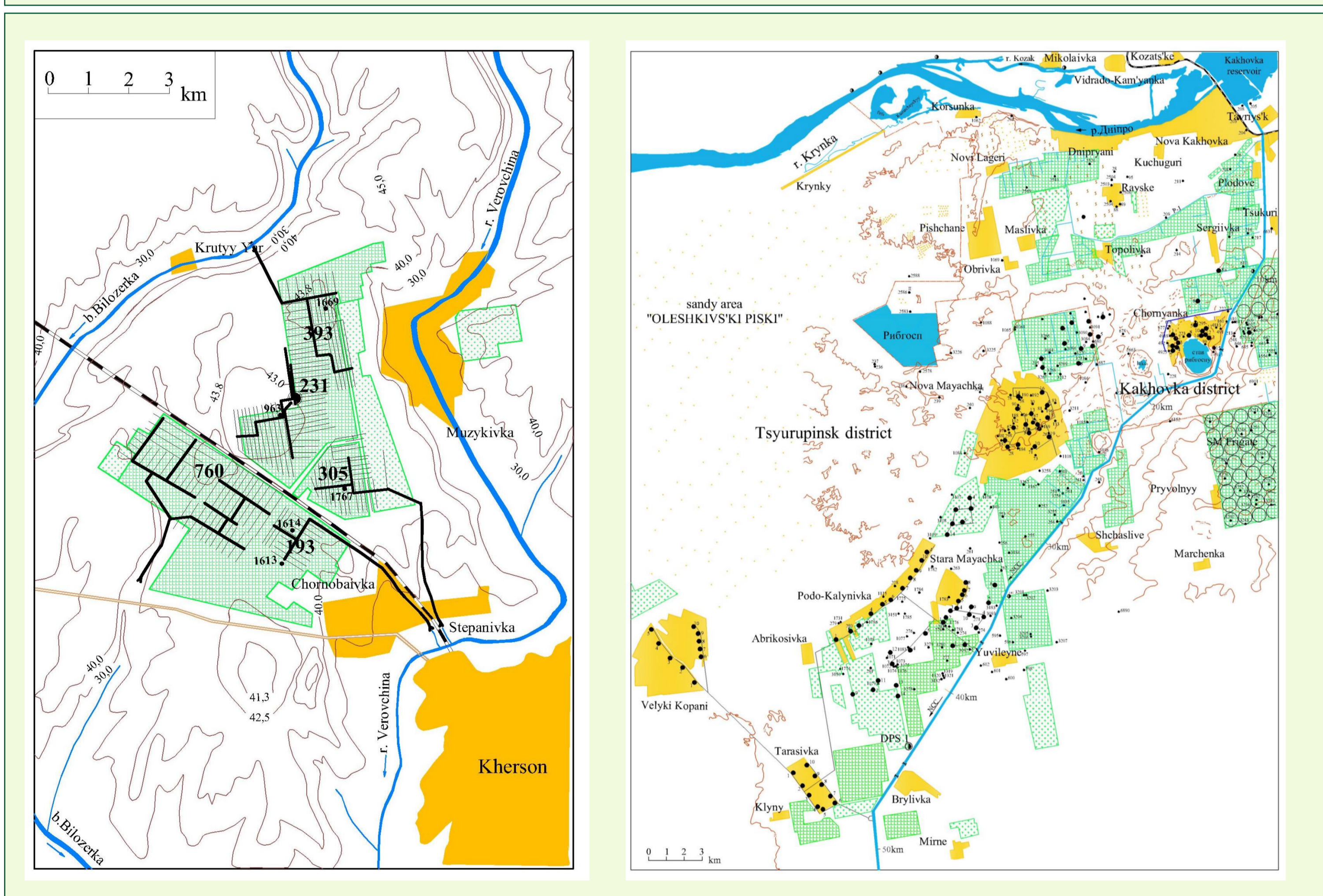


In the zone of irrigated agriculture in the area of 600 thousand hectares constructed engineering drainage systems of two types: horizontal and vertical. Lifetime of such systems is gradually expiring. Because of this large arrays in the South of Ukraine have become more vulnerable to the development of flooding processes.

In this regard, the issues of studies of drainage systems with long operation time effectiveness and scientific justification of existing drainage systems modernization and implementation of more efficient protective measures gained urgency (Fig.1).

Fig.1. Object of gorizontal and vertical drainage



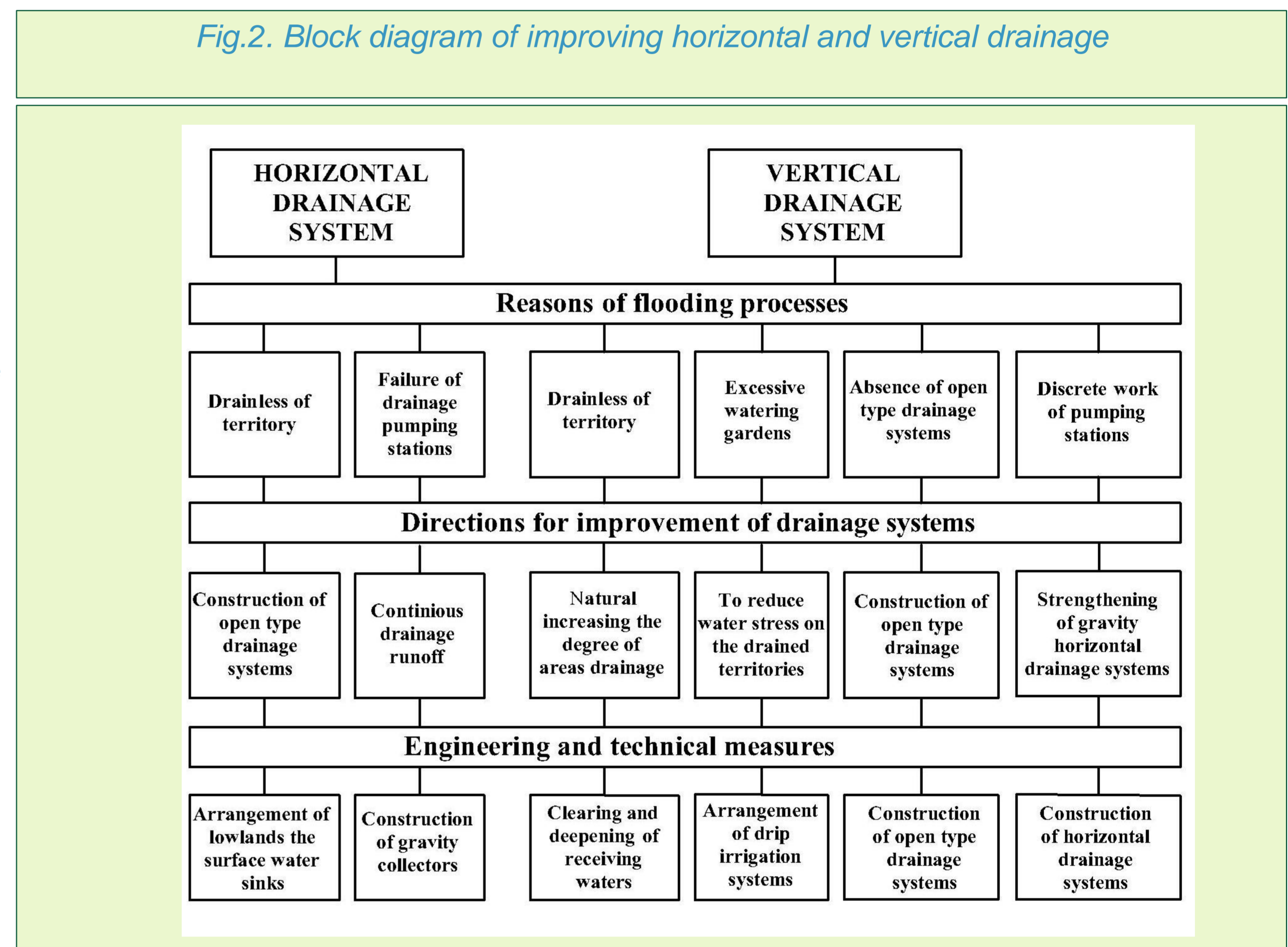
The results of researches and field surveys of drainage systems allowed determining the processes that occur on research objects due to the harmful action of water, and propose directions for improvement of drainage systems (Fig. 2).

For horizontal drainage systems of gravity type must carry out repairs and renewals works, including equipment of observation wells with upper reinforced concrete rings, hatches, stairs, etc., cleaning sedimentation tanks and mouths from silt, extraneous objects and overgrowing, rinse drains and collectors.

To ensure the efficiency of forced type drainage in some cases it is proposed to make transfer to gravity type by laying deep closed collectors.

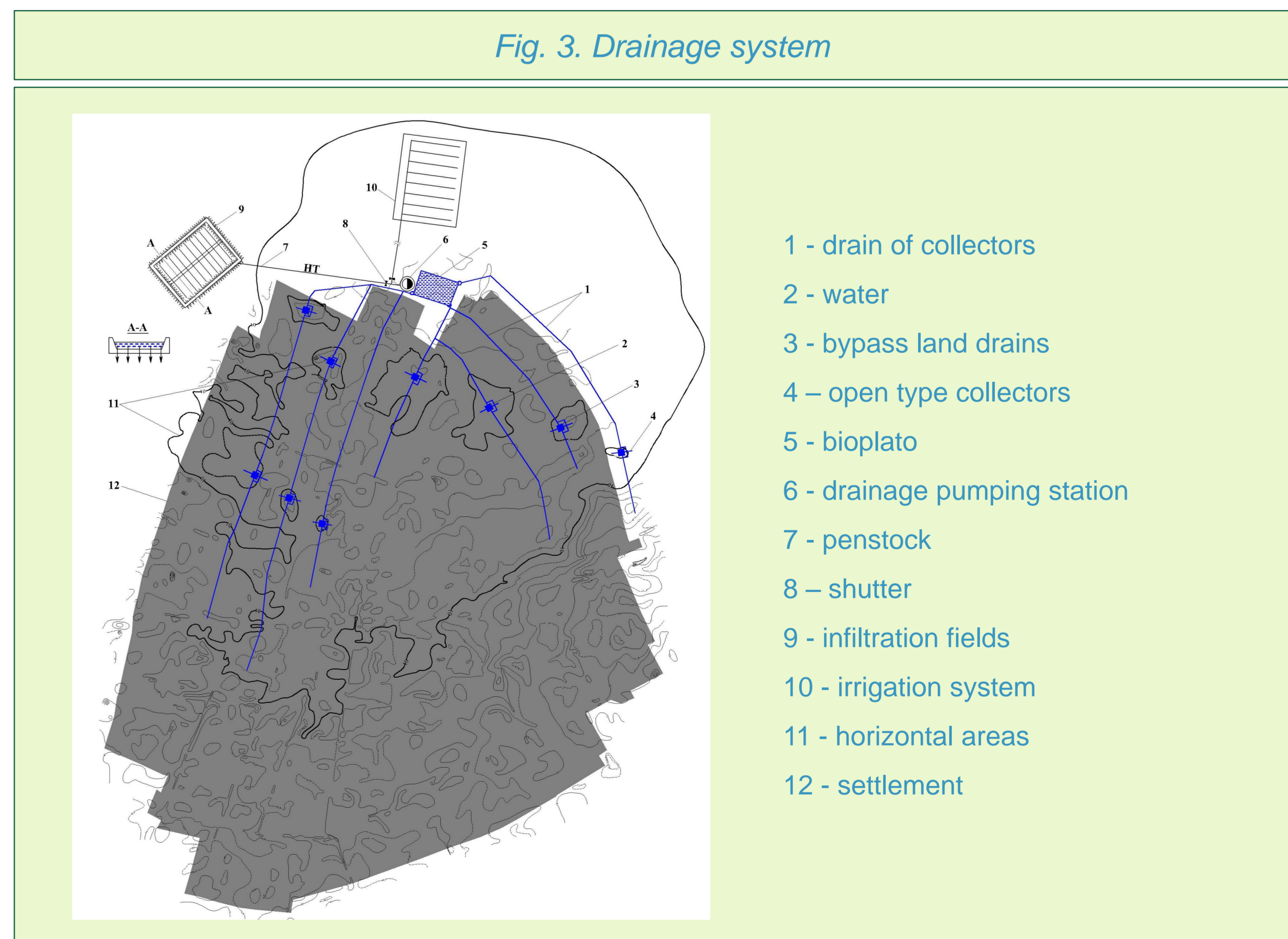
For vertical drainage systems developed a set of engineering and technical measures to modernize and improvement it. These measures based on the principles of natural increasing the degree of areas drainage, to reduce water stress on the drained territories, modernization of existing irrigation systems based on water-saving technologies, strengthening of gravity horizontal drainage systems, which work does not depend the conditions of electricity supply, reducing drainage runoff and negative environmental impact on water objects (receiving waters).

Fig.2. Block diagram of improving horizontal and vertical drainage



For drainage areas with lots of “steppe saucers” and low salinity of groundwater, developed a special drainage system which contain closed drainage and collectors, artificial ponds located on the bottoms of lowlands and “steppe saucers” and are designed to evaporation, freezing, reuse of drainage runoff and receiving surface water, drainage pumping station, filtration and accumulation fields of drainage water in winter season and irrigation system for watering in vegetation period (Fig.3).

Fig. 3. Drainage system



In general, modernization of existing system and construction of new ones will significantly increase the level of territory protection.