

NATURAL AND HUMAN BOUNDARIES AT THE CASPIAN SEA

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In accordance with the watershed principle, convergence of genuine natural boundaries (such as watershed lines) with the human-set boundaries (e.g., administrative borders) contributes to the sustainable use of natural resources.

In certain cases, defining spatial correlation between systems under governance and management systems is virtually impossible. This refers to transboundary water bodies, where watershed principle is not fully applicable; however, certain cooperation efforts exercised by the riparian states may improve the situation.

After the collapse of the Soviet Union, the new states emerged in the Caspian Sea region. New issues appeared in the Caspian agenda – application of the national jurisdiction to the seabed, water column and surface water areas, marine natural resources. These issues gained urgency due to discovery of the new oil and gas deposits. Taken together, they are often referred to as the problem of the Caspian Sea legal status. It is a well-known fact that this problem has not yet been resolved because of the divergent positions of the Caspian littoral states, while negotiations proceed for more than a decade. This uncertainty provides a chance to harmonize the borders of full (or partial) national (or conjoint) jurisdiction with the boundaries of natural systems.

The Caspian Sea ecosystem is indivisible. Its integrity is maintained through the active horizontal and vertical water circulation, as well as migrations of fish species and seal, covering the entire sea area and river estuaries. Environmental integrity of the sea ecosystem is demonstrated by its reaction to the invasion of ctenophore species *Mnemiopsis* (comb-jelly). *Mnemiopsis* winters in the south, at the Iranian coast, and during the summer season permeates with the currents throughout the whole water area, up to the northern part of the Volga River estuary.

The Caspian Sea ecosystem is diverse, i.e., it includes a number of subdominant, partially isolated ecosystems. The following natural factors contribute to the isolation process: sills (Kulaly, Mangyshlak, Apsheron), hydrological fronts (particularly, the water-mix zone, the Volga River-North Caspian), quasi-stationary water circulation systems.

In terms of functional organization, ecosystems of the shallow North Caspian and deep-water South Caspian are strongly different. In the former, the major energy flux passes via detritus food web, in the latter – via pastoral / grazing food web. The coastal ecosystems of steady circular currents and of the open sea are markedly different in species diversity. It should be noted that the above current does not spread into the North Caspian, which has its own water circulation system.

Issues of the Caspian Sea division into zones of national and / or conjoint jurisdiction are generally regarded under two patterns: “lacustrine” and “maritime”. Under the first pattern, the sea is divided into the “national sectors” using the median line method. According to the second pattern, the full jurisdiction extends only to the coastal (territorial) waters, whereas remaining part of the sea is kept in common use.

The Convention on the legal status of the Caspian Sea is not yet adopted, however, all littoral states have already “nationalized” it – in a varying degree, under uni- or bilateral procedures. Currently, there exist: “Azerbaijani sector”, “territorial waters” of Kazakhstan and Turkmenistan, Kazakhstan and Russian “seabed districts”. This list does not include Iran, which has already used its military force to protect the waters adjacent to the Iranian coast. Presently, the Russian formula “Divide the seabed and share the water”, proposed for consideration of the Caspian Sea legal status, is in the focus of negotiation parties.

Our research is related to studying environmental specifics of the areas / districts, which will emerge through the sea division under this or that pattern, assessment of conformity between natural and human boundaries, finding environmental formula for the Caspian division process.

Below certain results of our research are cited.

Results of water balance calculations for the “national sectors” of the Caspian Sea show that only one of them, namely, the Russian, has a surplus of water balance. The annual water inflow and consumption in the Iranian “sector” are equal; the largest deficit of the water balance is recorded in Kazakhstan “sector”, followed by Turkmen and Azerbaijani “sectors”. Concurrently, the surface runoff from Russian territories provides the major source for covering moisture deficit in the Caspian “national sectors” featuring a negative water balance.

As regards the water balance, the Caspian Sea may be divided into two parts, both with the equal water balance ratio (inflow equal to/ consumption). The first part includes Iranian “sector”, and the second part – all other “sectors” taken together. It is noteworthy that the border between these two parts passes approximately by the Astara – Ghassan-Kuli line, a previously tacit border between the Soviet Union and Iran (Persia).

In the other cases, the borders between the “national sectors” as defined by the median line method, do not coincide in the least with the natural Caspian boundaries. Establishment of the “national sectors” in the Caspian Sea region, given the disproportion in their water balance, is fraught with conflicts in the field of water use.

Analysis of oil products distribution in the surface water layer, based on the long-term observations (starting from the 1970-s), shows that four sea areas may be identified, according to the level and dynamics of oil pollution at sea:

- a) the North Caspian and the Central Middle Caspian,
- b) the area of circular current in the Middle Caspian,
- c) the South Caspian,
- d) the coastal areas of local pollution in the South Caspian.

The highest values of oil concentration in the water are typical for the certain coastal zones at the South Caspian (Bay of Baku, Turkmen Bay). At the same time, the other coastal areas do not differ from the open part of the South Caspian as regards oil concentration in the water. Similar pattern is typical for the Middle Caspian, where the average oil concentration in the coastal waters does not exceed the relevant value recorded at the central region.

In the open sea, the highest concentration of oil products is registered in the North Caspian; in the Middle Caspian the average concentration of oil products is lower than that in the North Caspian; and in the South – lower than that in the Middle Caspian. It may be stated that distribution of dissolved oil products in the surface waters of the Caspian Sea is mainly determined by two factors - the presence of local pollution sources and specific features of water circulation.

Distribution of the majority environmental parameters and, consequently, the existence of natural boundaries at the Caspian Sea are connected with integrated system “coastal areas – circular current – central areas”. However, the North Caspian is not involved in this system. The most important internal natural boundary of the North Caspian is the Kulaly sill, which divides it into the eastern and western parts, whereas the Mangyshlak sill separating the North and the Middle Caspian comes as the most important external natural boundary.

In order to reach conformity between the natural and human boundaries in the Caspian Sea, the North Caspian Sea should be completely divided into national sectors between Russia and Kazakhstan, while the remaining part of the sea area should be divided as follows:

- a) territorial waters under the full jurisdiction of the coastal states,
- b) the zone of circular current and fish migrations under the partial (fisheries) jurisdiction of the coastal states,
- c) the open sea part under conjoint jurisdiction of the coastal states.

In addition, the number of the Caspian flag states should not exceed the number of the littoral states.