



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

Biodiversity indicators: A policy making tool for Sustainable forest management.

Anil Kumar Dular

Assistant Professor, Department of Environmental Science, Maharaja Ganga Singh University, NH 15 Jasailmer Road, Bikaner 334004 Rajasthan, India.

Manuscript Info

Manuscript History:

Received: 15 August 2014
Final Accepted: 16 September 2014
Published Online: October 2014

Key words:

Biodiversity Indicators,
Conservation, Sustainable forest
management.

*Corresponding Author

Anil Kumar Dular

Abstract

The present article emphasize that biodiversity indicators are key statistical series which are used to help policy makers and resource managers to assess condition, trends and achievement of conservation goals. Biodiversity indicators evaluate and ascertain whether existing policies are having desired effect on biodiversity and to help justify where problems exist in current forest management policy framework. In present article we have used twenty one indicators to assess biodiversity status, trend and forest management practices and methodologies which are suitable for the action plan and determine the priorities for sustainable management of the forest

Copy Right, IJAR, 2014,. All rights reserved

Introduction

Forest is the planet's largest and important terrestrial ecosystem. They have profound influence on the structure and functions of human habitat locally and globally. They constitute the largest reservoir of biodiversity on the land and sustain world's diversity of life embodying stupendous genetic wealth over evolutionary time. Sustainable forest management is forestry component of sustainable development which is economically viable, environmentally benign and socially beneficial and which balances present and future needs. The present study reveals that how the biodiversity indicators attributes the conservation of biodiversity in forest ecosystem from species to genetic level that maintain the life supporting system and ecological benefits obtained from forest ecosystem.

These indicators help not only to understand community structure but also the diversity in forest ecosystem to meet human needs, support species and genetic diversity and enable the system to adapt to changing conditions.

Principles and Practice Methods:

Forest ecosystem has major and minor communities which can considered qualitatively and quantitatively by using characters like density, frequency abundance, dominance, importance value index, species diversity and comparison of two communities or stands. These characters are determined by quadrat methods, transect method, Simpson(1949) index of dominance, Raunkiaer(1934) species area curve method, Kulczynski (1937)community coefficient, Odum, Cantlon and Kornicker(1960), Margalef(1958), Menhinick(1964), Shannon and Weaver(1949) and Pielou(1966) species diversity index or Sorenson(1948) similarity index. Biodiversity indicators are statistical series Noss (1990) which are of enormous value at the level of management of diversity at communities and species level. These indicators are used by decision makers and conservationists in the pursuit of goals of sustainable management of forests.

When these indicators are used judiciously amalgamation with working plan and management plan of forest will leads to desirable results in the field of conservation practices and sustaining the essence of ecosystem with their structure, function and diversity.

1. Species richness to assess number of species per unit area or per unit habitat so this indicator emphasize on specific type of habitats which helps in categorization of forest ecosystem.
2. Species threatened with extinction (number and percent).
3. Species threatened with extirpation (number and percent)
4. Species with endemism or endemic species (number and percent)
5. Endemic species threatened with extinction (number or percent). It indicates that how the communities or ecosystems are distinct to each other biologically. Myers (1990) used it to analysis the potential biodiversity in the hotspots.
6. Species risk index. The index is calculated by multiplying the number of endemic species per unit area in a community by the percentage of the natural community that has been lost especially in biogeographic units (Corner and McCoy, 1979 and Simberloff, 1986) expressed as $S = CA^Z$.
7. Species with stable or increasing populations (number and percent). It helps to indicate the change takes place due to conservation efforts.
8. Species with decreasing populations (number and percent). It helps in better monitoring of conservation efforts and reviews the existing policies.
9. Species threatened in protected area (number and percent. It helps to derive the importance of keystone species.
10. Species endemic in protected areas. It helps to derive the indigenous species and stability of habitat.
11. Species threatened have required maintaining exsitu..It helps to determine the nature of species which are on the verge of extinction.
12. Species threatened with their viable population through exsitu method. It is base line indicator involves class linkage of exsitu and insitu for the potential conservation in protected areas.
13. Species used by local residents. It emphasizes the dependence of local community on biodiversity to ensure benefits derived from forest remains sustainable without impairing the resource base.
14. Forest inventory and biodiversity survey. It helps to define quantitative and qualitative assessment of growing stock in forest and also identifying and enumerating biodiversity components. This indicator helps in preparing database by using indigenous knowledge system and biodiversity action plan and strategies and bioactive principles.
15. Sampling methodology for forest ecosystem. The inventory design for the forest based on sampling technique includes the stratification, random distribution of sampling units and the estimation of the required number of sampling units to yield the desired estimate within the accepted limits of accuracy. These sampling units of inventory are usually random and non random sampling with their intensity, size (Roy, P.N.1993) $N=tcv/(AE\%)$.
16. Categorization of wildlife habitat as per provision of IUCN, 1990 from category I to VI. It determines the habitat or niche on basis of soil, temperature, elevation, slope, radiation and rainfall. This indicator also identifies the edges, magic sites and riparian zone which are the succession stage of various communities with respect to richness and degree of interspersions of wildlife. It also identify the amiable factor like microclimatic conditions and inimical factors like presence of roads, harvesting operation and other anthropogenic encroachment with reconnaissance report of wildlife compartment wise.

17. Forest and biodiversity mapping. Sustainable management of forest resources necessitates formulation of sound management plan for this purpose maps are the sine qua non of sustainable management of biodiversity. in vogue they are stock map, soil map, geology map ,indicative map, thematic, topographic and other maps.

18. Geographical information system their use in assessment and protection of forest. Geographic information system used in store analysis of spatial and non spatial data(Parker 1988) which helps to ascertain felling trees, growth of stock, degraded areas, types of forest, their density composition and age of plantation or wild life habitat zone. This indicator gives idea about vicinity maps of bioproductivity and also identifies areas beset with incidence of biotic pressures, illegal activities with disturbances.

19. Management and working plan of forest with participatory appraisal of forest resources. This indicator tends for baseline information a about forest and their included diversity of flora and fauna. It gives overview of present status, position, area register, compartment and blocks, biotic pressures, concession and privileges of the forest ecosystem. This working plan provides ground condition to reconnaissance survey of forest with statistics of growth, yield, extension activities and evaluation techniques to maintain and manage forest ecosystem. the participatory appraisal of forest resources is way of learning from local community who live in proximity by which conservation and management practices learn and analyses, assess and evaluate use of forest resources and take appropriate decision with regard to management of resources in the context of knowledge/experiences gained over ages(Chambers, 1994).(PAFR) participatory appraisal of forest resources focuses on local natural resources from the viewpoint of local community and highlights the critical relationship of local community with their forest resources.

20. Microplanning for biodiversity conservation in forest areas. This indicator emphasize on practices like joint forest management or by demarcation of forest area, study existing vegetation and fauna of the area, treatment map for the area and divided it into equi-productive areas and listing out the various operation activities. It is site specific package of measures with the promoting sustainable use of forest biodiversity (Panwar, 1992).

21. Techniques for optimizing forest land use. This indicator helps to develop inventory of forest soil resource in context to forest division because effective use of available soil resource shall improve bioproductivity, so scientific appraisal of soils able to prepare perspective land use plan for an area in order to optimize land use for sustainable forest management.

Conclusion.

The above discussed indicators are used for forecasting and projecting trends of biodiversity in the context of given level of forest management. They also important to determine priorities of action and clarify where problem exist in current policy framework, besides this it also helps to develop a base line ecological data for monitoring and evaluation of forest management activities to achieve the goal of sustainable development and the indicators itself act as policy making tool for sustainable forest management.

References:

Noss, R. F. 1990. Indicators for monitoring Biodiversity: A hieararchial approach. Conservation Biology vol.4 355-356.

Myers, N. 1990. The Biodiversity Challenge: Expanded Hotspots analysis. The Environmentalists, vol,10.

Corner, E.F and E.D. McCoy, 1979. The statistics and biology of species- Area relationship. American Nationalists. Vol.13.791-833.

Simberloff, D. 1986. Are we in the verge of the mass extinction ed. Elliot, pp 165-180, New York: John Wiley and Sons.

Roy, P.N. 1993 A study on the optimum size of plots for forest inventory. Indian forester. 1993.

IUCN 1990. Conserving the Worlds Biodiversity. IUCN/WRI/WWF-US/World Bank.

Parker, H.D. 1988. The Unique qualities of geographical information system 54ii:1547-49, part 1 Empire Forestry Association, London.

Chambers, R. 1994. Participatory rural Appraisal Anaysis of experiences. World Developmentvol. 22 No 9,PP 1253-1268.

Panwar, H.S1992. Ecodevelopment; An integrated approach to sustainable development for people and protected areas in India. Paper presented in the iv world congress on National Parks and Protected Areas, Carcus, Venezuela.