

**TOPIC: WATER RESOURCE DEPRECIATION AND POLLUTION: A GLOBAL PROBLEM AND SOLUTIONS IN THE CASE OF UZBEKISTAN**

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**Abstract:** This thesis analyzes the problems of global depletion and pollution of water resources, their causes and ecological and social consequences. The study examines in detail the acute problems of water scarcity in Central Asia, in particular, in the case of Uzbekistan, the impact of the Aral Sea tragedy on the regional ecosystem, and the cases of irrational use of water. Scientifically based proposals and recommendations have been developed on water resources management, the introduction of modern water-saving technologies, strengthening international cooperation in the use of transboundary water bodies, and raising environmental culture. The main conclusions of the work are of practical importance for improving the strategy for sustainable water resources management.

**Keywords:** water resources, water scarcity, water pollution, Aral Sea, Central Asia, sustainable management, water saving technologies, environmental safety

One of the most serious global problems facing humanity in the 21st century is the increasing depletion and deterioration of fresh water resources. The growth of the planet's population, the rapid development of industry and agriculture, as well as global climate change are increasing the pressure on water resources to an unprecedented extent. According to the United Nations, today about 40 percent of the world's population suffers from water scarcity, and this figure is projected to increase further in the future [2]. This problem is of strategic importance for the Central Asian region, including Uzbekistan. The issue of using transboundary rivers such as the Amu Darya and the Syrdarya, which are the main water sources of the region, is closely related not only to environmental, but also to economic and political stability. Therefore, an in-depth study of the causes of depletion and pollution of water resources, an assessment of its consequences, and finding effective solutions are one of the most urgent scientific tasks today.

of water resource depletion and pollution, the development of scientific and practical recommendations for mitigating the negative consequences of the problem and sustainable water use.

Although water covers about 71% of the Earth's surface, only 2.5% is fresh water. Of this fresh water, the majority (about 68.7%) is stored in glaciers, and 30.1% is stored in groundwater. The water reserves in rivers and lakes that are available for human use account for less than 1% of the total fresh water [4]. These resources are very unevenly distributed across the planet. While regions such as the Middle East, North Africa, and Central Asia suffer from natural water shortages, other regions have abundant water resources. Global climate change is exacerbating this imbalance: changing

precipitation patterns, longer droughts, and melting glaciers pose serious threats to the sustainability of water resources.

Not only the quantity, but also the quality of water resources is becoming a global problem. Sources of water pollution are conventionally divided into two groups : point and diffuse. Point sources include industrial enterprises, municipal wastewater systems. They directly discharge large amounts of pollutants into water bodies . Diffuse sources occur through the leaching of pesticides, herbicides and mineral fertilizers from agricultural lands , rainwater flowing from urban areas and atmospheric precipitation. Depending on the type of pollutants , chemical (heavy metals, petroleum products, synthetic substances), biological (pathogenic microorganisms) and physical (radioactive elements, heat) pollution are distinguished. Such pollution poses a direct threat not only to ecosystems, but also to human health.

Uzbekistan and all of Central Asia is the drying up of the Aral Sea. Once the fourth largest closed water body in the world, the Aral Sea began to dry up rapidly in the 1960s due to the massive diversion of the waters of the Amu Darya and Syr Darya rivers to irrigate cotton fields. This tragedy has led to far-reaching environmental, social and economic consequences. In place of the sea, a new salt-sandy desert called the Aral Sea has appeared on an area of millions of hectares . From here, millions of tons of toxic salt and dust are blown by the wind for hundreds of kilometers, causing serious damage to agricultural crops, gardens and the health of the population. The climate of the region has changed dramatically: summers have become hotter and drier, and winters have become colder. Biodiversity has decreased sharply, and the fishing industry has completely disappeared .

Uzbekistan receives the main part of its water resources (about 80%) from transboundary rivers - the Amu Darya and the Syrdarya - which are formed on the territory of neighboring countries. More than 90% of the water consumed in the country is used for agriculture . Unfortunately, the efficiency of water use in the agricultural sector remains quite low. The main part of irrigation is carried out in the old-fashioned way - by plowing, which leads to the wastage of a large amount of water through evaporation and filtration. Most of the irrigation systems, in particular canals and ditches, are outdated and in need of repair. Industrial enterprises also "contribute" to the pollution of water resources. Many enterprises do not have wastewater treatment facilities or they operate inefficiently, which leads to the discharge of untreated industrial wastewater into rivers and collector-drainage networks. This situation, despite the fact that it contradicts the requirements of the Law "On Water and Water Use" , is still observed in practice [5].

In conditions of water scarcity, the most effective use of available resources is a priority task. The most effective way to do this is to widely introduce water-saving technologies in agriculture, in particular, drip and sprinkler irrigation methods. Drip irrigation allows reducing water consumption by 50-70% compared to traditional methods and increasing productivity by 20-40%. In addition, this method allows for the delivery of mineral fertilizers directly to the roots of plants (fertigation), which reduces fertilizer consumption and prevents soil pollution. It is necessary to further improve the mechanisms for the state to encourage farms implementing such technologies through subsidies and preferential loans.

Sustainable water resources management in Central Asia is impossible without close cooperation between the countries of the region. A fair and rational distribution of water resources in the Amu

Darya and Syr Darya basins, a coordinated policy on water use are the key to regional stability [6]. In this regard, it is important to strengthen the activities of existing platforms such as the Interstate Water Coordination Commission (ICWC) and the International Fund for Saving the Aral Sea (IFAS). It is necessary to develop common approaches to joint management of reservoirs, establish water quality monitoring, ensure the safety of hydraulic structures, and address environmental problems. Attracting technical and financial assistance from international financial institutions and donor organizations also plays an important role in this process.

Strengthening the legislative framework is important in ensuring rational use of water. The Law "On Water and Water Use" [7] should be improved in line with the requirements of the time, by introducing payments for water use (the principle: "polluter pays" and "user pays"), strengthening responsibility for illegal use of water and its pollution. At the same time, it is necessary to form a high ecological culture in society by conducting large-scale propaganda and advocacy among the population, especially the younger generation, to value water and not waste it. It is advisable to actively involve the media, educational institutions and civil society institutions in this process.

The conducted analyses show that the depletion and pollution of water resources is a strategic problem for Uzbekistan, which is a serious obstacle not only to environmental, but also to economic and social development. Global climate change and demographic growth in the region are expected to further exacerbate this problem. The solution to the problem requires an integrated approach and should include the following main areas: first, the transition to a strict saving regime in all areas of water use, especially in agriculture, and the widespread introduction of modern technologies; second, strengthening mutually beneficial and constructive cooperation with neighboring countries in the use of transboundary water resources; third, improving the legal and institutional framework for water resources management; fourth, forming a water-saving attitude and ecological culture in society. Only in this way can water resources, which are a source of life for future generations, be preserved and the country's sustainable development be ensured.

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