

National Program for Rehabilitation of the Main Irrigation Infrastructure

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Abstract: This paper work summarizes The Romanian National Program for Rehabilitation of the Main Irrigation Infrastructure during 2016 – 2020 as well as the results of SWOT analysis of irrigation arrangements in Romania highlighting the need to rehabilitate and modernize the main irrigation infrastructure to ensure the necessary of water in the secondary infrastructure FOUAI/OWUI rehabilitated/modernized during 2007 – 2013 (as 125) or under rehabilitation (as 4.3/AFIR).

Keywords: rehabilitation, main irrigation infrastructure, SWOT analysis, FOUAI, OUAI.

1. INTRODUCTION

Romania owns a 3,1 mil. hectares irrigated area, which occupies about 22% of the agricultural area of the country and about 34% of arable land. The irrigation systems were build up until the year of 1991 and, in the coming years, an important part of this systems were left in ruins[6,7].

The irrigation arrangements are in an advanced stage of degradation and 75% area of irrigation arrangements are not functional and those that function are not efficient in terms of water and energy consumption, being expensive for farmers.

The main problems that the irrigation systems deal with, are the following: low hydraulic efficiency, high cost of electricity for the still based systems on pumping (The Danube is being the main source of water) and high water rates.

Between 2007-2013, was accessed the measure no. 125 of the NRDP (National Rural Development Program), by a total of 134 OIF (OUAI), which used the allocated amounts for the rehabilitation of the secondary irrigation infrastructure taken from ANIF, according to Law no.138 / 2004 of land improvements - republished with the subsequent amendments. Starting 2016 the measure no. 125 became measure 4.3.

The main irrigation infrastructure which belongs to the public domain, that feeds the secondary irrigation infrastructure owned or administered by FOIF/FOUAI and OIF/OUAI is mostly undischarged, pumping stations and re-pumping stations function in

low yield and conduits significant water leaking, leading to high prices per 1000 cubic meters of pumped water prices fully borne by farmers who want to irrigate.

The public institution responsible for implementing the National Program for Rehabilitation of Main Irrigation Infrastructure is the Ministry of Agriculture and Rural Development through the National Agency of Land Improvement.

The actual situation of the main irrigation infrastructure is:

- base stations and pumping efficiency is 50%;
- the degradation degree of the sealing canals and hydro - technical constructions of these canals is 72%;
- the water loss on the transport canals are 52%.

Applying this rehabilitation program aims at substantial improvement in these parameters. The program meets the irrigation sector measures of the National Rural

Development Program, both in the period 2007-2013 and the current European financial programming period 2014-2020.

In this context, the restoration of interior irrigation arrangements which belong to organizations and federations of land improvements organizations (OIF and FOIF) has earmarked an amount of 128 million euros by the RDP 2007-2013, measure-125, and in the programming period 2014-2020 European funds allocated under RDP 2014-2020, sub-measure 4.3 – irrigation, totals 435 million euro for the rehabilitation of secondary irrigation infrastructure owned / use of organizations / federations of water users for irrigation. After approval of the program, expertise will be performed and projects developed for its implementation.

2. NATIONAL PROGRAM FOR REHABILITATION OF THE MAIN IRRIGATION INFRASTRUCTURE [5]

The National Program for Rehabilitation of the Main Irrigation Infrastructure for Romania has provide an investment value of 1.015 bilion euro

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according to law no. 269/2016 and approved by Government Decision nr. 793/2016 – approval of the National Program for Rehabilitation of the Main Irrigation Infrastructure for Romania, published in the Official Gazette nr. 879 of November 2, 2016. The National Program for Rehabilitation of the Main Irrigation Infrastructure for Romania is a three steps program, elaborated by The Ministry of Agriculture and Rural Development (MARD) with the help of National Agency for Land Improvements, Agency of Rural Investments Financing and General Directorate for Rural Development – Managing Authority for NPRD.

Implementation period for The National Program for Rehabilitation of the Main Irrigation Infrastructure is 2016–2020.

The program aims to solve the following problems of the irrigation arrangements:

a) improperly technical condition of the main irrigation infrastructure belonging to the public domain;

b) reduced ability of users to contribute to the rehabilitation of the main irrigation infrastructure.

The overall objective of the program aims the main irrigation infrastructure rehabilitation which will increase the functional area of the viable and marginally viable area, in economical terms for irrigations, up to 70% in 2020 and 90% in 2030, and consists the main irrigation infrastructure rehabilitation structured by 86 viable arrangements belonging to the public domain measuring approximately 1.8 mil hectares, until the end of the year 2020.

The main irrigation infrastructure rehabilitation has the effect of increasing functional yields of irrigation arrangements with direct reflection in reducing the charge/1000 mc of pumped water, which will create bigger opportunities for farmers to use the irrigation water.

The main irrigation infrastructure is composed of:

- water intake;
- base pumping stations (fixed or floating), including the reversible one;
- re-pumping stations;
- canals and supply and distribution pipes for irrigation water until the pressurizing pumping station.

There are three stages of the Program implementation:

- *Stage I* will be the main irrigation infrastructure rehabilitation containing 40 arrangements belonging to the public domain.

- *Stage II* of the rehabilitation includes a number of 37 viable declared arrangements by the study „Updating investment strategy in the irrigation sector - expertise on the economic viability of irrigation systems - Final Report” elaborated by EXPERCO - ISPIF, an area of 490.089 ha. On these arrangements are made OIF-s that will be able to rehabilitate the secondary irrigation infrastructure within the framework of sub-measure 4.3 of the NPRD 2014-2020.

- *Stage III* - the rehabilitation will include 9 viable irrigation arrangements including 199.810 ha, area which is not owned by OAI-s. In case that this OUA-s will be found, they will enter into the second phase of rehabilitation.

Implementation period of the stages I, II and III is 2016 - 2020 and overlaps with NPRD implementation period, 2014-2020.

In those three stages it will be rehabilitated:

- water intake;
- base pumping stations (fixed or floating), including the reversible one;
- re-pumping stations;
- canals and supply and distribution pipes for irrigation water until the pressurizing pumping station.;

- hydro-technical constructions.

Will be rehabilitated a total area of 2.006.941 ha out of 86 viable irrigation arrangements.

In the first stage it will be rehabilitated the main irrigation infrastructure which belongs to the public domain composed by 69 base pumping stations, 87 re-pumping stations, 2525 m discharge pipes, 1.226.505 m of supply pipes, 1.965.488 m distribution canals and 3.125 hydro-technical constructions out of 40 irrigation arrangements that are set up with organizations and federations of Land Improvement Organizations who accessed 125 measure of the NPRD 2007 -2013.

At present, the yield of the base and pumping stations, the degradation stage of the sealing canals and hydro-technical constructions, the losses of water from the canals being very high.

In the second stage it will be rehabilitated the main irrigation infrastructure which belongs to the public domain formed by: 32 base pumping stations, 37 re - pumping stations, 678.389 m supply canals, 494.478 m distribution canals and 1.345 hydro - technical constructions out of 37 viable irrigation arrangements that are set up with organizations and federations of Land Improvement Organizations who are going to access the under – measure 4.3 of the NPRD 2014 -2020.

The same as after the first stage, it will be significant increases to the yields of base and pumping stations, the waterproofing of the transport canals it will be higher and the water losses from the canals will be only out of evapotranspiration.

In the third stage it will be rehabilitated the main irrigation infrastructure which belongs to the public domain formed by: 9 base pumping stations, 13 re - pumping stations, 92.587 m supply canals, 425.107 m distribution canals and 525 hydro – technical constructions out of 9 viable irrigation arrangements which are not set up now as OUA-s. In case that this kind of organizations will form, it will pass the second phase of the rehabilitation.

Following the main irrigation infrastructure rehabilitation will increase the share of viable and marginally viable area for irrigation reaching 90% in 2030.

The rehabilitation work of the irrigation arrangements it will be made by promoting

environmental protection in accordance with environmental standards, it will take account of inefficient use of water, the soil erosion and moisture excess.

Investments regarding the main irrigation infrastructure will generate a serially effects that will lead to land productivity rises average production / ha increase.

Following the SWOT analysis on irrigations arrangements, it's been identified a serie of strong and weak points.

3. RESULTS OF SWOT ANALYSIS ON IRRIGATION ARRANGEMENTS FROM ROMANIA

We appreciate the SWOT analysis made by ANIF (National Agency of Land Improvement) Bucharest [5] as relevant and points out the following:

Strong points:

- The OUAIs functioning– up to this date, they were founded 475 OUAIs, on an 1.085.053 ha area.

- The use of irrigation, mostly by commercial farms - the use of irrigation represents a phase that appears during the development of the farm, it's not a phase to begin with the farm's development.

- Farmer's experience in irrigations – owned mostly after 2000, when by foundation of OUAIs they were determined to manage by themselves the irrigation systems in the area of the farm. This result was obtained with the major support of granted subsidies, which led to the formation of OUAIs core able to irrigate and where to practice a high profits agriculture.

- The price of water in sustainable arrangements – the main water provider, NALI (ANIF), in 2015 had an average price of 155,40 ron/1000 m³ for the organizations which used the water for irrigation, but the maximum price reached 510 ron/1000 m³.

Just to draw a parallel, in France the price of irrigation water varies between 248 ron/1000 m³ and 1228 ron/1000 m³ and in Cyprus the price reaches 490 ron/1000 m³.

Having this informations, it seems that in Romania the price of water is not exaggerated for the arrangements in viable and marginal viable areas.

- The accomplished investments for the last years – The Rehabilitation and Irrigation Section Reform Project brought, during 2004 – 2012, to the irrigation sector about 80 mil. dollars investments. The support provided by Law no. 269 / 11.06.2015 approving Government Emergency Ordinance no.4 / 2015 amending Government Emergency Ordinance no.82 / 2011 on certain measures of organization of land improvement, on the following aspects: giving the secondary irrigation infrastructure to the irrigation water users organizations and create the possibility to return the secondary irrigation infrastructure back to ANIF in case that they don't respect the infrastructure transfer protocol.

Weak points:

- Economical:
 - Crops structure;
 - Farms lack of economic capacity;
 - Systems design for large holdings;
 - Reduced use of viable arrangements.
- Technical:
 - Old and misfit infrastructure to the new requirements;
 - Significant loss of water in the main irrigation infrastructure;
 - Energy consumption;
 - The lack of protective forest curtain;
 - The fact that the land occupied by land improvement was not intabulated.
- Organizational
 - Difficult colaboration between OUAIs and ANIF
 - The users not involving in leading and monitorizing organizations activity;
 - The lack of cooperation between farmers;
 - Reduced number of federations;
 - The lack of field advisers in development and OUAIs foundation.
- Perception:
 - High energy price – not confirmed.

According to Eurostat dates about energy price to industrial consumers, Romania occupies a relatively favorable place, place 9 out of 30 european states, 20% below EU average.

• The collective mentality on the sector - There is a nostalgic perception on irrigation opposite the previous results of 1989. There are missing steps in the development of farms to irrigation: management, market orientation, providing distribution, profitable business, access to finance, technological knowledge. This is one of the main reasons for the lack of demand for the service. Results seen: irrigation are used mainly by commercial farms, those that have the above mentioned factors. The investments in areas where the demand for water is not strengthened and the farmers are not organized, it did not lead to the expected results.

- Oportunities:
 - Farmers with seed lots;
 - Funding for the existing investments by allowing NPRD implementation of investment projects in irrigation infrastructure or purchased watering equipment. Between 2007 - 2013 a total of 134 OIFs have accessed 125a measure of the NPRD 2007 - 2013, the amount of accessed funds being approx. 118 million euro.
 - The consolidation of OWUI by extending the scope of activity. Organizations and federations can become a platform for further reform of Romanian agricultural sector by the opportunity it represents these organizations to structure a real process of collaboration between farmers. The nearly 10 years operation can be a first step in a process of introducing and strengthening the collaboration between farmers. Obsolete idea of partnership and cooperation is not caused only by the communist period, but in greater measure after 1990 when the association and cooperation meant actually enrich the

leaders of "associations" at the expense of other members and the factors production belonging to all members of "associations". These adverse experiences greatly contributed to the absence of methods in the conduct of this equipment in Romania. Expanding the activities that organizations and associations of water users for irrigation carry them out, would lead to the organizations strengthening by taking over the acquisition of inputs for all members and especially by providing a common dissolution products.

- Risks:
 - The developed countries tend to discourage irrigation;
 - The irrigations water users will not or can not afford to contribute to the investment programs;
 - The significant decrease of the irrigation area after the subsidies for irrigation removal;
 - Degradation or handing over the infrastructure to inactive OWUI s. As they will become inactive and the users will lose their interest in irrigation, a part of inactive OWUI s will act in two directions:
 - they will intend to hand over the taken infrastructure;
 - they will leave it to degrade.
 - The phenomenon of the organizations insolvency.

4. CONCLUSIONS

The objectives of irrigation that will be subjected to the action of rehabilitation in those three phases are: intakes, base pumping stations, including the reversible ones, pipes and distribution and supply canals of the irrigation water to realising pressure pumping stations, hydro-technical constructions. Thus, it will be rehabilitated an area of 2,006,941 ha out of 86 viable irrigation arrangements which include the following objectives: 110 base pumping stations, 137 re - pumping stations, 2.525 m discharge pipes 2.525 m, 1,997,481 m supply canals, 2,885,073 m distribution canals and 4,995 hydro-technical constructions, from which [5]:

In the first stage will be rehabilitated the main irrigation infrastructure which belongs to the public domain, formed by 69 base pumping stations, 87 re-pumping stations, discharge pipes 2.525 m, 1,226,505 m supply canals, 1,965,488 m distribution canals and 3125 hydro-technical constructions out of 40 irrigation arrangements which are set up with organizations and federations of Land Improvement Organizations who accessed 125a measure of the NPRD 2007 to 2013.

The current situation of the infrastructure described above is as follows:

- the yield of the base pumping stations and re-pumping stations is 40%;
- the degradation degree of the canals sealing and hydro-technical constructions is 80%;
- the loss of water on the transport canals are 60%.

After rehabilitation, the main irrigation

infrastructure described above will have the following general characteristics:

- the yield of the base pumping stations and re-pumping stations will be 75%;
- the sealing of the irrigation canals and hydro-technical constructions will be fully restored;
- the loss of water on the transport canals will be 30% and will be represented by evapotranspiration.

In the second stage – will be rehabilitated the main irrigation infrastructure which belongs to the public formed by: 32 base pumping stations, 37 re-pumping stations, 678 389 m supply canals, 494.478 m distribution canals and 1,345 hydro-technical constructions out of 37 viable irrigation arrangements that are set up with organizations and federations of Land Improvement Organizations (FOUAI and OWUI) that can access the sub-measure 4.3 of the RDP 2014-2020.

The current situation of the infrastructure described above is as follows:

- the yield of the base pumping stations and re-pumping stations is 45%;
- the degradation degree of the canals sealing and hydro-technical constructions is 75%;
- the loss of water on the transport canals are 55%.

After rehabilitation, the main irrigation infrastructure described above will have the following general characteristics:

- the yield of the base pumping stations and re-pumping stations will be 77%;
- the degradation degree of the canals sealing and hydro-technical constructions will be 20%;
- the loss of water on the transport canals will be 28% and will be represented by evapotranspiration.

In the third stage – will be rehabilitated the main irrigation infrastructure which belongs to the public formed by: 9 base pumping stations, 13 re-pumping stations, 92.587 m supply canals, 425.107 m distribution canals and 525 hydro-technical constructions out of 9 viable irrigation arrangements that are not set up with OWUI. In case that the organization will be set up, this will pass in the second stage of rehabilitation.

After rehabilitation, the main irrigation infrastructure described above will have the following general characteristics:

- the yield of the base pumping stations and re-pumping stations will be 79%;
- the degradation degree of the canals sealing and hydro-technical constructions will be 20%;
- the loss of water on the transport canals will be 26% and will be represented by evapotranspiration.

By investing in the rehabilitation of the main irrigation infrastructure is envisaged increasing the share of marginally viable and economically viable functional area for irrigation (%) of 50% as is the current level to 70% in 2020. The long-term target (2030) will be 90%.

The irrigation arrangements operation, that is subjected to rehabilitation will be done to prevent the inefficient use of water, excess moisture, erosion and

soil pollution and also to promote the environmental protection in accordance with environmental standards.

The Ministry of Agriculture and Rural Development, provided the undertaking by the Government by a decision of the National Program for the Main Irrigation Infrastructure Rehabilitation will receive between 2016-2020 an amount of 1.015 billion euros needed to rehabilitate the main irrigation infrastructure, as follows: in 2016, 145 million euros, while the allocated funds in the next four years will increase by approx. 17% every year to achieve the approved cap for the multi-annual investment program.

The source of investment financing rehabilitation of the main irrigation infrastructure is the state budget, the legal framework is provided by Article III of the Law no.269 / 2015 approving Government Emergency Ordinance no. 4/2015 amending Government Emergency Ordinance no. 82/2011 on certain measures of organization of land improvement, as amended. Investments in rehabilitation of the main irrigation infrastructure will generate macroeconomic effects consisting mainly in increasing the net income compared to the situation before rehabilitation through: - improving the land productivity, currently with moisture deficit, salted, acid, etc ; the improvement of the crops plan by using only valuable and profitable plantes; increasing the average production per hectare.

According to ANIF calculation on agricultural production value obtained from land with undischarged irrigation arrangements compared to the rehabilitated ones resulted a net benefit of approx. 19 580 thousand EUR / 100.000 ha.

The calculation was carried out on a general rotation for Romania's agriculture, taking into account the market prices of agricultural products, made up by the following crops with the following weight: wheat - 20.70%, barley - 2.30%, corn - 46.90%, sugar beet, sugar - 0.80%, sunflower - 5.20%, vegetables - 1.90%, barley - 0.30%, other crops (soybean) - 0.10% potato - 1.20%, pink - 17.40%, orchard - 2.40%, oats - 0.80%, total - 100.00%.

In calculating costs were taken into account a number of expenses on water price, transport, materials, electricity, etc. Thus, the net profit was obtained after deducting all expenses from gross income. Water price (/ 1000 m3) to be paid by beneficiaries shall reflect all the costs of taking water from the source to the plant.

Also, the rehabilitation action will lead, on the one hand, to the increase of the main irrigation adduction efficiency, which represent the main source of water for the interior irrigation arrangements which belong to OIF and other land improvement works and on the other hand, increasing efficiency of interior irrigation arrangements belonging to OIF with reflection in lowering the price for 1000 m3 of pumped water for irrigation, price entirely paid by the beneficiary.

The impact is even more important given the

increasing efficiency of the irrigation arrangements that were set up with Land Improvement Organizations and Federations who accessed 125a measure of the NPRD 2007-2013 and the viable irrigation arrangements which are set up with Land Improvement Organizations and Federations, which will enter the sub-measure 4.3 of the NPRD 2014-2020.

Farmers will feel the effects of measures to reduce the price for irrigation in order to reduce production costs and thus increasing the profitability of farming.

Rehabilitating the main irrigation infrastructure will lead to savings of water and energy resources by reducing losses and implementing an efficient management of resources.

The social impact is achieved by carrying out the rehabilitation action, that reduces the vulnerability of human communities to drought by avoiding damage to a population of 1,097,433 inhabitants in 190 localities.

In terms of environmental impact - through the rehabilitation of the existing works whose environmental impact was assessed on execution, will not generate changes in the original environmental impact.

The program was approved so that on auction to conduct expertise and develop the necessary projects (DALI and DE) implementation. Thus far SEAP auctions are underway for the first works auctioned.

In parallel to mention that the present arrangements are ongoing development of new local irrigation arrangements, especially in western Romania (Jud. Timis) with financial support from the personal funds of landowners. We believe that EU funds would be required also for the support of landowners in creating new irrigation arrangements, in these areas where the global warming, it is felt the negative effect of drought during summer [6-10].

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