

Сравнив обобщённые хронологии по двум участкам, можно чётко отследить отличия динамики колебаний. Древесные насаждения ЛОД с 1960-х годов не изменили свою динамику. Можно отметить относительно равномерную амплитуду колебаний прироста, отчётливо выраженные «реперные» годы.

Насаждения Лиственничной аллеи сильнее отражают воздействие урбанизации. В динамике четко прослеживается нарушение цикличности радиального прироста, наличие резких спадов и всплесков прироста, падение прироста в 1970-х годах.

Спектральный анализ временной динамики суммы активных температур на основе вейвлет-преобразования показал, что на всём протяжении наблюдений преобладали четырёхлетние циклы. Аналогичный анализ динамики суммы осадков за год также показал доминирование в динамике 4-годичных циклов.

Поиск цикличности в динамике годовичного радиального прироста исследуемых деревьев с помощью вейвлет преобразования показал доминирование циклов продолжительностью 64 года, однако у временных рядов деревьев ЛОД и Лиственничной аллеи наблюдается сдвиг фаз этого цикла: в лесном биоценозе его доминирование более длительное с постепенным переходом цикла в 90 летний; 32-летний цикл на ЛОД выражен очень слабо, а 16-летние и 12-летние отсутствуют.

Климатические циклы не совпадают с циклами роста деревьев, что свидетельствует о том, что причиной цикличности радиального прироста являются не флуктуации климата, а действие иных факторов, к числу которых относится техногенная деятельность человека. Различия в характере цикличности прироста наблюдаются с 1920-х годов, что может быть вызвано начавшимся активным строительством жилых домов.

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INFLUENCE OF ANTHROPOGENIC LOAD ON ECOLOGICAL FUNCTIONS AND ECOSYSTEM SERVICES IN THE FOREST ECOSYSTEM

Solomon Melaku Melese, Post-graduate student of the Department of the Ecology of Federal State Budgetary Educational Institution of Higher Education “Russian Timiryazev State Agrarian University”, solyeme@gmail.com

Annotation: *Anthropogenic impact are processes, objects or materials that are the result of human activity, as opposed to those that arise in the natural environment without human influence. Intense anthropogenic disturbances, has the possibility of degrading the composition and availability of structural attributes in forests.*

Key words: *Anthropogenic load, Ecological function, Ecosystem Services.*

Anthropogenic load is one of the most severe problems in the preservation of forest ecosystems. The proximity and quantity of human settlements have been shown to be factors that greatly reduce biodiversity in highly urbanized areas [1]. Many people have migrated from urban areas to found new villages [2]. In a recent study, [3] showed that richness decreased in highly disturbed and transformed areas worldwide, Because of anthropogenic disturbance, which accounted for the presence of garbage, trails, roads, human construction and soil manipulation.

Human activities endanger the structure and operation of natural and semi-natural habitats, as well as the diversity of plant and animal species that live there. Increased air pollution by both reduced and oxidized nitrogen compounds in the form of NH_x and NO_y is one of the most serious anthropogenic challenges in temperate climate environment [7]. The nitrogen cycle has, to a large extent, been altered by human activities. Industrial and agricultural activities, as well as fossil fuel burning, emit nitrogen compounds to the atmosphere [2]. The atmospheric depositions of sulphate (SO_4^{2-}) and nitrogen compounds still exceed critical loads in many parts of the country. In addition, high nitrogen deposition is recognized in cities as a major limiting factor in maintaining or restoring a good state of conservation in vulnerable natural areas [6]. In addition to fragmentation, land managers must contend with the loss of distinctive habitats as a result of biotic homogenization, or the similarity of species assemblages across geographically distinct regions [7]. Current climate changes, such as rising air temperatures, evolving precipitation patterns, and an increase in the frequency of extreme weather events (e.g., heat waves, droughts, etc.), in combination with rising CO_2 concentrations, can have a major impact on forest production and distribution [6].

Over the past few decades, interest in environmental studies has increased in the number of edges associated with roads [5]. Seven categories of road effects on terrestrial and aquatic ecosystems were examined: increased mortality from road construction, from collisions with vehicles, modification of animal behavior, changes in the physical environment, changes in the chemical environment, the spread of exotic species, and increased habitat change in humans [4]. Numerous negative effects of forest roads on the remaining forest have been reported, and road construction is considered a major cause of habitat fragmentation. Because Roads cut previously large sections into smaller ones, and they create a forest edge habitat on both sides of the road. This can lead to a change in the composition of the community. Thus, retention of remaining off-road or adjacent off-road areas of the landscape and restoration of some roads are critical to maintain habitat integrity [4].

Pollutants and excessive nutrient loading Atmospheric pollution, soil contamination and excessive nutrient loading affect exposed forest ecosystems. For instance, pollutants affect the CO_2 concentration in the atmosphere and the nutrient cycling in soils. Trees may become more susceptible to stress and acute events, such as drought, storms, diseases and pest infestation by, for example, the bark beetle. This exposure may impact forest biodiversity and the capacity of

forest ecosystems to provide valuable ecosystem services [3]. Pollutants have been a serious problem for forests in the world. Data directly related to ecosystem health have been used to assess damage to forests, crops, natural vegetation, soils, surface and ground waters by determining the critical levels of pollutants and their loads with regard to the responses of these systems [4].

Disturbances can worsen undergrowth density, coarse wood pulp volume, debris (CWD), driftwood density, stand base area and litter depth. Anthropogenic disturbance of the natural vegetation of fragmented forests, showed that the protection of forest habitats is necessary to preserve the richness of plants in the remaining stands. The loss of these attributes of the forest is known to affect biodiversity, including mammals, birds, reptiles, amphibians and invertebrates, whose survival depends on these key structural attributes of the habitat [5]. So, an accurate understanding of the relationship between biotic and abiotic parts of forest ecosystems and anthropogenic influences on plant biodiversity is critical to forest management and protection activities [5].

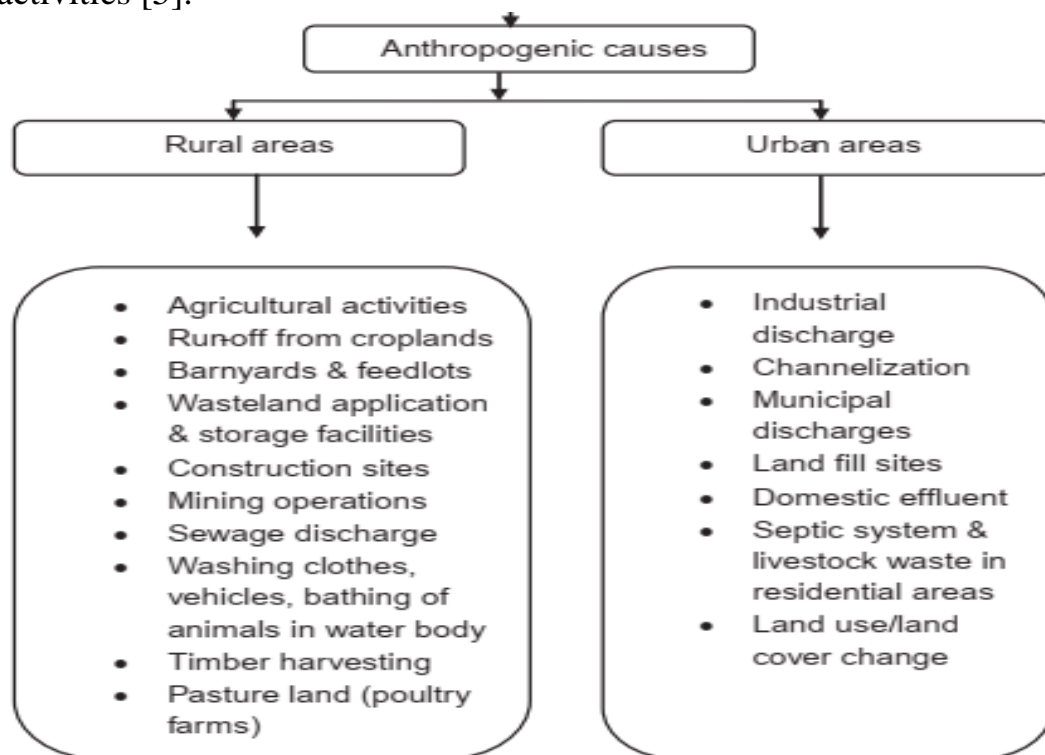


Figure 1 Anthropogenic cause of rural and urban areas

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ROLE OF SOIL AS A BASIC COMPONENT OF FOREST ECOSYSTEMS

Solomon Melaku Melese, Post-graduate student of the Department of the Ecology of Federal State Budgetary Educational Institution of Higher Education "Russian Timiryazev State Agrarian University", solyeme@gmail.com

Annotation: *Soil is an important component of forest and woodland ecosystems as it helps regulate important ecosystem processes, such as nutrient uptake, decomposition, and water availability. Soils provide trees with anchorage, water and nutrients. Soil used as a basic component of forest ecosystems. It is made up of a variety of minerals, organic matter, and living organisms. Soils are also crucial for global food security, water security, biofuel security, and human health, in general sustaining ecosystem. Forest ecosystem of soil is a key component of the Earth system to control geochemical, biological, erosional, and hydrological cycles, as well as providing utilities, products, and energy to humans.*

Key words: *Soil, Forest ecosystems, Basic components.*

Soil plays an important role in forest growth and management. It provides moisture and nutrients for tree growth, serves as a medium for root growth, and physically supports the equipment used in harvesting, yarding and other operations [1]. Soils of forest ecosystems perform a wide range of ecosystem services and ecological functions, among which the most important functions are the regulation of the composition of atmospheric air, the storage of carbon and nutrients, the immobilization of pollutants, the regulation of the water regime and resistance to recreational load [2]. It is also a vital component of the biosphere, living and complex natural organism that plays many key roles in terrestrial ecosystems, such as, maintaining hydrological stability, and biological diversity [4, 5]. It serves as a source of food, and a mechanism that maintains environmental quality at the local, regional, and global levels [1]. As a result, improvements in soil fertility and nutrient balances are considered main measures of forest ecosystem quality [5].

Forest ecosystems are crucial role in soil conservation, water conservation, and environmental improvement [2, 3]. Forest soils, in particular, are critical in deciding the forest ecosystem's long-term productivity [4]. Forest soil is used to maintain the stability of the ecosystem [2], and important in the global carbon cycle, and peatlands, wetlands with a high carbon storage capacity, of the biosphere's carbon pool [7]. The type of soil that forms depend on what type of vegetation grows. Soils that formed under deciduous forests are very fertile and productive agricultural lands because of the decomposing leaves at the soil surface [3]. The role of soil organisms in resource-intensive agroecosystems has received little attention, since natural and biologically mediated processes such as regulating soil structure and nutrient supply have been largely replaced by human impact [5]. The intrinsic characteristics of the soil, which