MORPHODYNAMICS OF THE BLACK SEA COASTAL ZONE OF ADJARA AND MODERN APPROACHES

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Abstract

The coastline of Adjara, especially the Cape of Batumi, is an active area, which is caused by the underwater canyon of Batumi. It was influenced by the construction of Batumi port in 1878. To protect the port from the impact of storm waves and flooding, a 170-meter-deep dam was built, which eventually caused the Batumi Accumulation Basin to rise sharply, causing it to approach the Batumi Underwater Canyon. The average width of the beach today is 70-80 meters and the threat is growing, as already happened on January 14, 1999, when a beach of about 200 meters long with a total area of 11000 m² washed ashore and sank into the Batumi Canyon. The incident reportedly occurred during the night, triggered by a small earthquake in the city of Trabzon. the construction of dams in the river Chorokhi basin, since the 1990s, had an extremely negative impact on the southern section of the Black Sea coast. (These references are taken from examples of coastal hazard along the Georgian black sea coast: "Examples of coastal hazard along the Georgian black sea coast" Gelovani, I., Lominadze, G., Kavlashvili, G., Russo, G. NATO Science for peace and Security Series C: Environmrntal security, 2021, pp.317-326.)

The innovative project of the company "Ambassador Batumi Island" involves the construction of two artificial peninsulas and an island at the entrance of Batumi, in the settlements of Barchan and Tamar. An area of 144.3223 m² has been allocated for the project, of which 108.50632 m² will be used for various purposes, of which 84 m² will be artificially created area, while the rest will be devoted to protective moles and artificial island aquarium.

The project was preceded by two years of preparatory work, a detailed study of the Black Sea coast. More than 30 local and international studies have been conducted. Three alternative sites were selected for the construction. Eventually, after laboratory findings and expert advice, the Cape of Batumi was chosen for artificial development. More than five hectares of land has already been developed, and work is underway to improve the waterfront. A bridge was constructed to carry heavy equipment, and the necessary infrastructure was put in place. It is worth noting that the seven-ball storms in Batumi in 2023 and 2024 had no impact on the ongoing construction in the Gulf, which confirms that the geographical location for the project was selected with caution by qualified specialists. Planning takes into account an eight-point seismicity and the global warming-related tendency for water to rise.

The EIA (Environmental Impact Assessment) concludes that the environmental impact of a construction site can be reversed in 5 to 10 years. The island will have a well-developed blue-green infrastructure that will create a new landscape and integrated ecosystem for the population. The territory of the island should be created an outstanding architectural example of world importance, which will make the city of Batumi more distinctive and attractive. The work carried out along the Black Sea coast may lay the foundation for new modern approaches that are important and necessary for us as a maritime country.

Keywords: Black Sea, future project, artificial island

Introduction

The coastline of Adjara, especially the Cape of Batumi, is an active area, which is caused by the underwater canyon of Batumi. It was influenced by the construction of Batumi port in 1878. To

protect the port from the impact of storm waves and flooding, a 170-meter-deep dam was built, which eventually caused the Batumi Accumulation Basin to rise sharply, causing it to approach the Batumi Underwater Canyon.

Figure 1: *Completed "Ambassador Batumi Island"*

The average width of the beach today is 70-80 meters and the threat is growing, as already happened on January 14, 1999, when a beach of about 200 meters long with a total area of 11000 m^2 washed ashore and sank into the Batumi Canyon. The incident reportedly occurred during the night, triggered by a small earthquake in the city of Trabzon. the construction of dams in the river Chorokhi basin, since the 1990s, had an extremely negative impact on the southern section of the Black Sea coast. (These references are taken from examples of coastal hazard along the Georgian black sea coast) "Examples of coastal hazard along the Georgian black sea coast" Gelovani, I., lominadze, G., Kavlashvili, G., Russo, G. NATO Science for peace and Security Series C :Environmrntal security, 2021, pp.317-326

Method

In order to better solve the problem, joint work of the state and private investors is necessary. As an example of modern approaches, I have cited the project of "Ambassador Batumi Island" LLC, which envisages the construction of two artificial peninsulas and an island. [Fig.1] An area of 1 443 223 m^2 has been allocated for the project, of which 108.50632 m^2 will be used for various purposes, of which 84 m^2 will be artificially created area, and the rest will be reserved for protective moles and artificial island aquatoria.

The settlements of "Bartskhani" and "Tamar" at the entrance of Batumi have been selected for construction, the infrastructure is currently in place, appropriate equipment has been purchased, a connecting bridge has been built, and an area of more than 5 hectares of land in the water has been arranged.

The big storms of Batumi in November-January 2023-24 did not affect the area under construction, which proves that the geographical location of the island was chosen correctly. The project was preceded by two years of more than 40 local and international studies. 8-point seismicity and global warming-related rising water trends are considered. In the framework of the Ambassador Batumi Island project in Ankara, Republic of Turkey, testing and additional studies were conducted in the hydraulic laboratory, the purpose of which is the engineering stability of the two peninsulas and the island structure. The intersection of the two waves and the speed of the wave were checked. The terrain, geological structure, landscape, hydrology, wave regime, morphodynamics of the construction area of the artificial island were studied by joint researches of local and foreign scientists

As a result, it was concluded that the implementation of the artificial island project will not have a negative impact on the sustainability of the sea coast. Soil settlement estimation was done using Settle3 software. Various preventive measures will be implemented during the construction

period. The project envisages the arrangement of pumping equipment, which ensures the pumping of water from the internal aquarium to the external aquarium. Monitoring of water pollution and quality in the relevant catchment basin will be carried out systematically. Observation of the biological environment of the sea will be conducted twice a year and additional mitigation measures will be implemented if necessary. According to the results of the research of water and bottom sediments of the marine aquaria, it was established that at a distance of 60-70 m, there is a high level of historical pollution of the sediments of the bottom slope of the underwater slope with oil and oil products. In the coastline, the river Bartskhana and river Kubistskal used to discharge water contaminated with petroleum products into the sea. The construction of the artificial peninsula and island will permanently cover the historically polluted seabed. As a result, the risk of contamination is eliminated. In case of contamination of sea water and bottom sediments, mitigation measures will be implemented. In order to study the background condition of the bottom sediments quality, field work and laboratory research of the taken samples will be conducted twice a year. The island will have a well-developed blue-green infrastructure that will create a new landscape and an integrated ecosystem for the population. Stones, concrete inert material required for the purposes of the project will be brought in ready form from licensed quarries. This will certainly reduce the risks of environmental impact, such as the spread of dust in the ambient air, the spread of noise and the impact on the water environment. (Fig. 2 and 3.)

"Ambassador Batumi Island", at the stage of development of the technical-economic study, design and development of the master plan of the artificial island, cooperates with the largest international corporations such as Colliers (Great Britain), Arup GROUP (Great Britain), Yuksel Proje (Turkey) SHOP Architects (USA) etc.

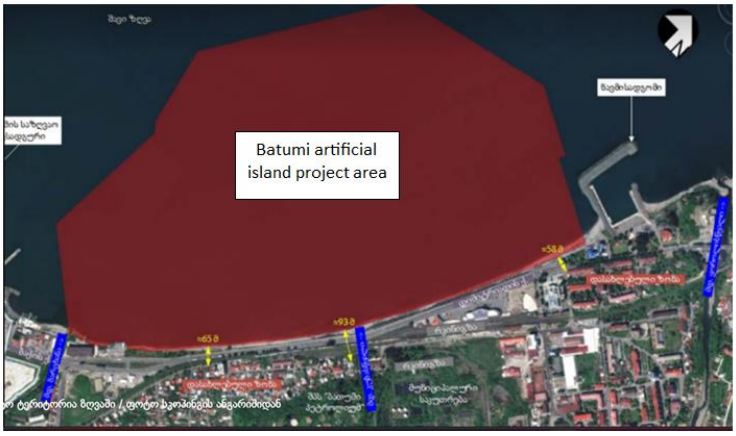

Figure 2: Artificial island project area

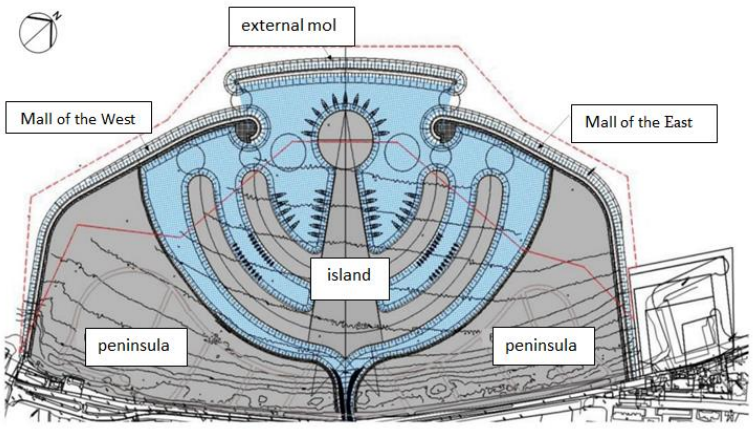

Figure 3: *Gen plan*

Conclusion

The Ambassador Batumi Island is an important project for the region. In the course of the planned activities, mitigation measures will be taken to reduce the negative impact on the environment. Geological engineering studies indicate that geological processes are not expected to have a high risk of impacting newly constructed infrastructure. It is also worth noting that the company's management gives students the opportunity to participate in this project and receive qualified education with foreign specialists. The territory of the island should be created an outstanding architectural example of world importance, which will make the city of Batumi more distinctive and attractive. The work carried out along the Black Sea coast may lay the foundation for new modern approaches that are important and necessary for us as a maritime country.

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