Oecologia Montana 2012,
21, 42 - 44

TECHNIQUES AND STRATEGIES

About some regularities of geosystems' degradation in Central Asia

L.A. ALIBEKOV[1], S.L. ALIBEKOVA[1], I.K. NAZAROV and M.R. GUDALOV
[1]Department of Geography and Ecology, Samarkand State University, University Square 15, Samarkand, UZ-703004, Uzbekistan.[2]Economic Theory Department, Samarkand State University, University Square 15, Samarkand, UZ-703004, Uzbekistan. e-mail: davlat1982@yahoo.com

The appearance of new countries on the territory of Central Asia on the map and the Aral disaster in its center had complicated the efficient and complex solution of ecological, social and economical problems of this region. At present the ecological situation on the flat part of Central Asia is remaining tense despite practical measures undertaken and attracted efforts of authoritative international organizations and some countries.

The following evident facts can serve as an unquestionable argument in favor of such a conclusion: 1) year after year the tendency of growth of anthropogenic load on natural ecosystems is increasing; 2) preservation of relatively high rate of growth of population and the increase of its need for natural resources; 3) a new political, social and economical situation on the territory of Central Asia that is focused on the establishment of market relations; 4) the existence (even intensification according to some aspects) of interstate, interregional, intereconomic and private owner barriers, especially, on proportional usage of water and other resources; 5) low ecological literacy of the population including certain people in leading link of administrative personnel and oth. In these conditions the problem of preservation and replenishment of environment and resources of desert area of Central Asia is considered urgent and actual task. A positive solution of this problem dictates the need of theoretical bases that represent elaboration of new scientific approaches, ideas which could serve as a methodological support for deeper knowledge of mechanism of development of natural-economical systems and for elaboration of strategy of optimal use of nature to be applied for the whole territory of Central Asia. Because private, locally realized practical measures of recovery of the ecology of desert geosystems is ineffective on the background of functional dynamical integrity of Aral basin.

It is known that the territory of Central Asia is made up of two different morphostructural spaces - mountains and flat deserts. However, they function and evolve concomitantly. There is an energy and mass exchange between these contrasting structures and in paragenetical and paradynamic background they represent integrated geographical system. Conceptual ideas of these scientists, undoubtedly, have scientific, theoretical and applied significance. The mechanism of interaction and its ecological consequences in the "mountains - plains" system of Central Asia is clearly seen from the position of basin conception. The point of this conception is that there is a special type of natural territorial systems - reservoir geosystems on the earth's surface which emerge on principle of dynamic concomitancy and functional integrity. Hydrological subsystem is a main system forming factor here. A constant water flow is integral expression of functions of all nature components including anthropogenic content.

The followings are considered to be determinative section of the basin geosystem: 1) relatively visible expression of natural borders of rivers, lakes (seas); 2) geographical determinativeness (predetermination) of the direction of ground and underground horizontal streams of the substance and energy; 3) cascade location of territorial subsystems of the basin along the slope of the relief and accordingly, inadequacy of the mass and size volume of the energy exchange between mountainous and plain subsystems of the basin; 4) natural eco ability to refine itself of the upper stores of the basin in comparison with lower ones and accordingly, their predisposition to physical and chemical pollution; 5) genetic and geodynamic integrity of the territory of the whole basin, and also natural historical originality of the development of "nature-economy-people" system on its territory.

The examination of the history of formation and modern tendency of the development of geosystems of plain-desert relief of central Asia from the point of basin conception allows to expose the mechanisms of the origin of ecological tension more deeply not only in the region of Aral coastal but also in other parts of the deserts of this region. The beginning of the underground water movement from mountain territories to the west, in the direction of paleo-Turan dates back to Jurassic. For the last period on the background of new tectonic movements the flat territory of Central Asia served as a reservoir for the accumulation of ionic and solid alluvium from the

territories of mountains. Maximum amount of their inflow was observed in Ice age. During this Age the power and territory of ice cover in the mountain parts of Central Asia appreciably exceeded the modem ones. The total area of the ice cover in the territory of Tajikistan in the epoch of Pole glaciation (Mid quaternary time) was 24860 square kilometers. (Now it is 8470 square kilometers). The length of Fedchenko glacier (171km) exceeded almost in 2,5 times the modem one - 71 km. The rivers were deeper in the comparison with rivers nowadays, for 2-6 and 10 times. In some parts of the desert the power of only alluvial drifts of pleistocene reaches 500-1000 meters. As the consequence of surplus accumulation in the lower reaches of alluvial drifts, the rivers with different power of flow migrated along the whole plain territory smoothing the plastic of desert zone of Central Asia. One may conclude that litho and halogen surfaces of Turan are obliged to paleoflows from the side of the mountains that surround it. This inherited and natural process of carrying substances out with water flow, including anthropogenic components, is continuing incessantly nowadays as well. The volume of washout of silty fractions from mountain territories of Central Asia ranges from 5 to 3000 t/square km. The total volume of solid flow of Sirdarya at the outflow into the Fergana valley for the period of 1948-1956 years on an average made 38 mln.ton a year. Along the Amudarya in Kerki they make 270 mln.t/year. Till the sixties of the twentieth century Amudarya and Sirdarya yearly transported about 31,5 mln ton of dissolved salts into Aral Sea basin. In connection with cessation of flow into the Aral nowadays they are accumulated in the zone of irrigated lands and neighboring territories.

The plain desert territory of Central Asia occupies the basement (lower storey) of Aral-Balkhash basin. Besides river waters, sewage, sewer-drainage, noxious substances connected with chemicalization of sowing area and gas escape or accident in industrial establishments which are located on the part of the basin flow in here. During the accident in Kattakurgan Oil extraction factory in February 4-5, 1990, 7000 cube meters of alkali got into Zerafshan River and the negative consequences were observed in hydro ecosystems of the lower part of the river. Analogical situations are observed in under mountain zones of Central Asia deserts. The consequences of any measures connected with anthropogenic activity within the bounds of the basin are exposed firstly in its lower part. It means the regions situated in the lower parts of the basin will be the first ecological victim. The Aral ecological catastrophe can serve as an example. Undoubtedly, the roots of this disaster lay far from Aral water area, but are situated within the bounds of its basin. At the moment, new meso and micro focuses of ecological intensity are generated in the closed delta regions of medium and small rivers of desert zone. Original artificial "pieces" of Aral - delta fault lakes appeared around Bukhara, Karakul, Karshi, Tejen, Murgab and other oases of Central Asia. At this moment these places have the accumulation and concentration of harmful chemical substances from the upper parts of the rivers' basins. For example, the pollution degree of Zarafshan water is substantially decreasing down the stream of the river. The content of phenol and nitrate in the river water in the upper part of Samarkand basin was 1,0 and 0,9 in July, 1990. However, in Navoi city it increased for 6,0 and 10,5 times accordingly. The analogical tendency is observed in other rivers of Central Asia. We have calculated that yearly more than 5 mln tons of water-soluble salts, other harmful chemical substances, 10-15mln ton of silt and other components of solid drain come into the irrigated area of the lower part of Zarafshan basin with irrigation water. This regular process is correlated by the deterioration of ecological comfort top-down the stream of the river, where we can see the growth of swamp, flooded, silted and salty land areas that resulted not only in degradation, but also in impoverishment of species variety of original biocoenosis. We also can observe the worsening of sanitary hygienic situation, especially, in hydro ecosystems. The result of perennial ecologic-toxicological researches showed that the quality of water in hydro-ecosystems, which are situated in the flat desert territories of Central Asia, doesn't meet the demands of fish industry, especially, at the level of pollution with pesticide, phenols, heavy metals and mineral salts that is also explained with anomalous high levels of cumulation of polluting substances in abiotic and biotic components, and also with correlation of processes of primary product and decomposition of organic substance. There is also observed a tendency of common sickness rate of the population at the lower reaches of rivers. We take the liberty of naming this objective ecological-geographical process, which is happening within the bounds of river basins and which has natural anthropogenic genesis, geoecological law of basin geosystems' functioning and development. One should notice that channels - "hydro-ecological canals" (irrigation-drainage systems) in the upper part of the basin eventually join in the main watercourse, however, in the lower reaches they flabellumly break up into separate water hoses and their final part — "irrigational tails" go to fault lakes or to oasis reliefs. The main mass of harmful chemical migrants accumulates exactly in artificial reservoirs and considered to be nidi of different infections and other anti-ecological processes. Nowadays, there is a tendency of drain reduction in closed delta parts of the rivers and main canals that is connected with gradual increase of the volume of water consumption in the upper parts of the basin of these watercourses.

In terms of basin conception one can confirm that further development of productive forces in mountain areas of Central Asia, which demand the consumption of additional water resources, brings to further expansion of Aral Sea disaster hearth in the direction of mountains, upstream. At the moment, lower pieces of many closed rivers have already lost their prior function and have changed into the main drainage artery. Such a fate long ago overtook a delta part of Zarafshan River where more than a hundred kilometer long riverbed is now named "Central Bukhara Collector".

It's known that Aral disaster has intergovernmental pattern. If we consider this problem from a position of basin conception, it is not only the

problem of Aral Sea and Aral Coastal, but also of a whole Aral basin. Consequently, cardinal decision of this important task dictates the necessity of creating an international scientific center "Aral" and development of interstate, long-term program that includes the territory of whole basin of Aral Sea. Executive board of this program should play the role of the coordinator, supervisor, integrator and disseminator of information about the events happening in all branches of nature management, especially, in proportional distribution of water resources of Aral basin. Besides, the organization of collector-drainage water diversion into the Aral waters has important significance. The program must also provide a further improvement of network of particularly protected objects, an absolute preservation and restoration of prior genofond of such an original and unique nature of this region.