Anti Erosion development works in the Greoni –Tigvani area

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Abstract: In this paper are presented regularization works of Lisava Valley, located in the catchment Bârzava, on administrative territory Gradinari, Greoni, Tigvani, Oravita Caras Severin county. The area under study is 1200 ha and includes drainage works and corresponding hydrotechnical constructions. Works that were performed had a positive effect on the environment, removing excess moisture from the soil and excess moisture from precipitations directing to drainage channels to natural emissaries : Lisava Valley and Oraviţa Valley (Fig. 1). Channel network had set in relation with the new owners of land, the location is determined by mutual agreement, aiming generally lowlands. Category of land at the time of design was: pastures and meadow.
Keywords: water supply regulation works, drainage channels, hydrotechnical constructions, categories of use.

1. INTODUCTION

The paper was pursued work performed and their environmental impact. Thus, in Caras-Severin county, were executed the following works:

Regularization valleys Lisava and Oravita on a length of 4 km by hydrotechnical construction works afferent (falls from gabions, stone falls, pipes culvert) that led to obtaining equilibrium slope to that valley arrangement.

In the current situation Caraş River is arranged with works of flood embankment and hydrotechnical works, on the sector Ticvaniu Mare - border with Serbia.

The works consist of:
- Temporary accumulation
- Proposed drainage channel network has adapted to the new configuration of landholders.

Sizing of drainage channels was calculated based on the specific flow (2.3l/s) for the high plain area.

For ensuring the execution conditions and access earthmoving equipment on the channels site were performed clearing work on area of 6.6 ha, the resulting material was buried in waterside channels.

Hydrotechnical scheme adopted consists of 3 main collecting channels length of 6.825 km and 8 secondary channel length of 4.775 km.

On the channel network have been provided hydrotechnical works too. (Fig. 2; 3).
Pipe culvert Dn 1200mm -2 pieces;
Pipe culvert Dn 1000mm -4 pieces;
Pipe culvert Dn 800mm – 4 pieces;
Stone drops Hc = 1m -24 pieces;
Undercrossings depone systematic on the Lisava valley Dn 1000mm – 2 pieces.

Earthworks results are scattered in layers of 15 cm thick on one bank.

Due to the location of crops covered valleys and drainage channels, earthworks and thus performance hydrotechnical constructions have not been done until harvest and was gave up the solution of rubble rocks drops with concrete drops leading to a volume of poured concrete of 800mc.

2. MATERIAL AND METHOD

In the years preceding and during the work, was monitored, verified and analyzed during heavy rainfall fallen in the area, behavior of performed works.

From pedological point of view, on the arranged surface dominate preluvosol, clay illuviated preluvosol stagnogleyzation, exposed to erosion phenomenon, both on channels and on nearby land areas.[1]

To prevent erosion phenomenon in channels, but also retaining river alluvial deposit entrained proposed execution drops of initial threshold of rubble rocks and then redesigned the thresholds of concrete with weep hole and revetment of reinforced concrete in downstream side of the threshold, both on new executed channels and existing ones.

Currently Caras River is equipped with flood defense works on the sector Ticvaniul Mare- border with Serbia.

The work performed consisted of:
• Accumulation impermanent of lowland on Lisava with two compartments with a total volume of 9.30 million cubic meters for transit flows to provide 1%, Section 1, I with a volume of 4.90 million cubic meters in Section 2, to ensure 5%. Accumulation is intended to regulate the maximum flow of the border

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section of 245mc/s to provide 5% and of 390mc/s to provide 1%. Through Lisava hydraulic complex is limited transit flow on stream Lisava to 40mc/s.

- Damming up works - dams of earth.

The land on which the works are expected not affect land holders from Greoni and Grădinari, location being established mutually agree with them, aiming generally low areas, respectively "privalurile" (depressions) where water usually accumulates excess, current category of land is classified as unproductive land, pasture and meadow.

The works are located in the major riverbed of the right and left bank of the Oravița stream, respectively left bank (downstream of the confluence with the Oravița stream).

On the left bank of the Lisava stream, in the drainage area into emissary of channels CCS 42 and CCS 43 is carried along the bank a systematic depone (dam from earth with a height less than 1.0 m)

The work is being executed are classified as hydrotechnical constructions, importance class IV, according to STAS 4273-83, dimensioned to debits with probability of exceeding of 5% minimum clearance of 0.20 m.

CCS43 and CCS42 channels discharged into the Lisava stream through undercrossing with diameter 1000 mm equipped with valves.

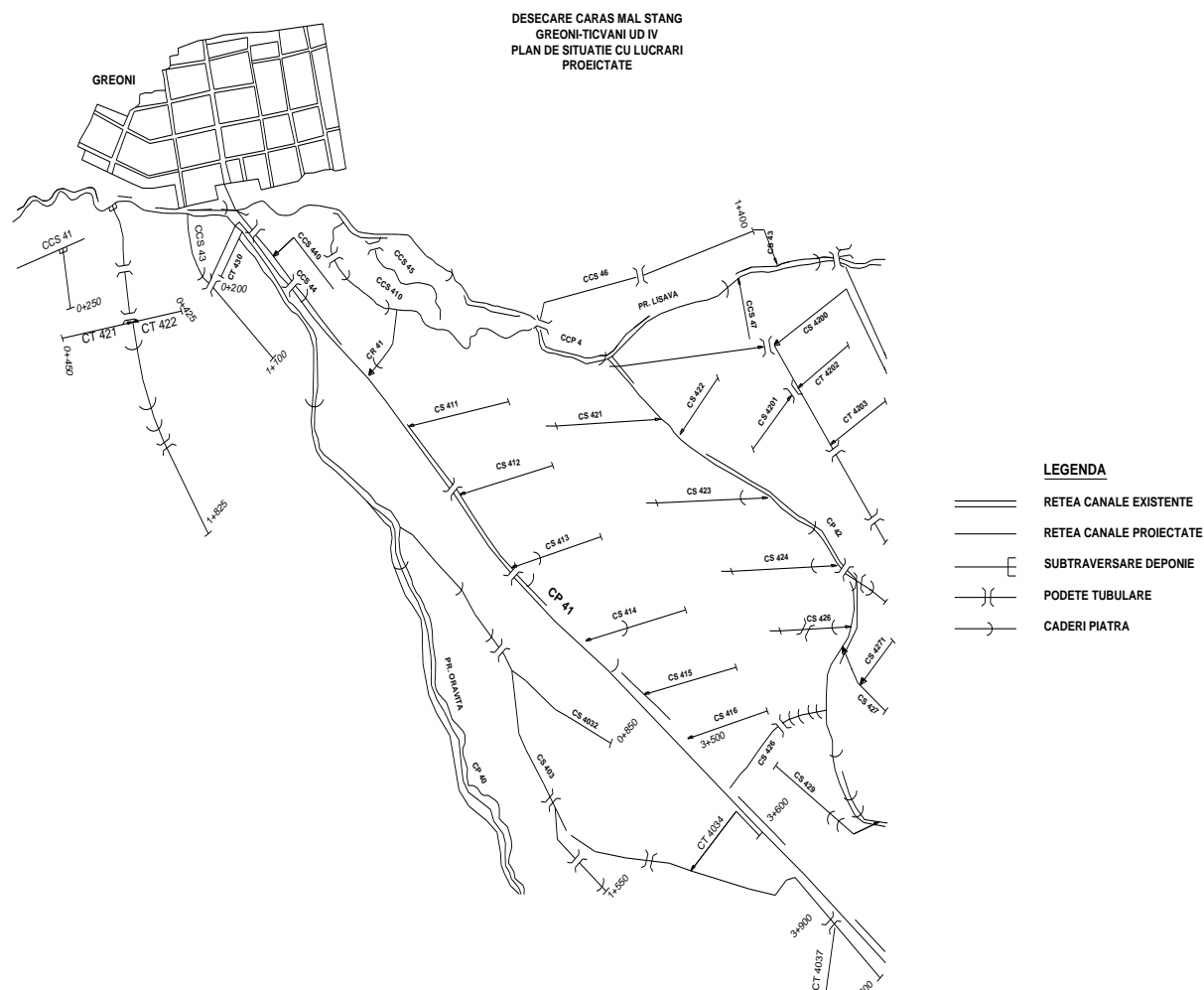Channel CS403 gravity discharged into the Oravița stream

Figure 1. Hydrotechnic scheme of arrangement

Figure 2. Operational exhaust channel

Figure 3. The execution of a channel for the excess water uptake

For ensuring the execution conditions and access earthmoving equipment on the channels site were performed clearing work on area of 6.6 ha, in the CCS42, CCS43, CCS430channel area.

Development scheme provides the realization of 11600 m channels with trapezoidal section of the thalweg width b=0.50m and 1.0m, thalwegs with a slope of 1:2 to 1:1.5, as follows:

• 3 main collecting channels CCS42, CCS43 and CS403 total length of 6825 m
• 8 secondary channel CCS41, CT430, CT421, CT422, CT4032, CT4034, CT4037, CS405 (Fig. 1) totaling a length of 4775 m.

On the network of canals designed and existing channels are provided:

• 2 Undercrossing depone systematic in the left bank of the Lisava stream (CCS42, CCS43);
• 2 Pipe culvert with a diameter of 1200mm;
• 4 Pipe culvert with a diameter of 1000 mm;
• 4 Pipe culvert with a diameter of 800 mm;
• 24 concrete drops with height $h_{max} = 1.0$ m.

Undercrossing from the left bank depone Lisava were made of concrete type BUCOV with diameter of 1200mm diameter placed on a simple concrete foundation with reinforced concrete tympanums and developments upstream and downstream of the crossing of prefabricated slab revetments placed on a ballast bed of 10 cm depth.

At the end of the upstream and downstream have provided concrete beams of 25 cm width at a depth of 0.5 m in order to prevent erosion.

Undercrossing from operating roads area were made of concrete pipes PREMO type of 1000mm, respectively 800mm, also laid on a bed of ballast, prefabricated tympanums or walls upstream and downstream, channel arrangements, upstream and downstream of the crossing of revetment of rubble rocks placed on a bed of ballast thickness of 10 cm, with beams of simple concrete, both downstream end and upstream end of the arrangement of 0.25 cm thickness and minimum depth of 0.5 m.

Initial drops were set in stone masonry (or gabions) with useful height of 1.0 m and a thickness of 0.5 m, revetment upstream and downstream stone masonry on a bed of ballast of 10 cm but later were constructed from concrete provided with weel holes.

FLOW CALCULATION DOWNLOAD IN EMISSARY

Storm water flows were established according to STAS 1846-90 by the relationship:

$Q = m * S * \emptyset * i$

where:

Q = debit of calculation rain (l/s);

m = coefficient that takes into account the storage capacity in time, of the channels and calculation rain duration: m = 0.80 for t< 40 min; m = 0.90 fir t> 40 min;

S - collecting basin area, (ha);

$\emptyset$ = leakage coefficient;

i = calculation rain intensity, depending on the rain frequency and duration of rain calculation, according to STAS 9470-73;

After calculations resulted:

For channel CCS42: S =138 ha, f =2/1, t = 180 min, $\emptyset$ =0,075; i = 13,80l/s ha

$Q = 0,90 * 138 * 0.075 * 13,8 = 129$ l/s.

For channel CCS43: S =43 ha, f =2/1, t = 180 min, $\emptyset$ =0,075; i = 13,80l/s ha

$Q = 0,90 * 43 * 0.075 * 13,8 = 40$ l/s.

For channel CS403: S =345 ha, f =2/1, t = 63 min, $\emptyset$ =0,075; i = 31,60l/s ha

$Q = 0,90 * 345 * 0.075 * 31,60 = 736$ l/s.

Specific flow calculation is contained between 0.93l/s ha to channels CCS42 and CS403.

3. CONCLUSIONS

A number of works of terracing of slopes made before 1989 that were established orchards, after land restitution were, in most cases, eliminated by cutting plantation which led to erosion occurring on these slopes.

The executed works did not comply fully original the initial project solutions, along the works intervening changes at designed stone that have been replaced with concrete drops.

Water collected in the drainage channel discharges into watercourses:

- Lisava stream, collecting channel CCS42, I CCS43 (through undercrossing depone) discharges are provided with metallic valve, estimated debits are: Q_1 =0,129mc/s and Q_2 =0,040mc/s;

- Oravita stream, collecting channel CS403, download gravitational, calculation flow estimated at Q_3=0.736mc/s.

Development scheme provides realization of 11600m of channels with trapezoidal section at thalweg width b=0.5 m and B=1.0 m, slopes with a slope of 1:2 and b=1.0 m as follows:

-3 main collecting channels, CCS42, CCS43, CS403 totaling a length of 6825m, with b=1.0 m and slope gradient 1.2;

-8 secondary channels, CCS41, CT430, CT421, CT422, CT4032, CT4034, CT4037, CS405, with b=0.5 m and slope gradient 1.5.

On the network of canals designed and existing channels are provided:

• 2 Undercrossing depone systematic in the left bank of the Lisava stream (CCS42 and CCS43);

• 2 Pipe culvert with a diameter of 1200mm;

• 4 Pipe culvert with a diameter of 1000 mm;

• 4 Pipe culvert with a diameter of 800 mm;

• 24 concrete drops with height h_{max} = 1.0 m.

Romanian state interest for land reclamation works was materialized since 1910, when by rozal decree given bz King Charles I, was founded Service specifically for Land Improvement. [5]

For soil erosion control works in recent years, funds have been allocated less and have not done than the regulation work of Lisava and Oraviţa vallezs, a lenght of 4 km.

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