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“Badai-Tigai,” nature reserve – located on the right bank of the Amudarya in the southwestern part of Karakalpakstan, 85 km south of the Takhiatash dam (see) and 130 km north of the Tuyamuyun dam. Its length is 17.5 km, and its width is 1.5 to 2 km. It was created in 1971 for conservation of typical intra-zonal tugai ecosystems that in the Amudarya lower reaches and delta have been practically lost by now. It was the model ecosystem of the Amudarya lower reaches. In the past, *tugai* (see) covered approximately 70% of the territory in the Amudarya lower reaches, but due to regulation of the Amudarya flow and agricultural development of floodplains, they disappeared nearly completely. At the time of the establishment of the preserve, it contained about 167 varieties of higher plants. By 1985, their quantity had shrunk to 61. In addition, it became a habitat of many species of animals now rare in the lower Amudarya, such as Bukhara deer (re-introduced), fox, jackal, badger, rabbit tolai, pheasant, little owl, long-eared owl, purple heron, peregrine, black kite, little cormorant, and others.

Baigubekmuryn, Cape* – an insignificant southward projection from the western shore of A.S. Here, the steep shore descends smoothly, step-like, until at the extreme end it goes down steeply into the water. The sea near the cape was deep, exceeding 50 m only 3 km from the shore.

Barsakelmes, Barsa-Kelmes* (meaning in Kazakh “*if it goes, it will not return*”) – (1) the third largest island in the Aral Sea. Its area is 183 sq. km. It is located in the northern part of the sea, 26 km to the south-east of the *Izendyaral Cape* (see) and 85 km from the Syrdarya mouth. The relief of this island is rather high and undulating, but gradually lowering to the north. The western and southern shores are high and steep. In some places, in particular nearby the *Butakov Cape* (see), its cliffs are about 50 m high, steep, and come up closely to the water edge. Along the low northern shore, a narrow belt of sand beaches stretch. On the northwestern part of the island, a group of small lagoon-type saline lakes is found. In 1949, B. was assigned the status of a nature reserve to be managed by the Kazakh Academy of Sciences. It was organized for protection of the endangered animals: Persian gazelle, saiga, and koulans that were brought here recently. Apart from wild hoofed animals, this island is a habitat for

large-toothed souslik, jerboa, copperhead snakes, and many birds, mostly water fowl. In 1997, the island became connected with the parent shore. (2) Sor (solonchak) in the southeastern part of the *Ustyurt Plateau* (see).

Bartold, Vasily Vladimirovich (1869–1930) – one of the most renowned and outstanding representatives of the Russian Oriental science of the late 19th – early 20th centuries. He studied on the Faculty of Oriental Languages in the Petersburg University. At the age of 32, he became a Professor of Petersburg University, since 1913 – academician. He was a member of nearly all European academies and scientific societies and a wide specialist in Oriental disciplines. The basic lines of his scientific activities are history of the peoples and states of Central and Middle Asia, the interaction of Oriental and Western cultures, and the history of Islam. The works of B. contain an enormous amount of factual material supported by archeological and numismatic data and represent a real encyclopedia of historical and philological knowledge about ancient and medieval Central Asia. B. made his significant contribution in the development of a network of scientific establishments, educational institutions, and libraries in Central Asia and in collections of manuscripts and their study in local archives. In 1902, B. published his work, “Data about the Aral Sea and Amudarya Lower Reaches from the ancient times to the 17th century,” and in 1914, he published, “About the history of irrigation in Turkestan.” In 1924, in Baku he read a cycle of lectures, “Place of Circum-Caspian areas in the Moslem world history” to the young intellectuals.

His most important works are “Turkestan in the epoch of Mongolian invasion” (in two volumes, 1898–1900); “History of Oriental studies in Europe and Russia” (1911); “Ulugbek and his time” (1918); “Islam” (1918); “Turkestan History” (1922); “Tractates” vols. 1–9, M. (1963–1977); and “Works on historical geography” (2002), to name but a few.

Fig. 20 V.V. Bartold
(1869–1930)



Basin of the Aral Sea – see Watershed Basin of the Aral Sea.

Basin Water Management Associations (BVO) – in 1987, pursuant to the resolution of the October (1985) Plenum of CPSU CC, the BVO “Amudarya” and

"Syrdarya" were established within the framework of the USSR Ministry of Water Management. They were in charge of allocation of water resources among republics and operation of water intake structures and waterworks. They were located in Urgench and Tashkent. On their basis were formed the Kurgan-Tyube, Chardjou, Urgench (*UPRADIK*), Nukuss (BVO "Amudarya") as well as Gulistan, Uchkurgan, Chardara, Chirchik (BVO "Syrdarya") territorial production authorities on control of water resources utilization and operation of water intake structures. In 1992, BVOs were turned into executive and inter-departmental control bodies of the Interstate Coordination Water Management Commission (*MKVK*).

BVOs were vested the following powers: allocation of transborder water resources and water supply to water users in the Aral delta and A.S. following the *MKVK* decisions; control of the operating regime, approved by *MKVK*, of a cascade of reservoirs on the transborder surface water resources; implementation of nature conservation actions within water protection zones of transborder rivers and reservoirs in compliance with the legislations of the parties upon agreement with the local administration; preparation of basic materials for *MKVK* meetings in accordance with their agenda on water resource management, water use, improvement of the environmental situation and promotion of management and procurement establishments; and support of relationships with other international organizations.

The hierarchy of water resource management in BVO includes three levels, each one subordinate to a higher-ranking one. The first level is BVO Administration that reports to *MKVK* and addresses the issues of planning, management, control, and water allocation among states. Informationally, BVO is linked with the Ministries of Water Management of Uzbekistan and Kyrgyzstan, Tajikistan, and Turkmenistan, research centers of *MKVK*, and the hydrometeorological services of Central Asian states. The second level is represented by four territorial authorities of waterworks that, pursuant to the water intake quotas approved by BVO, ensure water supply to water users. Each authority controls the objects of a water management complex and ensures transportation, formation and utilization of water resources within their command territories. The territorial authorities directly subordinate to the BVO administration. The third level are control and management points that include hydraulic structures and gauging stations which are on a balance of territorial authorities.

Basin Water Management Association (BVO) "Amudarya" – In 1987, pursuant to the resolutions of the October (1985) Plenum of CPSU CC and the USSR Government and order of the USSR Ministry of Water Management, a basin department on inter-republican allocation of water resources in the Amudarya basin was established. Later, it was renamed the Basin Water Management Association (BVO) "Amudarya." Its administrative center was located in Urgench (Uzbekistan). It has 5 divisions. According to its Statute, BVO acts as an interstate organization. In its activities, it is guided by the BVO Statute approved by *MKVK*, interstate treaties, protocols, and other regulatory acts. It

has an independent balance, exercises the rights of a legal entity, has its seal, and special and current accounts with state banks. BVO is headed by a chief appointed by MKVK and is financed by three states – Uzbekistan, Tajikistan, and Turkmenistan.

At present, by agreement of the regional states, the BVO “Amudarya” commands not the whole Amudarya basin, but only the main channels of the Pyanj, Vakhsh, Kafirnigan, and Amudarya from their origin to A.S. BVO “Amudarya” controls all pumping stations on the main channels of these rivers and on interstate canals as well as part of river water intakes not put on the BVO balance. These are the waterworks on the Vakhsh, the Karakum Canal, and the Tuyamuyun waterworks with the reservoirs on the Amudarya. In addition, this Association is in charge of operation of the interstate main canals in the Amudarya lower reaches downstream, the Tuyamuyun waterworks.

For management of transborder water resources on such vast territory 4 authorities were created in BVO “Amudarya” responsible for operation of water intake structures, waterworks, and interstate canals: Upper Darya Waterworks Authority (UGU) with its central office in Kurgan-Tyube (Tajikistan); Middle Darya UGU (Turkmenabad, Turkmenistan); Lower Darya UGU (Takhiatash, Karakalpakstan, Uzbekistan), and UPRADIK (Urgench, Uzbekistan).

The Kurgan-Tyube Waterworks Authority (a new name for the Upper Darya Waterworks Authority) is in charge of operating 8 water intake structures and controls water intakes from the Pyanj, Vakhsh, and Kafirnigan Rivers as well as from the Amudarya stretch of 246 km long as far as the Kelif water gauging station.

The Turkmenabad Waterworks Authority (a new name for the Middle Darya Waterworks Authority) controls water intakes on an Amudarya stretch of 552 km long between gauging stations in Kelif and Darganata. Nine major river water intake structures are overseen by the authority.

The Authority for Amudarya Inter-Republican Canals (UPRADIK) is responsible for the operation of 11 river water intakes, 52 hydraulic structures on main canals, management and operation of 386 km of the main canals, control of the water intakes on the river stretch from the Tuyamuyun waterworks to the Pichpak gauging station (167 km in length). UPRADIK controls 3 major irrigation systems: Tashsakinsky, Klychniyazbaisky, and Kupchak-Bozsu.

The Nukus Waterworks Authority (a new name for the Lower Darya Waterworks Authority) undertakes operation of the Takhiatash waterwork, the head river intakes on the Khan-yab and Djumabaisaka canals, and controls all water intakes on a river stretch from the Kipchak gauging station to A.S. (a length of 283 km).

The Tajikistan, Turkmenistan, and Uzbekistan Republics passed 84 hydraulic structures (including 36 headworks of river water intakes), 169 gauging stations, 386 km of interstate canals and related engineering communications

(roads, communication lines, power supply lines, technical facilities, etc.) to the BVO "Amudarya" balance for temporary use.

Basin Water Management Association (BVO) "Syrdarya" – In 1987, pursuant to the resolutions of the October (1985) Plenum of CPSU CC and the USSR Government and orders of the USSR Ministry of Water Management, it was decided to establish a basin department on inter-republican allocation of water resources in the Syrdarya basin. Later, it was renamed into the Basin Water Management Association (BVO) "Syrdarya." Its administrative center is located in Tashkent. It has 4 divisions. Its structure includes: Charvak Reservoir Authority (settlement Charvak, Uzbekistan); Upper-Chirchik UGU (Chirchik City, Uzbekistan), Naryn-Karadarya UGU (Andijan City, Uzbekistan), and Golodnaya Steppe Waterworks and Canal Authority "Dustlik" (Gulistan City, Uzbekistan). BVO "Syrdarya" organizes the supply of Syrdarya waters for the MKVK sovereign member states, undertakes operation of water intakes and waterworks, and attempts to improve the environmental situation and control of the quality of utilized water resources. The Association controls the flow regime of the Naryn, Karadarya, Chirchik, and Syrdarya Rivers as far as the Chardarya reservoir. The association is financed by MKVK member states on the parity and share-related basis in proportion to the volumes of withdrawn and used river water. (In fact, some states fail to provide financial support on a regular basis, which makes the association's functioning difficult.)

The association manages head water intake structures on the Syrdarya and its main tributaries and also canals of interstate significance (e.g., the "Dustlik" canal and the Greater Ferghana Canal); all are owned by the states in which territories they are located. BVO manages 203 hydraulic structures, including 21 on the main riverbeds of Naryn, Syrdarya, Karadarya, and Chirchik. Water discharges of these structures vary from 20 to 250 cu. m/s, while the flows of "Dustlik" and GFC reach 400 cu. m/s.

The main water user in the basin is farming; the total area of irrigated lands here is equal to 3.4 mln ha. About 1.73 mln ha are irrigated directly from the river. Metering of water intake from rivers and commanded canals is done at 445 points comprising 21 head water intakes, 36 permanent pumping stations, and 172 temporary pumping plants. Consumption of surface river waters is controlled mostly by the hydrometeorological services of the republics and on water intake structures like those of BVO "Syrdarya" and other water management bodies of the Central Asian states.

BVO "Syrdarya" has a three-level management structure: first level – central authority in Tashkent, second level – territorial authorities, and the third level – control and management divisions. The central authority accumulates information about water supply to projects; estimates water needs; plans water allocation among four states and A.S., including for each water intake on the Syrdarya and interstate canals; plans operation of the Naryn-Syrdarya cascade of reservoirs; and accumulates information about river water quality. The second level of this hierarchy includes 4 territorial authorities that are responsible for repair of

waterworks and directly control the structures in the course of their operation. They control compliance with the quotas on water intake from rivers within the set borders together with the district and regional water management and agricultural bodies of the states in which territory they operate. They also control the quality of river waters and compliance with the environmental requirements. The zones of action of the territorial authorities cover the Syrdarya proper (two authorities), its main tributaries (Chirchik and Karadarya), and also the Charvak reservoir zone. The third level of BVO includes the control and management divisions covering head water intakes, dams, pumping stations, and gauging stations. The tasks of these divisions are to amass information about the condition of the water management complex and to understand the impacts of its control.

Bastard Sturgeon (*Acipenser nudiventris*) – fish of the sturgeon family (*Acipenseridae*). In 1828, G. Meendorf, a member of the embassy in Bukhara and Khiva, brought one specimen of the Aral B.S., and A. Lovetsky, using this specimen, described B.S. as a new species. B.S. was often called the Aral sturgeon. It was up to 2 m long. Anadromous. The males reached fertility at the age of 6–9 years, while females matured at 12–14 years. They spawned in the Syrdarya and Amudarya in the second half of April. Their fertility varied from 280 thou eggs to 1 mln eggs. The eggs were about 3 mm in diameter. Prior to introduction, B.S. fed largely on mollusks. This fish was a typical bentophag. Later on there were proofs that it became predatory fish. In the stomach of the Aral B.S. there were found bullhead, sand pipers, aterina, shrimp. A valuable commercial fish, its reserves were severely depleted.

Bay-type coast – see Aral-type coast.

Begdulla-Aidin Lake – a part of the marshlands of the Sudochie Lake in the south of A.S., it covers 5.5% of its water area. The maximum length of the lake is 4 km, while the width is 2.5 km. The depth does not exceed 1.2–1.5 m, and the length of its coastline is 11 km. During the disastrous low-water period in 2000–2001, it dried out completely.

Bellingsgauzen Island, Shoal Bank* – a former shoal, it appeared in place of a water eroded island to the north of the Lazarev Island. This shoal extends for over 10 km from north-north-east to south-south-west. With the drying of the Aral Sea, this shoal first turned into an island and then became linked with Vozrozhdenia Island.

Beltau, Bel-Tau Upland* – an anticlinal upland running along the A.S. coast in the south-east for 30 km in a sublatitudinal direction. It is composed of Paleogene and Neogene clays and sandstones. Its maximum height is 146 m. It rises up to 85 m over the delta adjoining the upland on the south. The southern and western slopes are steep, in places even steep, with structural terraces; some places are covered by wind-blown sands. The B. northern slope gently descends towards A.S. where it is confined by a sea terrace. For over

20 km, the scoured parent rocks to the west of B. form small uplifts coated with wind-blown sands. The prevailing relief is ridge-honeycomb. Some depressions are occupied with saline lakes, the largest of which is *Karateren* (see).

Bening Shoal* – located to the north of the Komsomolsky Island 39 km to the east-south-east of the *Baigubekmuryn Cape* (see) on the bottom rise extending from the Kordjendy Peninsula to the *Muinak Island* (see). The shoal extended in the meridional direction for about 7.5 km. The surrounding depths were 8 to 10 m.

Berg, Fedor Fedorovich (Frederick William Rembert) (1793–1874) – a military and state figure, traveler, geodesist, general field marshal (1866), aide-de-camp general (1831), Count (1856). He studied at the Derpt University. Took part in the Patriotic War of 1812 and in foreign campaigns of the Russian Army in 1813–1814. Then he traveled over Europe. In 1820–1822, he was on a diplomatic service in Munich and Rome. Prepared a military-statistical description of Turkey. In 1823 and 1825, he headed the expeditions to the Trans-Caspian Area during which he collected the material for the military-topographical description and maps of the territory between the Caspian and Aral Seas. Participated in the 1828–1829 Russian-Turkish War. In 1828–1830, he supervised surveys of the northeastern part of Bulgaria and Balkan Mountains, Romania and on the shores of the Kamchia River. From 1843, he was the General-quartermaster of the Headquarters. B. guided preparation (from 1845) of a 3-*versta* (*versta* = 3.500 feet) military topographical map of Russia, including a military-statistical description of provinces; under his surveillance, the application of photographs during topographical surveys began. In 1845, he became a founding member of the Russian Geographical Society. B. was the Honorary President of the Joint Staff Academy (1861) and an Honorary Member of RGS (1870).

Berg, Lev Semenovich (1876–1950) – a well-known Russian geographer, biologist, and natural scientist. A corresponding Member of the USSR Academy of Sciences from 1928, academician from 1946, RSFSR Honored Worker of Science (1934), and Honorary Member (from 1934) and President (1940–1950) of the USSR Geographical Society. Laureate of the USSR's Stalin Award (State Award) (1951) for the monograph "Fresh-Water Fish in the USSR and Neighboring Countries" (1946, 4th edition, Parts 1–2, 1948–1949). 1899 begins the Central Asian (Turkestan) period in Berg's life. For several years, he studied A.S., the Issyk-Kul and Balkhash Lakes, the Greater Barsuki sands, and climbed glaciers in the Turkestan ridge. He studied the problems of ichthyology and fisheries in the Aral and in the Amudarya and Syrdarya deltas. In 1904, B. was invited to Petersburg to work at the Zoological Museum (now Zoological Institute of the Russian Academy of Sciences). In 1908, his fundamental book named "*Aral Sea: Experience of Physiographical Monograph*" (see) was published. He submitted it as his thesis work for the degree of Master of Geography, but in 1909 was awarded the doctoral degree. In 1913, B. began his pedagogical activities, first as professor of ichthyology and hydrology at the

Moscow Agricultural Institute, then after 1916 at Petrograd (Leningrad) University in the Geographical Institute which, in 1925, was included as a department at the University. In 1915, B. was awarded the Great Gold (Konstantinov) Medal. In the same year, the Moscow Society of Natural Scientists elected him its honorary member. In 1925, B. visited A.S. again. He studied fishery and conducted hydrological investigations.

Berg conducted his investigations in Western Siberia, Central Asia, Povolzhie, in the Caucasus, the East-European Plain, and in other regions of the USSR. His scientific interests cover the theory of geography, teachings on landscapes and landscape zones, regional geography, history of Russian geography, ichthyology, limnology, climatology, paleogeography and also geomorphology, lithology, soil science, glaciology, zoogeography, and others. B. developed further the V.V. Dokuchaev's theory on natural zones, developed a theory of landscapes, and proposed the soil theory of loess formation. A prominent place among the scientific issues addressed by Berg is his studies of the Caspian Sea. One of the chapters in his book, "Essays on the History of Russian Geographical Discoveries" (1949), was devoted to the first Russian maps of the Caspian and Aral Seas.

In honor of his outstanding works in the field of geography, biogeography, and ichthyology, the Russian Academy of Sciences instituted in 1995 the award of the L.S. Berg Gold Medal (Departments of Oceanology, Physics & Atmosphere, and Geography).

In 2001, in the non-recognized Circum-Dnestr Moldavian Republic (B. was born in Bendery), B. was honored on a commemorative coin (100 rubls., silver 925).

His principal works are: "Will Central Asia Dry Out?" (1905); "Aral Sea. Experience of Physiographical Monograph" (1908; for this work B. was awarded the academic doctoral degree in geography and the medal of the Russian Geographical Society named after P.P. Semenov-Tyanshansky); "Climate and Life" (1922); "Essays on the History of Russian Geographical Discoveries" (1929); "Relief of Siberia, Turkestan, and the Caucasus" (1936); "Nature in the USSR" (1937); "Essays on History of the Russian Geographical Discoveries" (1946); "One Century of the All-Union Geographical Society. 1845–1945" (1946); "Landscape-Geographical Zones of the USSR" (Part 1, 1931); "Geographical Zones of the Soviet Union" (Part 2, 1952); and "Selected Works" (Vols. 1–2, 1956–1958).

Berg Strait – Named in honor of *L.S. Berg* (see), it was located between the *Kokaral Lake* (see) and the Syrdarya mouth. Its width was 15 km with a maximum depth of 13 m. In the early 1980s, bottom dredging works in the existing waterway were carried out. In 1989–1990, it dried out. Until 1992, instead of this strait there was a small strait with a rather strong current from the Small Sea to the Large Sea (the result of the water level rise in the Small Aral). In 1992, a cofferdam was constructed that in several days was destroyed. Then, a stronger cofferdam was constructed that was destroyed in early 1993 due to the water level rise in the Small Aral. In 2005 a solid dam was constructed here.

Biiktau Island* – located near the southeastern shore of A.S., 6.3 km to the south-east of the *Uyaly Island* (see). Low, sandy, with some small hills. The northern and eastern shores of the island are flat. The southern part of the island gets flooded in some places.

Biodiversity of the Aral Sea Region – In the past the uniqueness of the Aral Sea Region contributed to richness and diversity of the biota, which could be compared with Africa. There were 500 kinds of birds, 200 species of mammals and 100 species of fishes, thousands of insects and invertebrates. Before 1960 the river deltas were home to over 70 kinds of mammals and 320 types of birds. At present a half of them remain. In lowstreams of the Amudarya and Syrdarya rivers thousands hectares of alluvial soils became salt-marsh, and swamp and meadow-swamp soil became dry. This resulted in the destruction of several herbs needed for fodder for sheep, horses, camels and goats. Diseases and death of cattle began, musk-rats cultivation stopped, and sheep live-stock decreased sharply. The regional flora was impressive and included 1,200 flowers, 560 types of tugai forests of which 29 are endemic to Central Asia. The change in water balance caused mineralization of the water in the Aral Sea basin, which led to the loss of unique biocenosis and a number of endemic species of animals. The formerly flourishing sea ecosystem included 24 species of fishes, including bream, sazan, aral roach (vobla), carp, perch, sturgeon, salmon, sheat-fish and spike that disappeared completely due to tenfold rise of salinity.

Bioecology Institute, Karakalpak Branch of the Uzbek Academy of Sciences – was established in 1994 on the basis of biological laboratories of the Integrated Institute of Natural Sciences and the Department on Circum-Aral Environmental Problems (former Research Center “Aral” of the USSR Academy of Sciences). This is the only research institution in the Central Asian region dealing with this issue. The main lines of research activities of this institute are: the study of environmental consequences of anthropogenic impact on the natural environment of the Aral basin, addressing the issues of conservation of biological diversity, and the wholeness of the ecosystems in the region and criteria for assessment of their state.

The Institute includes laboratories, research stations, and groups: Ecology of Microorganisms, Fish Ecology, Hydrobiology and Hydrochemistry, Soil Science, Phytocenology, Ecology and Physiology of Plants, Ecology of Land Animals, Parasitology, Ustyurt Desert Station, Muinak International Biological Station, the Group of Herbaria of the Southern Circum-Aral Area, and a Zoological Museum. The Institute also conducts 2 research workshops: Problems of Circum-Aral Ecology and Biodiversity & Specially Protected Natural Territories.

Bioplateau – a method of biological treatment of polluted drainage and waste waters by the artificial planting of higher water plants as biofilters in settlement ponds and collecting-drainage canals. Among the higher aqueous plants, the most practical for water treatment are reeds, narrow-leaved cattail, lacustrine

Fig. 21 Camels at the watering place. Photo by N.V. Aladin.



rush, hyacinth aqueous, hornwort, among others. The best water treatment has been achieved by strip planting of rush and cattail across the direction of the polluted water flow. This method is environmentally safe and less costly compared to other methods.

Biyurgundy Island* – located in the north of A.S., 2.6 km westwards of the *Kendyrli Island* (see). High-elevated and undulating, in general, its northern coast ends with rather high and steep cliffs. In the southwestern direction, the island becomes lower and its southwestern coast is low-lying and flat.

Blaramberg Ivan Fedorovich (1800–1878) – a geographer, traveler, and military topographer of Dutch origin. He finished a law degree at Hessen University, and in 1823 went to Moscow where he studied the Russian language and improved his knowledge in French literature, mathematics, history, and drawing. In 1824, he naturalized in Russia. He graduated from the Institute of the Corps of Railway Engineers and took part in the Caucasus campaigns against highlanders as a General Staff officer. In 1832–1836, he completed a major work on a description of the Caucasus. In 1836, he was awarded the rank of captain. In the same year, B. took part in the G.S. Karelin expedition to the southeastern shores of the Caspian Sea, where they made a detailed description of the eastern shores of the Caspian Sea. From 1841 to 1856, he took part and headed topographical surveys and geographical studies of the Northern and Eastern Circum-Aral area. He selected places for construction of forts (fortifications), including Ural (Irgiz-Kala, presently Irgiz settlement in the Aktyubinsk Region, Kazakhstan), Orenburg (Turgai, presently Torgai of the Kostanai Region, Kazakhstan), and Aral (Raim, presently Raim aul of the Kyzylorda Region, Kazakhstan) fortifications. He also took part in the seizure of the Ak-Mechet fortress (later Perovsk, presently Kyzylorda, Kazakhstan) and was promoted to the rank of general. In 1850, he published the “Topographical and statistical description of the eastern coast of the Caspian Sea from the Astrabad

Bay to the Tyuk-Karagan Cape” (more correctly Tyub-Karagan) in the Proceedings of the Emperor Russian Geographical Society. In 1853, he published in the same proceedings the “Record book made during the expedition for study of the eastern coast of the Caspian Sea in 1836” and a “Statistical review of Persia.” At the end of his days, he published “Reminiscences” that in 1978 were translated from German to Russian and published in Moscow.

Fig. 22 I.F. Blaramberg
(1800–1878)



Board of the International Fund for saving the Aral Sea (IFAS) – see International Fund for saving the Aral Sea.

Bottom soils of the Aral Sea* – the soft, unconsolidated soils prevailing in the sea. Stony soils are practically absent, except for small areas adjoining the Kulandy Peninsula (*Izendyral and Uzunkair capes* (see)), *Vozrozhdenia Island* (see)) (eastern shore), small Chagaly Island, and also *Lazarev Island* (see) (eastern shore). The coastal strip is composed of sandy soils. Near the eastern shore overgrown with thickets of cane and reed and abounding in algae some places are made of silts and silty sands. The sandy soils occur at depths to 10 m, and next to them there is a narrow strip of silty sands replaced further on by sandy silt. In many places, shells of *Adacna minima*, *Dreissena polymorpha* and *Cardium adule* are found. Significant accumulations of these shells occur to the south of the Kulandy Peninsula, near the western shore of the sea, to the east of the Baigubekmurun (Bai-Kubek) cape, to the north-west of the Uyaly Island, and nearby the northern and eastern tips of the Kug-Aral Island. The greater part of the sea bottom is composed of gray silt overlain with a thin layer (2–5 cm) of very soft (semi-fluid) light-gray silt. In the central part of the sea is an area of more compacted gray-colored argillaceous silt overlain with a thin layer of light-brown semi-fluid silt. The underwater upland stretching from the Kulandy Peninsula nearly as far as the Lazarev Island is made up of sandy soils passing southward into silty sands. The soils in the deep-water depression near the western shore beginning from depths 35–40 m were represented by black,

fluid, slimy silt smelling of hydrogen sulfur. Small areas composed of black silt may be found in the middle of the northern part of the *Chernyshov Bay* (see) and to the south of the Karatyube Peninsula. Black silt (with a considerable addition of sand) is found not only at great depths but also in some shallow-water bays near the eastern shore.



Fig. 23 Dried bottom of the Aral Sea (November 2007). Photo by Pavel Kosenko, <http://pavel-kosenko.livejournal.com>

Bozkol Bay* – located on the eastern shore of A.S., stretching for 40 km in the northeastern direction and representing a vast shallow water basin limited on the west by the *Agurme Peninsula* (see), on the north and east by the mainland, and on the south by *Tasty* (see), *Takhtaatau*, *Eshkeatau*, and *Aijarym Islands* (see). Except for some fishery areas, the bay was not suitable for navigation of even small vessels because it was overgrown nearly completely with reeds; in many places, it dried out and was filled with water only during large floods on the Syrdarya.

Bugun Bay – located in the south-east of the *Small Sea* (see), 22 km to the south-south-west of the *Kishi-Karatyup Bay* (see). The banks around the bay are low and sandy. In some places, hills up to 10–15 m high are found 100 to 200 m from the water edge. Bugun settlement is located on the southeastern shore of the bay, 2.5 km to the east-south-east of the Kara-Karnau Cape. Earlier, the Bugun fishery base “Goslov” and a fish processing plant were located here.

Bulrush (*Scirpus*) – a grass plant of the sedge family, mainly perennial though sometimes annual grasses. Approximately 200 varieties of B. are known. They grow mostly in areas with moderate climate of the Northern Hemisphere along the banks of rivers and lakes and in wetlands. In Russia and a Central Asia, about 40 varieties are found. They grow at depths up to 3 m and their leaves are up to 2.5 m long with stems 3 to 4 m high. Roots creep under water, while flexible stems rise above it. The most well-known variety is lacustrine bulrush (*S. lacustris*) with cylindrical stems nearly without leaves up to 2.5 m high. B. creates protective zones and contributes to ground silting which creates favorable conditions for algae growing. Their creeping roots facilitate spreading and form a solid, net-like cover on the bottom of shallow overgrown water bodies. B. always grows in water or near water. At depths up to 3–5 m, it forms dense thickets that by a wide belt go into a water body and replace *cane* (see) zones. Together with the cane, B. overgrows lakes. B. is often called cane, but the latter is markedly different from B. and is classified as a cereal. Some varieties of wildrye and selinum growing on sands in Central Asian countries and in the south of Russia are called sandy or dune B. Bulrush was well developed in low-saline waters of the Aral, in particular near the Akpetkinsky Archipelago (1960).

Butakov Alexey Ivanovich (1816–1869) – circumnavigator, rear-admiral (1864), investigator of waterways in Central Asia and A.S., and the “Magellan of the Aral Sea,” as the great A. Humboldt called him. He graduated from the Sea Corps (1832), and I.F. Kruzenshtern recommended leaving him in the Officer Class, which he finished in 1836 when he was directed for work on the corvette “Lvitsa” (Lioness), then the frigate “Kastor,” and still later the vessel “Bogatyr” (Athlete). In 1840–1842, with a rank of senior officer, he navigated round the world on the military transport “Abo.” From 1845, he was a member of the Russian Geographical Society (RGS), and from 1848, he was chief of the expedition to survey and describe the A.S. shores. In spring 1848 in Orenburg, he organized production of parts for and assembly of the scow schooner “Konstantin” near Aralsk. In the summer and spring, sailing on this vessel, he described the northern, southern, and western shores of the sea and revealed the sea level fluctuations. In 1849, he was promoted to the rank of captain-lieutenant. For his hydrographic works, he was awarded the Saint-Vladimir Order of the 4th degree. Later, he headed the *Aral fleet* (see). In the western part of the sea, he discovered the Vozrozhdenia Island and other smaller islands. In 1850, B. went to Sweden to order two iron vessels for the Aral fleet. In 1852, a center-board vessel “Perovsky” and a steam longboat “Obruchev” were delivered via Orenburg in a dismantled state to Raim and in the next year they were launched. These were the first steam vessels on the A.S. In 1850, information about the expedition was published in a short article, “Recent expedition for study of the Aral Sea” in the “RGS Geographical Proceedings.” In Orenburg, he prepared the first map of the sea in the Mercator’s projection and included with it albums with pictures of the exiled *T.G. Shevchenko* (see). He was reprimanded by the Emperor for inviting Shevchenko for work.

For investigations of A.S., on the A. Humboldt's initiative, in 1853 he was elected the Honorary Member of the Berlin Geographical Society and was awarded the RGS Demidov Prize.

In 1853, on the vessel "Perovsky", he crossed the Syrdarya and took part in the seizure of the Ak-Mechet fortress in Kokand. For building of the vessel, he was awarded the St. Ann Order of the 2nd degree. In 1854, commanding a unit of 300 Cossacks and 50 Bashkirs, he delivered the parts of seven iron row vessels for the fleet from Orenburg to the Aral fortress. He organized construction of a shipyard, a port for the fleet, and a slipway for pulling a vessel onshore. In 1855, he was promoted to captain, rank II. He prepared an inventory of the Syrdarya from the Kum-Sukhta area to the mouth. In 1857, with three hundred Cossacks, he took part in actions against rebellious Kirghizs near the Aryk-Balyk area on the Syrdarya. In 1858, with his fleet he carried the first hydrographic investigation of the Amudarya River for supporting the Russian diplomatic mission. Among the members of this expedition were O.V. Struve (later on the director of the Pulkovo Astronomical Observatory) and fleet lieutenant A.F. Mozhaisky (future inventor of a plane). In 1859, he helped the Kungrad Bek that separated from the Khiva Khan to raise the siege of Kungrad. He also continued his descriptions of the Amudarya delta.

In 1860, he was promoted to the rank of aide-de-camp and sent to England to order two iron vessels, a floating pontoon drydock, and barges. After the execution of this order, he was sent to North-American United States. In 1861–1863, he supervised the assembly of a floating pontoon drydock and the vessels "Aral" and "Syrdarya," which had been delivered from England, and made an inventory of the Syrdarya from the fortress Perovsky for 807 *verstas* upstream and in the Turkestan and Tashkent estates for 1500 *verstas* from the mouth of the river.

In 1864, he was promoted to rear-admiral, taking the position of the chief of the Baltic Sea fleet headquarters. In 1865, he became the junior chief of the Baltic Sea armored fleet and the commander of the soundly armored sheep squadron. After 1866, he was a member of the artillery division of the Maritime Technical Committee, and from 1867 was the acting squadron-major of His Majesty. In 1868, he went to Germany for medical treatment, where in the resort town Shwalbach he spent his last days.



Fig. 24 A.I. Butakov
(1816–1869)

Among his published works are “Information about the 1848 expedition for the Aral Sea description” (1853), “Notes on meandering of the Syrdarya mouth beds” (1851), “Sailing of the ‘Petrovsky’ vessel over the Syrdarya” (1857), “Recent expeditions for the Aral Sea investigations” (1861), and “Diaries of A.I. Butakov made on the ‘Konstantin’ schooner during the Aral investigations in 1848–1849” (Tashkent, 1953).

Butakov Bay (former Paskevich Bay)* – located in the north of the A.S., demarcated on the east by the Kokturnak Peninsula, on the north by the mainland shore, and on the south-west by the Shubartarauz Peninsula. The entrance into the bay is located between the *Vasily Cape* (see) and the *Tastubek Peninsula* (see). The bay was deep at more than 20 m. The shores are montane: in its northern part, the shores are high and steep, while in the eastern and western parts wide sandy beaches are found. It is named in honor of rear-admiral *A.I. Butakov* (see).

Butakov Cape* – the southwestern tip of the *Barsakelmes Island* (see). Represents a high steep cliff projecting insignificantly towards the sea. The sea is deep near the shore. It is named in honor of rear-admiral *A.I. Butakov* (see).

The Aral Sea Encyclopedia

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2009, VIII, 290 p., Hardcover

ISBN: 978-3-540-85086-1