



Basics of sustainable development





SOCIAL CHANGES IN THE WORLD

Great human development transition in connection with **the Agricultural and Industrial Revolutions** could not change people attitude to the environment, nor the relationship between people themselves

These two historical revolutions divided the mankind into three groups:

- **Hunter-gatherer society,**
- **Agrarian society,**
- **Industrial society**

The relationship «man-environment» and «person-to-person» is very important now and for the future

There are still existing small hunter-gatherer communities

For example, the Ju/Hoansi in South Africa, Ache in Paraguay, Haji in Tanzania, Merriams in Australia

Merriams or island people of the Torres Strait still are primal hunters, fishers, gatherers of plants that have survived through the millennia in local communities

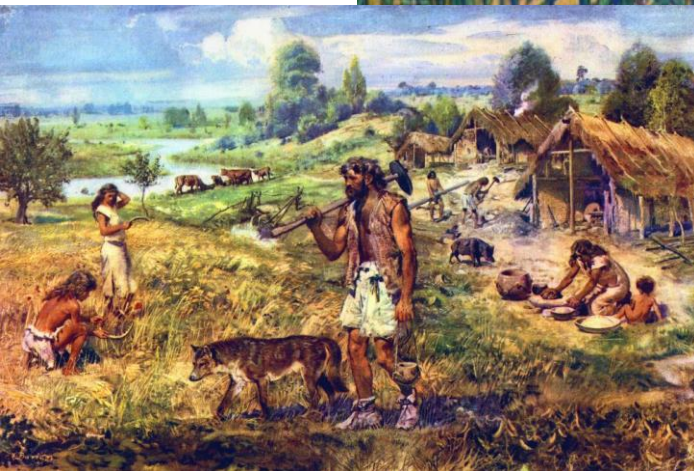


In the absence of an inevitable and successive transition from one type of society to another, there is the possibility of a return to the previous type of community, but it happens very rarely



Whereas, a direct jump from the hunter-gatherer society to industrial society is impossible

Hunter-gatherer society was completely dependent on that what was caught or found – they did not have the opportunity to accumulate some wealth or to improve their well-being



Such society can be described as egalitarian – absolutely equal to all its members with a common property (habitat), common food and similar social status

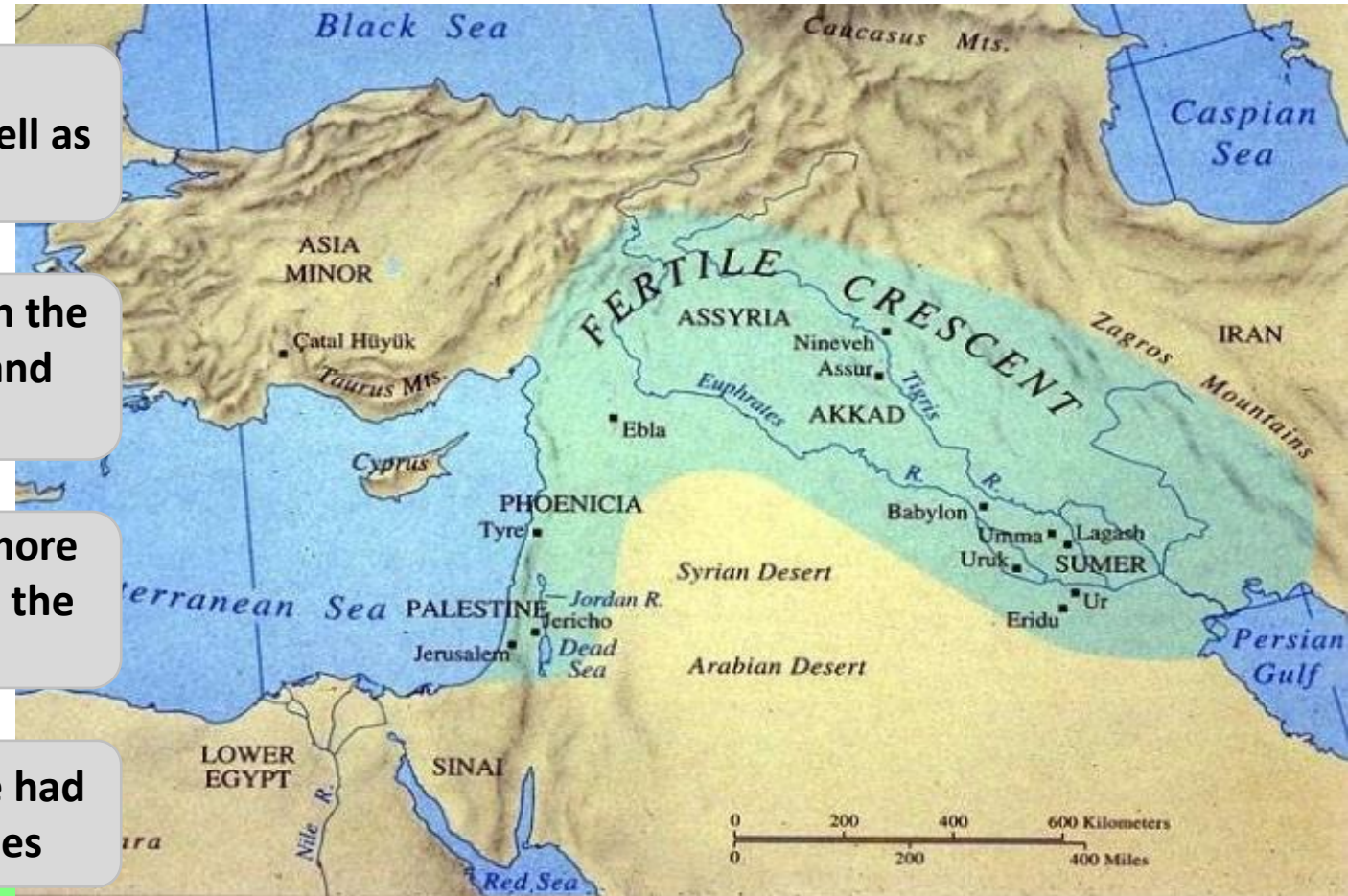
Agrarian societies sowed and harvested – produced and stockpiled food, and was able to accumulate more wealth – tools, weapons, ornaments which witnessed an increase of wellbeing

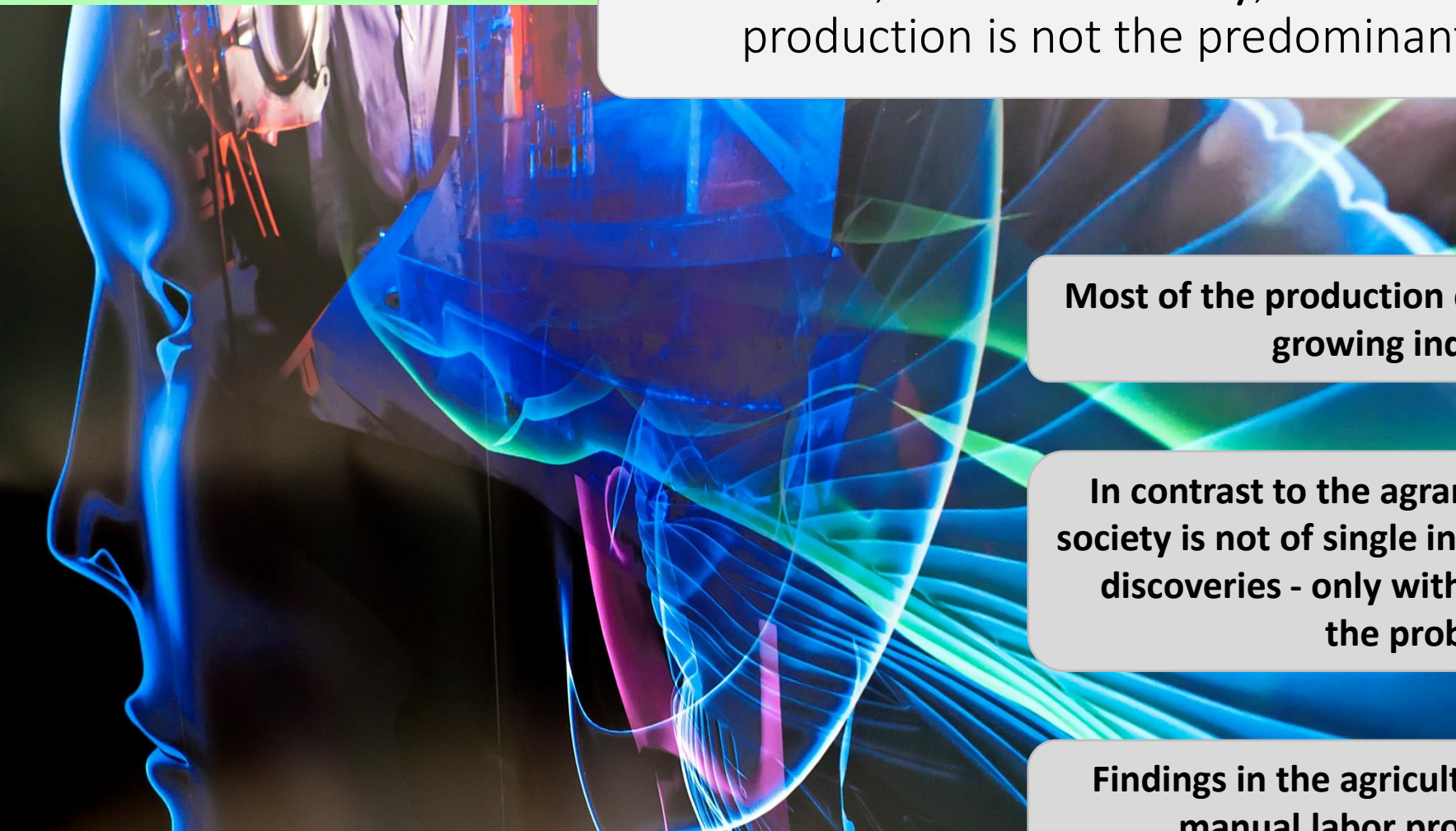
There was a chance to increase the population of community, and hence the division of labor began as well as the social structure changed

However, after some time, conditions occurred in which the expressed majority were forced to provide products and services for a very small elite group of community

Later the leading class began to form and the class of more knowledgeable member of society which together laid the foundation for a new social order

For the safety and protection of the lower class, people had to invest in their work, produced products and services





The current, **industrial society**, is characterized by that the food production is not the predominant activity any more

Most of the production consists of a strong and constantly growing industry of technologies

In contrast to the agrarian society, support of industrial society is not of single innovations, but significant scientific discoveries - only with their help it is possible to solve the problems of a new era

Findings in the agricultural sector reduced the need for manual labor providing opportunities to use it in other areas

Former «owner-subordinate» system has been replaced by **a centralized and hierarchical bureaucracy**, but the state has monopolized the legitimate rights to power, while the people relatively rarely have to do something of compulsory

The notable exceptions are international armed conflicts or disagreements (dissidents, alternative views), one-sided political violence, organized crime

Legitimacy no longer is defined by divine settings or religious rituals, but ritualized emulation

Examples include general elections, property auctions or job competitions

The transition from agrarian to industrial society also promised advantages, because in the remaining system there was a high risk of being exposed and exploited by more technically-advanced groups



Our location in transition scale is not precisely determined, but retaining in the current way of thinking and within the familiar patterns the civilization could remain as losers even in not so distant future



Previous transitions did not take place simultaneously around the world

Also the next transition apparently will start in one place, where there will be entwined all the necessary preconditions and a belief that it will bring long-term benefits

Therefore, now it is extremely important to understand the previous major social changes in order to successfully carry out the future for the sake of our own

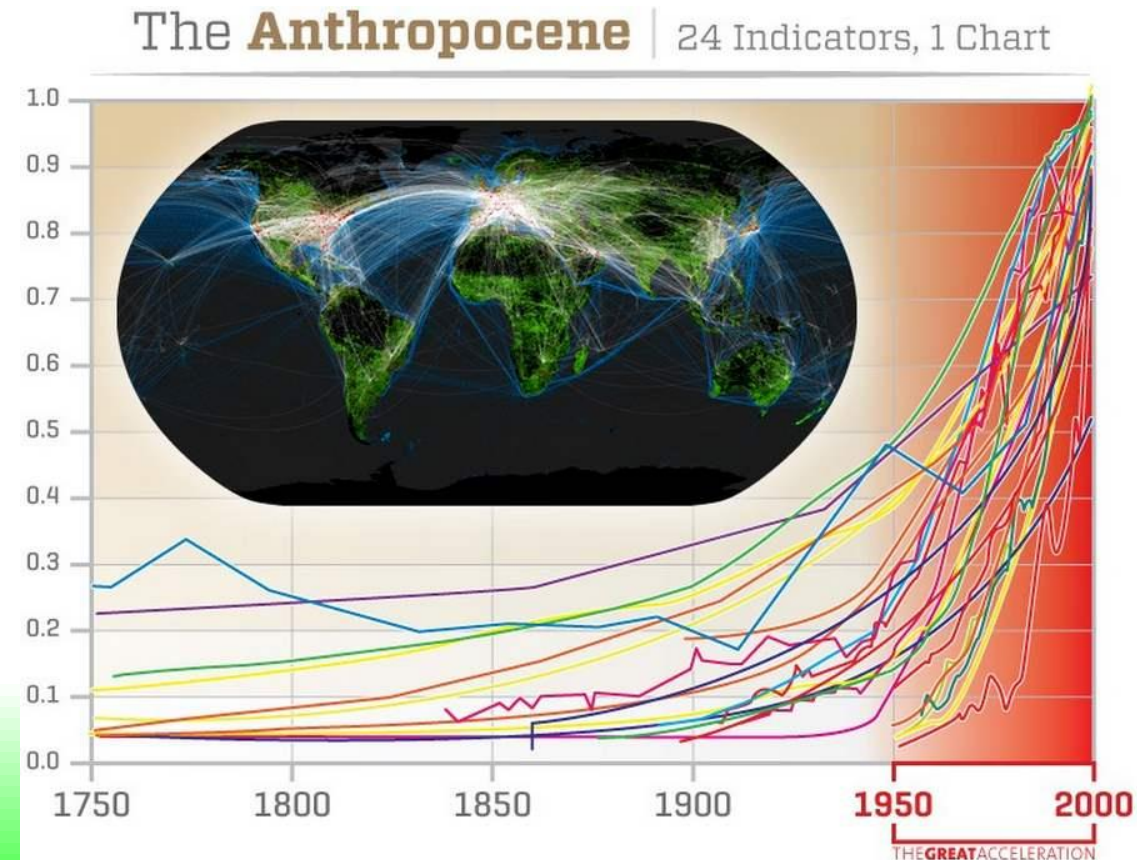
The current geological period is known as **the Anthropocene**, thus demonstrating that human activity has become equivalent to the powerful forces of nature – now we already are able also to essential destructive activities

The Anthropocene – the era, which is characterized by increased impact of human activities on ecosystems resulting in many extinct plant and animal species, changed terrains and landscapes

Our future is uncertain, but the world is dynamic and complex – we are only human and can not predict the future

The only thing we can do is to anticipate what might happen and with what probability and consequences it could happen

We should gather all the knowledge and experience to make optimal decisions for the sustainable future



ECONOMIC DEVELOPMENT OF THE WORLD



By moving fast forward on humanity's historical timeline it has managed highly efficient growth and spread –

People traveled to every habitable corner of the planet, and even to some not so appropriate, for example, deserted places

Forests and marshes turned into farmlands, and village, later towns and cities, began to grow like mushrooms

Finally, small groups of people even appeared on frozen poles and space stations orbiting the planet

EXPONENTIAL GROWTH

Modern «growth of the growth» has no well-defined beginning, however, it has many decisive turning points

For example, European seafarer's discoveries and colonization of North and South America, termination of feudalism in Europe, commercial government formation –

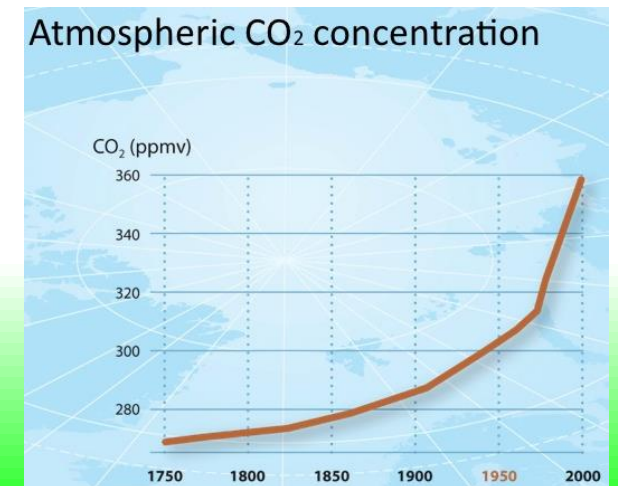
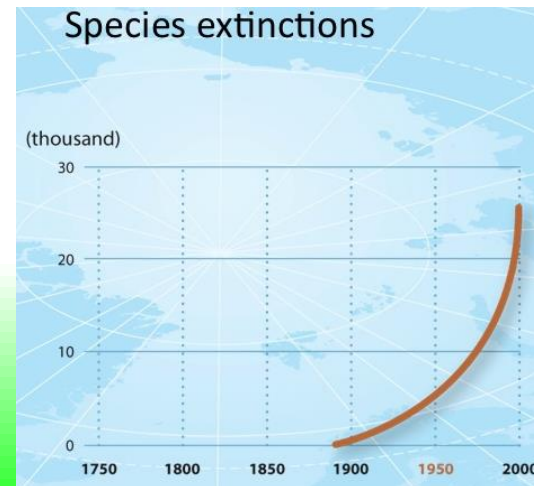
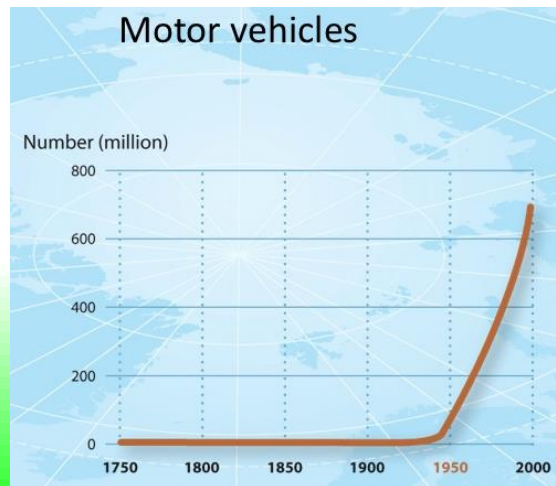
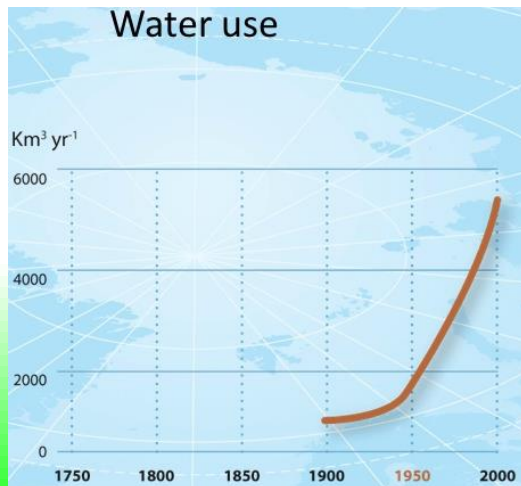
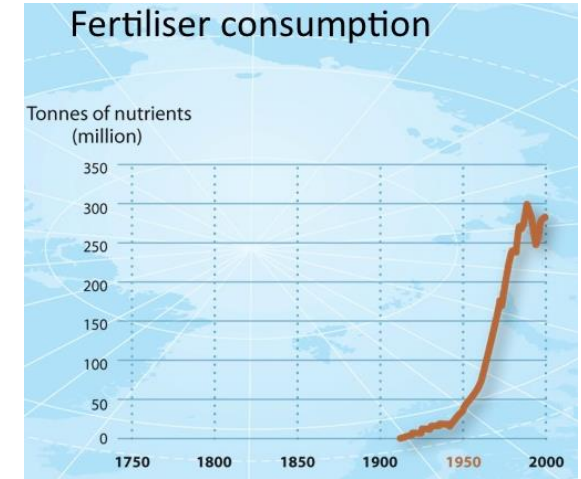
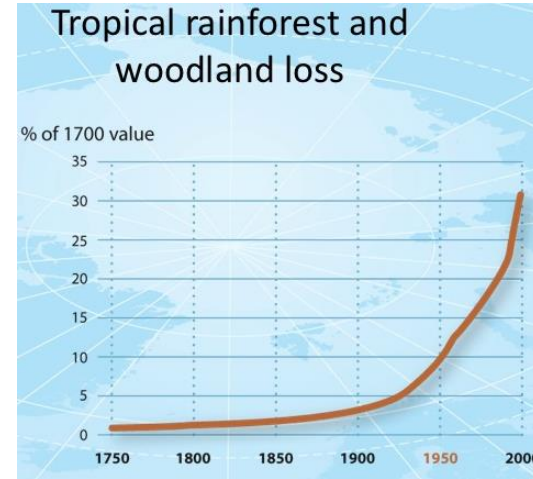
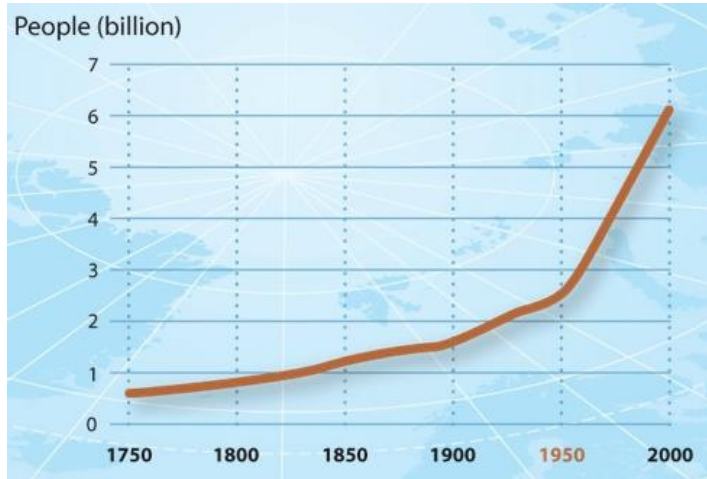
It opened development of entrepreneurial skills for all classes of people and accelerated dissemination of new technologies



At some point the growth was «acceleration»; statistical data show a slight increase in population, use of resources, production, trade, travel, quantity of waste, density of communication and many other areas by mid of 1800-ies

Then around the 1950-ies there was a relatively sharp elevation – almost all indicators of economic growth in recent decades are similar and show a trend of exponential growth

Many curves that graphically characterize global changes still retain the sharp rise – they are named as «The Great Acceleration»

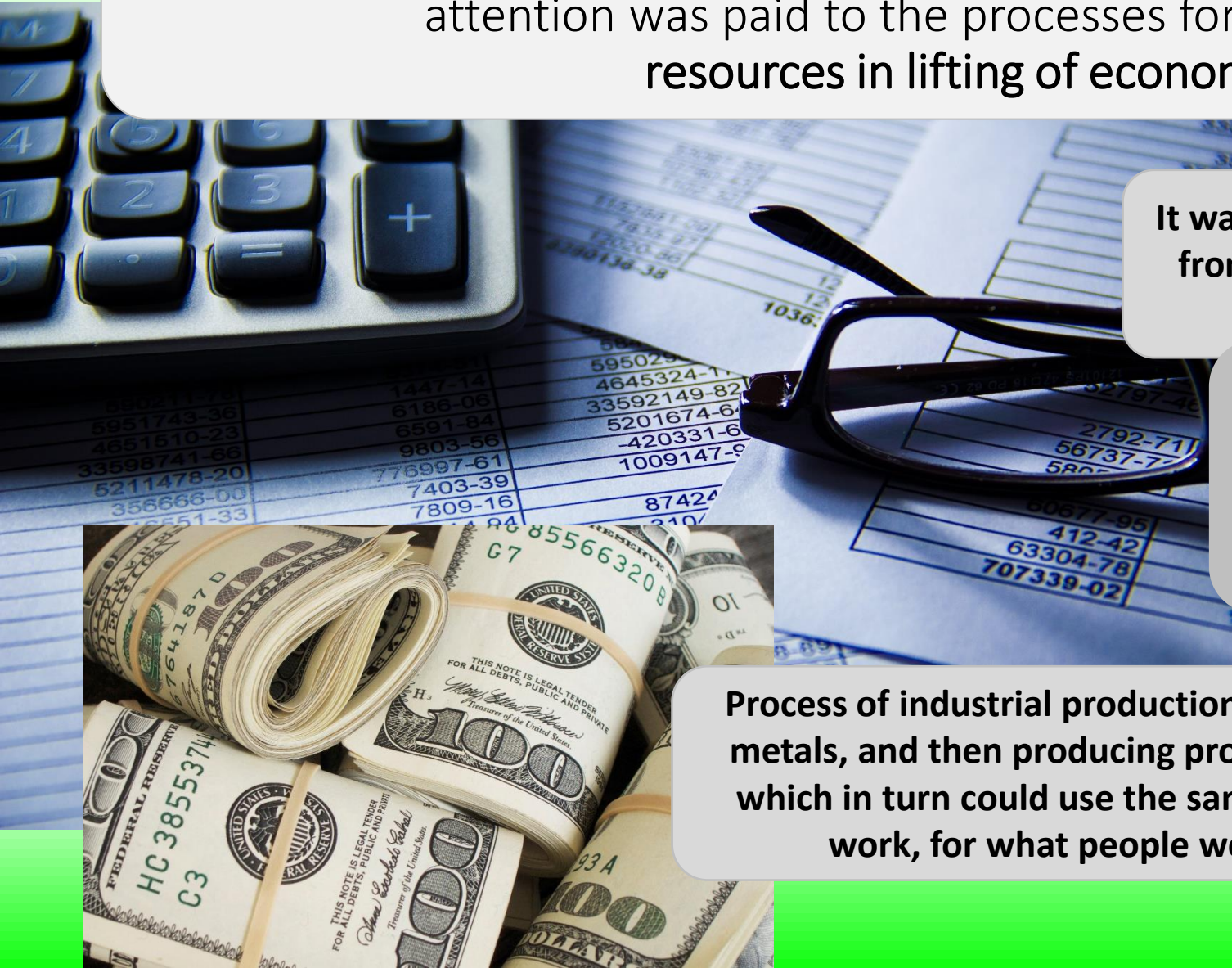


During the late 1800s, when substantially all of the land was already occupied, but gold and other resources were already distributed among the countries, significant attention was paid to the processes for the use of monetary resources in lifting of economic activity

It was another one more way of how people focused from pure «growth», when people spread all over the planet, to the «economic growth» -

When from the accumulated resources of raw materials (earth, metal, wood), using a variety of processes were acquired other things that as a new value was converted into monetary value

Process of industrial production became more efficient, converting the ores to metals, and then producing products from derived metals in industrial plants, which in turn could use the same energy to perform an increasing amount of work, for what people were willing to pay more and more money



A COMPONENT OF GROWTH – ENERGY

The process of bringing raw materials to the workforce and technologies to «produce» the money was greatly accelerated in relation to **energy and technology revolution (Industrial Revolution)**, which began in late 1800-ies



By adding to rich energy sources – oil, gas and coal – the recipe how to use coal in power generation, the global economics obtained powerful innovation to create added value that was turned into money

Around the beginning of 1900-ies, automobiles and other industrial products came from the rapidly growing production lines, which were operated and driven by a powerful new forms of energy

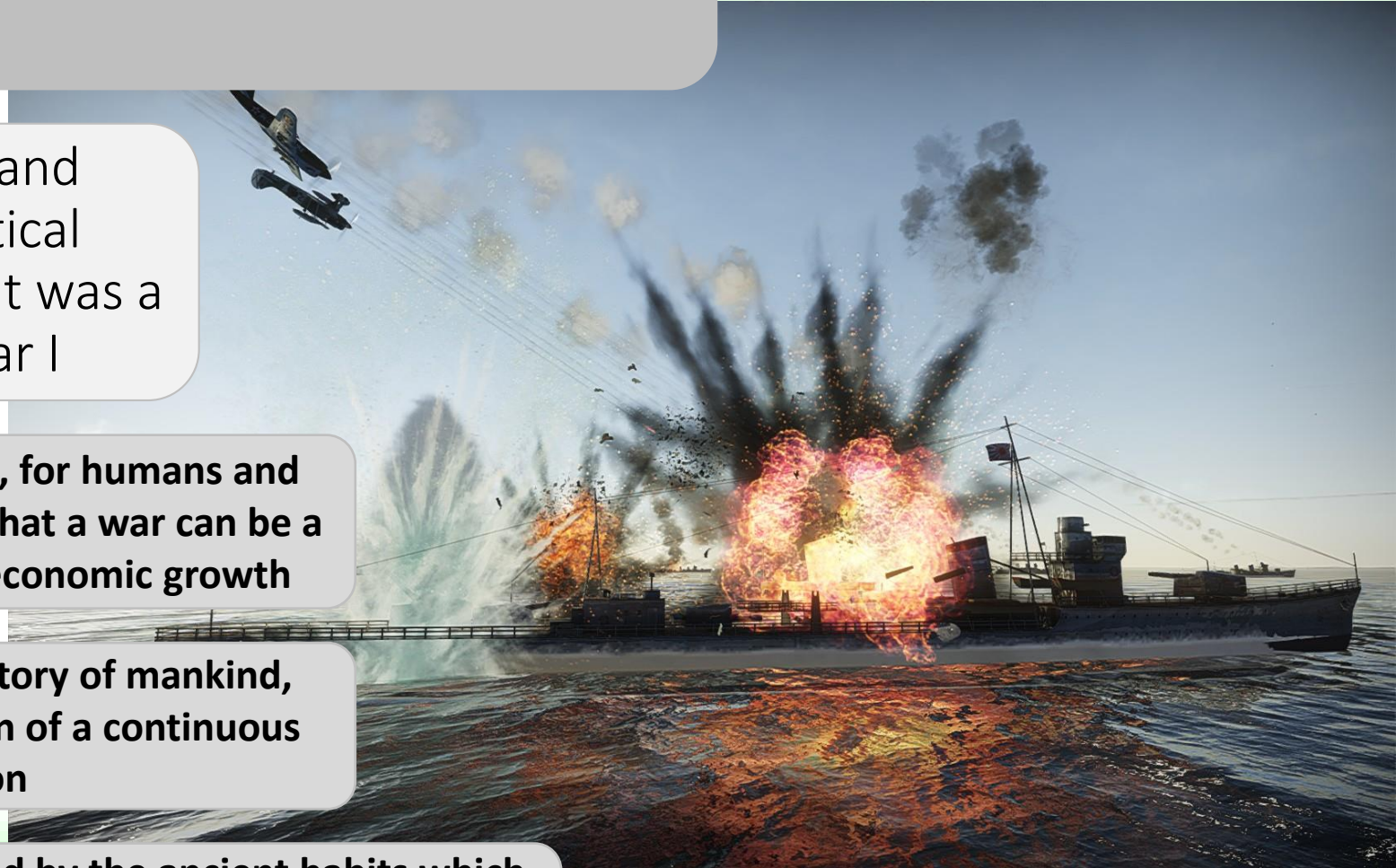
GROWTH AND WARS

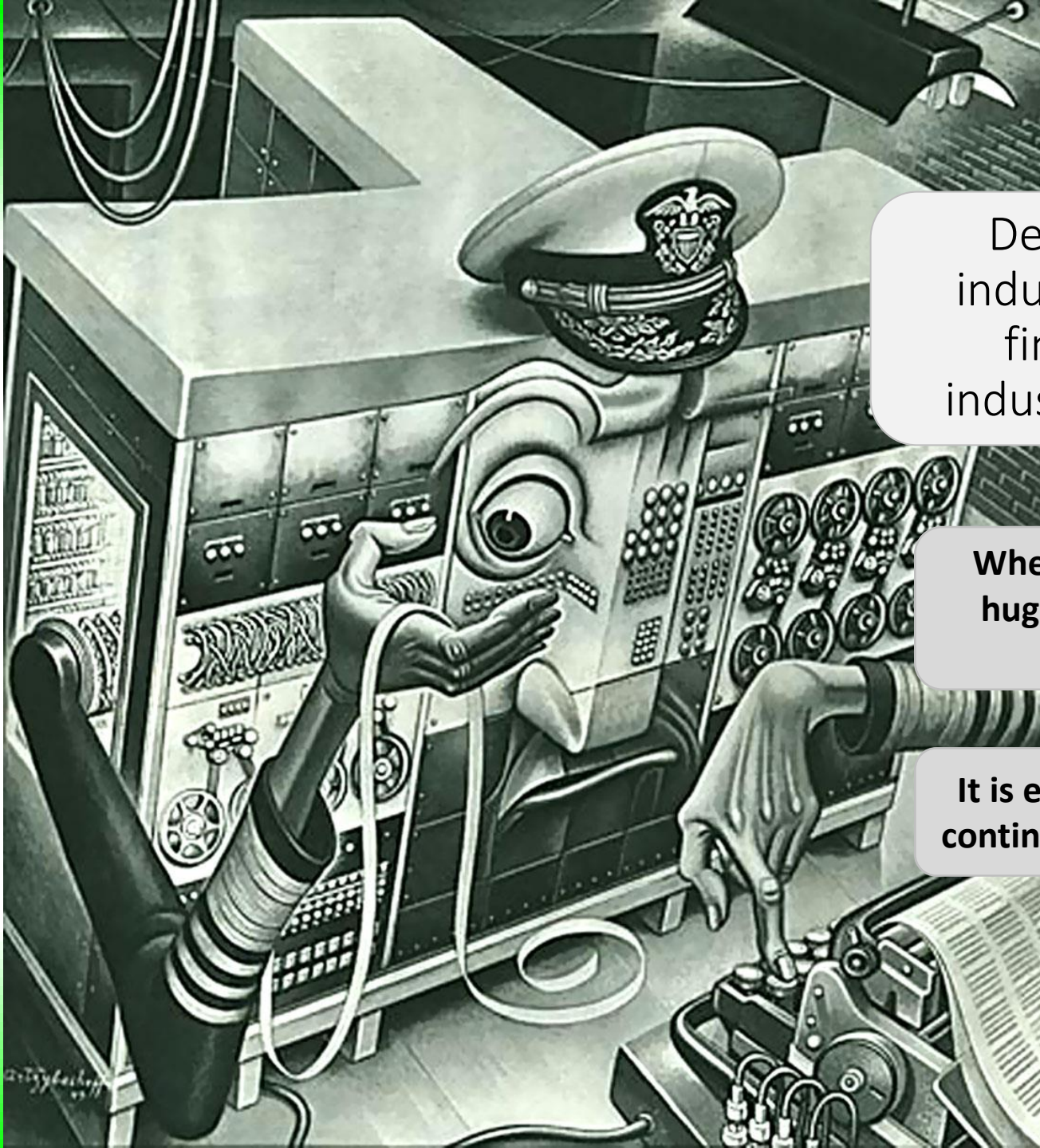
The fight for power, goods and resources led to sharp political disputes and, to some extent, it was a precursor to the World War I

By contrast, war required terrible costs both, for humans and for the environment; however, it turned out that a war can be a positive event from the perspective of the economic growth

Formation of empires, the is recorded in history of mankind, always has been driven by the political vision of a continuous and rapid economic expansion

World wars of the 20th century were promoted by the ancient habits which were equipped with modern technologies and complemented by many times more destructive power of empire builders





Deep economic depression, of which the industrialized world suffered in the 1930s, finished only with the transformation of industrialized countries to the war economies

When, due to the needs of war, the country is investing huge sums to develop new technologies and industrial production, everyone is involved in the work

It is even estimated that the world's industrial economics continues to operate in war-time regime to the present day

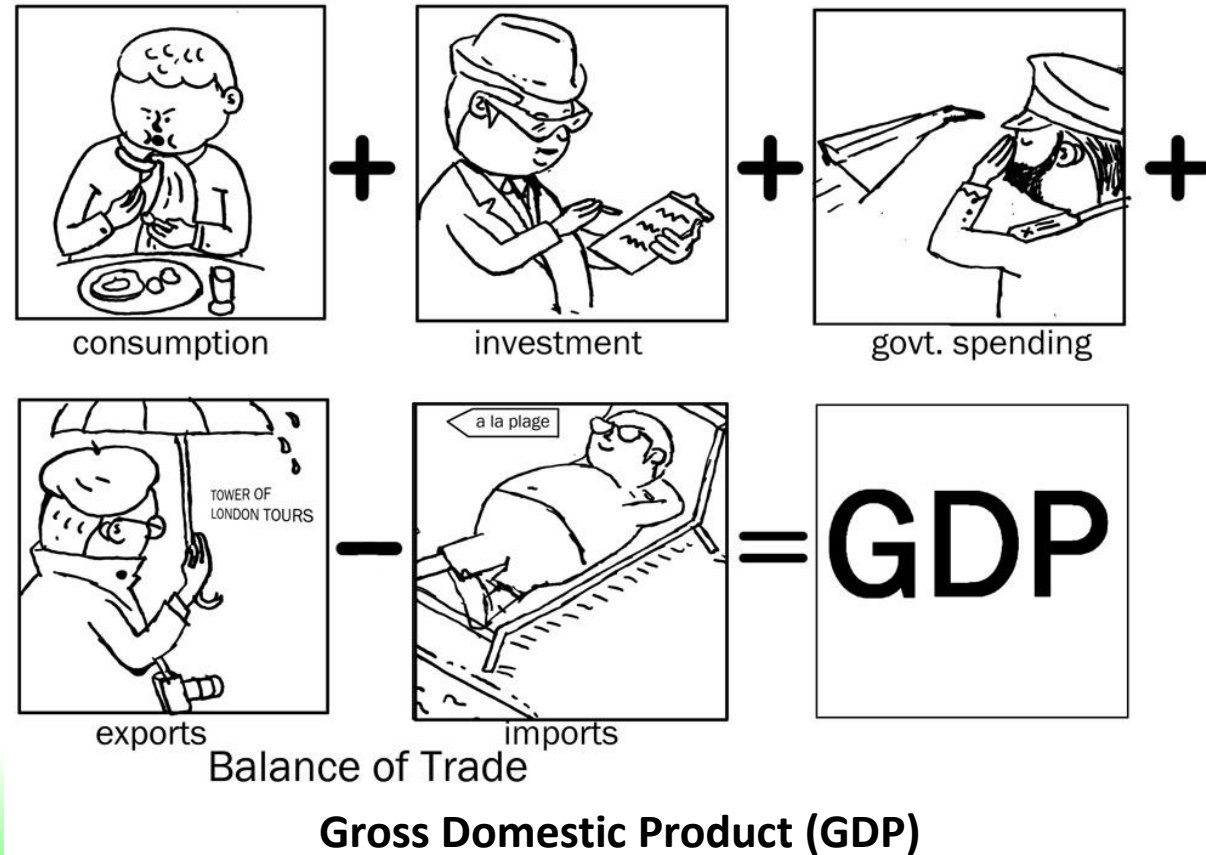
This is evidenced by both, the «Cold War» and the current «war against terrorists»

The war has proven to be one of the ways of the world to provide substantial monetary economic growth and increase of gross domestic product (GDP)

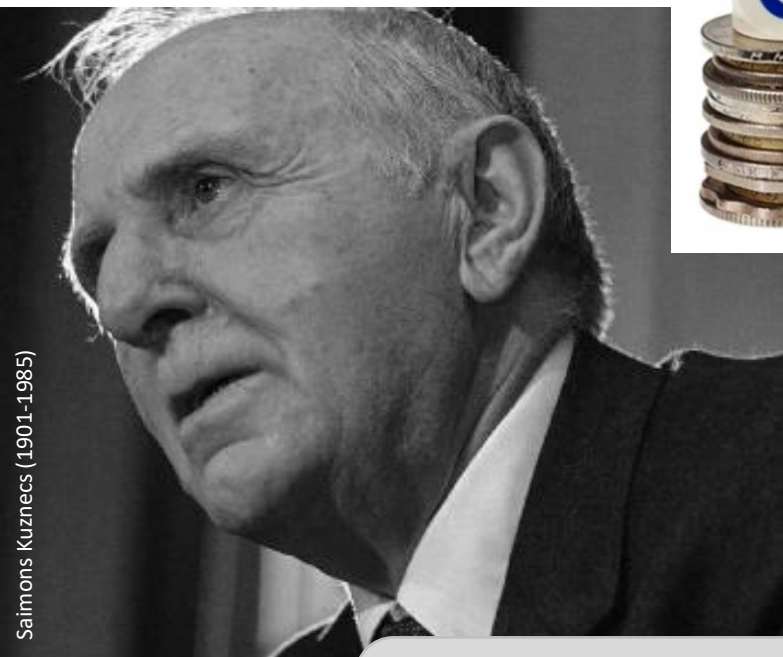
GDP means all the ongoing economic performance of a country expressed in monetary terms within a specified time period

If the numerical value of GDP becomes larger – there is an economic growth; if it becomes smaller – the economic recession, but if the recession continues for a long time – it has intervened in depression

GDP reports to the world community for practical purposes and it is identified with economic growth setting the level of progress of each nation



The implementer of GDP, Simon Kuznets, was worried that his invention could be used maliciously



S.Kuznets about his worries reported to the US Congress in 1934, warning that the statistics of new national economics should not be used to assess the overall prosperity of the people

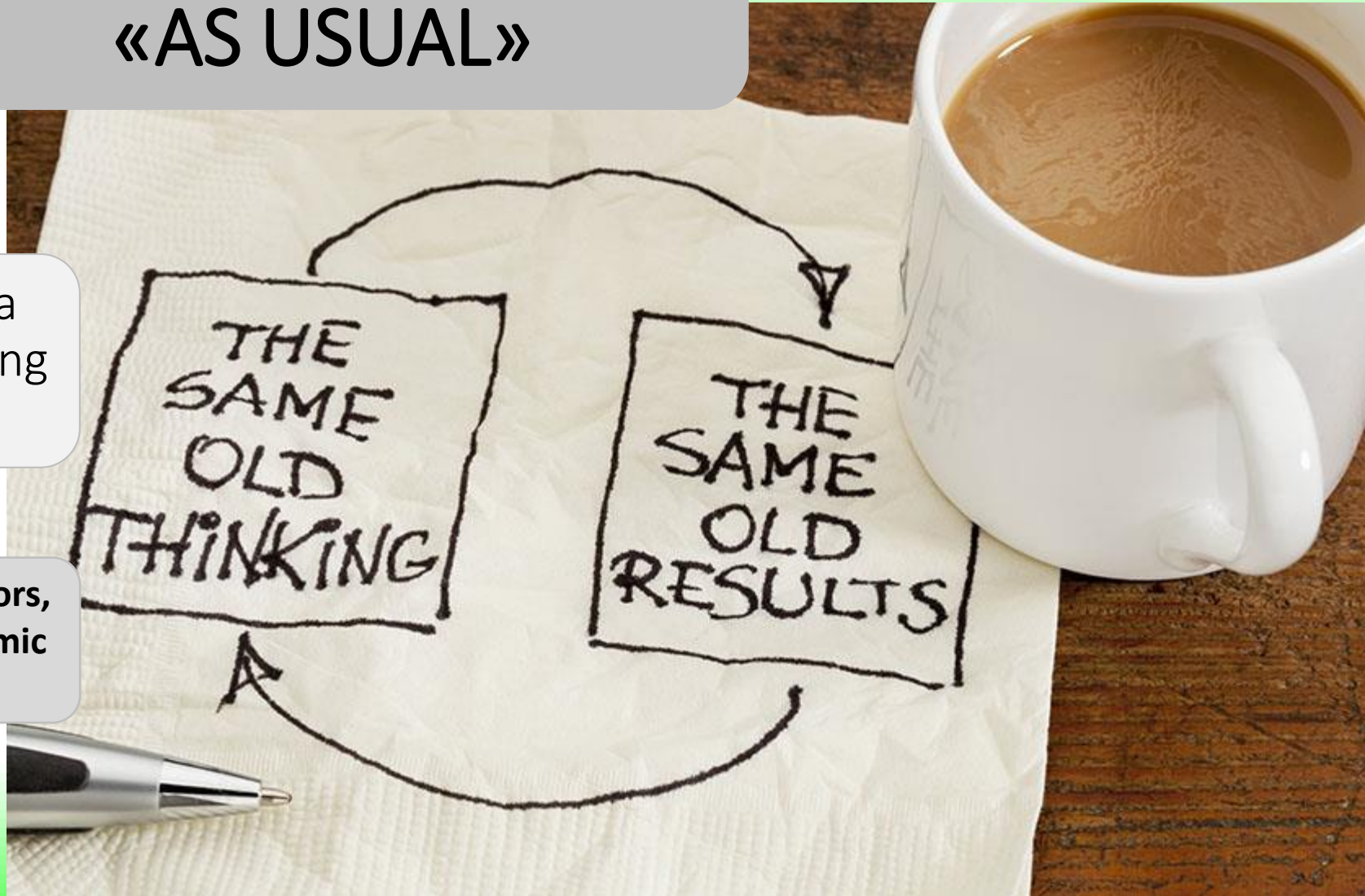
However, the warnings of GDP inventor were ignored and by the increase of global financial and economic system, GDP became increasingly important as the indicator of economical achievements

UN figures, reflecting the socio-economic status, regular reports on GDP growth, state media that actually praises «growth as usual» and many other examples again and again serve to strengthen the domination of GDP

GROWTH «AS USUAL»

If only GDP data are used as a victory flag, civilization is moving towards collapse

Only by finding and using other indicators, it is possible to understand that economic growth leads to a growing troubles



Starting with the 1950-ies, growth curves for many human actions increased sharply, not just only due to GDP but also due to physical expansion, thus they were measured in terms of number of people and the amount of resources



There were many reasons of this «run-up», but perhaps it was a combination of war and peace in "Cold War" between the capitalistic West and the communistic East, which luckily did not flash into the global armed conflict

Western nations contributed to the increasingly commercialized lifestyle, partly to show that the Western model is better than state-controlled violent «equality» against the nations of the Soviet block

The result was an impressive growth in all areas: more people, more production and consumption, more money that flowed through the economics and rapid technological development; the growth also was not questionable

The exception was the warnings expressed by scientists and writers such as Rachel Carson with the book «Silent Spring» published in 1962 and Paul Ehrlich with the book «The Population Bomb» (1968), which revealed the idea that **there are limits of the planet's growing human activities**

'Silent Spring' Is Now Noisy Summer

**Pesticides Industry
Up in Arms Over
a New Book**

By JOHN M. LEE

The \$300,000,000 pesticides industry has been highly irritated by a quiet woman author whose previous works on science have been praised for the beauty and precision of the writing.

The author is Rachel Carson, whose "The Sea Around Us" and "The Edge of the Sea" were best sellers in 1951 and 1955. Miss Carson, trained as a marine biologist, wrote gracefully of sea and shore life.

In her latest work, however, Miss Carson is not so gentle,

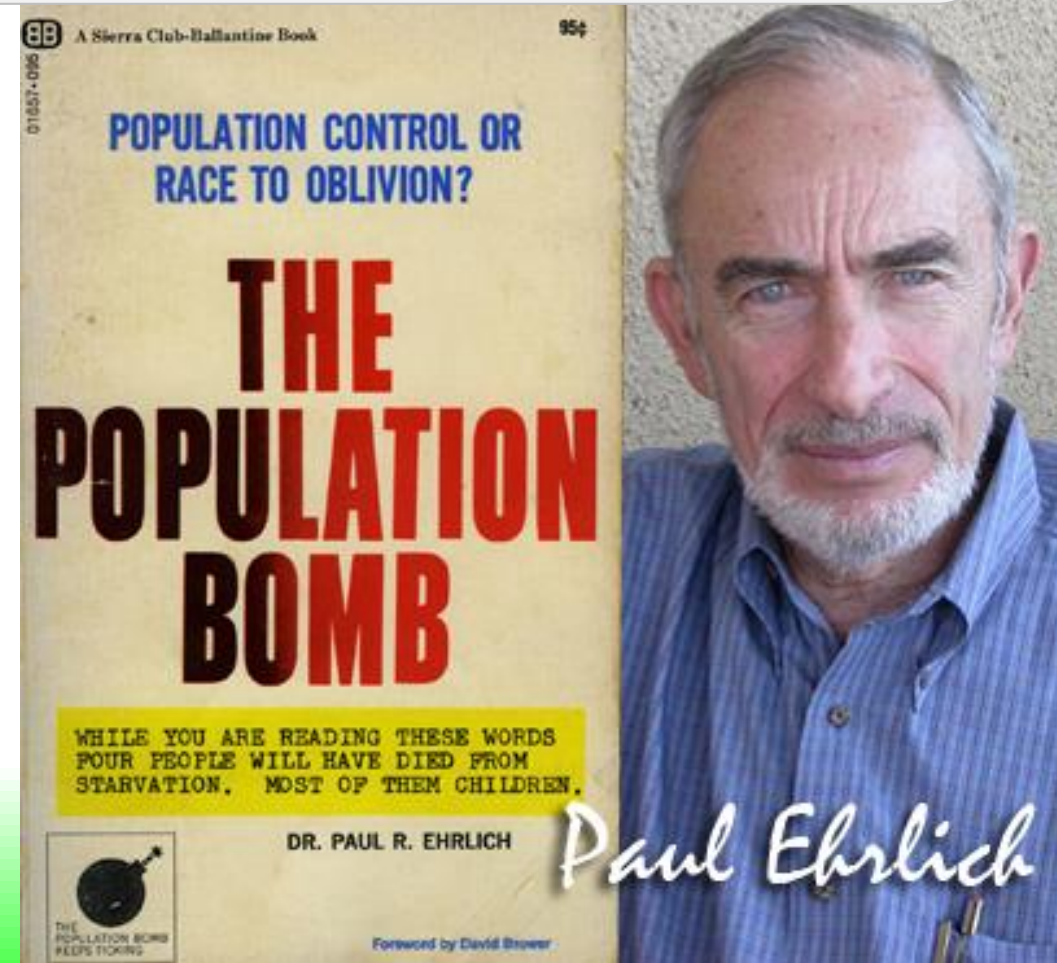
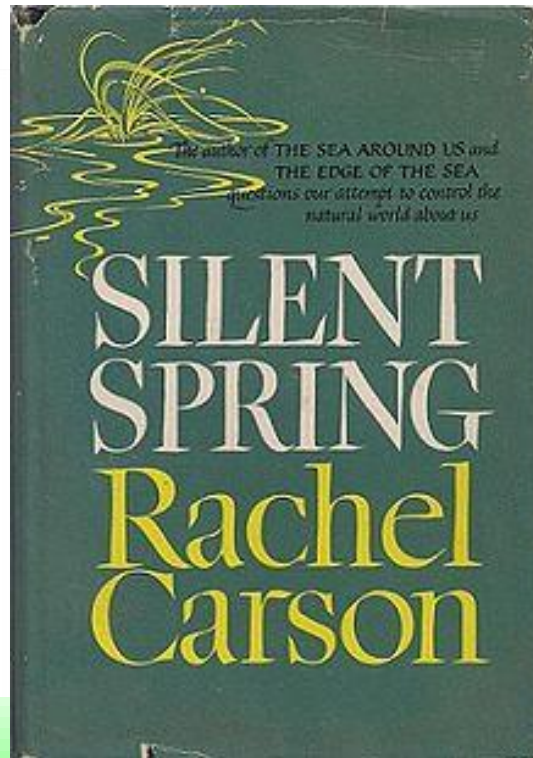


**Rachel Carson Stirs
Conflict—Producers
Are Crying 'Foul'**

fending the use of their products. Meetings have been held in Washington and New York. Statements are being drafted and counter-attacks plotted.

A drowsy midsummer has suddenly been enlivened by the greatest uproar in the pesticides industry since the cranberry scare of 1959.

Miss Carson's new book is entitled "Silent Spring." The title is derived from an idealized situation in which Miss Carson envisions an imaginary town where chemical pollution has silenced "the voices of spring."



GLOBAL DISCUSSIONS ON GROWTH

Historically, year 1972 was marked as a turning point when, for example, the last «Apollo» spacecraft went to space because the Lunar Exploration Program of the USA was stopped due to stringent budget problems

In is symbolic interpretation, this turning point was recognized silently, as people began to realize that the Earth is the only our home

We can not escape beyond the Earth's borders and find new planets or moons that would be habitable in the near future

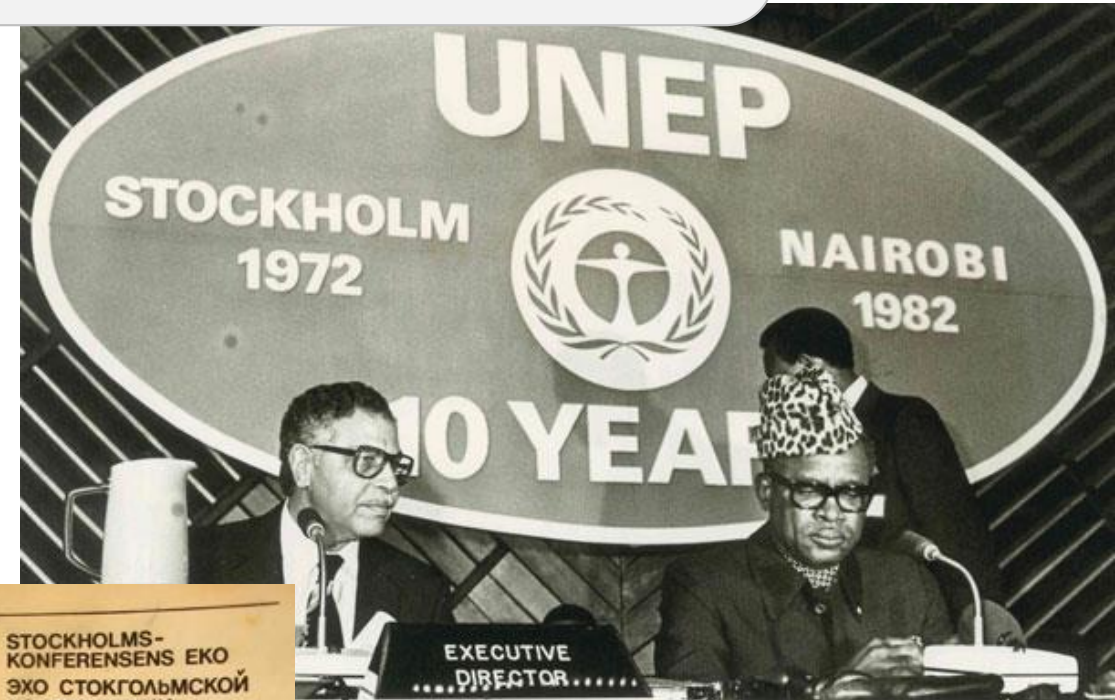


Eugene Cernan, the USA astronaut on the Moon surface in December 13, 1972

Year 1972 also was significant by **the first UN Global Conference on the human environment** in Stockholm, which reflected a number of new concerns and the necessary care for the future of the planet

The Stockholm Conference is considered as the starting point of the world summits of environmental and development issues

In 1972, the world's first ministries of environment were created and the first comprehensive environmental laws were established in the USA and several European countries



**STOCKHOLM
CONFERENCE
ECO**

JOINTLY PRODUCED BY
THE ECOLOGIST
AND FRIENDS OF THE EARTH

16th JUNE 1972

THANK YOU SWEDEN

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КОНФЕРЕНЦИИ
ECO DE LA CONFERENCE
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DE ESTOCOLMOU
斯德哥尔摩会议

田 声



OUT OF STOCKHOLM, A NEW INITIATIVE

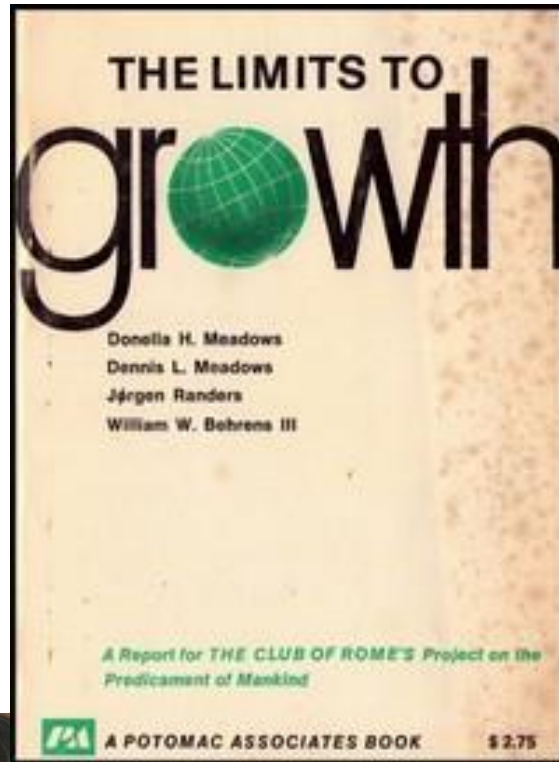
**World Ecological Areas
Programme Launched**



However, no other event reflects better the year 1972 as a turning point in the history as **the research «Limits to Growth»** performed by the Club of Rome and the Massachusetts Institute of Technologies



Dennis Meadows



The book was sold in millions of copies and launched to the intense global debate on the long-term prospects for economic growth – debates continue to this day

In the research, using computer modeling, there were searched similarities between the world's population growth, industrial production, resource use and pollution

The authors warned of serious resource and environmental problems in the future if people will continue their current course of development



Jørgen Randers



Donella Meadows

LIMITS OF THE GROWTH

Human development in the 20th century is characterized by exponential growth of population, production and consumption and globalization of many processes

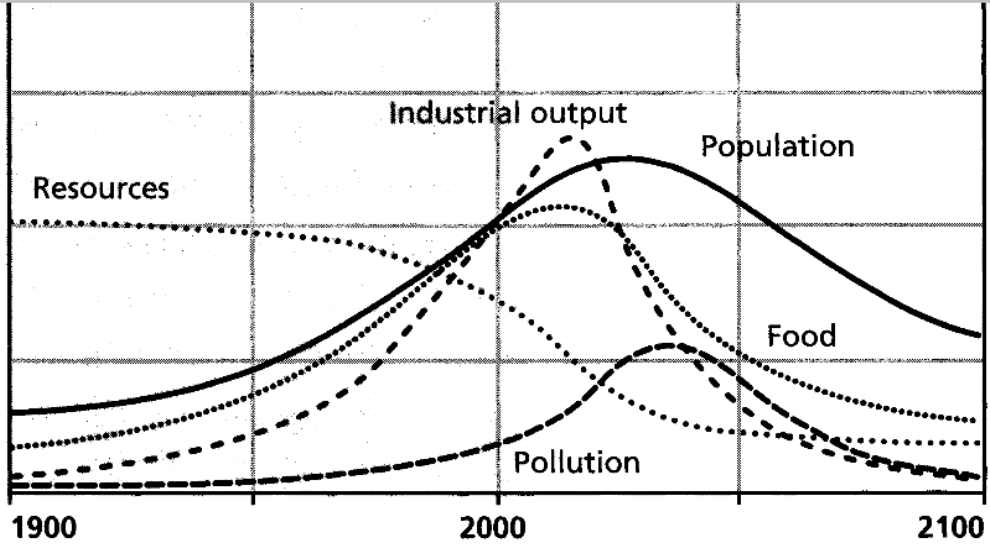
Of course, not everything is growing with the same speed, for example, global oil consumption rate is decreasing slightly, but consumption of natural gas is increasing

The world's population has started to grow exponentially since the beginning of the Industrial Revolution

Also emissions of pollutants are increasing, and global climate change is a consequence of the increased carbon dioxide concentrations in the atmosphere

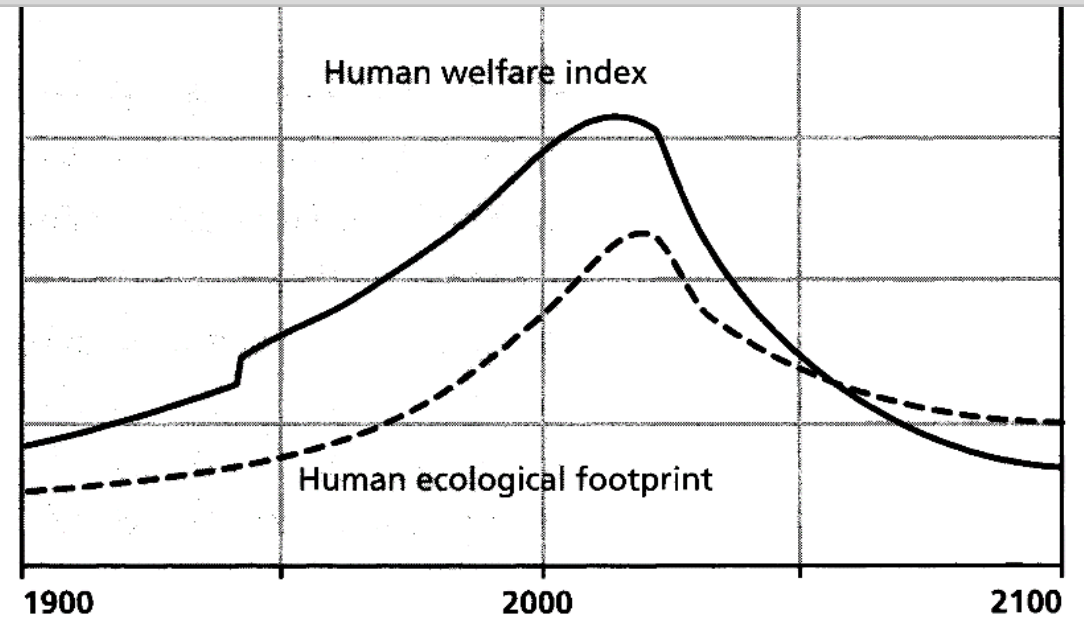


State of the world

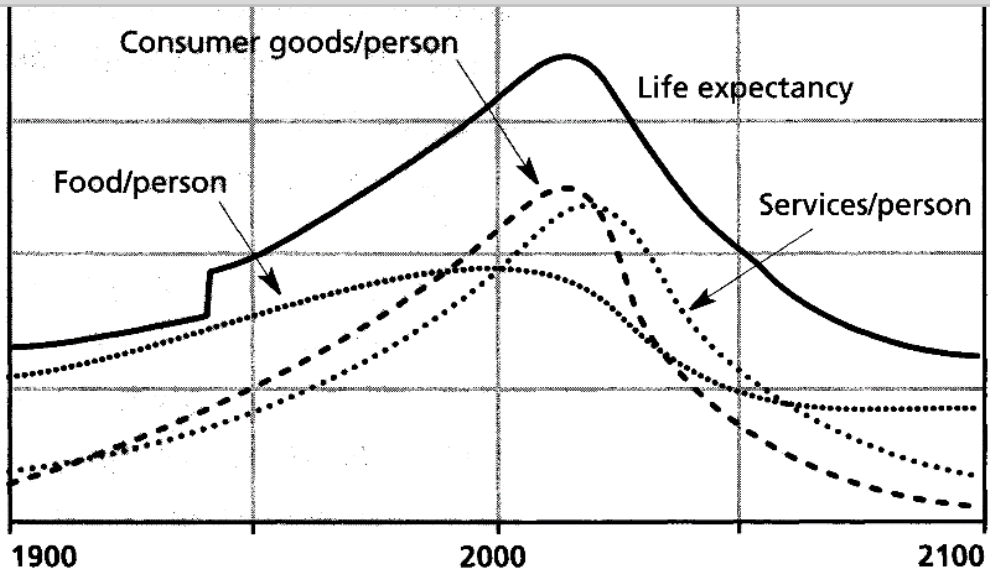


Changes of characteristic indicators of human development during centuries

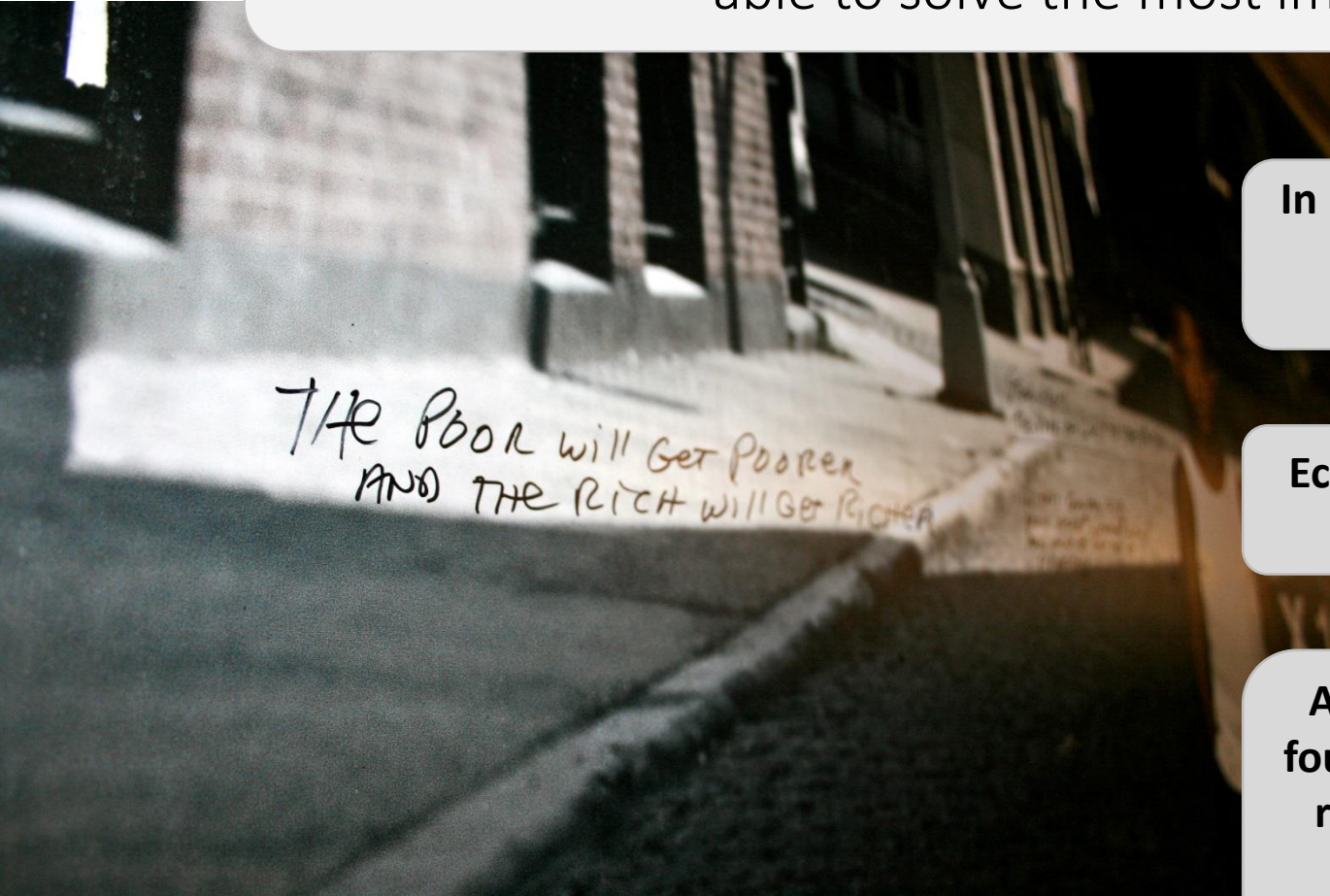
Human welfare and «ecological footprint»



Material welfare



Growth of society is often regarded as an achievement; many communities and nations, rich or poor, are seeking to expand their activities to be able to solve the most important problems



In rich world the economic growth need to be justified by the need to create jobs, ensure social protection and technical progress

Economic development in poor countries is the only way to get out of a poverty

As long as no other solution to the world's problems is found, people will consider the development as the main road to a happy future and will do its best to promote growth - these are psychological and material reasons of the growth

The growth is able to solve some problems, but unfortunately it also creates new – it is linked to limits of the growth and development

The Earth is not endless, but the physical growth of the population and also of the number of cars is still increasing, pollution amount still continues

However, human demographical expansion, amount of buildings and concentration of pollution are not the most important limits to growth

The most important restrictions apply to the energy and material flows needed to sustain people as well as the production of motor vehicles and the construction of buildings



Society and economics are dependent on air, water, food, raw materials and organic fuel streams that come from the Earth, but these flows cause pollution and waste streams



Good illustration of an exponential growth is the Persian legend of the wise courtier, chess and rice grains

Limits of growth actually are a global resource constraints and the planet's limited capacity to absorb waste and pollution

Exponential growth is the driving force of the public economics approaching the planet's physical borders

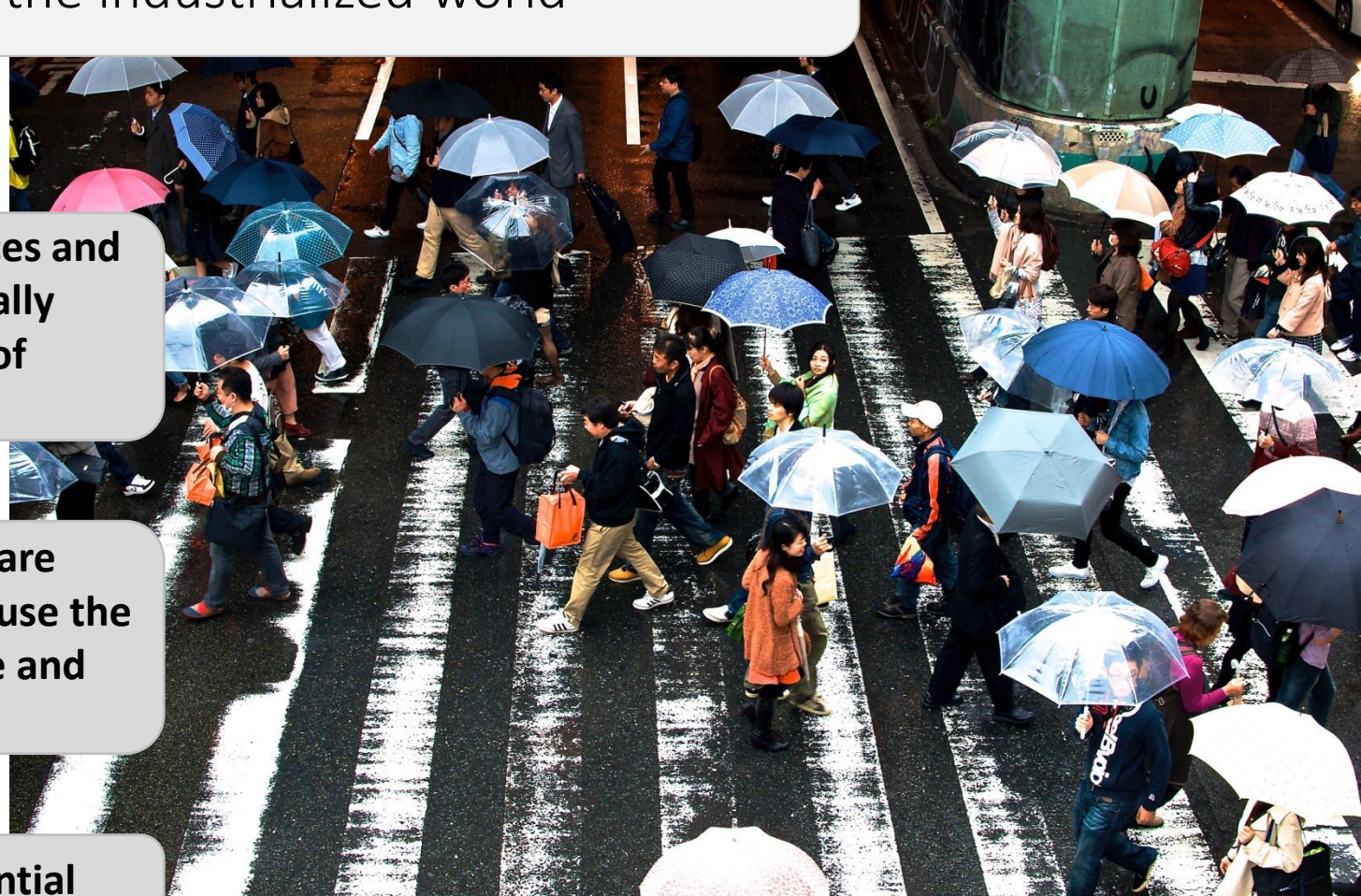
Many human activities ranging from mineral exploitation to urban development are growing exponentially – it is rooted in human culture and become an integral part of the global structure


Population and capital are the engines that provide the growth of the industrialized world

Other indicators – food production, use of resources and pollution – also are tended to grow exponentially because they are influenced by the number of inhabitants and the capital

Food production, use of resources and energy are increasing rather than due their capacity, but because the exponentially growing population requires more and more food, materials and energy

Turnover of capital can be described by exponential growth, exponential decline or dynamic balance



A worker in a blue cap and high-visibility vest is working on a large blue industrial wheel. The wheel is part of a larger machine, and the worker is standing on a yellow platform. The background is a dark, industrial setting.

In the period between 1970 and 2010 production has increased by almost 100% – such growth in the world should have to create twice as much industrial goods per capita, unless the number of population had remained unchanged

However, by increase of population, the average amount of industrial goods per capita has increased only one-third

If the amount of capital is growing faster than the population, then, according to the demographic transition theory, it should mean that increased material standard of life would reduce growth rate of population

But neither economic growth nor its demographic counteraction is not fast enough; in some cases, these effects contribute positively to each other

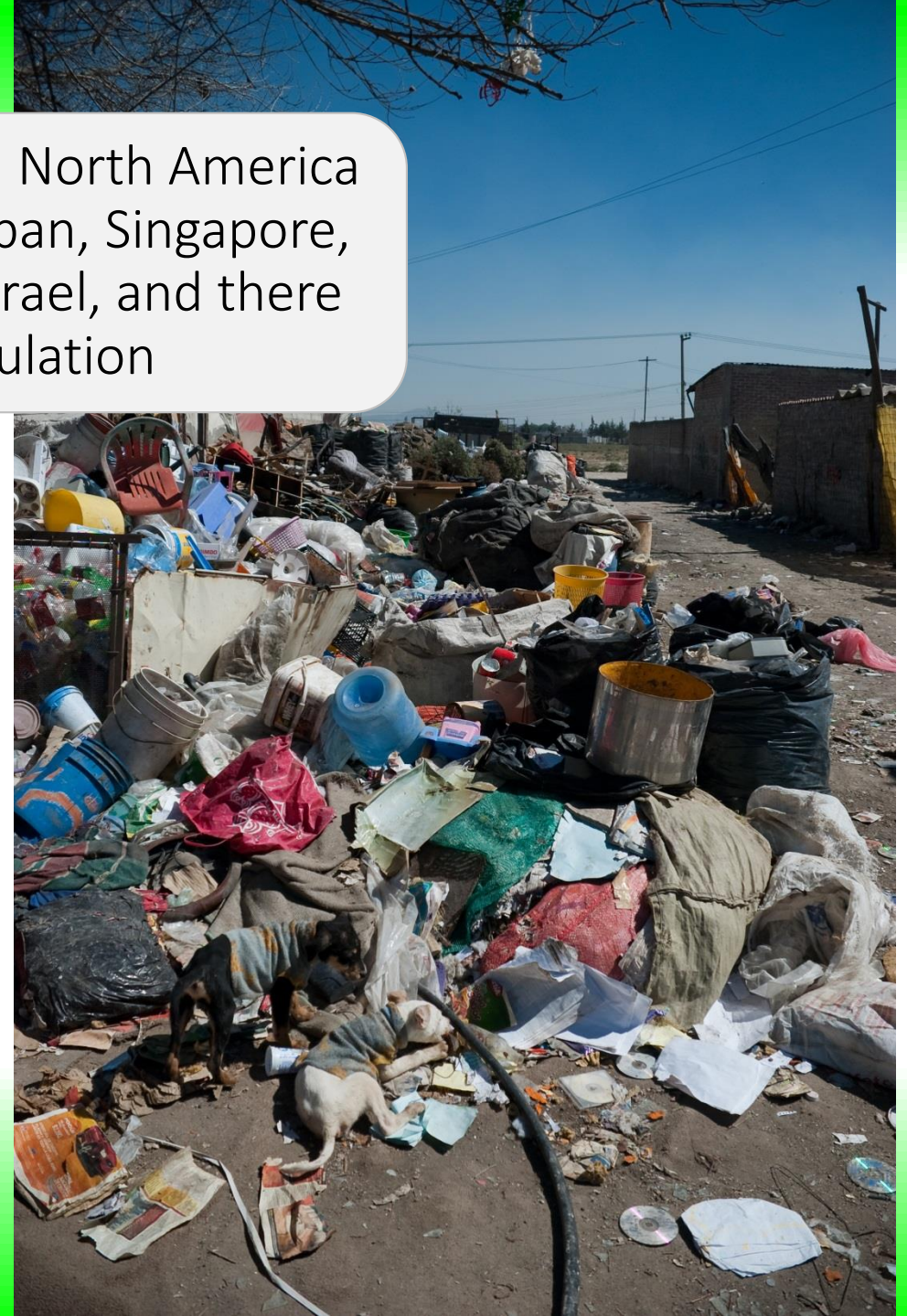
Therefore, the economic well-being decreases, but the population is constant or growing, and to some extent it is determined by the production-sharing mode

The world's 20 richest countries are mainly located in North America and Western Europe, but this group also includes Japan, Singapore, Australia, New Zealand, United Arab Emirates and Israel, and there are living about one-fifth of the world's population

More than three billion people live in the poorest countries of Africa and Asia

Annual income of an average citizen in the world's richest countries is 100 times higher than for an inhabitant of a country with low income

Lifestyle of affluent population has a significant impact on consumption of global resources; e.g., in the USA where lives 5% of the world's population, about a quarter of world's production of goods are consumed and nearly half of all industrial waste are produced



Economist Jeffrey Sachs, the UN Millennium Development Project Director, points out that it would be possible to eradicate extreme poverty in the world by 2025 if richer countries would donate only 0.7% of national income to aid for poor countries



These funds should be used for children vaccination against infectious diseases, primary education, facilities of drinking water and sanitation, food for starving etc.

The amount (about 100 billion EUR per year) is much higher than it is now donated, but the question is about the priorities –

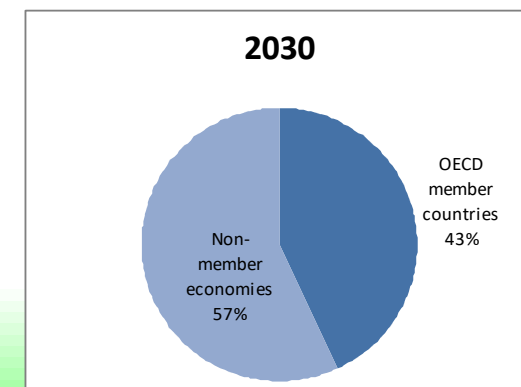
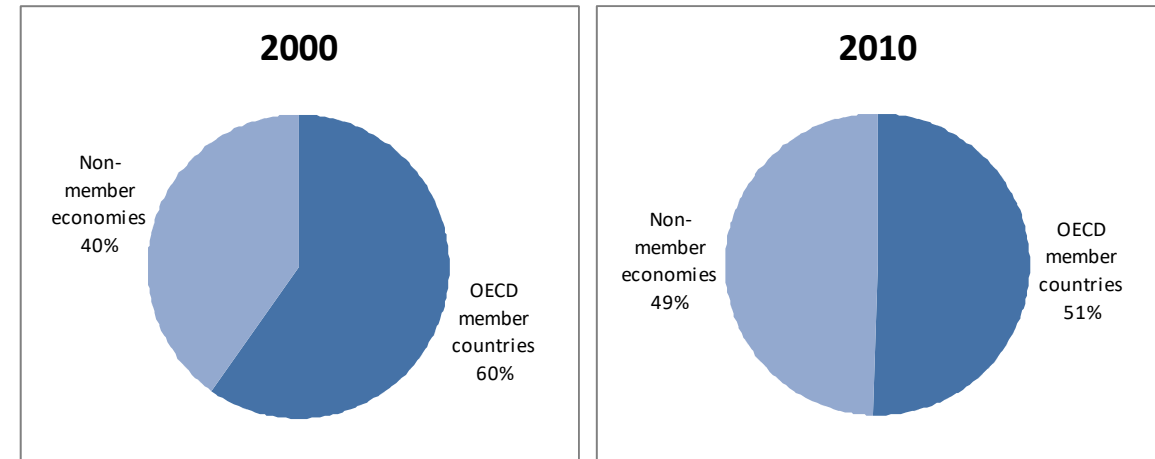
Currently, expenses for military purposes ranges around a trillion EUR a year, which is equivalent to half of the world's population income during the year

For rich countries it is much easier to save, invest and increase capital than for poor countries, and not just because the rich nations have greater control over the market conditions, can develop and buy new technologies and manage resources

In rich countries, during the growth of the previous centuries more capital have been accumulated that can increase more efficiently now

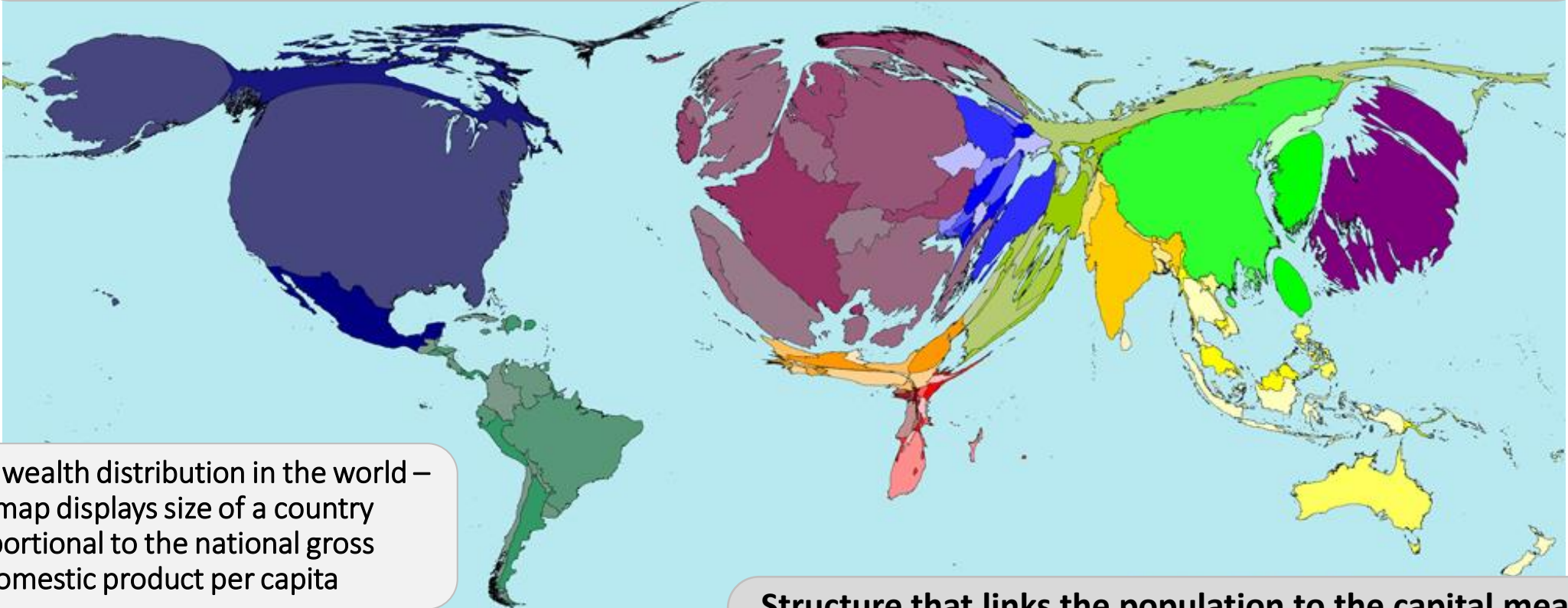
However, in the future provision of the basic needs will be possible only without the current depletion of natural resources, saving resources and preserving the investment amounts

Slower population growth in the richer countries allows them the greatest part of industrial capital to be shifted for production investment and to reduce investment share in the service sector needed for health care and education



Changes of global economics according to the parity of purchasing power

Poverty is promoted by corruption, low level of education and incorrect management, but people are exposed to the growth model which increases the population, but does not allow to become richer



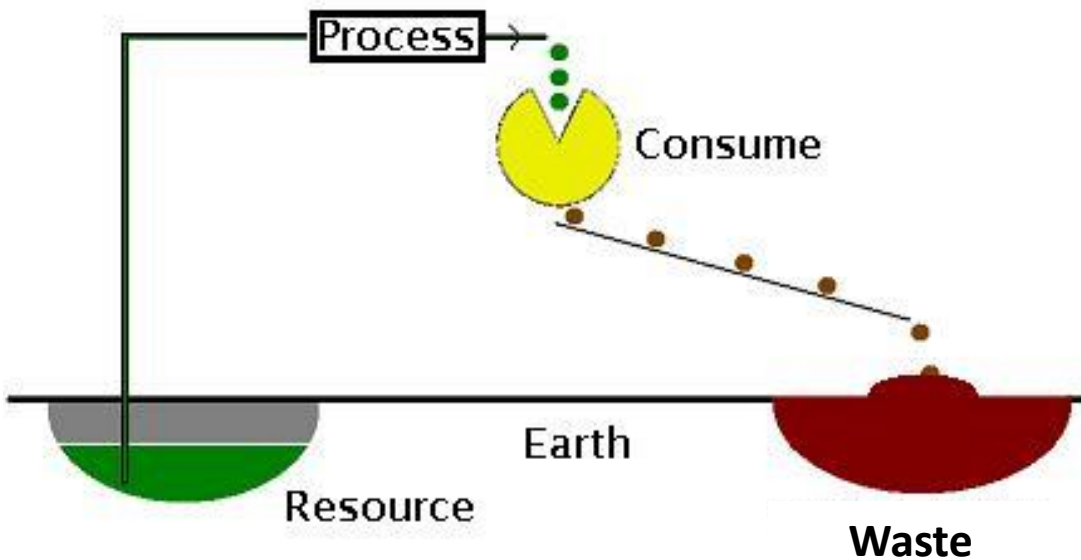
National wealth distribution in the world – the map displays size of a country proportional to the national gross domestic product per capita

There are large limits for capital growth in poor countries due to population growth and other reasons

Structure that links the population to the capital means that the global economic scenario is realized by a principle which is well characterized by an old proverb – «a rich is getting richer, but a poor has children»

LIMITS OF DEVELOPMENT

Society consistently promotes growth to provide production – however, this potential can not be realized without continuous incoming flows of energy and materials, and, without continuous outgoing flows of pollution



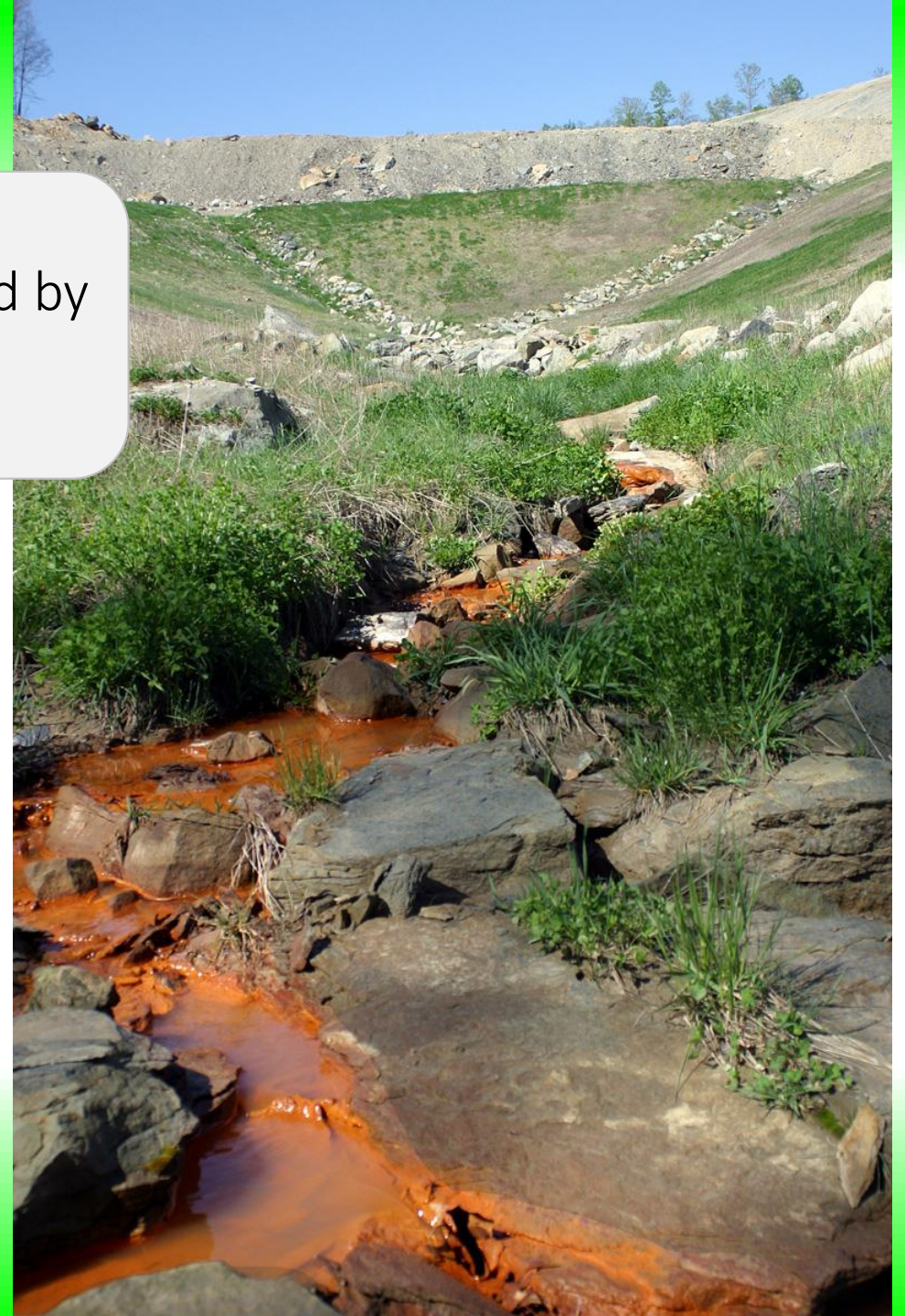
There is a flow of global materials and energy sources through the economics to the environment that accumulates waste and pollution

There are speed limits on what people and capital may use materials and energy or generate waste in way that it does not cause harm to people, economics and for absorption, regeneration or self-regulation processes of the Earth

All resources used by people – food, water, iron, phosphorus, oil and hundreds of others – are limited by both, the source limitations and the pollution caused due to leakage

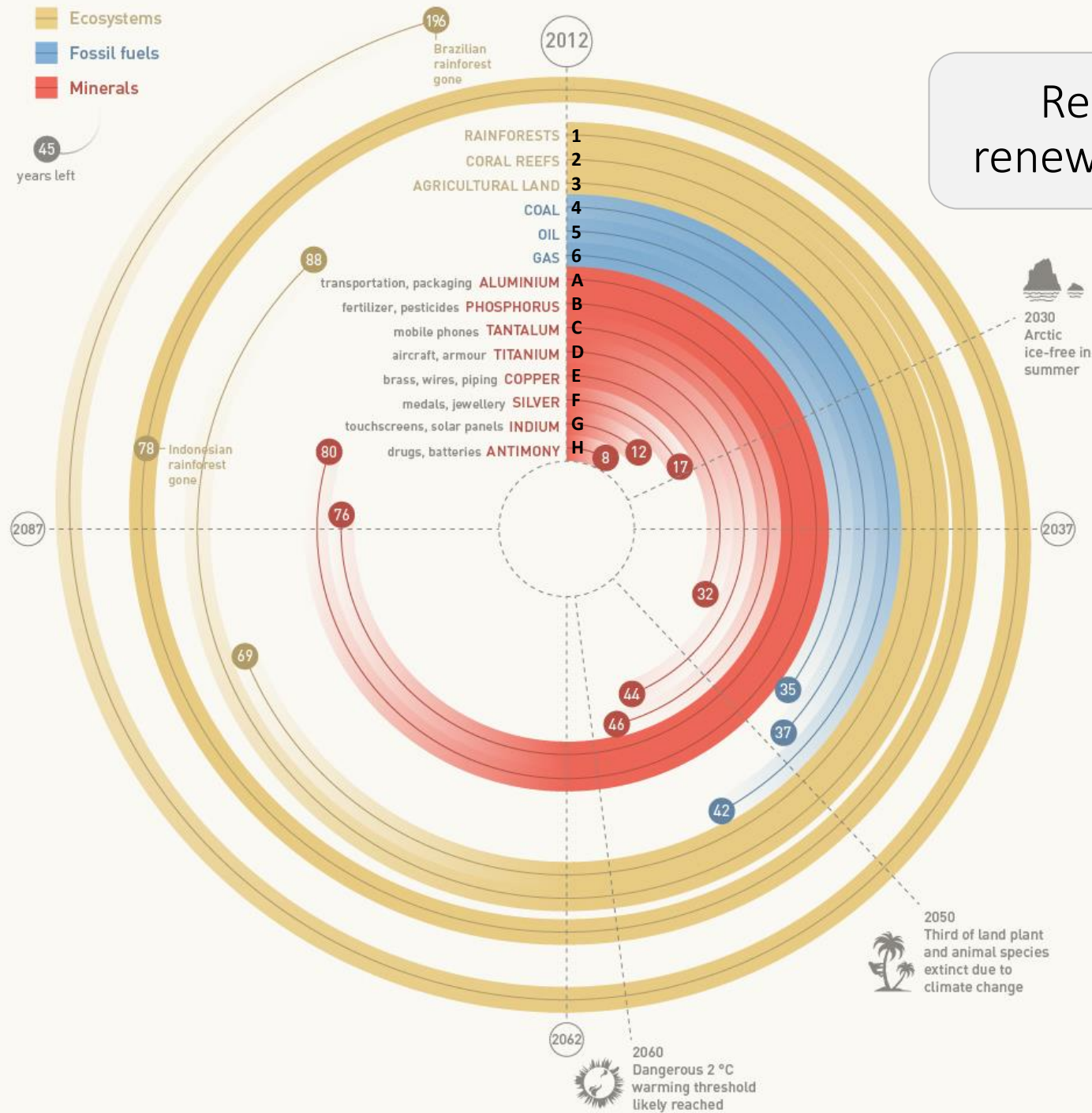
True nature of limits of resources is complicated because their sources and leakages are a part of a dynamic, interconnected and a single system – the Earth

There exist also a short-term restrictions such as the accumulated amount of oil in the reservoir to be needed for some activity or a long-term constraints such as the amount of oil available in the Earth's depths



- Ecosystems
- Fossil fuels
- Minerals

45
years left



Remaining amount of non-renewable resources in the world

Sources and leakages can be mutually interconnected, but the planet in a natural way can simultaneously affect both, sources and leakages

**"THE MORE
WE RECYCLE,**

**THE LESS WE
NEED TO MINE."**

- Wilfred Visser

World Bank's economist Herman Daly has offered three simple regularities in order to bring clarity to this complexity and to define the long-term balanced development restrictions:

- 1) **For renewable resources (soil, water, forests, fish)** – the sustainable exploitation rate should not be higher than the speed of regeneration
- 2) **For non-renewable resources (fossil fuels, high concentrations mineral ores, natural underground water)** – a balanced speed of use should not be greater than that at which the renewable resources are used to replace non-renewable resources
- 3) **For pollution** – a balanced leakage rate should not exceed the rate at which contamination may be disposed, absorbed or rendered harmless to the environment

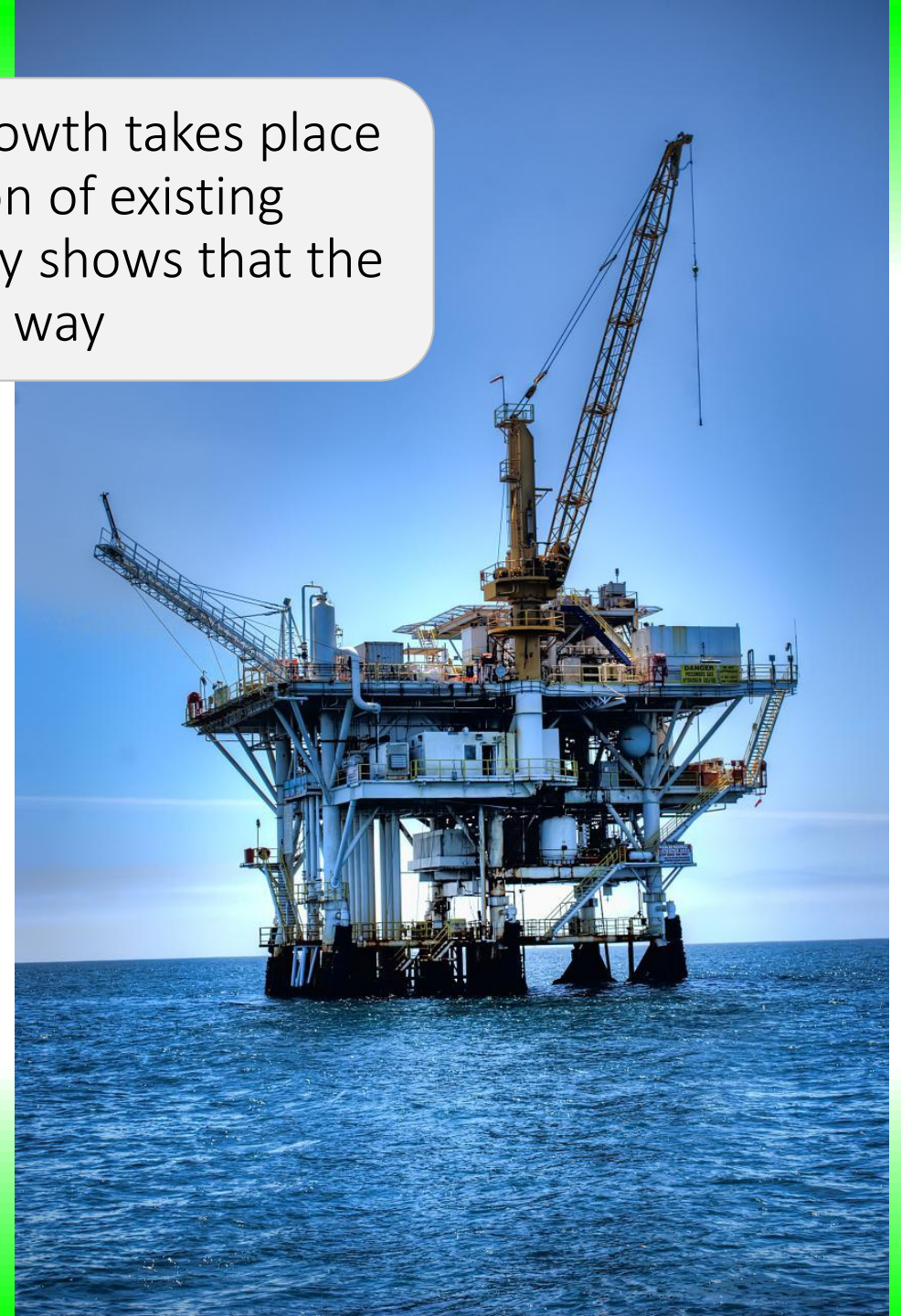
There are many evidences that the development and growth takes place on the basis of irreversible exhaustion or degradation of existing resources – nature of human development unfortunately shows that the Earth's resources are not used in a balanced way

Soil, surface water and groundwater, wetlands, nature and environment have started to degrade

Even in places where renewable resources seem to be stable such as forests of North America and soils of Europe – quality, diversity and survival of resources are under the doubt

Mineral and fossil fuel supplies begin to dry up, but there is no even a plan of any investment program to maintain the industry when supplies of fossil fuels will run out

Pollution accumulates and its emissions already are starting to exceed the fluxes of the biogeochemical cycles, but atmospheric chemical composition changes



Humanity will have exceeded the limits of sustainable development – these restrictions apply to the raw materials which are used for a certain period



Is the mean temperature of the ground in any way influenced by the presence of heat-absorbing gases in the atmosphere?

— *Svante Arrhenius* —

AZ QUOTES

Humanity has accelerated the use of reserves not only spatially, in terms of flow rate or limited forms, but also in terms of the number of people

Scientists of the world are trying to understand and describe the nature of sustainable development as well as are looking for ways to solve the challenges of sustainable development since Renaissance

For example, in 1896, Svante Arrhenius proposed the greenhouse theory and did the first calculation of possible consequences from human-initiated climate change

Exceed of the planet's limits is seriously affecting the life conditions of people and endanger the survival in the future

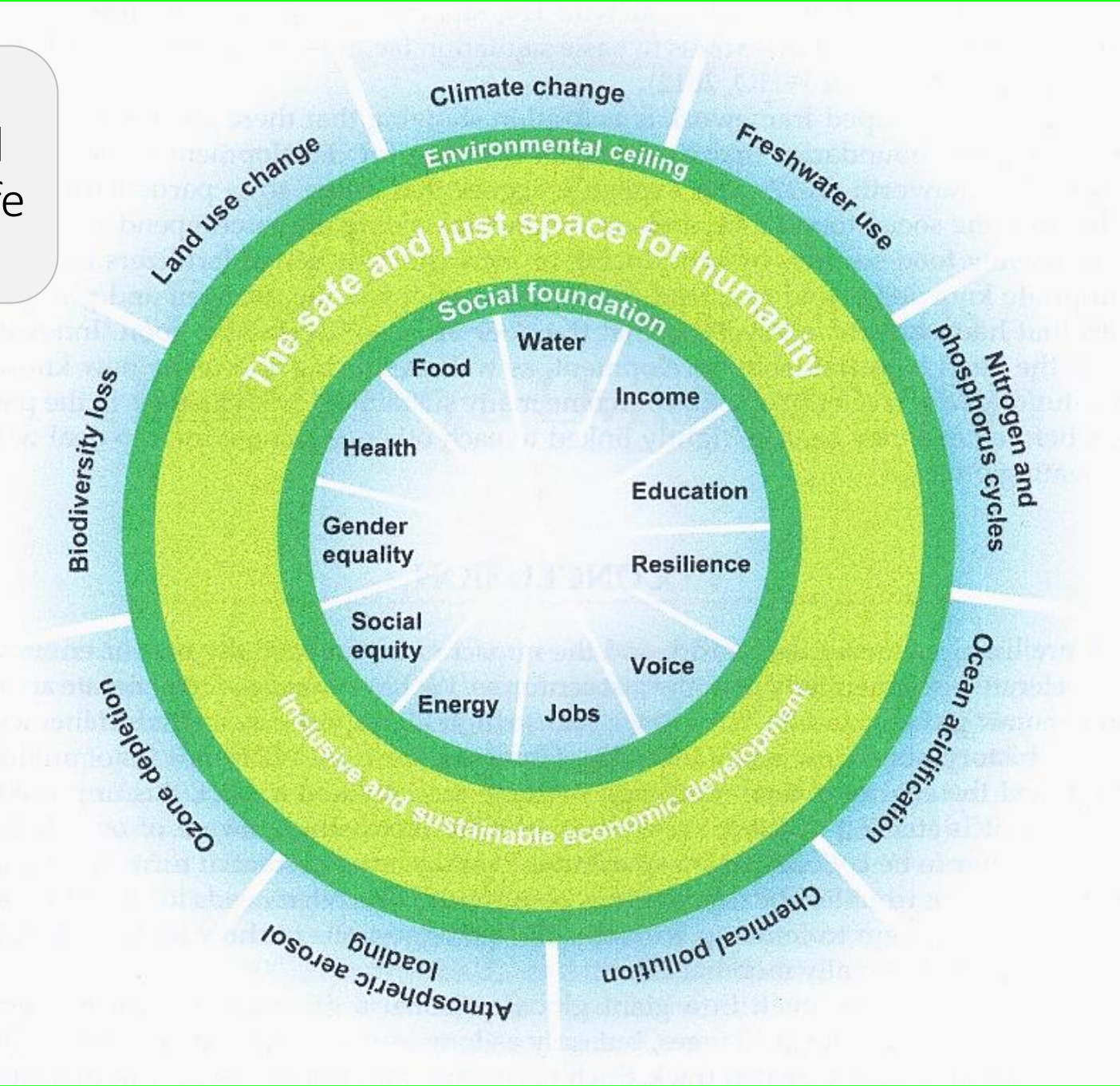
Therefore, scientists have been trying to connect the planet's boundaries with social borders of humanity based on universal human rights

In this view, the world in social terms can not be sustainable if currently there are around one billion people permanently starving

Humanity can not accept the world's non-sustainability, if about 11% of the population do not have access to safe drinking water, but almost half of the population are not provided with basic sanitation



Interaction of environmental and social factors for safe environment



Limits of the planet's capacity are determined by the use of the environment and the implementation of policy in favor of humanity with the aim even with weak management capacity not to destroy the global environmental system



Whereas, humanity is trying to define its social opportunities which is similar to social funds and provide people with –

Adequate food, energy and water supply, necessary sanitary and environmental conditions, including housing as well as safety, health, education and opportunities for cultural expression

In case of sustainable development, it is not permissible that limits of the planet are exceeded, nor too high lift of social ceiling

In earlier periods of history humanity has managed to overcome conditions of non-sustainability, but never before there haven't been so many individual circumstances that are mutually influencing each other leading to severe intensification of negative impacts

BEYOND THE LIMITS

Modeling the character of human development reveals that by continuation of the former character of development, even with the technological progress and expansion of the resources, possible limits of growth will be exceeded and welfare indicators will catastrophically decline already in this century

The consequences can include the decline of industrial production and availability of food, as well as decrease of population

Especially in recent decades when advanced industrial culture was associated with the development of the consumer society and it was introduced into human consciousness in relation to the idea of growth which always continues



Society tends to reject the option of restrictions and is trying to substitute it with a possible fight for improvement of technologies and development of free market



However, modeling of society growth reveals that the current human development path itself is exhausted:

- **If the world's population, industry, pollution, food production and resource consumption growth trends will continue, the limits of our planet will be reached in about next hundred years**
- **There is a possibility to reduce the growth trends and to create the conditions of the environment and economic stability which could be balanced also for more distant future**
- **Existence of balanced and sustainable society is technically and economically feasible – it requires not only productivity and technologies, but also maturity, compassion and wisdom**

CONCEPT OF SUSTAINABLE DEVELOPMENT

Concept of sustainable development includes physical conditions, political concept, the concept of quality of life and well-being and optimized impact on the environment to ensure that the resources are equally available to all generations

Concept is based on the understanding of three major concepts: development, needs of society and needs of future generations

Not only short-term processes (to ensure the needs of the present) are considered, but also provision of equal opportunities between the generations

Truly sustainable society would be one that could exist forever



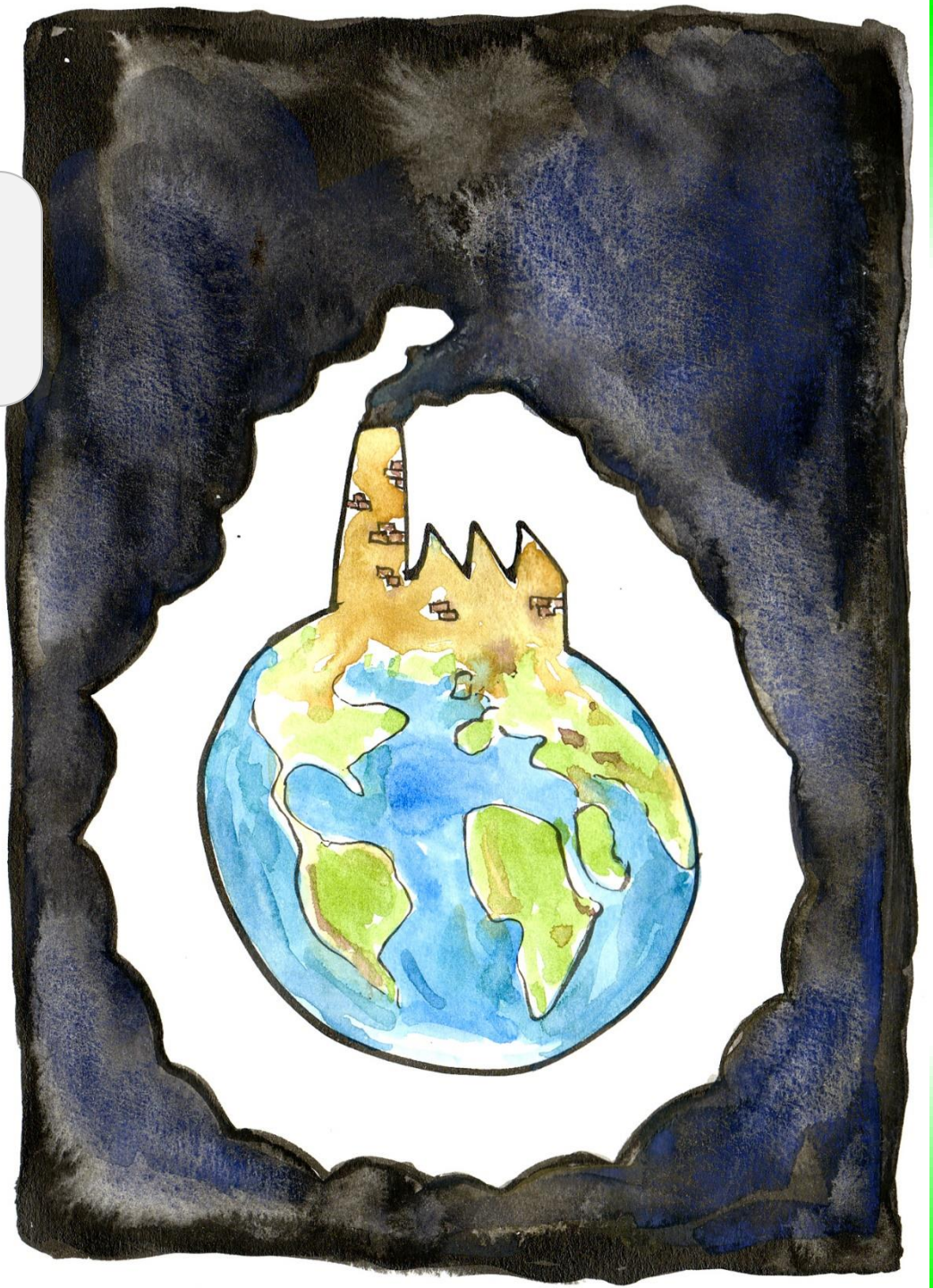
In reevaluation of society development concept the major role plays the understanding of the impacts of human development on the environment, therefore, there are several reasons why existing community development models need to be reestimated, for example:



- **Development, especially in Western society, is understood as human domination over the nature**
- **In the dominant development model of Western societies the top priority is economic growth**
- **Development of the society, which is based on increasing the use of resources, will inevitably lead to the depletion of resources**
- **Consumer society development model ignores the fact that the production that overspends resources and degrades the environment, but also provides a high-level life in the richest countries of the world, all over the planet is not possible**
- **Development of current Western society is based on the understanding that the development and growth are not limited**

Due to production and consumption development in the last decades environmental problems have changed:

- **Sources of environmental pollution – point or diffuse**
- **The scale of environmental problems – local, regional or global**
- **The degree of environmental pollution problems – simple or complex**
- **Continuation of environmental problems – short-term or long-term**



FRAMEWORK OF SUSTAINABLE DEVELOPMENT



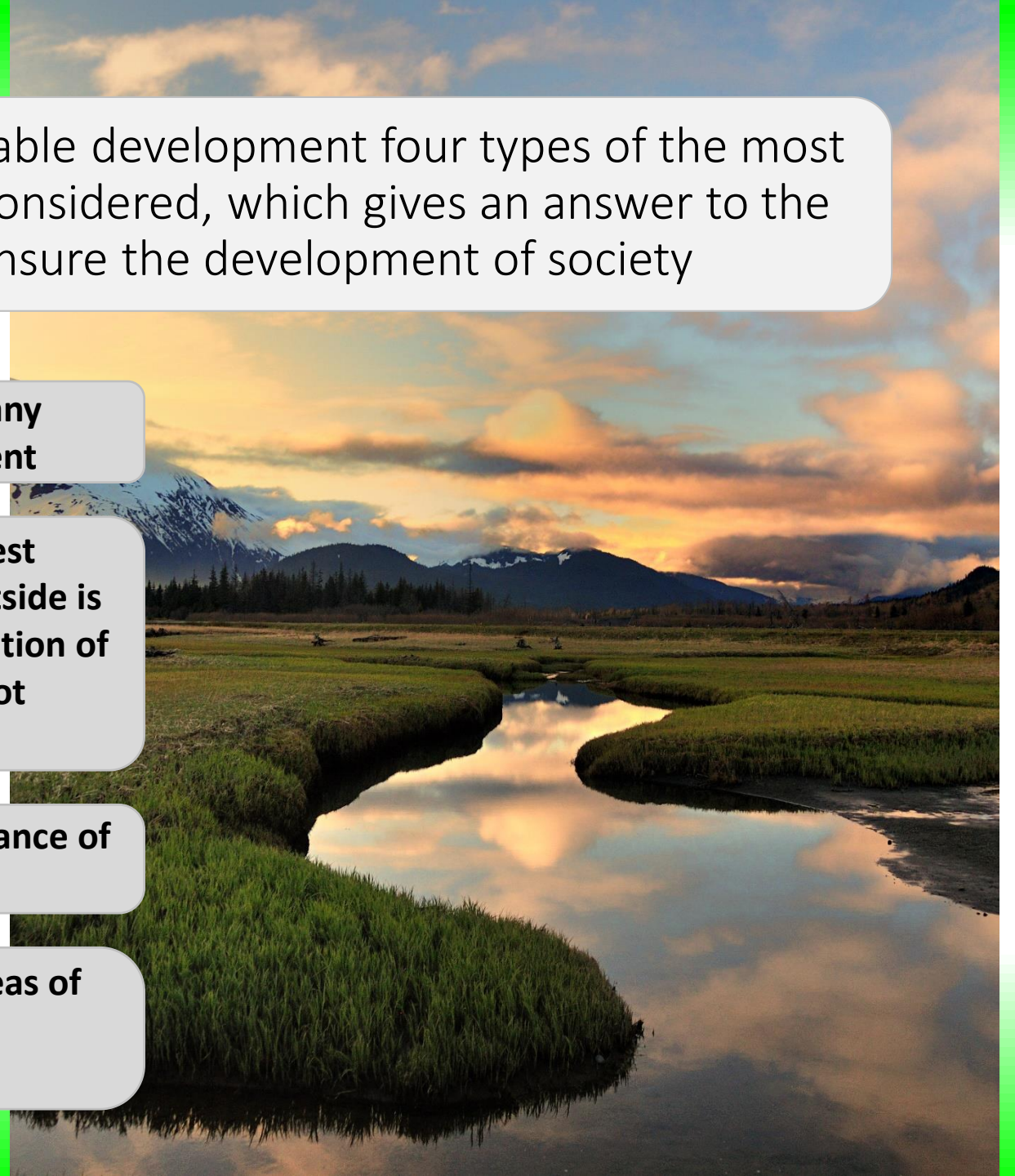


The main challenges of sustainable development:

1. **Conservation of resources – ensuring the availability of resources not only for current, but also for future generations**
2. **Balanced development of human-made and natural environment**
3. **Development of society for provision of acceptable environmental quality by discontinuing or limiting the processes that degrade the environment**
4. **Social equality**
5. **Participation of society in public, governmental and environmental management to ensure support for sustainable development**
6. **During the implementation process of sustainable development the changes regarding values must be implemented**

Within the basic principles of sustainable development four types of the most important sustainability should be considered, which gives an answer to the question «**How to do it?**» to ensure the development of society

- 1. Diversity is considered as a necessary condition for any system (including the society) for further development**
- 2. Subsidiarity means all possible functions at the lowest possible level of administration; assistance from outside is desirable only if it is contributing to the implementation of a certain function, but at the same time, if it does not dangerously reduce subsystem autonomy**
- 3. The principle of cooperation emphasizes the importance of horizontal, non-hierarchical mutual interaction**
- 4. The principle of participation corresponds to the ideas of democracy and it is the basis for the diversity of approaches**



Thank you
for the attention!

