

# GEOGRAPHICAL ALLOCATION OF "WINGED FORELAND" ABRASION-ACCUMULATIVE SYSTEMS

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**Introduction.** The coastal zone of the World Ocean is a very important link in the *global lithodynamic system*, consisting of difficult developing structures that are subdivided: into *abrasion, abrasion-accumulative and accumulative systems* (Зенкович 1962, Шуйский 1986) according to the nature of the substance's direction. Abrasion-accumulative coastal systems are the most difficult. These natural formations are characterized by a significant variety of litho-and morphodynamic conditions, which allows to distinguish different types of coastal systems within them. The "winged forelands" are the most specific types of abrasion-accumulative systems (Зенкович 1962).

The "winged foreland" abrasion-accumulative systems are the least studied natural coastal formations in the World Ocean. The intensification of anthropogenic activities within the coastal zone of the seas and oceans leads to significant changes in the evolution of coastal systems. That is why the insignificant knowledge of the "winged forelands" does not allow rational use of their natural resources.

**The definition of "winged forelands".** For the first time the definition of the term "winged foreland" was presented in 1898 in the scientific treatise of the American scientist F. Gulliver "Shoreline Topography". He singled out the "winged forelands" as complex coastal formations, which included an indigenous section of the coast and two symmetrically located accumulative forms. This author determined the evolutionary position of these systems by describing their occurrence at an early stage of leveling the dissected bay shore (Gulliver 1898).

V.P. Zenkovich, the founder of coastal science, defines "winged forelands" as a kind of abrasion-accumulative systems (Зенкович 1962). In the terminological reference, he cites the following definition for this system: "Winged foreland is a set of eroded indigenous cape and two spits, growing due to the transfer of destruction products on both sides of it. Examples are frequent on drumlin shores. In the native literature, the term has not been spread" (Зенкович 1980).

**General characteristics of the largest "winged foreland" coastal systems.** The studied abrasion-accumulative systems are most prevalent

within the coastal zone of the seas of Eurasia, among which are the Mediterranean, the Caspian, the Azov, the Black, the Baltic and the North. Within the ocean shores "winged forelands" are found on the Atlantic coast of North America (fig.1a).

In most cases the central indigenous section of the coast ("headland") is distinguished within the limits of these coastal systems. It is composed of bedrock, which is adjoined from opposite sides by two accumulative forms that are interconnected by the alongshore sediment flow. In the morphogenesis and evolution of "winged forelands" periodically alternating wind waves of different directions, wind and tidal fluctuations of sea level, as well as associated coastal currents, are important.

Within the Black Sea "winged forelands" are located exclusively in the northwestern shallow part (fig.1c). *The Tendra – Dzharylgach "winged foreland"* is the largest formation of this type. Its total length is about 130 km, of which "headland" is 22 km, the Tendra spit is 65 km, and the Dzharylgach spit is 42 km. The genesis of this formation is associated with the displacement, joining and morphological transformation of the coastal bar. The indigenous section of the coast consists of clay and loamy rocks, and the accumulative forms consist of quartz sand with admixture of shell and detritus (Котовский 1991, Давидов 2018).

The total length of *the Kinburn – Pokrovskaya – Dolgiy "winged foreland"* is about 35 km, of which "headland" is 12 km, the Kinburn Spit is 10 km, the Pokrovskaya Spit is 6 km and the Krugliy and Dolgiy islands are about 7 km. The genesis and evolution of this system is associated with the shift and joining of the coastal bar to the shore cusp of alluvial origin. Within the system there are exclusively sandy rocks of terrigenous and biogenic genesis (Шуйский 1999).

*The Budak-Bournas "winged foreland"* has a total length of about 55 km, of which the indigenous shore occupies 30 km, the Burnas barrier beach is 6 km, and the Budak barrier beach is 17 km. Genetically, this system is also a sided and transformed shore bar. The geological structure is similar to the Tendra-Dzharylgach coastal system (Зенкович 1960; Шуйский 1989).

*The Dolgaya-Kamyshvatskaya* is the only one "winged foreland" within the coastal zone of the Azov Sea, located in the eastern part, in the area of the frontal cusp of the Eisk peninsula. The length of the system is about 53 km, of which the "headland" occupies about 30 km, the Dolgaya Spit is 17 km, and the Kamyshvatskaya Spit is 6 km. The indigenous cusp is composed of clay rocks, and the accumulative forms consist of sandy rocks of biogenic origin. The genesis and evolution of the system is associated with

the transformation of the coastal bar and the formation of arrow and spit within its termination (Зенкович 1962, Мамыкина 1980).

*The Cheleken "winged foreland"* is located in the southeastern part of the Caspian Sea within the same peninsula (fig.1d). The length of the system is about 62 km, of which the "headland" is 25 km, the North Cheleken Spit is 20 km, and the South Cheleken Spit is 17 km. In morphogenetic terms this coastal system is a shifted and transformed coastal bar. The indigenous area is composed of clayey rocks and accumulative forms consist of sandy rocks of biogenic origin (Леонтьев 1977, Курбанов 2011).

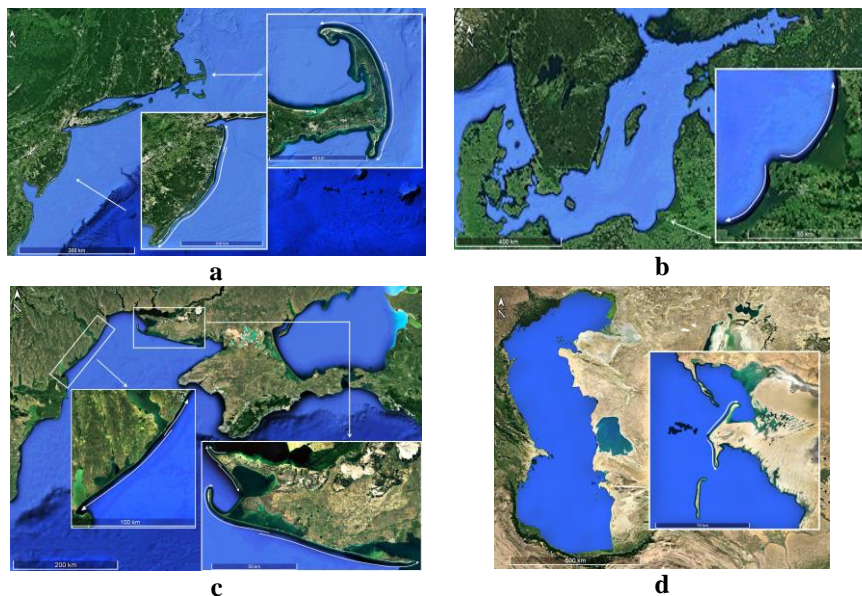


Figure 1. The geographical location of the largest "winged foreland" coastal systems: a) the Atlantic coast of North America; b) the area of the Sambian Peninsula; c) the north-western part of the Black Sea; d) the south-eastern part of the Caspian Sea.

*The Curonian-Baltic "winged foreland"* is located in the southeastern part of the Baltic Sea (fig.1b). Its total length is about 220 km, of which the "headland" occupies about 54 km, the Curonian Spit is 98 km, and the Baltic (Vistula) Spit is 65 km. Genetically this system is represented by coastal bars shifted and attached to the indigenous cusp. The indigenous cusp is composed of glacial rocks, and accumulative forms consist of alluvial and fluvio-glacial sands (Бадюкова 2006, 2011; Žaromskis 2018).

**Conclusions.** The "winged foreland" abrasion-accumulative systems are transformed coastal bars that have experienced displacement and transformation into various accumulative forms. Activation of anthropogenic activity within these systems leads to their degradation. That is why the study of the reaction of the system to human activity should be a priority.

**Список литературных источников:**

- Gulliver F.P. 1898. Shoreline topography // Proceeding of the American Academy of Arts and Sciences. Volume 34. P.151 – 258.
- Žaromskis R. Gulbinskas S. 2018. Krantodara ir krantotvarka. Klaipėdos Universiteto leidykla. 260 p.
- Бадюкова Е.Н. и др. 2006. Геолого-геоморфологическое строение Куршской косы и некоторые этапы истории ее развития // Геоморфология. № 3. С.37-48.
- Бадюкова Е.Н. и др. 2011. Геолого-геоморфологическое строение Балтийской (Вислинской) косы // Океанология. том 51. № 4. С. 675–682.
- Давидов О.В. та ін. 2018. Особливості еволюції вздовж берегової літодинамічної системи Тендра-Джарилгач в умовах антропогенного перетворення // Науковий вісник Херсонського державного університету. Серія: Географічні науки. Вип. 9. Херсон. С.105-110.
- Зенкович В.П. 1960. Морфология и динамика советских берегов Черного моря. Т. II (Северо-западная часть). Москва: Изд-во АН СССР. 286 с.
- Зенкович В.П. 1962. Основы учения о развитии морских берегов. Москва: Изд-во АН СССР. 710 с.
- Котовский И.Н. 1991. Морфология и динамика берегов Черного моря в пределах Херсонской области УССР. / Автореферат дисс. на соиск. ученой степени канд. геогр. наук. по спец. 11.00.04. Геоморфология и палеогеография. Киев: Инст. географии АН Украины. 19 с.
- Курбанов Р.Н. 2011. Береговые процессы на полуострове Челекен // Проблемы освоения пустынь. Т. 1., № 2. С. 17 – 20.
- Леонтьев О.К. и др. 1977. Геоморфология берегов и дна Каспийского моря. Москва: МГУ. 208 с.
- Мамыкина В.А. 1980. Береговая зона Азовского моря. - Ростов н/Д: Изд-во Рост. ун-та. 174 с.
- Морская геоморфология: Терминологический справочник. Береговая зона: процессы, понятия, определения / науч.ред. В.П.Зенкович. Москва: Мысль, 1980. – 280 с.
- Шуйский Ю.Д. 1986. Проблема исследования баланса наносов в береговой зоне морей. Ленинград: Гидрометиздат. 240 с.
- Шуйский Ю.Д., Выхованец Г.В. 1989. Экзогенные процессы развития аккумулятивных берегов в Северо-западной части Черного моря. Москва: Недра. 198 с.
- Шуйский Ю.Д. 1999. Распределение наносов вдоль морского края Кинбурнского полуострова (Черное море) // Доклады НАН Украины. № 8. – С. 119 – 123.