BIODIVERSITY INFORMATICS: ENABLE US TO UNLOCK THE WEALTH OF BIODIVERSITY INFORMATION BY USING INOFORMATION TECHNOLOGY TOOLS & WEB-BASED TECHNOLOGY

Section A -Research paper

BIODIVERSITY INFORMATICS: ENABLE US TO UNLOCK THE WEALTH OF BIODIVERSITY INFORMATION BY USING INOFORMATION TECHNOLOGY TOOLS & WEB-BASED TECHNOLOGY

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ABSTRACT

Biodiversity Informatics is to provide a sound information planning and management infrastructure. Computer assisted monitoring of vegetation using satellite and geospatial data is the new vegetation monitoring methodology by using remote sensing and GIS to make rapid progress. This information is diverse and includes biological specimens, journal articles, videos, numeric data, GPS, GIS, satellite images, and audio files. The term Biodiversity Informatics was coined for utilization of the application of IT tools and technology. The wealth of digital data permits the development of new sources by using spatial information for better management by systematically acquiring, integrating, analyzing and applying digital information to support sustainable forests. In this present research it was opportunity to apply this technology to develop an information infrastructure that will enable us to unlock the wealth of biodiversity information that exists around the world today.

Keywords: Web Technology, GIS, Bio-information, Satellite images, Biodiversity-Informatics

INTRODUCTION

We have opportunities to apply this technology to develop an information infrastructure that will enable us to unlock the wealth of biodiversity information that exists around the world. We can, however, make rapid progress if the computer and information science and technology research community becomes focused on the challenges posed by the biodiversity research community. The computer and information science and technology were utilized during this research. GIS uses geographical information, such as elevation, water table and location even roads and vegetation-spot potential of geospatial data. Satellite images and digital aerial

Eur. Chem. Bull. **2022**,11(Issue 03),55-63

55

photography was used for visualization of geospatial data by using web technology. Satellite maps along with other features provided information for better planning and implementation and utilization of these resources in a sustainable manner. In this present research work digital images of taxonomically important data and features likewise time, date, and location of image collection was collected and studied. Biodiversity Informatics is to provide a sound information management infrastructure for biodiversity and Global Change research. The main objective of this research paper was mapping and monitoring forest and tree cover of the Melghat vegetation In this present research work the wealth of digital data permits the development of new approaches to using spatial information and potentially important data for better management monitoring & conservation of forest tree vegetation.

REVIEW OF LITERATURE

Clark *et al.,* (1998) adopted digital terrestrial photogrammetric methods for tree stem analysis of Boise, Idaho, USA,. A digital camera was used to measure diameter at various heights along with the stem on 20 red oak trees. Diameter at the breast height ranged from 16 to over 60cm, and height to a 10-cm top ranged from 12 to 20m. Varying stem heights, damage incurred during felling, and human error accounted for unequal sample sizes within the various strata. Rawat *et al.,* (2008) have shed light on monitoring and mapping India's forest and tree cover through Remote Sensing. Forests are ecological as well as socio-economic resource. These have to be managed judiciously not only for environmental protection and other services but also for various products and industrial raw materials. This requires periodic monitoring of the forest cover of the country for effective planning and sustainable development. The efforts of Hock *et al.,* (2003) a 'digital forest' had been developed by the Sustainable Forest Management project at Forest Research for Research purposes, in collaboration with Carter Holt Harvey Forests. A GIS database of environmental and management data for 40,000 hectare segment of Kinleith Forest, New Zealand, had been built up. Base data from a number of sources were included. Torres *et al.,* (2007) introduced a digital library framework for biodiversity information systems. Biodiversity Information System (BIS) involves all kinds of heterogeneous data, which include ecological and geographical features. Clark *et al.,* (1998) adopted digital terrestrial photogrammetric methods for tree stem analysis of Boise, Idaho, USA,. A digital camera was used to measure diameter at various heights along with the stem on 20 red oak trees. The

BIODIVERSITY INFORMATICS: ENABLE US TO UNLOCK THE WEALTH OF BIODIVERSITY INFORMATION BY USING INOFORMATION TECHNOLOGY TOOLS & WEB-BASED TECHNOLOGY

Section A -Research paper

conclusion of this study revealed that camera station distance should roughly be equal to the uppermost sample height to be measured using the averaging method set forth in this study.

MATERIALS & METHODS

Plants were described according to Bentham and Hooker system of classification by identification of the plants to the level of species, genus, and family was done with help of publish floras. In the present study especially the tree species were selected because the trees were economically and medicinally important and they show lot of diversity among them. The morphological study was carried out Different sizes of the trees i.e. small, middle and large were also recorded. The whole information was carried over further to computational study. The web browser i.e. Internet explorer software was used. Actual topographic locations of vegetation-spot potential from the satellite photographic images were studied. Photo images were seen as specimens; these hyperlinks were prepared. Database software was the best alternative to the conventional methods for handling huge/large amount of data or information in user friendly manner with sufficient security system. Terminology database was created in MS-Access software. The digital information was processed to prepare a Digital Virtual Herbarium and Digital Bark Library.

OBSERVATIONS & RESULTS

Eur. Chem. Bull. **2022**,*11(Issue 03),55-63*

57

Fig: 1. Forest Cover Maps

This forest was of dry mixed deciduous type hence there was always fear of forest firing in summer. The number of trees showed leaf fall during summer season and many of them had timber value. It was observed that the Teak (*Tectona grandis* Linn.) was the predominant species of the forest area. Present study was based on data recording, field survey and collection of specimens. It was seen that at ground level, tree density was quite good, while tree population was sparse with low vegetation growth at upper middle area of the hills where the vegetation was exposed directly to the sunlight. Distribution of the trees species and their diversity appeared to be strongly related to environmental factors. Study of trees species was completed by collecting all the required information available with respect to morphodiversity, e.g. specimen sample collection, photographs, description, illustrations, height and girth data and bark features.
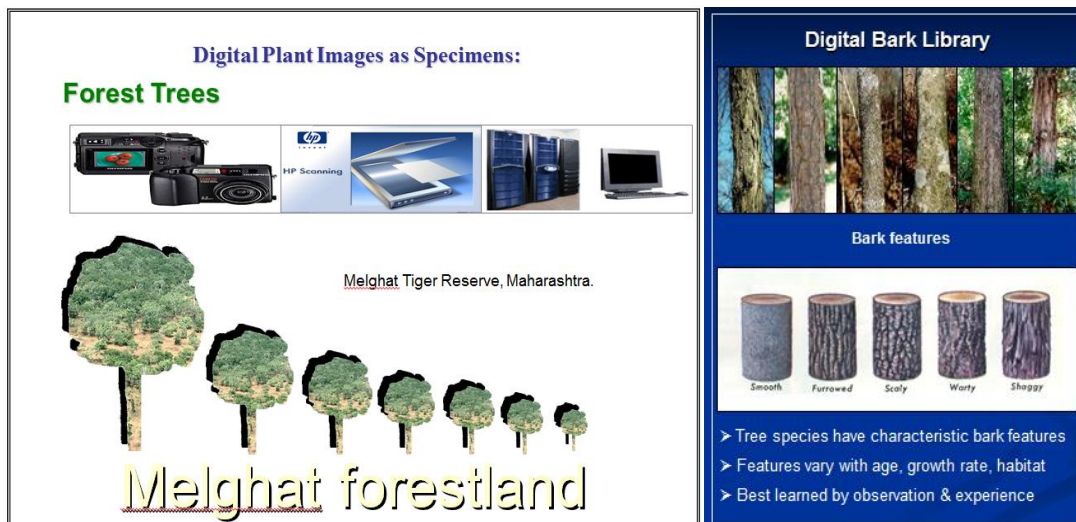
Fig: 2. Digital Bark Library

The current research study deals with the survey and distribution of trees species. Samples collections, photographs, plant descriptions, illustrations, and bark morphology was studied. Present study was based on data recording, field survey and collection of specimens. It was seen that at ground level, tree density was quite good, while tree population was sparse with low vegetation growth at upper middle area of the hills where the vegetation was exposed directly to the sunlight. Distribution of the trees species and their diversity appeared to be strongly related to environmental factors.

Study was done on trees species was completed by collecting all the required information available with respect to morphodiversity, e.g. specimen sample collection, photographs, description, illustrations, height and girth data and bark features rtc.. Based on this survey and study it was possible to derive the specific requirement to define the species in the software form with its necessary information. List of tree species was generated with its local and scientific names and their taxonomical identification to make data ready for computation study. Ethnobotanical survey of the medicinal plants was conducted to collect the information regarding medicinally important plant species and its use on various human health problems such as bone fracture, acidity, injury, worm control, body power, blood impurity, antidote to snake poison, cough, dysentery, skin and fever. The 'Digital Bark Library' and Digital Herbarium was prepared with the help of computer software for further study.
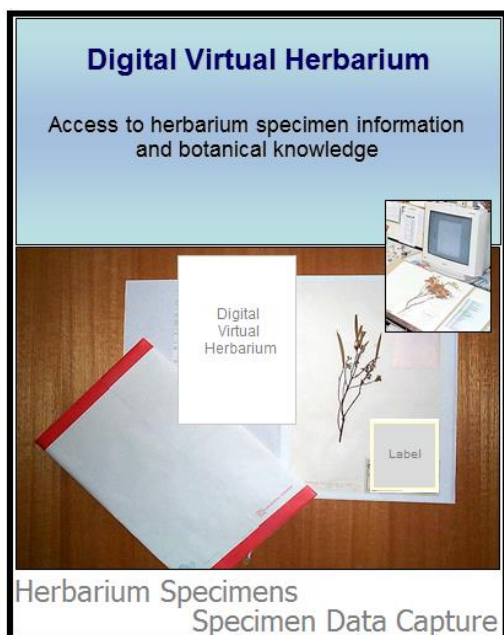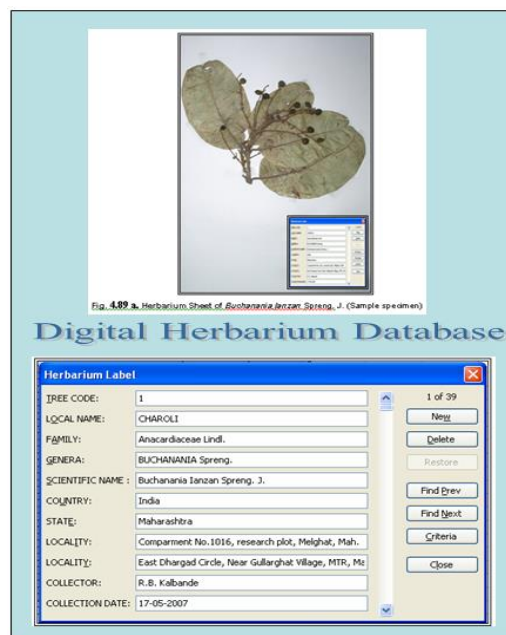
Fig: 3. Virtual Herbarium   **Fig: 4. Digital Herbarium**

CONCLUSIONS

The reasons were constant invading of the forest area by tribal inhabitants for their livelihood and secondly uncontrolled grazing of the cattle's nearby cultivated fields. Hence the forest was under great biotic pressure; it was important that management authorities should handle this issue as a priority work. The vegetation site was consisting mostly of middle and small sized trees, due to the hot dry climatic conditions.

DISCUSSIONS

The database has proved to facilitate research efficiency and capability. The wealth of digital data permitted the development of new approaches in using spatial information for forest management. In view of Sambandan and Chowdhery (2004) herbarium database was a computational method, where the information about the herbarium specimens were digitized in such a way that it was easily accessible with the help of Internet and World wide Web (WWW) throughout the world. The modern databases included actual herbarium specimens as digital images with all accompanying information available on the herbarium sheet label. It was the contention of Shanmughavel (2007) that the massive development of biodiversity related information system over the WWW (World Wide Web) created much excitement in recent years. Taxonomist created the nomenclature and classification databases. Databases can also contained

BIODIVERSITY INFORMATICS: ENABLE US TO UNLOCK THE WEALTH OF BIODIVERSITY INFORMATION BY USING INOFORMATION TECHNOLOGY TOOLS & WEB-BASED TECHNOLOGY

Section A -Research paper

all kinds of information about organisms, including their characteristics, economic importance, conservation and management. Earlier Clark *et al.,* (1998) used image processing software for image measurements. The images were sequentially numbered by the camera in the order they were captured. A digital camera was used to measure diameter at various heights along the stem on 20 red oak trees. Here, herbarium specimens were available in our Digital Virtual Herbarium by using MS-Access database software.

The current research study with the survey of the area of the Melghat. The distribution of trees species was carried out during study period. Melghat forest which was under strong forest cover; however dense patches of vegetation predominately occurred throughout the forest; trees showed heavy leaf fall during summer season and exhibits dry deciduous forest conditions. The distribution of the trees species and their diversity appeared to be strongly related with environmental factors. Patel (1968) wrote "Forest Flora of Melghat;" the forests of Melghat are mostly of the dry mixed deciduous type wherein the Teak (*Tectona grandis* Linn.) was the predominant species. The vegetation varied considerably with the change in altitude, aspect and rain fall. Earlier Dhore and Joshi (1988) wrote "The Flora of Melghat Tiger Reserve". The forest of Melghat as they experienced, was of dry deciduous type, where teak was the dominant tree species widely spread throughout the forest. Pant (2003) has carried out ecological analysis of the Satpura conservation area landscape through stratified field sampling and Remotely Sensed data.

BIBLIOGRAPHY

Baskauf SJ, Kirchoff BK. 2008. Digital Plants Images as Specimens: Towards Standards for Photographing Living Plants. Vulpia 7: pp.16-30.

Clark NA, Wynne RH, Schmoldt DL, Winn M. 1998. Digital Terrestrial Photogrammetric Methods for Tree Stem Analysis. Integrated Tools Proceedings 16-20.

Clark NA, Wynne RH, Schmoldt DL, Winn M. 1998. Digital Terrestrial Photogrammetric Methods for Tree Stem Analysis. Integrated Tools Proceedings 16-20.

Dhore MA, Joshi PA. 1988. Flora of Melghat Tiger Reserve. Directorate, Project Tiger Melghat, Paratwada – 444805, Maharashtra (India) 1-248.

Eur. Chem. Bull. **2022,**11(Issue 03),55-63

61

BIODIVERSITY INFORMATICS: ENABLE US TO UNLOCK THE WEALTH OF BIODIVERSITY INFORMATION BY USING INOFORMATION TECHNOLOGY TOOLS & WEB-BASED TECHNOLOGY

Section A -Research paper

Dhore MA, Joshi PA. 1988. Flora of Melghat Tiger Reserve. Directorate, Project Tiger Melghat, Paratwada – 444805, Maharashtra (India) 1-248.

Hock B, Payn T, Stevens P, Dunningham A. 2003. A Digital Plantation Forest for Research and the Demonstration of Spatial Modeling. The 15th Annual Colloquium of the Spatial Information Research Centre University of Otago, Dunedin, New Zeyland.

Hock B, Payn T, Stevens P, Dunningham A. 2003. A Digital Plantation Forest for Research and the Demonstration of Spatial Modeling. The 15th Annual Colloquium of the Spatial Information Research Centre University of Otago, Dunedin, New Zeyland.

Lertlum S, Murai S. 1995. Computer Assisted Monitoring of Vegetation Using Multi-Resolution Satellite and Geospatial Data. From http://www.aars-acrs.org.acrs/proccedings.ACRS1995/Papers/PS295-1.htm

Meyera P, Staenzb K, Ittena KI. 1996. Semi-automated procedures for Tree Species Identification in high Spatial Resolution data from Digitized Colour Infrared-Aerial Photography. Published by Elsevier Science B.V. 51 5-16.

Musavi A, Mathur PK, Qureishi Q, Sawarkar VB. 2006. Mapping of Biotic Pressure and its Impact on Prey Densities in Melghat Tiger Reserve, Maharashtra. International Journal of Ecology and Environmental Sciences 32(4): 327-343.

Pant A. 2003. Ecological Analysis of the Satpura Conservation Area Landscape through Stratified Field Sampling and Remotely Sensed Data. Map India Conference on Forestry & Biodiversity from http://GISdevelopement.net

Patel RI. 1968. Forest Flora of Melghat. International Book Distributors 1-380.

Prakasha HM, Nanda A, Krishnamurthy YL. 2007. Tree Species Composition, Diversity and Dominance along Disturbance Gradient in Tropical Dry deciduous forest of Bhadra Sanctuary. Indian J. Ecol. 34(1): 8-14.

Rai AP, Handa AK, Choudhari S, Krishna Prasad YV, Pilli AB. 2003. Application of Database Management Tools for On-line Dissemination of Information on Agroforestry in India Through World Wide Web. Indian J. Agroforestry 5(1&2): 109-114.

Rawat JK, Saxena A, Dasgupta S. 2008. Application of Satellite Based Remote Sensing for Monitoring and Mapping of India's Forest Tree Cover. Monitoring and Mapping India's Forest tree Cover through remote sensing 1-7. From http://www.gisdevelopment.net/application/environment/ffm.ma04067pf.htm

Sahu SC, Dhal NK, Reddy S, Pattnaik C, Brahmam M. 2007. Phytosociological Study of Tropical Dry Deciduous Forest of Boudh District, Orissa, India.Research Journal of Forestry 1(2): 66-72.

Shanmughavel P. 2007. An Overview on Biodiversity Information in Databases. From www.bioinformation.net Bioinformation 1(9) 367-369.