JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS

VOLUME 04, ISSUE 11
MOPNTHLY JOURNALS

ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08

ENVIRONMENTAL PROBLEMS OF DESERTIFICATION IN THE MODERN WORLD

Madraim Khasanovich Sarikulov

Associate Professor, Almalyk State Technical Institute,

Almalyk, Uzbekistan sarikulov.madraim4@gmail.com

Abstract: This article examines the environmental challenges of desertification in the modern world. It examines the problems of well-known deserts, which are common in Africa and Asia, as well as other regions of the globe. The article also highlights the problems associated with the spread of droughts, which consume large areas and lead to economic decline in these regions. Furthermore, desertification is considered in the context of its negative impacts and consequences, such as droughts that contribute to the deterioration of soil fertility and lead to reduced crop yields. These negative factors collectively pose a threat to food security, which in turn increases the risk of hunger and malnutrition.

Keywords: Desertification, population migration, paleodesert, ecosystem crisis, blue planet, land degradation, natural factors, Sahel region, Gobi Desert, soil erosion, poverty and social conflict, food shortages, ecological balance.

INTRODUCTION

It should be noted that one of the dangers threatening modern civilization and humanity is an environmental catastrophe with its many components, including global climate change and drinking water shortages. At the current stage of human development, humanity is faced with perhaps the most pressing problem: how to preserve nature and civilization, since no one knows when and in what form an environmental or other catastrophe might occur in the modern world.

In the context of environmental disasters, I would like to draw public attention to desertification in the modern world as one of the negative factors of our time. In recent years, global warming has increased worldwide. It is no secret that climate change may lead to a reduction in renewable water resources. Water shortages can negatively impact the provision of water supply and sanitation services and affect human health. Furthermore, water shortages can trigger desertification of vast territories, which in turn may lead to migration flows from arid regions.

LITERARY RESEARCH

The modern world is characterized by accelerated technological advances and the introduction of highly productive technologies for the production of material goods, as well as the creation of comfortable living conditions for the population. Meanwhile, alongside the introduction of highly productive technologies, the downsides of these achievements are beginning to emerge. In this regard, I would like to draw attention to the negative aspects of these advantages. In particular, one of the negative aspects of these achievements is considered to be humanity's inability to obey the laws of the biosphere. It is precisely these wrong actions committed by humanity that can lead to an unpredictable abyss, that is, Man's desire to dominate Nature. This, in turn, can have a detrimental effect on the existence of the human population.

The main cause of ecosystem crises is the unlimited human material desires, coupled with limited means of satisfying these needs. Just 30-40 years ago, no one had heard the word

"ecology"; only so-called philosophers discussed environmental problems, but their "cry" was not taken seriously. A little later, it became clear that huge garbage dumps, dirty water, and dirty air had already become a global problem. It was discovered that all spheres of the planet were under threat.

Source [1] provides information on the world's most famous deserts, which formed as a result of natural processes operating over long periods of time. For much of this time, deserts expanded and contracted independently of human activity. Paleodeserts are large sand seas that currently experience no noticeable change due to their stabilization by vegetation. Some paleodeserts extend beyond the current boundaries of major deserts, such as the Sahara, the largest hot desert.

According to the website [2], Earth is called the "Blue Planet" (Fig. 1) due to the vast expanses of oceans. The yellow-green spots on Earth highlight the continents, each unique. Along with this, the red color on the map shows areas most susceptible to desertification. Land degradation is observed there, caused by both human activity and natural factors and processes. Desertification processes are characteristic of semi-arid and arid regions of the globe. As can be seen from the figure, desertification primarily affects North Africa, Central and Southeast Asia, Australia, North and South America, and Southern Europe. As can be seen, there are many such regions on Earth, meaning the process is truly global and requires humanity's attention.

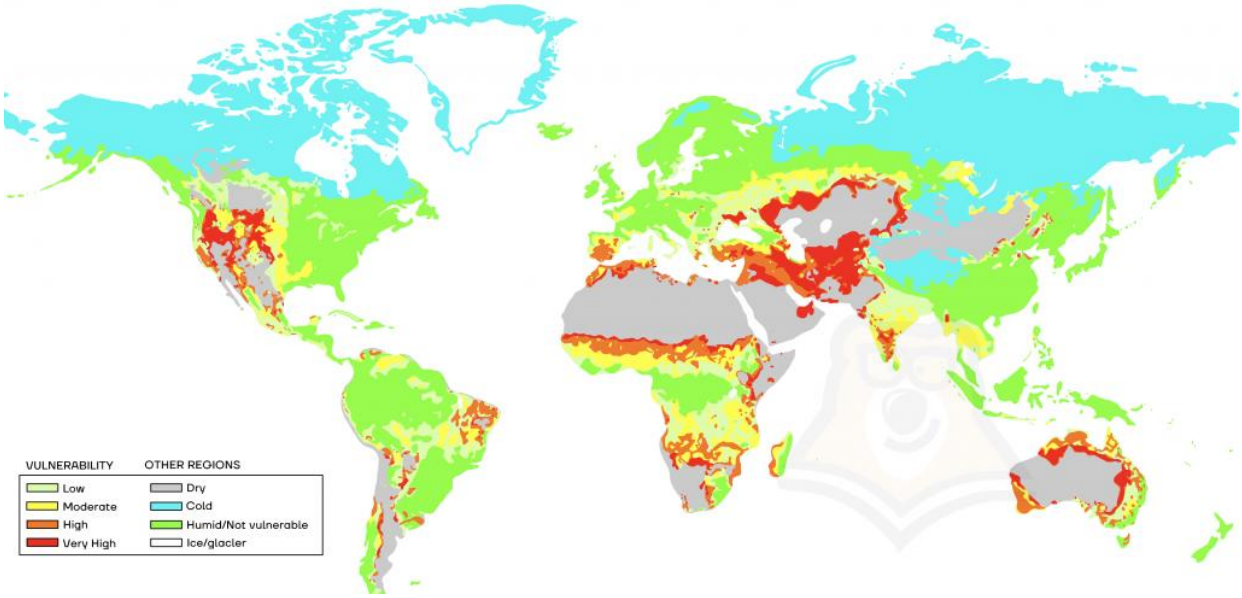

Figure 1. Illustration of the desertification process on Earth.

According to the website [3], arid regions occupy approximately 41% of the Earth's land surface. This territory is home to over 2 billion people (as of 2000). Ninety percent of the population lives in developing countries, which have low development indicators. Child mortality in countries occupying arid regions is higher, and the gross national product (GNP) per capita is

lower than in the rest of the world. Due to limited access to water, agricultural markets, and a lack of natural resources, poverty is widespread in arid regions.

According to source [4], the impact of global warming and human activity is clearly demonstrated in the tropical savanna region of the Sahel. The level of desertification in this area is very high compared to other parts of the world. All areas located in eastern Africa (the Sahel region) are characterized by a dry climate, high temperatures, and low rainfall (300-750 mm per year). Droughts are therefore common in the region. Some studies have shown that over the past 50 years, Africa has lost approximately 650,000 square kilometers of productive agricultural land. The scale of desertification in this region is quite significant.

The source [5] notes that a study conducted by the Institute for Research on Development has shown that drought is rapidly spreading across the Sahel region. Seventy percent of arid areas have collapsed, and water resources have disappeared, leading to soil degradation. The loss of topsoil means that plants cannot take root and can be uprooted by torrential rains or strong winds.

The United Nations (UN) Convention [6] indicates that approximately six million Sahel residents are being forced to flee the desert zones of sub-Saharan Africa. Lake Chad, located in the Sahel region, has been particularly hard hit by this phenomenon. The drying up of the lake is due to the cessation of irrigation and annual rainfall.

Based on data from the website [7], it can be concluded that another large area susceptible to desertification is the Gobi Desert. Currently, the Gobi Desert is the fastest-growing desert on Earth. According to some researchers, the Gobi Desert consumes over 3,370 square kilometers of land annually. This has already led to the destruction of many villages. Currently, photographs suggest that the Gobi Desert has expanded to such an extent that the entire nation of Croatia (approximately 4 million people) could fit within its territory. The encroaching desert is creating a serious problem for the residents of China. Although the Gobi Desert itself is still quite far from Beijing, field reports indicate that large sand dunes are forming just 70 kilometers outside the city.

According to sources [8] and [9], South America is one of the regions affected by desertification, as 25% of the land is classified as drylands. In Argentina, for example, drylands account for more than half of the total land area, and desertification could disrupt the country's food supply. According to UN estimates, approximately 90% of Mongolia's rangelands are susceptible to desertification. About 13% of desertification in Mongolia is caused by natural factors, while the rest is due to human impacts, particularly overgrazing and increased soil erosion in cultivated areas. The area of Mongolian land covered by sand has increased by 8.7% over the past 40 years. These changes have been accompanied by the degradation of 70% of Mongolian rangelands.

Based on data from the website [10], we can conclude that a handful of soil on the earth's surface contains numerous microorganisms that ensure fertility. A 1-cm-thick soil layer takes a century to form, but it can be destroyed in a single field season. This, in turn, leads to desertification and the complete devastation of natural landscapes. Annual plowing of agricultural soils and grazing by animals leads to rapid soil depletion and subsequent loss of fertility.

Methodology

Desertification is the result of a long historical process in which natural phenomena and human activity, reinforcing each other, lead to changes in the characteristics of the natural environment. Desertification has become a natural and social disaster, affecting many humanitarian aspects that require close attention and immediate action. Desertification is a global environmental problem that disrupts the global economy and reduces living standards. According to the UN, drylands already cover 30% of the planet, in more than 100 countries, inhabited by 2 billion people.

According to the latest estimates, more than 230 million people live in areas immediately threatened by desertification. Globally, desertification affects 3.5 billion hectares, and annually, 21 million hectares become completely or almost completely unusable. Thus, desertification poses a threat to humanity, as it reduces the life-support base on earth. Experts estimate that approximately 10-20% of drylands are already degraded, with the total area affected by desertification ranging from 6 to 12 million square kilometers. Approximately 1-6% of dryland inhabitants live in desert areas, and one billion people are at risk of further desertification.

Desertification is a process that spreads across the Earth's surface, turning fertile soil into sand unsuitable for plant growth. Experts believe the main causes of desertification are:

• Droughts;

• Deforestation;

• Mining;

• Resource extraction;

• Soil pollution;

• Natural disasters;

• Groundwater extraction;

• Overgrazing;

• Climate change;

• Agricultural practices;

• Overpopulation and overconsumption;

• Urbanization and other land management practices;

• Excessive use of fertilizers and pesticides.

The environmental and economic consequences of desertification are significant and almost always negative. Agricultural productivity declines, and species diversity and abundance are reduced, leading to even greater dependence on natural resources, especially in poor countries. Desertification limits the availability of basic ecosystem services and threatens human security. It is a significant obstacle to development, leading the United Nations to establish the World Day to Combat Desertification and Drought in 1995, then to proclaim 2006 the International Year of Deserts and Desertification, and subsequently to designate the period from January 2010 to December 2020 as the UN Decade for Deserts and the Fight against Desertification.

Desertification and drought have a serious impact on the world, leading to a range of negative consequences, including food shortages, poverty, and social conflict. One of the main consequences of desertification is a threat to food security. Drought and deteriorating soil fertility lead to reduced crop yields and production, which in turn increases the risk of hunger and malnutrition. This increases dependence on natural resources, especially in poor countries. Populations in developing countries, where up to 90% of the population lives in arid regions, are faced with widespread food insecurity due to desertification.

It is important to note that poverty is a consequence of desertification. People living in poverty become even more vulnerable due to the loss of fertile land and the resulting famine. This can lead to further impoverishment and increased social inequality.

The environmental problem of desertification includes biodiversity loss, water scarcity, and decreased resilience to climate change. Deteriorating habitats and reduced food availability lead to declines in animal populations, which in turn disrupts the ecological balance.

Desertification leads to increased flooding and siltation of reservoirs and shipping channels, creating serious infrastructure problems and impeding access to clean water. This negatively impacts human health, causing respiratory diseases and psychological stress.

Conclusions

Combating desertification and restoring desertified areas is a long-term process; it requires the development and implementation of appropriate measures to combat this scourge. Desertification requires strategic solutions that include specific short- and long-term actions aimed at addressing the structural causes of this phenomenon. Ultimately, the only real solution to combat desertification is sustainable development.

Desertification is a social, not a natural, process—this was the concept adopted by the UN Conference on Desertification. However, research and projects have focused primarily on the physical aspects of this problem, while ignoring the humanitarian aspects. The integration of dryland populations into the international system brings new challenges due to the need to compete in global markets and the emergence of new consumption patterns. In the fight against desertification, all these factors have often been ignored. Desertification, however, does not exhaust the full depth of the economic problem that humanity faces today in an extremely diverse array of manifestations. These manifestations demonstrate that all of humanity faces an environmental challenge, regardless of the international division of labor, as this problem is becoming global in scope.

REFERENCE.

1. The United States Geological Survey // General Information Product. – 1978. – doi:10.3133/70039404.

2. https://umschool.net/library/geografiya/globalnye-ekologicheskie-problemy-chast-1/

3. http://www.un.org/ru/development/sustainable/desertification/

4. Defining Desertification (English). earthobservatory.nasa.gov (January 3, 2007). Accessed February 9, 2022. Archived February 8, 2022.

5. United Nations Convention to Combat Desertification: Issues and Challenges (American English). E-International Relations (April 30, 2014). Accessed February 9, 2022. Archived February 8, 2022. 6. Uche T. Okpara, Lindsay C. Stringer, Andrew J. Dougill. Lake drying and livelihood dynamics in Lake Chad: Unravelling the mechanisms, contexts and responses // Ambio. – 2016-07-01. – T. 45, issue. 7. – pp. 781–795. – ISSN 1654-7209 0044-7447, 1654-7209. – doi:10.1007/s13280-016-0805-6.

7. https://www.worldometers.info/world-population/croatia-population/

8. Laura Torres, Elena M. Abraham, Clara Rubio, Celia Barbero-Sierra, Manuel Ruiz-Pérez. Desertification Research in Argentina // Land Degradation & Development. – 2015-07. – Vol. 26, issue. 5. – Pp. 433–440. – ISSN 1099-145X 1085-3278, 1099-145X. – doi:10.1002/ldr.2392.

9. |RRC.AP. www.rrcap.ait.ac.th. Date of access: February 9, 2022. Archived February 8, 2022.

10. https://greenologia.ru/eko-problemy/zagryaznenie-pochvennogo-sloya.html

11. Toshov J., Baratov B., Sherov K., Mussayev M., Baymirzaev B., Esirkepov A., Ismailov G., Abdugaliyeva G., Burieva J. Ways to optimize the kinetic parameters of tricone drill bits // Material and Mechanical Engineering Technology, Kazakhstan, 2024, No. 1, pp. 35-45.

12. Toshov, Javokhir & Toshov, B.R. & Baratov, Bakhtiyor & Haqberdiyev, A.L.. (2022). Designing new generation drill bits with optimal axial eccentricity. Mining informational and analytical bulletin. 133-142. 10.25018/0236_1493_2022_9_0_133.

13. Baratov B. N., Umarov F. Ya., Toshov Zh. B. Assessment of the performance of tricone drill bits / Mining Journal - Moscow, 2021. - No. 12. – P.60-63.

14. O.V. Tuyboyov, N.F. Raxmanova, B.N.Baratov. Investigation into sustainable innovations in mining engineering for resource optimization and environmental efficiency// “Kon mashinalari va tekhologilar” Ilmiy-technik magazine, Toshkent, 2024, No. 1(7), pp.51-58.

15. Toshov, Z.B., Rahutin, M.G., Toshov, B.R., Baratov B.N. Tracking prevention in roller cone bit drilling // Eurasian Mining, 2024, 41(1), pages 62–66. DOI:10.17580/em.2024.01.15

16. Toshov, Javokhir & Baratov, Bakhtiyor & Baynazov, Umid. (2020). Method of calculating the gear ratios of the cones of tricone drill bits. E3S Web of Conferences. 201.01012.10.1051/e3sconf/202020101012.

17. Toshov, B. & Toshov, Javokhir & Akhmedova, L. & Baratov, Bakhtiyor. (2023). The new design scheme of drilling rock cutting tools, working in rotation mode pairs. E3S Web of Conferences. 383. 1-6. 10.1051/e3sconf/202338304069.