

Sedimentation and Morphology of the Kura River-Deltaic System in the Southern Caucasus under Anthropogenic and Sea-Level Controls

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Abstract : The Kura River is the major water artery in the Southern Caucasus; it is a third river in the Caspian Sea basin in terms of length and size of the catchment area, the second in terms of the water budget, and the first in the volume of sediment load. Understanding of major controls on the Kura fluvial- deltaic system is valuable for efficient management of the highly populated river basin and coastal zone. We have studied grain size of sediments accumulated in the river channels and delta and dated by ²¹⁰Pb method, astrophotographs, old topographic and geological maps, and archive data. At present time sediments are supplied by the Kura River to the Caspian Sea through three distributary channels oriented north-east, south-east, and south-west. The river is dominated by the suspended load - mud, silt, very fine sand. Coarse sediments are accumulated in the distributaries, levees, point bar, and delta front. The annual suspended sediment budget in the time period 1934-1952 before construction of the Mingeçhavir water reservoir in 1953 in the Kura River midstream area was 36 mln.t/yr. From 1953 to 1964, the suspended load has dropped to 12 mln.t/yr. After regulation of the Kura River discharge the volume of suspended load transported via north-eastern channel reduced from 35% of the total sediment amount to 4%, and through the main south-eastern channel increased from 65% to 96% with further fall to 56% due to creation of new south-western channel in 1964. Between 1967-1976 the annual sediment budget of the Kura River reached 22,5 mln. t/yr. From 1977 to 1986, the sediment load carried by the Kura River dropped to 17,6 mln.t/yr. The historical data show that between 1860 and 1907, during relatively stable Caspian Sea level two channels - N and SE, appear to have distributed an equal amount of sediments as seen from the bilateral geometry of the delta. In the time period 1907-1929, two new channels - E and NE, appeared. The growth of three delta lobes - N, NE, and SE, and rapid progradation of the delta has occurred on the background of the Caspian Sea level rise as a result of very high sediment supply. Since 1929 the Caspian Sea level decline was followed by the progradation of the delta occurring along the SE channel. The eastern and northern channels have been silted up. The slow rate of progradation at its initial stage was caused by the artificial reduction in the sediment budget. However, the continuous sea-level fall has brought to this river bed gradient increase, high erosional rate, increase in the sediment supply, and more rapid progradation. During the subsequent sea-level rise after 1977 accompanied by the decrease in the sediment budget, the southern part of the delta has turned into a complex of small, shallow channels oriented to the south. The data demonstrate that behaviour of the Kura fluvial - deltaic system and variations in the sediment budget besides anthropogenic regulation are strongly governed by the Caspian Sea level very rapid changes.

Keywords : anthropogenic control on sediment budget, Caspian sea-level variations, Kura river sediment load, morphology of the Kura river delta, sedimentation in the Kura river delta

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