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Biodiversity Rich Areas : New Identified Sites in Punjab

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EDITORIAL

Biodiversity is a wealth with immense importance for the very survival of the human race. It is essential for stability of food production & other ecosystems, maintenance of ecological functions, including stabilizing of the water cycle, maintenance & replenishment of soil fertility, pollination and cross-fertilization of crops & other vegetation and protection against soil erosion. Over the last century, a great deal of damage has been done to the biodiversity existing on the earth. Increasing human population, increasing consumption levels, and decreasing efficiency of use of our resources are some of the causes that have led to overexploitation and manipulation of ecosystems. Thus, the ecological arguments for conserving biodiversity are based on the premise that we need to preserve biodiversity in order to maintain our own life support systems. There are two main ways to conserve biodiversity. These are termed *ex situ* (i.e. out of the natural habitat) and *in situ* (within the natural habitat).

Globally, national governments play an important role in preservation of biodiversity through the passing of laws requiring protection of species and habitats. However, it is not enough just to have laws, there must also be the will and the resources to enforce them. Several international conventions exist for the preservation of biodiversity. The most far-reaching agreement on biodiversity in recent years is the Convention on Biodiversity, signed by 156 nations at the United Nations Conference on Environment and Development (the Earth Summit) in Rio in 1992. Many others have signed since, and as they ratify the convention, governments accept responsibility for safeguarding biodiversity in their nations.

India has a long history of conservation and sustainable use of natural resources based on local knowledge systems and practices. Formal laws, policies and programmes for conservation and sustainable utilization bio-resources date back to several decades. Over the years, India has developed a stable organizational structure and a strong legal and policy framework for protection of environment in the country. They include, providing special status and protection to biodiversity - rich areas by through *in-situ* conservation i.e. declaring them as national parks, wildlife sanctuaries, biosphere reserves, ecologically fragile and sensitive areas. India is also a Party to the Convention on Biological Diversity (CBD), which calls upon all Parties to prepare national biodiversity strategy and action plans for conservation and sustainable use of biological diversity. India is one of the few countries to have passed legislation on Biological Diversity i.e. the Biodiversity Act, 2002 and Biodiversity rules, 2004 for conservation of biodiversity and sustainable utilizations of biological resources.

Punjab has a very small area under forest cover (approximately 6 percent of the total geographical area). The major forest areas in the state are - Shivalik Forests (especially in the districts of Ropar, Gurdaspur and Hoshiarpur), Bir Forests (in district Patiala) and Mand Forests (primarily around wetlands in districts Amritsar, Kapurthala, etc). With about 84 percent land area under agriculture with cropland ecosystem being dominant ecosystem in the state. The state was known to harbour great genetic variability, however, over the years this has reduced due to change in cropping pattern and higher dependence on certain high yielding varieties of crops. Diverse historical events and frequent reorganizations, over exploitation of soil & water resources for agriculture, increased urbanization and industrialization have contributed to habitat and biodiversity loss in the state.

The present issue of Newsletter discusses the Bio-diversity rich areas within the Punjab State and deliberates upon some new identified sites. It discusses three case studies namely, Inami Baag in Hoshiarpur district, Kaya Kalp Vriksh in Fatehgarh Sahib district and Chat Bani near Pathankot. It is hoped that this endeavor would help in strengthening the biodiversity conservation in traditionally managed areas and highlight the existence of important floral biodiversity rich areas outside the Protected Area Network. These areas need special attention as they exist in fragile ecosystem and have a positive interface between nature, culture and society. It is anticipated that this initiative would help in consolidating the on-going efforts of conservation and sustainable use of biological diversity. Further, it would be used as resource material for all stakeholders to motivate them to take positive actions at community level.

Editors

INTRODUCTION

Biodiversity encompasses the variety and variability of all life on earth. In other words, it refers to the differences within and between all living organisms at their different levels of biological organisation - gene, individuals, species and ecosystem. It forms the foundation upon which human civilization depends. Biological resources are vital for maintaining the basic processes on which life depends and key to sustainable development. Bio-resources provide food, medicines and products of commercial and non commercial use. It also maintains life by providing environmental services like, air & water quality, soil fertility, recycling of nutrients, pest & disease control, etc.

Thus, Biodiversity sustains human livelihoods and life itself. The importance of biological diversity to human society is tough to state. It is through the myriad interactions among and between these organisms and the abiotic environment that the possibility for adaptation arises. Maintaining the potential for adaptation is important because it allows organisms to adapt to modifications in the environment.

Biodiversity is mainly recognized at three levels, namely species, genetic and ecosystem level. The country has various ecosystems like forests, grasslands, wetlands, coastal and marine ecosystems, and deserts which are ecological habitats of diverse plant and animal species. It is one of the top 17 mega biodiversity countries especially because of its varied physiography, diverse climatic conditions and a variety of habitats. The country has four out of thirty-five biodiversity hot spots. These are Western Ghats, Himalayas, Sundalands and Indo-Burma (Nicobar Island).

About 7.8 percent of the species recorded all over the world have been reported from India. 45,500 species of plants and 91,200 species of animals have been recorded here. India has rich crop diversity and has been reported to be habitat of 167 important cultivated plant species and 320 species of their wild relatives. Several breeds of plant and animals have been reported to be originated here (www http://nbaindia. org). Thus, it is imperative to use biodiversity sustainably so that the future generations can also have its benefits.

India is partaker in many International agreements and programmes concerned with aspects of nature conservation and sustainable development. These range from legal instruments such as the Convention on Biological Diversity (CBD), which place obligations on those nations which become contracting parties, to scientific programmes such as the UNESCO's, Man and the Biosphere Programme (MAB), a global programme of International Scientific co-operation of Organization of Economic Co-operation & Development (OECD). Few agreements and programmes related to biodiversity with which India is collaborating include:

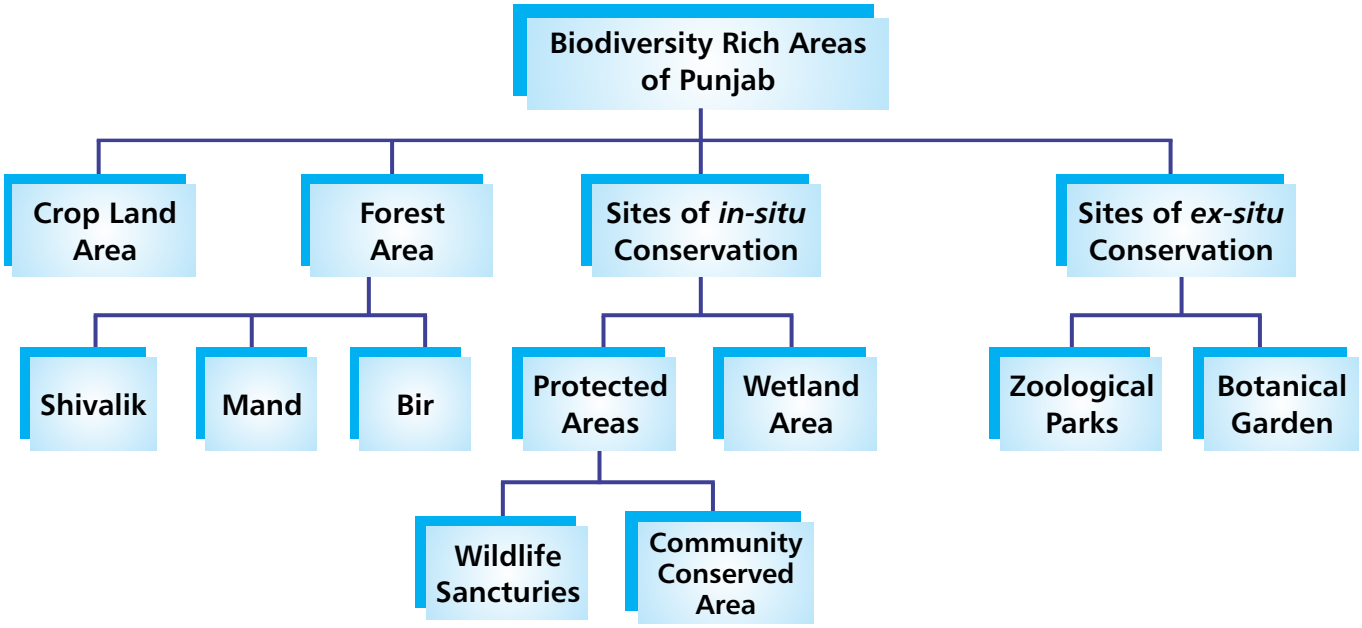
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) :** CITES is an international agreement (since its first idea in 1960s) between governments to which States (countries) adhere voluntarily. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Because the trade in wild animals and plants crosses borders between countries, the effort to regulate it requires international cooperation to safeguard certain species from over-exploitation.Today, it accords varying degrees of protection to more than 30,000 species of animals and plants, whether they are traded as live specimens, fur coats or dried herbs. States (countries) that have agreed to be bound by the Convention ('joined' CITES) are known as Parties. Although, CITES is legally binding on the Parties, in other words they have to implement the Convention, it does not take the place of national laws. Rather it provides a framework to be respected by each Party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level. For many years, CITES has been among the conservation agreements with the largest membership and 176 Parties presently (www. cites.org). India became a party to CITES on 18th October 1976. Since then, it has provided data annually to the CITES secretariat on the trade of endangered species through its CITES Management Authority.
- **World Heritage Convention:** The World Heritage Convention is the most ratified international treaty for cultural and natural heritage preservation in the world in 1972. The World Heritage Convention was adopted by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) General Conference at its 17th session in Paris on 16 November 1972. The Convention came into

force in 1975. The World Heritage Convention aims to promote cooperation among nations to protect heritage around the world that is of such outstanding universal value that its conservation is important for current and future generations (http://www.environment.gov.au). The prestige that comes from being a State Party to the Convention is having sites inscribed on the 'World Heritage List' often serves as a catalyst to raising awareness for heritage preservation. A key benefit of ratification, particularly for developing countries, is access to the 'World Heritage Fund' (http:// whc. unesco.org). India approved the World Heritage Convention in 1977 and since then six natural sites have been declared as areas of 'outstanding universal value'. These sites are Kaziranga National Park, Keoladeo National Park, Manas National Park, Sundarbans National Park and Nanda Devi National Park.

- **Convention on Biological Diversity :** The Convention was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit"). The Convention on Biological Diversity was inspired by the world community's growing commitment to sustainable development. It represents a dramatic step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. India signed the Convention on Biological Diversity on 5th June 1992 and confirmed it on 18th February 1994 and further, brought it into force on 19th May 1994. This convention provides a framework for the sustainable management and conservation of India's natural resources (http://ces.iisc.ernet.in).

- **Ramsar (Wetlands) Convention :** The Convention on Wetlands called the "Ramsar Convention" is an intergovernmental treaty which was negotiated through the 1960s and the treaty was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975. It embodies the commitments of its member countries to maintain the ecological character of their wetlands of international importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories. It is the only global environmental treaty that deals with a particular ecosystem, and the Convention's member countries cover all geographic regions of the planet. The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world" (http://www.ramsar.org). India has been a party to the Ramsar Convention since 1st February 1982. India has designated 25 wetland sites as Ramsar sites covering 6,48, 507 ha of area.

Fig 1. Major Ecosystems with respect to Biodiversity in Punjab



Further, India is one of the few countries to have passed legislation on Biological Diversity i.e. the Biodiversity Act, 2002. This Act mainly aims at giving effect for conservation and sustainable use of biodiversity and facilitate access to biological resources & associated traditional knowledge so as to ensure fair and equitable sharing of benefits arising out of their commercialization. The Govt. of India promulgated the Biological Diversity Rules in 2004. For protection of wetlands, Wetlands (conservation & management) Rules, 2010 also came into force w.e.f. December 2010.

BIODIVERSITY RICH AREAS IN PUNJAB

Punjab comprising 1.57 percent of the country's total geographic area, has three major biogeographic zones which are as under :

- The central alluvial plains which comprise of major cropland areas besides some wetlands (the state has three Ramsar sites) and small patches of natural forests in form of 'birs' and 'rakhs'.
- The northeastern Shivalik foothills which comprise 18 percent area in the state consisting of over 3 percent forest area, rest being rainfed and partially terraced fields.
- The southwestern dry zone with saline alkaline patches.

However, the major ecosystems with respect to biodiversity in the state are cropland ecosystems, and forest ecosystems. Various activities are undertaken for biodiversity conservation at *in-situ* and *ex-situ* sites (Jerath *et.al.,* 2002) as summarized in Fig 1.

As Punjab has 84 percent land area under agriculture so the cropland ecosystem forms the dominant ecosystem in the state. The state was known to harbour great genetic variability, however, over the years, it has reduced due to change in cropping pattern and higher dependence on certain high yielding varieties of crops. The state has a very small area under forest cover (approximately 6 percent of the total geographical area).

The major forest area in the state is namely, Shivalik forests area, especially, in the districts of Ropar, Gurdaspur and Hoshiapur as discussed in Box 1. The other forest areas are Bir Forests in Patiala district and Mand Forests in Amritsar & Kapurthala districts.

The state focuses on species conservation outside the natural habitat i.e. through *ex-situ* methods through zoological parks, botanical gardens, gene banks, and through captive breeding programs.

The major *ex-situ* conservation ecosystems in the state are : M.C. Zoological park at Chaat bir, Tiger Safari at Phillaur and deer parks at; Bir Motibagh in Patiala, Bir Talab in Bathinda, Neelon in Ludhiana. Further, various mini zoos also exist in the state. Botanical Gardens an important means of *ex-situ* conservation are : Aam Khas Bagh in Fatehgarh Sahib, Rambagh in Amritsar, Shalimar Garden in Kapurthala, Banasar Garden in Sangrur and Company Bagh in Hoshiarpur.

In-situ conservation in the state includes protected areas, wetlands and community conserved areas for conserving living resources through their maintenance within the natural ecosystem in which they occur. The declaration of Protected Areas are the only *in-situ* legal instrument within the state to achieve long-term conservation of nature with associated eco system services and cultural values.

Protected Area Network in the state has twelve wildlife sanctuaries and two communities reserves covering 340.05 sq. km. area. Wildlife Sactuaries in the state are : Bir Motibagh, Bir Bhunerheri, Bir Dosanjh, Bir Bhadson, Bir Mehas, Bir Gurdialpura, Bir Aishwan in Patiala District; Bir Aishwan in Sangrur; Harike Lake in Ferozepur; Takhni-Rehmapur in Hoshiarpur; Jhajjar-Bachauli in Rupnagar; Nangal Lake; and Kathlaur-Kushliyan in Gurdaspur. The two community reserves are namely, Lalwan Community Reserve in Hoshiarpur and Keshopur Chhamb Community Reserve in Gurdaspur.

The state has twelve natural wetlands covering a total area of 8.39 sq. km. and nine manmade wetlands covering an area of 147.39 sq. km. There are three Ramsar sites (Harike, Kanjali & Ropar) in the state. Though large scale biodiversity studies have not been carried out in the state, yet, a large number of flora & fauna has been recorded from the forest areas and wetlands.

Besides above mentioned biodiversity rich areas, the state has many other sites which are yet to be recognized.

Box 1: Shivalik Forest Area of Punjab

The Shivalik area of Punjab is a hilly micro-endemic zones of the country with an area of 9448.97 km^2 in the north-eastern part of the state, running from north-west to south-east along the Himachal Pradesh border.

The study conducted on 'Biodiversity in Shivalik Ecosystem of Punjab' by PSCST in collaboration with ZSI, BSI, IIRS & Punjabi University, Patiala highlighted that the Shivalik area is quite rich in biodiversity with four major vegetation types namely, Dry Deciduous, Moist Deciduous (including Khair-Sissoo & Dry Bamboo Brakes), Dry Deciduous Scrub (including Euphorbia) and Chir Pine forests. Out of these the Dry Deciduous vegetation areas showed maximum biodiversity and Chir pine forests showed minimum diversity. The Scrub forest area has been found to show maximum degree of fragmentation, an indicator of high anthropogenic activity.

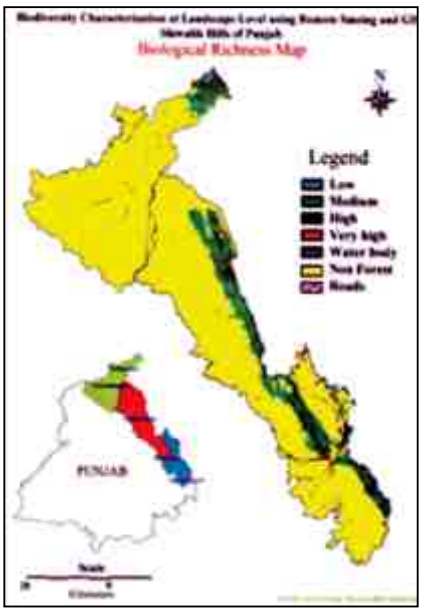
The floral studies highlight that a considerable number of cryptogams exist in the area, the number of fungi being especially high. This study records 560 species of both macro & micro fungi, 21 species of Lichens, 9 species of mosses, 17 species of liverworts and 5 new records of Pteridophytes. Another important observation has been the presence of a single species of Gymnosperm (*Pinus roxburghii* Sarg.). The study reports 562 angiospermic species of plants. The area has 28 wetland plants and 214 plants of economic importance out of which 132 are medicinal plants. Some of the economically important plants are: *Acacia catechu*, *Bombax ceiba* Linn., *Cassia fistula* Linn., *Pinus roxburghii* Sarg. and *Euphorbia royleana* Boiss. Some of the important medicinal plants are: *Adhatoda zeylanica* Medik., *Bacopa monnieri* (Linn.) Wettst., *Azadirachta indica* Juss., *Ricinus communis* Linn. and *Abrus precatorius* Linn.

The area is also found to be quite rich in faunal diversity especially bird fauna (2 important wetlands exist in the area out of which Ropar wetland is a Ramsar site). A total of 396 species of birds have been recorded from Shivaliks. Results indicate that five species of Lepidoptera, 44 species of fish, 18 species of reptiles, 156 species of birds and 19 species of mammals are listed under different categories of conservation status of IUCN, CITES, CAMP and IW (P) Act. Further, all the five leeches recorded from the area are new records for Punjab.

Only 19 mammalian species could be recorded from the area which include four globally threatened species as per IUCN (*Semnopithecus entellus* (Dufresne), *Macaca mulatta* (Zimmermann), *Lutra lutra* (Linn.) and *Manis crassiaudata* Gray), three species belonging to Sch. 1, three species under Sch. II , four species under Sch. III, six species under Sch.IV and two species under Sch.V of Indian Wildlife Protection Act.

Few areas/sites with rich diversity of species of plants and animals have been identified as biodiversity rich pockets namely, Guru Gobind Singh Nature Reserve, Anandpur Sahib (Ropar), Sadavarat Forest Ropar & Ropar Wetland (Ropar), Kahanpur Khuhi Forest (Ropar), Dholbaha-Kukanet Forest (Hoshiarpur), Nara Forest (Hoshiarpur), Chohal Forest (Hoshiarpur), Takhni-Rehmapur Wildlife Sanctuary (Hoshiarpur), Talwara Forest (Hoshiarpur), Manguwal Forest (Hosiarpur) and Dhar & Dunera Forest (Gurdaspur).

Shivalik Forest in Punjab



Source: Neelima Jerath, Puja & J. Chadha, 2006

Box 2 : Biodiversity Heritage Sites

Biodiversity Heritage Sites

Biodiversity Heritage Sites (BHS) are well defined areas that are unique ecologically fragile ecosystems - terrestrial, freshwater or marine having rich biodiversity comprising of any one or more of the components such as; species richness, high endemism, presence of rare, endemic and threatened species, keystone species, species of evolutionary significance, wild ancestors of domestic/cultivated species or land races or their varieties, past pre-eminence of biological components represented by fossil beds and having cultural or aesthetic values and are important for the maintenance of cultural diversity, with or without a long history of human association with them.

Declaration and Management of BHS Under Section 37 of Biological Diversity Act, 2002, the State Government in consultation with local bodies may notify in the official gazette, areas of biodiversity importance as Biodiversity Heritage Sites (BHS). The State Government in consultation with the Central Government may frame rules for the management and conservation of BHS under sub section (2) of Section 37. Under sub section (3) of Section 37, the State Governments shall frame schemes for compensating or rehabilitating any person or section of people economically affected by such notification. Areas which have already been designated, identified or notified (for example as protected area, biosphere reserve, etc) under other Acts or programmes may not be considered under this provision. The idea is to identify those areas important from Biodiversity point of view which do not enjoy protection/support under any other Act or programme.

To identify new biodiversity rich sites Environment Information System (ENVIS) Centre, Punjab State Council for Science & Technology (PSCST) and Punjab Biodiversity Board (PBB) organized a brain storming workshop with technical guidance of UNESCO for "Identification of Biologically Rich Areas in Punjab" on 21st March, 2012 at U.T. Guest House Chandigarh. The main objective of the workshop was to identify Biological rich sites in the state, which have potential to get declared as Biosphere Reserve (BR) or Biodiversity Heritage Sites (BHS) (Box 2).

During the deliberations, various biodiversity rich areas were recommended to be specifically considered for conservation which may further be proposed to be declared as Biodiversity Heritage Sites or Biosphere Reserves. The recommended biodiversity rich sites are as under :

- Inami Baag site in Hoshiarpur district with large diversity of mango species.
- Largest Banyan tree (Kaya Kalp Vriksh) site in Fatehgarh Sahib district.
- Chatpat Bani forest area (conserved by local community) in village Kataru Chak, on Pathankot-Amritsar National Highway.
- Areas falling outside Harike Wildlife Sanctuary from village Gagrewal to Goindwal Sahib on river Beas as dolphin heritage site for conservation of dolphins.
- Patti, Amritsar and Ferozepur area for native livestock species like Nili Ravi.
- Mand area for conservation of Hog Deer population.
- Sultanpur Lodhi area and area between Nangal and Ropar for conservation of fish biodiversity.
- Aam Khas Baag and Ram Baag in district Amritsar
- Baradari Garden, Patiala for Simbal Tree & Banayan tree (which are about 120 years old) and Ferns.
- Shalimar Garden, Kapurthala
- Northern parts of Shivaliks as biodiversity rich pockets.
- Dhar block in district Pathankot & Nurpur Bedi area in Rupnagar district for Vultures, Indian Python and Hedge hog.
- Pandori (area between Keshopur Miani and Kahnuwan) in district Gurdaspur as a sacred grove
- Area falling outside Kathlaur Kalsian Sanctuary along Ranjit Sagar Dam.
- Keshopur Miani & Magamudian in district Gurdaspur for Sarus Cranes.

From the above recommended biodiversity rich sites, the present article focuses three case studies namely, Inami Baag in Hoshiarpur district, Kaya Kalp Vriksh in Fatehgarh Sahib district and Chatpat Bani in village Kataru Chak near Pathankot.

BIODIVERSITY RICH NEW IDENTIFIED SITES IN PUNJAB

Case Study 1

Inami Baag, District Hoshiarpur

In the state of Punjab, mango cultivation has been mainly confined to sub-mountane zone known as Kandi area (in Districts Hoshiarpur, Gurdaspur, Ropar and Nawan Shehr). Nearly 80 per cent of total mango growing areas in the state are concentrated in these regions. The area had been famous for its rich mango grooves comprising, desi 'tapka' varieties of mango. Most native mango varieties/land races belong to the 'sucking' type of mango though a few table purpose varieties are also being cultivated for their market value.

Old records, dating back to the early nineteenth century by Capt Montogomery in Hoshiarpur District Gazetteer (Anonymous, 1914) indicated a wide variety of mangoes in the region (Box 3). However, for the last few decades mango seedling grooves and isolated/scattered plantations in the region have shrunk due to pressures of population, industrialization, urbanisation, unprecedented deforestation, land fragmentation, construction of check dams, widening of roads, etc. Orchards are being replaced by profit oriented cash crops. Erratic rainfall and adverse weather conditions due to environmental changes also pose a real threat to mango seedling plant diversity in the state. During these processes, many elite mono-embryonic mango seedling/germplasm known to possess desirable horticultural traits like good size, attractive fruit colour, flavour, tolerance/resistance to malformation, pests, diseases, various biotic and abiotic stresses, juice consistency, bearing regularity, fruit yield, etc. have been lost or are at the verge of extinction.

With the above background, PBB & PSCST alongwith Punjab Agricultural University, Ludhiana during the year 2008 conducted a study to report the variety of mangoes within the region. An old orchard of Mangoes 'Inami Baag' located at village Bassi Umar Khan, Block Bhunga, District Hoshiarpur, was identified as a biological rich site with large diversity of native mango species.

In the early nineties, the 'Inami Baag' had been locally famous for winning awards (inam) for its elite mango varieties especially one particular variety called the 'Inami amb'. The site is spread over an area of 10 acres on private land. The site was earlier spread in 16 acre land with 256 mango trees of sucking type belonging to 43 native varieties/ land races. The 6 acre land of their orchard has been already lost due to the fragmentation caused by passing of 'kandi canal', an irrigation channel, from the middle of the site.

Box 3 : Mango Variety in the Hoshiarpur District of Punjab

The records, dating back to the early nineteenth century by Capt Montogomery in Hoshiarpur District Gazetteer (Anonymous, 1914) indicated a wide variety of mangoes in the region. These include :"the *Panchpaya*: large fruit, said to weigh five quarters (*panch pao*) of a kacha ser; the *Kharbusa*: fruit average size, inside colour supposed to be like a melon (*kharbusa*); the *Kasumbla*: Small fruit, outer colour like safflower (kasumba); the *basantia*: small fruit, inner colour yellow (basanill); the *Pera:* small and very sweet, supposed to be in shape and taste like the local sweetmeat 'pera'; the *Dihalu*: large fruit, inside like curds (dahi); the *Marabla*: large fruit, sweet, with a small stone used principally for making preserves (maraba); the *Pathar*: fruit average size, supposed to be like a stone (pathar) in weight and hardness of its skin, keeps for a long time; the *Laler*: shaped like a coconut: fruit, large and sweet; the *Bhadauria*: average size, ripens in the month of Bhadon (mid-August to mid-September), after other mangoes are over; the *Sandhuria*: average size, so called on account of its red (sandur) colour; the *Kesari*: large fruit, colour saffron (Kesar); the *kela:* long fruit like a plantain (kela), with a large stone; the *Misri*: large fruit, very sweet (misri); the *Jawainia*: large furit, smells like aniseed (ajwain); the *Shahatia*: large fruit, sweet as honey (shahad); the *Gora*: large and brown like the bolls made up of cleaned cotton. The above species fetched the highest prices, especially the *Bhadauria* as it was available in the market even after other varieties were over. The remainder were less thought of like, the *Saru*:-small fruit, rots very quickly (sorjala); the *Harar*: small like the fruit of harar (*Terminalia chebula*); the *Dohki*: small with a strong taste of turpentine; the *Sufeda*: small and of a white colour; the *Rara*: small and sweet in size like the fruit of the bahera (*Terminalia bellerica*); the *khala*: average size, bad colour and acid (khata) taste; the *kala*: average size, dark coloured skin even when ripe; the *Laichi:* small fruit, grows in clusters said to smell like cardamom (ilaichi); the *Dodhia*: small, white inside like milk (dudh); the *Chhali*: long fruit like maize cob (chhali); the *Kakra*: large long fruit, origin of name unknown".

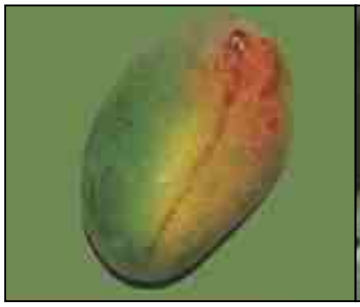
Box 4 : Mango Varieties at Inmai Baag

Pencil Amb

Thudi Amb

Bhagva Chhalli

Tota Pari



Shashi Amb

Chusa Amb

Achari Gola

Arru Amb

Pir wala Amb

Ohri Selection

Charan Achari

Anda Dushehree

Haryana Kangi

Laddu Amb

Kala Amb

Charan Sidhuri

Ber Amb

Mahantan di Chhalli

Jogiya Chhalli

Inami Chhalli

A View of Inmai Baag, village Bassi Umar Khan, Block Bhunga, District Hoshiarpur

The assessment of biological resources (Table 1) and detailed phenotypic & chemical studies have been done.

Table 1 : Trees in Inami Baag

Name of Tree	Number
Jamun	2
Simbal	1
Mango	215
Eucalyptus (young plantation)	467
Total	**685**

Physio-chemical analysis of the mangoes sample show that variability found in indigenous mango population in various qualitative and quantitative attributes contributes to biological diversity, nutritional and livelihood but can also be used for crop improvement.

Some interesting mango strains observed (Box 4) in the area have been named on the basis of fruit shape. The local names of the available mangoes varieties are Anda Dusehree, Laddu Amb, Gola Ghassipur and Ber Amb. In Punjabi folklore, some native mango strains are called as 'Chhalli' on account of their oblong shape and large fruit size (resembling a small sized corn cob).

Attractive yellow fruit colour with red blush on the shoulders was observed in seven mango strains (Choe Sindhuri, Ghassipur di Chhalli, Sindhuri Chusa, Anami Chhalli, Mahantan di Laltain, Laddu Amb, Hariana Kanghi). Fruit colour ranged from yellowish to light yellow, deep chrome, greenish, spinach green and dark green in select mango strains. Fully coloured fruits were locally preferred especially varieties called Arru Amb (resembling peach fruit), Samrali and Throlli. They were the preferred sucking type of mangoes mostly due to high juice content, soft flesh and coarse fibres and commanded higher price in the area.

A View of Mango Varieties at Inami Baag, District Hoshiarpur

Other popular strains include Jogiya Chhalli (which assumes the size of a small corn cob), Anda Dushehree (which had the flavour & taste of Dushehree variety of Mango, a popular table variety, but of the size of an egg averaging only 60.1g), Thudi Amb, Gola Desi and Ber Amb (with lowest recorded fruit pulp weight 18.3g and appears like a ripe *Ziziphus* fruit), Mahantan di Chhalli, Kala Amb, etc. Further, strains like Charan Achari, Gola Desi and Banta strains No.1, 2 and 3 are locally conserved and used for pickle purposes on account of their higher juice acid per cent, pulp/stone ratio, sour taste, almost roundish shape and medium to abundant fibre content.

Besides, Jogiya Chhalli other long fruit variety sucking mangoes include Thudi Amb, Anami Chhalli, Achari Gola, Kukian de Chhalli and Bhagva Chhalli. The shortest fruit length was that of Arru Amb (6.01 cm average) and minimum breadth of Ber Amb (3.83 cm average). The team studied various phenotypic (fruit shape, length, breadth, colour, weight, taste, flavour, pulp per cent, stone & peel weight, pulp-stone ratio, etc.) and chemical TSS, acidity, total sugars, reducing & non-reducing sugards, etc.) attributes and statistically significance variability was found among different mango strains.

PBB has identified "Inami Baag" (a mango orchard), as a biological rich site with large diversity of native mango species requiring conservation for the benefit of posterity. In view of its importance due to rich biological diversity, the Board has initiated actions for conservation of this orchard as Biodiversity Heritage Site u/s 37 of Biological Diversity Act, 2002. Besides conservation, the activities will help mainly for carrying out selection of desirable traits for evolving new varieties of mangoes. A proposal has been prepared and submitted to Govt. of Punjab in this regard and activities have been undertaken like, onsite meetings with local sarpanch and villagers to apprise its importance, detailed site survey (jointly by SDM, Horticulture Development Officers, sarpanch of Bassi Umar Khan, concerned patwari and scientists of PBB, PSCST and Punjab Agricultural University).

Presently, the mango seedlings are being conserved mainly due to religious beliefs, growing along strips of roads railway lines, canals/ drains and restriction imposed on felling of trees over the Shivalik areas of Punjab under section 4 and 5 of the Land Preservation Act 1900. During the survey, it was observed that indigenous mango seedling population in the area is declining due to poor management practices in general and due to various insects-pests. Thus, the site requires *in situ* more conservation efforts to preserve the indigenous mango plantation and has been recommended to declare it as BHS.

Case Study 2

Kaya Kalp Vriksh at Fatehgarh Sahib

Trees have a special religious and cultural significance in India. Banyan tree (Ficus bengalensis) is the National tree of India and have been venerated for centuries. The tree is native to India and is characterized by its thick and abundant prop roots.

The Punjab state has one of the largest Banyan *(Ficus bengalensis)* tree amidst lush green fields at village Cholti Kheri, block Khera Mandal of district Fatehgarh Sahib.

The canopy of the tree spreads over three to four acres of land. It is also known as 'Kaya Kalp Vriksh'. The tree resembles a small forest as its aerial roots have grown as large props supporting the tree's many branches with under storey vegetation which is thick that even sunlight hardly penetrates especially during monsoons. The fruit is a small fig but is not edible and is red when ripe.

Kaya Kalp Vriksh, district Fatehgarh Sahib

Aerial roots of Kaya Kalp Vriksh

According to villagers this great banyan is a few hundred years old. The local belief is that nobody can stop the relentless spread of the tree. Even though the tree is surrounded by private land, the adjoining land owners do not cut any branch which may grow and cover their land. This is due to associated sacred believes.

The tree has acquired religious as well as cultural significance with a temple. People of the surrounding villages believe that the tree has unique healing and medicinal power, therefore, people suffering from different ailments visit this place to spend some time under its shade in order to get cured. A fair is organized by local people annually under its shade on 15th February to worship the divine powers of Great Banyan.

The tree has created its own unique eco system in the area as it supports large number of birds such as mayna, peacock, parrot, crow, owl, egret, etc and many insect species. The site has a tourism and heritage potential as it attracts many visitors including people from nearby areas, students groups, tourists and the spiritually inclined. Though great banyan tree continues to grow undisturbed, however, it needs to be conserved from the vagaries of time, weather and human behaviour.

A village Biodiversity Management Committee has been already constituted at village Cholti Kheri, as per provisions of Indian Biological Diversity Act, 2002 by PBB to manage, conserve and promote the site. PBB would further take up the matter with National Biodiversity Authority regarding the declaration of 'Kaya Kalp Vriksh' as State's 1st Heritage Tree. It is hoped that Punjab Heritage Tree status would also facilitate to formulate special projects for conservation, promotion of eco-educational potential of 'Kaya Kalp Vriksh'.

Religious believes associated with Kaya Kalp Vriksh

Peacock at Kaya Kalp Vriksh site

A View of Chatpat Bani Forest

Case Study 3

Chatpat Bani (Kataru Chak) in Pathankot

Forests have been the lifelines for forest-dwelling communities since ancient times. India has a long tradition of careful use and wise conservation of all resources that are useful to people. One method for conservation of these forest resources was the protection of the these areas by creation of sacred groves (Box 5), usually dedicated to a local divinity.

The Chatpat Bani protected forest resource is at Pathankot which is a small city situated in Punjab in Northern Region of India. It is the city situated at the foot of hills and near the head of Bari Doab canal. Chatpat Bani in village Kataru Chak located on Pathankot-Amritsar National Highway. It has 30 acre area under thick forest.

The officials from Punjab ENVIS Centre, PSCST, Punjab Biodiversity Board along with Institute of Ecology & Environment, Pathankot visited the Chatpat bani, Kataru Chak and studied the site.

The Chatpat Bani site has a preserved forest area and a temple. This forest area has been preserved by the residents due to sacred beliefs (Box 6).

Box 5 : Sacred Groves

A sacred grove is a grove of trees of special religious importance to a particular culture. These groves can be considered as a traditional means of biodiversity conservation, the ancient equivalent of natural sanctuaries where all forms of living creatures are given protection by some holiness. No one is permitted to cut any tree or plant, kill animals and birds, or harm any form of life in this area. Ancient Indian texts have many references to sacred groves, for example, Kalidaasa's Vikramorvawsiyam.

Sacred groves vary in size from a few trees to dense forests covering vast tracts of land. These groves are important today as they are banks of genetic and plant diversity that have to be preserved and sustained. These areas often contain species that have disappeared from the regions outside the grove. The extant groves are proof that the forests exist not only because there are regulations but also because there are traditions.

Source : http://edugreen.teri.res.in

Flying Fox at Chatpat Bani Forest

Insects at Chatpat Bani Forest

A View of Chat Pat Bani Temple at Kataru Chak

Box 6 : Sacred beliefs associated with Chatpat Bani

It is believed that a saint Chatpat Nath ji one of the Guru Gorakshanath 84 saints who was born in Chamba, Himachal Pradesh. Sampradaya of Mahayogi Gorakshanath is an ancient authentic yogic tradition. It was Guru Gorakshanath who has founded this tradition is well known among Nine Nathas (Nava Nathas). In India, he is regarded as Shiva. Mahayogi Gorakshanath has established and developed yoga which is being practised nowadays worldwide. Many scientists suppose that tradition arose during 5-12th century A.D.; but as a rule all data are very contradictory. Gorakshanath and other great Yogis are respected by Nathas as realized kaya-siddhi who has attained immortality.

As per the locals of the Chatpat Bani and information displayed at the temple, saint Chatpat Nath ji visited Punjab State many years ago. One morning, he was praying and meditating in the fields of Kataru Chak village. The farmers of the field (where he was praying) came and asked him to get up so that they can plough their fields. Saint Chatpat Nath ji did not get up as he was praying. The farmers started ploughing the fields over the saint ji with the bullocks.

The places where saint ji's elbows and knees touched ground at those places three kunds (tanks) with water and at the fourth place fountain appeared. When people of the village got up in the morning they saw that Saint Chatpat Nath ji had grown forest (on the 30 acre field area of the farmers who had insulted saint Chatpat Nath Ji)with his yoga & meditation within night from 10 p.m. to 4a.m. Due to this reason this site was given name as 'Chatpat Bani'.

Source: www.nathas.org & personal communication

A View of Kunds at 'Chatpat Bani' Temple

Further, this site has religious believes associated with its temple having kunds (Box 6). It is believed that by taking bath in these kunds the skin diseases are cured and women are blessed with children.

The Chatpat bani forest area has rich biodiversity area. Faunal diversity consists of mainly :

Mammals: Flying fox *(Pteropus giganteus)*, Monkeys *(Macaca mulatto)*, Wild cat *(Felis silvestris)* & Indian palm squirrel *(Funambulus palmarum)*.

Birds : Common Kingfisher *(Alcedo atthis)*, Common Myna *(Acridotheres tristis)*, Common Hoopoe *(Upupa epops)*, Rose ringed Parakeet *(Psittacula krameri)*, Jungle Babbler *(Turdoides striata)*, Grey horn bill *(Ocyceros birostris)*, Bulbul, Tawny owl *(Bubo flavipes)*, Indian robin *(Luscinia brunnea)*, Rock pigeon *(Columba livia)*, Spotted dove *(Spilopelia chinensis)*, Wood pecker *(Dinopium benghalense)*, Black drongo *(Dicrurus macrocercus)*, Cattle egret *(Bubulcus ibis)* and House sparrow *(Passer domesticus)*.

Reptiles & Amphibians : Common Cobra *(Naja Naja)*, Toads *(Bufo melanostictus)* & frogs *(Rana tigrina)* and Garden Lizard *(Calotes versicolor)*.

Fishes : Rohu *(Labio rohita),* Mrigala *(Chirrnus mrigal)* and Indian Carp *(Catla catla).*

Insects : Butterflies *(Apis mellifera)*, Honey bees *(Danaus genutica)*.

The floral diversity consists of mainly:

Trees : Peepal *(Ficus religlosa)*, Bodh *(Ficus bengalensis)*, Bael *(Aegle maramelos)*, Jand *(Prosopis spicigera)*, Jamun *(Syzygium cumini)*, Kikkar *(Acacia nilotica)*, Plash *(Butea monosperma)*, Dhatura *(Datura stramonium)* and Varun *(Crataeva nurvala)*.

Shrubs & Herbs : Gilo *(Tinospora cordifolia)*, Amb *(Mangifera indica)*, Kamala *(Mallotus philippinensis)*, Loquat *(Eriobotrya japonica),* Ak *(Calotropis gigante),* Tulsi *(Ocimum tenuiflorum),* Brahmi *(Bacopa monnieri) and Jangeli Mehndi (Ammania baccifera)*

Actions needs to be taken to conserve biological diversity as per the legal framework including, Biological Diversity Act 2002, Protected Area Network. It is hoped this will further led to the conservation of local floral & faunal diversity with people participation.

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Other Useful Weblinks

www.atree.org
Ashoka Trust for Research in Ecology and the Environment

www.biodiversitya-z.org
World Heritage Sites – A to Z of areas of biodiversity importance

www.biodiversityofindia.org
Biodiversity of India

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Convention on Biological Diversity

www.globalissues.com
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News

Indian species on most threatened list

NEW DELHI: They may disappear even before we get to know them. Four Indian species feature in a list of the '100 most threatened' species in the world. The list consists of critically endangered animals, plants and fungi that don't serve any obvious purpose for humans and are, therefore, not priority for government conservation efforts. Titled, "Priceless or Worthless," the list was compiled by the International Union for Conservation of Nature (IUCN) and the Zological Society of London and released on Tuesday.

The 'Great Indian Bustard', one of the heaviest flying birds, 'Gooty tarantula', a poisonous spider known for its vibrant blue colour, 'Batagur buska', an endangered turtle and the 'White Bellied Heron' are all on the brink of extinction, according to the list, released at the IUCN World Conservation Congress in South Korea. 'Priceless or Worthless,' highlights the plight of species that have been endangered but haven't received adequate attention from governments. Conservationists fear the neglect will continue as none of them provide humans with obvious 'benefits.' For the first time, more than 8,000 scientists from the IUCN Species Survival Commission (IUCN SSC) came together to prepare such a list.

The four species lack the charisma of bigger endangered animals like tigers. But The disappearance of the four species is of concern as all four they once occurred in great abundance in India. The Gooty Tarantula (also metallic tarantula or peacock tarantula), was plentiful in Ooty, Tamil Nadu.

According to the list, there are just 50 to 249 adult birds left of the Great Indian Bustard that was very common in Maharashtra, Gujarat, Rajasthan and Karnataka. "At least through this list the bird may get some attention. In 1969-70, there were around 1,200 to 1,300 GIBs but with hunting and change in agricultural methods, it's disappearing," says Pramod Patil of Pune-based Great Indian Bustard Foundation.

Source : The Economic Times, 12 Sep., 2012

Need to create awareness about 'Neelkanth', says expert

The farmer-friendly bird declining in number due to loss of habitat and natural feed

Ludhiana: According to a popular myth in Punjab, a person is considered lucky on getting a glimpse of the bird "Neelkanth" (Indian Roller). These days, however, it is rare to see the bird, also called Blue Jay, in the state.

Dr Tejdeep Kaur Kler, an ornithologist from the zoology department at the Punjab Agricultural University, said there had been a sharp decline in the ratio of the Indian Roller, and at present, these birds comprised less than one per cent of the total bird population. Towards the end of the last century, it was a common sight on the fields with a ratio of 3.5 per cent, she said.

The expert revealed that there were two major causes of decline in the population of this bird specie. First, the destruction of habitat, as "Neelkanth" is very selective by nature and chooses high nesting sites. It requires a height of at least 15 metres for nesting on traditional trees like banyan, neem, mango, and peepal. Due to a decline in such mature trees, it is hard for Neelkanth to find natural cavities on trees. This bird, moreover, does not tolerate any other bird on the tree.

The other reason for decline is the decline in its feed. Indian Roller is an insectivore and feeds on agricultural insects and rodents. Due to the use of insecticides, there has been a decline in the number of insects.

To increase the population of the bird specie, the agricultural university is making rural masses aware of its natural habitat. Artificial nests are being introduced for this farmer-friendly bird by the department of zoology.

"People must know that how useful these birds are. We suggest them to protect the birds by making alternative arrangements," said Dr Kler.

Source: The Tribune: 20 Aug., 2012

Wetland gets new lease of life

Gurdaspur: Keshopur wetland, known for attracting migratory birds from Siberia and central Asia, is all set to become a major attraction for eco-tourists as the Department of Culture and Tourism will develop and protect the area.

The Tourism Department has taken this iniative as it has received a loan of Rs 9 crore from the Asian Development Bank (ADB).

Geetika Kalha, principal secretary (Tourism), confirmed this development and added that work on the project would commence soon.

Earlier, the project was mired in controversy with the panchayats of five villages in the area refusing to lease out land to construct the ADB funded Tourism Interpretation Centre, which would come up in an area of 25 kanals, located close to the main wetland.

However, the panchayats of villages Keshopur, Mattam, Daala, and Miani recently passed a resolution to lease out 850 acres of the land to the government. At one stage the wetland was on the verge of extinction with village elders refusing to cooperate with the authorities to save the area, which has been a winter home for many migratory birds for centuries. However, after much persuasion from the wildlife authorities, the panchayats finally decided to lease out the land.

Deputy Commissioner Dr Abhinav Trikha, who is co-ordinating various agencies engaged in revamping the project, said "Wetlands are considered to be one of the most productive aquatic ecosystems. Punjab is home to three internationally acclaimed wetlands - Harike, Kanjli and Ropar - and three others including the Keshopur wetland. It is an important site and had a profound impact on the economy of the villages surrounding it."

As initially there was some scepticism about the project, the Tourism Department in an attempt to

placate the villagers planned a trip for them to the famous Bharatpar Wildlife Sanctuary. They were shown how the project would be financially viable.

Harpreet Kaur, Community Development Officer, said that nature trails, huts, bird heights and pause points would be developed. A Mumbai based design consultant was roped in to create the right ambience for eco-tourists, she added.

Sources revealed that the Forest Department had recorded more than 400 bird species in the Keshopur wetland. Out of these, 45 species of migratory birds numbering over 40,000 visited the area in the winter season, which extended from October to March.

Source: The Tribune: 17 Aug., 2012

NGOs join hands to conserve wildlife

The Rotary Club Ludhiana Greater joined hands with CAPE India (Care for Animals and Protection of Environment) in launching the yearlong campaign to promote the concept of protection of wildlife and preservation of environment.

The project was launched at the Tiger Safari on the Jalandhar bypass. It was inaugurated by divisional forest officer Naresh Mahajan. Signboards were also installed for the promotion of the Tiger Safari, so that more and more people visit it.

Rotary Club president, Dr Arvinder S Nagpal, said people had begun to pay less importance to the welfare of the wildlife these days that also inhabits earth. There are millions of species and sub-species with whom we coexist. However, some species are on the verge of extinction, since their natural habitats have come under threats due to various human-related activities such as deforestation, pollution, chemical poisoning and oil spills.

The Project Tiger, started in 1972, is a major effort to conserve tigers and their habitats. India is home to the world's largest population of tigers in the world, said Naresh Mahajan.

Dr Sandeep Jain, chairperson of CAPE India, enumerated major threats to wildlife like habitat loss, climate change, pesticides and toxic chemical, unregulated hunting and poaching, natural phenomena like floods, earthquakes, volcanoes, lightning and forest fires. Pollution and accidental deaths viz car collisions, air collisions (birds), collisions with ships (whales), etc, are another threats to the wildlife.

Dr Rajinder Mittal, secretary of Rotary Club Ludhiana Greater, said talks regarding wildlife and environment would be held at school and college level, besides awareness marches and sticker campaign.

Source: The Tribune: July 04, 2012

Events

22nd to 24th November 2012

5th International Congress of Environmental Research

Venue: Kuala Terengganu, Malaysia

Organized by: JERAD & UMT

Website: http://www.icer12.jerad.org

Contact person: Prof.Subhash C Pandey

23rd and 24th November 2012

National Conference on Forest Resilience, Biodiversity and Climate Change

Venue: Andhra University

Organized by: CSIR-Indian Institute of Chemical Technology, Hyderabad

Email: ajsraju@yahoo.com;

Contact person: Prof. A.J. Solomon Raju

3rd to 7th December 2012

International Workshop "Biodiversity : the challenge in a changing environment of South-East Asia.

Venue: Maha Sarakham University, Bangkok

Organized by: Maha Sarakham University

Website: http://www.thailand.ird.fr

29th to 30th December 2012

2012 International Conference on Biodiversity and Climate Change -- ICBCC 2012

Venue: Hong Kong, China

Organized by: cbees

Website: http://www.icbcc.org/

Contact person: Mr. Lee

Major Activities of ENVIS Centre

National Evaluation Workshop for ENVIS Centers

ENVIS Centre Staff namely, Mr. Gurharminder Singh, SSO (Environment) & Co-ordinator and Ms. Ravleen Singh, SPO participated in a "National Evaluation Workshop" organized by Ministry of Environment & Forests, GoI on 29th- 30th August 2012 at Disaster Management Institute (DMI) Bhopal, Madhya Pradesh.

The inaugural session was followed by review & evaluation of ENVIS Center's, wherein Centers presented their activities. The State Specific Centers were reviewed separately at two different venues. Punjab ENVIS Centers activities were presented by Mr. Gurharminder Singh, SSO (Environment) & Co-ordinator. The Center's activities were appreciated by the expert committee.

Experts during the Inaugral Session

Mr. Gurharminder Singh SSO (Env.)/ Co-ordinator presenting the activities of Punjab ENVIS Center

Launch of New ENVIS Website

As per instructions of MoEF, GoI the websites of all the ENVIS Centers have been designed on a uniform template based on Content Management System by NIC. With this, the monitoring of work being done by all the Centers would be transparent to the Ministry as well as general public. The website of Punjab ENVIS Centre has been launched in September 2012 with the same URL www. punenvis.nic.in. This new template of the websites is more user friendly.

A View of Homepage of Punjab ENVIS Centre Bi-lingual Website (English & Punjabi)

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Invitation for Articles

Punjab ENVIS Centre Newsletter is committed to collect, collate & disseminate information on 'Status of Environment & Related Issues'. The Newsletter is extensively distributed at the State, National and International levels.

To obtain information from grass root level for further dissemination, the Centre invites articles, review papers, case studies or news items relevant to the subject area for publishing the same in the forthcoming issues of the Newsletter.