

INTERNATIONAL ECONOMIC RELATIONS AND NATIONAL ECONOMY MANAGEMENT

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ATTAINMENT OF THE GLOBAL SUSTAINABLE DEVELOPMENT MODEL THROUGH THE BREAK OF THE VICIOUS CIRCLE: POVERTY – ENVIRONMENTAL PROBLEMS – POVERTY

The article is devoted to the determination of the cause-and-effect relationship between poverty and poor ecology on a world scale and the identification of the way to overcome both of the specified issues in order to achieve global sustainable development. The indicators of environmental problems in the world are analyzed, the correlation between environmental problems and poverty issues is shown, the environmental effectiveness of developed and developing countries is compared. It is identified how the developed countries are helping to solve the problems of poverty and ecology of the developing countries, and the reasons for the lack of success of the mentioned efforts are determined. The paper argues that poverty and environmental problems can only be effectively addressed through technology transfer, especially green technology.

Keywords: environmental problems, sustainable development, poverty, green economy, technology.

Introduction and problem statement. The UN report of 1991 stated that the real purpose of the development is to expand people's opportunities to choose. This envisages an opportunity to live a long, healthy and creative life, including political freedom, guaranteed human rights and self-respect¹. It has long been proven that human health is directly dependent on ecology. In 2019 the UN published the first for the last 5 years full environmental assessment report². As noted in the paper, since the publication of the first report in 1997 a number of environmental problems have been solved, but in general the overall state of the environment continues to deteriorate. The irrational model of production and consumption in most countries and climate change are often the reasons³. The unresolved environmental problems mean that society has not

¹ United Nations Economic Commission for Europe (2017). *Guide on Poverty Measurement*. New York and Geneva, 3-4. *UNECE*. <<http://www.unece.org/fileadmin/DAM/stats/publications/2018/ECECESSTAT20174.pdf>> (2020, March, 15).

² Программа Организации Объединенных Наций (2019). *Глобальная экологическая перспектива. ГЭП 6. Резюме для директивных органов*. Найроби, 5. *Green Growth Knowledge Platform*. <https://www.greengrowthknowledge.org/sites/default/files/GEO6SPM_RU.pdf> (2020, March, 15).

³ Программа Организации Объединенных Наций (2019). *Глобальная экологическая перспектива. ГЭП 6. Резюме для директивных органов*. Найроби, 7. *Green Growth Knowledge Platform*. <https://www.greengrowthknowledge.org/sites/default/files/GEO6SPM_RU.pdf> (2020, March, 15).

achieved a model of sustainable development whereby the needs of present generations are met without sacrificing the ability of future generations to meet their own needs.

Nowadays, there is an increase in the world's population among the major environmental problems. According to the UN data, in 1950 the population was 2.6 billion, in 1987 – 5 billion, in 1999 – 6 billion¹, in 2018 – 7.5 billion, projected for 2050 the population of the planet will already be 10 billion, and in 2100 – 11 billion². The fastest population growth is observed on the African continent. The population of sub-Saharan Africa is expected to double by 2050³. Researchers attribute population growth to increasing environmental footprint. In parallel with the growth in population, the pace of urbanization is increasing. Urban development in fact historically accompanies the economic development in a market environment. At the same time, urbanization, and especially metropolitan areas, brings with it a number of environmental problems, since large cities concentrate all kinds of environmental pollution.

The extinction of biological species, reduction of genetic diversity, decrease of ecosystem stability, and food problem are also destructive for our environment and society. Another fact stands out contrary to this fact: species have always died out. Evolutionary biologist Gerardo Ceballos after investigating the extinction of mammal species in different epochs, concluded that in the past during every 100 years 1.8 species have died out for every 10,000 species. When comparing these indicators with extinction rates over the last 500 years, it has been found that the rate of extinction of species has increased by about 53 times compared to the natural background level and continues to rise. From 1900 one would expect extinction of 9 vertebrate species, but in fact at least 477 of their species have died out⁴.

The environmental problems of the oceans and coastal regions are warming and ocean acidification, ocean pollution, growing use of the ocean and coastal zone for production, transportation, recreation, mining, and energy production. As a result, marine ecosystems are lost, coral reefs die⁵.

Climate change, namely global warming, air pollution, reducing forest area, soil degradation and desertification are another well-known global environmental problems. Some experts point out that while maintaining the CO₂ trajectory at the current level and in the absence of radical measures to mitigate the effects of climate change, the average temperature on the Earth will increase by 4 °C – 6.1 °C by 2100 compared to the start of the Industrial Revolution, and if all countries fulfill the commitments they made under the Paris climate agreement of 2015, then by at least 2.6 °C⁶. In turn, it is established that air pollution leads to 6–7 million cases of premature deaths, as well as to an increase in the population morbidity, especially in cities⁷. However, the most important property of forests is the ability to absorb carbon dioxide and release oxygen into the air. Furthermore, reducing forests means not only the increase of the carbon dioxide in the air, but also the absence of many species of plants and animals, and lead to further soil degradation and desertification. It is stated that 29 % of world land area are primarily manifested in soil degradation⁸.

The global environmental problem of fresh water is closely linked to the problems mentioned above. Approximately 1.4 million people die each year from infections caused by pathogenic water pollution. Water pollution affects the endocrine system and leads to infertility. Antibiotic-resistant bacteria are found in fresh

¹ Организация объединенных наций (2020). *Народонаселение*. <<https://www.un.org/ru/sections/issues-depth/population/index.html>> (2020, March, 15).

² Программа Организации Объединенных Наций (2019). *Глобальная экологическая перспектива. ГЭП 6. Резюме для директивных органов*. Найроби, 9. *Green Growth Knowledge Platform*. <https://www.greengrowthknowledge.org/sites/default/files/GEO6SPM_RU.pdf> (2020, March, 15).

³ Организация объединенных наций (2020). *Народонаселение*. <<https://www.un.org/ru/sections/issues-depth/population/index.html>> (2020, March, 15).

⁴ Ceballos, G., Ehrlich, P. R., Barnosky and others (2015). Accelerated modern human-induced species losses: Entering the sixth mass extinction. *Science Advances*, 1 (5). doi: 10.1126/sciadv.1400253.

⁵ Программа Организации Объединенных Наций (2019). *Глобальная экологическая перспектива. ГЭП 6. Резюме для директивных органов*. Найроби, 13. *Green Growth Knowledge Platform*. <https://www.greengrowthknowledge.org/sites/default/files/GEO6SPM_RU.pdf> (2020, March, 15).

⁶ McKinnon, C. (2019). Climate crimes must be brought to justice. *The UNESCO Courier*, 3. <<https://en.unesco.org/courier/2019-3/climate-crimes-must-be-brought-justice>> (2020, March, 15).

⁷ Программа Организации Объединенных Наций (2019). *Глобальная экологическая перспектива. ГЭП 6. Резюме для директивных органов*. Найроби, 10. *Green Growth Knowledge Platform*. <https://www.greengrowthknowledge.org/sites/default/files/GEO6SPM_RU.pdf> (2020, March, 15).

⁸ Ibid, 15.

water around the world; it happens owing to the presence of antibiotics in the freshwater sources that get there because of the water cycle in nature through domestic wastewater. A particular issue is the shortage of drinking water in many parts of the world¹.

Having outlined the major global environmental problems of our time, we want to pay attention to such issues as what part of the mankind is most affected by these problems, on whom and to what extent bears the anthropogenic blame for environmental problems, and who and how can solve the environmental problems of the mankind.

Analysis of recent research and publications. Most international organizations' reports on environmental threats indicate that the most environmentally vulnerable category is poor people from developing countries. Poverty does not allow a person to fully participate in public life, which means vulnerability to violence, living in disordered and dangerous places without access to clean water and sanitation². Today's globally agreed poverty threshold is 1.90 US dollars per day on purchasing power parity (PPP). The UN report of 2017 stated that 760 million people live below the poverty line in the world³.

We should mention Thomas Malthus and his work, "An Essay on the Principle of Population" of 1798, the only limit to the reproductive capacity of plants and animals is the mere fact that, when reproducing, they mutually deprive themselves of their means of subsistence. As Malthus points out, the destructive barriers to population reproduction by their nature are very diverse. These include all causes that reduce the natural life expectancy of a human being. These obstacles include harmful to health occupations, hard overtime work, extreme poverty, poor nutrition for children, unhealthy living conditions in big cities, all kinds of redundancy, disease, epidemics, war, famine⁴.

At the same time, numerous UN reports indicate that there is no greater task for the world community than the fight against poverty in all its manifestations. While the poor are recognized as the most affected by bad ecology, there has recently been a trend to find the roots of the world's environmental challenges in the problem of poverty. More frequently environmentalists say that poverty is one of the causes of a number of environmental problems. Since the 1970s, most experts have agreed that poverty and environmental degradation are inextricably linked. The World Commission on Environment and Development noted (1987): "Poverty is a major cause and effect of global environmental problems". It is therefore futile to attempt to address environmental problems without a broader perspective that encompasses the factors underlying world poverty and international inequality⁵.

For the first time, the problems of poverty and the environment were linked in 1974 at the Stockholm UN Conference. Then Indira Gandhi stated that population growth and lack of access to land are putting pressure on poor people and forcing them to increase the environmental exploitation of the suburbs. This process leads to degradation of resources and, in the long run, to impoverishment and endangers the lives of many people. According to the report of the United Nations Development Program of 2014, most of the poor live in areas affected by environmental degradation, while in a number of cases they themselves play a crucial role in the destruction of their environment. Poor people have no choice but to haphazardly exploit natural resources⁶.

UN notes that poverty reduction should be considered as a global public good, since high levels of poverty and significant inequality are associated worldwide with social problems, human rights and dignity violations (illegal migration), public health issues (the spread of infectious diseases through the unsanitary

¹ Программа Организации Объединенных Наций (2019). *Глобальная экологическая перспектива. ГЭП 6. Резюме для директивных органов*. Найроби, 16. *Green Growth Knowledge Platform*. <https://www.greengrowthknowledge.org/sites/default/files/GEO6SPM_RU.pdf> (2020, March, 15).

² United Nations Economic Commission for Europe (2017). *Guide on Poverty Measurement*. New York and Geneva, 3–4. *UNECE*. <<http://www.unece.org/fileadmin/DAM/stats/publications/2018/ECECESSTAT20174.pdf>> (2020, March, 15).

³ United Nations Economic Commission for Europe (2017). *Guide on Poverty Measurement*. New York and Geneva, 5. *UNECE*. <<http://www.unece.org/fileadmin/DAM/stats/publications/2018/ECECESSTAT20174.pdf>> (2020, March, 15).

⁴ Malthus, T. (1798). *An Essay on the Principle of Population*. London. *The Electronic Scholarly Publishing Project*. <<http://www.esp.org/books/malthus/population/malthus.pdf>> (2020, March, 16).

⁵ Forsyth, T., Leach, M., Scoones, I. (1998). *Poverty and Environment: Priorities for Research and Policy. An overview study*. Sussex BN1 9RE, Falmer: Institute of Development Studies, 5.

<http://eprints.lse.ac.uk/4772/1/Poverty_and_environment-priorities_for_research_and_study.pdf> (2020, March, 16).

⁶ Нищета в человеческом обществе. *Pars Today*. <<http://parstoday.com/ru/radio/programs-i71258>> (2020, March, 16).

living conditions of the poor and marginalized groups), environmental problems (environmental degradation and exploitation of natural resources), and political instability, confrontation and violence¹.

As Eric Reinert points out, since the fall of the Berlin Wall in 1989 the world economic order has been subordinated to economic theory, which proves the exact opposite of what we see in practice. Free international trade is projected to narrow the income gap between the population of poor and rich countries. It is assumed that if mankind does not interfere in the activity of natural forces of the market, that is, apply the principle of laissez-faire, economic harmony and progress will prevail in the world. At the same time, Reinert highlights that the current state of the world economy is marked by the fact that the gap between the rich and the poor has not narrowed and the ecological catastrophe is approaching. The author notes that the mankind seems to have forgotten how rich countries had enriched. International organizations and developed countries are trying to solve the problem of poverty in third world countries by “destroying charitable colonialism that allows rich countries to maintain their power over the poor”. Reinert also notes that all developed countries have become rich because for decades and centuries their power and ruling elite have invested in the development of dynamic industries and services, in which technological advances have been concentrated. Thus, they created rents (profits that exceed the normal level of income) that extended to capitalists in the form of higher profits, to workers in the form of higher wages, and to the government in the form of higher tax revenues. In essence, colonialism is a system that seeks to prevent these effects from developing in colonies. Colonies (poor countries) specialize in activities for which at least one of the following features is typical: declining rather than increasing returns; they lack the capacity to accumulate knowledge and technical experience; the results of this accumulation, instead of leading to the wealth of the country itself, lead to lower prices for its products for buyers from many countries².

In the modern world, ways of solving environmental problems of the mankind to achieve sustainable economic development with environmentally-efficient use of resources and resolution of the problem of poverty on Earth remain indeterminate. Instead, the recipe for a parallel solution to the environmental and economic problems of the mankind has already been invented; it is a green or circular economy based on four principles: reduction, reuse, recycling of materials, social corporate responsibility. Although the term “green economy” was introduced relatively recently (in 1989), and green economic policy measures were recommended by the UN in 1992 at the conference in Rio de Janeiro, developed countries are already making significant strides in their implementation. The problem remains that in the context of the global world, where environmental problems are also global in nature, the green economy is currently the privilege of developed countries, while environmental problems are largely concentrated in poor developing countries. Developed countries are donors of innovative green products for poor countries, but it is a help in addressing the effects of environmental inefficiency, not a way to solve the problem.

The purpose of the article. The purpose of our research is to identify the causal link between poverty and environmental issues in order to find the way of effective assistance from developed countries to poor developing countries based on the identification of errors in the current mechanism of their interaction.

Research results and discussion. Consider the first of the mentioned above environmental problem – increasing the planet’s population – on the basis of the ranking of countries with the highest population growth in the ratio of GNP per capita in these countries (Table 1).

As we see from Table 1, not all countries with the highest population growth rates can be attributed to poor countries. According to the World Bank methodology, countries with GNI per capita below 1025 US dollars are considered poor. However, Equatorial Guinea, Angola, Zambia, Tanzania are characterized by an uneven distribution of income, and therefore by a large proportion of the poor. The Maldives lives mostly at the cost of tourism and the number of people below the national poverty line does not exceed 16%. Therefore, the high birth rates here, as in the rich countries of Bahrain and Oman, are largely driven by cultural specificities and traditions and do not lead to other environmental problems. Thus, according to the World Bank methodology, 8 (53.3%) of the 15 countries with the highest population growth rate are poor countries, and 4 more (26.6%) have a high degree of income distribution inequality and a large proportion of the poor people. 12 of the above mentioned 15 countries are from Sub-Saharan Africa, the other 3 are Asian.

¹ Стратегия ЮНЕСКО в области развития и ликвидации нищеты 2000. (Организация Объединенных Наций по вопросам образования, науки и культуры). *UNESCODOC Цифровая библиотека*. <https://unesdoc.unesco.org/ark:/48223/pf0000120547_rus> (2020, March, 16).

² Райнерт, Э. (2017). *Как богатые страны стали богатыми, и почему бедные страны остаются бедными*. Москва: Высшая Школа Экономики (Государственный Университет). <http://loveread.ec/view_global.php?id=75411> (2020, March, 16).

Table 1

Population growth rate and GNP per capita in the countries of the world

Rank	Country	Population Growth Rate % (2019)	GNP per capita \$ (2018)
1	Bahrain	4,31	24050
2	Niger	3,82	414
3	Equatorial Guinea	3,66	10261
4	Oman	3,59	16415
5	Uganda	3,59	642
6	Maldives	3,45	10330
7	Angola	3,29	3432
8	Democratic Republic of the Congo	3,22	562
9	Burundi	3,15	272
10	Chad	3,04	728
11	Mali	2,99	899,7
12	Tanzania	2,97	1050,7
13	Gambia	2,94	716
14	Zambia	2,93	1540
15	Mozambique	2,90	499

Source: Generalized by the authors based on United Nations¹, TheWorld Bank²

Population growth is occurring in parallel with urbanization. The world's rural population has been growing slowly since 1950 and is expected to reach its maximum level of just over 3 billion, while the urban population is rising rapidly from the same year: from 746 million to 3.9 billion people in 2014. Due to this continuous growth of population and urbanization, the world's urban population is projected to increase by 2.5 billion. Almost 90 percent of the growth will be in Asia and Africa³.

It should be noted that large cities in developing countries are most often characterized by a high degree of pollution. We use one of the existing urban pollution indices (Table 2), which is an estimate of the overall pollution in the city. The greatest weight is given to air pollution, then to water pollution / accessibility, two main pollution factors. Low weight is given to other pollution types.

As Table 2 shows, the most polluted city is the European city, but most of the world's most polluted cities are located in Asia. However, we should point out that the situation in the ranking is still constantly changing. In particular, the number of Chinese cities has been significantly reduced in the list of polluted cities in the world. For instance, in 2014 the Chinese city of Xi'an ranked 3rd place in the world by the rate of pollution, Guangzhou ranked 8th, Beijing ranked 14th, Shanghai ranked 21st. Not many cities in Africa make the list of the most polluted except Accra. Nevertheless, other problems are exacerbated in African cities, and although not all of them are listed as the cities with most polluted water and air but researchers have repeatedly noted the negative features of urbanization in Africa. There are problems with the recycling of waste in many cities (there are no refuse factories in Senegal, all of Dakar's garbage is taken to a single landfill, etc), slums occur in cities.

¹ United Nations (2020). *Population Division. World Population Prospects 2019*.

<<https://population.un.org/wpp/Download/Standard/Population/>> (2020, March, 20).

² The World Bank (2020). *GDP per capita (current US\$)*. <<https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>> (2020, March, 20).

³ United Nations (2016). *United Nations Conference on Housing and Sustainable Urban Development (Habitat III) Regional Report on Housing and Urban Development in the Economic Commission for Europe Region: Towards a City-Focused, People-Centred and Integrated Approach to the New Urban Agenda 2016 (United Nations)*. <<https://undocs.org/en/A/CONF.226/10>> (2020, March, 20).

Table 2

Pollution Index by City 2020

Rank	City	Pollution Index
1	Tetovo, Macedonia	97.33
2	Kabul, Afghanistan	96.61
3	Faridabad, India	95.98
4	Kathmandu, Nepal	95.65
5	Accra, Ghana	94.93
6	Ghaziabad, India	94.51
7	Dhaka, Bangladesh	94.07
8	Ulaanbaatar, Mongolia	93.75
9	Noida, India	92.92
10	Beirut, Lebanon	92.85

Source: NUMBEO¹

Nowadays from 900 million to 1.6 billion people worldwide live in slums (it is 1/4 of the world's urban population). Experts note that by 2030, the 1 of 4 people on the planet will live in urban slums or other informal settlements. Today's biggest slums are Khayelitsha in Cape Town (South Africa) 400,000; Kibera and Nairobi (Kenya) 700,000; Dharavi and Mumbai (India) 1,000,000; Neza (Mexico) 1,200,000; Orangi Town and Karachi (Pakistan) 2,400,000². The main problems of slums are shortage of quality water, unsanitary conditions (including the absence of toilets), unemployment, crime, absence or lack of schools. Improper water supply, sanitation and hygiene are important factors in increasing the burden of neglected tropical diseases, which affect more than 1.5 billion people every year. 842,000 diarrheal deaths can be prevented annually thanks to improved water supply, sanitation and hygiene. WHO estimates that more than 340,000 children under the age of five die from diarrheal diseases every year due to poor sanitation, improper hygiene or lack of safe drinking water, that is nearly 1000 children per day³.

Not only urban poverty is a source of environmental threats, rural poverty leads to problems of a different nature. The deficiency of economic benefits for rural people pushes them to find a means of survival, usually at the expense of nature. Currently, Madagascar mahogany is in danger. Many of them grow in underdeveloped areas, such as the northeastern Sava region, where logging is one of the few sources of income. Loggers make from two to three dollars a day, cutting down two trees a day. Truly, not loggers make money on the mahogany. The final price of 1 ton of redwood is 20-25 thousand US dollars. In 2013 rare wood (mainly red) was illegally exported from Madagascar for the sum of 250 to 300 million US dollars. Massive deforestation, which is fostered not only by felling but also agriculture, is demonstrable. There is evidence that 80 percent of Madagascar's forest lemurs have disappeared⁴.

By the mid-1980s, deforestation rate in Bangladesh was 8,000 hectares per year. The main causes of deforestation are: industrialization of the country, high speed of urbanization, population growth, livestock grazing, increase in sown areas and farmlands, fires, uncontrolled and commercial logging. Thus, almost half of the forest areas are used for various types of non-forest use. 50% of destruction of forests over the last

¹ NUMBEO (2020). *Current Pollution Index* <https://www.numbeo.com/pollution/rankings_current.jsp> (2020, March, 20).

² Kibera, K., Kibera, N. (2017) The World's Largest Slums: Dharavi. *Habitat for humanity* <<https://www.habitatforhumanity.org.uk/blog/2017/12/the-worlds-largest-slums-dharavi-kibera-khayelitsha-neza/>> (2020, March, 20).

³ Всемирная организация здравоохранения (2015). *Доклад ВОЗ/ЮНИСЕФ по доступу к воде и санитарии*. <https://www.who.int/water_sanitation_health/monitoring/jmp-2015-key-facts/ru/> (2020, March, 20).

⁴ Sharife, K., Maintikely, E. (2018) Гибель редких мадагаскарских лесов. *OCCRP*. <<https://www.occrp.org/ru/investigations/8480-the-fate-of-madagascar-s-endangered-rosewoods>> (2020, March, 20).

20 years has led to degradation of the soil cover. Also, the use of non-renewable resources in production has a detrimental effect on the ecology, damaging the environment¹.

Without forests, water from melted snow and rain quickly flows into streams and rivers, blurring the soil and forming gullies, and causing flooding downstream. Moisture, when entering the rivers, almost does not evaporate back into the air, as a result of which droughts often begin. Syria in 2006–2011 experienced one of the worst droughts of recent centuries. According to the Peace and Climate Institute report, over 60% of Syria's agricultural land has been destroyed over the years. According to the UN estimates, in 2011, Syrian livestock farmers lost 85% of their livestock. In another report, the UN estimates that more than three million Syrians suffer from absolute poverty through drought and famine².

When poor people are directly asked about poverty, in the majority of cases they identify the lack of access to water as one of the key causes of poverty and improving access to water as one of the top priorities in reducing poverty³.

Examples similar to the above mentioned can continue to be given almost infinitely. Poverty leads to the irrational use of natural resources, which worsens the environmental situation and, as a consequence, to even greater poverty. 75% of the effects of environmental problems lie on developing countries. Currently, these countries are in the last places in the ranking of the Environmental Performance Index (a combined indicator of the Center for Environmental Policy and Law at Yale University, which measures the country's achievements in view of environmental situation and management of natural resources: 1st place in the ranking shows the highest index, the best result). Figure 1 shows the 10 countries with the lowest and 10 countries with the highest Environmental protection scores. As can be seen from the figure, the lowest indices are in poor developing countries.

Thus, the greatest advances in natural resource management and environmental support are observed in developed countries where there are currently no excessive environmental problems, in particular, because of that Western TNCs have moved a number of polluting industries to other countries in due time. Developed countries are actively moving to the green economy. The world's first wood-based renewable diesel plant has been commissioned in Lappeenranta, Finland. Renewable diesel, produced at this plant, reduces greenhouse gas emissions by up to 80% compared to traditional diesel⁴.

Waste recycling plants on green technology are being actively created in developed countries. In rich countries about 70% of domestic and industrial waste water is recycled, in middle-income countries it is up to 40%, and in poor countries it is practically not processed. It is obvious that innovation, namely green innovation, contributes to solving environmental problems. Meanwhile, in the period from 2007 to 2017 all international patent applications for green energy technology in the world were distributed as follows: Japan – 29%, USA – 21%, Germany – 12%, Republic of Korea and China – 6%, France – 4%, Netherlands – 3%, Canada and the United Kingdom – each at 2%, Switzerland – 1%⁵. With the origin of other green innovations, the situation in the world is similar. However, it should be noted that developed countries often transfer eco-innovations to poor developing countries free of charge. Bill Gates, having quit his job at Microsoft in 2008, to pursue philanthropy more, began traveling actively to poor countries with his wife. The couple was impressed and over the last 7 years Bill and Melinda Gates spent 200 million US dollars for research and development of non-sewage refinery facilities⁶.

¹ Алам, М. Ш. (2013). Экосоциальные проблемы развития Республики Бангладеш. *Вестник Российской государственной академии гражданской защиты*, 5, 90–95. <<http://journals.rudn.ru/ecology/article/viewFile/12352/11782>> (2020, March, 23).

² Pars Today (2017). *Нищета в человеческом обществе*. <<http://parstoday.com/ru/radio/programs-i71258>> (2020, March, 16).

³ Harvey, P. (2008). Poverty Reduction Strategies: opportunities and threats for sustainable rural water services in sub-Saharan Africa. *Progress in Development Studies*, 8 (1), 115-128. doi: 10.1177/146499340700800110.

⁴ Biowatt (2020). *Энергетические леса как способ производства биомассы* <<http://www.biowatt.com.ua/informatsiya/energeticheskie-lesa-kak-sposob-proizvodstva-biomassy/>> (2020, March, 24).

⁵ Leon, L. R., Bergquist, K., Wunsch-Vincent, S., Xu, N., Fushimi, K. (2018). Economic Research Working Paper No 44. Measuring innovation in energy technologies: green patents as captured by WIPO's International Patent Classification (IPC) green inventory. *WIPO*. <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_econstat_wp_44.pdf> (2020, March, 24).

⁶ Bordunova, Y. (2018). 6 причин, почему Билл Гейтс инвестирует в туалеты. *Bit-UA* <<https://bit.ua/2018/11/pochemu-bill-gejts-investiruet-v-tualety/>> (2020, March, 24).

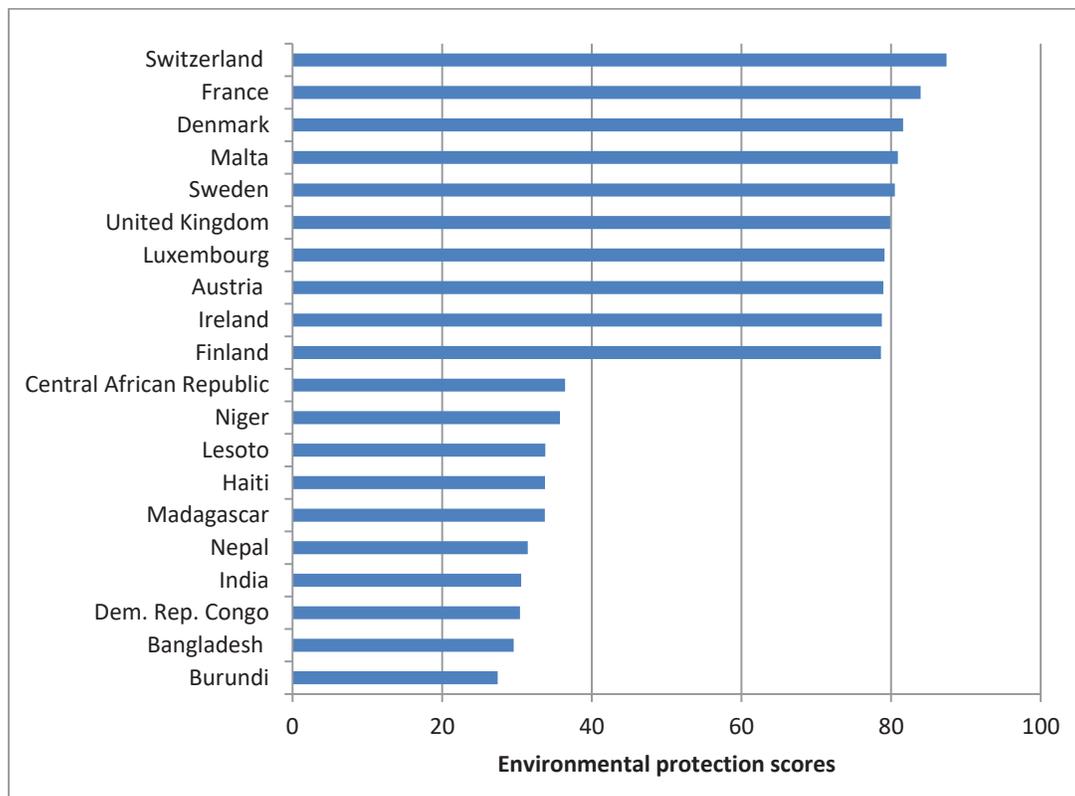


Fig. 1. Environmental protection scores by country

Source: Developed by the authors based on Environmental Performance Index¹

The US Patent and Trademark Office has launched the program “Patents for Humanity”, which awards those innovators who are able to ensure the use of technologies that change the lives for the better for the benefit of the needy. Contestants submit applications, describing how they use patented technology for the benefit of disadvantaged groups of people, in five nominations, that meet five broad categories of humanitarian needs: medicine, nutrition, sanitation, energy, and standard of living².

Conclusions. There is a close correlation between the environmental problems of the mankind and poverty. On the one hand, poverty is the cause of inefficient production, pollution and depletion of the environment, and on the other hand, the poorest population suffers most from environmental problems. The economic potential of poor developing countries is not enough to address environmental and social problems. Resolution of the problem of poverty and environmental issues is a kind of public good for which developed countries have paid for decades.

Traditional methods of monetary and humanitarian aid, even with the help of green technology products, do not fundamentally solve the problem. The idea that aid to poor countries is hurting them more quickly starts being intensified in the world community (in 2015 Angus Deaton becomes the Nobel Prize winner in Economics “for his analysis of consumption, poverty and welfare”, who justifies this fact). The invention and implementation of green technologies require enormous investment and a scientific and infrastructure base that is missing in poor countries. Therefore, the question arises who and at whose expense should solve the environmental problems of such countries, since the single donation of green innovations from rich countries to poor countries does not fundamentally solve the environmental problems.

¹ Environmental Performance Index (2018). *Results*. <<https://epi.envirocenter.yale.edu/2018/report/category/hlt>> (2020, March, 24).

² Эллиотт, Э. (2017). Патенты для человечества: повышение качества жизни людей всей планеты. *WIPO*. <https://www.wipo.int/wipo_magazine/ru/2017/02/article_0003.html>(2020, March, 24).

Nowadays technology transfer in the world is carried out in many forms and allows for both commercial and free options. However, in the light of market economy principles and experience, we do not believe that free technology transfer is capable of reaching levels that are not just to “patch holes” in the environment of poor countries, but it can provide a background for the development of production based on efficient technology, that will lead to an increase in the GDP of countries, a rise in income, a solution to the problem of poverty and, as a consequence, addressing the environmental issues. The problem is finding ways of the above-mentioned effective technology transfer, since it is obvious that we will have to start from the stage of establishing an effective education system in poor countries. In this regard developed countries have a choice whether to continue to provide bogus aid to developing poor countries, or to try to help break the “poverty – environmental problems – poverty” circle through the transfer of green technology and to achieve sustainable development model worldwide.

It is interesting to mention the experience of countries in the Asia-Pacific region, where in less than 20 years (from 1990 to 2008) the total GDP of the countries has almost doubled. This fact is caused by a number of reasons, one of which is a particular model of development based on the concept of “catching up with economic development”. Japan is the leader. Each previous number of countries of the region according to the development leads the following countries through the transfer of technology and know-how, direct investments, ensuring export markets. Meanwhile, those industries that were key yesterday in the country or countries of the previous line, today are moving to the countries of the next. The previous line of countries goes further, developing higher-level manufacturing. This maintains the dynamism of the entire region. We order to realize such a development concept, it is important to have international economic integration within the region.

In principle, there are now fairly effective international integration entities in every region of the world. In the Asian region, in particular, ASEAN, SAARC, APEC, in the African continent – ECOWAS, CEMAC, COMESA, SADK and others. The experience of China in technological development is interesting. Thus, the country’s openness as a “world factory” to the global economy allowed to gain technological experience from TNCs and a number of positive results, on the other hand, China’s problems became over-dependence of the labor market on conditions in the global market, increase in population income inequality, pollution of the environment, including the loss of already scarce agricultural land and over-dependence on imported food, low quality of life index. The fact of China’s technological success is very well attested by the imposition of import duties on Chinese goods by the US and accusations Beijing by the US side of infringement of intellectual property rights. China’s negative environmental experience and the enormous current costs of structural reforms and environmental restoration testify that while any technology is conducive to production, only green technology immediately contributes to sustainable development.

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