# THEORETICAL ISSUES OF ECOLOGY

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## BIOGEOMES OF HYDROSPHERE AND LAND AS ELEMENTS OF THE BIOSPHERE STRUCTURE

**Abstract.** Ecosystems as the smallest unit in the structure of the biosphere form natural groups with similar nonliving or inert components (geome) and leaving, biotic (biome) as a result of the ecological convergence. Thus it is formed following after ecosystem level structure of the biosphere – biogeomes or complexes of similar in its structure and function ecosystems. It is proposed unit classification of 12 biogeomes of hydrosphere and land, combining with three types of ecosystems: biotic, oligobiotic and subbiotic types. The biotic type combine with ecosystems controlled by leaving components as well as woody vegetation or hermatypic corrals. The ecosystems of oligobiotic type have strong impact of abiotic factors but biotic ones are important too. It is grass ecosystems on the land, and shelf ecosystems of ocean. In subbiotic type of ecosystems strongly prevail in its habitus abiotic components. It is ecosystems of deserts, and ocean deep bottom or pelagic ocean ecosystems. The evolution of biosphere was lead as well as to new local ecosystems divergently and convergently to formation limit number of ecosystems types, biogeomes. There is reason to believe it possible to form a new scientific section – biogeomics because there is a particular object of it study – the biogeome.

***Keywords**: biosphere, noosphere, ecosystem, biogeom, biosferomeron, evolution.*

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## БІОГЕОМИ ГІДРОСФЕРИ І СУХОДОЛУ ЯК ЕЛЕМЕНТИ СТРУКТУРИ БІОСФЕРИ

**Анотація.** Екосистеми, як найменші одиниці в структурі біосфери внаслідок екологічної конвергенції утворюють природні групи, в яких екосистеми з подібними абіотичними

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компонентами, які визначаються нами як геом, мають подібні біотичні компоненти або біом. Таким чином формується наступний за екосистемним рівень структури біосфери – біогеоми, комплекси подібних за своєю структурою і функціональними показниками екосистем. Пропонується єдина система біогеомов гідросфери та суши з 12 біогеомів, які об'єднують три типи екосистем – біотичний, олігобіотіческій і суббіотичний. До першого типу віднесені біогеоми з яскраво вираженим домінуванням біотичної компоненти екосистем. Це (на суші) біогеом тропічних дощових лісів або гілея, лісовий біогеом з суттєвою періодичною зміною абіотичних умов та біотичних фаз, в гідросфері це біогермовий біогеом. Для екосистем цього типу характерними є наступні особливості: біотична складова екосистем інтенсивно «будує» просторову структуру всього біому, є просторовим «каркасом» екосистем, основна кількість органічної речовини знаходиться у біомасі вищих рослин (ліса), безхребетних ( коралові екосистеми), продукційно-деструкційні цикли є дуже інтенсивними і в значній мірі замкненими, що дає можливість існувати екосистемам в досить оліготрофних умовах. Останнє, зі свого боку є фактором великої вразливості екосистем цього типу. До другого типу віднесені тундровий, біогеом трав помірної зони, шельфовий біогеом, гідротермальний, реобіогеом та лімнобіогеом. В екосистемах цього типу біотична та абіотична складові так би мовити, «паритетно» обумовлюють просторову архітектоніку біокосної системи. Накопичення органічної речовини відбувається у ґрунті (трав'яні екосистеми), у відкладах детриту (екосистеми лімнобіогеому). Метаболічні процеси в екосистемах в більшій частині ідуть по типу детритних ланцюгів, але деякі оліготрофні лімнічні системи за своїми метаболічними процесами дещо подібні до екосистем першого типу. До третього, суббіотичного типу віднесені біогеом пустель на суші, пелагічний біогеом, батіально-абісальний біогеом океану. Для них є характерним переважне домінування абіотичних елементів екосистем, саме в просторовій структурі, архітектоніці та загалом, габітусі екосистем. До вже наявної різноманітності поєднань елементів природного біотичного та абіотичного характеру людина додає велику кількість різних антропогенних елементів. У біосфері безумовно відбувається формування нового типу «композитних», антропогенно-природних екосистем, які вже не є незначними острівцями в світі природних, а все більше розширюють поле свого існування. Зовнішність ландшафтів цілих країн і географічних районів повністю перетворені діяльністю людини. Антропогенні екосистеми дуже різноманітні, об'єднання їх в єдиний біогеом (або в три: техно-, агро-, урбо-біогеоми) поки проблематичне, проте безперечно слід брати до уваги його роль в біосфері. Ноосферогенез є, по суті, процесом заміни природних екосистем, цілих біогеомів на антропогенні, скоріше – на антропогенно-природні. Введення поняття біогеома як суббіосферной одиниці доповнює уявлення про структуру біосфери, а також обумовлює нові підходи до вивчення ноосферогенеза як одного з етапів еволюції біосфери. Щодо структури наукових дисциплін, то є підстави вважати доцільним формування нової наукової дисципліни – біогеоміки, з огляду на те, що вона має принаймні свій особливий об'єкт дослідження – біогеом.

***Ключові слова**: біосфера, екосистема, біогеом, біосферомерон, еволюція.*

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## БИОГЕОМЫ ГИДРОСФЕРЫ И СУШИ КАК ЭЛЕМЕНТЫ СТРУКТУРЫ БИОСФЕРЫ

**Аннотация.** Экосистемы, как наименьшие единицы в структуре биосферы вследствие экологической конвергенции образуют естественные группы, в которых экосистемы со сходными косными компонентами, определяемыми нами как геом, имеют сходные биотические компоненты или биомы, определяемыми как биом. Таким образом формируется следующий за экосистемным уровень структуры биосферы – биогеомы, комплексы сходных по своей структуре и функциональным показателям экосистем. Предлагается единая система из 12 биогеомов гидросферы и суши, объединяющих в три типа экосистем – биотический, олигобиотический и суббиотический типы. К первому типу отнесены биогеомы с ярко выраженным доминированием биотической компоненты экосистем. Это (на суше) биогеом тропических дождевых лесов или гилея, лесной биогеом с периодической сменой биотических фаз, в гидросфере это биогермовый биогеом. Ко второму типу отнесены тундровый, биогеом трав умеренной зоны, шельфовый биогеом, реобиогеом и лимнобиогеом. К третьему, суббиотическому типу отнесены биогеом пустынь на суше, пелагический биогеом, батиально-абиссальный биогеом океана. Введение понятия биогеома как суббиосферной единицы дополняет представления о структуре биосферы. Что касается структуры научных дисциплин, то есть основания считать целесообразным формирование новой научной дисциплины – биогеомики, исходя уже хотя бы из того, что она имеет свой особый объект исследований – биогеом.

***Ключевые слова***: *биосфера, экосистема, биогеом, биосферомерон, эволюция.*

## INTRODUCTION

Vladimir Vernadsky used as synonyms two terms: «the ***face of the Earth***, the surface of our planet or its ***biosphere***» (Vernadsky, 2012, p. 222), although its are not absolute synonyms. The term «biosphere» is more schematic, implies some kind of a model system, circuit interconnections, the allocation of sufficient abstract elements. This is the reality and abstraction. First term is much more figurative, geographically implies something real.

At the geographical approach, the basis of biosphere structure is the concept of landscape in sense of Lev Berg (1947): a set of topographic features, climate, water, soil and vegetation, fauna, the results of human activity. According to Berg, it is «geographical individuals» which brings us to the analogy: we can speak about «populations» of similar geographical landscapes as well as the populations of species of organisms.

Physiognomy, habitus of landscapes is not only the visible part of the image of nature, «... the landscape can be described not only physiognomically, in the style of Alexander von Humboldt, but also chemically, by the dominance of certain chemical processes» (Zavarzin, 1994, p. 8) or the processes of transformation of matter by the energy entering to ecosystem. In landscape, ecosystem there is biosphere exchange of atoms, which Vernadsky wrote about.

Concept of landscape is geocentric, but ecosystem is biocentric. Face of the Earth includes land, water, underwater landscapes and bottom or different chorological elements of the hydrosphere and land. In addition, now the image of the Face of Earth increasingly complemented by features of human nature. The richness of ecosystems as elements of the biosphere is huge but there is another pattern: the «total design» of ecosystems is fairly typical: in similar conditions (similar GEO) are similar biological structures of superorganismal level (similar BIO). Thus, on the background of a wide divergence exist prerequisites convergent similarity. Convergence does not deny the individuality of various objects, but allows us to combine them into regular classes for some similar characteristics. The example of it is differentiation in the biosphere only four biosferomerones (Protasov, 2012) based on the Vernadsky (2012) biosphere condensations.

## Ecological convergence

Examples of ecological convergence are in ecomorphology. One of the highlights example is the streamlined body shape of aquatic organisms originated and evolved solely on the basis of the same hydromechanical interaction between the body and a dense medium in which its move (Aleev, 1986). This process of divergence and convergence create the necessary balance of diversity optimum of biological systems: processes of divergence have a «centrifugal» nature, provide an increase in the variety of devices, forms of convergence – on the contrary – limits of diversity, establishes the optimum conditions in these forms. These processes exist at all levels of organization of living and bioinert systems.

The divergence of ecosystems creates and supports by:

• diversity of variants of consumption of nutrients and energy;

• many adaptations for breeding, increasing the number, save the population in conditions of competition and the environment impact;

• the difference ways of the development and retention of habitable space;
• large number of biocenotic links that change over time.

Manifestations of convergent processes are also quite a lot of prerequisites:

• morphological, behavioral similarity of species that are same ecomorph or one life form;
• similarity of trophic adaptations, limited by trophic levels;
• limitation of types of the main life strategies;
• limitation of the main energy sources and types of its biological transformation;
• the existence only a few major habitats for organisms and the main types of adaptations to life in them.

The diversity concept clearly prevails in ecology. Any textbook on ecology, you can find a lot of information about the diversity of ecological niches, and of living conditions of organisms, various adaptations, but very little information on the ecological convergence processes.

In the early twentieth century K. Petersen, analyzing material on the structure of the set of marine benthic communities in the North Sea has allocated no more then 14 types of them, called by the dominant organisms. Developing the idea of convergent similarity of communities G. Thorson in the late 1950s suggested that the concept of parallel communities, which, however, as well as in K. Petersena based on the similarity of taxonomic composition, dominant taxonomic groups. However taxonomic similarity criterion is not sufficient in some cases and contrary to the concept as closely related species may vary in nature as a food, and the level of metabolism. This is due to differences ecomorphological genetically related forms: «... necessarily understanding the convergence communities in the broadest sense, is any phylogenetic, taxonomic framework» (Kuznetsov, 1980, p. 93).

The ***biome*** concept based on the principles of ecological convergence: «The plant-animal formation, the base unit of communities (basic community unit) is the biome» (Clements, Shelford, 1939, p.20). This definition was not very clear, it is possible to subsequently widely interpreted the concept and the term itself. Biome is rather a type of communities with a fairly generic composition, characteristic metabolic processes, succession. As an example of biome Clements and Shelford leads the steppe and other similar range systems. The definition of biome by E. Odum (1975) emphasizes the inextricable link of biotic and abiotic components of the landscape, the presence of specific life forms and a certain historicity.

It goes without saying that the similarity of communities, actually *Biome* is largely determined by the similarity of conditions, or *Geome*. Therefore, we propose the term and the concept of biogeome that combines both biocenotic so and environmental characteristics of the groups are similar in nature ecosystems, leaving behind the concept of «biome» generalized characteristic of similar nature biocenoses. The term «biogeome» used in paleontology to indicate possible living conditions and the likely population that has become due to geological processes thanatocoenoses in a particular basin (Tesakov, 1978).

On land distribution of various types of vegetation in scale of all continents, and ecosystems, which habitus vegetation determines, associated with temperature and humidity ratio (Whittaker, 1980). Certain combinations of abiotic conditions corresponds some certain group or class of ecosystems. Not just the vegetation, but whole ecosystem. While the relationship between character of biome and conditions, such as moisture, it is obvious, there is a lot of data about the role of biotic factors in the formation, in particular herbal ecosystems – the steppe, pampa, prairie (Zhirkov, 2010).

## Types of biogeomes and criteria for their selection

What are the most important features characterize different Geomes and Biomes? Obviously, its must be, both biotic and abiotic characteristics. Briefly they can be represented in a kind of biogeome «formula». For land biogeomes formula might look like this: Geome = climatic conditions (Cc, temperature, humidity) + nature of soil (Sl); Biome = key life forms, ecomorphs (Lf) of organisms + chorological characteristics (H) or spatial location, stratification, mosaic. In short form it is (Cc + Sl) + (Lf + H). The general trophic characteristics not is important here, so land ecosystems fre photoautotrof-geterotrofic, unlike hydrosphere which happen photoautotrofic, chemoautotrofic and heterotrofic.

For aquatic biogeomes needed other than for terrestrial ones features of the environment. Formula of biogeomes in the hydrosphere, as follows: Geome = thermal condition (T) + photic o disphotic conditions (Ph), dynamics of water masses (D) or the intensity of water exchange, the current speed + level of oxidizing and reducing conditions (O) + substrate (Sb). Biome part of formula is key life forms biota (Lf) + trophic structure (Tr) + horology (H, layering, stratification, mosaic) in short form – (T + Ph + D + O + Sb) + (Lf + Tr + H).

Ecosystems can be divided sufficiently to three types: as «biotic», «oligobiotic» and «subbiotic» (these names are related only to the role of living and inert elements, but certainly not to the actual structure of the ecosystem). This division (*see table*) based on the greater or lesser importance of biotic or abiotic physiognomic components can be considered in a unit classification, terrestrial and aquatic ecosystems, and, consequently, their set or biogeomes. Significant predominance of inert elements in ecosystems leads some authors to the idea do not classify such areas the earth's surface as ecosystems (Biotopy lisovoy..., 2011).

**Characteristics of biogeomes (using partially classification of typically land biomes (Whittaker, 1980), classification of hydrobiomes (Protasov, 2011)**

| Column № | Column name | Geome features | Biome features |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| **Land biogeomes of «biotic» type** (appearance of the ecosystem is determined mainly by biotic elements) | | | |
| 1 | Biogeome of tropical rain forests | A substantial uniformity of abundant precipitation and a relatively high temperature during the year. Poor humus lateritic soils | Main life forms are trees, lianas, epiphytes. The high primary production, high trophic specialization of the heterotrophs. Significant spatial complexity of communities |
| 2 | Forest biogeome with periodicity of biotic phases | The climate with harsh winters and fairly warm summers. Prolonged snow cover. The climate is temperate, with cold winters and warm summers, precipitation mainly in summer. The climate is tropical. Summer rains and the dry season from 2 to 10 months. The soils are poor in nutrients with a small amount of humus. There is a layer of leaf litter | Main life forms are trees. The periodic change of the community development phase. There is a phase of decline of activity in cold or dry season. Significant spatial complexity of communities |
| **Biogeome of «biotic» type in the hydrosphere** (appearance of ecosystems is determined mainly biotic elements such as sedentary hermatypic corals or algae) | | | |
| 3 | Biogerm biogeome | High and stable water temperature. Circumtropical distribution. Most ecosystems exists in the upper part of the photic zone | The main of modern life forms is hermatypic corals, sedentary form.In the basis of the trophic links is trofosimbiosis of heterotrophic ephaptobionts with autotrophic endosymbionts. Distribution is |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| | | | determined by the depth of a few tens of meters, which is determined by the penetration of light and the ability of photosynthesis simbionts algae. Enormous rishness of species and life forms |
| **Land biogeomes of «oligobiotic» type** (ecosystems appearance as determined by mainly biotic elements do not create a complex spatial structure. Also the abiotic elements and environmental factors plays important role ) | | | |
| 4 | Tundra biogeome | Winters are long with low temperatures, a short growing season with long daylight days. Circumboreal distribution. Deep soil freezing and thawing in the summer only the surface layer. The accumulation of organic matter in soils, peat formation | Main photoautotrophs are follow life forms: shrubs, grasses, mosses and lichens.Major herbivores are small rodents. Important seasonal herbivores are nesting migratory birds |
| 5 | Grass biogeome of temperate zone (steppes, prairies, pampas) | For the climate is characterized periodic dry season, with high summer temperatures.Soils are rich in humic substances, are fertile.Significant part of ecosystems are man used for agriculture, the bulk of the ecosystem is severely transformed | Main photoautotrophs are herbaceous plants, sometimes sparse woody vegetation that is resistant to fire.Basic heterotrophs are burrowing larvae of insects, vertebrates excavations, large herbivores. Spatial complexity expressed very weakly |
| **Biogeomes of «oligobiotic» type in the hydrosphere** | | | |
| 6 | Shelf biogeome | The coastal shelf zone of the ocean. Significant temperature latitudinal zonation with a large temperature range. Various hydrodynamic factors: currents, upwellings, downwellings. The hydrodynamic connection between the bottom and the water column habitats. Most of the ecosystems located in the photic zone | A large variety of life forms. Primary producers are represented mainly by plankton algae, but locally attached macrophytes plays the important role. Basic trophic chains are pastoral ones |
| 7 | Hydrothermal-seeps biogeome | Deep bottom vents of mineral water fluid substances with a high temperature. Large hydro-chemical and thermal gradients. The island nature of the sources and hydrothermal fields. Cold-water hydrogen sulfide and hydrocarbon bottom seeps | Sedentary and mobile forms, endosymbiotic adsotrophs are maine ecomorphs. Energy flows in the communities provide mainly primary products by endo- and ectosimbiotrophic chemosinthetics. Rich composition and spatially complex community of heterotrophic organisms. |

*Table end*

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| | | | Spatial structure has concentric character around the fluid source |
| 8 | Rheobiogeome | Streams of runoff with high water exchange. Wide temperature range from freezing in winter to tropical with stable temperature. Expressed latitudinal zonation. There is a zonation of ecosystems along the direction of flow, as well as metameric structure, local recurrence types of habitats | Among the primary producers a big role play contourobionts of periphyton and benthos. There are significant diversity of nekton, benthos and periphyton |
| 9 | Limnobiogeome | Water bodies of surface runoff from slow water exchange. Wide temperature range – from freezing in winter to tropical waters. Expressed latitudinal zonation. There is a depth zonation and stratification | Primary producers represented by planktonic algae, rarely bacteria and benthic or periphytic autotrophs. Trophic network are pasture and detrital.There are high diversity of plankton and nekton forms |
| **Land biogeomes of «subbiotic» type** (ecosystems appearance determine abiotic elements, and formed mainly abiotic factors) | | | |
| 10 | Desert biogeome | The arid climate. Wide temperature range, precipitations are very small. The appearance of the landscape determine the soil rather than vegetation | There are many specific life forms: ephemeroids, succulent plants, burrowing, active at night animals. Primary production and biodiversity are very low |
| **Biogeomes of «subbiotic» type in hydrosphere** **(**ecosystem shape is determined exclusively by the biotic elements: water environment, sediments**)** | | | |
| 11 | Pelagic ocean biogeome | Latitudinal thermal zonation in the surface layers. Low and relatively stable temperature on deep. Separation of photic and unphotic zones. Surface directed flows and circular currents | Kingdom of planon ecomorphs, the nekton and plankton. Separation of autotrophic and heterotrophic aphotic and photic zones. Trophic networks are pasture and detrital. Exists significant vertical migration of plankton and nekton |
| 12 | Bathyal-abyssal biogeome | Low and stable temperature without clear latitudinal zonation. Sedimentation suspensions, including delivery of organic matter depends on the processes in the pelagial. Exist expressed deep zoning of conditions | The prevalence of sedentary and low-moving forms, which always have the contacts with the substrate. Absence of autotrophic organisms and exclusively detrital food chains. The spatial complexity of the ecosystems are very small |

The system is widely used already, such as marine biologists are considering applying EUNIS-classifying habitats (habitat classification) for mapping the benthos in European seas (Galparsaro et al., 2012). Ukrainian geobotanics Ya. P. Didukh and O. L. Kuzmanenko (2010) examined this terminology question of terms relationship and concepts «biotope», «ecotope», «habitat», etc.

The «habitat», in the sense used European experts in the field of nature protection is «plant or animal communities that appear as characteristic elements of biotic environment, together with the abiotic factors – the soil, climate, available water – operating working together at different scales» (Moss, 2013). It is easy to see that this definition is probably related to the ecosystem, rather than to the habitat or biotope of community.

On land the selection of different types of ecosystems – forests, wood forms with modifying and treeless grassy or herbal is under an ecological grounds (Razumovsky, 1999). There are many examples of biogenic transformation of ecosystems dominated by terrestrial forms to non-forested ecosystems (Zhirkov, 2010), but these processes are likely to have a complex character. As for the features of forest ecosystems, unlike grass, it should be emphasized that in the forest organic material accumulation occurs mainly in the biotic part of the ecosystem. It seems appropriate to split the all forest ecosystems at two biogeomes. The different types of ecosystems of various climatic zones of the land are different climatic conditions and soils, the nature of trophic relations, metabolic activity in time. The time cyclicity of environmental conditions is different (Stanyukovich, 1970). The major ecological role of terrestrial vegetation is expressed in many ways, first of all, that the one creates a very specific biogenic habitat for other organisms. The most important in terms of assessing the differences geome represented permanence and periodicity of the environment. Two forest biogeomes can be identified: a tropical rain forest and seasonal forests.

With regard to the allocation of biogeomes of «biotic» type in the hydrosphere, the inclusion of biogerm ecosystems is no doubt in it. They biotic ecosystem elements (corals, algae, another organisms) create a completely new environment for the other members of biocenoses, underwater landscape, actually becoming «geological force», in the words of Vernadsky.

The ecosystems of «oligobiotic» type characterized some abiotic factors along with biotic form their shape. Low winter temperatures, short summers contribute to the formation of permafrost in tundra soils. The main forms of plant life are hemicryptophytes. Great importance in the life of plants plays a thermal microzonation. In the summer during the prolonged sun exposure creates a relatively large amount of organic matter initially produced, which accumulates as peat, large detritus (Prirodnaya …., 2000). In herbal temperate ecosystems (steppe, prairie) important abiotic factor is low moisture in the summer, a drought that reduces the intensity of the destruction of organic matter, its accumulation in the soil.

There is large number of ecosystems in the hydrosphere can be attributed to oligobiotic type. Shelf ecosystems are very diverse, highly variable the ratio of the biotic and abiotic components. The underwater «forests» of brown algae in the upper rocky intertidal zone, densely populated as the sedentary and mobile forms is clearly dominated by biotic elements. At the same time, life in the intertidal zone is largely determined by tidal action. In general, the causes in a separate set of shelf biogeome ecosystem that is the part of the biosphere, which converge into one system border zones of three biosferomerones: the surface of the ocean, bottom, and land. This is one of the most important contour zones in the biosphere. The coastline of the continents is about 600 000 km (Gladyshev et al., 2009). The ecosystems of this zone is extremely varied, one after another, they stretch along the shores of oceans and inland seas of some hundreds of thousands of kilometers. Its can be combined to one shelf biogeome.

Hydrothermal ecosystems are selected in a separate biogeome, undoubtedly. They are compared to most another aquatic ecosystems – photoautotrophic and heterotrophic – look quite peculiarly (Van Dover, 2000). If the vast majority of the Earth's ecosystems derive energy from the sun (an organic substance heterotrophic community also has the nature of photosynthetic), the hydrothermal communities formed by chemosynthetic activity look like an island in an ocean of «green autotrophic life» (Vernadsky's term). Hydrothermal is a geological phenomenon, and in the ecosystem, the life of which depends on the intensity and duration of the outpourings of fluid, hydrothermal activity is the determining factor.

The ecosystems habitus define clusters of peculiar animals. Besides hydrothermal ecosystems in this biogeome should also include some other marine ecosystems associated with reducing environment.

The ecosystems of water bodies of surface runoff, though closely associated with land ecosystems, should be allocated to individual biogeome. Habitual criterion leads us to classify them as «oligobiotic» type. Although a large river or lake looks more like a single huge water mass (prevalence inert elements) to the borders of the shores, in smaller ponds and streams biotic components also determine the general habit of the ecosystem. And above all, it is higher aquatic vegetation, which has a contour (coastal) location. To separate the two biogeomes (the biogeome of water bodies and biogeome of rivers and streams) exist main abiotic criterion: specifically intensity of water exchange. This is connected with differences in the nature of the time processes (Ward, 1989). In water bodies (slow water exchange) succession are ongoing. In streams with intensive water exchange, cyclical changes are expressed as the inert and biotic elements. (Alimov et al., 2013)

In ecosystems, which are included in «subbiotic» type, inert parts define its common habitus. It does not depend on the size of ecosystems or conditional fragmentation for the study and is manifested in the small fragments. On land the ecosystems of deserts can be combined into one biogeome. Their formation and existence is determined by a combination of factors, which are close to the extreme: high or low temperatures, extremely low humidity.

In the hydrosphere in this subbiotic type may be included two types of ecosystems where is clearly dominated inert elements. Its are oceanic pelagic and bottom ecosystems including to ocean pelagic and bathyal-abyssal biomes. Primary production of the pelagic zone of the ocean as a whole does not exceed the production of terrestrial deserts. Pelagic biogeome of the ocean is the largest subunit of the biosphere and holds the overwhelming majority of the whole population living organisms hydrosphere (Verity et al., 2002)

Thus, we allocate 12 biogeomes which cover practically all biosphere of the Earth.

Hydrobiomes, together with the continental biomes create a proper, functioning of modern living biosphere. Biosferomerones acquire its structure, that is, from «merons» or parts of the biosphere its become the system with their own specific structure.

## Exbiogeome ecosystems

It is obviously that the above scheme can not show a plurality of transitions between biogeomes. There are ecosystems that are generally difficult to attribute to any of them. As H. Walter (1975) note, on land where the actual shape is determined by vegetation except zone defined by basic climatic characteristics, there exzonation vegetation, which is difficult to attribute to any biome. He believes that its are: vegetation of river sediment of freshwater ponds and streams, vegetation of brackish and salt water, macrophyte vegetation of the seas, vegetation of coastal dunes. A huge diversity of ecosystems can not be strictly and fully reduced to a small number of biogeomes, among the most significant exbiogeome are following: savanna, wetland ecosystems, mangroves, estuarine ecosystems. It should be noted that they all have ecotone character.

## Techno-biogeome and noospherogenesis

A man adds a lot of different anthropogenic elements to the existing diversity of combinations of natural elements both BIO and GEO. In the biosphere, really occur the formation of a new type of composite, man-made ecosystems, which are islands in the world of natural ecosystems иred ever-expanding field of its existence. The appearance of landscapes of entire countries and geographical areas completely transformed by human activity. Anthropogenic ecosystems are very diverse and combining them into a single conditional techno- biogeome (agro-, and urbobiogeome) is problematic, however, should take into account role of this ecosystems in the biosphere.

The transformation of the biosphere as a natural system to the noosphere is going through the transformation of natural ecosystems to antropogenic ones.

The complication of «biogeomic construction» of biosphere in evolutionary time is obviously. Billions years ago, the entire biosphere could consist of a very small number of ecosystems types. It was, most likely, coastal semimarine-land ecosystems that functioned on the basis of bacterial mats, which occurred as the production of organic matter and its destruction (Ponomarenko, 2007). The diversity of the biosphere in this aspect was close to zero. Not only because the types of ecosystems were not enough, but also because much dominated by one type. At present the richness of ecosystems is large, but it is also important that no one biogeome not a currently an absolute dominant in the biosphere. Thus, over billions of years the diversity of the biosphere grew enormously, not only in the aspect of increasing the number of taxa, but also in the aspect of increasing the number of types of ecosystems and the uniformity of their significance in the biosphere. In this regard, a very important question about the formation of agro-, technical- and urbo-ecosystems. Formally, they also increase the diversity of the biosphere. But at the same time whether its sustainability is not whether this will lead to a change in uniformity in the structure of the biosphere and not fall? Unfortunately there are grounds for an affirmative answer to this question.

## CONCLUSION

The balance of divergent and convergent processes is one of the most important principles of forming complex bioinert systems. The basis of the formation of biogeomes, complexes of similar ecosystems are ecological biocenotic convergence.

Differentiation of biogeomes based on the similarity characteristics of geomes and biomes. The combination and the prevalence of a main features of ecosystem type permit us divided three types of ecosystems and biogeomes: biotic, oligobiotic and subbiotic. We allocate 12 biogeomes in hydrosphere and on land: tropical rain forests, seasonal forests, biogerm, herbal, tundra, ocean shelf, hydrothermal biogeomes, limnobiogeome, rheobiogeome, deserts biogeome, ocean pelagic and bathyal-abyssal biogeomes.

Modern biogeomes structure was formed in the process of evolution of the biosphere, the main thrust of which there is an increase in diversity, both in terms of increasing the richness of taxa and in the aspect of increasing the richness of connections between functional groups, between the living and inert elements. In the evolution process has increased not only the number of types of ecosystem, types of relationship between BIO and GEO, but also the evenness of their representation in the biosphere.

The biogeome concepts essentially complement submissions of the hierarchical structure of the biosphere. Creating by human a new ecosystem types is the way to the evolution of the biosphere into the noosphere.

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