WAYS OF CREATING VEGETATION LAYER AT THE BOTTOM OF THE ARAL SEA

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Abstract. The desiccation of the Aral Sea, a result of extensive water diversion for agricultural purposes, has left behind a barren landscape devoid of vegetation. The restoration of a vegetation layer at the bottom of the Aral Sea presents a complex and challenging endeavor. This article outlines various proposed methodologies to reintroduce plant life and revive the ecological balance in this severely degraded environment.

Keywords: Aral Sea, vegetation layer, ecological restoration, hydroseeding, salinity-tolerant plants,soil improvement, groundwater recharge, community engagement,environmental restoration, halophytes.

On January 18, 2022, the Cabinet of Ministers adopted a decision on "Additional measures to establish "green covers" - protective forests on the dry bottom of the Aral Sea and in the coastal areas." In accordance with this decision, a total of 500 plants are planned to be laid in the Aral Sea region in 2022-2026. This, in turn, shows the importance of laying plant covers [1].

The Aral Sea, once a thriving body of water located in Central Asia, has dramatically shrunk due to excessive irrigation and the diversion of its two main tributaries. As a result, the exposed seabed has become a desolate and barren landscape. However, several methods can be employed to create a vegetation layer at the bottom of the Aral Sea, which could potentially restore some ecological balance to the region.

One approach to establishing a vegetation layer could involve introducing native plant species that are resilient to the harsh conditions of the exposed seabed. These species should be able to tolerate high salinity levels, drought, and extreme temperatures. Conducting detailed research on the suitable native plant species, including their adaptability and ability to thrive in such adverse conditions, would be crucial.

To facilitate the growth of vegetation, necessary infrastructure such as irrigation systems and water reservoirs would need to be established. These systems could utilize water from nearby rivers, rainfall, or desalinated seawater, ensuring a sustainable water supply for the vegetation layer. Proper water management and irrigation techniques would be vital to ensure the vegetation's survival and growth [5].

Additionally, soil improvement techniques could be employed to enhance the quality of the seabed for vegetation growth. This could involve introducing organic matter, nutrients, and

beneficial microorganisms into the soil, thereby increasing its fertility and providing a suitable environment for plant roots to anchor and absorb water.

The establishment of a vegetation layer in the Aral Sea could also involve community involvement and engagement. Local communities, who have been adversely affected by the sea's decline, could be trained to participate in the planting and maintenance of the vegetation. This would not only provide livelihood opportunities for the communities but also foster a sense of ownership and responsibility towards the ecological restoration of the region.

Regular monitoring and evaluation of the vegetation layer's progress would be necessary to assess its effectiveness and identify any necessary adjustments. As the vegetation layer matures, it could help stabilize the exposed seabed, prevent further soil erosion, and create habitats for various species of flora and fauna [3].

As it can be seen, creating a vegetation layer at the bottom of the Aral Sea would require a multi-faceted approach, considering factors such as suitable native plant species, water management, soil improvement techniques, community involvement, and monitoring. While it may not fully restore the Aral Sea to its former glory, this approach could provide some ecological benefits and contribute to the overall revitalization of the region.

In addition, innovative technologies for creating a vegetation layer at the bottom of the Aral Sea would likely need to address the unique environmental challenges of the region, including high salinity, fluctuating water levels, and sediment contamination. Some potential innovative approaches that could be considered include:

1. Bioremediation techniques: Utilizing specific plant species that have the capability to absorb and remove contaminants from the sediment, thus aiding in the restoration of the ecological balance.
2. Biodegradable 3D printed structures: Creating biodegradable structures, possibly using 3D printing technology, which can provide a framework to support the growth of vegetation and stabilize the sediments [2].
3. Aquatic drones for seeding: Using specialized aquatic drones to disperse seeds of native plant species in the underwater environment, possibly in areas where traditional planting methods are impractical.
4. Hydroponic systems: Implementing hydroponic systems that can host and nurture vegetation in the underwater environment, providing controlled conditions for plant growth and potentially enhancing the establishment of a vegetation layer.
5. Remote sensing and monitoring: Deploying advanced remote sensing technologies, such as satellite imagery and underwater acoustic devices, to monitor the progress of vegetation growth, assess the health of the ecosystem, and make informed management decisions.

These innovative technologies will be beneficial in the process of creating vegetation layer.

Creating a vegetation layer at the bottom of the Aral Sea can have both benefits and drawbacks. One of the main benefits is that it can help restore and rehabilitate the severely degraded ecosystem of the Aral Sea. The vegetation layer can provide habitat and food for various species of fish, birds, and other aquatic animals, thus promoting biodiversity in the region. It can also help improve water quality by reducing nutrients and controlling algal blooms [4].

Additionally, the vegetation layer can have a positive impact on the local economy. The restoration of the Aral Sea can create opportunities for fishing, tourism, and agriculture,

which can provide employment and improve the livelihoods of the local communities. This can also lead to increased economic growth and development in the surrounding areas.

However, there are also drawbacks to consider. One major concern is the feasibility and cost of creating a vegetation layer on such a large scale. It would require significant investment in infrastructure, including pumps, irrigation systems, and the transportation and planting of vegetation. This can be a financial burden for the countries involved in the restoration efforts.

Furthermore, the success of the vegetation layer largely depends on the availability of water resources. The Aral Sea has been significantly depleted over the years, and diverting water for the creation of a vegetation layer may further strain the already limited water supply in the region. This could have negative consequences for agriculture and other water-intensive activities in the surrounding areas.

Lastly, there may be challenges in ensuring the sustainability and maintenance of the vegetation layer. It would require ongoing efforts to monitor and control invasive species, as well as maintaining the necessary water levels and nutrient balance for the vegetation to thrive. Without proper management, the vegetation layer may not achieve its desired outcomes and could end up as a wasted effort.

In conclusion, the creation of a vegetation layer at the bottom of the Aral Sea presents both ecological and engineering challenges. However, the implementation of various strategies such as introduction of native plant species, sediment and soil improvement techniques, regular monitoring, community involvement can contribute to the revival of the ecosystem. Each approach offers potential benefits in stabilizing the sea bottom, promoting biodiversity, and enhancing habitat conditions. Nonetheless, the success of these methods will rely on a thorough understanding of the local environmental conditions, active participation of experts in the field, and continuous efforts toward addressing the root causes of the Aral Sea's deterioration. By addressing these challenges and applying sustainable, environmentally responsible practices, there is potential to bring about positive change in the Aral Sea region and contribute to its restoration.

References:

1. Vazirlar Mahkamasining 2022-yil 18-yanvardagi 31-son qarori
2. Абдиров Ч.А., Константинова Л.Г., Курбанбаев Е.К. Качество поверхностных вод низовьев Амударьи в условиях антропогенного преобразования пресноводного стока. Ташкент.-ФАН.- 1996.- с. 110.
3. Кочкарова Севара Ахмеджановна (2019). АНАЛИЗ НАПРАВЛЕННОСТИ СУКЦЕССИОННЫХ ПРОЦЕССОВ РАСТИТЕЛЬНОГО ПОКРОВА НА ОБСОХШЕМ ДНЕ АРАЛЬСКОГО МОРЯ. Евразийский Союз Ученых, (8-1 (65)), 17-19.
4. Кубланов Жалгасбай Жумабаевич, & Тлеумуратова Бибигуль Сарыбаевна (2023). ОБОБЩЕНИЕ МНОГОЛЕТНЕЙ ДИНАМИКИ ФИТОЦЕНОЗОВ ОСУШЕННОГО ДНА АРАЛЬСКОГО МОРЯ МЕТОДАМИ МАТЕМАТИЧЕСКОГО МОДЕЛИРОВАНИЯ. Universum: химия и биология, (8-1 (110)), 25-30.
5. Кузьмина Ж.В., Трешкин С.Е., Мамутов Н.К. Результаты опытного Формирования естественной растительности на засоленных землях обсохшей части Аральского моря // Аридные экосистемы. -Том 9.- 29.- 2006.- С.27-39.