Changes in species composition or diversity

Business, Management

Changes in Species Composition or Diversity Name: Course: Date: Changes in Species Composition or Diversity Species richness is part of the composition of species in a given habitat.

As part of studies in rangeland inventory and monitoring, species richness may be used to give definition to the presence of diversity of species of given animals or plants in a given habitat. Rangeland ecosystems are considered as composed of varied landscape features. Orientation and subsequent distribution and area of land can be used to determine the use and the management process of natural resources. Numerous ranches include areas such as uplands, lowlands and drainages. Areas such as dunes, ridges, cliffs, canyons and rock outcrops usually increase the diversity in a habitat and landscapes.

On the other hand, areas such as lowlands, drainages and basins usually have higher water tables or surface water. Such areas are usually lucrative for livestock production as well as for wildlife habitat because of the adequacy of water and vegetation. Additionally majority of managers in ranches usually focus on the health of the livestock as well as management of wildlife. However, they fail to ensure the evaluation of the resources such as the land and vegetation necessary for the rearing of livestock as well as for the wildlife (Loiselle, et al.

, 2003). Vegetation in rangelands is inadequate top provide sustenance to the healthy ecosystems if issues such as the biological requirements for plants are overlooked. Plants are considered as primary producers in that they engage in the direct conversion of solar energy into usable chemical

energy through the photosynthesis processes. Tracking of the health of livestock is paramount in livestock management practices. However, this is inadequate to tell of the health of rangelands.

Deterioration of the ecological and the hydrological conditions of rangelands usually provides minimal information as to the decline in animal performance in a rangeland. This is because animals can engage in compensation of the deterioration of the ecological and biological conditions through the consumption of low preference plant species. Additionally higher levels of precipitation can provide an illusion as to the hydrological conditions of land and its surfaces. Hence, before the decline in animal performance in a given rangeland, the decline in land output could take place leading to a scenario whereby the recovery of land performance could take ample time such as several years. Consecutive years of precipitation and grazing activities usually provide the necessary platform for the cause and effect evaluations. This is essential in that it provides the needed information for the evaluation of pasture and its use sequence thus enabling formulation of grazing rotation plans. Rangeland monitoring activities usually require primary data for effective management.

Such primary data is the maintained records of the grazing and precipitation data for all pasture in a given rangeland. Additionally other data such as the presence of species and assessment of the hydrological conditions of a rangeland should be conducted on an annual basis to ensure that the achievement of results of the evaluation of the productivity of a rangeland. The monitoring and subsequent evaluation of rangelands is a continuous

process, which should be actualized on a random basis through repeated observations of fixed locations for a period of more than two years.

Various methods are necessary for use by ranchers in the evaluation of the rangeland health and the relative carrying capacity for livestock or wildlife. Such methods include the development of mental images of rangeland health are appropriate in the scouting activities of the fields in cases of checking the livestock, barriers and water in the rangeland (Mathias, et al., 2004).

Continued evaluation may take place using quadrats permanent, transects and photos which are individually applicable for various scenarios in a ranch. Such includes the change in use of management approaches in a single or several pastures. This is also driven by the need to record the responses as well as the presence of appropriate time and skills or labor for conduct of the evaluation using a specific method. Another scenario may be the lease of land from the government or a related entity as well as from a conservationist proprietor who requires constant monitoring of the land. Another scenario might be presence of a contractual agreement for cost sharing conservation efforts, which necessitates the need for monitoring of the rangeland.

It is also provided that is paramount to ensure the presence of a sunset clause, which should be in any privately designed plans for monitoring. Such might be based on the presence of accomplishments of the management objectives in terms of rangeland management. Dry conditions usually necessitate the need for constant evaluation because of the need to have

adequate data given the presence of previous healthy baseline data. Changes in species composition or diversity are affected by incidences of secondary successions. However, their relationships are usually marred by the presence of uncertainties. Such uncertainties have led to the development of concerns among managers in ranches as well as those charged with the responsibility of ensuring the presence of diversity in ecosystems. The measurement of diversity and species composition is applied to the attributes of ecosystems such as in processes structures or in the species. The diversity of species and composition of the same is usually viewed from there specific scales namely; the landscape for gamma diversity, between-stand level also known as bet diversity, and the last which is the within-stand or the habitat level (alpha diversity).

Hence, diversity varies form the three spatial groupings provided. Ecologists provide that diversity usually increase due to succession. Others also provide a reduction in diversity because of succession. The difference between diversity and succession usually depends on the presence of numerous variables. Such variables may include a given community, geographical location, and incidences of disturbance and succession. Hence, it is paramount to study the patterns of diversity in the process of succession, which should be conducted in the various habitats as well as under various levels of disturbance.

The removal of plant species in the rangeland ecosystems and habitats may result in the decrease in the diversity of plant species. This may be on a large scale such as local or regional scale, which could adversely affect rare

and endangered species. Changes either expected or unexpected in the composition of species can affect various elements such as the quality of forage, functions of the ecosystem and the biological diversity. However, the documentation of species change in composition is difficult because of the absence of accurate historical data on species' composition. The changes in the composition of species and increase or decrease of diversity in rangelands are attributable to various factors. Such factors include activities such as livestock grazing, competition amongst and with invasive species, conversions from one vegetation type to another and the movement of propagules from one location to another by human and livestock activities (Phillips, Anderson, & Schapire, 2006). Changes in the rangelands in terms of composition of species are an illustration of the changes in the global environment and the subsequent loss of biological diversity, functions in the ecosystems, and the reductions in the productivity of rangelands.

Invasive species have a significant effect on the ecosystem in that they differ in functionality, which has the potency to result in significant effects on the ecosystem. For instance, annual grasses and exotic grasses have different traits and adaptability to climatic changes. Exotic grasses are usually invasive hence actualization rapid changes in composition of species in a given rangeland. On the other hand, annul grasses are accustomed to heavy grazing and the presence of inadequate nutrients. This has a subsequent effect on the conduct of livestock grazing and the vitality of open grazing in rangelands. Deterioration of range conditions has an effect on the livestock in that livestock opt for less palatable species of plants thus increasing the consumption of the less palatable species of plants. Hence, this has an effect

on the output of the livestock in terms of the economic value added by the livestock.

Hence, the presence of invasive plant species has an effect on the native species in that this results in the limitation of regeneration of the native species. Hence, due to inadequacy or unavailability of historical data on composition of species this has led to few studies on the long-term changes in composition of species in rangelands (Phillips, Anderson, & Schapire, 2006). Rangeland assessment is paramount to establish the productivity of such ecosystems as well as forecast possible changes in the ecosystem. The available models or methods of rangeland assessment are relative to the historical use of rangelands.

The 19th century was marked by changes in terms of new use and exploration of the rangelands in the United States. Hence, due to increased use in rangelands there is dire need for methods of evaluation to gain the data as to the level of deterioration and capacity for use of the rangelands. Over the years, the use of rangelands has changed leading to subsequent changes in the physical and biotic environments. A good model, which is able to assess the health a given rangeland, should be able to provide distinction between the long-term and short-term changes that are as a result of the fluctuations in both biotic and physical factors or conditions in an ecosystem within a rangeland. Changes such as threshold shifts, which are essentially permanent, do not translate in the limitation of the capacity of a rangeland to remain productive and provide satisfaction. Rangeland degradation is a complex matter in that it entails the presence interactions

of various factors such as physical, chemical and biological in the soils to result in overall changes in the rangelands.

Literature also provides that the evaluation of the health of a given rangeland is usually based on the presence of mere judgment rather than actual figures from measurements. This is because the health of a rangeland is similar to range conditions (SCS) and ecological status (USFS and BLM). Range health is not a physical condition, which can be provided, in a given metric of measurement. However, actual measurement can be provided using indicators for meaningful insights into the measures. Rangeland inventories are provided for the various reasons such as due to scientific curiosity, economic needs, and legal obligations (Phillips, Anderson, & Schapire, 2006). Species richness method provides the number of varied species within a set of a population sample. This is essentially considered a count of richness of the species within a given ecosystem. This metric does not put into consideration the levels of abundances of the species and their relative abundance distributions.

This is in contrast to the definition of species diversity, which provides for the consideration of the richness of species as well as the evenness of species in an ecosystem. This method provides and appropriate means of measurement of the composition as well as the diversity of species availed in a given rangeland or ecosystem. It has various assumptions for execution to arrive at the needed data (Phillips, Anderson, & Schapire, 2006).

Sampling considerations are based on ensuring the presence of equality in terms of collection of data and providing all species with an equal

opportunity for evaluation. Selection of a sample can take form in various ways. Various methods can be used in the collection of data such as the use of pitfalls, monitoring plots, and inventory plots. In addition, the identification of the set of individuals is paramount for the actual quantification of the species' richness. This is possible if the species-level taxonomy is provided for all the organisms in the sample size. The use of varied delimitations for species usually leads the accrual of varied levels of species' richness values in a similar set of individuals or sample size. Large areas of evaluation of the richness of the availed species may result in varied data.

Application of similar sampling approaches may lead to the evaluation of different sets of data. Hence, this usually leads to varied data of the richness of the species because of the use of different approaches of sampling. The introduction of a new individual into a sample size usually increases the species richness of the sample set available. Hence, higher numbers of individuals in a sample set is an indication of a high level of species richness. Appropriate standardization of data in the efforts of sampling is essential for comparison of data in an underlying habitat or a larger unit.

To achieve standardization in the samples, re-sampling techniques can be used (Pearce, & Ferrier, 2000). Specific trends are derived from sampling the data. Species richness is affected by the various elements such as the population size or number of individuals as well as the heterogeneity of the sample size. Individuals drawn from diverse environmental conditions and habitats usually provide a higher rate or species richness in comparison to the sample collected from similar conditions or a specific locality.

This can be illustrated in a species accumulation curve, which can be constructed in several ways. An increase in the possible area of sampling has the possibility to result in the increased richness because larger areas have higher levels of heterogeneity in comparison to smaller sampling areas (Hurlbert, & White, 2005). Numerous organisms usually have higher numbers of their respective species in the tropics, which has the potency to lead to the presence of latitudinal slopes in species richness. Hence, this has resulted in a discussion as to the role of and relationship between species richness and levels of productivity.

This method is used as a criterion for the assessment of the relative values of conservation in habitats or landscapes. However, an area with a high level of species richness comprising of rare and endangered species is considered of higher conservation value in comparison to an area, which has a similar level of species richness but is comprised of common species. Species richness patterns are also influenced by the sources of data. The representation of data on species richness could be provided using some methods identified as point-to-grid which is essentially the mapping out of the species distribution records; an overlay of expert drawn range maps; overlay of modeled species ranges; and hybrid approach, which is a combination of some specific aspects of the three initial models (Graham, & Hijmans 2006). The four models identified usually result in the development of varied species richness maps.

Hence, this brings about the need to evaluate the choice of approach used to develop the maps. Species richness maps usually record a higher correlating

value at the lower spatial resolutions. However, correlation usually masks the conclusions, which might be derived form the maps developed. Hence, each type of method used fort the developed of the maps usually results in different values. Hence, research such as macro-ecological analysis, which relies on data, developed from species richness maps could be improved through the constant improvements on knowledge related to species distributions and the need to consider the possibilities of uncertainties in the pattern in analysis.

Different environmental conditions and factors were highly correlated with richness maps based on the bird survey data instead of those based on the expert-drawn ranges. Additionally, distribution models usually predict higher range sizes irrespective of the method used. This results in higher corresponding values of the species richness, which is a possible indicator of the over-estimation of the range of a given size of an identified species. Such errors could arise due to commission as the models used are based on climatic factors and do not provide for the consideration of the interactions of the various species as well as the presence of limited dispersal ability. Expert drawn range maps usually indicate the species habitat relationships to represent the maximum geographical extent to which the species are predicted to occur given the presence of good conditions in the given habitat. They focus on known species and their distributions.

In addition, they also include historical data related to extinct populations of species, which is used to provide for possible repopulation of such species without the presence of any form of human intervention (Hijmans, &

Spooner, 2001). Species distribution models used in the provision of the species richness data is a combination of the information from the point occurrence data and the incorporation of the various environmental variables for the prediction of the geographical distribution of species. This is provided with the inclusion of the environmental variables, which are mainly based on the weather or climatic conditions of a given habitat. This is because it determines the productivity of a rangeland or a given habitat. A hybrid approach is applicable in the evaluating of species richness in a given rangeland and habitat.

This is usually marked by the inclusion of elements such as occurrence points, the modeled ranges and the expert drawn range maps. The spatial resolution of the species richness maps is developed through the combination and absence maps for the identified individual species within a given habitat or in the rangelands (Guisan, & Thuiller, 2005). The four methods highlighted usually result in diverse results which is an indication of the necessity for consideration of the type of map used to highlight the species richness in a given habitat. Richness maps usually indicate a lower level of spatial resolution in the presence of high levels of correlation between species. Richness models based on the modeled ranges in comparison to such based on expert drawn range maps has potency to emanate from the presence of biases accrued from the point of occurrence date which is used in the distribution models. Under sampling of data has potency to result in the influence on the distribution models.

This is possible if the there are inexistent records of the occurrence in an area which has a different environment in comparison to the environment with records. Hence, this results in the prediction and interpretation of the identified environment as unsuitable for habitation by a species. Additionally species that use the environmentally restricted areas usually result in the modeled ranges, which have a higher level of accuracy in comparison to the expert draw ranges maps. Expert-drawn maps usually provide for current data on species availed in a given habitat.

The use of a map usually determines the type of map to be used to present the data on the species richness. Hence, the use could be representation of a current situation in terms of species richness in a rangeland or habitat, the representation of the possible future situation in terms of species richness or representation of past data (Graham, et al., 2004a). Conclusively the need or use of a given map in the representation of species richness is determined by the purpose or intended use of the data. Rangeland inventories are also used for the evaluation of the productivity of the rangelands. Additionally this is actualized with the use of the availed information about the environmental conditions such ads climate and weather data to provide relative information with the inclusion of risks and uncertainties. Additionally, the presence of uncertainties is used as a means of indicating the probability towards achievement of the desired results. Measurement of the productivity of rangelands as well as other habitats is an indication of the need for good management practices.

Such provides the managers with the needed information as to the approaches to be used in the management of livestock and wildlife in the rangelands. Reference Graham, C. H. & Hijmans R. J.

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