Improving Romania's Green Cover by Planting Forest Protection Curtains, in the Context of Current Climate Changes

Camelia MĂNESCU[1*], Ada-Flavia CRISTINA[1], Teodor MATEOC[1], Camelia GAVRILESCU[2], Nicoleta MATEOC-SÎRB[1,3]

[1]Department of Management and Rural Development, Banat's University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania" from Timişoara, Calea Aradului nr. 119, 300645, Romania,
[2]Institute of Agricultural Economics of the Romanian Academy
[3]Academy Romanian Subsidiary Timisoara
*Corresponding author: *cameliaoborocea2004@yahoo.com*

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ABSTRACT

In Romania, the area covered by forest has decreased in the last period of time (28%), is currently below the average of developed countries in the European Union (40%). Meanwhile, a series of extreme weather phenomena have increased, representing the greatest threat facing humanity and the environment. In the current paper the authors analyze the distribution of Romania green cover on geographical areas, trying to find solutions to minimize the existing imbalances.

Expanding forest areas should be a priority for ecological restoration because Romania has low forest coverage areas. Research shows that there is an unbalanced distribution of green coverage of Romania in the current climate change, which requires the plantation of protective forest curtains.

Keywords: *climate changes, forest, protection curtains.*

INTRODUCTION

In Romania 28 % of the area is covered with forests (about 6.43 million hectares), of which 3% (200 thousand hectares) recorded as remaining primary forests and 97 % as secondary forests and forest land, if considered only functional ecological forests, the degree of forestation is only 23 % .

In our country, the percentage of forestation is below that of other European countries with similar natural conditions (Slovenia 57 % , Austria 47 % , Bosnia 53% , Slovakia 41%), representing about half of the optimal proportion for Romania (40-45 %). (NSSD of Romania Horizons 2013-2020-203, 2008]

In this context, for Romania, expanding forests is a priority for ecological restoration because there are still too many hilly areas (Transylvania Plateau, Dobrogea and Moldavia Highlands) with low forest coverage. (Steriu V., Otiman PI, 2013)

In the plains, deforestation has caused excessive dryness, excessive steppization and here and there, even desertification and massive erosion in hilly soil.

MATERIALS AND METHODS

The research methodology consisted in a thorough study of bibliographical resources (Romanian literature, Internet sites on the topic), carried out in several steps: information on sources, observation, collection of data and information, analysis, and evaluation. The research is carried out as postdoctoral studies, part of a project for

human resources development at BUASVM from Timisoara.

RESULTS AND DISCUSSIONS

One of the main ways of ecological reconstruction and creation of a natural balance is long-term regional greening through reforestation and the creation of the national system of forest protection curtains.

The protection curtains are established by forest vegetation formations planted in various lengths and widths relatively narrow, placed at a certain distance from an object in order to protect it from the effects of the harmful factors. This reduces the wind speed over a distance of 5 to 10 times their width. Thus, the wind speed is reduced and there are made some local changes of the wind direction, especially to those near the ground and the curtain.

Curtains determine the retention and even the distribution of the snow on the land surface, so that it increases the soil water reserve, it improves daily temperature through the reduction of the daily amplitude, and fights against flooding effect by lowering the groundwater level. The forest curtains protect the settlements, the ways of communication, the crops and they are sources of wood in the regions with rare forests.

In Romania, this solution of protecting the soil and crops by using forest curtains was initiated in 1861 and developed in the great disasters, excessive drought, dust storms (1890, 1935, 1946), and it was materialized until 1962, when there were deforested once with the forced land merger for collectivization. Following this approach it was destroyed the main network of protection curtains in Romania. After 1990, concerns arose about the reestablishment of forest protection curtains.

In 2002, Romanian Parliament adopted the Law no. 289 (republished in 2014) on implementation of a national system of protection curtains. According to this law, beyond the protection of communication routes against heavy snowfall, the forest curtains were and are a shield against landslides, erosion, as a defense of settlements, dams and river banks against climatic factors.

These last years, on the background of global warming, the frequency and intensity of extreme climate phenomena has increased globally, regionally and locally. These phenomena can have a catastrophic effect on the population both short term (large numbers of victims and material damage) and long term (land degradation and, implicitly, diminution of their productive potential. (Ardelean, F., Colda, I., 2008)

In general, global warming is caused by the greenhouse effect of the gases from human activities. The sectors that generate a considerable increase of greenhouse effect gases are industry,

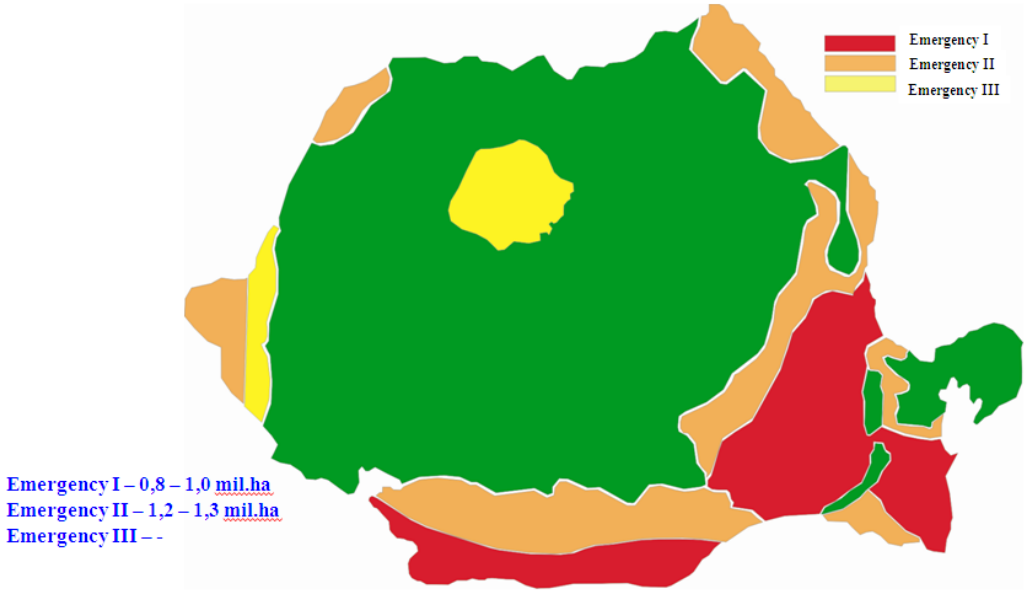

Fig. 1. Areas that require forest curtains for the field protection, on emergencies
Source: Păun Ion Otiman, 2011

transport, and energetic consumption, while the increase caused by residential and commercial buildings, by deforestation and agriculture is slower. (Săndulache, C., Săndulache, I., 2011)

Late climate changes, frequency of increasingly sharp and dry periods of severe drought and temperature extremes, determined the appearance and extended the high risk (12%) and medium (35%) of desertification, which requires development/rehabilitation of irrigation systems in drought affected areas and the establishment of forest curtains to mitigate these negative phenomena. (Fig. 2) (Păun Ion Otiman, 2011)

The efficiency of the protection curtains is recognized in the fight against drought and other climate adversities and topography: storms, torrents, blizzards, landslides, for prevention and combat the massive processes of soil degradation, etc.

The forest curtains have a decisive role in protecting crops, through direct effect on the microclimate, and it stops landslides and local torrents, helps the growth and the conservation of the soil fertility. All these effects of the action of the forest curtains, contributes to safeguarding and promoting the diversity of flora and fauna.

The agriculture system with protection curtains is a part of the development strategy and is suited to the country's modern legislation. According to the requirements of European integration, integrated environmental management for sustainable agricultural development includes conservation and sustainable use of bio-resources and biodiversity, agro-ecosystems reconstruction, goals that can be achieved by planting forest protection curtains. (Law no. 289/2002 and Law no. 46/2008. Forest Code)

The main benefits of setting up the protection curtains are primarily on the environment by increasing carbon storage, reducing air temperature and humidity raise, by capturing the dust and air filtration, stimulating exchanges of air, reducing noise and gaseous pollution, having positive effects on biodiversity and farm land by improving the conditions of agricultural land for growth and development for adjacent crops, by increasing fertility conditions and soil conservation (maximizing humidity and humus formation conditions and reducing erosion and deflation) and last but not least, by increasing production.

Unbalanced distribution of green coverage of Romania and the need for storm-water retention and preservation, the reduction of snow and wind strength, requires the achievement of the protective forest curtains in the Romanian Plain (Bărăgan), in southern Moldova and to a lesser

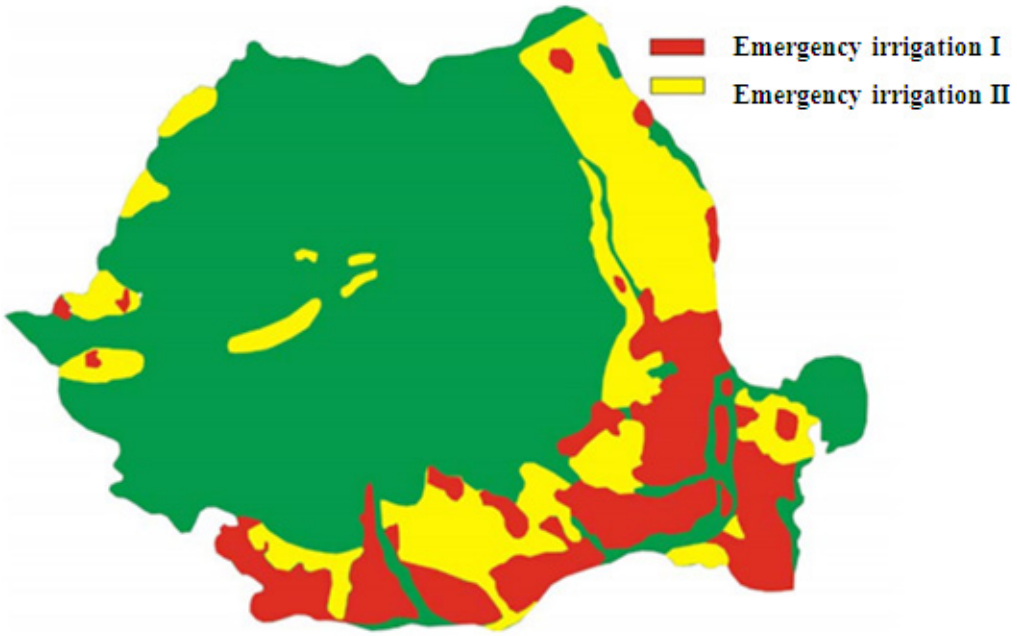

Fig. 2. Drought-affected areas requiring irrigation
Source: Păun Ion Otiman, 2011

extent in the Western Plain. (Fig. 3) (Păun Ion Otiman, 2011)

In the plains with small areas of forest, the protection curtains have a particularly favorable influence on the environment, serving as climate protection. This aspect reduces the wind speed over a distance of 5 to 10 times their width. This way, is reduced wind speed and it has some local changes over direction, especially next to the curtain.

The protection curtains causes the retention and even distribution of snow on the land surface, thus increases soil water reserves, improves daily temperature by amplitude reduction and combats flooding effect by lowering the groundwater level .

Trees and shrubs of the forest curtains attenuate noise. The specialty literature, it shows that the protective curtains have the ability to reduce noise up to 10 decibels. In the United States, was recorded that about 30 m a strip of forest placed along a road vehicles reduce 8-11 % of the traffic noise.

The protection curtains have decontaminated role. Regarding the phenomenon of chemical pollution, is noted that a stream of air pollution with sulfur dioxide at a concentration of 0.1 mg / m^3 can be completely de-polluted by slowing the transit of more than one hectare of forest. The protection curtains composed of conifers performs a microbial treatment. The forest curtains serves as a form of recreation for the bordering population, provides an environment for developing wildlife, creates a favorable microclimate for the summers with high temperatures.

The protection curtains is a rich source of industrial and food products (fruits, mushrooms, medicinal and bee products), improves living conditions, purifies the air, tame the climate, beautifies the landscape and improves the water regime.

In the context of climate change, improving the green coverage of Romania requires the establishment of protective forest that will potentially increase green surfaces and which will have an important role in the sustainable development of rural communities, contributing to a better microclimate, by reducing wind speed, improving conditions for growth and development of crops, reducing erosion etc.

CONCLUSIONS

The objectives of rural development programs and planning must relate to the expansion of forests through the establishment of the new plantations and the forest protection curtains.

Nowadays, in sustainable agricultural development schemes, it is strongly emerged the need of establishing the forest curtains with their

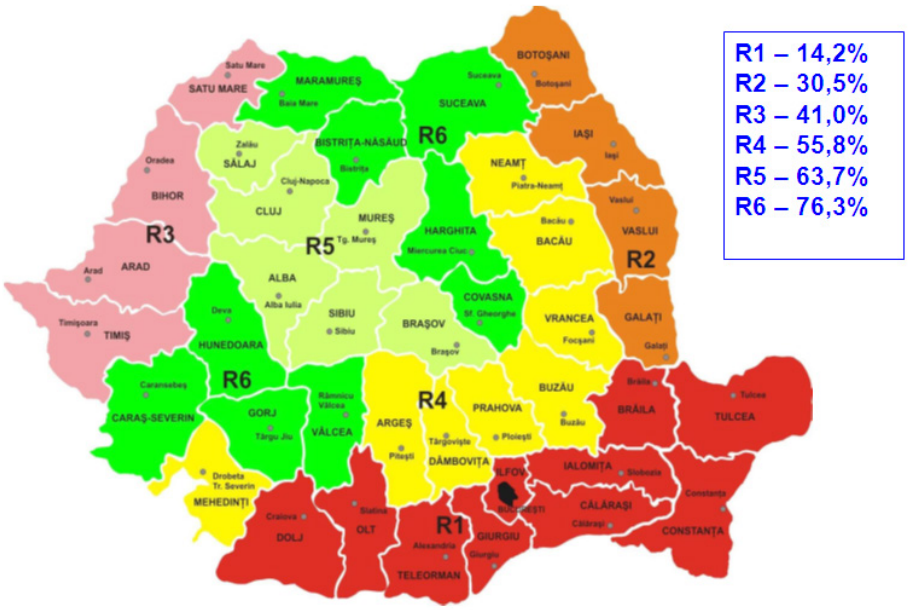

Fig. 3. Map coverage on ecological macro-regions of Romania
Source: Păun Ion Otiman, 2011

numerous protective effects on crops, causing stability and ecological balance, biodiversity and pesticides pollution prevention, etc.

Under the current legislation, protection curtains may be set up for different utilities, thereby:

- farmland protection against harmful climatic factors and weather conditions to improve protected area;
- erosion control, soil protection which is the subject to erosion;
- communications and transport protection, especially against heavy snow;
- dams and riverbank protection against currents, floods, ice and others;
- protection of the localities and of the different economic and social goals.

The forest curtains created for the protection of the agricultural land, aims to mitigate the effects of drought on crops, notably in:

- regions with low rainfall or with sufficient rainfall for crop development, but irregular distributed in time;
- dry climate regions, taking into account soil types;
- areas subject to periodic drought;
- regions where winds are provided with high frequency during the growing season and annual precipitation values below 400 mm or between 400 and 700 mm, but are irregular distributed in time.

The areas needing protective forest curtains identified in Romania are: Romanian Plain, Tisa Plain, Danube and Dobrogea Plateau, affected by frequent droughts. Location is done based on technical documentation, usually on rectangular networks, in stages and in emergency order, giving priority to the most arid lands.

The forest curtains against erosion can be achieved in all areas of the country, on lands with different degrees of degradation. The identification procedure and forestation of degraded lands is provided in Government Ordinance no. 81/1998 on measures to improve through forestation of the degraded lands, approved with amendments by Law no. 107/1999. In this category are covered even lands with mobile sands, which require forestation works to fix them.

The forest curtains for the communication and transportation lines protection can be established by one side or the other of them, on the portions affected by frequent heavy snow deposits.

The forest curtains for the communication lines protection are reduced height curtains (max 8 m) compact, impenetrable, with the aim of snow accumulation in the curtains area or in their immediate vicinity, at a width of 10-15 m.

Depending on the degree of intensity of the snow and winds, there will be:

- *Snow-trap forest curtains* - in areas with high intensity winds and strong snow blocking;
- *Hedges* - in forest areas with winds of less intensity and less snow.

Forest curtains to protect dams and riverbanks against currents, floods and ice flows, can be achieved along them with rectangular alignments, on different widths and lengths, according to the orography of the land, water flow velocity, wave height and the thrust of ice.

These protective curtains are installed as obstacles as ice blocks for breaking the waves in case of flooding, leaving behind them, close to the dam or shore, a quiet area, without destructive power.

Typically, there are used forest species with strong root system, resistant to flooding and with great sprig power.

Forest curtains to protect localities and the various economic and social goals are set up around the urban and rural areas, near the polluting industrial units, close to the economic, social, cultural and strategic targets in order to protect them from pests or climatic factors excessive pollution. They also have a creative role for human communities.

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