



Biogeosystem technique – the fundamental base of modern Water Policy and Management

Valery Kalinitchenko (1), Abdulmalik Batukaev (2), Tatiana Minkina (3), Natalia Solntseva (1), Andrey Skovpen (4), Ali Zarmaev (2), Vaha Jusupov (2), and Olga Lohmanova (5)

(1) Institute of Fertility of Soils of South Russia, Director, Persianovka, Russia (kalinitch@mail.ru), (2) Agrotechnological Institute of Chechen State University, Grozny, Russia (batukaevmalik@mail.ru), (3) Southern Federal University, Rostov-on-Don, Russia, (4) Don State Agrarian University, Persianovka, Russia, (5) Don Scientific Research Institute of Agriculture, Rassvet, Russia

Freshwater conservation is the problem of world water strategy. Water is intended not only for human consumption but also for functions of the biosphere – the only place where humanity can exist. To maintain the quality of biosphere is very relevant.

An important property of biosphere is ability of soil to provide the synthesis of fresh living biological material by plants. There are few places in the world where exists a natural high level of biological production. Therefore, irrigation widely applies. Irrigation provides an increase of crops, but the imitating gravitational frontal isotropic-continual irrigation paradigm has the adverse effects on soils and landscapes. So irrigation in the past history of humanity was one of the causes for civilization's downfall, Sumer in particular, now irrigation causes a humanitarian catastrophe in Central Asia.

Irrigation is the world main consumer of water. Leading cause of negative results of irrigation in biosphere is the irrigation paradigm defect. By artificial watering is imitated a natural hydrological regime of the land. The water flows down into soil through the soil surface. Or groundwater flows up through the soil bottom. In either case, a natural or standard artificial soil moisturizing amplifies the mass transfer in soil continuum. At initial soil stage the mass transfer in soil continuum plays positive role. Adverse substances are leached, in particular soluble salts. Fine material and organic particles determining soil fertility are accumulating.

However, after a soil genesis initial stage the mass transfer through soil continuum plays negative role. Irrigation excess water flow into soil reduces the productivity of cultivated plants as compared to the optimum soil solution conditions. The excess soil moisture leads to excess transpiration, evaporation, infiltration, destroys the soil disperse system composition, forms inactive dead-end pores, leaches useful biological and other substances synthesized in soil out from active biosphere stage to vadose zone. These substances are entering the undesired stage of sedimentation and lithogenesis. Such adverse events are enhanced by irrigation. As a result, up to 80-90% of the fresh water taken for irrigation from lakes, rivers, storage reservoirs, desalinators are lost useless entailing economic losses. As a result of irrigation the quality of water is deteriorated as well as the quality of soil and landscape. A quality of human environment and a quality of biosphere as a whole is reduced. It is much more dangerous than economic losses.

The irrigation paradigm shift is essential for successful water policy and water management in modern world.

In a framework of Biogeosystem technics the new intrasoil pulse continuous-discrete paradigm of irrigation is developed. Water is supplied by small discrete portions into individual volumes of a soil continuum without excess soil mass transfer, transpiration, evaporation and seepage. New paradigm of irrigation optimizes plant growth, reduces consumption of water per unit of biological product, the yield increases. It provides the soil and landscape conservation, fresh water – the global deficit – saving up to 10-20 times, biological productivity and sustainability of biosphere.

Intrasoil pulse continuous-discrete robotic irrigation technologies match the nowadays noosphere technological platform.