Towards Two Ways of Constructive Geography Development in Ukraine

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Abstract: This paper presents two main ways of constructive geography development in Ukraine. The authors consider environmentology as a well-developed approach which pays special attention to the condition and evaluation of natural capital. The latter is made by means of environmental economics. In Ukraine three main tools of environmental economics are used, namely rent assessment of land, emission trading schemes and environmental regulations. Noosphere genesis is another promising way of geography development in information society, as it recognizes society as a driving force of changes in natural environment.

Keywords: sustainable development, natural capital, environmental economics, noosphere, constructive geography, Ukraine

I. INTRODUCTION

During the period of industrialization in Ukraine, especially in the period up to 1970’s, as well as throughout the world, a change of social values took place. On the one hand, human capital displaced and somewhat downplayed the role of natural capital in the economy and society. On the other hand, people recognized that the deterioration of the natural environment can affect the development of the society. As a solution, two ways of socio-economic development were determined. A conservative way was presented in the form of the concept of sustainable development after the famous report for the Rome Club, intense and fruitful work of the commission of Gro Brundtland and the Summit of Rio in 1992 (Meadows, 1972; Report of the World Commission, 1987; Report of the UN, 1993). This concept provides some restriction requirements that could reduce the economic growth, diminishing any support of economic institutions and. However, it is still not reflected in the indexes of development of the UNDP, which has been showed, in particular, during the Rio +10 Summit in Johannesburg.
A certain cure for economic slowdown is the development of environmental economics and practical implementation of its approaches, which could contribute to the economic enrichment of the society through the constitution of natural capital and use of natural resource rents as the engine of economic progress.

In this research the authors identify natural capital as a measure of embodied ability of the environment to create economic benefits in the form of natural-resource rents spontaneously induced by the natural processes. From the position of constructive geography according to the authors’ opinion, there are three main groups of natural resource capital, namely:

- **Anthropogenic natural capital**, which is heavily influenced by people’s activities;
- **Critical natural capital**, which provides supporting services for life on our planet;
- **Other substitutive forms of natural capital**, some of them are renewables, some are finite, but can be replaced by the means of technologies.

The total value of natural resources is made from economic, social and environmental values. Meanwhile, an economic value takes into consideration only the first aspect. The authors think that rental, cost-is-no-object, alternative value, and total economic value approaches are more accurate.

A rental approach captures an added value which results from the best quality of resource and environment. It helps to consider the capacity of ecosystems to reproduce themselves. The problem is that in post-soviet countries with economics in transition natural resource rent does not distribute equally (see Lvov, 2001).

A cost-is-no-object approach exposes costs for preparation and use of natural resources. The recourses of the best quality and conditions for exploration, therefore, get the least value assessment, which can be argued, as this way we do not capture the value of resources’ renewal.

An alternative or loss of profit value is calculated in regard of lost monetary and non-value benefits which we would be able to get in case of effective use of natural resources and ecosystem services.

Last but not least important approach is used to take into account costs of conservation and non-use of nature along with benefits from aesthetic value and value of existence of natural ecosystems and biodiversity. The traditional cost-benefit analysis does not consider economic externalities, which influence the quality of natural resources, especially in a long-term run. The way it is, future generations will not be able to fulfil their needs. Today the governments should play the leading role in promoting ethical values regarding environment and
internalization of external costs. They are able to use numerous tools to force companies to pay for the environmental and social value of nature and its state.

This environmental path is being developed in Ukraine. Another promising approach is being suggested by Bagrov (2010) considering the sustainable development of environmental and noospheric paradigm.

Subetto (2003) conducted a wide research considering the heritage of Vernadskiy and he determined eight main aspects of noosphere (Bagrov and Chervanyov, 2008):

- The start point of noosphere development is when human kind begins changing geochemical cycles in the biosphere of the planet.
- Noosphere development is the result of geological evolution.
- Society moves from the biosphere to noosphere using its ability to think and plan and act. Hereby, biosphere is assimilated by noosphere.
- Noosphere is the kingdom of human mind, it influences biosphere as a living substance.
- It is considered as a model of future social and natural co-development.
- The world becomes globalized; people interact more and can populate the whole planet.
- The humankind cooperates with the respect for natural biodiversity.
- One of the results of noosphere genesis is that people will become autotrophic organisms; they will have autonomic food and energy systems and hereby preserve natural ecosystems.

Last aspect is analyzed by Kaznacheev and Spirin (1991). The concept of sustainable noosphere development is outlined in Buriak (2008). Thus, Ukrainian geography developed two visions of the challenges of sustainable development through the use of natural resources: environmental and noosphere genesis

II. ENVIRONMENTOLOGY IN THE SCOPE OF SUSTAINABLE DEVELOPMENT

Environmentology is well-developed in traditional science. This paper presents its aspects with a special regard on how the methodological approaches are used in constructive geographical research.

Considering the role of environmental approach, the publication activity of scientists is studied in Science Direct, Springer Link, and Scientific Electronic Library I.V.Vernadskiy National Library of Ukraine. We search using keywords within “geographical” subject areas. The following keywords are treated as those which represent environmental research disciplines in a triangle economics-
society-environment: environmental economics, ecological economics, green economics, and economics of natural resources (Table 1)

Table 1. Publication activity changes of environmental research within “geographical” subject areas, date of search - 09-10.12.2013

<table>
<thead>
<tr>
<th>Name of the library</th>
<th>I.V. Vernadskiy National Library of Ukraine</th>
<th>Scientific Electronic Library (Russia)</th>
<th>Science Direct (Elsevier)</th>
<th>Springer Link</th>
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</thead>
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<tr>
<td>Website</td>
<td>nbuv.gov.ua</td>
<td>eLibrary.ru</td>
<td>sciencedirect.com</td>
<td><a href="http://link.springer.com">http://link.springer.com</a></td>
</tr>
<tr>
<td>Total number of materials in the database, millions</td>
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<td>12</td>
<td>8</td>
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<tr>
<td>Time period coverage, years</td>
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<td>1991-2014</td>
<td>1823-2014</td>
<td>1903-2014</td>
</tr>
<tr>
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<td>Geography</td>
<td>Earth and planetary science</td>
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<tr>
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<td>9847</td>
</tr>
<tr>
<td></td>
<td>Ecological economics</td>
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<td>34</td>
<td>3962</td>
</tr>
<tr>
<td></td>
<td>Green economics</td>
<td>0</td>
<td>3</td>
<td>3470</td>
</tr>
<tr>
<td></td>
<td>Economics of natural resources</td>
<td>16</td>
<td>6</td>
<td>7333</td>
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<tr>
<td>First article regarding the topic, year</td>
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<td>1963</td>
</tr>
<tr>
<td></td>
<td>Ecological economics</td>
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<td>1964</td>
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<td></td>
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<td>1889</td>
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<td></td>
<td>Economics of natural resources</td>
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<td>2003</td>
<td>1927</td>
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<td>Publication activities change in the number of publications between 2000 and 2013, %</td>
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Ukrainian and Russian databases do not represent the scale of development of environmental approach in respective countries. One of the main reasons is that achievements of local scientists are not represented online. So, they cannot be
reached using online databases. This is a common problem for researchers in post-soviet countries (Moskovkin, 2005).

Most publications are presented in environmental economics and economics of natural resources sections, which intersects with research interests of constructive geographers. However, number of publications in ecological and green economics is growing more rapidly.

To some extent society’s approach to the natural resources has changed in the second half of the XX century, after the obvious environmental and energy crises. Now society faces a progressive deterioration of the environment. To solve such kind of problems it is not enough to join efforts of environmentalists; multidisciplinary approach that takes into account the peculiarities of the environment is required (Venkatachalam, 2007). These approaches are implemented in the framework of methods and tools of environmental and ecological economics. More details about the differences in the approaches are clearly identified in (Hoepner et al., 2012; Chervanyov and Gryshchenko, 2012; Illge and Schwarze, 2009).

A convincing example of capitalization of nature is the change in the land use as a natural resource. Since the mid-90s it has been recognized at the legislative level that the land is a commodity. In the early 2000s, it was adopted by the Land Code of Ukraine (Land Code, 2001), which constituted monetary value of land prices by capitalizing a differential land rent. Thus, the economic situation is determined, according to which the land is the basis of natural capital, as all other natural resources are somehow tied up to it. This unprecedented step is the largest one in the direction of approval of environmental economics principles in Ukraine.

It is important to mention that the environmental economics analyzes the interactions of human activities (mainly economic) and certain territories (environments). The latter, in turn, is the carrier of most of the properties and relationships that are important in three main aspects (Bagrov et al., 2008): resource-environmental, economic and social. In the first aspect environmental economics uses a block of knowledge of natural sciences, especially geography and ecology. In the second - it treats natural capital as an economic category. In the third - it uses the term human development in all its social dimensions.

In the former Soviet Union countries, an integration of economics and ecology took place mainly on the basis of natural resources management. Numerous environmental protection activities in the framework of the traditional economic system were conducted (Melnyk, 2002). At the same time, we can mention some scientific studies which were carried out in the framework of major research areas of environmental economics (Golub and Strukova, 1998; Lukmanov
and Bagautdinov, 2011; Rjumina and Anikina, 2009). However, such kinds of research are fairly conventional.

II.1. Environmental economics: global prospective

Meanwhile, environmental economics is a rapidly growing research area. As of October 2013, the picture of the publication activity on "environmental economics" according to Science Direct database is as follows (Fig. 1).

![Fig. 1 The exponential growth of publications related to environmental economics research in scientific journals in 1975-2013 (based on data source: http://www.sciencedirect.com/)](image)

The largest number of papers is presented under the topics of climate change, renewable energy, sustainable development, energy efficiency, ecosystem services, natural resources, environmental impact, management of waste and policy in the sphere of environmental protection. The fig. 2 shows the place of environmental economics in the modern structure of disciplines.

Thus, we can conclude that the economics is getting environmental aspect as an important one, and environmentalism becomes an economic doctrine of the XXI century. This position is enhanced by the requirements of the concept of sustainable development, adopted by most countries in the world as a universal program for this century. Today there is still no well-established approach to the definition of "environmental economics" and to the methodology used in the study of the environment within the environmental approach. We can say that economic, geographical, ecological, sociological, statistical, mathematical, and other scientific methods are used to solve specific problems related to environmental management.
II.2. Some constructive geographical aspects

Girenok and Moiseev (1987) suggest that environmental sciences should contribute to the process of co-evolution of human beings and nature by mobilizing capacity of harmonization of relevant socio-economic and ecological (environmental) relations. In geography of the countries of the former Soviet Union such constructive relationships were studied by constructive geography, which has no analogue in the world of science. It was established by Innokenti Gerasimov (Abramov and Gerasimov, 1973) as the conductor of geographical knowledge in large-scale transformation of nature to create designed conditions of social and economic development. In this regard it has repeatedly shown its ability to create complex schemes of protection and management of nature of key regions: the Baikal-Amur railway in Siberia and the Far East, the region of the Kursk magnetic anomaly in modern Russia, the Donetsk coal basin in Ukraine and some other large areas - each area can occupy an area of an European country.

At present times, structural problems of geography in Ukraine have transformed significantly. Objects become smaller in territorial scope and much more diverse. Among the problems which are inherent to constructive geography, most attention is paid to environmental management, resource management, sustainable consumption, sustainable development, the characteristics of the society-environment relationship, climate change, biodiversity conservation, etc. These are typical modern interdisciplinary problems, which are covered by means...
and approaches of constructive geography, including some aspects of territorial organization, landscape planning and environmental management (Chervanyov and Gryshchenko, 2012).

The obvious advantage of the geographical approach is that geography studies the territory as the object, mean and purpose and also as an indispensable condition for the existence of humankind, and this forms the basis of the specific methodology of spatial (territorial) analysis, which is a fundamental constructive geographical approach (Petlin, 2010).

III. NATURAL CAPITAL IN THE EMERGING ENVIRONMENTAL ECONOMICS IN UKRAINE

III.1. Rent assessment of the land

In those periods of social development when natural resources were unlimited, and there was no need to regulate their intake, the question of their economic evaluation was missed. But when a deficit has occurred, the demand to regulate the resource consumption has raised. This is most easily done by introducing a price on it.

Natural protected lands are recognized such as the lands that have a special value, including environmental, ecological, scientific, recreational and aesthetic. Gryshchenko and Chervanyov (2013) noted that the objects of natural protected land have a different, intangible value, they are significant contributors to the biological productivity of the territory and provide ecosystem services to neighboring areas, are producers and donors of natural capital.

A similar approach is applied to the lands for recreational purposes. The Land Code of Ukraine (2013) indicates "the natural healing properties of such lands". From the geographical point of view, an important message here is "prevention of deterioration of aesthetic state and ecological role of man-made landscapes" (ibid.). In order to prevent degradation of the land as a natural resource the procedure of monitoring is implemented, it tracks the environmental and economic consequences of land degradation.

It is important to note that the "land cadaster is the basis for conducting inventories of other natural resources" (ibid.), it has been designed to determine the amount of payment for the land and its value as a part of natural capital. Especially noteworthy seems the mechanism of economic valuation of land as a natural resource, the means of production and the spatial framework of social production. Evaluations are made to provide a comparative analysis of the efficiency of land use. This data is the basis for monetary valuation of the land for a different intended use.
Land accounting is not only quantitative but also qualitative. Qualitative evaluation shows the characteristics of land that affect the productivity of soils and their economic value, thus, an economic valuation of ecosystem services is carried out. In Ukraine, apart from the introduction of the rental approach in the evaluation of land at the legislative level, some other attempts were made to use tools of environmental economics.

### III.2. Emission trading schemes

Ukraine participates in the European Emissions Trading Scheme. The country exports quotas for carbon emissions under the Kyoto Protocol agreements. Since the emission limits under the Kyoto Protocol for Ukraine has been established regarding 1990, today thanks to reduction of the number of operating heavy industry enterprises, Ukraine has unused emission credits that can be sold on the international market.

In 2011, Spain, Switzerland and the United Kingdom bought emission allowances in the amount of 7.5 million tons of CO$_2$ equivalent (Ukraine, 2011). Taking into account these quotas, we estimate, using ecological footprint method, that Ukraine requires an additional 0.09 ha of forest per capita to absorb CO$_2$ emissions in rated year.

The problem is that Ukraine sells mostly "cheap" quotas. Such quotas are formed due to the low energy efficiency of the economy, so the cost of greenhouse gas emissions reduction in Ukraine is much lower than in developed countries (Kitura, 2009). In addition, from the point of view of nature as a system, all pollution should be reduced, as everything in the global geographical sphere is connected.

This issue can be addressed in a geopolitical aspect. There are countries (such as Belgium, the Netherlands, Denmark, France, Austria, Italy, the United States) that have little or no natural landscapes and, therefore, do not produce many ecosystem services of general use (including oxygen) essential for sustainability of the biosphere, acting as their recipients. On the other hand, countries such as Brazil, Canada, Russia, Finland, partly Ukraine have large preserved areas of natural landscapes that absorb CO$_2$ and that produce oxygen (Global Footprint Network, 2013).

That is why, the authors argue that it is necessary to introduce amendments to the Kyoto Protocol, as has been often suggested by donor countries and to take into account not the emissions of CO$_2$, but the balance of its emissions and assimilation potential of natural systems of sovereign territories (waters) (Boronos and Kostel, 2010). In such a case, the recipient countries would have to pay the donor countries for preservation of natural carrying capacity - an important part of
the natural capital. It should be noted that the bulk of the developed countries consider such kind of approach as disadvantageous, it deals with internalization of negative externalities and causes additional costs in the economy.

**III.3. Environmental regulations**

In international practice, management regulation methods are implemented by the governments to internalize externalities and implement the polluter pays principle. In general, regulatory measures aim using certain production methods to reduce pollution, and stimulating production and consumption of products with lower negative externalities.

Talking about Ukraine, an important step in this direction was the adoption of state standards of Ukraine DSTU ISO 14004-97 "Environmental Management System" in 1997 (ISO 14004-97, 1997). It was replaced by DSTU ISO 14001:2006 (ISO 14001:2006, 2006), which meets the requirements of ISO 14001:2004 Environmental management systems - Requirements with guidance for use.

The authors remark a certain inconsistency of the used terminology. After all, the concept of "environment" is much wider than the concept of "ecological system" which is used in Ukrainian version of the standard. In addition, the concept of "governance" and "management" are also not identical as they are presented in the Ukrainian standard.

The adoption of this standard means setting goals with regard to the quality of the environment and natural resources, which can be achieved by applying the best management practices and technologies, where these are technically and economically feasible. This requires the implementation of methodological approaches of environmental economics by companies, because they operate in a certain environment, which includes natural resources, air, water bodies, land, flora and fauna, society, and the relationship between them. The use of raw materials and natural resources is considered as the ecological (in original - environmental) aspect of the organization activities.

**IV. NOOSPHERE GENESIS AND ITS ROLE IN DEVELOPMENT OF CONSTRUCTIVE GEOGRAPHY**

In the theory of Vernadskii (1944), the noosphere is the third phase of development of the Earth, after the geosphere (inanimate matter) and the biosphere (biological life). Just as the emergence of life fundamentally transformed the geosphere, the emergence of human cognition fundamentally transforms the biosphere.
The agenda of the XXI century is the sustainable development. It is possible to name many reasons for this, but we have never heard that somebody would pay attention to the absence of the concept of "moral" in the lexicon of the Rome club, or in the decisions of Rio-92 and Johannesburg. Maybe this is the reason why the situation is changing extremely slowly, and the threats to the civilization do not decrease.

Indeed, many new ideas demand further examination and discussion, challenging the intellectual potential of creative society on the reformation actions. Bagrov (2010) believes that the main way to avoid global ecological crisis is to create a civilization that must move forward by mobilizing the intellectual potential of society. He believes that noosphere genesis is able to overcome not only an ecological crisis, but above all - the crisis of consciousness of an "industrial" and "economic" person. As a model - the area where one can see clear evidence of noosphere genesis - the region of Crimea is used - the transnational territory within Ukraine with two thousand years of history, combined with the latest advances in post-industrial development, suggests a positive outcome of the full-scale simulation. In V.I. Vernadskiy Taurida national university - the leader of the noosphere movement in Ukraine - compulsory training in noospherology is conducted, and together with the Crimean scientific academic center a museum of the noosphere is created. These important activities must be countered, as society only starts understanding the power of thought.

The authors recognize the ideas of Bagrov (2010) concerning the importance of the following statements and add three more:
- Using means of Geography in studying of sustainable noosphere development.
- The necessity of assertion of noosphere moral ideology and role-defining category of noosphere genesis in development of information society.
- The integral structure of geographical regional components defines the value of the whole system.
- The programs of economic target setting should consider aspects of sustainable-noosphere development.
- Various methods of natural resources assessment, including intangible assets, and valuation should be used to make cost-benefit analysis more unbiased.
- The priority of environmental economics in eco-development of the territory should be widely recognized.
- The methodology and principles of spatial-regional and landscape planning are helpful in decision-making.
IV.1. Noosphere genesis and individuals

Every person is individual, but together we form a collective cognition. Culture influences our thoughts; basically it has a huge impact on their content. Every person gets cultural background from social environment, which is hardly influenced by mass-media. Modern citizen of a city often does not care about what kind of information (s)he gets, but feels like this is a convenient way to stay informed. Receiving lots of information every day, most people think that they are continuously learning. But in fact, they consume heterogeneous information. Learning based on experience sometimes is useful. However, it does not help to build a picture of a real world. There is a lack of correspondence between educational knowledge people get in schools and universities and the one they get as a life experience.

Without formal education the matrix of environmental perception is incomplete and lots of complicated information cannot become rational knowledge. Therefore, it is impossible to replace academic background with mass-media culture.

According to Mol’ (1973), every person is operationally equipped with individual culture, which predetermines the ways (s)he reacts on different situations and then act. Our knowledge helps to understand the importance of each message from the real world we receive. Then we decide whether or not we accept information and assimilate it using a world-view matrix of previous knowledge.

The problem occurs when a world-view matrix is not complex enough to maintain the flow of information. Today the internet makes it possible to learn whatever people want and omit systematic learning. This is one of the main reasons why modern people are not able to correspond to complex interdisciplinary issues, including environmental. The phenomenon of virtual reality leads to a situation when a person cannot distinguish which world is a real one. The other side of the coin is a real virtuality. It occurs if a person prefers developing itself in virtual world instead of looking for a place in real society. The situation above is dangerous for the future of humankind. It opposes noosphere genesis and will not allow humankind developing sustainably.

V. CONCLUSIONS

In the modern post-industrial era economics and geography both acquire qualitative features in relation to their traditional status and at the same time come closer to each other on the platform of in-depth attitude to nature. Nature in constructive geography is represented as a complex of geosystems as self-replicating objects. For environmental (ecological, "green") economy, they are
components of natural recourse capital. The modern system of natural resources’ usage is built on unconscious exploitation of natural recourse capital (as it is not a part of the economic system, and refers to the externalities). The result of natural recourse capital’s exploitation is a natural resource rent, which is implicitly appropriated by the land owners through the added value.

The task of constructive geography in this regard is to adopt arsenal of environmental economics, considering its most important task as a care of natural resource capital and rent, which are to be used as its economic categories. Allocation and evaluation of natural recourse capital would allow to make inventory and to include nature qualities which generate human values in national wealth.

Environmental development approach is based on natural capacity of self-regulation using the feedback mechanisms. The Earth is a sustainable system, which strives to homeostasis. At the same time natural systems are able to develop independently; their state can be characterized as sustainable non-equilibrium. That is why non-linear effects take place, including a famous “effect of a butterfly”.

Sustainable-noospheric development considers modern social reality. Scientific and technical achievements are ruled by people’s desires: they want more power, more money, more respect. The feedback mechanisms do not work in social sphere, so there seems to be no limitations. Technical progress is moving forward faster than ever. Humankind is concentrated on short-term ‘profits’ in all social spheres. And people eliminate the role of environment we live in.

Today most of the developed countries import natural capital from the donor countries which export ecosystem services embedded in products. It is obvious that the value of natural environment is underestimated. However, only economic tools might not be able to solve complex interdisciplinary problems we face today. So, we should get more understanding of how noosphere genesis runs and how we can influence people’s decisions to put them in line with natural environment.

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State Standard of Ukraine ISO 14004-97: Environmental management systems: 


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