

Forest ecological restoration works on degraded areas included in the Remetea Mica improvement area, Timis county

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Abstract

The territory where the “Remetea Mica” breeding perimeter is located is in the northeastern part of Timis County, 35 km from Timisoara and 2 km from Remetea Mica. The degraded land included in the improvement perimeter is located entirely outside the municipality of Remetea Mica. Masloc in the county. Timiș and they were constituted in two bodies: Hamaș - bordering on the P.U. IV Sarlota of the O.S. Timisoara and Honos - bordering on the P.U. V Honos of the O.S. Timisoara. Abusive grazing and improper exploitation of the dirt roads within the improvement perimeter, mostly consisting of steep slopes under the influence of rainfall specific to the study area, have led to erosion processes on the land covered by this feasibility study. The economic and eco-productive effects of the works proposed in the project will be felt after 6 years from the installation of the plantations and especially after the closure of the massifs. They will be felt throughout the life of the stands to be created on the degraded land within the improvement perimeter. The ecological forest reconstruction on the degraded lands included in the Remetea Mica improvement perimeter can only be achieved by adopting a complex technical solution, through which the project objectives can be achieved. The technical solution adopted has the following components: - the installation of forest vegetation on 129.78 ha of degraded land, by afforestation with forest species characteristic of the area, respecting the principle of biodiversity, appropriate to the types of resorts presented. The following objectives have been set out in the present work: to use forest vegetation to exploit degraded land taken over from the agricultural sector; to halt the process of land degradation and gradually improve it under the direct effect of protective forestry crops.

Keywords: improvement perimeter, Remetea Mica, restoration

Introduction

The territory where the “Remetea Mica” breeding perimeter is located is in the northeastern part of Timis County, 35 km from Timisoara and 2 km from Remetea Mica. The degraded land included in the improvement perimeter is located entirely outside the municipality of Remetea Mica. Masloc in the county [2] Timiș and they were constituted in two bodies: Hamaș - bordering on the P.U. IV Sarlota of the O.S. Timișoara and Honos - bordering on the P.U.V Honos of the O.S. Timisoara [4,7].

Abusive grazing and improper exploitation of the dirt roads within the improvement perimeter, which is mostly made up of slopes of various inclinations, under the influence of rainfall specific to the area under study, have led to erosion processes on the land covered by this feasibility study [1, 3].

This land has lost all or part of its productive capacity for agricultural use and silvicultural improvement work is needed to restore it to productive use [8].

As a result of the onset of land erosion and the total or partial loss of productive capacity for agricultural use, silvicultural improvement works are required.

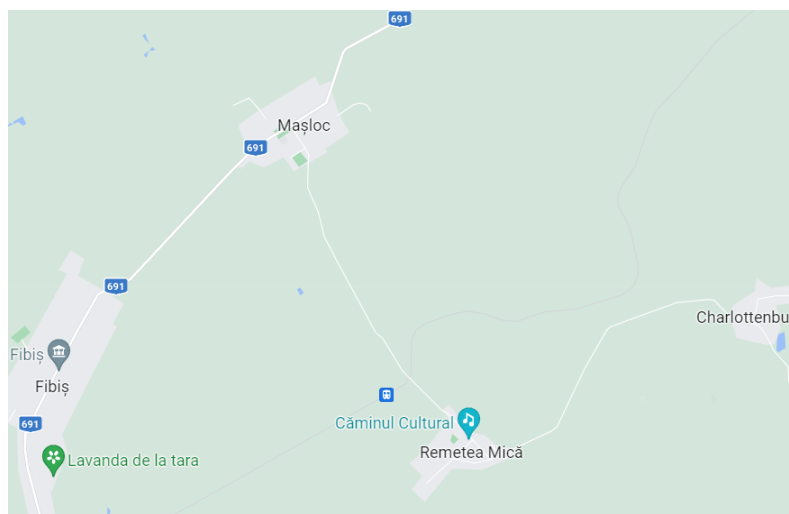


Figure 1. Satellite view of Remetea Mica

Material and Method

The ecological forestry reconstruction works on degraded land included in the “Remetea Mica” improvement perimeter have a pronounced environmental protection character, in the sense of reducing and stopping soil degradation processes, from which economic effects may also result.

In the local socio-economic context, the investment will indirectly result in:

- the restoration of 188.39 ha of degraded land to economic use.
- improvement of the landscape aspect, with a positive effect on the development of agro-tourism.
- by carrying out the investment, temporary and permanent jobs will be provided, which will absorb part of the labour force in the county. Masloc and the surrounding area.

The economic and eco-productive effects of the works proposed in the project will be felt after 6 years from the installation of the plantations and especially after the closure of the massifs. They will be felt throughout the life of the stands to be established on the degraded land within the improvement perimeter.

The ecological forest reconstruction on the degraded lands included in the Remetea Mica improvement perimeter can only be achieved by adopting a complex technical solution, through which the project objectives can be achieved.

Results and Discussion

The technical solution adopted has the following components:

- the installation of forest vegetation on 129.78 ha of degraded land, by afforestation with forest species characteristic of the area, respecting the principle of biodiversity, appropriate to the types of resorts presented. The installation technologies include for each afforestation composition, land and soil preparation works, planting of seedlings, care of the plantations through completions and maintenance works until the achievement of the stand condition.
- support of forest vegetation on land affected by deep erosion, consolidation of riverbeds through specific works, i.e. single and double clumping with longitudinally laid bundle rakes [9].
- works to control defoliating insects for the entire area included in the Remetea Mica improvement perimeter.
- ensuring the security and protection of the plantations against grazing, by fencing with barbed wire, carrying out work to control biotic pests, and preventing and extinguishing fires, until the state of massiveness is achieved [10, 13].

Land and soil preparation works

Land and soil preparation will be carried out mechanised over the entire surface (SAD) on the planting plots of technical solution no. 2 and includes scarifying at a depth of 70-80 cm by two perpendicular passes, ploughing at 25-30 cm and two-way disking.

Clearing the land of bushes (Ct), with a view to afforestation of the planting areas of technical solutions 1, 4 and 5, which are covered with bushes (mace, poplar, hawthorn, hornbeam, bloodroot, etc.) to be removed from the surface of the glasshouses.

The exploitation of plum trees > 10 cm in diameter (Expl) for afforestation on the planting areas of technical solution No. 1 which are covered with rare and dry plum trees left over from former orchards.

Land preparation in 60 x 80 cm, 5000 vines/ha on land related to technical solutions 1, 3, 4, and 6.

On the land to be planted under technical solution 6, the planting of seedlings will be carried out only after the consolidation of the hollows and ravines, which consists of 39 clamps (CI), of which 22 are simple clamps 1.0 m high and 2.0 m long, with a simple raft of longitudinally laid strips and 17 are double clamps 1.0 m high and 2.0 m long, with a double raft of longitudinally laid strips [5, 15].

Details of the location of single and double clamps are shown in the Technical Solutions Map, with the execution details to be dealt with in the technical project.

Planting installation works

The stakes used in the planting work must comply with STAS 1347-04 - Small, medium and medium-sized forest stakes and the provisions of Government Emergency Ordinance No 11 of 2004 on the production, marketing and use of forest reproductive material [6, 8].

Planting will be carried out in prepared land, in hand-dug pits with sides of 40x40 cm and a depth of 40 cm for cvercinee, mixed, aid and black poplar species, and 30x30 cm pits with a depth of 30 cm for willow. It is recommended to cut back deciduous seedlings after planting (except black poplar). In autumn plantings, cutting should be carried out in spring with the revision work.

Plantation care works

In the case of evenly spread or clustered losses, additions have been foreseen in years II and III from planting in percentages of 15% and 10% respectively for land under technical solutions 1 and 2, 20% and 10% for land under technical solutions 3, 4 and 6 and 15% and 5% respectively for land under technical solution 5. The species to be introduced by additions must ensure the proportions established by the regeneration compositions.

For losses higher than these percentages found during the annual control, disaster certificates may be drawn up if these losses are caused by factors of this nature, and the work related to the reforestation may be paid from the fund for miscellaneous and unforeseen expenses only after the preparation and approval of the related documentation by the law.

Replanting will be carried out in years I and II for the lands related to technical solutions 3, 4 and 6 and in years I, II and III for the lands related to technical solutions. Soil mobilization between the rows of seedlings will be carried out mechanically with a tractor plough on 60% of the area by ploughing at 15 cm and manually on 40% of the area around the seedlings - on the lands to be planted related to technical solution 2, and on the planting areas of technical solutions 1, 3, 4 and 5, mobilisation will be carried out only by hand, around the seedlings, 1-3 times per year until the mass state is achieved.

The cvercinee plantations of technical solutions 1 and 2 will be planted with one clearing each in years IV and V and the plantation of technical solution 5 will be planted with one clearing each in year V.

The type and number of care works proposed are aimed at creating the conditions for the establishment, maintenance and development of the plantations under the climatic and seasonal conditions specific to the improvement perimeter.

Pest control works

For the prevention and control of root pests, seedlings of cvercinee, mixed, helper and black poplar species should be treated by hand by bathing the roots in a toxic solution of Karate Zeon at a concentration of 0.25-0.30%, clay soil and decomposed manure. The manure should have the consistency of cream to adhere well to the roots.

The control of beetles and defoliator caterpillars is carried out by spraying with Kyoritz-type machines in all growing years until the mass stage is closed with Karate EC insecticide at a concentration of 0.03% at a dose of 300 l/ha.

For overcome-based plantations, one treatment/season is applied against hay fever until the mass stage is closed with Tilt 250EC at 0.03% concentration and 300 l/ha application rate.

It was planned to fence the plantations with barbed wire fencing, 1.80 m high, supported on 2.5 m by 2.5 m bulwarks. A total of 8495.2 ml of fencing was determined. It should be noted that no fence was proposed in the portions where the two bodies of the perimeter adjoin and are separated by mesh fencing from the Sarlota hunting park.

To ensure the success of the afforestation work, it is recommended that the rules for transporting, handling, storing and planting seedlings be strictly observed.

The seedlings must be transported to their destination by covered means of transport to protect the roots of the seedlings from damaging wind and sunlight. The saplings must be laid in layers. A layer of moss, litter or damp straw shall be placed between the layers, including above, below and to the side.

Annual regeneration control work

The autumn work will be carried out between 15 September and 15 October, with the setting up of sample plots and the inventory of seedlings following the regulations in force, resulting in a total of 719 sample

plots, with areas of 100 and 200 m² of rectangular shape, the number of which will be detailed in the technical project. These markets will be permanent from the reception of the planting works until the final success. Depending on seasonal conditions, final success is planned for the sixth year after planting.

Delimitation of the improvement perimeter

The bollards will be made of reinforced concrete, have the shape of a pyramid trunk with a square section, the side of the large base 16 cm, the side of the small base 12 cm, 60 cm high and buried in the ground with the large base to a depth of 40 cm, remaining 20 cm above the ground. They are placed on earth or stone platforms.

Seedling Requirements

The establishment of the seedling requirements was done taking into account the planting schemes and the percentage of completions for each composition of afforestation as well as the planting staggering of the areas covered by the project. The need for seedlings is shown in Table 1.

Table 1. Seedling requirements

Crt No.	Species	YEAR I	YEAR II	YEAR III	YEAR IV	YEAR V	YEAR VI	TOTAL
		thousands of pieces	thousands of pieces	thousands of pieces	thousands of pieces	thousands of pieces	thousands of pieces	thousands of pieces
0	1	2	3	4	5	6	7	8
1	6CE	262.86	39.429	26.286	-	-	-	328.575
	2TE	87.620	13.143	8.762	-	-	-	109.525
	2ARB	87.620	13.143	8.762	-	-	-	109.525
2	3ST	12.870	1.931	1.287	-	-	-	16.088
	1NU.N	4.290	0.644	0.429	-	-	-	5.363
	3FR	12.870	1.931	1.287	-	-	-	16.088
	3ARB	12.870	1.931	1.287	-	-	-	16.088
3	2.5CE	3.463	0.693	0.346	-	-	-	4.501
	5FR	6.925	1.385	0.693	-	-	-	9.003
	2.5SÂ	3.463	0.693	0.346	-	-	-	4.501
4	5CE	53.350	8.003	2.668	-	-	-	64.020
	2.5FR	26.675	4.001	1.334	-	-	-	32.010
	2.5PD	26.675	4.001	1.334	-	-	-	32.010
5	10PLN	12.504	2.501	1.250	-	-	-	16.255
6	10SL	19.600	3.920	1.960	-	-	-	25.480
TOTAL		633.654	97.346	-	-	-	-	789.030

Staggering the start of planting work

Table 2 shows the scheduling of planting works in the Remetea Mica improvement perimeter, resulting in a total area to be planted of 129.78 ha.

Table 2. Planting work schedule

Regeneration composition	u.a.	Area of plantation (ha)	
		total	of which: First-year
60Ce, Gâ20Te, Pa, Ci, Ju, Pă, Mă, 20Arb (Pd, Sâ, Lc)	48G,48H,48I,48N,48O,49C,49E, 50A,50C%,51A,51D,51F,51H%, 81A,82C,82G,82I,82K,82M,82N, 82P,82R	87.62	87.62
30St 10Nu.n 30Fr, Ci, Pa, Te, Ca 30 Arb (Pd, Sâ, Lc)	48C,48M,51N	8.58	8.58
100PIn, PI	50E%,50F,51O%,51R%	7.51	7.51
25Ce (Go,Str) 50Fr (Ci, Pa, Tea, Vit) 25Sâ (Lc, Co)	48K,51C	2.77	2.77
50Ce (Gâ) 25Fr (Tea, Ci, Pa) 25Pd (Po, Lc)	48D,48F,48J,49A,49B,51L,51P,82D	21.34	21.34
100SI (Mj, Vit)	48B,48E,51B,81B,81C,81D,81E,81F	1.96	1.96
TOTAL GENERAL		129.78	129.78

Conclusions

The following objectives have been derived from this paper:

- to valorise, with the help of forest vegetation, degraded land taken over from the agricultural sector.
- to halt land degradation processes and gradually improve the land under the direct effect of protective forestry crops.
- mitigation of climatic adversities, protection of human settlements and crops, and other objectives in the area (roads, electricity and telecommunications lines).
- improving surface runoff and flow regimes on watercourses in the area.

The ecological forestry reconstruction works on degraded land included in the “Remetea Mica” improvement perimeter have a strong environmental protection character, in the sense of reducing and stopping soil degradation processes, which may also have economic effects.

In the local socioeconomic context, the investment will indirectly determine:

- the restoration of 188.39 ha of degraded land to economic use.
- improvement of the landscape, with a positive effect on the development of agro-tourism.
- by carrying out the investment, temporary and permanent jobs will be provided which will absorb part of the labour force in the county. Masloc and the surrounding area.

The economic and eco-productive effects of the works proposed in the project will be felt after 6 years from the installation of the plantations and after the closure of the massifs. They will be felt throughout the life of the stands to be established on the degraded land within the improvement perimeter.

References

- [1] Damian, I. (1978), *Aforestations*. Ed. Didactics and Pedagogics, Bucuresti.
- [2] Dragomir P.I. (2020), *Aforestations - Course notes*
- [3] Dragomir, P.I., Saiti, B.O., Tulcau, C., Moatar, M.M., Camen, D. D. (2023), *Total phenolic content, flavonoid content and antioxidant potential of bilberry (Vaccinium myrtillus L.) from up V Higel*. International Multidisciplinary Scientific GeoConference: SGEM, 23(3.1), 351-358.
- [4] Florescu, Gh., Abrudan I.V. (1998), *Aforestations. Design principles and solutions*. Litography University of Brasov.
- [5] Florescu, Gh., Abrudan I.V. (2003), *Forest crop installation technologies*, Ed. Transilvania University of Brasov.
- [6] Giurgiu, V. (1967), *Studying growth in forest stands*, Ed. Agro-Silvică, Bucuresti.
- [7] Marcu, M. (1983), *Forest meteorology and climatology*, Ed. Ceres, Bucuresti.
- [8] Forest District Timisoara, *** *Forest management dossier U.P. IV Honos*, Ed. Pentru Viata, Brasov.
- [9] Șofletea, N., Curtu, I. (2000), *Dendrology*. Vol. II, Corology, ecology and biological characteristics of species, Ed. Pentru Viata, Brasov.

- [10] Șofletea, N., Curtu, I. (2002), *Dendrology*. Vol. I, Determination and description of species, Ed. Pentru Viata, Brasov.
- [11] Ștefan, C., Stanciu, S., Moatăr, M. (2016), *Consideration regarding the new gardening and the future of great gardens*. *Lucrări Științifice Management Agricol*, 18(1), 293.
- [12] Târziu, D., (1997), *Pedologie si statiuni forestiere*, Ed. Cereș, Bucuresti.
- [13] Vass, H., et al. (2021), *Study on climate change issue and environmental degradation in Romania*. *Lucrari Stiintifice Seria I Management Agricol* 23(2): 89-96.
- [14] VASS, H., et al. (2020), *Study on adapting society to the effects of climate change*. *Review of Management & Economic Engineering* 19(2)
- [15] Vișoiu, D. (2004), *Ornamental woody species*, Ed. Mirton, Timisoara