

Conception and evolution of drainage projects in Romania

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Romania is characterized by a large diversity of geomorphology, hydrography, lithology and soil. The climate also shows a considerable annual and seasonal variation, especially in the alternation of dry and wet periods. Therefore the soils differ much in their yield capacity and present many reclamation problems:

- 2.5 million ha must be protected from inundation;
- 5.35 million ha suffer from excess water and require surface and subsurface drainage works;
- 5.5 to 6.0 million ha are frequently affected by water deficit and may benefit from irrigation;
- 5.5 million ha of sloping lands are threatened by soil erosion;
- 450 000 ha of salty soils and 400 000 ha of sandy soils require soil improvement (Agricultura Socialista).

In the past, due to the historical and socio-economic conditions of Romania at that time, the execution of large reclamation works was not possible. Nevertheless, interesting reclamation vestiges exist in different countries of ancient Dacia and the Romanian principalities. Records show that in the first century B.C. the Dacs in the Cris and Barcau valleys used to build dykes for protection against inundations as well as enemies. Canals in the Hateg country (Tara Hategului) used for drainage as well as irrigation date back to the second and third century and drainage works in the Birsa Depression to the thirteenth century. Since the fifteenth century documents record the existence of many small water accumulations (fish-ponds) in the Moldavian valleys as mentioned in Cantemir's book 'Descriptio Moldaviae' (1716).

Big hydrotechnical works for flood protection and reclamation of swamps were carried out; e.g. regulating the Bega river and digging the navigable Bega canal in the Banat, the endikement of the Somes and Crasna rivers from 1751 to 1774 in the Northern Tisa river plain, the digging of drainage canals in Arges of the Dimbovita and Ciorogirla rivers against high water in order to protect Bucharest from flooding. Such works continued during the nineteenth and the beginning of the twentieth century. Until August 1944 the endikement works covered an area of about 622 000 ha. On part of the endiked lands drainage and swamp reclamation were implemented covering 358 000 ha (Agricultura Socialista).

The modernization and the intensive development of the agricultural production asked for a reclamation programme concerning the entire agricultural area. Since the fifties, together with the introduction of the planning that was part of the economic progress strategy, surveys and research were carried out to obtain a better insight

of the reclamation problems, a correct territorial location of the reclamation works and the most adequate technical solutions. Projects were made for large natural units and hydrological basins which allowed the implementation of complex territorial projects. The development of the agricultural sector ensured better conditions for a complex approach of the reclamation problems and their solution; the industrialization policy ensured the technical and material basis necessary to implement those projects (Desecri).

In Romania excess water finds its cause in:

- Abundant and often torrential precipitation on soils with little slope and without good run-off and on lowly permeable soils, affecting an area of 2.5 million ha;
- A shallow groundwater table recharged by precipitation and from rivers, terraces or high neighbouring plains, affecting an area of 1.5 million ha;
- River floods affecting an area of 1.3 million ha.

Sometimes owing to local conditions excess water results from a combination of causes mentioned above or from the pedo-geological conditions as in the case of the Romanian plain depressions formed on loess.

Surface and subsurface drainage as well as soil improvement have been carried out step by step. Experience has shown that complete reclamation is a process of long duration. Drainage leads to a gradual modification of both hydrological and pedological conditions and therefore drainage activities were carried out in two stages:

- In the first stage a network of drainage canals was implemented together with soil improvement and, where necessary, tile drainage;
- In the second stage all operations were executed, that aim at a complete improvement of the area, taking into account the modifications resulting from the works achieved during the first stage i.e. tile drainage, reclamation of depressions, land levelling.

By the end of 1986 surface drainage networks, and pumping or repumping stations were implemented over an area of 3.1 million ha, and subsurface drainage on an area of 300 000 ha.

Drainage operations in irrigated and non-irrigated areas comprise improvement of existing drainage systems to obtain maximum efficiency as well as implementation of new drainage systems. For improving the efficiency of the drainage systems, the offices in charge of implementing land reclamation have been equipped for maintenance and repair services and a programme has been established in order to operate the drainage canals and the pumping stations at the designed parameters.

The solutions adopted for drainage can be summarized as follows:

1. For lowly permeable soils suffering from excess water due to precipitation are:
 - ditches at a spacing between 300 and 400 m;
 - land levelling, taking into account local depressions;
2. For soils with a moderate to low permeability suffering from excess water due to a shallow watertable:
 - ditches at a spacing between 300 and 400 m;
 - tile drainage;

3. For soils with a low permeability and excess water from seepage:
- ditches;
 - wells or drains, discharging with or without pumps into collectors.

These solutions can be adjusted according to the specific conditions of each area.

References

Agricultura Socialista a României, Editura Politica, 1984
Descari, Editura CERES, 1986.