3.9. Assessment of possibilities of reclamation-ecological processes management with salt removal and drainage outflow minimization from irrigated lands under its reuse in places of its origin

Generalization of field investigations at local and regional level shows, that collector-drainage water formed in various hydrogeological-meliorative and water management conditions are different by volume, salinity, salts chemical composition, recharge and head of ground waters, meliorative conditions of irrigated lands.
Within AmuDarya and SyrDarya river basin there are four different zones according to conditions of collector-drainage water formation.

1. In zone of seepage and dissipation of ground waters within the intermountain valleys and hollows drainage water is recharged from irrigation and ground water. Volume of collector-drainage water is up to 1000 m^3/ha/month, water salinity within the limits 1,5-2,5 g/l. Chu and Fergana valleys, Pritashkent, Zapafshan and Syrkhandarya hollows are included.
2. In steppe zone, mainly plains, of SyrDarya, Djizakh, Bukhara and Karshi oblasts drainage water recharge by irrigation water is developed. Monthly rate of drainage-released waters in steppe zone during vegetation does not exceed 500-880 m^3/ha. Drainage water salinity is 2,5-5 g/l and more.
3. In flood plain part of AmuDarya-Sherabad cone of removal and Zarafshan low terrace, drainage waters are recharged by irrigation and filtration from large canals. Drainage water salinity fluctuates from 3 to 7,0 g/l.
4. In zone of interception horizontal drainage system is recharged from artesian waters, for example, Fergana valley, Sykhandarya oblast, etc. Ground water salinity does not exceed 0,8 -1,0 g/l.

While assessing possibility of collector-drainage water use it is necessary to take in to account, first of all, total concentration of salts and their chemical composition.

In respect to above mentioned while deciding question about collector-drainage water re-use for irrigation it is necessary to take into account quality of water in specific zones according to existing classification. For various zones with specific soil-hydrogeological-meliorative conditions characterized by distinctive properties of collector-drainage water (soda salinization, heavy metals, etc.) it is necessary to apply relevant classifications. In conditions of Central Asia, where soda soil and collector-drainage waters salinization is not available, five-point scale could be used which is developed by academician I. S. Rabochev, Scientific Research Institute of Agriculture.

In above mentioned scale indicators of soda-absorption relation (SAR-USA), sum of salts and share of toxic salts are combined, table 3.14.

Generalized classification for estimation of water quality
(I.S. Rabochev)

Table 3.14.

Ball	Water quality	On SAR	Sum of salts, g/l	Including toxic salt	
				г/л	%
1.	Very good	до 5	1	0,1	10
2.	Good	6-10	2	0,4	20
3.	Satisfactory	11-15	5	1,8	35
4.	Less satisfactory	16-20			50
5.	Unsatisfactory	20	8	4	50

Total volume of return waters, being formed over Aral sea basin during year of medium humidity, is 36-38 km^3 per year, of which 32-35 km^3correspond to collector-drainage water, and 3,3 km^3 to industry and municipal wastes. Of total volume of CDW about 51 % (16-18 km^3) returns to rivers, about 36 %, i.e. 11,5-12,6 km^3 is disposed in natural sinks and lost for evaporation. Only 13 % of CDW (4,1-4,6 km^3/year) is reused for the irrigation over all basin.

Uzbekistan takes prevailing place on the volume of disposed CDW, where about 25-28 km^3/year of CDW is formed. Of this volume right in places of origin 1,4-2,1 km^3 of CDW is used depending on water availability. Estimation of the CDW quality according to proposed classification showed that only over Uzbekistan relevant for irrigation CDW with the evaluation "good" (mineralization is lower than 2,0 g/l, sodium absorption efficiency < 10 and etc,) are about 30 %, or 8,4 km^3 per yea.

Selection of soil types, the most relevant for CDW use, is one of the important factors under estimation of drainage water acceptability for irrigation. Foreign and local experts determined by means of experiments that on soils of light structure and sandy loam mineralized water can be used for irrigation without danger of salinization.

Measures on CDW use for irrigation should correspond to availability of areas and types of soil of light structure with availability of DW volumes of relevant quality.

Evaluation of areas with light structure (Sredasgyprovodkhlopok and Uzgi prozem institutes) shows that there is not less 1,5 mln ha of lands in the regions acceptable for CDW use for irrigation (over-irrigated zone).

So in the Aral sea basin there are about 10 km^3 of CDW acceptable for in contouse (about 30 % of total volume), which under keeping scientific recommendations for their application can be used directly in places of origin.

Results of generalization of fulfilled field researches show that carring out measures on CDW in-contour use will allow to reduce their release in to river trunks and improve river water quality, lowering mineralization on 20-30 %, and up to river lower reaches to keep it within standards, that practically solves a problem of damage to irrigation farming and ecological state.