

SOME ASPECTS OF BIODIVERSITY AND INDIAN TRADITIONS

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Intimate familiarity and relationship with bioresources of the neighbourhood has been an integral part of Indian tradition. Early man considered plants and animals as his partners in collective management of the biota; he respected, even worshipped them. A modern biologist looks at plants and animals as sources of genes and chemicals for his benefit.

The numerous and traditional material and cultural relationships between bioresources and human race are discussed with examples. These include traditional wild edibles, drugs, fibres, fodders, and ornamentation of body, cultural, mythological and religious relationships, including bioresources in art and literature, and taboos, faith and worship.

The role of faith in preservation of sacred forests and individual species (like sacred Basil or Peepul) is emphasized. Revival of respect for indigenous knowledge and participation of the custodians of this knowledge in management of bioresources is recommended.

Key-words: Biodiversity, India, Indigenous knowledge. Traditions.

INTRODUCTION

In India, in ancient times the knowledge about natural plant and animal life was an integral part of a person's learning. References to numerous plants and animals are found in scriptures, epics, legends, folk tales, songs, and even in proverbs, similies and metaphors.

In simple terms, biodiversity is the vast variety of natural plant and animal life existing in any region.

The biodiversity is usually studied now by taxonomists, who take great pains in collecting, identifying, documenting and describing the elements of diversity. But, the approach usually is very materialistic. A plant or animal is just one unit in their inventory. Plants and animals are taken to possess genes and chemicals and not spirits.

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Their cultural associations are rarely studied, recorded or understood.

HOW ONE LOOKS AT NATURE

A field worker from industrial society looks at bioresources in a forest as a vegetation type, like a scrubland, or plants or animals in groups or associations.

If the publications on biodiversity in India in last five or seven years are any indication, the questions raised, answered or discussed in these studies fall in three broad categories – (a) what elements of biodiversity are found in any region – number of families, genera, species, and varieties, (b) how these bioresources can be exploited, as new sources of genes and chemicals, and (c) how to preserve that biodiversity. Very few researchers and authors have tried to write on the traditional knowledge or perceptions of the local folk and the local man-biodiversity interrelationships.

An indigenous person looks at the tree, forest or an animal with innumerable memories, associations, and anecdotes. He recalls the day when he first visited the forest as a child, his mother offered flowers or fruits at this spot, and a particular tree formed the limits of his clan's hamlets, or of their community forests.

A forest dweller, farmer or folk, i.e. an insider in that environment acquires knowledge and familiarity, and establishes intimate personal relationship with the bioresources, as he sees and feels them, walks by them, sits near them, and presumably talks to them each day of his life. This aspect of biodiversity is invisible and inaudible to most of us.

Some aspects of ancient or traditional knowledge like on Āyurveda are available in easily accessible literature. Much however is not accessible, or studied and understood.

In the terms of simple taxonomic numbers, Jain¹ reported about 110,000 species of plants and animals in India. But, if each human use or relationship with plants and animals is taken as a unit, the total of our material, cultural and symbolic associations with bioresources will be many many times more. That actually is the richness of biodiversity.

Human culture and material uses of bioresources, that is the total human relationships with bioresources, are largely shaped by history, and by physical and social environments (Alcorn)². These relationships cover a very wide canvas, from wild foods, medicines, fibres, fodders, dyes and body ornamentation, etc. to still more important but less understood areas of the social and religious relationships, like beliefs, faith, taboos, worship and even protection and preservation. It is a very vast area of knowledge; but only a few indicative examples are given here.

PLANTS AND ANIMALS IN TRADITIONAL DIETS

Biodiversity for food:

A peep into the evolution of main human need i.e. food is relevant here. The strongest intent and concern of all cultures has been to satisfy hunger. The process has been experimentation, selection, tolerance, acceptance, domestication and improvement of wild plants for food (Johns)³. During the domestication process, several chemical changes took place in plants. Reduction in levels of allelochemicals meant improvement in flavour or reduction in toxicity, and enhancement in allelochemicals meant more resistance to pests or more pharmacological activity. Though geophagy and other processing techniques by early cultures meant detoxification, toxic plants in diets provided some useful nutrients. In many situations, humans favoured toxic and bitter plants, if they had positive pharmacological activity. These cultural processes did influence in the past and still continue to influence the biodiversity in all parts of the world.

In general, man has tried to prefer following characteristics: 1. larger size of edible fruits, grains, tubers, roots or seeds; 2. variability for wide choice; 3. adaptation to a variety of climatic conditions; 4. reduced protective characters, like thorns, spines, toxins, and bitterness; and reproduction vegetatively or by self-pollination.

In all cultural settings, these human preferences have influenced biodiversity at species, infraspecific as well as genetic levels. For example, in India selection activity by man resulted in less bitter Cucumber (*Cucumis sativus*), Bottle-Gourd (*Lagenaria siceraria*), and Luffa (*Luffa acutangula*) (Johns)³.

Depending on their perceptions, needs and environmental conditions, different human groups have used varying criteria for selecting certain wild plants for domestication. This, in turn, has influenced dispersal of cultigens, and evolution of weeds.

Arora^{4,5} has shown by many examples that traditional domestication of wild plants has resulted in gradual but remarkable improvements in their morphology and even edible qualities. A few notable instances are the drought tolerant and disease or pest resistant rice, maize, cold adaptable barley and finger millet, cold hardy non-lodging foxtail and soft-shelled jobs-tears. Among fruits and vegetables, the domesticates show lesser seeds, larger and more tasty edible core, and better yield. Also, traditionally, the forest dwellers and rural people utilise several parts of a plant thereby multiplying the value of bioresources. Good examples are leaves, shoots and also tubers of aroids, leaves, shoots, flowers, seeds and also rhizomes of lotuses and both flowers and seeds of Kachnar. The traditional knowledge about edible products often goes beyond modern

botanical classification, and tribals of Manipur and Mizoram distinguish three types of *Parkia roxburghii*, on basis of tenderness, hardness, pulp quality, and flavour of sap of pods.

A very useful tradition relating to biodiversity has been the tribal and rural convention of keeping kitchen gardens or planting trees and shrubs in courtyards. Arora and Pandey⁶ listed several fruit types, spices, condiments and tuberous or rhizomatous types traditionally grown, e.g. *Allium rubellum*, *Phytolaca acinosa*, *Pyrus pashia*, spp. of *Prunus*, *Sorbus*, *Malus* and *Rosa*, in western Himalaya; *Perilla frutescens*, spp. of *Clerodendrum*, *Alpinia*, *Hedychium*, *Mangifera*, *Docynia*, and *Citrus* in northeast, *Carissa congesta*, *Capparis decidua*, spp. of *Salvadora*, *Zizyphus* and *Cordia* in arid western India, and spp. of *Artocarpus*, *Syzygium* and *Spondias* in peninsular region, This tradition has resulted in conservation and survival of many original native types over centuries. In today's agricultural scene of predominance of few improved varieties, these traditional varieties are important reserves of biodiversity.

The continuing patronage by many tribal and other traditional farmers of favoured cultivars of crops are another major aspect of biodiversity. Ravishankar & Selvan⁷ have listed many instances in crops like rice millets, maize, beans, cucurbits and Amaranths from south India. Many similar instances are available from other parts of the country.

Commenting on traditional biodiversity, Swaminathan⁸ has said:

“The usual criteria for recognising IPR, novelty and nonobviousness, generally tend to ignore the knowledge systems of rural and tribal families, although they are often characterised by a high degree of inventiveness”.

“..... reward the farm women and men who over centuries have helped to conserve and select a large proportion of global genetic diversity in crop plants,. Human selection is as much responsible for genetic variability as natural selections”. (emphasis by present author).

BIODIVERSITY FOR MEDICINE

Studies were made by us^{9,10} on herbal remedies among many traditional societies in India. Among the Kharia of Bihar and Orissa, we observed recipes for three common diseases, viz. gastroenteritis, malaria and joint diseases. The choice of herbs depended on several factors, such as the alternatives available, the reputation of a recipe, past experience in the family, access to the plant, and whether it was used singly or in mixture. These perceptions varied from community to community and even person to person.

Jain¹¹ described plants used in healing bones in India in ancient times, and in traditional therapies even today. Joshi¹² undertook studies among various major tribes of Rajasthan, such as the Mina, Bhil, Damor, Garasia and Saharia, and several minor tribes. He described traditional relationships with plants and also some animals for their abodes, livelihood, food, healing, artefacts, recreation, fine arts, folk proverbs, ceremonies, and faith, in religion or supernatural powers. Joshi¹² has inferred that the folk can (i) correctly guess location of underground tubers from condition of soil and foliage of neighbouring vegetation, (ii) Distinguish even small seedlings of herbs, and they possess variety of such deep knowledge. Boys and girls experiment right from childhood with various plants for suitable fruits, gums, fibres, etc. They found latex of *Jatropha* suitable for bubblegum, not as a chance discovery, but by trial on many gums.

OTHER TRADITIONAL KNOWLEDGE

These folk are quite familiar with the habit of wild life too, and could predict reasonably correctly the presence or absence of major animals in the forest. Many aspects of plant-animal interactions are known to the folk e.g. heavy infestation of red ants on liana of a *Celastrus* species and on *Terminalia arjuna*. They know that a fly locally called 'Pasula' hovers around *Tridax procumbens*.

Cultural associations are witnessed also with specific trees. Garasias believe in a kinship with *Salmalia* trees, and treat the headman of the village as brother of this tree; and his wife as a sister-in-law of *Salmalia*.

Similarly, Borthakur¹³ made detailed studies on bamboo and tree species used by the Mikir of Assam for making indigenous weaving implements, and found that *Bambusa nutans* (Chak), *B. tulda* (Artungso), *Dendrocalamus hamiltonii* (Kaipho), *Artocarpus integra* (Jang-phong-arong), *Dvsoxylon binectariferum* (Khrang-kelok-arong), and *D. procerum* (Khrang) are among the traditionally preferred species.

Certain other traditional associations with biodiversity are:

Trees and forest patches serve as landmarks for past and present events. The form and life cycle of plants and animals provide material for similies and metaphors. These enrich language and literature, e.g. tall like palm; slow like a tortoise and clever like a fox, etc.

Often names of villages, tribes and clans are based on plants or animals; Jain¹⁴ described clan names among the Sors of M.P. (Table 1).

TABLE 1 – CLANS, RELATED PLANTS AND THE MODE OF CONSERVATION

Clan type	Local name of the plant/product	Botanical name	Taboo/conservation and others
Chheyolia	Chheola	<i>Butea monosperma</i>	They worship the plant and do not use it in any form.
Hardua	Haldi	<i>Curcuma longae</i>	Worship, cultivate and eat.
Bhataiya	Bnatta	<i>Solanum meloncena</i>	Do not eat fruits.
Badele	—	—	Do not make any wooden item by own hands, and worship its wooden implements.
Chakaria	Chak	<i>Saccharum munja</i>	Women never use ring made of this grass to put and support water vessel or other load on their heads.
Chandeliya	Chanden	<i>Santalum album</i>	Worship the wood and never use it.
Kentha	Kaith	<i>Feronia limonia</i>	Worship the tree and do not eat its fruits.
Kansoriya	Kans	<i>Saccharum spontaneum</i>	Worship and do not use its rope.
Patele	Pata	(Any wood)	Do not sit on any wooden stool or bench.
Rajoliya	Rajgira	<i>Amaranthus peniculatus</i>	Worship the plant and do not eat its seeds.
Surajmukhi	Surajamukhi	<i>Helianthus annus</i>	Worship and never harm it.
Saneria	Sunn	<i>Crotalaria juncea</i>	Do not sit on the cot made of its fibre.

The phenology of plants effects festivals.

An interesting aspect is the plant and animal forms in ancient art and artefacts. Expression of animals and plants or plant parts in paintings, sculptures, engravings, etc. provide valuable clues to familiarity with biodiversity of certain regions, or preoccupation of the artist's mind with certain species. Critical studies provide valuable clues to evolution of bioresources, their dominance or rarity in different periods and regions (Gupta^{15,16}).

Many ethnic groups have unique traditional ornaments and souvenirs from biological products. Interesting instances of locally fabricated single pan balance and an insulated water bottle were seen in eastern and central India respectively (Fig. 1, 2). A calibrated horn provides arm of the balance. A fruit of watergourd serves as water flask (Jain¹⁷). Ornaments made from fruits, seeds, shells and feathers etc. are a common sight in tribal markets and even in fancy souvenir shops. They provide living to thousands of people (Mehra et al.¹⁸, Jain & Banerjee¹⁹). Tribal girls wear certain dry fruits (as of *Abutilon*) as earrings, many kinds of flowers and feathers in hairdo and pigtail, and many fibres as girdle, necklace or headstrap.



Fig. 1. A youngman using indigenous single pan balance (Mikir-Assam) – Ph. S.K. Borthakur

The work of basketry, wickerwork, natural dyes, painting on walls of houses, ornaments or body ornamentation, and arts and artefacts have primarily been women's traditional domain.

In ancient times, and in some societies even today possession of certain animals (pigs, sheep, mithun, cows and buffaloes, etc.) was a measure of wealth and richness. Even today, biodiversity and knowledge of biodiversity is wealth, but is measured by different standards.

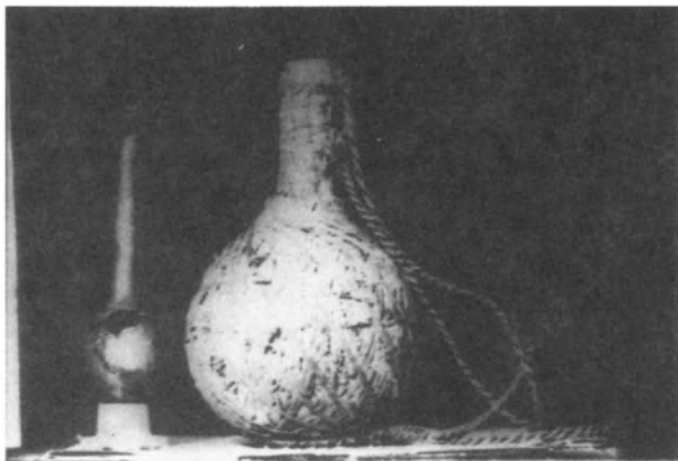


Fig. 2. Indigenously insulated waterflask (Gond, Madhya Pradesh) – Ph. S.K. Jain.

FAITH AND MYTHOLOGICAL ASSOCIATIONS

The belief about origin of certain plants from the body of gods and deities attaches special mythological significance to these species. Dube²⁰ assigns origin of Lotus from navel of Lord Vishnu, of *Acacia catechu* (Khair) to torso of Lord Brahma and of *Aegle marmelos* (Bel) to arm of Lakshmi.

He has also narrated plants related with planets, fasting days, and flowers and leaves associated with offering. Among the plants with significant mythological associations, he lists Mango, Āṅṅlā, Peepal, Banyan tree, Bel, Scholar's tree (*Alstornia scholaris*) Dub grass, Kushā (*Desmostachya*), Basil, Āk (*Calotropis* spp.) Turmeric and 'Brahmkamal' (*Saussurea* spp.).

Plants and animals are associated with gods and goddesses as their symbols, or vehicles (*vāhan*), or favourites, and so are biological entities for various planets. Western literature is also full of such associations.

These associations have one direct relevance to biodiversity; that of recalling and popularising these mythological associations for saving these species or ecosystems from destruction.

It is not widely known or appreciated that traditional associations with plants and animals have enriched languages and literature. Vernacular names of species usually refer to appearance, property, habitat or association with gods and goddesses.

Turmeric has been called 'Shobhna' due to pleasing golden color, *Helicteres isora* as 'Marorphali' due to shape of twisted fruit and use in colic (Maroṛā), *Diplocyclus palmatus* as 'Shivlingi' due to shape of seeds like *Śiva-linga*, Euphorbias as 'Dudhi' due to milky latex, *Centipeda minima* as 'Nakchhinkni', as it is a source of a snuff, *Phyllanthus fraternus* as 'Bhui-āṅṅlā' due to its habit, and *Annona reticulata* as 'Rāmphāl'. Some old and common proverbs too indicate good traditional knowledge of properties of plants, e.g. 'karelā neem chadhā' i.e. a Bitter gourd plant climbing on a Neem (*Margosa*) tree, can be still more bitter.

This is used for referring, e.g. to an undesirable person acting on advice of more crooked persons. Or 'ek anār, sau beemār' (one pomegranate but a hundred sick persons wanting to eat it), refers to a very scarce commodity wanted by too many claimants. 'ām ke ām, guthliyon ke dām', refers to a situation where not only the main product is useful, even its byproducts bring good revenue. 'ulte bāns bareilly ko'. Bareilly has been a major rail head in north India for trade of bamboos extracted from foot hills of the Himalaya. The proverb is used to signify lack of wisdom in sending a product to a region already known for its abundance.

CONSERVATION IN INDIAN TRADITION

Numerous traditional practices among the forest dwellers are clearly directed towards conservation and survival of bioresources. A few examples are:-

Santhals of West Bengal extract tannin from *Emblic myrobalan* (Aonla). They do not cut trees or branches, but only peel bark, that too by rotation from different branches and different trees. The Gonds of central India use wood of *Buchanania lanzan* (Chironji) for making a stringed musical instrument; they do not cut trees or even branches for it, but use only naturally fallen branches.

Similarly, taboos in the tradition of certain societies ensure survival of many economic plants, e.g. taboos on cutting *Madhuca latifolia* (Mahuā), *Butea superba* (Palāshvel) and *Holarrhena antidysenterica* (Marorphali) among Lodhas of West Bengal, and the taboo on plucking fruits of *Zizyphus* spp. (Ber) or pulling out plants of *Evolvulus alsinoides* (Vishnukrānti) before seed dispersal among Santhals of West Bengal. Several more examples are given in Table 2.

The conservation of near original and virgin forests in many sacred groves in India, particularly in peninsula and northeast, are examples of conservation through faith. Some studies have been made by Vartak and Gadgil²¹ on sacred forests or Devrais in India. The flora of Parasnath hills in Bihar has been saved due to the Jain faith of non-injury to any life. This hill is of great phytogeographic significance, like Mt. Abu in Rajasthan; both these hills act as bridge for migration of flora between

TABLE 2 – SOME EXAMPLES OF CONSERVATION THROUGH TABOOS.

Name of Plant	Taboo	Region/Ethnic group
<i>Angiopteris evecta</i>	To remove immature rhizome for eating.	In Assam
<i>Dillenia indica</i>	To eat fruit before a religious ceremony in April.	Santhals of West Bengal.
<i>Emblica officinalis</i>	To cut tree for tannin, peeling bark by rotation allowed.	Santhals of West Bengal.
<i>Mangifera indica</i>	To eat fruit before a ceremony in April.	Gonds of central India.
<i>Melothria heterophylla</i>	To dig whole root; some should be left in ground.	Lodha of West Bengal.
<i>Musa balbisiana</i>	To pluck unripe fruits.	Assam.
<i>Shorea robusta</i>	To cut, except on full moon days in October.	Santhals of West Bengal.

the Himalaya and south Indian hills.

Ramakrishna²² has also described the positive effects of various practices, beliefs and taboos among the folk in conserving several species and landscapes.

Many ethnic groups in India have been practicing shifting agriculture. The practice is called variously like 'jhum', 'bewar' or 'penda'. They slash some patches of forests, burn it, raise mixed crops on the land for some years, and then abandon it, to move to another forest patch. Ramakrishna and his associates have studied the subject of shifting cultivation for several years and profusely published on various ecological and functional aspects of this slash and burn practice. (Ramakrishna^{23,24}; Ramakrishna et al²⁵). They have opined that with regulation, this practice has some positive influences on nutrient and resource cycling, animal husbandry and economic life of the folk.

Traditional knowledge and relationship with bioresources have been largely responsible for survival of biodiversity in India. For better management of bioresources this needs appreciation and respect. Realizing this significance of traditional knowledge, the recently notified Convention on Biological Diversity and Agenda 21 also state:-

CONVENTION ON BIOLOGICAL DIVERSITY AND AGENDA 21

Art. 8(&).... Respect, preserve and maintain knowledge, innovations and

practices of indigenous and local communities embodying traditional lifestyles.....

Art. 10(C) Protect and encourage customary use of biological resources in accordance with traditional cultural practices

Art. 11 adopt economically and socially sound measures

The value of tradition and indigenous knowledge about biodiversity is thus now recognised worldwide.

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