

A Role of Drainage Infrastructure in the Frame of IWRM

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The Turan lowland where major irrigation schemes of Central Asia are located is a zone of intensive mobilization and accumulation of salts due to arid climate and geomorphology, as well as hydro-geological conditions formed under the influence of natural hydrostatic head of ground waters.

Intensive water management development during the second half of 20th century was accompanied by the considerable expansion of irrigated areas and large-scale construction of drainage systems. At the beginning, the network of main collector-drains was constructed; and after that, constructing of the systems of open and subsurface drainage, drainage tubewells, and horizontal drainage with booster-wells were developed. At that, most of new-developed lands were characterized by prevalence of saline soils or soils subjected to salinization.

At present, it is necessary to keep and maintain the drainage network, and to develop additional drainage infrastructure in some places, as well as to create an appropriate system of drainage management as a part of integrated water resources management.

In the arid zone, land drainage plays an enormous role as a tool to remove excess surface and subsurface water from the land and to manage of groundwater levels, creating the normal conditions for maintenance of buildings and irrigation structures, for implementing of agricultural operations and crop growth. At that, land drainage prevents the accumulation of salts in the root zone that can adversely affect crop growth and at the same time, creates the conditions for optimal management of soil moisture and groundwater within irrigation schemes as a whole. The fact is that large-scale irrigation causes the mobilization of millions of tons of salts; and proper tools are necessary in order to manage these processes and to support the ecological equilibrium of landscapes and water bodies, especially in lower reaches of the rivers.

Scientifically grounded selection of drainage parameters at the stage of designing allows minimizing the salts exchange between an aeration zone and groundwater due to capillary rise and upwards movement of soluble salts, as well as between irrigated lands and drainage water sinks (local depressions, rivers, wetlands etc.). It is very important to understand that excessive drainage results in not only removal of harmful salts from soils but also useful salts (gypsum) and nutrients, causing damage on soil texture and fertility. Therefore, the optimal water and salt regime in the root zone under minimum water exchange between the aeration zone and groundwater is a tool for maintaining irrigated land fertility.

However, it is not sufficient only to build a drainage system with optimal parameters because it is also important to establish a well-grounded system of joint management of drainage and irrigation in such a way, which can provide minimal salts mobilization and minimum salts exchange between irrigated lands and surface water streams. At present, in Central Asia, under conditions of transition towards the market economy, organizing of proper drainage management faces considerable difficulties due to the following causes:

- Abrupt decrease in the scope of work related to construction and rehabilitation of drainage systems, when drainage infrastructure continues deteriorating;
- A lack of funds for timely repairing, maintaining and developing drainage infrastructure;
- Fragmentation of management and maintenance of drainage systems, especially in transboundary river basins and under arising of thousands of new land and water users; and

- Collapsing the technical base of former organizations responsible for land reclamation; and insufficient efforts for establishing a new institutional framework for drainage management.