

## SOIL EROSION IN ROMANIAN AGRICULTURE

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### Abstract

This paper deals with the problem of soil erosion in Romania's agriculture as the main phenomenon of land resource degradation. The size of the phenomenon is estimated at more than 50% of the country's arable land area. In terms of regional distribution, the most affected areas of the country are those from Transylvania, the Sub-Carpathians and the Plateau of Moldova. There were assessed the erosion extent and the losses in terms of harvest and soil. The anti-erosion works were included among the main land reclamation works. However, within this ranking, soil erosion was on the last place, after irrigation and drainage, although experts in the field consider it the worst because soil losses due to erosion are unrecoverable. At the end of 1989, from a program providing for 5,500 thousand ha equipped for irrigation, 5,530 thousand ha of drainage, 5,300 thousand ha of anti-erosion facilities, there were achieved in percentage terms: 56.5% - irrigation, 55.8% - drainage, and anti-erosion facilities- only 41.9% (2,220 thousand ha). The economic efficiency of erosion control works has been assessed at a yield increase of 20-25%, with an additional financial supplement of less than 10%. In conclusion, the authors consider that the current land policy, which gives absolute priority only to the rehabilitation of irrigation systems, does not correspond to the requirements for preserving the best land resource, i.e. the soil.

**Key words:** soil, erosion, efficiency, land reclamation

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Land reclamation works involve a series of more or less profound interventions on the natural agricultural environment in order to increase its yield, stop or reduce its degradation, or in order to correct the unfavorable features that also reduce its yield or even prevent it. Among these, the most important but also the most costly ones are: the hydro-ameliorative works performed in order to fight against drought; embankment and drainage works carried out in order to combat excessive humidity; last but not least, soil erosion control works, considered to be the most important, both in terms of increasing the yield and in stopping or mitigating non-recoverable soil losses.

All three categories of works have been performed on the territories inhabited by Romanians since ancient times, such as irrigations and terraces up to heights of 1,200-1,400 m. In the modern period, and especially between 1944 and 1989, the anti-erosion works were neglected, compared to the hydro-ameliorative and even to the drainage ones. According to a land reclamation program for the period 1983-1989, an area of 5,300 thousand ha would have been benefited from anti-erosion works. In fact, these works were performed on only over 2,200 thousand ha, representing a

42% achievement rate compared to 56% for drainage works or 56.7% for irrigation works.

At present, the ministries of agriculture and the environment are concerned with the phenomenon of deforestation, the main cause of soil erosion. However, the actions undertaken are aimed primarily at rehabilitating the irrigation systems, not at combating soil erosion.

### MATERIAL AND METHOD

Along with the evolution of the statistical data on the areas that benefited from the three categories of land reclamation works, i.e. irrigation, drainage and anti-erosion works, the authors of this paper used the data on erosion types and on their spreading on the Romanian territory (per erosion type). The authors used both the experimental data collected from the research units in the field (Pierieni, Valu lui Traian) and the results obtained in the standard perimeters that were to prove the technical and the economical effects of soil erosion control works. The authors calculated the economic efficiency of soil erosion control works using the specific methodology, and they finally drew conclusions and made proposals on the prospects of this type of works.

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mentioned that soil erosion control works were neglected especially in favor of hydro-ameliorative and even drainage works because irrigation

systems (Table 1) were to be built on the drained surfaces, especially in the Danubian Plain.

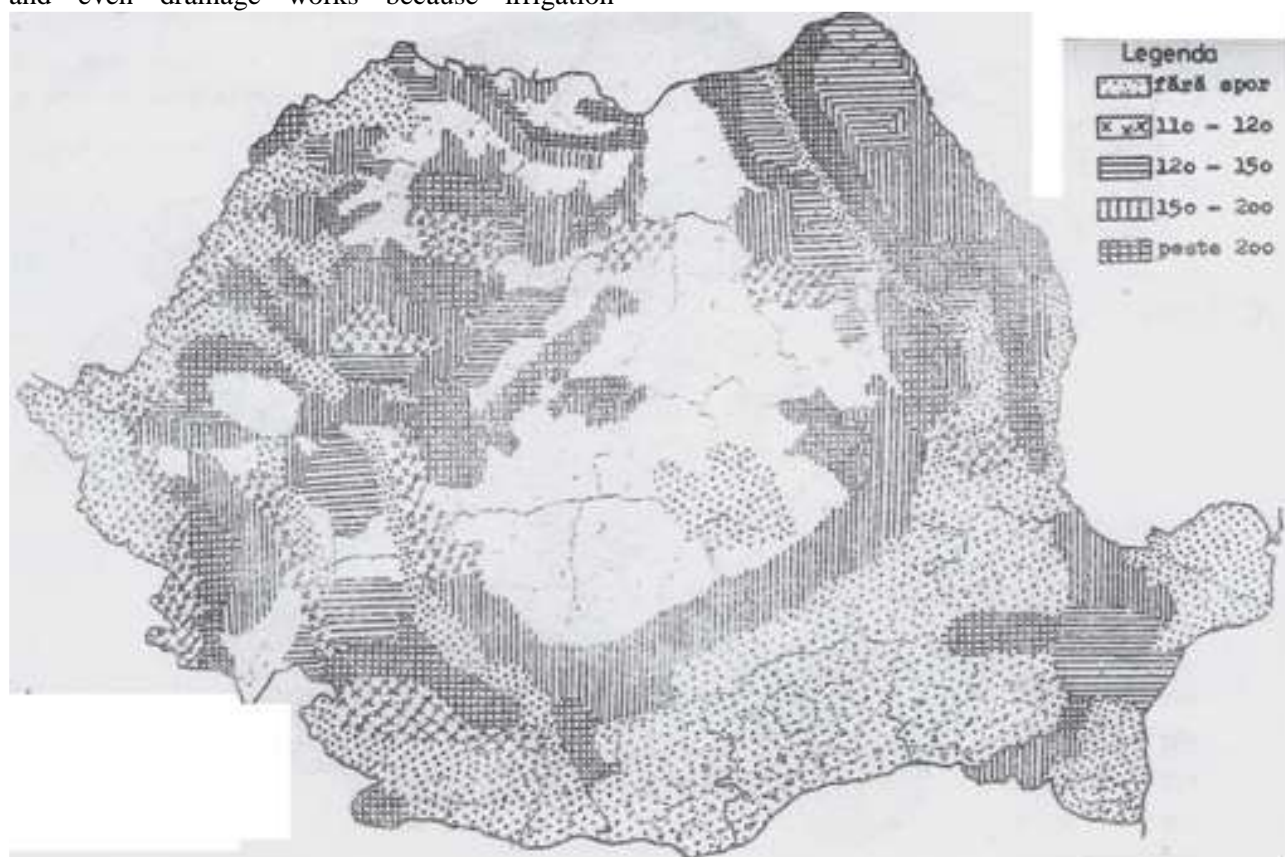


Figure 2. The effects of combating soil erosion (% yield increase)

According to the data from the above-mentioned table, the backwardness of the anti-erosion works is evident, although the specific investment (per ha) is much lower than in the case of hydro-ameliorative or drainage works.

**Table 1**  
**The evolution of irrigations, drainage and soil erosion control works, 1950-1989**

- thousand ha -

Year	Irrigations	Drainage	Soil erosion control
1950	42,5	368,1	2,0
1955	93,1	404,4	9,4
1960	199,6	505,7	100,0
1965	220,9	587,0	197,5
1970	731,3	1111,4	435,3
1975	1474,2	1965,5	983,1
1980	2301,0	2462,5	1608,7
1985	2956,3	2948,8	2095,5
1989	3066,6	3107,1	2192,1

Source: D.G.E.I.F.C.A.

The data provided by the 1990 Governmental Commission report reveal, for example, that the amount of the funds fixed at that time was 25,000 lei/ha for irrigation, 20,000 lei/ha for the works performed in order to combat excessive humidity and only 10,000 lei/ha for anti-erosion works.

It is noteworthy that the soil erosion control works were programmed on surfaces comparable to those equipped for irrigation (5,500 thousand ha) and drainage (5,530 thousand ha), i.e. 5,300 thousand ha. However, the anti-erosion works remained behind schedule, and this was also known by the authorities from the respective period, i.e. in 1983. At that time, the share of the works compared to the final quota (1989) was 43.3% for irrigation, 46.6% for drainage and only 32.4% for anti-erosion works.

Regarding the actual figures of the areas that benefited from anti-erosion works, they differ from one source to another. However, it is generally accepted that about 2,200 thousand ha were equipped. The report of the Governmental Commission from 1991 mentioned 2,263 thousand ha, of which 1,674.7 thousand ha (74%) belonged to former agricultural cooperatives. In 2003, a departmental record (S.N.I.F. SA) mentioned the figure of 2,212.1 thousand ha, and a rehabilitation program of the ministry for 2001 presented the figure of 2,200 thousand ha. The same program provided for the equipment of another 500 thousand ha by 2010.

**1.3. The economic efficiency of combating soil erosion.** Overall, the yield increase for a

specific crop structure was estimated at 20-25% compared to similar unequipped land. The additional expenses at the level of the agricultural producer did not exceed by more than 10% from those incurred on unequipped land, which revealed a profit of at least 10%. As regards the efficiency of the investments in anti-erosion works, this is clearly superior to the other categories of land reclamation works. Between 1983 and 1986, 35 standard perimeters with a specific investment of 6,300 lei/ha were equipped, the value of the yield increase being estimated at over 1,000 lei/ha (1).

As far as erosion is concerned, the economic efficiency is also expressed in terms of stopping soil degradation; unless stopped, this phenomenon would lead to the total loss of the agricultural yield and to massive landslides; moreover, it would damage social and economic objectives and it would ultimately entail ecological imbalances (6).

Similarly, Professor D. Teaci argues as follows: *"All land reclamation works have some economic efficiency. In the case of soil erosion prevention and control works, in addition to the economic efficiency estimated by the current income increase per surface unit, it is necessary to take into account the long-lasting social and economic effect consisting in preserving the quality of the national land from the densely populated areas of the country. Not only do the improvement of the eroded land and its intensive use trigger the increase in the volume of products; it also contributes to the stabilization of the population and to the creation of an environment favorable to the harmonious economic and social development of the old areas of our country's rural civilization"*.

## CONCLUSIONS

At the end of the Second World War, the new political regime set up in the spring of 1945 inherited one of the least performing European agriculture. To the historical trend, there were added both the destruction of the war and the catastrophic drought from 1945-1946, when the increase in the agricultural yield became the absolute economic priority. At that time, the irritations of field crops were unknown, the drains from Banat and from the Western part of the country were represented only by the legacy of the Habsburg Empire, and the anti-erosion works were limited to peasant agro-terraces, also inherited from the past.

Thus, in 1950, the official statistics recorded 368 thousand ha of drainage, only 42 thousand ha of irrigation – with vegetables and some rice – and only 2,000 ha of anti-erosion works. Ten years later, in 1960, irrigations would be performed on over four times larger areas – which was still insufficient –; drainage would exceed half a million ha, but only 100 thousand ha would benefit from anti-erosion works.

A turning point would take place in 1965; thus, in 1970, the following figures were recorded: over 700 thousand ha equipped for irrigation, over 1,100 thousand ha with drainage works and 435 thousand ha with anti-erosion works. Land reclamation works would continue, reaching, in 1989, to more than three million ha equipped for irrigation, three million ha with drainage works – some of them in order to make room to irrigation – and only 2.2 million ha with anti-erosion works, although the final program rates for the three categories of works were similar.

Combating soil erosion has been neglected at political command, although researchers, designers and builders would acknowledge in 1990: "Soil erosion, which is the worst phenomenon affecting more than 40% of the agricultural area, with disastrous effect, triggers an annual loss of 150 million t of soil, reaching 50 t/ha/year, while the soil recovery capacity is 2-6 t/ha/year".

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