiently. They were and sometimes still are considered a public property without an added value, thus, their importance is underrated. Therefore, there is a loss of the natural capital of the Slovak Republic in the long term. The global ecological, economic, and social changes faced by the Slovak Republic, may get the country into a disadvantage in the future, if its natural capital is destroyed and natural resources exhausted. The loss of biodiversity and the subsequent decrease in the creation of services and goods from natural ecosystems will require expensive technological alternatives. Therefore, investments in the conservation of natural capital will save the resources in the long term, which is important for the living standard and long-term survival of society.

Implementation of the EU policy in the area of biodiversity, which defined the vision till 2050 and main objective till 2020, should represent the response to the growing pressures on ecosystems. To reach the overall objective, the EU Biodiversity Strategy to 2020 proposes framework objectives and measures in five key areas: 1. conserving and restoring nature; 2. maintaining and enhancing ecosystems and their services; 3. ensuring the sustainability of agriculture, forestry and fisheries; 4. combating invasive alien species, and 5. addressing the global biodiversity crisis. In the Slovak Republic, it is reflected by the strategic document – Updated National Strategy of Biodiversity Conservation to 2020, which defines the key objective to 2020 as follows: *To stop the loss of biodiversity and degradation of ecosystems and their services in the Slovak Republic till 2020, to ensure the recovery of biodiversity and ecosystems to a suitable extent, and to increase our contribution to preventing the loss of biodiversity in global scope.* For the purpose of specification of the long-term direction of biodiversity management in the Slovak Republic, a long-term vision of protection and sustainable use of biodiversity till 2050 was formulated: *The natural capital of the Slovak Republic – biodiversity, ecosystem services, and goods are sufficiently protected, assessed on a regular basis, reasonably utilised, and where suitable, also recovered till 2050 due to their internal values and for their non-*

*negligible contribution to well-being and economic prosperity of the Slovak Republic. The adopted measures and policies at a national level prevent adverse changes, which would be caused by the loss of natural capital.*

In the next period, it will be necessary to reach higher awareness of the economic value of ecosystems at a level of decision-making bodies as well as the general public. If efficient measures to stop the decrease of biodiversity are not adopted now, mankind will pay a high price in the future. The ethic, economic, and social aspects of the loss of biodiversity and ecosystems are the main reason for the set of measures and activities at global, European, and national levels.

## GMT 9 Increasingly severe consequences of climate change

The climate change is caused by firing fossil fuels (either for electricity generation or for heating), by the changing and growing transportation, changes in the agricultural activities, deforestation, and global changes of the country. Climate change is increasingly documented as the trigger of migration, and conservative estimates say that in 2050, about 200 million migrants will be on Earth, who will have to leave their homes as a consequence of environmental changes (IOM, 2009).<sup>4</sup> Undoubtedly, it is a main global challenge not only in the area of the environment but also for further operation of economy and social area. The countries being parties to the United Nations Framework Convention on Climate Change (UNFCCC) confirmed the global dimension of the issue and its anthropogenic roots, while committing to adopt measures and solutions, both in the area of emission reduction, mitigation of impacts, and in the area of solving consequences (adaptation).

According to the UN Intergovernmental Panel on Climate Change (IPCC, 1996), the term “climate variability” only covers the climate changes of natural character, i.e. caused by the changes of solar activity and other astro-nomic factors, volcanic eruptions, changes of circulations of oceans, etc. On the contrary, the term “climate change” is only that part of all climate changes, which is caused by man by changing the greenhouse effect of atmosphere (emissions of greenhouse gases and aerosols, change of utilisation of the country).

Climate change also starts manifesting itself in the region of Central Europe and in Slovakia. In Slovakia, the average annual air temperature has increased by 1.1°C in the last 100 years<sup>5</sup>. It is expected that by 2075, air temperature will have increased by 2 – 4°C. It means that the climate of the Danube Lowland will move to Liptov. (Zlocha, SHMU, 1997) This will have impacts on agriculture, animal breeding, and on human health. This development of temperature is connected with and multiplied by the change of quantity and time and spatial distribution of water precipitations. In the last ten years we have seen extreme values of atmospheric precipitations, such as high precipitation totals – which resulted in floods with large economic losses. There have also been long-term droughts resulting in the occurrence of forest and field fires connected with considerably lower yields from agricultural production. Within the

<sup>4</sup> For comparison: In 2014, there were about 60 million political and war migrants (according to UNHCR estimates).

<sup>5</sup> Measured at the meteorological station in Hurbanovo.

framework of climate change, reduced levels of rivers and groundwater can be observed. It results from lower precipitation totals multiplied by uneven distribution of precipitations. Precipitations reach Earth in the form of storm rainfalls, ground is not able to hold water from them, and thus it does not soak into ground and flows to the sea in rivers. We lose the small water cycle as well as soft local precipitations. Moreover, water does not get into groundwater and its levels drop. Significant impacts on natural ecosystems and biodiversity are expected, agricultural production will change and various social and economic impacts will occur (e.g. pressures on migration, costs of infrastructure). Significant consequences can be expected in the form of increased demands for the solving of the problems occurred either in the form of subsidies for those affected by droughts or floods, solutions for flood-protection barriers, investments in agriculture, as well as solution of health impacts – human and animal health. The changing temperature conditions will allow diseases to spread.

The Paris Agreement was adopted in the international scene in December 2015<sup>6</sup>. The European Union ratified the Agreement in October 2016, with the commitment to reduce the quantity of greenhouse gases by 40% by 2030. The Paris Agreement warns against an increase in the global average temperature by more than 2°C above pre-industrial levels, it calls upon the States to limit the temperature increase to 1.5 °C<sup>7</sup>. The European Union reduces greenhouse gases emissions, and it should fulfil the objectives of the EU 2020 strategy amounting to 20 % reduction. However, globally we see an increase in emissions, connected in particular with the economic development in Asia, and an increase in the quantity of energy from fossil fuels firing. They have increased by as much as 60 % in comparison with 1990 (the base year for the Kyoto Protocol).

Recently, the Slovak Republic has reached a considerable progress in reducing greenhouse gas emissions. In comparison with the objectives set in the strategy Europe 2020, where it can increase emissions in comparison with the initial state (2005) till 2020 by as much as 13 %<sup>8</sup> it is expected that the emissions will actually drop by about 24 % in comparison with the base of the year 2005. For 2013, a maximum possible increase by 2.3 % was planned, but the real emissions dropped by as much as 8 %. In 2014, there was a drop by as much as 14.1 %. Thus, the objectives of emissions reduction are successfully fulfilled except for the sector of transport. The problem is that relatively low objectives have been set, and according to the plans, the Union will reduce emissions by 40 % till 2030 and by 80 % till 2050 (in comparison with the level of 1990). It will mean the need of increasing investments as the more the percentage of reduction will rise the more expensive it will be for economy.

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<sup>6</sup> The text of the Agreement is available at: <https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>

<sup>7</sup> The IPCC forecasts (2007, 2011) claim that already in this century temperature can rise by 1.8 to 4 °C. The catastrophic scenarios expecting complicated models of greenhouse gases release from sea water and permafrost speak about even higher temperatures.

<sup>8</sup> Except for the Emissions Trading Scheme (ETS).

## GMT 10 Increasing environmental pollution

Environmental pollution has become global and transboundary problem, which manifests itself by changes in the quality of air, water, soil, and ecosystems, and directly affects human health and well-being of the population. Access to hygienically satisfactory drinking **water** is decisive for maintaining the population's life. Recently, the population with access to drinking water has globally increased, however, there are vast regional differences and there is still a great number of people reliant on its untreated sources. The availability will remain limited, and an increase is expected in the number of people living in river-basins with serious water shortage, as well as an increase in water consumption. The Slovak Republic has water sources to support its current as well as perspective needs; the level of high-quality water supplies from public water supply systems to the population is high and increasing.

The non-conforming quality of both surface water and groundwater represents an important problem of global scope. It is expected that in the following period, water sources will be exposed to higher pressures, which will lead to an increase in threats to ecosystems including people.

The nitrogen and phosphorus pollution is close to exceeding the globally sustainable limits and causes significant eutrophication of waters. It is estimated that the number of lakes with oxygen shortage will rise globally and similarly the scope of dead coastal zones will also increase. In the conditions of the Slovak Republic it is expected that the content of nutrients in groundwater will not increase essentially, a slight drop can be rather expected. On the other hand, in connection with the implementation of regulations related to municipal waste water treatment, there is a real assumption of an increase in the pollution introduction by nutrients into surface waters.

The chemical status of waters is also a significant problem all the more because for almost one half of European surface waters, the chemical status remains unknown. Approximately a quarter of European groundwater has poor chemical status. In the Slovak Republic, too, there are surface water and groundwater bodies that do not reach good chemical status; however, they have been reduced. Despite the adopted measures, the achievement of good chemical status both at European and national level will be extremely demanding.

The decrease in amount of groundwater in certain regions can become the biggest threat to agriculture and water sources for towns. In terms of further development, it can be affected negatively by extreme situations occurring in relation to climate change (occurrence of drought periods, floods). Another risk is connected with a continued increase in chemical substances used in various types of industry. This applies in particular to newly appearing substances.

**Soil** fulfils production and non-production functions. With respect to the extremely slow process of its creation, it can be essentially considered a non-renewable resource. The ability of soil to provide ecosystem services in terms of production of food and feed, the environment for soil organisms and plants, as well as regulation of cycles of water, nutrients and biological cycles it is under an increasing pressure. The observed changes related to soil contamination, erosion, salinization, fragmentation, as well as a decrease in organic matters reduce this ability of soil. Soil degradation has a direct impact on the quality



of water and air, biological diversity, and climate change. It can also cause an impairment of the health status of the population and endanger the safety of food and feed. Carbon release into the air connected with soil degradation in one Member State endangers the achievement of international objectives regarding the climate change. Soil denudation related to erosion clogs up dams and damages infrastructure downstream in other countries. Due to contamination of food and feed and their following distribution the influence of contaminated soil manifests itself in global scope. The deposition of acidifying substances from the atmosphere contributes to soil acidification decreasing soil pH, which results in the change of the soil ecosystem, when heavy metals are mobilised and yields of plants drop.

The drivers caused by man which represent threats to soil have an increasing tendency. No positive changes in the use of soil and its management as well as related environmental and social-economic factors are expected. The facts suggest that soil degradation will continue in the global, European as well as local scale probably even faster than up to now.

To a great extent, air quality is affected by remote transmission of pollutants, not only in European dimensions but also between individual continents. As regards air pollution, the situation in Europe improves, but its global level is high and an increase is expected, in particular in Asia. Improvement in Europe concerns pollutants such as lead, sulphur dioxide, and benzene. Other pollutants affecting health still remain the source of special concerns. In addition to the mentioned ozone and particulate matter (PM), they also include nitrogen oxides and carcinogenic polycyclic hydrocarbons.

The share of the European population exposed to (2012) air contaminants, such as PM<sub>2.5</sub> and ozone, exceeds 90 % according to the strict standards of the WHO. It is expected that air quality in Europe will further improve in the period till 2030; however, the harmful levels of air pollution will persist.

The situation in the EU, which is improved in certain aspects, is not satisfactory unless our country reaches at least the European averages, which are still far from us. Within the EU, the Slovak Republic is in last places also as regards the air quality parameters. Here, we can see a correlation with a similar position in financing science and technology. Bulgaria is a "leading" country in PM pollution, followed by Poland, Slovakia, Hungary, and the Czech Republic. The highest air quality is in Sweden and Finland. For the development of Slovakia as a small country, a considerable sensitivity to changes in the structure of production, its modernisation, issuance of new, stricter standards etc. is typical. However, improvements can be reached relatively flexibly in a small economy. On the other hand, if started trends are not observed, changes can easily lead to the worsening of the state.

The emissions of pollutants into the air in the Slovak Republic in the long-term (1993 – 2012) have decreased, however, the speed of the decrease dropped after 2000 considerably. Despite the drop, similarly to the assessment at a European level, the exceeding of limit values set for air quality evaluation in terms of human health protection and ecosystem protection is recorded. Like in other European countries, the main problems include PM pollution, contamination by nitrogen oxides and tropospheric ozone. The projections of emissions of pollutants into the air in the Slovak Republic expect a decreasing trend. The Slovak Republic contributes to total emissions of projected emissions (SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub>, NH<sub>3</sub>, VOC) at a level of the EU from about 0.7 % for NH<sub>3</sub> to about 2.5 % for PM<sub>2.5</sub>. The transboundary nature

of pollution limits the possibilities of achieving limits values by measures in individual countries. There is a real assumption that similarly to other EU countries, in the SR too, harmful levels of air pollution exceeding the permitted limits will persist.

Recently, the technological progress and development of new technologies, chemical substances or genetically modified organisms have speeded up. As a consequence, people are exposed to a sharply increasing quantity of chemical substances and physical factors with mostly unknown impacts on the environment and health, which produce legitimate concerns.

## **GMT 11 Diversifying approaches to governance**

Governments and governance increasingly face the discrepancy between the need to see problems and objectives in longer horizons, and the problem of short-term focus on election cycles. Global problems, such as climate change and a decrease in biodiversity require global solutions, but this encounters local power fields. National governments are under pressure of varied interests focused on short-term and fast profit, which has its social and environmental costs. Therefore the importance and need of international commitments increases and the essential strengthening of domestic policies is necessary. Yet in the developed economies, the support of progressive environmental policies decreases and the rhetoric of threat and defence rules.

The trend is the shift from governance based on hierarchy to decentralised and participatory forms of governance. Although these trends are basically positive, there are two problematic aspects hindering efficient governance focused on the solution of system threats. The first one is the power asymmetry, where market and business gain the dominant position. Another one is an increase in irrationality in the political discussion, populism, and focus on marginal or problematic topics and solutions.

The areas and topics identified in the mapping and analysis of 10 main GMTs pose the governance two key questions: What are the effective forms of governance necessary to solve the identified problems? What tasks and challenges exist for their implementation? We identify three such challenges in the context of the Slovak Republic:

- Influencing and adaptation.
- Participation and balanced dialogue.
- Decentralisation and support of local approaches.

An important task for the Slovak Republic in the area of strengthening of positive and correlating of negative megatrends will be to adopt and fulfil international commitments, and nationally, to affect the environmental, economic, and social development towards the society existing on sustainable principles.

Influencing and adaptation represent the basic approaches to the understanding and solving of impacts and implications of megatrends through diversified governance. Influencing means the commitments, tasks and possibilities, which the SR has at the international and national levels, and which could and

should contribute to the mitigation of negative megatrends and their solution. In the area of adaptation, the climate change, biodiversity decrease, and the changing population trends will represent main challenges. Climate change will have not only local impacts as we can already see in agriculture or water management; it also produces global mass migration and the connected geopolitical changes.

The objective of diversified governance is mainly to define what we can influence (mitigate) locally and globally, and what are the most efficient ways to the defined objectives. If some trends cannot be solved or they are out of control of the national government, it will be necessary to define the objectives of adaptation measures and to ensure their support.

The concept of diversified governance is based on the participation of the public, professional groups, and experts in forming the public policies and programmes. This requirement is partially an international commitment of the Slovak Republic. The “Convention on access to information, public participation in decision-making and access to justice in environmental matters” (the Aarhus Convention) guarantees the right to access to information, public participation in decision-making and access to justice in environmental issues.

The public participation in decision-making is clearly declared in the principle of partnership as required by the planning of the cohesion policy. It is a set horizontal principle and multilevel governance in accordance with which the Member States should facilitate the achievement of social, economic and territorial cohesion and the assurance of Union’s priorities in the area of smart, sustainable and inclusive growth.

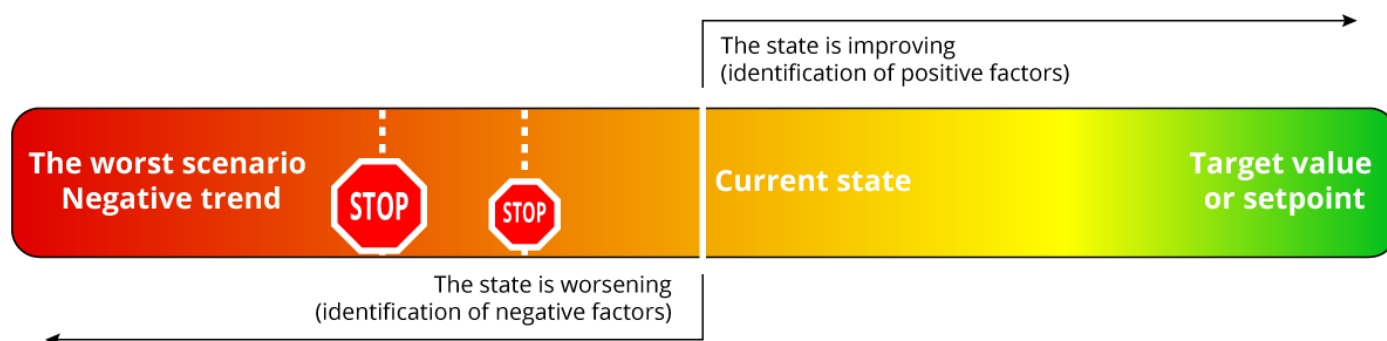
The objective of diversified governance should be to elaborate these principles and to also apply them to the areas out of the environment and cohesion policy. It will be necessary to continue in the public discussion about the forms of operational and institutionalised cooperation and good practice propagation.

The analysis of megatrends also indicates, besides the global responsibility, the need to strengthen the implementation framework, identification and support of the local and regional planning and development of local economies as one of the key approaches mainly in the area of adaptation to adverse trends. It should include the plans for more efficient utilisation of natural resources and energy in the context of general development and interconnection with the labour market strengthening measures. The regional development should be based on compensating the social differences through the support of green jobs. These are high-qualified and low-qualified. The first group concerns science, research and applications of new technologies and approaches, whereas the jobs for people with lower qualification are also important for Slovakia; these people find their place on the labour market with difficulties. These are various types of work in the country management, energy savings, energy production from biomass, or ecological agriculture. Another line is the subsequent involvement and projection of local experience into the forms of governance at a national level and creation of a functional dialogue within the whole society. The network form of governance is a tool for the generation of optimal solutions for optimal costs and with a real chance for implementation.

## Megatrends and main challenges

The analysis of global megatrends describes the changing situation of Slovakia in the context of economic, social, and environmental challenges. Not all GMTs have strong impacts yet but in the medium- and long-term horizon they will manifest themselves in various forms. As we illustrate in Fig. 2, knowledge of the current state and direction of the development is important both for the support and preservation of positive trends, as well as for targeted measures slowing down and stopping the negative direction.

**Fig. 2.** Situation analysis in the context of megatrends, Source: CEAA.



Demography is the basic factor defining the state and development of the society. **Different population trends** manifest themselves in two ways. On the one hand, we see the perspective of the starting demographic decrease and ageing of the population, on the other hand there are growing migration pressures, which we cannot avoid, and which will be ever more intense due to climate change and the fact that a considerable part of regions in Africa and Asia will face water shortage and agriculture decline. Demography will have direct implications for all social and economic areas, starting from the consumption of resources, ethnic conflicts, and ending at the sustainability of economic growth.

It will not be possible to solve the population development without the utilisation of **technological progress**, with an effort to search progressive technological solutions allowing increasing the quality of life while reasonably **utilising the natural resources**. The quality of **economic growth** will be the crucial issue. As regards this, the European Union gradually elaborates and implements the principles of low-carbon economy, which represents part of a wider context of so-called circular economy. It means **economic growth**, which, at the same time, **reduces the consumption of natural resources** and waste production through the efficient utilisation of resources, decrease in consumption and recycling. A decrease in goods import and creation of jobs could be a non-negligible feature of such system.



The development should be based on the principle that the economic development simultaneously reduces greenhouse gas emissions and increases the efficiency of natural resources management. Six main principles of circular economy include:

1. All materials are permanently recycled.
2. Any energy is generated from renewable or otherwise sustainable sources.
3. Human activities support ecosystems and natural capital development.
4. Resources are used to create values (financial and other).
5. Activities support public health.
6. Human activities are directed towards the support of sound and socially cohesive society and culture.

Is Slovakia on the way to these objectives? The GMT analysis indicates both the positive and negative development. In the area of productivity of resources, the objective of green growth is *decoupling* – an increase in the economic growth should be simultaneously connected with the reduction of the quantity of consumed natural resources and reduction of waste produced. The indicators analysed for Slovakia show that decoupling really takes place, and the **economic growth** is accompanied by the decrease in energy and material demands of economy.

Undoubtedly, this trend results to a considerable extent from de-industrialisation and transfer of production; however, there are investments in green technologies and production procedures, which consume a smaller amount of inputs. The development of environmental management plays an important role focusing on better recovery of resources and waste recycling.

On the other hand, as we see in the GMT analysis, **ecosystems or the whole biodiversity are ever more endangered and degraded**. According to the MoE SR (2014), the vulnerability of lower plants in the Slovak Republic currently achieves 17.6 %, the vulnerability of higher plants amounts to 42.6 %. As many as 59 % of vertebrates living in our territory are endangered. According to the report on the state of species and habitats of Community importance in the Slovak Republic (for 2017 – 2012), the most endangered habitats in European scale include salt meadow habitats, upland moors, peat bogs, moorlands (sensitive to changes of water regime and insufficient management), and sand habitats (they are endangered by afforestation and succession).

At the same time, the situation in Slovakia must be seen in the context of global challenges, where GMTs help indicate the current and future issues. Climate change is the main one. Although Slovakia is getting on well in the area of greenhouse gases decreasing by 2020, ever more emissions are imported in products and services carried out somewhere else. The objectives of the European Union were confirmed in October 2016 by ratifying the Paris Agreement. The Union faces ambitious goals till 2030:

- to reduce greenhouse gas emissions at least by 40 % (in comparison with 1990),
- at least a 27-percent share of renewable energy,
- to increase energy efficiency at least by 27 %.

Within the framework of shared efforts within the EU and to fulfil these objectives, the Slovak Republic will have to negotiate and adopt ambitious commitments. Slovakia will most likely fulfil and exceed the targets of Europe 2020, whereas the framework of objectives till 2030 will represent a challenge. Simple and cheap solutions of reducing emissions and energy consumption run out and further reduction will be ever more complicated and expensive. However, this will not be enough, either, for local effects of global changes, and investments in **adaptation measures** will be necessary. Changes in the agriculture, flood-protection measures, and solutions protecting water sources will be crucial. Changes of average temperatures will bring new threats, such as **pandemics and diseases**, which we do not know here today. Malaria is an example.

All these threats and challenges require international cooperation. Intensified **global competition for resources** may lead to new tensions and conflicts. Therefore, the description and analysis of GMTs show us that it is necessary to focus our efforts on two parallel and interacting levels.

Global **climate change** already produces and will produce water conflicts, mass migration, and fight for resources. Therefore, the Slovak Republic must be actively involved in global solutions with local impacts on our country, too. The main approach is active cooperation in global agreements and commitments, such as development assistance to affected regions, and the support of solutions of on-site situation, using local resources, and creating opportunities for people.

As the following table illustrates, each of the GMTs has implications for public policy formation and targeting. Besides the clearly set strategic priorities and objectives, it is important to find optimal ways of governance, how to head for them. The challenges, such as internal and external security, circular economy or management of natural resources require **diversified approaches to governance**. The implementation of strategic goals in sustainable growth is not possible without sustainable regions, towns, and settlements. The strengthening of economic and social cohesion is a challenge. The people, who do not suffer from economic deprivation and social exclusion, have more possibilities and resources how to defend against environmental risks and support progressive solutions.

## Table: Megatrends, relevance and main challenges

Global Megatrend	Relevance/SR	Main challenges
Diverging global population trends	HIGH	to stop the demographic decrease and controlled migration
Towards a more urban world	medium	to support the concept of sustainable towns and settlements
Changing disease burdens and risks of pandemics	medium	prevention and complex strategies of interconnection between environmental and health measures
Accelerating technological change	HIGH	to support progressive technological solutions built on low-carbon approaches and precaution principles
Continued economic growth	HIGH	to develop a growth concept in the context of circular economy and alternatives to growth quality measurement
An increasingly multipolar world	HIGH	to support peaceful solution of conflicts and international cooperation
Intensified global competition for resources	HIGH	efficient utilisation of resources and dematerialisation of production and consumption
Growing pressures on ecosystems	HIGH	focus on the causes of pressures and complex solutions
Increasingly severe consequences of climate change	HIGH	to continue in mitigation, preparation of a low-carbon strategy, and support of adaptation measures
Increasing environmental pollution	HIGH	to look for interconnection of technical and political solutions in the context of development of new economic models
Diversifying approaches to governance	medium	to look for long-term and functioning solutions based on transparency and participatory governance

