International Journal of Advanced Biological and Biomedical Research (IJABBR)
Available online at http://www.ijabbr.com
Volume 6, Issue 3 (2018),pp. 178-184

Research Article

Providing an essay about: a study on the spatial pattern of biodiversity caused by implementing agroforestry methods

Hamid Ahani*[1], Hamid Jalilvand[2]

[1]PhD candidate of forestry, Sari agricultural sciences and natural resources university, Iran.

[2]Associate professor of Forest ecology, Sari agricultural sciences and natural resources university, Iran.

*Corresponding Author E-mail: Ahani1977@gmail.com

Received: 8 August 2018, Revised: 24 August 2018, Accepted: 15 September 2018

Abstract

Forests are biologically diverse systems, representing some of the richest biological areas on Earth. They offer a variety of habitats for plants, animals and micro-organisms. However, forest biodiversity is increasingly threatened as a result of deforestation, fragmentation, climate change and other stressors. Biodiversity is the variation of life forms within a given ecosystem, biome, or on the entire Earth. Hypothesis of this paper is method of investigation in agro biodiversity for conservation biodiversity beside economic products. Biodiversity is often used as a measure of the health of biological systems. The biodiversity found on Earth today consists of many millions of distinct biological species. The year 2010 has been declared as the International Year of Biodiversity. Biodiversity is not distributed evenly on Earth, but is consistently rich in the tropics and in specific localized regions such as the Cape Floristic Province; it is less rich in Polar Regions where fewer species are found. Research on biodiversity has been investigated in the species diversity level. The objective of these researches was to study of every plant dispersion spatially woody plants and biodiversity of associated woody species in forests. In addition, type of woody species identified and is documented. Shannon-Wiener 's and Simpson's diversity indices are used for evaluating of woody species diversity; also, evenness and richness indices will be calculated. For detecting relationships between diversity indices with richness and evenness, correlation of Simpson s index with its evenness and etc must be analysed. D is Simpson's index and N_2 is N2 HILL that is applied for very abundant species. H is Shannon-Wiener's index and N_1 is McArthur is applied for abundant species. In order to provide a research we can apply every index of biodiversity and spatial pattern formulas to appraisal diversity in agroforestry and other methods such as agro sylvo pasture, aqua forestry and wood culture. In developing countries agroforestry compilation and match of culture in farming must be side conservation on biodiversity.

Key words: Agroforestry, Biodiversity, Forest

Introduction

Biodiversity is the variation of life forms within a given ecosystem, biome, or on the entire Earth. Biodiversity is often used as a measure of the health of biological systems. The biodiversity found on Earth today consists of many millions of distinct biological species. The year 2010 has been declared as the International Year of Biodiversity. Biodiversity is not distributed evenly on Earth, but is consistently rich in the tropics and in specific localized regions such as the Cape Floristic Province; it is less rich in Polar Regions where fewer species are found (Site Biodiversity, 2010).Research on biodiversity has been investigated in the species diversity level. The objective of these researches was to study of every tree dispersion and biodiversity of associated woody species in forests. In addition, type of woody species identified and is documented. Shannon-Wiener's and Simpson's diversity indices are used for evaluating of woody species diversity; also, evenness and richness indices will be calculated. For detecting relationships between diversity indices with richness and evenness, correlation of Simpson's index with its evenness and etc must be analysed. D is Simpson's index and N2 is N2 HILL that is applied for very abundant species. H is Shannon-Wiener's index and N1 is McArthur is applied for abundant species.

$$D = \sum_{i=1}^{s}\left[\frac{n_i(n_i-1)}{N(N-1)}\right] \qquad N_2 = \frac{1}{D} = \frac{1}{\sum_{i=1}^{s} P_i^2}$$

$$H' = -\sum_{i=1}^{s} P_i \log_2 P_i \qquad N_1 = 2^{H'}$$

For detecting richness we can use R_1 (Margalef) and R_2 (Menhinik). Richness or number of species are completion factor for appraisal biodiversity (Ravindranath et al, 1997).

$$R_1 = \frac{S-1}{Ln(N)} \qquad R2 = \frac{S}{\sqrt{N}}$$

Forests are biologically diverse systems, representing some of the richest biological areas on Earth. They offer a variety of habitats for plants, animals and micro-organisms. However, forest biodiversity is increasingly threatened as a result of deforestation, fragmentation, climate change and other stressors. In the last 8000 years about 45% of the Earth's original forest cover has disappeared, cleared mostly during the past century. The Food and Agriculture Organization of the United Nations (FAO) recently estimated that about 13 million hectares of the world's forests are lost due to deforestation each year. The annual net loss of forest area between 2000 and 2005 was 7.3 million hectares (equivalent to the net loss of 0.18 percent of the world's forests). 2010 year is world year of biodiversity (Site CBD, 2010). The aim of this paper is providing a model essay about study on the spatial pattern of biodiversity caused by implementing agroforestry methods that can use in every branch of biodiversity.

Rationale and literature review

Carbon dioxide is an important factor to global warming. Trees are the most important reservoir of carbon sequestration exclusive 50% of stand biomass. (Ravindranath et al, 1997). It's a paradox that's puzzled scientists for a half-century. Models clearly show that the coexistence of competing species depends on those species responding differently to the availability of resources. Then why do studies comparing competing tree species draw a blank? Competitors like black gums and red maples have coexisted for millennia in the shaded under stories of eastern U.S. forests, yet species-level data offer scant proof that they respond differently to environmental fluctuations that limit access to light, soil moisture and other essential resources. These are the very differences required for their long-term coexistence a paper in the journal *Science* offers new insights that may resolve the puzzle. "Species differences do exist, consistent with theory, but species-level data don't show them. We have to go to the individual level. Scientists working to address pressing ecological issues, such as the spread of invasive species, will benefit from this finding. Effect of spatial pattern changing in pattern of planting in agroforestry in biodiversity must be appraised. Species-level studies--the preferred approach in nearly all past research on forest tree diversity--rely on average responses of sample populations to infer information such as average growth, reproduction and survival rates for entire species over time. They're useful for many purposes, but because they assess species' responses in only the handful of environmental dimensions that can be measured, they miss most of the subtle ways in which species differ. The change in perspective yields new insights into a variety of pressing ecological issues. They have always wondered, for instance, how introduced species could invade existing communities where competition is already intense. "The assumption was: since existing species are competing for limited resources, it must be especially difficult for invaders come in, establish and compete successfully."But these results suggest that competitive exclusion doesn't work as well as we thought. Knowing that diversity is likely controlled by variations in many dimensions makes it easier to understand why invasions are so common and suggests new ways of thinking about why they are so successful (Science Daily, 2010). Painstaking, multi decade study of 33,000 individual trees may finally have uncovered the roots of biodiversity. That biodiversity's origin needs uncovering is surprising because the word seems to be everywhere. But scientists still don't quite understand why one place has more species than another, or fewer.

According to the tree study, that's because ecologists haven't looked for the right niches. They take this very complex, high-dimensional thing called the environment, and average out all the variation that organisms really require. "Biodiversity is very much a niche response, but it's just not evident at the species level. The central tenet of biodiversity science is that animals compete against their own kind, not against other species. So ecologists have developed a theory of niches: Every species has a particular specialty, a set of conditions for which it's best suited. Some plants do well in shade, others in rocky soil, and so on. This is true. However, it still doesn't seem to explain biodiversity. Some ecosystems that are very poor in resources, and consequently don't seem to have many niches, can still have a high species diversity. The scientist spent the last 18 years studying trees in the south-eastern United States and has assembled 22,000 detailed individual accounts, spanning 11 forests and three regions. For each tree, has recorded its precise, on-the-ground (and in-the- ground and above-the-ground) exposure to moisture and nutrients and light, its response, and its proximity to other plants. Ecologists usually aggregate this information, turning it into average. By going tree-by-tree, he found that there are, in fact, enough niches to go around. They're filled when competition in a species drives individuals to fill them. Biodiversity or, from another perspective, configurations of organisms that don't need to compete against each other is the result of this fierce race for resources. The niches could only be seen at a fine-grained level, not in the coarse analyses typically used by ecologists. They take environmental variation and project it down to a very small set of indices. Light becomes average light per year. Moisture becomes average moisture per year. It's not just light and water and nitrogen it's variations of each of those things, in different dimensions. The approach he's taken is marvellous. The approach will likely be extended beyond the world of trees. Understanding the essential dynamics of biodiversity could improve ecosystem management, in applications from conservation to farming. Ecologists spent a lot of time in the 20th century trying to find ways to reduce the complexity of natural systems so that he could understand them (Brandon, 2010). In the past, explanations for high species diversity have been sought at the species level. Theory shows that coexistence requires substantial differences between species, but species-level data rarely provide evidence for such differences. Using data from forests in the south-eastern United States scientist show here that variation evident at the individual level provides for coexistence of large numbers of competitors. Variation among individuals within populations allows species to differ in their distributions of responses to the environment, despite the fact that the populations to which they belong do not differ, on average. Results are consistent with theory predicting that coexistence depends on competition being stronger within than between species, shown here by analysis of individual-level responses to environmental fluctuation(Clark, 2010). The reintroduction of agroforestry networks (via a GIS-supported design procedure) is one of a number of strategies that some authorities of the lagoon of Venice drainage basin (in Italy) are planning to use in order to control lagoon pollution and to achieve landscape amelioration. While attention is paid to the conservation implications and environmental effects of an ecological network, socio-cultural impacts are not generally given the same consideration. The aims of this paper were 1- to assess the impacts of agroforestry network planning outputs on the perception of landscape in terms of scenic beauty (SB) estimation, 2- to analyze the influence of socio-economic variables on the agroforestry role in SB, 3- to analyze the relationships between SB and landscape variables as measured on the local and landscape scales, and 4- to assess the strength of an expert rating SB empirical procedure utilized in the GIS system. The outcomes of the GIS planning procedure application were found to have a positive impact on the perceptive evaluation of landscape, but landscape sites preference did not appear to be significantly different between socio-economic groups: in all cases, sites with an optimized agroforestry network were preferred to the same sites without. A strong explanatory relationship was found to exist between citizens' scenic beauty estimation (SBE) and the landscape metrics. The representative empirical procedure gave sound qualitative results in this kind of landscape, but can be efficiently substituted by the regression model tested at the "local" scale (Franco et al, 2002). Released by The Economics of Ecosystems and Biodiversity (TEEB) research consortium at the first Global Business of Biodiversity Symposium the business case for biodiversity and ecosystem services by illustrating the importance and immense value of natural services provided to, and affected by, a wide range of industries (Trade, Finance and Investment in Sustainable Development.2001). The report contains chapters on: business, biodiversity and ecosystem services; business impacts and dependence on biodiversity and ecosystem services; measuring and reporting biodiversity and ecosystem impacts and dependence; scaling down biodiversity and ecosystem risks to business; increasing biodiversity business opportunities; business, biodiversity and sustainable development; and biodiversity and business growth (UNEP, 2010). In order to mark the International Year of Biodiversity in 2010, this annual review focuses on the importance of biodiversity conservation in sustaining livelihoods and reducing poverty. It includes viewpoints on the importance of indigenous peoples in biodiversity conservation, protected areas, marine biodiversity, and invasive species and poverty. It also includes regional reviews and developments on funding for biodiversity through REDD +, as well as voluntary standards (World Bank, 2010). The high alpha-diversity of tropical forests has been amply documented, but beta-diversity--how species composition changes with distance--has seldom been studied. Scientist presents quantitative estimates of beta-diversity for tropical trees by comparing species composition of plots in lowland terra firmer forest in Panama, Ecuador, and Peru. They compare observations with predictions derived from a neutral model in which habitat is uniform and only dispersal and speciation influence species turnover. We find that beta-diversity is higher in Panama than in western Amazonia and that patterns in both areas are inconsistent with the neutral model. In Panama, habitat variation appears to increase species turnover relative to Amazonia, where unexpectedly low turnover over great distances suggests that population densities of some species are bounded by as yet unidentified processes. At intermediate scales in both regions, observations can be matched by theory, suggesting that dispersal limitation, with speciation, influences species turnover (Condit et al, 2010).

Research objectives

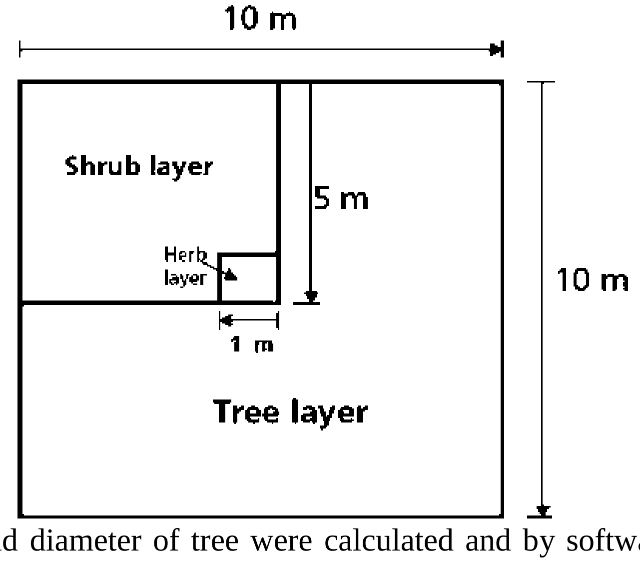
1. submit of modeling of methodology in agroforestry
2. comparison of different methods
3. spatial pattern of tree planting and role in diversity
4. Investigation on inter diversity in habitat (study area)
5. comparison between alpha and beta and gamma diversity

Hypothesis

1- Agro forestry is caused to change biodiversity
2- Enhancement of method of agroforestry is caused improvement of biodiversity
3- Shannon wiener indices is more important than Simpson index in case study
4- Significant difference is between geographic characteristics and diversity indices

Material and Method

With guidance of teachers and supervisor we can select the forest region in every forest for research subject. Sampling probability is selected by standard deviation and error percent and cost & etc. In each plot, initiated geographic characteristics (i.e., slope, aspect and elevation) were documented, then diameter at breast height of trees that had 10≤dbh class was measured and crop yields in agroforestry region. Also, type of woody species identified and documented. Shannon-Wiener׳s and Simpson׳s diversity indices were used for evaluating of woody species diversity, also, evenness and richness indices were calculated. Shape of inventory plots determined by empirical and experimental. Relation between indices will be analyzed. For example in each compartment network with 500*500 meters with 100 cubic meters quadrate. For regeneration and below storey Subsidiary plots 1*1 and 5*5 meter were situated. And these data is documented in spatial forms.



Volume and height and diameter of tree were calculated and by software same as SPSS and excel and other result and analyses were measured. Richness and evenness in agroforestry plan will be analyzed.

Schedule

1- study in library
2- COMPILATION and collection in resources and references
3- Sampling and inventory in area
4- Analyses of data in form sampling and appraisal of data
5- Providing of booklet of dissertation
6- Defense of thesis

Results and Suggestion

In order to provide a research we can apply every index of biodiversity and spatial pattern formulas to appraisal diversity in agroforestry and other methods such as agro sylvo pasture, aqua forestry and wood culture. In developing countries agroforestry compilation and match of culture in farming must be side conservation on biodiversity. The variety of life on Earth, its biological diversity is commonly referred to as biodiversity. The number of species of plants, animals, and micro organisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of a biologically diverse Earth. Appropriate conservation and sustainable development strategies attempt to recognize this as being integral to any approach. Almost all cultures have in some way or form recognized the importance that nature, and its biological diversity has had upon them and the need to maintain it. Yet, power, greed and politics have affected the precarious balance. It has long been feared that human activity is causing massive extinctions. Despite increased efforts at conservation, it has not been enough and biodiversity losses continue. The costs associated with deteriorating or vanishing ecosystems will be high. However, sustainable development and consumption would help avert ecological problems (Shah, A., 2010).

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How to cite this article: Hamid Ahani, Hamid Jalilvand, Providing an essay about: astudy on the spatial pattern of biodiversity caused by implementing agroforestry methods. *International Journal of Advanced Biological and Biomedical Research*, 6(3), 178-184.