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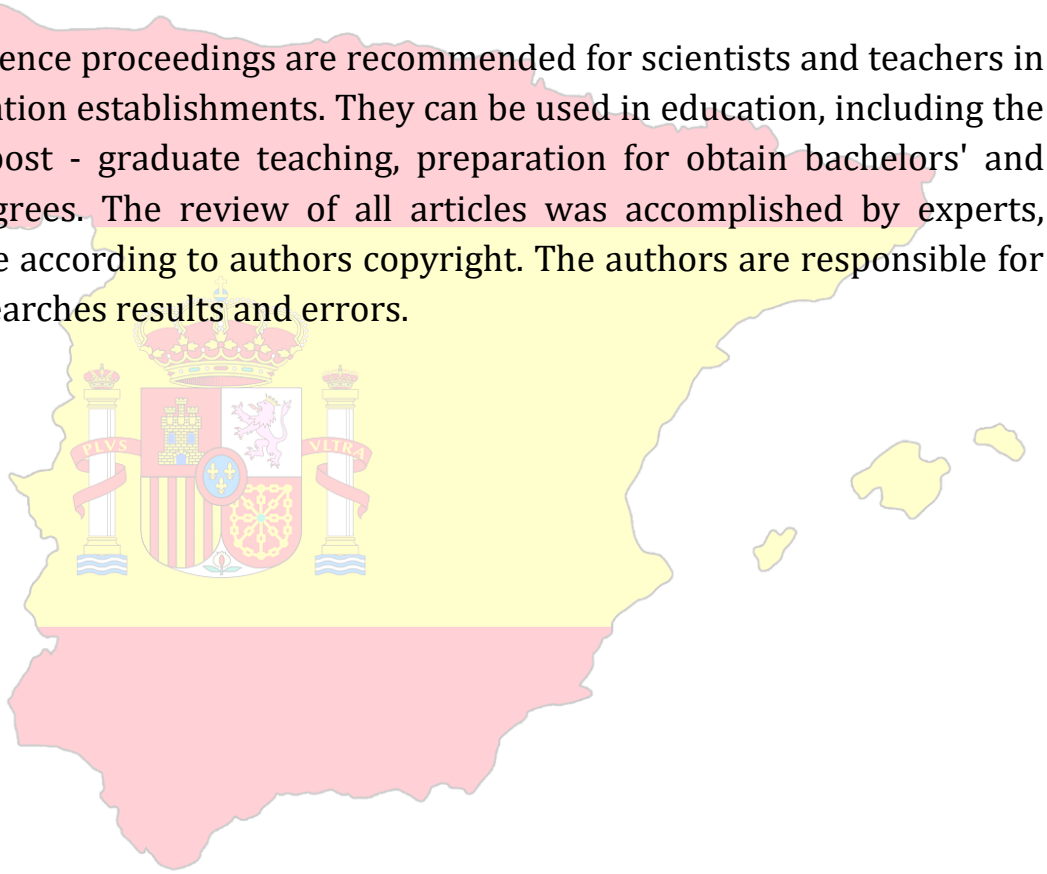

# FOREIGN EXPERIENCE IN WATER RESOURCE MANAGEMENT AND POSSIBILITIES OF ITS APPLICATION IN LOCAL CONDITIONS

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**Abstract:** This article studies the advanced foreign experience of Israel, the Netherlands, Australia, China and Singapore in water resource management in different regions of the world based on comparative analysis. Their management models, technological solutions and political mechanisms are described, taking into account the geographical, economic and institutional context of each country**.**

**Keywords:** international experience, water management, IWRM, water policy, Uzbekistan, comparative analysis, adaptation, sustainable development, water-saving technologies, institutional reforms.

Water resources are now recognized as a strategic economic asset, and their effective management is becoming a guarantee of sustainable development for many countries. About 4,000 km³ of fresh water is consumed annually worldwide, and this figure is increasing by 1% every decade [1]. At the same time, water resources are increasingly depleted due to climate change, and according to forecasts, more than half of the world's population may live in conditions of water scarcity by 2050 [2]. This situation is forcing different countries to look for new approaches to water resource management. A number of developed countries have achieved significant relief from the problem of water scarcity through innovative technologies, effective institutional mechanisms and participatory governance principles. Studying these experiences and adapting them, taking into account regional specificities, has become an urgent task for many developing countries.

The scientific literature on the study of foreign water management experience has grown significantly in recent decades. Gleick [4] put forward the concept of a “soft path” in water management, justifying the need for institutional changes along with technological solutions. This approach emphasizes water conservation, reuse and demand-side management, which is fundamentally different from the traditional supply-side expansion (building facilities) approach. The concept of Integrated Water Resources Management (IWRM) developed by GWP [5] is widely used as a theoretical basis for analyzing foreign experience. IWRM is defined as the process of implementing the harmonious development and management of water, land and related resources in order to increase economic and social well-being without compromising the sustainability of ecosystems. Calder [6] analyzed this concept from the perspective of practical implementation and identified the main factors for successful implementation.

The study used comparative analysis and systematic literature review methods. Three criteria were used to select countries: first, having similar conditions to Uzbekistan in terms of water scarcity or management problems; second, having recognized achievements in water management; third, covering different geographical regions and management models. On this basis, Israel, the Netherlands, Australia, China and Singapore were selected. For each country, the analysis was carried out along the following dimensions: geographical and climatic context; institutional management model; main technological solutions; economic mechanisms; achieved results and indicators; degree of adaptation to the conditions of Uzbekistan. A matrix approach was used for comparative analysis. A search was carried out in Scopus, Web of Science and Google Scholar as a literature database. Search terms: 'water management', 'water governance', 'water policy reform', 'IWRM implementation', 'water reuse', 'water market' and their combinations. More than 180 sources published between 2000 and 2024 were used.

Despite being one of the driest countries in the world, Israel has achieved globally recognized success in water management. This is evident from the fact that agriculture has developed even in the Negev Desert, where annual rainfall is less than 200 mm [7]. Technological foundation. Israel's main technological contribution to water conservation is the drip irrigation system. Invented by the company Netafim in the 1960s, this technology is now used on more than 75% of the country's irrigated land and reduces water consumption by 30–50% compared to traditional irrigation methods [7, 8]. In addition, the country holds the world record for water reuse: 87% of treated wastewater is reused in agriculture, a figure that no other country in the world has matched [16]. Institutional model. Israel's water management is centralized through the Water Authority. Established in 2007, this body acts as the sole authority for water policy development, licensing, and oversight. This organizational model has eliminated fragmentation in water management and allowed for the formation of a single strategic direction [17]. Economic mechanism. Israel's water pricing policy is based on a progressive (graded) structure: the price increases rapidly as the user increases his consumption. The first quota — for basic needs — is provided at a low price, and excess consumption is provided at market prices. This approach creates a strong economic incentive to save on consumption [8].

**Table 1. Comparative analysis of water management models of foreign countries**

| Country | Main Model | Key Technology | Type of Management | Suitability for Uzbekistan |
|---|---|---|---|---|
| Israel | Technological Innovation | Drip Irrigation, Desalination | Centralized | High |
| Netherlands | Integrated Management | Water Councils, "Living with Water" | Multi-level | Medium |
| Australia | Market Mechanism | Water Rights Trading | Market-based | Limited |
| China | Central Planning + Digital | IoT, AI Monitoring, Mega-projects | Centralized | Medium-High |

The water management system of Uzbekistan has been undergoing significant reforms in recent years. The "Concept of Water Resources Development until 2030" adopted in 2020 and the "Water for Sustainable Development" Decade (2018–2028) announced by the UN in 2022 at the initiative of Uzbekistan were important steps in this direction. However, a number of systemic problems still await their solution [3, 13]. The most serious problems include: high water losses due to the obsolescence of 40–60% of irrigation canals; setting water prices below their real cost, which leads to waste; weak inter-sectoral coordination; low coverage of monitoring systems; the need for economic incentives for the introduction of water-saving technologies [15]. The results of the analysis show that the method of completely "copying" foreign water management experiences to Uzbekistan is not appropriate. Each model needs to be adapted to the specific conditions of Uzbekistan, taking into account its climate, level of economic development, institutional capacity and cultural characteristics. The Israeli experience stands out as the most suitable model for Uzbekistan. Both countries are characterized by a dry climate, a high share of water consumption in agriculture and a strong reliance on irrigation. However, Israel's technological successes are built on the basis of scientific and technical potential accumulated over many years, strong state policy and a high pricing system. In Uzbekistan, these conditions need to be created gradually [7, 15].

This study analyzes the water management models of five leading countries - Israel, the Netherlands, Australia, China and Singapore - and assesses their applicability in the conditions of Uzbekistan. Based on the comparative analysis, the following main conclusions were drawn. The first conclusion: success in water management depends not on a single "magic solution", but on the harmonious combination of technological innovations, institutional reforms and economic mechanisms. The experience of Israel and Singapore is a clear proof of this. The second conclusion: it is necessary to apply the basic principles, adapting them to local conditions, rather than copying foreign models. There are many examples of the failure of unadapted transfer. The third conclusion: The most effective direction for Uzbekistan in the short term is technological adaptation (drip irrigation, IoT monitoring) and institutional strengthening (improving watershed management).

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