Database for Biodiversity of Andaman and Nicobar Islands

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ABSTRACT

The Andaman and Nicobar group of islands covering an area of 8249 square kilometers with huge biodiversity both in terms of flora and fauna. These islands are considered to be the third most hotspots for biodiversity in the country. The agro biodiversity occupies a unique place within the overall ambit of biodiversity. A total of 14 rice cultivars are being cultivated by the farmers in various part of the islands. These islands are considered as reservoirs of medicinal plants, orchids and ferns having horticultural and floricultural importance. About 52 species of medicinal plants are being used by different tribal groups of the islands and over 1130 species of orchids & 120 ferns have been reported from A & N Islands. However, due to reckless exploitation, biodiversity faces the threat of extinction. Though, a vast array of literature on the biodiversity of islands exists, they are scattered and dispersed. This paper focuses on the details of database developed for documentation of biodiversity of Andaman & Nicobar Islands.

Keywords: Biodiversity, MS Access, Asp.Net, Flora and Fauna

INTRODUCTION

Andaman & Nicobar Islands comprises of a group of 572 islands and islets and are situated in the eastern coast of India. Islands have the tropical 54% area under evergreen forest.

Andaman and Nicobar Islands represents one of the richest repositories of biodiversity in the whole of south and South East Asia, which is similar to Indo-Burmese these islands, are the virtual bio reserve, which is unique both in terms of biodiversity and abundance. Situated between two major biodiversity hot spots, namely the Indian sub continent and the Malaysia-Indonesia region, it is hardly surprising that the islands manifest biodiversity of extraordinary range with in a limited geographical area. The biodiversity detailed information is illustrated below "Fig. 1".

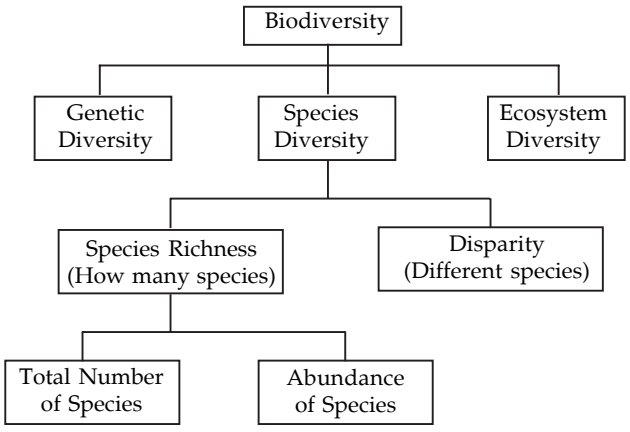

Figure 1: The Hierarchy of the Biodiversity

Rice Genetic Resources of Bay Islands

Rice is the principal cereal crop of Andaman and Nicobar Islands. Out of total 45000 ha cultivable land, rice covers 7895 ha alone. Majority of the rice growing area in Andaman's are occupied by a tall traditional long duration and photosensitive cultivar C 14-8. There are around 11 cultivars of rice grown in these islands and all of them which are designated as local, and all of them are the once introduced from elsewhere at different elevations. They are the truly adapted genotypes, which have endured many years of the selection pressure in this wet humid tropic. Wild species are extremely limited in these islands except for the discovery of the new species, *Oryza in andamanica* Ellis in the recent past from Rutland. Eleven different lines/ cultivars of *Oryza sativa* collected are documented along with indigenous wild species *Oryza indandamanica* Ellis in the present database.[3-4]

Naturalized Orchids

The orchids are distinctive plants and highly priced in the international florist trade due to their intricately designed spectacular flowers, brilliant colors, delightful appearance, myriad sizes and long-lasting qualities. Orchids represent the most highly evolved family *Orchidaceae,* among mono cotyledons. Orchid flowers have emerged as the leader in the international market and immensely contributed to the economy of various countries. Andaman and Nicobar islands possess about 110 species in naturalized state, of which about 25 species are endemic. Some of them are even figured out in the endangered and rare species category. Hence, it assumes

great importance to collect and conserve them at this juncture.[11]

Biodiversity in Medicinal Plants

India is a vast treasure house of Medicinal plants, almost 25000 plants are known for their medicinal value. A number of studies have indicated, that a large number of plant species are used by ethnic tribes and local people of bay islands for various medicinal purposes one such example is *Alstonia macrophylla* and *Morinda citrifolia* are used in treatment of stomach ache, joint pain and fractured bones. Documented the medicinal plants of Andaman & Nicobar Islands and their use.[8-9]

Underutilized Fruits

Andaman and Nicobar Islands are having a vast variety and diversity of underutilized wild tropical fruits, many of which are of evolutionary in specific niche. Most of these fruits have remained semi-domesticated while many species have become rare and endangered due to large scale urbanization. These underutilized fruits although having nutritional and commercial medicinal value, they are yet to be exploited to full potential. These underutilized fruits though contain all the essential ingredients of our diet, yet this are not recognized as important source of minerals and vitamins. These islands being rich in biodiversity have a very large number of underutilized fruits.[2, 7-12]

Seaweed Resources

Seaweeds are the macro scopic algae and form an important component of marine living resources and are mostly available in the intertidal zones of the sea where suitable substrata are available for growth. Seaweeds are used as food, fodder, fertilizers and have wide industrials applications. Apart from these they are also important source of protein, iodine, vitamins, minerals and substances of antibiotic nature. Survey of seaweed resources of Andaman and Nicobar Islands revealed that about 55 species of seaweeds are available in different parts of these islands. A systematic list of important seaweeds of Andaman is documented in the form of database.[6]

Insects

According to the zoological survey of India, 1500 to 2000 species of insects have so far been discovered identified in these islands. These islands harbor a wide range of insect fauna which includes swallow tails (*Lepidopetra: Papilonidae*) which are the best studied family of butterflies. Out of the endemic species of swallow tails, three have been found in these islands. Andaman and nicobar islands are ranked 16th out of a total of 51 countries in the world that harbor critical swallow tail faunas. Similarly all the 6 species of wild silk moth are also known from these islands. The insect's species that are documented in this database are chosen on the basis of its uniqueness, rarity and economic importance. [13]

Biodiversity of Livestock and Poultry

Main livestock species in these islands are cattle, buffalo, goat, pig, poultry, a few horses and rabbits. Out of 36 islands, 12 islands have no livestock what so ever and another 4 islands have a population less than 200 numbers. The North, South and Middle Andaman have major chunk of livestock in Andaman group of islands and Car Nicobar and Katchal are the centers having more concentration of livestock in Nicobar group of islands. At the same time cattle, buffalo and goat are the predominant livestock species in Andaman group of islands where as pig and goat are dominant in Nicobar Islands. This distribution clearly points out the food habits of people in the two regions. Poultry population in this region is predominantly i.e. non-descript about 80% and only 20% of the total 8 million poultry birds are high yielding or exotic breeds. In poultry, the total population is about 8 million birds of which 80% are none descript and 20% are high yielding on exotic breeds. Poultry is mostly concentrated in North Andaman (31.2%), Car Nicobar (21.77%), South Andaman (20.29%) and Middle Andaman (10.41%), Rest of the islands have less than 10% poultry and seven islands have no poultry birds at all.[1]

Marine Faunal Diversity of Bay Islands

The Exclusive Economic Zone (EEZ) around Andaman and Nicobar Islands is vast, covering a sea area of 0.6 million sq.km i.e., 30% of EEZ of India. The Bay Islands enjoy the status of an archipelago and zoo geographically they are close to Indo-Malayan region, which is supposed to have contributed to the rich biodiversity of A & N Islands. Because of the limited studies on marine fauna of Bay Islands, their nature of evolution as isolated population or their endemism is little known. Nevertheless, it has been clear from the available literature that many marine fauna of these islands are similar to those of Indo-west Pacific. Marine habitats are quite varied and vast and their diverse fauna range from microscopic planktons to enormously weighing whales.[10]

MATERIALS AND METHODS

The computer application skills on biodiversity and related issues are not available much. However with the advent of CD-ROM and its application software made possible to exploit the power of computer in wide variety of agricultural applications like monitoring levels of diversity, recording information in computerized documentation and databases. The work was conducted

in the SUB-DIC unit of CARI, Port Blair during 2004-07. The literature survey was conducted through CD-Rom, Internet, Published books, journals & News letters from the Institutes. The Secondary data are collected from the Agriculture Department Botanical Survey of India & Zoological Survey of India of Andaman & Nicobar Islands.

Apart from the survey of data the information collected were cross checked and authenticated from published resources.

Database Development

MS Access

MS Access provides sharable frame work with metadata, quality evolution procedures and their standardization. The entire database is organized in object oriented relational database using MS-Access as backend and the interface for the database was developed with ASP.NET.

Web Page Development

ASP .Net

ASP.NET pages, known officially as "web forms", are the main building block for application development. Web forms are contained in files with an ASPX extension; in programming jargon, these files typically contain static (X) HTML markup, as well as markup defining server-side Web Controls and User Controls where the developers place all the required static and dynamic content for the web page. Additionally, dynamic code which runs on the server can be placed in a page within a block <% — dynamic code — %> which is similar to other web development technologies such as PHP, JSP, and ASP, but this practice is generally discouraged except for the purposes of data binding since it requires more calls when rendering the page. With all these information, an offline database was made for Windows.[5]

RESULTS

A database is a collection of information related to a particular subject or purpose. In the database developed for Biodiversity of Andaman and Nicobar islands, there is a main menu containing the fields such as data entry, printing reports and exit. Under the field of data entry, the following sub-fields were created, *viz*. add a new data, save a new data, modify the existing data, delete the existing data, search for a particular data, view the data and view images through which, the above-said operation could be made. Similarly in the field of print, reports can be viewed and be printed through which, category-wise prints could be taken. Biodiversity databases of Andaman and Nicobar Islands using our created the database software MS Access, webpage creation software Asp.Net and retrieve Information's from the Andaman Central Agricultural Research Institute online databases of insects, and livestock animals, Marine faunas, various Orchids plants, different types of poultry, variety of rice's, seaweed plants and the underutilized fruits were collected and tabulated in "Table 1". Main page illustrations of biodiversity database which contain of the Andaman & Nicobar biodiversity information's and the main menu page link is also in bottom "Fig. 2". The view of the main menu will look like the following "Fig. 3".

Table 1
Threatened Species of Andaman & Nicobar Islands

Taxonomy Groups	*Number of Species*	*Distributions*		
		Andaman	*Nicobar*	*Both*
Insects	18	14	3	1
Live Stock Animals	6	4	2	–
Marine Faunal	10	6	4	–
Naturalized Orchids	6	5	1	–
Poultry	3	1	2	–
Rice Indigenous	13	7	6	–
Seaweeds	17	8	7	2
Underutilized Fruits	18	10	5	3
Total	**91**	**55**	**30**	**6**

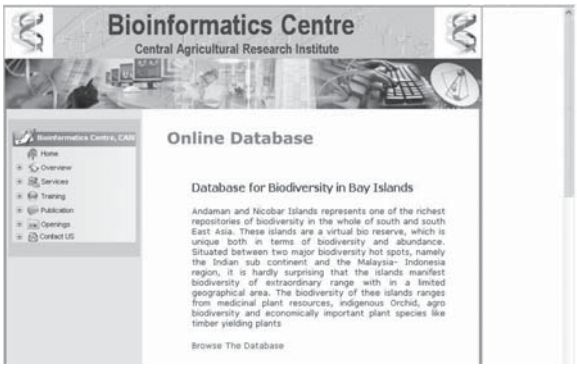

Figure 2: Main Page of the Online Biodiversity Database

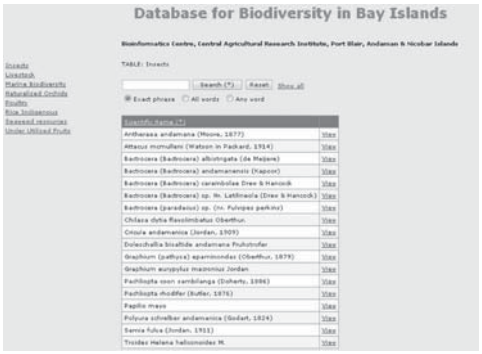

Figure 3: Main Menu of the Online Biodiversity Databases

The database page provides biodiversity of given species "Fig. 3". Each of these categories comprises of

links to diversity species belonging within each category which will take the user to the well furnished database which has been developed in ASP.Net. The database will give complete information about the individual species regarding their family, order, habitats, distributions area, economic importance, scientific names, status and utility.

Obtained information's of total number of species and the area of distributions from the databases, each species with different ratio of species are illustrated in the threatening graph "Fig. 4". They are insects-18, livestock-6, marine animals -10, naturalized orchids-6, poultry-3, rice indigenous-13, seaweeds-17, the underutilized fruits - 18 and the total number of species were 91. Moreover, the area of distributions in bay islands of biodiversity especially in Andaman & Nicobar Islands. The most of taxonomy group of species is in Andaman region was with high ratio and the others are Nicobar region and the others region is lower than the Andaman regions indicated in graph view "Fig.5".

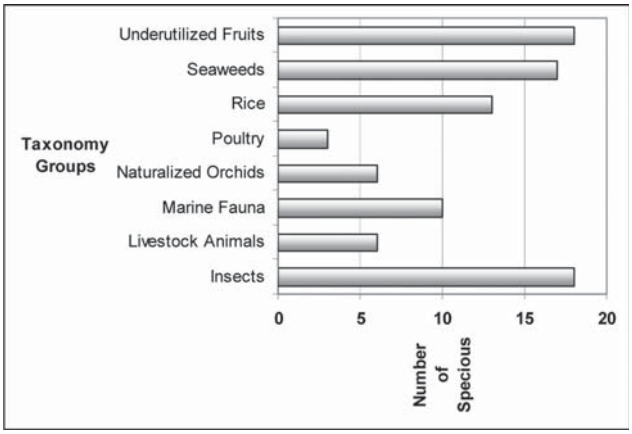

Figure 4: Threatened Species in Andaman & Nicobar Islands

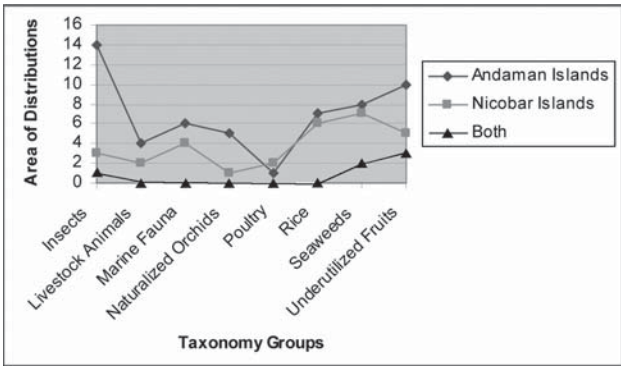

Figure 5: The Distributions Area of Species in Andaman & Nicobar Islands

CONCLUSSION

It is needless to state that biodiversity databases play an essential role in agriculture economy. The future improvement and development of flora and fauna for agriculture is dependent upon the availability of genetic variation, which are its principal resources. When compared to Indian mainland, very limited variety of flora and fauna is found in these islands. We need to conserve and simultaneously exploit this potential resource in a sustained manner to meet out the islands demand. This database design is user friendly and provides all the information about flora and fauna resources for the end user *viz.* research, academic, development and administrative departments. This database can be updated on a regular basis, so that it would provide current status about the livestock resources.

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