

works of Joseph STIGLITZ and Thomas PİKETT. At the beginning of 2017, the wealth of the eight richest people in the world equalled the total wealth of the 3.6 billion poorest people. In only 2017, the 500 wealthiest people increased their wealth by more than one trillion dollars (almost 25%). On the contrary, the share of people in extreme poverty (as living on less than 1.90 USD per day) has steadily been growing on all continents during the past few years.

Important issues influencing population growth the same way are infectious diseases and epidemics. The author provides a detailed introduction to these topics and critically underlines that, interestingly, everyday attention is mostly focused on wars, acts of terrorism, and traffic accidents, although AIDS and malaria cause more deaths separately than all former factors combined. Still, in terms of population topics, international migration became a hot topic due to its accelerating volume, especially in terms of economic and environmental migrants. In 1970, 2.3 per cent of the world's population was migrating, whereas the same value was 3.4 per cent in 2017 (equalling to more than 250 million people). The most spectacular migratory flows occurred in the case of Mexico, from where 12.3 million people moved to the US in 2017.

The next chapter (*Global climate change and environmental atmospheric problems*) deals in general with the composition of, and temporal changes in, the atmosphere. The results of different paleoclimatic researches offer a great overview of past climate changes on global and regional level. RAKONCZAI underlines that the history of the Earth involved a series of climate changes. Although no spectacular change can be detected in the life of individuals, it is already known that there have been much warmer and colder periods in the history of the Earth. As the author stresses, the process, background and major consequences of current climate change can mostly be explained through the changing atmospheric concentration of greenhouse gasses, global warming, seawater acidification, El Niño, the Great Ocean Conveyor Belt, precipitation conditions, desertification and volcanic activity. In order to emphasise the seriousness of these topics, he provides some thrilling information. For instance, just to mention some evidence on global warming: the annual maximum ice cover varied between 15.7 and 16.3 million km² in the 1980s, but in the last decade (2009–2018), it decreased to between 14.4 and 15.3 million km². Considering the trends, estimates assume that the Arctic Sea ice will totally disappear by 2040 (or even earlier). Another solid evidence for the global climate change are altering precipitation conditions and desertification. These are not simply natural phenomena but joint consequences of natural, social and economic processes. The situation is the worst in Africa, where two-thirds of the population lives in drought-prone areas. Deforestation, erosion, deflation

are not only results, but accelerating factors for further negativ processes. Deforestation advanced southwards at 15–20 km per year on average (up to a sum of 400 km in the 1990s), and the Sahara expanded 5–6 km per year to the northwest. Other examples are the gradual melting of permafrost areas, seawater acidification, severe floodings and the changing nature of the Global Ocean Conveyor Belt. As a praiseworthy part of several chapters, the author deliberately ends with forming a critical opinion on responsibility issues leading the readers towards further re-thinking.

The volume provides a detailed analysis of the Ozone Hole, including its evolution, its chemical and physical attributes, the differences between the Northern and Southern Poles, and the responsible materials and economic activities. Similarly, serious, but often neglected global problems are connected to acid rains, which are caused by three major factors: industrialisation, deficiencies in environmental regulations, and gas emissions associated with volcanic eruptions. The reader can find a lot of examples of the harmfulness and long-term effects of these phenomena. As the author stresses, they do not constitute a unified global problem, rather a combination of regional problems over huge areas that does not affect the entire world, but primarily industrial and urban areas where population density is the highest.

Among atmospheric problems, air pollution must also be mentioned as, according to WHO data, 92 per cent of the world's population is exposed to unsafe levels of air pollution, and an estimated three million deaths a year are linked to outdoor air pollution and 4.3 million to indoor air pollution. The reader can also find many information on health consequences of natural and anthropogenic air pollution.

A remarkable part of the book is dedicated to global water problems, which constitutes an important issue since, besides food, water is another 'bottleneck' for humans in the future, and the importance of water has already preceded that of food. Growing population, its food supply, and urbanisation have caused rapid growth in water use. Declining water resources and the population growth in many countries result in water scarcity or water stress (concerning quality and quantity as well). In 2015, about two-thirds of the people suffered from water stress, and 1.8 billion people lived in areas of water scarcity. According to the book, humanity used about 54 per cent of all available freshwater at the beginning of the third millennium, and this figure is expected to increase to 70 per cent by 2025. The annual increase of water use exceeds the rate of population growth: between 1950 and 2014, population increased by 2.87 times, and water consumption increased by 3.25 times. A relevant solution might be the extraction of groundwater in many places, though the over-exploitation of groundwater also causes problems. Sad examples are for that ir-

responsible water use, such as in case of the Aral Sea, Lake Chad, Lake Urmia and Lake Poyang, just like the Yellow River, Colorado and Nile Rivers. Water pollution and flood risks are perfectly presented through regional and local examples. At the end, the book investigates water resources which are flowing through semi-arid areas and causing serious water conflicts that might lead to 'water wars' in the future, such as in Israel, Jordan, Syria, Turkey, Iraq, Egypt, and Ethiopia.

In connection with water, sea issues such as overfishing also pose a big problem. Between 1950 and 2006, the size of fishing areas has increased tenfold, now reaching 100 million km² and affecting the wildlife in at least one-third of the world's seas. On more than 30 per cent of the seas the signs of overfishing can clearly be detected. Another striking sign of overfishing is the size of the fish that are captured. Moreover, as a typical change in marine fishing, after the radical decline in the population of some species, previously less valuable species are being caught now. As one of the hottest environmental topics of the year 2019, the pollution of world seas, especially the appearance of masses of plastic waste seems to be the biggest problem. Eight million tonnes of plastic per year reaches the sea, but some calculations suggest the claim that the amount will be double of that this year. An important example is the so-called Eastern Garbage Patch, which later was renamed the Great Pacific Garbage Patch. It was already more than twice as large as the state of Texas in 2007, and was located in the northern Pacific Ocean between California and Hawaii. The waste in this 'plastic island' originates from the continents, and has been transported and shaped by ocean waves for a long time, causing enormous problems to wildlife. The water and air pollution by supertankers and tanker disasters are also investigated through many examples from the previous decades.

In the following parts of the volume, two small chapters are dealing with deforestation and the waste problem. According to the author, one of the most spectacular changes has been caused by the destruction of the natural forests of the world. About 8,000–10,000 years ago, approximately 62.2 million km² of land was covered by natural forests, close to 42 per cent of all land area. By 2015, this amount had decreased to below 40 million km², with significant regional differences. The waste problem is also mentioned as the amount of waste is increasing much more rapidly than the opportunities for its treatment or processing. The major factors of this growth are urbanisation, industrial growth, the emergence of consumer society, and changes in social habits. The huge increase in waste since the 1960s has become an increasingly difficult challenge for economically developed, consumption-oriented societies. It is no coincidence, therefore, that waste appeared as a major global problem. Many versions of future scenarios predict a catastrophic end due to environmental pollution.

The next part puts special emphasis on limits of non-renewable natural resources, especially hydrocarbons and noble metals. Based on the demand-supply relationship, it was not surprising that raw material price shocks occurred during the past decades. This economic process fundamentally changed the rate of raw material use, and further price explosions have led to a constant decline in the rate of increase in consumption. The author gives a detailed overview of oil and rare earth metals, and provides estimations about the ways and time frame of their use.

After Chernobyl and Fukushima, the utilisation and consequences of nuclear energy are obligatory issues for a book like this. In 2018, 450 nuclear power plant reactors were operating in 34 countries around the world, 57 were under construction, and 154 were at the planning stage. Nuclear energy has become a leading source of electricity production in many countries. In 2017, the share of nuclear power exceeded 30 per cent in 12 countries. The most challenging environmental problem related to nuclear energy is the safe disposal of the high-level radioactive waste of nuclear power plants and the further 250 research reactors in 55 countries around the world. An average power plant reactor generates approximately 27–30 tons of high and 200–350 m³ of low-level and intermediate-level radioactive waste every year. Nuclear power plants had also generated 370,000 tons of high-level radioactive waste by the beginning of 2018, out of which 120,000 tons were reprocessed.

Fertile soils are the most important criterion for food production and they play a major role in meeting further anthropogenic demands. That is the reason why Chapter 11 is about soil. The associated problems mainly belong to three categories: the limitation of the size of arable land, a decline in the area of agricultural production due to environmental problems and urbanisation, and the continuously decreasing amount of productive area per capita. An improvement in the food supply of the growing population has been ensured by the increasingly intensive use of land in the past decades. Increasing yields are the result of the growing use of fertilisers, improving plant protection and, especially, irrigation, which contribute to higher crop yields and food security. Soil degradation has many causes and consequences. The causes include overgrazing, deforestation, improper agricultural practices and overproduction. A further cause is the withdrawal of agricultural land due to the development of settlements, industrial facilities and transport infrastructure. The most significant consequences are erosion, deflation, chemical degradation, physical degradation and the decrease in biodiversity, which is associated with all the above mentioned factors.

Last but not least, decreasing biodiversity is also a mainstream environmental problem. Humanity has become a new factor in the alteration of the natural environment on Earth – numerous examples of this

can be found in earlier chapters of the book. Its role in the changes is, of course, less dramatic than that of the meteorite mentioned before, but its impact on wildlife is greater in terms of efficiency and speed than that of the glacial climate change. Apparent causes are habitat loss, a direct loss of wildlife, habitat fragmentation, pollution, spread of invasive species, and climate change.

Eventually, the author scrutinises human responses to environmental challenges in much detail. One can observe the development of legal and practical ways of environmental protection as well as the role and responsibility of science and politics. For this reason, the author presents important earth summits, which fostered paradigm shifts, such as those in Stockholm (1972), Rio de Janeiro (1992), Johannesburg (2002),

and, again, Rio de Janeiro (2012). Furthermore, based on sectoral divisions, global summits have been introduced (e.g. conventions on ozone, greenhouse gases, acid rains, marine environment, freshwater, natural protection, and waste disposal).

The examples provided in the book show not only our environmental responsibility, but also the power of human knowledge. The basic question concerning the future of humankind is when and how this knowledge might be mobilised to tackle global challenges both socially and economically. Another question is whether the moral responsibility of major powers for global matters will overcome their desire for power.

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