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AN IMPORTANT STEP IN THE FIGHT AGAINST CONTINUOUS BIODIVERSITY LOSS

This article presents in a very compact form the author's view on fundamental points of biodiversity loss in the Earth ecosystem in general and biodiversity loss in forest ecosystems in particular. Further scientific elaboration and practical implementation of Site Conditions Classification is emphasized to be the one of the most important steps in halting continuous biodiversity loss.

Keywords: ecosystem, ecosystems unit, site conditions classification, biodiversity loss.

Introduction. Aiming to be in balance, the "end-ecosystem" is full of energy flows and products of metabolism from surrounded "below-located-ecosystems" and surrounding "above-located-ecosystems". These "below-located-ecosystems" and "above-located-ecosystems" being on the way to their own balance misbalance parts of or the whole "ecosystems unit". More or less opposite processes are the base of ecosystems' dynamic.

Biodiversity gain and biodiversity loss are two opposite natural processes also aiming to be in balance. Continuous one way directed loss in biodiversity can serve as a warning about mismatches in the ecosystem's functionality.

The article presented here highlights the strong connection between permanent ecosystem overuse and biodiversity loss. One very important step for halting continuous biodiversity loss is proposed. The forest ecosystem is defined as the "end-ecosystem" in this article.

Methodology. The first definition of the term "Ecology" dates from 1866 by Ernst Haeckel, a German biologist and supporter of Darwinism, and it comes from οίκος – Greek oikos "house, household", and λόγος – Greek logos "knowledge", meaning – "science of household". In 1866 Haeckel wrote: "Under Ecology we understand the whole science of the relations of the organism to the surrounding outer world, where we can expect in the broader sense all conditions of existence. These are partly organic and partly inorganic nature" **[1]**.

The main functional units in ecology are ecosystems. Not "unit" and not "ecosystem", but the plural form of these notions. This interpretation comes from the definition of Ecology: relations of the organism to the surrounding <u>outer</u> world and (not mentioned in definition but existing) surrounded <u>internal</u> world.

A graphical illustration of such an ecosystem with surrounding and surrounded worlds (complex of neighbour-ecosystems) is presented in Figure. Two dimensional bodies on the graph represent at least three dimensional entities in fact.

Figure explains in simplified form the functioning of a theoretically separated unit of three ecosystems. The equilateral triangle in the figure represents an ecosystem (for example, a forest stand) which is supposed to be in or near to balance. The internal circle represents ecosystems or organisms (surrounded internal world which consists, for example, of trees) which belong to the forest ecosystem. The external circle

[1] The views expressed are purely those of the writer and may not in any circumstances be regarded as stating an official position of the European Commission

represents the surrounding neighbour-ecosystems (e.g. agricultural fields, water reservoirs, settlements etc.) which influence the forest ecosystem (triangle) by biotic, abiotic, and anthropogenic ecological factors.

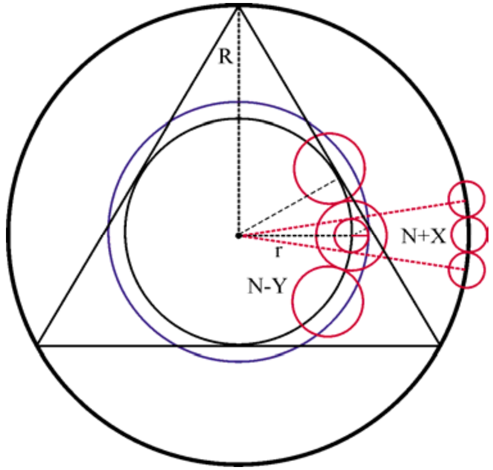

Figure. Ecosystem (equilateral triangle) aiming to balance with surrounding and surrounded complex of neighbour-ecosystems (external and internal black circles)

These ecosystems are linked by exchange of different products of metabolism and / or exchange of energy. If we accept that all this complex of ecosystems <u>stays</u> in balance, then we can accept that all of its parts (organisms) have the same exchange of energy and the same size (e.g. small red circle on the black internal one). In this case the N-number of small red circles (on a black-white print all colored circles are grey) on the internal surrounded black circle will be influenced by the (N + X)-number of the same sized red circles on the external surrounding black circle. Such a positioning leads to "overproduction of products of metabolism" on the external surrounding circle side and to an imbalance in its energy exchange with the internal surrounded circle.

This inequality is the base for an increasing of productivity of N-number organisms of the surrounded ecosystem to the level of production that will cover the difference in overproduction by X-number organisms of the surrounding ecosystem.

An increase in productivity will lead to an increase in size (big red circle) of organisms on the border of our surrounded (internal circle) complex. Such an increase in size with time (Growth) restores balance between neighbour-ecosystems (external surrounding and internal surrounded circles) but forms the basis for imbalances inside the surrounded N-Y-number complex itself (growth led to decrease of Y-number of organisms on surrounded circle).

These imbalances lead to a decrease of area (and resources) available for internal N-number components (e.g. trees) inside the surrounded ecosystem. As a result the balance between external surrounding ecosystem with (N + X)-number of organisms and internal surrounded ecosystem with (N-Y)-number of organisms will be achieved (even if for a short period of time).

Results. Figure explains not only the complex of ecosystems aiming (staying is not an appropriate word here) to be in balance, but also growing or disappearing of organisms which are parts of ecosystems and, at the same time, ecosystems themselves.

Figure can also be seen as a very simplified but still valid schema for increasing (growing) or decreasing (disappearing) organisms. The theoretical border between Growth and Disappearance is marked by the blue circle. Continuing movement of this blue circle in the direction of the surrounding ecosystems means that N-number of organisms on the internal black circle (surrounded ecosystems) are able to grow more efficiently compared with the (N + X)-number of organisms on the external black circle (surrounding ecosystems).

The inability of surrounded ecosystems to be more efficient (Vital) compared to surrounding ecosystems will lead to a decrease with possible disappearance all of these systems or their parts in the future if this trend towards the centre of the surrounded ecosystems complex continues permanently.

Such an interpretation of increase (growth) and decrease (disappearance) of organisms (or ecosystems) applied to our research leads to conclusions connected directly to the question of the percentage of use of growing and renewable resources (e.g. wood).

Let us accept that, surrounded by the internal black circle ecosystem is a forest stand with growing stock r in 2009, and that this forest stand will have growing stock R in 2010 (surrounding external circle, please see Figure). Then the difference (R – r) is the annual increment that we are going to use. In case of 100 % use of real available biomass we will cross the stand's "blue line" which in fact marks its appropriate border of ecological sustainability, or in other words, the optimal level for resistance to unfavourable external and internal disturbances.

Conclusions. As has been already noted, the level of annual increment used cannot be equal to 100 % and will depend on the ecosystem's unit productivity. It has already been mentioned that surrounding ecosystems, surrounded ecosystems and between them the border ecosystem itself (Forest Stand as ecosystem under research) belong to this unit.

An ecologically sustainable level of annual increment use means such a level of artificial forest ecosystem disturbance that will not create an imbalance with surrounded and surrounding ecosystem units that leads to deterioration of forest ecosystem productivity in future. It means that the level of border ecosystem use should be less than the level of irreversible imbalances between the border ecosystem and its surrounding and surrounded neighbour-ecosystems. This level of ecosystem use in our example will depend on the position of the blue line between the internal and external black circles (please see Fig.1).

In forest practice, a sustainable level of annual increment use (position of blue line, Fig.1) will depend on its correspondence with site index, which is the most important notion in forestry and characterizes the stand's real productivity (internal black circle, Fig.1), compared with the site's potential productivity (external black circle, Fig.1).

It means that to be able to estimate a level of sustainable use of renewable resources (in our example, percentage of annual increment use) we have to know two notions: site index and (ecological) class of site conditions. Even more – these two notions have to be classified, since classification allows us to evaluate and predict possible changes of these classes in time and space. Then we will be able to react more effectively to these changes.

It means that in addition to Site Index (SI), the site conditions or Site Class (SC) has to be known (estimated) for each separate case (forest stand). We want to emphasize here that SI and SC are not the same notions. The site conditions should also be clearly classified into Site Classes, just as Site Index is already classified in forestry.o

Site Condition Classifications such as this are already developed and in "daily practical use" in at least three countries – Ukraine **[2]**, Czech Republic and Canada. But research and practical activity in this field have to be increased and achieved results have to be sheared on regional and global scale.

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References

1.Haeckel, Ernst, 1866. Generelle Morphologie der Organismen. Allgemeine Grundzüge der organischen Formen-Wissenschaft, mechanisch begründet durch die von Charles Darwin reformierte Deszendenz-Theorie. – Berlin, Bd. 1. – S. 236 (in German).

2. Pogrebnyak, P.S., 1955. Fundamentals of Forest Typology. – Kyiv, Publisher AS USSR, 456 p. (in Russian).

М'ястківський В.Ф. **Важливий крок на шляху припинення постійного зниження біорізноманіття**

Представлено у стислому вигляді авторський погляд на фундаментальні пункти зниження біорізноманіття у земній екосистемі загалом та у лісовій екосистемі зокрема. Наголошено, що подальша наукова розробка та практичне впровадження класифікації лісорослинних умов є одним із найважливіших кроків на шляху припинення постійного зниження біорізноманіття.

Ключові слова: екосистема, комплекс екосистем, класифікація лісорослинних умов, зниження біорізноманіття.

Мястkивский В.Ф. **Важный шаг на пути приостановления постоянного снижения биоразнообразия**

Представлено краткое изложение авторского взгляда на фундаментальные пункты снижения биоразнообразия земной экосистемы в общем и лесной экосистемы в частности. Подчеркивается, что последующая научная разработка и практическое применение классификации лесорастительных условий является одним из важнейших шагов на пути приостановления постоянного снижения биоразнообразия.

Ключевые слова: экосистема, комплекс экосистем, классификация лесорастительных условий, снижение биоразнообразия.

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ХАРАКТЕРИСТИКА ЛІСОВОГО ПОКРИВУ СТАРОСАМБІРСЬКОГО РАЙОНУ ЛЬВІВСЬКОЇ ОБЛАСТІ

Наведено результати аналізу первинного (корінного) і сучасного лісового покриву Старосамбірського району Львівської області. Рослинний покрив зазнав значних антропогенних змін. Сильно знижена лісистість не тільки рівнинної частини району, але і гірських схилів. Багатовікова господарська діяльність людини призвела до порушення просторової структури сучасного лісового покриву. Встановлено, що