A SERIES OF ASPECTS REGARDING THE ECOLOGICAL RECONSTRUCTION OF FOREST ECOSYSTEMS OF THE BALTA MICĂ OF BRĂILA NATURAL PARK (ROMÂNIA)

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Abstract: The drainage of the wetlands of Balta Brăilei (Wetland of Brăila) has had a negative influence both on physical-geographic factors and its biodiversity. The local alluvial forests have been mostly replaced by lignicole monocultures. Presently, the issue of ecological reconstruction of the forested areas of the Balta Mică of Brăila Natural Park more acute than first thought. In this respect Begu coppice has been chosen as forest pattern for it is the last natural existing vestige of alluvial forest in the area. The ecological reconstruction of the alluvial forests has a special importance for the ecological steadiness and balance within the Balta Mică of Brăila Natural Park, being an activity comprised by the Management Plan.

Keywords: aboriginal poplar and willow, Begu meadow forest, ecological reconstruction, Balta Mică of Brăila Natural Park

The development of the contemporary human society is based on the forced, irrational and pollution-generator industrialization. On the other hand the unsound exploitation of the natural resources, with an agriculture undertaken in wrong places and with chemicals was proved to be in time non-viable. There were short-term positive effects; on long term, these effects have become negative and turned into inhibitors of development (Giurgiu 2004).

The national and international decision makers were aware of the menace that this kind of development represents for the humanity only when the natural capital deterioration affected the socio-economical system (Vădineanu 1998), respectively when the phenomenon of economical self-destruction became obvious (Giurgiu 2004). So it could be observed that while many of us live in an urban society with modern technologies, we are addicted to the natural systems of earth, to the same extent as our ancestors from the Stone Age (Brown 2001).

In the past, the Balta Brăilei (Wetland of Brăila) used to be a complex of ecosystems where aquatic and terrestrial biotopes and biocenoses coexisted and functioned in harmony. In thousands of years of evolution, the nature had created here harmony featuring permanent water lakes, lakes with a variable water level, depending on flooding, and embankments covered with endless forests. If we animated this landscape with varied fishes and bird species, we would get the picture of what once had been one of the most stable complexes of ecosystems on the Danube's lower course.

In this delightful frame Grigore Antipa showed in 1910 (Antipa 1910) that the

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prosperous human activity can be achieved without disturbing natural environment.

Every year, on the higher grounds fertilized by the flooding mud, were obtained important harvests of wheat, corn and vegetables. Large semi-savagely herds of cattle and horses were grazing throughout the entire year without affecting the ecosystem's support capacity. The fish captured from these lakes was sold in the capital and big cities markets. All the houses from this area had woods for fire and for rural buildings.

Everything that nature had created in centuries of evolution was destroyed in a flash because of the damming, draining and clearing from the 6th and 7th decade of the previous century. The free flooding regime area was five times reduced, from 149.000 ha to 29.000 ha now. In the spring of 2006 the fatal effects of foolish damming of the river became the most obvious.

The draining of Balta Brăilei and the great hydro-technical works performed later upstream (barrages from the Iron Gates 1 and 2 and the Danube-Black Sea channel), have started important eco-socio-geographical changes in the area:

- the Danube Meadow was transformed, geographically speaking, because of the six times reduction of the high-water bed;
- the hydrological regime of the river was profoundly changed, ruining the dynamic balance of the aquatic biotope, an essential component of the Balta Mică of Brăila Natural Park;
- the biodiversity which existed in Brăila Wetland has been modified because the valuable complexes of aquatic and terrestrial ecosystems were replaced by agro-biocenoses and clone lignicultures of Euramerican poplars and selected willows;
- essential surrounding changes appeared, such as the aridity of the climate in the Romanian Plain and in the Dobrogea Tableland, leading to the steppe formation of meadow microclimate;
- important social mutations occurred, physically displacing human houses, and qualitatively changing the traditional people way of life.

It is remarkable that in only 3 years, Brăila Hydrological Station registered the historical minimum in 2003 and also the historical maximum in 2006. This unbalance shows the severe tendency of the steppe formation of the climate in Brăila. This combination of climatic and hydrological hazards triggered the background of the global heating, which has essentially changed the European climate and the hydrology of the Danube basin (817.000 km^2), but we believe the damming of the former Balta Brăilei (Wetland of Brăila) led to the changing of the local climate and hydrology. In this context, the auxological research of the combination of climatic and hydrological hazard consequences over the forestry vegetation represented for us a challenge when I have drawn up this study.

In the context of the facts shown above, Balta Brăilei (Wetland of Brăila) suffered a series of profound qualitative and quantitative transformations. The damming, draining and clearing that occurred 4 decades ago resulted in a serious reduction of the wetland area comprised by Balta Brăilei (Wetland of Brăila). The brutal replacing of the exceptional biodiversity held by aquatic and terrestrial ecosystems with large agricultural mono-cultures that occupy 80 % of the former wetland represented the first major qualitative mutation. The second major change, a serious strike on biodiversity, occurred during the substitution of the meadow forest with poplar and willow mono-cloned cultures. A precious genetic and ecological treasure, a stable and functionally complex, but less researched, was then lost (Giurgiu 1995, 2004). That is why the auxological research of Begu forest, the last natural crop proper to Brăila Danube Meadow, serves as a model for the ecological reconstruction process of Balta Mică of Brăila Nature Park.

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The auxological researches for reconstruction of the forestry ecosystems in Brăila Danube Meadow presents a theoretical, but also a practical importance.

Theoretically, the result of the researches justify, using forestry auxology (also ecological and social arguments), the necessity of adopting forestry policies that should consist of ecological reconstruction of mono-cloned lignicultures (poplar and willows) on the Romanian sector of Danube Meadow. Also, some preliminary results were on the base of making the management plan for the Balta Mică of Brăila Natural Park.

Virtually, the forest measurements and the auxology research of Begu forest stand as a base for the development and sustainable management of the forest and define the new forest management planning concerning the natural park.

Thus the purpose of our researches was, from the beginning, focused on finding a natural stand, a model regarding stability, the auxological efficiency and biodiversity indexes that should be used in the process of ecological reconstruction of poplar and willow cloned cultures by substitution with aboriginal species. The purpose was reached through the next categories of our research:

- the classification of natural species and their variety and ecotypes, the function of the auxology efficiency, recorded on different values of flooding index;
- the difference between aboriginal species and intra-specific units, the function of stability, on quotas of terrain in hydro-degrees;
- the defining of Begu meadow forest as a model for the ecological reconstruction process of forestry biocenoses in the park buffer area, as regards the structures of this natural mixture, the stability of this stand (including the species and its intra-specific units), biodiversity, competition and structure indexes.

Besides, during the elaboration of my study, have been identified and researched others objectives, such as:

- the comparison between aboriginal poplars and Euramerican poplars;
- dendroclimatical and dendro-hydrological research undertaken on isolated clumps of black genuine poplar, in the conditions of passing from a hydrological regime to one of enclosed area regime;
- proving the fall of Brăila poplar culture with auxological methods;
- the difference between the behavior of Euramerican poplar clones (Sacrau ’79 and I.214), regarding the positioning on the meadow micro-relief by using the flooding degree towards the action of different biotic and non-biotic factors;
- the study of the volume losses determined on Euramerican poplars after the lay-downs during the flooding.

Using the auxology and forest measurements of Begu meadow forest, we can bring out some useful conclusions with reference to the ecological reconstruction of the buffer area of the Balta Mică of Brăila Natural Park, using the substitution of clonal poplar cultures with aboriginal species. The uniqueness of Begu meadow forest, the complexity of this mixture, the stability and auxological efficiency, determine us to consider Begu meadow forest as a target for the actions in the management plan. So, Begu becomes a model for renaturation through the substitution of the cloned lignicultures during the ecological reconstruction process in the Balta Mică of Brăila Natural Park.

Dendrohydrological and dendroclimatical researches on isolated trees of black aboriginal poplars demonstrated that, by the damming of the former Brăila Wetland it was generated a series of mutation in the local climate and in the hydrological regime of the Danube. Our research proved that following the damming, the draining and the clearing of the former

Balta Brăilei (Wetland of Brăila), the meadow microclimate received a steppe formation tendency. The influence over the forestry vegetation through the replacing of the flooding regime with one of the enclosed areas was major. In this way, our research points out the fact that the differences between the evolution indexes and those from the enclosed area of Insula Mare of Brăila (Big Island of Brăila) represent 46.4 % from the period 1974-2003.

Regarding the auxological fall of Brăila poplar culture, our research has shown a series of conclusions that justify the reconsideration of the forestry politics, regarding the mono-cloned lignicultures in Brăila Forestry Directorate and on national level, too. Our research has proved that the white poplar is more resistant to dryness than the Euramerican one. The planting of Euramerican clone poplars presents risks in terms of animal attacks and wood deteriorating agents, unlike the aboriginal poplars'. An important example is the measurements done in 1998 (from 15 May through 30 June) at *Lymantria dispar* in the clone Sacrau'78, when the control stand recorded the most active increase of biomass. The losses of radial increment from the defoliated poplar culture were on 55 % during the vegetation season duration, and represented 31 % from the radial increment recorded by the control stand.

Following the researches undertaken in the 9 repetitions of the experimental group Gropeni, there have been identified a series of general conclusions on the culture of clones I.214 and Sacrau'79 in the last three decades. Our researches about dynamic of radial increments during the vegetation season and multi-annually prove that there are large auxologycal differences between these two clones, although the poplar cultivators consider that Sacrau'79 is clone I.214 acclimatisated in Germany because the clones look the same.

Alluvial deposits during large flooding in the Danube meadow emphasized the modification on vertical level of the position of the breast-height diameter measurements. The modification falsifies the calculation of the Euramerican poplars' volume. There also changed the stem shape, the calculation of the form factors, the regression coefficients specific to every clone from the equation used for the tree volume calculation and automatically the results. The losses are reported to the volume and to the quality because the participation of the valuable wood assortments is minimized to the dimensional sorting.

This research is intent upon an auxological and dendrometrical argument for the poplar cultures' renaturation on Romanian Danube Meadow, replacing those cultures after the exploitation.

Trough the classification of the species and intra-specific units into a natural model standafter the stability and auxological efficiency registered on quotas of terrain in hydro-degrees, this work will become a valuable instrument for the Scientific Council of the Balta Mică of Brăila Natural Park. The model offered by such a stand has become a target for the management plan and the management goal for the ecological reconstruction process trough replacing the mono-cloned poplar and willow cultures with species, varieties and ecotypes of aboriginal poplar and willow.

Rezumat:

UNELE ASPECTE PRIVIND RECONSTRUCȚIA ECOLOGICĂ A ECOSISTEMELOR DE PĂDURE DIN PARCUL NATURAL BALTA MICĂ A BRĂILEI

Desecarea zonelor umede din Balta Brăilei a avut o influență negativă atât asupra factorilor fizico-geografici, cât şi asupra biodiversității. În cea mai mare parte, pădurile autohtone aluvionare au fost înlocuite cu culturi monoclonale lignicole. În prezent se pune tot mai acut problema reconstrucției ecologice a zonelor împădurite din Parcul Natural Balta Mică a Brăilei. În acest sens s-a ales ca model forestier zăvoiul

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Begu, ca ultimul eşantion natural de pădure aluvionară existent în zonă. Reconstrucția ecologică a pădurilor aluvionare are o importanță deosebită pentru stabilitatea şi echilibrul ecologic din Parcul Natural Balta Mică a Brăilei, fiind o activitate inclusă în Planul de Management.

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