

Territorial Structure and Stability of Ecological Framework

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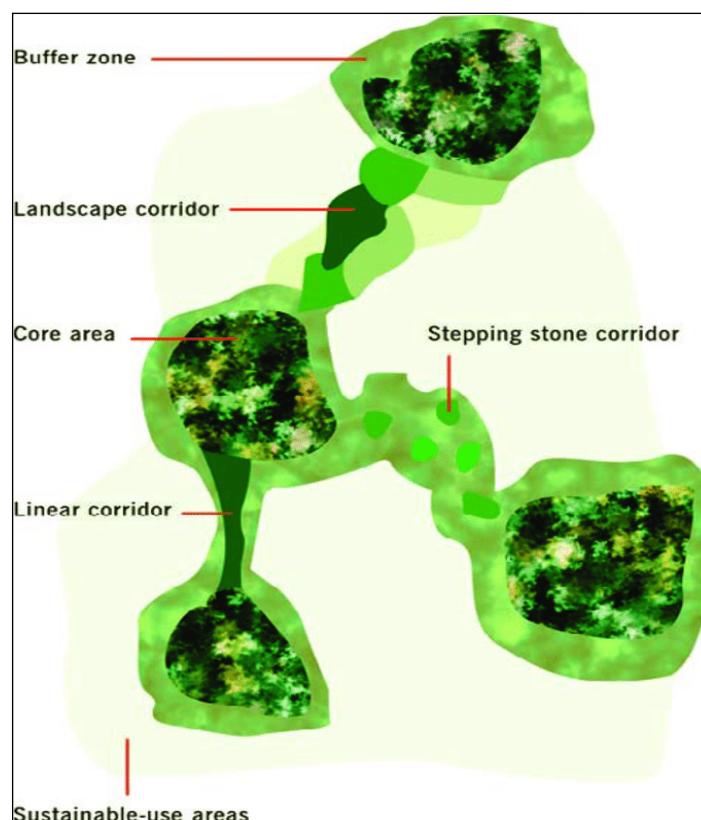
Abstract – This article provides an analysis of the ideas given about the concept, function, and structure of the ecological framework. The geo-ecological basis of the formation and development of the concept of ecological carcass is also considered.

Keywords – Ecological Framework, Nature Framework, Protected Natural Areas, Economy, Sustainable Development, Biological And Landscape Diversity.

The formation of the ecological framework requires, first of all, the identification of framework elements on the basis of ecological-functional zoning of the territory, the analysis of the structure of land use. The elements of the ecological framework at different levels (global, regional, and local) are the geographical system. This is because the functional relationship between the elements creates territorial integrity. Each element has the ability to perform a specific function, complementing each other, and manifesting itself as an integrated system that maintains stability in natural, environmental, social and economic processes [Kristiansen I., Jongman R.G.H., 1998.; Sepp K., Kaasik A., 2002].

The diversity in the structural structure of the ecological framework is related to the functional-territorial structure, which also determines their function in the system. For example, protected natural areas are attached to the following elements according to their function in the ecosystem: basic (protected natural areas with a reserve mode), connectors (environmental corridors) and multi-purpose modules (buffer zone). Some researchers have identified the following elements, regardless of the functional-territorial structure of the ecosystem (global, regional, and local): central areas or bio centers; ecological (or biological) corridors; buffer (protective) zone; regions (restoration (denaturalization, or nature development)) and parts in the form of steps [Bennett, 2006, p. 5].

I.M. Bouwma et al. [2002, p. 25] identified 6 elements in the ecosystem structure: ecological core or base areas (Core Area), Restoration area, Landscape Corridor, Linear and Corridor), stepping stone corridor and buffer zone (Picture 3.1).



Picture 3.1. Schematic structure of the ecosystem [Bowman, 2002, p. 25]

Projects related to the creation of ecological frameworks and ecological networks are very close to each other in terms of content and include three main elements (core, buffer and corridor) that complement each other functionally. The buffer and regeneration zones within the eco framework have been evaluated by some researchers as secondary elements [Bowman, 2002]. According to E.A.Ivanishcheva [2012], the main task of the ecological framework is to preserve the natural framework covering relatively rare areas and to ensure the interconnection between them. The researcher is also limited to separating the central area, buffer zone, and corridors as key elements of the ecological framework.

In a study conducted by the Global Environment Facility (GEF) and the International Wildlife Fund (WF) on the EKCONET-Central Asia (ECONET-life network) project [2006], ECONET elements were divided into three categories according to the nature use restriction regime: base areas (mainly, Consists of high levels of protected natural areas); ecological corridors (areas with sustainable use of nature); transition areas (areas where nature use regulations are established, for example, separate wetlands).

Classification of ecological framework elements by features was recommended by A.V.Elizarov [2008, p. 301] and is divided into the following groups: by function - the core or nodes, communicative elements; by hierarchical level - local, regional, regional and international; by legal status - protection zone, protected natural areas, new forms of protection, etc .; by the sign of the ecosystem - according to what type the element of the ecosystem represents; according to the degree of naturalness of the area.

O.V.Titova [2013] grouped the ecological framework by genesis elements and proposed the following composition by including natural complexes and artificial structures: unaltered areas in nature (protected natural areas, forest lands, swamps, pastures, forests, hills, etc.); reclaimed reserve areas (quarries, cliffs, non-aesthetic areas, barren lands, other lands); artificial elements, which are alien to the landscape in which they are located, but are important elements in the ecological optimization of areas with intensive economic activity (Abduganiyev, 2018).

D.V.Chernyx [2008, p. 68]. suggest the evaluation of sacral regions, which are of such religious, cultural, historical importance in the design of the ecological framework, as well as those formed in natural and cultural landscapes, as a central core

element. V.E. Boreyko, on the other hand, developed the concept of wildlife in his works by evaluating sacred objects and landscapes as protected natural areas [Boreyko, 2018].

The interaction and connection between the elements of the ecological framework is provided by a complete and integrated system of protected natural areas. E.A.Schwartz and A.S.Shestakov [2002] also evaluated the ecological framework as a system of protected natural areas in their research. According to them, it is through the integrated system of protected natural areas that the ecological framework is formed. In this process, initially, the network of protected natural areas is attached to the system of protected natural areas and, accordingly, the elements of the ecological framework are formed. If necessary, the ecological framework can be "adjusted" in accordance with the economic situation in the domestic and world markets and changes in the country in the field of nature protection (Abduganiyev, 2018).

According to the analysis of the views on the functional framework of the ecological framework and ecological networks, the system of protected natural areas (PNA) forms the basis of both infrastructures. In the geo-ecology classification of protected natural areas we consider the central core, geo-ecological recovery zones, geo-ecological corridors and protection zones as the main elements determining the functional-territorial structure of the ecological framework.

1. The core areas are large elements of the ecological framework in the form of nodules and areas, protected areas designed to protect unique natural objects and ecosystems, to preserve and study the genetic fund of plants and animals of special ecological value [Kristiansen I., Jongman R.G.H., 1998.; Sepp K., Kaasik A., 2002]. The central core of the ecological framework consists of state reserves, state biosphere reserves, landscape reserves, and national and nature parks, natural monuments. Category XIX of protected forests also serves as a central core. To maintain ecological balance in the region, the area of protected natural areas that form the central core should vary between 20% -60% of the total area of the ecological carcass [Elizarov, 2008]. The central core also includes typical natural complexes in the region, river catchments, distribution areas of rare and endangered species, basic ornithological zones, forest genetic reserves, unique geological objects, areas of high recreational significance special attention was also paid to the inclusion.

I.M. Bouwma et al. [2002, p. 11] argued that the stability of the ecological network and the central nuclear regions that form its basis is related to the size of the area. The researchers determined the minimum required area size for nuclear areas based on their ability to cover 70% to 100% of the habitats of species of European importance. The area of nuclear zones can be divided into 1st and 2nd tier zones according to their scientific and practical significance. Level 1 nuclei of the ecological framework are protected natural areas and other geo -complexes with a large area: reference protected natural areas occupying a relatively large part of the region (IUCN categories I, II and III); natural territorial complexes (watersheds, upstream rivers, river slopes, hills, low mountains, etc.); large forest massifs; areas such as natural forests, large sand massifs, which do not have the status of protection, but are of great scientific, ecological and economic importance.

Such areas serve to support biodiversity in the region, restore and protect natural territorial complexes. Such areas are part of the nuclear elements and may include mainly point elements and small-area areas: local-scale natural-territorial complexes that have retained their natural appearance; various geological deposits and natural-territorial complexes (residual mountains, hills, etc.) with different landforms; watersheds and tributaries of small rivers and streams; small areas and local-level natural-territorial complexes (various geological and geo-morphological objects, fossilized plant or animal remains, caves, rocks, waterfalls, springs, lakes, etc.) that preserve rare or typical natural objects.

It is not possible to establish protected natural areas with a large area in strongly developed areas for economic purposes. In this regard, it is necessary to use the experience of establishing micro-reserves, which has been successfully implemented in EU countries. In these countries, land users allocate 0.5-1.0% of their total land area for micro-reserves. Such a network of specific protected natural areas, while preserving the flora and fauna and relict soil cover specific to the region, plays an important role in the creation of a reserve land fund for the farm [Abduganiyev, 2018]. In the agriculturally developed areas of the Fergana Valley, some parts of the natural landscape in the form of "islands" have been preserved. By protecting such areas, protected natural areas are able to ensure the integrity and completeness of the system [Abduganiyev, 2018, 2021].

2. Geo-ecological restoration zones are created for the purpose of optimization and restoration of ecological functions of geo-complexes lost for certain reasons. From protected natural areas (according to IUCN, categories IV and V) order reserves, biological nurseries, hunting and fishing zones, resort natural areas, recreation zones, zones of formation of surface and groundwater

and protected forests (V, VI, IX, X) , Categories XI) are divided into geo-ecological restoration zones within the ecological framework.

These elements of the ecological framework can also include geo-complexes or some of their parts and components that have not lost their ecological significance. By limiting and regulating some types of anthropogenic impacts in the areas of geo-ecological rehabilitation, the most favorable options for optimizing the natural environment are realized in them . In such areas, along with limited economic activity, environmental rehabilitation measures are also carried out. As a result, the integrity and optimal size of the eco-carcass is ensured, as well as habitats for biological species are preserved.

A number of researchers have suggested that areas for reclamation and reclamation should also be included in the EC. Such areas are mainly degraded and degraded (eroded, infertile, saline soils, quarries, soils contaminated with toxic substances, geo-complexes with strong changes in the composition of some components in terms of quality and quantity, etc.). The inclusion of such areas in the EC as geo-ecological rehabilitation zones ensures the efficiency and integrity of the protected natural areas system [Elizarov, 1998].

In regions with complex geo-ecological conditions, it is impossible to achieve a completely positive result in the conservation of biodiversity and environmental security by protecting the current state of nature. In such cases, it is necessary to identify “recovery zones” where it is important to restore and maintain the habitat of the species and to establish nature protection measures in them.

3. Geo-ecological corridors connect the nuclear and ecological recovery areas of the ecological carcass. The hydrographic network of the region plays an important role in the formation of geo-ecological corridors in the ecological framework. Ecological corridors create conditions for the migration of biological species while ensuring the exchange of matter and energy in the ecological framework [Bennett et al. 2001; Sapp, 2002; Miklós, 2019].

Water protection zones and protected forests from protected natural areas (according to IUCN, category VI) serve as a geo-ecological corridor within the ecological framework. Geo-ecological corridors allow for the migration of biological species, the distribution of plant formations, and the provision and enrichment of component diversity by providing a link between the main elements of the ecological framework and natural, natural-anthropogenic landscapes.

Continuity of the ecological corridor can be ensured through the use of riverbeds and embankments, river valleys of different sizes, watersheds and mountain ranges, protective forest belts, water protection zones, water bodies, highways and green areas in settlements, trees and fences around crops. In addition, eco-corridors may also consist of some interlocking and stepping stones separated from each other. For example, small sand dunes within crops can also serve as an ecological corridor.

4. Buffer zones (buffer zones) perform the function of protecting the main elements of the ecological framework from adverse external influences and creating conditions for the restoration of natural resources. Buffer zones are established to minimize external adverse effects on the elements of the ecological carcass and to ensure their environmental sustainability. The protection zones of protected natural areas, III, IV, VII and VIII categories of protected forests act as buffer zones. It is also possible to include sanitary protection zones, green zones in settlements, and protection zones against adverse effects of agro-landscapes, protection zones of rivers and reservoirs, as well as landscape eco tones as a buffer zone [Bennett et al. 2001; Sapp, 2002; Miklós, 2019, Abduganiev, 2021].

Buffer zones are of particular importance in the return of degraded and degraded lands to the nature use area as an element of the eco-framework, as well as in the rehabilitation of areas where the management of traditional types of nature management is a priority [Jongman, 2004; Miklós, 2019]. Given the degradation processes taking place in ecosystems, measures aimed at protecting the current state of nature in order to preserve biological diversity is not sufficient. In some cases, the conservation and restoration of habitats of individual species is required. Therefore, in the design of the ecological framework, it is important to identify “regeneration zones” for rare biological species in the regions [Kalev Sepp, 2002, p. 55].

5. We suggest adding the following elements to improve the protected natural areas system.

1. Local elements - small natural monuments of various profiles, green areas of settlements, protected objects of inanimate nature, monuments of historical and cultural significance, and ecologically active points of geo-complexes, which can combine different objects. The function of natural-territorial complexes with local elements is to perform such aesthetic and social functions as the protection of unique natural and cultural objects.

2. Zones providing a favorable environment for the improvement of sanitary and hygienic conditions shall be formed around urbanized and industrial enterprises. They must perform tasks that protect the natural environment from various influences and improve the state of the environment (urban and suburban green zones, forest parks, sanitary protection zones of enterprises, etc.).

3. In areas of high economic activity in the Fergana Valley, on irrigated lands or in some parts of large settlements, special attention should be paid to the separation of "reserves" in the form of small islands. Depending on the scale of anthropogenic impact and the nature of the area, "reserves" can include forests, small lakes for migratory birds, spawning grounds for fish in rivers or streams, shelters for various animals and micro-reserves with favorable conditions for the development and reproduction of beneficial insects [Abduganiyev, 2018, 2021].

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