



TRADITIONAL INDIAN STRATEGIES FOR ENVIRONMENTAL CONSERVATION

*Vasumathi Sankaran, Ruby Singh,
Shekhar Singh*

The Authors



Vasumathi Sankaran

Vasumathi Sankaran completed her M.Sc in Geography from Madras University, later did her doctoral thesis under the guidance of late Dr. T. B. Naik former director of Tribal Research Institute, Gujarat. She has been working on resource management issues since then. She joined Indian Institute of Public Administration as a Consultant. She has authored several research papers dealing with the study of water resources, linking participatory mapping with GIS and the use of traditional knowledge in resource management. She had completed a consultancy for world Conservation and Monitoring Center and BSP of WWF/US in Nepal. Edited along with Harry Andrews "Sustainable Management of Protected Areas in the Andaman and Nicobar Islands" supported and published by U.K. Government's Darwin Initiative.



Ruby Singh



Shekhar Singh

Ruby Singh is a freelance writer and editor. She was part of the Raag RTI Study 2008-9, and 2012-13. She has also worked with The World Bank as a consultant editor since 2012, and has done curriculum and content development for IGNOU, and various employability enhancement programs.

Shekhar Singh taught philosophy at St. Stephen's College, Delhi University, the North-Eastern Hill University, Shillong, and at the Indian Institute of Public Administration, New Delhi, where he also taught environmental management. He was Advisor, environment & forests. to the Planning Commission of India, and consultant to various international agencies.

The Artists

The painting of the Banyan tree (*Ficus Benghalensis*) on the cover has been done by **Uma Bordoloi**, as have also the other paintings and sketches in the volume, except for the sketches on pages 41, 42, and 75, which are by the late **Pratibha Pande**.

TRADITIONAL INDIAN STRATEGIES FOR ENVIRONMENTAL CONSERVATION

Vasumathi Sankaran,
Ruby Singh,
Shekhar Singh



Research, Assessment and Analysis Group

C 17A Munirka, New Delhi 110067

2022

First edition: 1997
Revised and expanded edition: 2022

**This is a free access document and can be freely downloaded
and quoted, provided that the source is given in full**

TABLE OF CONTENTS

GLOSSARY	1
PREFACE	11
1. OVERVIEW	15
1.1 Some Basic Questions	15
What is Traditional?	15
Are Traditional Strategies of Conservation Efficacious?	17
How Have These Conservation Strategies Evolved?	17
How Were These Strategies Implemented?	21
How Were These Concerns and Strategies Communicated?	25
Methods of Communication	28
1.2 Various Strategies and Approaches	31
Nomadism and Shifting Cultivation	31
Settled Agriculture	32
Protecting Water Sources	34
Hunter Gatherers	36
Sustainability	37
Ecosystem Specific Strategies	39
Climate Change and Perceptions of Tribals	44
Respect for Nature	48
Ethnocentric Strategies	49
2. CLASSIFICATION AND CATEGORISATION OF TRADITIONAL STRATEGIES	51
Motivating Principles	52
Conservation Objectives	52
Planning and Implementation Methods	53
Relevance Over Time	53

Universalisability	53
Eco Systemic Relevance	53
Levels of Success	54
Conclusions	54
3. MOTIVATIONAL STRUCTURES	57
3.1 Fear	61
Fear of the Supernatural	61
Fear of Losing Benign Supernatural Intervention	66
3.2 Reason	67
3.3 Sustainability and Equity	69
3.4 Ethics	77
3.5 Aesthetics	78
3.6 Love and Respect	80
4. CONSERVATION OF SITES	87
4.1 Sacred Groves and Sites	87
4.2 Shifting Cultivation	92
4.3 Religious Values	98
5. CONSERVATION OF SPECIES	99
5.1 Totems and Taboos	99
Totems as the Basis of Names	102
Totems as Ancestors	105
Other Relationships	108
5.2 Some Commonly Totemised Animals	111
Snakes	111
Tigers	113
5.3 Commonly Totemised Trees	116
5.4 Totemised Medicinal Plants	117

6. CONCLUSIONS AND RECOMMENDATIONS	119
TWO MAPS, A TABLE, & SOME PHOTOGRAPHS	129
ANNEXURES	139
Annexure I: Fisheries	139
Annexure II: Classification of Tribes and Groups According the Characteristics of their Traditional Conservation Strategies-Tables 6-9	141
Annexure III: Practice of Self Restraint	149
Annexure IV: Cattle Herders of Ura	153
Annexure V: Pasture Allocation of the Changpas of Ladakh	157
Annexure VI: More Examples of Resource Sharing	159
Annexure VII: The Bisnoi Tradition	161
Annexure VIII: Religious Linkages of Plants	164
Annexure IX: Distribution of Sacred Groves in India	167
Annexure X: The Baiga Tradition	169
Annexure XI: National Parks/Sanctuaries Attached to Religious and Historical Sites Across India-Table 10	171
Annexure XII: How the World was Created	180
Annexure XIII: Clans, Their Totems and Rites of Passage-Table 11	182
Annexure XIV: Religious Support for Tree Plantation	186
Annexure XV: Warli Art	188
REFERENCES AND BIBLIOGRAPHY	190

LIST OF BOXES

BOX	TITLE	PAGE
1.	Kautilya's Arthasastra	16
2.	Rainfed Farming	33
3.	The Fishing Practices of the Korkus	40
4.	Cholanaicken System of Sharing Resources	67
5.	Regulating the Use of Commons	70
6.	Village Forests	72
7.	Supervision	73
8.	The Purana and Plants	79
9.	The Warli Tradition	81
10.	Hill Kharias of Similipal Hills	82
11.	The Indian Deities' Association with Flora	84
12.	Demojong (Sikkim) - Land of Hidden Treasures	91
13.	Decision to scrap Chu Hydel Project welcomed in Sikkim	92
14.	The Jhumming Cycle	97
15.	Why Totemism	99
16.	Totemism	100
17.	Tribals' Association with Totemism	100
18.	The Proto totemic Background:	103
19.	Comments by Verrier Elwin	106
20.	GADABA	109
21.	DIDAYI	109
22.	BONDO	110
23.	Bura Deo	117

Glossary of Terms and Names

Terms/Names	Meaning/Description
<i>Abhyanjana</i>	Massaging the body with oil.
<i>Agaru</i>	<i>Aquilaria malaccensis</i> Lam. is a fragrant tree, commonly known as <i>agarwood</i> .
<i>Agni Purana</i>	Is a medieval era encyclopaedia. Its 382/3 chapters deal with everything.
<i>Amalaka</i>	<i>Phyllanthus emblica</i> L. is a deciduous tree of the family <i>Phyllanthaceae</i> . Fruit commonly called <i>gooseberry</i> .
<i>Ao Nagas</i>	One of the Naga tribes, from Nagaland.
<i>Aparmarga or Apamarga</i>	Apamarga is botanically known as <i>Achyranthes aspera</i> L. Used as a medicinal plant.
<i>Arogya Pachai</i>	<i>Trichopus zeylanicus</i> Gaertn. A plant used by Kani tribals as medicine to alleviate exhaustion.
<i>Arjuna</i>	The tree <i>Terminalia arjuna</i> .
<i>Asadha</i>	First two months of monsoon season, corresponding to June-July in the modern (Gregorian) calendar.
<i>Ashoka (Tree)</i>	<i>Saraca asoca</i> (Roxb.) W.J.de Wilde, a tree.
<i>Aswattha</i>	<i>Ficus religiosa</i> L. known as the Bhodi tree or Peepul tree native to the Indian sub-continent.
<i>Baigas,</i>	Tribe spread over Madhya Pradesh and Chhattisgarh.
<i>Baisakh</i>	Corresponds to the months of April/May in the modern (Gregorian) calendar.
<i>Bewar/Bewurs</i>	A term used in Madhya Pradesh for shifting cultivation.
<i>Bhadrakali (Bhagavathi)</i>	A Hindu Goddess popular in Southern India, especially in Kerala.
<i>Bhishma</i>	An important character in the epic Mahabharath. Was the supreme commander of Kaurava forces.
<i>Bhomkas</i>	Tiger worshipping tribal sub group from Hoshangabad, in central India, on the south bank of River Narmada.
<i>Bhuitar</i>	Baiga shaman officiating in shifting cultivation ritual.
<i>Bhumij</i>	Tribals belonging to the Munda ethnic group of India. Primarily living in the states of West Bengal, Odisha, and Jharkhand.
<i>Bilva</i>	<i>Aegle marmelos</i> (L.) Corrêa, commonly known as <i>bael</i> , a tree native to the Indian sub-continent. Used in the worship of God Shiva.
<i>Birhor</i>	A tribe of nomadic people living in the state of Jharkhand.
<i>Birjia/Birjia Asur</i>	Birjia, a tribe living in the area surrounding the hills of Jharkhand state, in the districts of Ranchi, Palamu, and

	Lohardanga.
<i>Champak Flowers</i>	Known for its fragrance, these flowers are found on the ever-green tree: <i>Magnolia champaca</i> (L.) Baill. ex Pierre.
<i>Chandana</i>	<i>Santalum album</i> or Indian sandalwood tree.
<i>Chuta Tree</i>	An edible, non-toxic, plant, <i>Jatropha curcas</i> L. which is thought to have medicinal properties.
<i>Daibo</i>	God
<i>Darbar</i>	A ceremonial gathering, usually in the presence of royalty or other dignitaries. Also another name for a court.
<i>Datura</i>	<i>Datura metal</i> L./ <i>D. stramonium</i> L. species of flowering plants. <i>Used as medicine.</i>
<i>Dharbha Ghas</i>	<i>Desmostachya bipinnata</i> (L.) Stapf a special type of grass used in Hindu ritual worship.
<i>Dhumra</i>	Plant mentioned as having mythical origin.
<i>Dihuri</i>	Priest of the Baiga village who starts the ritual for clearing a forest area for use for shifting cultivation.
<i>Gaddis</i>	Nomadic tribe of Himachal Pradesh.
<i>Gandharvas</i>	A class of celestial beings , who are famed as singers.
<i>Garuda Purana</i>	It is one of the 18 Mahapurana texts, and is a part of Vaishnavism literature. See "Puranas" below.
<i>God Nateshvara</i>	The Hindu God Shiva, as a cosmic dancer.
<i>God Sambhu</i>	The name means benevolent or kind. Lord Shiva is known by this name.
<i>God Vivesvara</i>	Lord Siva , lord of the universe.
<i>Gonds</i>	One of the largest ethno-linguistic tribal groups spread over Andhra Pradesh, Madhya Pradesh, Uttar Pradesh and Chattisgarh.
<i>Goti</i>	Belonging to the same 'gotra' or clan.
<i>Gujjars</i>	Nomadic tribe found all over Western and Northern India.
<i>Gurudwaras</i>	A place of assembly and worship for the Sikh community.
<i>Hakkipikki</i>	A semi-nomadic tribe of Karnataka. Hakki-pikki means bird catchers, in the Kannada language.
<i>Haribol</i>	Haribol means, "chant the name of the Lord." Bol means to chant or speak. Hari means, "He who steals away the distresses of his devotees and ultimately steals their minds by His excellent transcendental qualities".
<i>Haritaki</i>	Commonly known as Indian hog plum. Scientific name: <i>Terminalia chebula</i> Retz. This plant has high medicinal value.
<i>Hill Kharia</i>	A semi-nomadic tribe occupying the hill areas of the states of Orissa and Bihar states.

<i>Iksu</i>	Sugar cane. <i>Saccharum officinarum</i> L., a plant used extensively in India, especially as a source of sugar.
<i>Irulibane</i>	Sacred grove in Coorg/Karnataka.
<i>Jaheras Or Jahera Thans</i>	Local names for "sacred groves" in Bihar/Chota Nagpur.
<i>Jaistha</i>	Period corresponding to the hot summer months of May-June.
<i>Jeth</i>	Month of May.
<i>Jhum/Jhumming</i>	Traditional system of shifting cultivation, where trees and vegetation are burnt and crops planted in the ashes. Called "shifting", because any specific area or plot is cultivated only for two or three years and then the cultivators "shift" to another location.
<i>Jitia Tree</i>	<i>Ficus religiosa</i> L. (peepal/peepul) tree.
<i>Juang</i>	An Austroasiatic ethnic tribal group found only in Keonjhar district of Orissa.
<i>Kadamba</i>	Tree having the botanical name <i>Neolamarckia cadamba</i> (Roxb.) Bosser, and the common name: burflower-tree.
<i>Kadar</i>	A hunter-gatherer tribe in the states of Tamil Nadu, Kerala and Karnataka.
<i>Kadlata</i>	Festival celebrated by Oran tribe.
<i>Kans</i>	Sacred groves of Uttar Kannada (part of Karnataka state).
<i>Kapitta</i>	<i>Feronia limonia</i> Linn - wood apple tree.
<i>Karam (Tree) (Festival)</i>	<i>Mitragyna parvifolia</i> (Roxb.) Korth. Commonly called Karam tree, it is at the centre of a festival harvest in Jharkhand, Bihar, Madhya Pradesh, and Orissa.
<i>Karavira</i>	Indian oleander (<i>Nerium oleander</i> L.) a flowering shrub.
<i>Kartikeya</i>	Vedic era God.
<i>Kasa</i>	A shrub, species of the genus <i>Memecylon</i> .
<i>Kasmari</i>	<i>Gmelina arborea</i> Roxb. ex Sm., fast growing deciduous tree.
<i>Kesara</i>	Aromatic plant, probably the saffron, <i>Crocus sativus</i> L.
<i>Khadira</i>	<i>Senegalia catechu</i> (L.f.) P.J.H.Hurter & Mabb. is a deciduous, thorny, tree.
<i>Kharia</i>	Tribe in Orissa, Simlipal.
<i>Kolams</i>	Tribe found in the states of Telangana, Madhya Pradesh, and Maharashtra.
<i>Kanis</i>	A tribe inhabiting the hilly ranges of Kerala and Tamil Nadu.
<i>Konyak</i>	One of the major Naga tribe, inhabiting the Mon district in Nagaland.
<i>Korkus</i>	Tribal group living around Melghat Tiger Reserve. Originally

	hunter-gatheres from Chindwara district of Madhya Pradesh.
<i>Koyas</i>	A tribal community found in Telengana, Andhra Pradesh, and Orissa.
<i>Krsna</i>	<i>Passiflora edulis</i> Sims. This flower has been used traditionally as a herbal medicine.
<i>Kumeri</i>	Shifting cultivation.
<i>Kunda</i>	<i>Jasminum multiflorum</i> (Burm.f.) Andrews or white jasmin, a flower.
<i>Kunduru</i>	An evergreen shrub, <i>Pistacia lentiscus</i> L., cultivated for its resin.
<i>Kusa Ghas</i>	<i>Desmostachya bipinnata</i> (L.) Stapf, is a species of grass, considered a sacred plant. Mats woven out of it are used to sit on while meditating.
<i>Ladakhis</i>	People of Ladakh region, in the Himalayas.
<i>Lasa</i>	Probably a species of the plant <i>Paeonia</i> .
<i>Madhavi</i>	<i>Hiptage benghalensis</i> (L.) Kurz, a medicinal shrub with flowers.
<i>Madhuka/ Mahua</i>	<i>Madhuca longifolia</i> (J.Koenig ex L.) J.F.Macbr. is a prominent tree in tropical mixed deciduous forest. Serves as a source of medicine and food for tribals.
<i>Mahabharata</i>	Sanskrit epic describing the historical war between good and evil.
<i>Mahapat</i>	God
<i>Maldharis</i>	Tribal herders in the state of Gujarat.
<i>Mallika</i>	<i>Plumeria</i> sp. is a flower belonging to the family Apocynaceae, it grows on a deciduous shrub.
<i>Matoli.</i>	During Ganesh Chaturthi, a wooden frame laden with wild and seasonal produce forms a canopy for the idol of Lord Ganesh. This canopy is known as the 'matoli'.
<i>Matsya Purana</i>	One of the 18 puranas. It narrates the story of Matsya, the first of ten major Avatars of the Hindu god Vishnu. See "Puranas" below.
<i>Moksha</i>	The transcendent state attained as a result of being released from the cycle of rebirth.
<i>Mrgasirsha</i>	The months of December-January.
<i>Mundas</i>	Tribe found in the eastern part of India, in the states of Jharkhand, Orissa, and West Bengal.

<i>Muria</i>	A sub-tribe from Bastar district of Chattisgarh. Part of the Gond tribal group.
<i>Muruvaka Flowers</i>	Flower (<i>Vedala cadai</i>) (Not sure) ¹ .
<i>Naga</i>	Various ethnic groups native to the north-eastern Indian state of Nagaland.
<i>Nagachamundi</i>	Snake goddess.
<i>Nagayakshi</i>	Snake goddess. Consort of Snake god Nagaraja.
<i>Naga Kavus</i>	Sacred grove dedicated to snakes.
<i>Nandivalas</i>	Nomadic caste, who entertain with bulls for a living. Nandivalas take their name from Nandi, a trained bull dressed in smart clothes with fringes of jingling bells and bell necklaces. They beg from house to house leading the Nandi and making him nod at the signal of a peculiar note they sound on the drum by percussion with a bent stick.
<i>Nanga Baiga</i>	Name of the Baiga tribals.
<i>Neem</i>	<i>Azadirachta indica</i> A. Juss., a tree well adapted to drought conditions. It's leaves are considered medicinal.
<i>Naktamala</i>	<i>Pongamia pinnata</i> or Indian beech tree.
<i>Nilavara.</i>	Underground cellar.
<i>Nipa</i>	<i>Nypa fruticans</i> , nipa palm or mangrove palm tree.
<i>Nyagrodha</i>	The Banyan tree (<i>Ficus benghalensis</i> L.).
<i>Oaraons</i>	A Dravidian ethnic group inhabiting the state of Jharkhand and west Bengal.
<i>Onges</i>	A tribal group from the island of Little Andamans, in the Andaman & Nicobar Islands.
<i>Palasa</i>	<i>Butea monosperma</i> (Lam.) Kuntze. This tree is also called flame of the forest.
<i>Padmaka</i>	<i>Prunus cerosoides</i> , a Himalayan cherry tree.
<i>Palandu</i>	<i>Allium cepa</i> - onion.
<i>Parvati</i>	A Hindu goddess.
<i>Peepal tree</i>	<i>Ficus religiosa</i> L. This tree is also called 'Ashwatta'.
<i>Phalguna</i>	The month of March-April is 12 th month of Hindu calendar.
<i>Plakshha</i>	<i>Ficus microcarpa</i> L.f. This tree and its leaves are considered to have medicinal value.

¹ Unfortunately, many of the traditional plant and tree names do not translate easily into English and often it is impossible to identify their botanical name.

<i>Prabhu/ Bhagawan</i>	God. Invoking God.
<i>Pradhan</i>	One who leads.
<i>Prajapati</i>	Prajapati is the supreme creator in the Vedic period of Hinduism, who was responsible for the creation and preservation of life. Originally, the term, prajapati, was used in reference to many figures; however, it became a term used for only a single deity. This deity is the lord of all creatures and identified with Vishnu, Shiva, different mythical progenitors, or the personifications of the sun and fire.
<i>Priyangu, Priyanga</i>	<i>Callicarpa macrophylla</i> Vahl is an Ayurveda coolant herb used for medicinal purposes.
<i>Proto-Totemic</i>	Early forms of Totems.
<i>Pulluvas</i>	A schedule caste group in Kerala.
<i>Puranas</i>	Ancient sacred texts. The Puranas are religious texts composed in Sanskrit, orally narrated for centuries before being written down from the 2nd century CE onwards. They are part of the sacred literature of the Hindu faith that also comprise of the Vedas, Brahmanas, Aryayankas, Upanishads, and the great epics.
<i>Rakshasas</i>	A type of demon or goblin. Rakshasas are also called "man-eaters" (nri-chakshas, kravyads). Rakshas is also used to describe Asuras, which are power seeking deities that lack divinity. They are often depicted as antagonists in Dharmic religious scriptures.
<i>Rudra</i>	Rigvedic deity.
<i>Rusain</i>	God
<i>Rusi</i>	Goddess
<i>Sabarimala shrine</i>	A temple complex located at Sabarimala hill inside the Periyar Tiger Reserve. It is one of the most popular pilgrimage sites, having 4-5 million devotees visiting it annually.
<i>Sahariya</i>	An ethnic group of particularly vulnerable people found in Madhya Pradesh.
<i>Saj tree</i>	<i>Terminalia elliptica</i> Willd. found in both dry and moist deciduous forests in south India.
<i>Sala</i>	<i>Shorea robusta</i> C.F. Gaertn. This tree ranges widely, south of the Himalayas. Sal tree resin is burnt as incense in Hindu ceremonies.
<i>Salmalia</i>	<i>Bombax ceiba</i> or Malabar silk cotton tree.

<i>Sami</i>	<i>Prosopis cineraria</i> (L.) Druce, also known as 'ghaf', is a species of flowering tree found in arid regions, particularly in Rajasthan.
<i>Santals</i>	Is the largest tribe in the state of Jharkhand.
<i>Sarnas</i>	Sacred groves from Chotanagpur plateau.
<i>Sarpayakshi</i>	Snake goddess, consort of snake God Nagarajaa.
<i>Sarppam Thullal</i>	Sarpam Thullal (Dance of Snakes) or Nagakalam Pattu, is a unique form of mystical ritual associated generally with ancestral temples or tharavadus predominantly in state of Kerala. From ancient times many family houses in Kerala have special snake shrines called Kavu or Pambin Kavu where this exotic and spectacular ritual performance is associated to, it is generally conducted to appease the snake gods and thereby to bring prosperity to the family.
<i>Savara (Saora),</i>	Ethnic group living in southern Orissa.
<i>Sema Nagas</i>	One of the Naga tribes.
<i>Seven Kanya</i>	Goddesses
<i>Shravana</i>	Month during July-August, devoted to worshipping Lord Shiva.
<i>Shleshmataka</i>	<i>Cordia Dichotoma</i> . Also called Indian cherry, it is a small to medium-size deciduous tree with a short crooked trunk, short bole and spreading crown.
<i>Shudra</i>	Shudra or Shoodra (Sanskrit: Śūdra) is one of the four varnas of the Hindu caste system and social order in India. Various sources translate it into English as a caste, or alternatively as a social class.
<i>Skandha Purana</i>	Largest of the puranas, titled after Skanda, son of lord Shiva and Parvati. See "Puranas" above.
<i>Soma Plant</i>	Unidentified plant of vedic times, the juice of which was offered as oblation in sacrifice. Alternatively, Soma is part of the ancient, yogic and shamanic usage of sacred plants, including tonics, nervines and mind-altering plants of various types as well special preparations of them. Each group, community or geographical region probably had its own Somas or sacred plants.
<i>Sraddha</i>	A ceremony performed in honour of a dead ancestor.
<i>Sthala Vrikshas</i>	Locational tree. Most historic Hindu temples are associated with a tree. The tree is located within the temple precinct. Western scholars have viewed the planting of the trees within the precinct as a means of protecting the environment.

<i>Syama</i>	<i>Ocimum tenuiflorum</i> L. The purple leaved tulasi/Tulsi. <i>Ocimum tenuiflorum</i> , commonly known as holy basil or tulsi, is an aromatic perennial plant in the family Lamiaceae. It is native to the Indian subcontinent and widespread as a cultivated plant throughout the Southeast Asian tropics.
<i>Tagara</i>	<i>Valeriana jatamansi</i> Jones ex Roxb., is a rhizome herb used in Ayurvedic medicine.
<i>Taliyapani</i>	Name of a Baiga village.
<i>Tamala</i>	<i>Cinnamomum tamala</i> , Indian bay leaf, also known as tejpat, tejapatta, Malabar leaf, Indian bark, Indian cassia, or malabathrum, is a tree in the family Lauraceae that is native to India, Bangladesh, Nepal, Bhutan, and China. It can grow up to 20 m (66 ft) tall.
<i>Tila (Til) oil</i>	Sesame oil.
<i>Tinduka</i>	Tendu - The tendu tree (<i>Diospyros melanoxylon</i>) is found widely across central India. Leaves plucked from its shrubs are used to wrap bidi, the poor man's cigarette.
<i>Tulasi (Tulsi)</i>	<i>Ocimum tenuiflorum</i> L. (Synonym: <i>Ocimum sanctum</i> , Tulsi, Tulasi) is a plant in the family Lamiaceae. It is also called Holy Basil. Tulsi is cultivated for religious and traditional medicine purposes, and also for its essential oil. It is widely used as a herbal tea, commonly used in Ayurveda, and has a place within the Vaishnava tradition of Hinduism, in which devotees perform worship involving holy basil plants or leaves.
<i>Tvastar</i>	Tvashttr is a Vedic artisan god or fashioner.
<i>Udumbara</i>	<i>Ficus racemosa</i> L. or cluster fig is native to Australia and tropical Asia.
<i>Uruli Kamazthal</i>	Ceremony, praying for child, conducted in temple.
<i>Usira</i>	<i>Vetiveria zizanoides</i> , cuscus grass.
<i>Vaisakh</i>	Corresponds to a month during April-May (from Apr.13/14).
<i>Vakula Flower</i>	Flower that grows on the tree <i>Mimusops elengi</i> , which is a medium-sized evergreen tree.
<i>Vanis, Kenkris, Oroans Or Shamlet Dehs</i>	Sacred groves.
<i>Vapi</i>	Step-well or small tank.
<i>Varaha Purana</i>	The Varaha Purana is a Sanskrit text from the Puranas genre of literature in Hinduism. See "Puranas" above.
<i>Vata</i>	<i>Ficus benghalensis</i> L., commonly known as the Banyan tree.
<i>Vatapoornima</i>	Worship of the Banyan tree by married women on the full

	moon day in the month of Jyaistha. (May-June).
<i>Vedas</i>	Sacred body of Hindu religious writings.
<i>Venu</i>	<i>Bambusa</i> sp., a large variety of bamboos.
<i>Vidata</i>	Creator
<i>Vilva</i>	<i>Aegle marmelos</i> (L.) Corrêa is a tree native to Indian subcontinent and southeast Asia.
<i>Vibhitaka</i>	<i>Terminalia bellirica</i> is a large deciduous tree in the <i>Combretaceae</i> family. It is common on the plains and lower hills in South and Southeast Asia.
<i>Vow Of Ananga Trayodashi</i>	An observance dedicated to Lord Shiva on the 13 th day of waxing moon in the month of April.
<i>Vratas</i>	It refers to pious observances such as fasting and pilgrimages.
<i>Vishnu Purana</i>	Is among the shorter puranas. It primarily centers around Hindu God Vishnu and His various incarnations.
<i>Warli</i>	An indigenous tribe of western India living in the mountainous as well coastal areas of Maharashtra.
<i>Yagnas</i>	Ritual offering done in front of a sacred fire.
<i>Yakshas</i>	A class of nature-spirits, usually benevolent.
<i>Yanadis</i>	One of the tribes of India, living in Andhra Pradesh.
<i>Yogesvara</i>	Refers to Krishna as the controller of mystic powers.
<i>Yudhishtira</i>	First among the Pandava brothers, as mentioned in 'Mahabharatha'.

As already mentioned in an earlier footnote, the English or botanical equivalents of many of the traditional names for plants and animals could not be found despite many efforts. Also other terms referring to people and objects were also sometimes beyond translation. These include the following:

Amara, Anjana, Arishta, Asuna, Aswattha, Balbaja, Bhandira, Girnjana, Kurndaka, `Parijata, Pindamulka, Saka Vaishyas from Jivika, `Shirisha', Sindhuka, Syandana, Upakama, Varana, Vartaku.



Purple heron (*Ardea pupuria*)

PREFACE

This volume is an expanded and modified version of a report written for the Ministry of Environment and Forests (MoEF), Government of India, and submitted to them in 1995.. On 26th March 1993, Shri R. Rajamani, then secretary of the MoEF had written to Shekhar Singh (SS) of the Indian Institute of Public Administration (IIPA) requesting him to examine issues related to the conservation and sustainable use of biological resources in accordance with traditional cultural practices. He went on to say that:

"As you know, India alongwith several other nations had signed the Conventions on Biological Diversity at the UNCED held in Rio de Janeiro in June, 1992. The Ministry of Environment & Forests is the national nodal agency for the Convention, and has initiated consultations and other activities by way of follow-up. Action points arising from the Articles of the Convention have been identified and certain priority actions have to be taken urgently at the national level. This will, no doubt, require inputs from several concerned agencies and experts in the country.

"The important action points for 'sustainable use' relate to:

- Formulation of measures relating to use of biological resources, encourage their customary use in accordance with traditional cultural practices compatible with conservation/sustainable use.*
- Integration of traditional knowledge, innovations and practices of local communities in the management of protected areas.*

"We would greatly appreciate if you would kindly take the lead responsibility for these action points in association with the other concerned agencies/experts, as the case may be.

"The terms of reference for the assignment are as follows:

- In-depth examination of the issues identified and formulation of plans highlighting specific recommendations including options, implementation mechanisms, time-frame etc."*

SS, along with Vasumathi Sankaran (VS), who is a geographer and a subject matter specialist on traditional methods of conservation, took up the task of providing the required inputs to the MoEF in the form of a report.

A draft report was submitted to the MoEF in 1995, and the final report, after taking into consideration various feedback and carrying out further research, in 1998. This original research was carried out at the Indian Institute of Public Administration (IIPA), New Delhi. In early 2000 both VS and SS left the IIPA, VS moved to Chennai, and SS to the Centre of Equity Studies, New Delhi.

In 2005, VS and SS decided to expand and update the report and convert it into a book. However, there was sporadic progress, given their other preoccupations, and it was only in 2020, with the covid 19 pandemic and subsequent lockdowns, that the final effort to complete this book was made.

Considering VS and SS had been working since 1993, on and off, on this book, it soon became obvious that their approach had become a little jaded and what was needed was a fresh perspective.. Accordingly, Ruby Singh (RS) was invited to join the team, first as an editor, and then as a co-author.

As can be seen, the finalization of this book has been a leisurely journey through material and expert interaction relating to traditional methods of conservation. Given how fascinating the topic is, there has been a hesitation to call it a day. As the authors have not been troubled by the worry of becoming out of date, or having to catch up with the latest events, it has been a fulfilling and truly enjoyable journey.

Acknowledgements

Many people have helped in the preparation of this book. Erach Bjarucha read through an early draft of the book and gave valuable suggestions on its structure and some additional areas of interest.

Dr. Narasimhan, retired professor of Botany, along with Srinivas Balaji, have helped us develop the glossary. Many of the photographs in the book are from the field locations of the work done, among the tribals of Odisha, by Dr. Narasimhan and his student Franco Merlin.

The late Pratibha Pande, who was earlier a part of the IIPA research team, did the sketches on Korcu fishing methods, and the map on Changpa grazing routes. She very kindly volunteered to make these sketches and map as she realized that we did not have photographs to illustrate these.

Neema Pathak, a former member of the IIPA research team, participated in the field trip to Melghat Tiger Reserve and, being a biologist, contributed much to an understanding of the issues involved.

Vishaish Uppal oversaw documentation at the center at the IIPA. She preserved all the papers and mimeos that had been gathered over a long period of time, and ensured that they were accessible when required.

We are grateful to Uma Bordoloi for the painting of a Banyan tree which adorns this book's cover.

Finally, we are grateful for administrative support and help from Vijay Naugain, in the early stages, and to Chandra Kaushal and Rubina Mondal in recent days.

Vasumathi Sankaran, Ruby Singh, and Shekhar Singh
New Delhi
January 2022



Tiger (Panthera tigris)

1.

OVERVIEW

India has a rich tradition of efforts at conserving nature. They emanate from differing causes and motivations, a few made explicitly obvious, but most shrouded in mystery. Multiple strategies have been used, with varying success and differing results.

Changes in values and beliefs, in social structures, and the evolution of science and technology and the cross fertilisation of ideas across communities and nations, have over the ages weakened, and even negated, traditional beliefs and efforts. However enough remains for us to appreciate how much was protected and conserved historically, and would have been most likely lost, but for these traditional concerns and methods.

This book is a preliminary effort at documenting and analysing some of the more important, and effective, traditional strategies for environmental conservation, especially their motivations, scope, and objectives. It seeks to identify the fundamental principles that underlay each strategy and contributed to its success. An effort has also been made to identify lessons that can be learnt from these traditional strategies that are relevant to contemporary efforts at environmental conservation.

The study was primarily carried out through a survey of secondary literature. However, some field visits were made, and various knowledgeable people interviewed.

1.1 Some Basic Questions

What is Traditional?

Perhaps before plunging into the discussion, we need to define how we use the term "traditional" and clarify the scope of this study.

By traditional practices or beliefs, we mean those practices or beliefs that have been passed down from generation to generation, among members of a community. Though it is difficult to set an exact limit to when traditionality ends, especially as many beliefs and practices that are passed down for generations are not considered traditional, while others are. Perhaps the critical consideration is the basis of the belief or practice: where it emerges from. A "modern" source, like for example science and technology, might deprive it of the label of "traditional", even though it is passed down over generations (like brushing one's teeth).

However, where the origins are based, for example, on religious beliefs, or on historical dictums or practices, whose basis for acceptance is more the fact that ancestors believed in and practiced them, rather than any scientific or empirical contemporary basis, there would be an inclination to consider them traditional. In some cases, contemporary scientific evidential or theoretical support might strengthen traditional beliefs without compromising their label of traditionality, but in other cases it might result in their losing their label of traditionality (See Box 1 as an example of traditional beliefs supported by modern science).

Box 1: Kautilya's Arthashastra

"Kautilya, also known as Chanakya, was a minister of Chandragupta Maurya (321-297 BC). The book *Arthashastra*, written by Kautilya, is a treatise on government and economics of ancient India.

"Among other things, *Arthashastra* maintained that people knew about rainfall regimes, soil types and appropriate irrigation techniques in specific micro-ecological contexts.

"*Arthashastra* demonstrated Kautilya's perceptions and concerns about living creatures - domesticated and wild animals, plants and other vegetation. Penalties and punishments were specified for injuring living creatures. Special positions were occupied by directors of forests, supervisors of animal slaughter, superintendents of cattle, horses, elephants, and pastures. These officials protected wildlife, ensured proper rations for pets and other domesticated animals, regulated grazing, prevented poaching of wild animals, ensured proper care of domesticated animals, etc. Individuals were supposed to follow norms about their dealings with domesticated animals.

"Non-agricultural lands were sometimes used for animal parks, where animals were given full protection. In these sanctuaries, capture or killing of animals was prohibited. Lists of protected animals, fish, and birds were found which evidenced scientific knowledge of biodiversity. Village head-men were made responsible for preventing cruelty to animals in village communities. Details of care, training, and treatment of horses, elephants and cows had been indicated.

"According to Kautilya, the king was supposed to protect forests and elephant habitats. Forests were considered a valuable resource; forest products were to be used in a sustainable manner and factories were to be started for manufacturing goods from forest produce. For cutting any part of a tree, fines of variable amounts were imposed on the offender, depending on the types of injury. Emphasis was given particularly on those which bore fruits or flowers, or provided shade. Among material forests, one which was large, full of resources, accessible and watered by a river was given more importance, because it could be a shelter in times of trouble." (Bhattacharya 2004)

In short, there is no modern scientific definition of traditionality that can be universally applied to all practices and beliefs. We have to feel our way around, as we have tried to do in this book. Though we have not defined any cut-off antiquity, the strategies and beliefs we discuss here as traditional are invariably, in their origins, prior to at least the twentieth century. Also, though many of these traditional strategies

might have religious roots in various faiths, we have attempted to discuss them secularly, in so far as that is possible.

Are Traditional Strategies of Conservation Efficacious?

When looking at traditional methods of conservation, what is most striking is their efficacy. Even today, after a hundred years of degradation, some of the best-protected areas in India are those that were protected by traditional communities as sacred sites. Of the many strategies used by traditional communities, the three that would be discussed here are:

- The protection of sites as sacred
- The recognition of taboos relating to nature
- The special status given to totemic species

Perhaps one fundamental question that needs to be asked and answered is: 'Were traditional lifestyles deliberately, or only accidentally, oriented towards environmental conservation?'

A bulk of the Indian literature on the subject seems to suggest that these were deliberate conservation strategies adopted by traditional communities (for an example of this see Box 1: Kautilya's Arthashastra).

However, considering that very often the explicit purpose of these strategies was not conservation but mainly to appease the gods and spirits, some further explanation is required.

Popular belief has it that members of traditional societies, or at least some among them, had the wisdom to recognise that various sites and species needed to be protected and conserved for the benefit of humanity. Also, recognising that the stipulation that these sites and species need to be conserved merely for human benefit might not be incentive enough for the common folk to honour the stipulation, the wise men and women of such societies associated divine imperatives with those of conservation. Consequently, human beings were forced to conserve what needed to be conserved, under threat of godly or spiritual displeasure and retribution.

The evidence available can also, nevertheless, support the alternate thesis that the attitude traditional communities had towards such sites and species was out of reverence and respect for the gods and spirits. The fact that this led to the conservation of the environment was only an incidental benefit.

How have these conservation strategies evolved?

Perhaps the first set of questions that needs to be answered regarding traditional conservation strategies concern their initial evolution:

- i) Who formulated these strategies?

- ii) What was the need for such strategies?
- iii) How was any particular strategy determined to be effective and optimal, in so far as it was?
- iv) How was the acceptance of a strategy by a community, and the participation and co-operation of members of that community, ensured?

Many of these strategies date back to hundreds, if not thousands, of years, and have been passed down from generation to generation, hence their classification as 'traditional'. But, as a result, very few records have survived, even if they ever existed, that help to answer any of these questions. So, what follows is a narrative, based on speculation and a few scattered clues, describing one possible way in which social and individual imperatives for conservation evolved. Unfortunately, no direct evidence is available to support this version, and contradictory evidence also pops up from time to time.

To take the well-known example of sacred groves, at one level there were, and are, myths and beliefs that the gods or other supernatural entities decree what areas should be treated as sacred. They also decree the response that such sacredness demands from the local communities, and presumably from all others, including a conservation imperative whose violation would invite the wrath of the gods and spirits.

Many examples have been recorded of experiences that reinforce people's belief that transgression of the rules associated with sacred places can bring down upon them swift and cruel punishment. Such experiences further lay a basis for fear-based conservation. Stories of punishment meted out to people who transgressed rules are many. For example, according to Mitra et. al. (1994)

"Religion seems to have pushed the principle of conservation. and this is where the word sacred becomes significant. The gods, or rather the communities, don't tolerate transgressions of sacredness or violations of their sanctuaries. The mediators between the ordinary and the divine are the priests, who interpret the punishments. The priests are fed and respected by the community.

"The gods can be very malevolent; such hostility is reserved for outsiders who challenge the deity's authority. Says Moghaji Mahadu Langhe, the pujari of a 2-ha deorai of Ahupe village in the Bhimashankar Wildlife Sanctuary near Pune, "Bhimaji Shedke of Rajawadi came here once five years ago and challenged the authority of the devta. He broke a leaf, but on the way back he suffered an attack of severe itching and began to vomit blood. He was told to

ask for the devta's forgiveness. He rushed back and did penance and was saved."

Interestingly, the ecological reason why a particular area or specie needs protection, or indeed why a certain type of activity must be followed or desisted from, is very rarely, if ever, given.

One could perhaps speculate that the power and absoluteness of a divine decree might have been compromised and weakened if it was seen to have a worldly, causal, reason which could then be evaluated and perhaps discounted. Therefore if, for example, a forest was decreed to be left untouched and it was revealed that this was to ensure regular rainfall and regulated water flows, then perhaps the community might be tempted to individually or collectively decide that at any given time exploitation of some of the forest resources was worthwhile, even if it meant some reduction or disruption in water flows.

It is perhaps for similar reasons that most divine dictums have no reasoning or causality attached to them, thereby causing priests of all religions to often observe that god moves in mysterious ways!

Where seeming divine dictums have very human origins, as arguably is always the case, it is in the very nature of the logic of divine intervention that details of the social and the very human processes that went on behind the scenes are never revealed, lest their revelation weakens the force of the divine imperative. Consequently, no details are available of what actually caused 'wise men and women' to formulate these dictums, and how the decision to float them as divine interventions was taken.

Speculation about the reasons behind the creation of sacred groves, or of other such traditional institutions for conservation, throws up interesting questions. For example, given the social reality of the time, it could be postulated that a small group of people, representing religious and other institutional authority in the society, decided that specific areas or species must be conserved. They also recognised that perhaps the most effective way to ensure this would be to invoke divine sanction. Clearly, given the theological beliefs of the time, this would have had at least three advantages over the more mundane strategies:

- i) There would neither be a need to have a troop of watchers to ensure compliance with these divine sanctions, nor another group of people to watch over these watchers, as by common belief the gods and other supernatural entities were always watching, and watching everyone.
- ii) There would be no need to waste resources and time on a complex and perhaps corruptible judicial process, to try and convict the

offenders. Under divine management, anyone who violated the laws of the gods would be speedily and appropriately punished. Presumably, there were enough diseases and other misfortunes in traditional societies to be able to constantly demonstrate that the gods were watching and that there was no escape from their justice.

Characteristically, in most cases, the belief that great evil would befall anyone who violated divine dictums was very powerful. In rare instances it was so powerful that if persons began to believe that they were defaulters, they often became ill and sometimes even died, all because they so strongly believed that this would happen to them. There are many recorded examples of what can now perhaps be explained as a self-satisfying prophecy.

*"Stories of exemplary punishments meted out have become legends over time, deterring potential violators. Jana Harku Asavala of Kondhre village in Pune district believes his mother began losing her eyesight because he cut a jamun (Syzgium cumini) tree from the sacred grove 15 years ago and sold it. Says Asavale: "The pujari (priest) pointed out that I had offended the devta (deity). Everyone told me to ask him pardon. I went and offered coconuts and chicken and the deity was appeased. My mother's eyesight became better." [Mitra et. al. *ibid*]*

- iii) The invocation of divine authority also saved the leaders from having to explain to the people in any detail why these areas needed to be conserved, and to what extent and level. This saved them from the many debates that we see today on the need for protected areas, or between environment and 'development'; or between different viewpoints among the environmentalists themselves.

Of course, there always remains a possibility that some or many of these conservation areas were not set up with benign intentions but were actually created to protect specific, vested, interests. For obvious reasons, information about such 'hidden' objectives was never made public, and has not therefore been handed down. In the euphoria that now exists regarding the wisdom and the inherent ethicality of traditional methods of conservation, it becomes difficult to postulate a thesis regarding traditional conspiracies by a few against the many. Also, as in most parts of the country such sites are today perhaps the only pristine ecosystems remaining, it is difficult to unravel what sinister purposes, if any, were behind their initial setting-up.

But all said and done, given today's scientific understanding, it seems incredible that people hundreds, sometimes thousands, of years ago managed to protect what appear today to be among the most critical sites and species. Whether this was a matter of knowledge or a matter of chance, is another fascinating area of study. Perhaps all that can be said is that today we know of only those societies who had the wisdom (or the good luck) to adopt such strategies and protect such sites and species. We know very little of those who did not and therefore have not survived to tell the tale.

How were these strategies implemented?

How did a society or the rulers of a society manage to ensure that the rules and principles laid down under these strategies were followed over time and by everyone?

Phase 1: Divine sanctions

As already mentioned, there were great advantages in having divine support for unpopular policies. However, the interesting question is how this divine support, or perhaps the myth of divine support, was established and maintained.

Characteristically, where societies had less evolved structures of social administration, the intervention of human agents in enforcing the will of the gods was minimal. In these 'primitive' societies any misfortune or illness, of which there were many, was taken as a demonstration of supernatural wrath. In most cases the victim had, or believed that he or she had, already done something that was in violation of divine dictums. Therefore, there was little reason to doubt that the illness or loss was a swift and harsh retribution. In those few cases where the victims did not accept that they had done anything to deserve this, the fact that there was retribution from the gods was considered better evidence than their denials. Consequently, they were branded as having sinned twice, once when they disregarded divine edicts and again when they falsely protested their innocence. In some cases, actions of past lives were also invoked as a part of the theory of *Karma*², to explain the basis of the misfortune.

Individual misfortunes were not the only types of evidence offered for establishing a belief in divine retributive power. Natural calamities

² A thesis that argues that the actions of earlier lives determine what happens to a person in this life, and sins of past lives are often punished in subsequent lives.

like earthquakes, floods, droughts, storms, forest fires, landslides and many such, which affected the whole community, were also postulated as retribution of god or nature, on those who defied the law. Very often the ire of the whole community was focussed on those few who were suspected of having brought such misfortunes down on the heads of everyone.

Phase 2: Growth of the scientific temper

Interestingly, as social organisations evolved and there was a growth of what is often called the 'scientific temper', the hold of divine imperatives began to weaken. People started finding other explanations for natural and even certain non-natural phenomena and began to question whether these really were retributions unleashed by the gods. The rulers responded by developing new social institutions aimed at ensuring that 'god's will' was respected. Rather than leaving punishment and retribution directly to the gods, these institutions became agents and claimed that they derived their authority and power from the gods.

In these 'less primitive' social groups, rather than wait for divine retribution, human beings themselves began to inflict punishment on those that violated divine edicts. This was, of course, also an admission that god was not always able to look after his or her own affairs and that human help was required. However, it also brought in at least some elements of the disadvantages inherent in systems administered by human beings. Though there was still no need to justify the demands of conservation, as these continued to be held up as divine edicts, there was now a need to watch over the people and to catch the guilty, as only then would human, though not always humane, punishment be possible. Also, very soon there was a demand that due process of law be set up by which the guilt of the accused could be demonstratively established, as humans could not claim the same infallibility that was the right of the gods.

In some cases, human rulers attempted to take on the mantle of the gods and claimed not only infallibility but extra sensory methods of knowledge. One example is the Devaraja order in medieval Southeast Asia. "Devaraja was the religious order of god-king or deified monarch in medieval Southeast Asia. The Devaraja order grew out of both Sanatana Dharma (eternal order of duties) and separate local traditions depending on the area. It taught that the king was a divine universal ruler, a manifestation of Shri Bhagwan (God)" (Wikipedia). The concept viewed the monarch to possess transcendental quality, the king as living god on earth .

Though these practices sustained for a while in some societies, they were far more difficult to impose over time and, almost everywhere, more objective processes were demanded and finally conceded.

In this process, the distinction between those strategies which worked purely out of fear of the gods and those where the fear of society or social institutions was the main motivation, became blurred. There was also a consequent blurring of the distinction between strategies fully implemented by an individual or a small select group of rulers, and those that increasingly required participation of the general public.

Phase 3: Growing incidence of violations

The next inevitable phase was the questioning of the very basis on which it was decided that an area or species was to be conserved, and the level to which it would be protected. But this came later.

In the transitional period, there appeared to have been growing incidents of the violation of the rules of conservation, whether divine or human made, and whether directly communicated by the gods themselves or indirectly through their human agents. Very often, such violations were a result of the survival needs of the desperately poor people who had little choice but to use the natural resources around them. The fact that their poverty was very often a result of the oppression unleashed on them by the same elements that were also asking them to conserve nature, made the call of conservation more suspect.

As usually happens, when large scale violations of the law started taking place, people started questioning the very basis of the law and whether there was any justification for it. That this was the will of the gods, as the sole reason, could not stop this process of questioning for long. Therefore, other reasons started being invented.

In the initial stages, the justification very often continued to be in the supernatural realm but was made more personalised. For example, the earlier explanation that these forests were the abode of the gods gradually transformed into or began to include spirits of the ancestors. This meant that anyone who was violating the rules of conservation and protection was showing disrespect not only to the gods but to his or her ancestors and was making 'life after death' of his or her father or mother more uncomfortable, even hellish.

"In Meghalaya in the north-eastern hill region, for example, many sacred groves are still well protected through the religious belief that local gods and ancestral spirits live in the groves (in spite of the advent of Christianity and decline in the traditional value system). The removal of plants or plant parts is considered to offend the ruling deity and to lead to local calamities." [Ramakrisnan 1996, See Annexure 19 'Distribution of Sacred Groves in India']

For a while this personalisation of the rationale effectively re-imposed the checks and balances sought to be established. However, in

many places, sooner or later, there developed more worldly justifications for conservation.

These came in the form of the principles of sustainability which, in varying forms and with some transformations, have survived till today. Linkages were sought to be established between climate, especially rainfall and other aspects of the hydrological cycle, and the conservation of specific ecosystems. To a humanity almost entirely dependent for its survival on rain-fed agriculture, these were very powerful arguments for conservation. The fact that many of these arguments might not have stood up to scientific or even in-depth scrutiny, did not necessarily detract from their persuasive value. This was partly because the notion of a general, all powerful, multi-disciplinary god was transformed into one of subject specific gods. So, there was a god of rainfall, a god for rivers and streams, and a god for lakes and ponds, all of whom desired the conservation of ecosystems in order to continue to be benignly and fully functional. For example:

"...the area below Mount Khangchendzonga in west Sikkim, referred to as *Demojong*, is the most sacred of all, being the abode of Sikkim's deities. The air, soil, water and biota are all sacred to the people of Sikkim, because of the interconnections that are perceived to exist between them. Any human-induced perturbation is considered to spell disaster for Sikkim as a whole, because disturbance will have been caused to the ruling deities and the treasures." [*Demojong: land of hidden treasures*, Box 12, Ramakrishnan 1996]

Gaps in scientific knowledge and understanding, and the lack of public commitment to conservation for its own sake, were more than made up by invoking spirits and deities. But, as knowledge increased and the fear of spirits decreased, the efficacy of such strategies also declined. Most societies have moved from traditional, authority based, structures to those that demand greater transparency, rationality and accountability. Conservation imperatives have also accordingly adjusted. Therefore, the third and final phase in terms of the motivating principles for conservation can be seen as the phase where economic incentives become pre-dominant.

Phase 4: Social evolution

There is perhaps a fourth phase where certain social groups, usually the powerful and well to do, have developed an ability to meet their own economic needs through utilisation of natural resources belonging to other social groups, usually the poorer and less powerful ones. For such societies, conservation imperatives come at least partly

from a fear of closing future possibilities and opportunities for their own opulent and exploitative lifestyles. However, such motivations seem to be mostly missing from traditional societies, especially given their limited ability to reach out and utilise other people's resources.

For such traditional societies, in so far as they are solely or primarily dependent on the renewability of their immediate ecosystem for their survival, the need to conserve these is paramount. This is especially because such societies have little ability to either manipulate natural ecosystems or to use resources which are not in their geographic vicinity.

How were these concerns and strategies communicated?

Oral tradition of Tribal People

Many of the tribal societies in India have a low literacy rate. The information they gathered by observing their surroundings and the skills honed by practice were passed to their progeny by oral tradition or word of mouth instructions. Therefore, their history is not written but oral and it is kept in the form of poetry, songs, proverbs, stories, narrative dances and various rituals. Their historical and cultural information are passed on from one generation to another through some of these means. Different means of storing information by oral and non-literate societies are:

Memory: the use of poetry, songs, riddles and proverbs.

Symbols: the use of color, art, paintings, carvings, symbols.

Stories: the use of stories, dramas, and narrative dances.

Rituals: rituals are the enactments of their fundamental beliefs and speak of their ideas through actions.

"In oral societies written forms of information and communication have very little value, whereas personal encounter is a basic requirement. Humans must have been communicating amongst themselves before the invention of script. Even after the invention of script - the use of which was likely the preserve of a privileged few - records of events, epics, traditions, stories of valour, songs, etc., were plausibly passed on from generation to generation through oral tradition. Another characteristic of oral tradition is its strong religious and cultural basis. Observation and participation are an important part of the learning process. Longtime observation goes into compounding the data. Many decisions of groups of people are based on this information."

(Source: https://en.wikipedia.org/wiki/Oral_tradition)

Importance of Oral Tradition

It is important to study and document oral tradition as it is fast disappearing due to acculturation of tribes. World's best biodiversity conserved areas are often places where indigenous communities (tribals) lived. Their knowledge helped the conservation and sustainable use of biodiversity and this knowledge needs to be recorded for future use. Recognizing this, article 8(j) of Biodiversity Convention of 1992 stresses the need for documenting oral traditions and promoting their application and ensuring equitable sharing of benefits generated out of using such knowledge. Current environmental laws allow the patenting of such traditional knowledge.

Use of such knowledge generates income for the people who are its repositories. The income is accorded to the tribal group which had acquired such knowledge from their elders. One recent example of such benefits reaching the people's group who traditionally knew of the use of herbs growing in their territory is that of the Kanikudi Tribal Cooperative.

The Kanis of Western ghats have been traditionally using a plant called *Arogya Pachai* to protect themselves from fatigue. Dr. Pushpangadhan, of the Tropical Botanical Garden and Research Institute in Kerala, published this information and patented the plant in the name of the Kanikudi tribal cooperative, in 1997. Since then, they have been receiving royalty from people who use this plant to prepare tonic or medicine.

There are laws and institutions in position now to safeguard the interests of the tribes and groups who have preserved traditional knowledge and practices related to human well being. According to a former MoEF secretary, biodiversity piracy means acquiring resources specific to India and exporting them for commercial development without permission from authorities or paying royalties to local communities concerned. In a village in Mahbubnagar district of Andhra Pradesh, a Japanese company had procured barks from a local variety of tree for export, but did not get permission from the National Biodiversity Authority of India. Based on a complaint, the GoI came down heavily on them and they had to pay royalties to the village panchayat.

Story telling is one of the chief means of conveying accumulated observations, as recorded by the famous anthropologist Verrier Elwin. The cult of tree worship is old. This is borne out by a seal discovered in Mohen-jo-daro, now in Pakistan, which depicts an *Aswatha* (*Ficus*) tree being worshiped. This seal dates back to 3rd or 4th millennium BC. The worship of trees is understandable as they not only provide food, shelter,

medicine and fuel, but also forests transpire moisture, thus helping in cloud formation, and rain, which is very important for an agricultural economy. In India a variety of plants and animals are considered sacred by one or more communities and therefore never destroyed. One such widely protected species is the *peepal* tree. Other species of the same genus were also considered sacred and were not felled. It is notable that now the genus is considered to be significant in that it is important in the overall maintenance of tropical biological diversity - a keystone species. Among the tribals, hunting of animals in certain seasons was not allowed. This season invariably was the breeding season. Many trees in villages are protected as abodes of spirits. Certain habitat patches may never be harvested.

Taboos are handed down from generation to generation while gathering food or dealing with natural elements. The example of the Onges of Little Andamans gathering edible roots and yams is described by Cipriani. Ritual offering was a developed institution in tribal societies. The ritual of snake worship in Kerala is an oral tradition. Serpent worship in Mannarsala is conveyed to each generation through the ritual art of 'sarpam thullal'. Women go into a trance to interpret the naga's wishes while being accompanied by the chants of 'pulluvass'.

Berale - Community Hut of the Onges
(Photograph by Vasumathi Sankaran)



Methods of Communication

Tribal education relating to environmental conservation is mostly through music and dance. Living in bachelor houses or 'gotul', the tribal youth learns many useful things. This is the place where younger people learn their music, dance and community work.

Many authors have quoted the animal ballets of the Juang (Orissa) tribe as a good example of this. The dancers enact the exact behaviour of the animals in these ballets. Likewise, historical events, mythological stories, etc., all learnt by rote, are sung by illiterates. There are songs for every occasion and every chore to lessen the burden of the task or for mere merriment. All these are passed on through oral tradition.

The tradition of making children commit to memory is a continuation of this process. Oral traditions were also passed down through the art of drawing and painting but mostly preserved in the caves. Bhimbetka in Madhya Pradesh is a fine example of cave painting. The rock shelters and caves of Bhimbetka have a number of interesting paintings which depict the lives and times of the people who lived in the caves, including scenes of childbirth, communal dancing and drinking, and religious rites and burials, as well as the natural environment around them.

Serpent worship in Mannarsala in Kerala is conveyed through the ritual of Serpam thullal. Women go into a trance to interpret the naga's (serpent's) wishes while being accompanied by the chants of the 'Pulluvas'. Verrier Elwin has compiled a volume of tribal myths. Some of these myths seem more than entertainment; they seem to convey



important information. Intra tribal education is mostly through music and dance, while living in 'bachelor' houses or "Gotuls". The tribal youth learn many useful things. This is the place where younger people learnt their music, dance and community work. The role of song and dance in the life of Juang show how sentiments and tribal ethics are transmitted (one such song is quoted below). From Khajuria village comes a song used during the Margo Pario or Deer Dance. The hero is a Savara

(Saora), but the song is sung by Juang, describing one of the methods of their hunting. It is interesting to note that the singer looks at the situation from the point of view of the animal.

"Taravali the deer wanders to graze,
 By strength of Mahadeo the deer is not afraid
 Taravali the deer is pregnant
 There is a child in her womb, with her are little deer,
 Daibo's work who can describe?
 What He has written on man's forehead
 According to his work his fate will be;
 According to his fate the life comes and goes;
 Good or bad the life comes and goes.
 One day the deer went to graze in the forest
 Biropakhoy Savara found her there
 He saw her and the little ones with her.
 He called on Vidata and struck his forehead with his hand
 "for three days I have been hungry and now I have found meat
 I will shoot and fill my belly today.
 For my brothers and relatives I will keep some of the meat.
 I will fill my belly and keep some meat for my grandson."
 As he said this the Savara's mind was pleased.
 Remembering Vidata he spread his net around
 He lit a fire behind and sat by the place of escape.
Le le le he sent his dog to chase the deer
 The deer was anxious, it was eating nothing.
 When it heard the noise it began to think.
 'If I go to the front I will be hit by an arrow,
 If I go to the side I will be caught in the net,
 If I go behind I will be burnt in the fire'
Le le the noise came loudly to her ears.
 'If I go to the front I will be shot with the arrow'.
 'Beat her strike her hold her'
Le le the dog comes running.
 Looking around the deer feels terrified.
 She falls senseless to the ground and thinks
 'How shall I escape from here?
 If I go to the front I will be hit by an arrow
 If I go to the side I will be caught in the net,
 If I go behind I will be burnt in the fire,
 If I stay where I am, the dog will catch me and drag me away.
 I will die and my little ones with me,
 And the child in my belly will die.
 Great sorrow has befallen me;
 Prabhu Bhagawan save me.'

This is the end of the song, but the singers say that when the deer took the name of Prabhu Bhagawan, the Savara's bow string snapped and she could escape [Elwin 1948]. The song indicates the initial reluctance of the Savara to kill the deer with its little ones. But hunger spurs him on. The trapped deer is confused. Invoking god's name she escapes by miraculous snapping of the hunter's bow string. The main idea seems to convey ethical values in hunting.

Lanjia Saora couple



1.2 Various Strategies and Approaches

Nomadism and Shifting Cultivation

One response to the limited carrying capacities of certain ecosystems was to adopt a nomadic way of life. Interestingly, in most ecosystems with limited productivity, like deserts and some mountain ecosystems, traditional societies very often adopted nomadism as a strategy for survival. This in effect significantly widened the area that they could use for meeting their needs and therefore allowed them to use nature and natural resources more intensively than would have otherwise been possible. Most nomadic cycles were also in harmony with natural cycles, so that ecosystems were used at a time when they were least vulnerable and, as the nomads moved on, there was adequate time for these ecosystems to regenerate themselves.

Many non-nomadic communities, like those in the tribal belts of North-east India, Madhya Pradesh and Orissa, also developed similar conservation strategies. They developed a system by which the areas being used for agriculture or grazing were changed from time to time, so that no area was overused and degraded beyond recovery. A good example of this was the traditional system of shifting cultivation or *jhumming*, practised in many such areas. The *jhumming* duration was usually two to three years, after which the area was abandoned and allowed to regenerate. It was many years before the community came back to the same site, and this only when the site had fully regenerated.

As is well known, both nomadism and shifting cultivation became progressively unsustainable as wilderness areas shrunk, populations grew and land use patterns changed drastically. Today, much of the *jhumming* activities in India are unsustainable because of shortened *jhumming* cycles and the resultant inability of an area to regenerate before it is *jhummed* again. Added to this is the fact that the losses incurred due to *jhumming* are no longer considered acceptable because the extent of forests has shrunk drastically.

Similarly, the nomadic wanderings of traditional groups like the *Gujjars* or the *Gaddis*, among others, are no longer thought to be sustainable, as their traditional nomadic routes no longer exist. The land use in areas that they used to visit has changed drastically and is unable to support their needs. There are also multiple demands on the natural resources along these routes and the growing populations in these areas are now not willing to let the nomads have access to these resources.

It was observed that in Rajasthan the nomads could pass through fallow lands once the harvest was over. They were given permission to halt in these fields. The farm-yard manure generated in the fields by

their livestock was adequate return for the owners. Such practices seem to have declined, perhaps resulting in crop residue burning and the consequent air pollution.

In the case of some of the *Gujjars*, as in the case of some of the *Maldharis* of Gujarat, changing circumstances have forced them to give up their nomadic ways and to settle in one location. This has made their interaction with their immediate natural surrounds less sustainable.

Settled Agriculture

However, in much of the country, the traditional method of habitation for the last nearly three thousand years has been settled habitation in a specific site. For communities that practised settled agriculture, their very survival was dependent on developing a strategy that allowed them to use natural resources without destroying or exhausting them. This was especially so in the period before they had the technology to immunise themselves at least partially against the vagaries of nature and to access resources that were not located near them. Most of these communities practised rain-fed agriculture (see Box 2), (which was also their main economic activity. Other economic activities included animal husbandry, and manufacture of goods by artisans, using mainly primary natural resources.

For their agricultural activities the availability of water and of good soil was of primary importance. As ability to access ground water, especially deep aquifers, was very limited; their major dependence was on surface water bodies and on rainfall. There was, therefore, very early understanding of the linkage between vegetation and forest cover on the one hand, and sustainable flows in rivers, streams and springs, on the other.

There was also some understanding of the linkage between forest and vegetative cover, and rainfall patterns, but this was much less developed and was more a matter of belief than of direct knowledge. Use of green manure in the field to replenish the soils was also an important reason for ensuring that there was adequate vegetation near agricultural areas.

Box 2: Rainfed Farming

"Farming is a function of the trinity of land, water, and soil. *Gharasias*, who live in the dry lands with uncertain rainfall, have various strategies for soil moisture storage, utilization and water harvesting. Soil moisture storage has been achieved by them by ploughing a couple of times so that water percolation is easy. For their rainy season crops, they like to add farm-yard manure. This makes the soil porous and granulated, with plenty of space for infiltration of water. Water runoff is minimized by contour ploughing. Bunding and terracing are the other ways for arresting runoff. Soil moisture is utilized to the maximum. Crops like black gram, which do not require much water, are grown on the slopes, and pearl millets which require more water are grown on level lands. Shallow saucer shaped basins are carefully bunded. Clay particles tend to get washed down and accumulate there. The tribals use such plots to grow a coarse variety of rice there. The stagnant water in such plots is thereby used for cultivation. In some areas, apart from rainfall, there is hardly any other source of water for irrigation. First crop is rainfed. If the rainfall has been good, a second crop is raised on residual moisture. Various other techniques like mixed cropping and strip cropping are also practiced, so that varying root lengths can tap water at various levels. Pulses, which belong to the legume family, help in fixing the nitrogen back into the soil. Wooden ploughs are used, which penetrate only for about 24cm." [Sankaran, Vasumathi 1988]

"Agriculture is essential for maintaining high agrobiodiversity. Since this knowledge is part of the local culture where there is diversity of tribal groups, the agricultural diversity is also high. The Jeypore tract of the study area (in Odisha) is known for its diversity of tribal population and also for its diversity of traditional rice varieties.

In the Koraput region, agriculture is a family occupation. Two kinds of lands are used, wetland and dryland. Dryland could be on mountain slopes or fields in lowland where water for irrigation is not available. Wetlands are those fed by streams where rice is the main crop. Millets, sorghum and maize, and dryland variety of rice, are cultivated on the mountain slopes.

Water conservation. Terraced cultivation: Small plots of land for cultivating rice are created by construction of terraces across flowing streams. Boulders are placed across flowing streams so that small plots are levelled for growing rice. Farmyard manure is applied as a base in these plots. The river seems to widen in areas of cultivation and thins out and is barely noticeable downstream of terraces. It once again become a narrow stream immediately after the cultivated area.

"This system has many advantages, since water is not damned or stored, much of the water used for agriculture is returned to the stream. It is not polluted since no synthetic fertilizer is used. Water available for crop is controlled by constructing temporary bunds on the sides, where water flowing from the upper terrace can be diverted and allowed to flow to the plot downstream. Further, no effort is required for pumping water to the field from the water source." (Franco and Narasimhan 2012)

Pest management

Rituals are performed in the agricultural fields to ward off pests. Ritualistic structures left behind in the field harbour a colony of spiders that trap insect pests and act as bird perches.

"Traditional cultivars are generally pest resistant. However, they have strategies to control pests. All the communities in Koraput region rear colony spider (*Stegodyphus sarasinorum*) in the fields. The colonies are translocated to the fields from elsewhere. The spiders help in controlling the pests. The communities perform certain rituals to avoid 'evil eyes' glancing at the crops. Branches of

Ritualistic structures left behind in the field harbour colony of spiders that trap insect pests and act as bird perches. (Photos by M.Merlin Franco)



trees are cut and erected in the fields. Besides these ladder-like structures are erected. After crops are harvested, colony spiders and other spiders are observed on these ladders left standing in the field. These structures also help as bird perches. Insectivorous birds perching on these branches further help in controlling insect pests." [Franco and Narasimhan 2012]

Protecting Water Sources

There are many recorded instances where village communities protected specific patches of forests or sub catchments because they saw them as being critical to their water supplies. In many cases, the watersheds

Terrace cultivation in Orissa. Streams are usually terraced for rice cultivation (photo credit: M. Merlin Franco)



critical to a community were located at a great distance and perhaps nearer to another community. In such cases, very elaborate arrangements were arrived at between the communities to ensure that riparian rights of each community were adequately protected. There was

a belief, in many parts of the country, that the stoppage or contamination of water was among the greatest sins (*pap*) that anyone could commit.

Though this was the general ethos, this did not prevent conflicts and even wars between communities over water. Clearly, though there was the wisdom to understand how critical water was for their survival, there was also the all too human greed to grab as much as one could for oneself. Historically, as today, the control of natural resources finally vested in the strong and the more ruthless, and there are many instances of whole communities being wiped out, or becoming subservient, because they lost the battle for control over natural resources.

"Human perception of the environment is the key to the strategy of survival. *Garasias* are agricultural tribals, who must look after their land and soil well. Knowledge of rainfall and ground water is important. This knowledge is empirical and passed down successive generations. These tribals look for natural indicators of ground water and observe clouds and wind direction to prospect for rain. In the absence of perennial rivers, they depend on ground water from wells. "Water divining", the process of locating ground water, is important for them. They have experienced elders among them who know and locate ground water. Such knowledge is very precious and hence a closely guarded secret. The person who possesses it passes it on to a worthy successor. The principle of water divining is based on observation of natural fauna and flora. An example they cite is the location of white ant hills, which indicate the occurrence of moisture, as ants require moist soil to build their nest. Large trees require both soil and water. Occurrence of trees like neem and bamboo indicates that there is water below. The water table is normally nearer the surface near a river bed. Till a few decades ago, tribals used to dig a pit near the river bed and leave it for a couple of hours, for water to percolate slowly. It would pass through the river sand, and get filtered. They would use this water for domestic use.

"*Gharasias* have developed their own way of prospecting for rainfall by observing the clouds. A large cauliflower shaped cumulus cloud is called *sadau*. The fact that they build up during very hot summer days and give local thunder showers is well known to them. That the grey and layered *Nimbo-Stratus* clouds blown in by the winds from the south-west bring in rain has been observed by them. They know many proverbs that indicate the mechanism of monsoons. They also know when the monsoon is retreating by the

change in the direction of the wind and the occurrence of the white feathery cirrus cloud. They can gauge the humidity in the air and observe the behaviour of insects like ants and amphibians like frogs and prospect for rainfall. Experience has taught them to make best use of rainfall in this dry region." [Sankaran 1988]

Weather prediction

"Kond farmers predict weather by observing laden, a long black earthworm. If they move from low-lying areas to highlands, rains can be expected. Observation of earth-worm movement as weather indicator seems quite effective." [Franco and Narasiman 2012, pg 58]

Water Divining

"A study of the local knowledge of this area revealed the remarkable practice of water divining. The study showed that most of the wells were located with the help of water diviners. Scientifically correlating the location of these wells with Landsat imageries showed that most of them corresponded to lineaments (surface fractures and faults where soil accumulates after weathering and therefore some moisture accrues). A well dug in such a space would contain water. It would be significant here to say that an ancient Indian encyclopedia called Brihat Samhita has a few stanzas in Sanskrit giving directions for locating ground water. It was written by a scholar named Varaha Mihira who lived in the court of Vikramaditya of Ujjain. His time is calculated to be anywhere between 1st century BC to 6th century AD. The principle for prospecting for groundwater was to observe the fauna and flora and give the approximate position to locate a well.

"Field study revealed that the water diviners in the study area knew exactly the situation described in the text. They were illiterate and could not have an idea of what is described in the text. These tribals were locals of the region for thousands of years. This must have been their local knowledge which Varaha Mihira might have collected and after some empirical testing might have included in his treatise." [Sankaran 1988]

Hunter Gatherers

In some parts of the country, especially where soils were poor and agriculture was not enough to sustain the communities, hunting of animals and gathering of wild species of edible plants was again critical for survival. Here, again, traditional communities developed strategies to ensure that critical species were not over hunted or over collected.

"A typical strategy was like the one reported from Little Andaman Island in the Andaman and Nicobar group. Here, the Onges, who love to hunt wild pigs (*Sus scrofa andamanensis*) had developed an ingenious way of ensuring that the pig did not get over hunted in any particular location. Every time an Onge killed a pig, he half broke a branch of the largest tree in the area. This branch then hung half broken from the tree and was a signal to all other Onges that a pig had been killed there recently. No one else would then hunt a pig in that locality but move on to some other locality. After a sufficient period of time had passed, the branch would *totally dry up and fall off, once again opening the area for hunting.*" (Source: Personal communication to SS from late Samir Acharya}

Onge cooking an Andaman Pig
(Photograph by Vasumathi Sankaran)



Communities also ensured that seed banks for plants and animals were protected by, among other things, closing some areas from hunting and gathering, or by banning the killing of animals in certain seasons.

Sustainability

There are numerous recorded examples of strategies where conservation of areas or of specific species was taken up with a clear understanding that such conservation was essential for the survival of the concerned individuals (on private property) or communities (in community areas). What is not totally clear is whether this understanding was adequate for

people to behave rationally or was the imposition of religious or social taboos still the prerequisite.

Clearly, such strategies worked only where community groups were small enough for every individual to suffer if the community suffered as a whole and, also allowed violators of the law to be easily identified. As human communities grew, the advantage of violating a law, to an individual, became far greater than the individual's share in the loss that his or her action caused to the whole community. This became even truer where the size of the society made it difficult for the detractors to be identified or punished. Arguably, therefore, many of these traditional strategies for conservation were effective only where communities were small.

Another factor that supported the effectivity of such strategies was the inability of individuals or communities to substantially change their lifestyles or to integrate with other community groups having drastically different standards. In the modern context, it is possible for communities or individuals to destroy or allow the destruction of the natural resources they have been dependent on, as long as such destruction gives them a basis for an alternate, preferred, lifestyle. For example, natural resources in many parts of the world were owned and responsibly managed by local communities for hundreds of years; these are now being auctioned to the highest bidder as the people want to change their lifestyles from essentially rural, agricultural ones to urban ones. The sale of natural resource has therefore been used to generate the money required to effect this change. The fact that such a change might not be collectively sustainable, or sustainable over a long term, does not appear to be an adequate deterrent.

Perhaps fortunately, these options were not available to most traditional societies. There were instances where a community would willingly hand over its natural resources to another and in return get the means of transporting itself to some other geographic location. However, the new community would also look after these natural resources, as the very survival of the new owners also depended on the protection and renewal of these resources. Besides, these resources had little commercial worth, other than perhaps exchange value, which depended on their being well maintained.

With the advent of industrial technology and industrialisation, much of these equations changed. Natural resources acquired new and distinct uses, hence were increasingly in demand, and transporting them over long distances became not only easier but also justifiable. It also became possible to totally destroy parts of a landscape and to go on to some other place and live a different life there. Consequently, whereas in

the past the protection and conservation of natural resources was the only way to survive, modern technology gave, at least in the short term and to some people, other options.

Along with presenting incentives to destroy natural resources, modern technology also increasingly provided the wherewithals to do so. Increasingly efficient technologies for cutting forests, diverting and damming rivers, fishing and dredging, and for removing whole mountains, were developed. This led to growing changes in land use patterns. Unfortunately, there was no parallel growth in the technology for conservation and regeneration. It is not clear how many of the conservation strategies that were effective in the past can still work in the rapidly changing modern world.

Ecosystem specific strategies

Traditional conservation strategies developed over time in a manner that was appropriate to the ecosystems within which they had to be applied. A broad survey of traditional strategies suggests that special strategies evolved for each of the following ecosystems:

- Deserts and other arid zones
- Mountains and alpine pastures
- Lakes, rivers and other water bodies (See Box 3 & Annexure I)
- Coastal and marine areas
- Forested areas

These strategies took into consideration the ecological requirements of each type of ecosystem. In deserts and other arid zones, given the low productivity of the habitat, conservation strategies were geared at spreading the ecological impact of habitation and sustenance over as wide an area as possible. This was also true of the higher mountain ranges. In coastal regions, as also in areas with lakes, rivers and other water bodies, the focus was on conserving spawning grounds of the fish and preventing over-fishing. There were also efforts to ensure that pollutants did not affect the fish and other marine or aquatic life.

In forest areas, the major thrust was on continuation and regeneration of forests, and on ensuring that no essential species became extinct.

Box 3:

The Fishing Practices of the Korkus

"The **Korkus**, who are fond of fishing, are the western most branch of the Munda tribe. They speak a dialect similar to the Munda language. There is a concentration of Korkus in the Melghat Tehsil of Amravathi district of Maharashtra. There are numerous streams in this area, draining the Satpuras and flowing into the Tapi river. The streams of this region are rocky and full of large to medium sized pebbles. In the riverbed there are deeply scoured basins with perennial pools of water. These pools are called **Doh**. The *dohs* are a source of fish for the *Korkus* during the dry season. The fast flowing but shallow part of the stream is called *kaladi*. The rocks and pebbles at the bottom are called *dhega* or *gotad*.

The *Korkus* practice three traditional methods of fishing:

1. The first method is mostly used by the women. Crab meat is placed in a shallow pot, or *bombochu* as it's locally called, with its mouth covered with a cloth. The cloth covering has small slits which the fish can slip through. The pot is placed in the shallow waters of the stream. The crab meat attracts the carnivorous fish, which enter through the narrow slit and get caught in the pot. Crab hunting takes place at night when people go out with torches. The crabs, stupefied by the light, scurry around and are easily caught. Some of this catch is consumed, and some is reserved to be used as bait for fishing.
2. The second method is to build a small obstruction across the stream, called a *pal*, using small boulders and pebbles. The rivulet now flows through the *pal*. At the site of the obstruction, a cylindrical bamboo basket called *kukri* is tied to one of the boulders. The open end faces the stream flow. The other end is gathered up in a cone. The fish swim in along with the stream water. They cannot escape as to do that they would have to swim against the current, which is too strong to allow this. The smaller fish escape out of the small gaps in the basket. In the morning the fisherfolk collect their *kukris* and are sure to get one or two kilos of fish. The species of fish caught in a *kukri* are *malya* (*Garra mulya*), *gurunguch* (not identified) and *pilum* (not identified). This type of fishing continues for about three to four months, till the river channel dries up. Thereafter, fishing operations shift to the *dohs*.
3. Fishing in the stagnant pools or *dohs* starts when the river channels dry up leaving behind water in the *dohs*. Vegetable poison is used to stupefy the fish, which are then caught easily. One of the poisons used is *kumri*, which is the bark of the tree *Careya arborea*. Palasir (*Millettia auriculata*) is another tree species whose bark is used. Poison is also extracted from the fruits of *Casearia graveolens* (*rivit*) and *Xeromphis spinosa* (*gheta bheta*). The vegetable poison is added to one end of the *doh* which has a raised bund to hold more water. Excess water flows through the other end and near the other end two fisherfolk hold a cloth across, arresting the flow of the water. They leave a small gap on one side to allow the escaping fish to swim away. The poison has the effect of suffocating the fish, which then try to swim away to clearer water. They manage to swim past the cloth to the other side. There, being confined in the narrow pool, they are easily caught. They are either scooped out with the help of a saree or caught by hand. (Sketches of Korku fishing techniques are given below).

The *Korkus* consume certain species of fish including *sule* (*Chana marulius*), *bam* (*Anguilla bengalis*), *gharkya* (*Chana stiatius*), *botri* (*Chana punctatus*), *shivra rohu* (*Labeo fimbriatus*), *bata* (*Labeo bata*), *singara* (*Mystus seengala*), *rengsa* (*Glossogobius giuris*), *dukka* (*Nandus nandus*), *singi* (*Heteropleustes fossilis*), *magur* (*Clarias batrachus*), *chal* (*Chela clapeoides*), *gani* (*Rasbora daniconius*), *gadar* (*Puntius ticto*), *bhuji* (*Colisa fasciata*), *suwa* (*Xenentodon cancila*). [Source: Fuchs 1988, as quoted in Sankaran 1995].

Sketches of Korku fishing techniques

(Sketches by Pratibha Pande ., 1996)

Figure 1: Doh

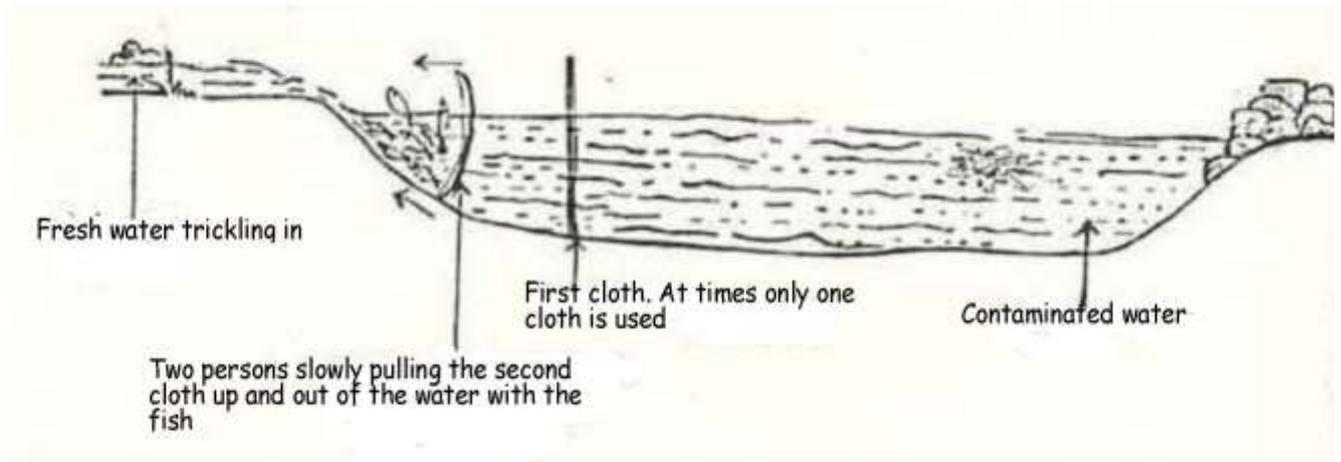


Figure 1a: Doh

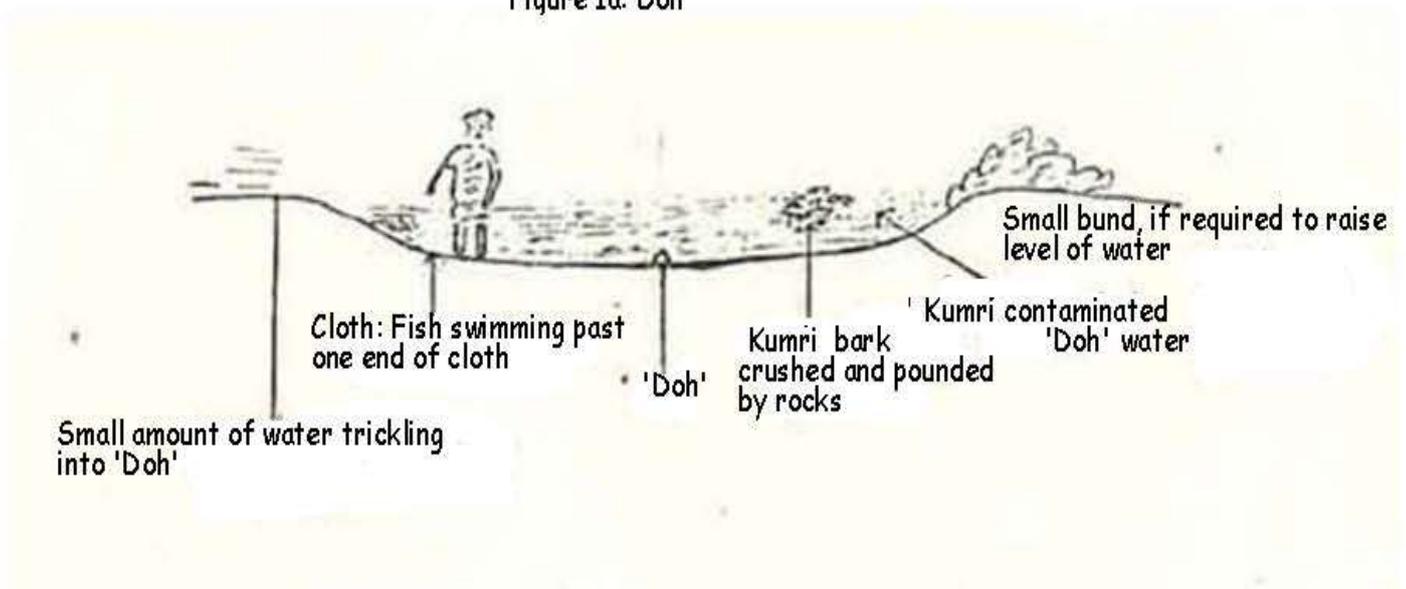


Figure 2: Bombuchu

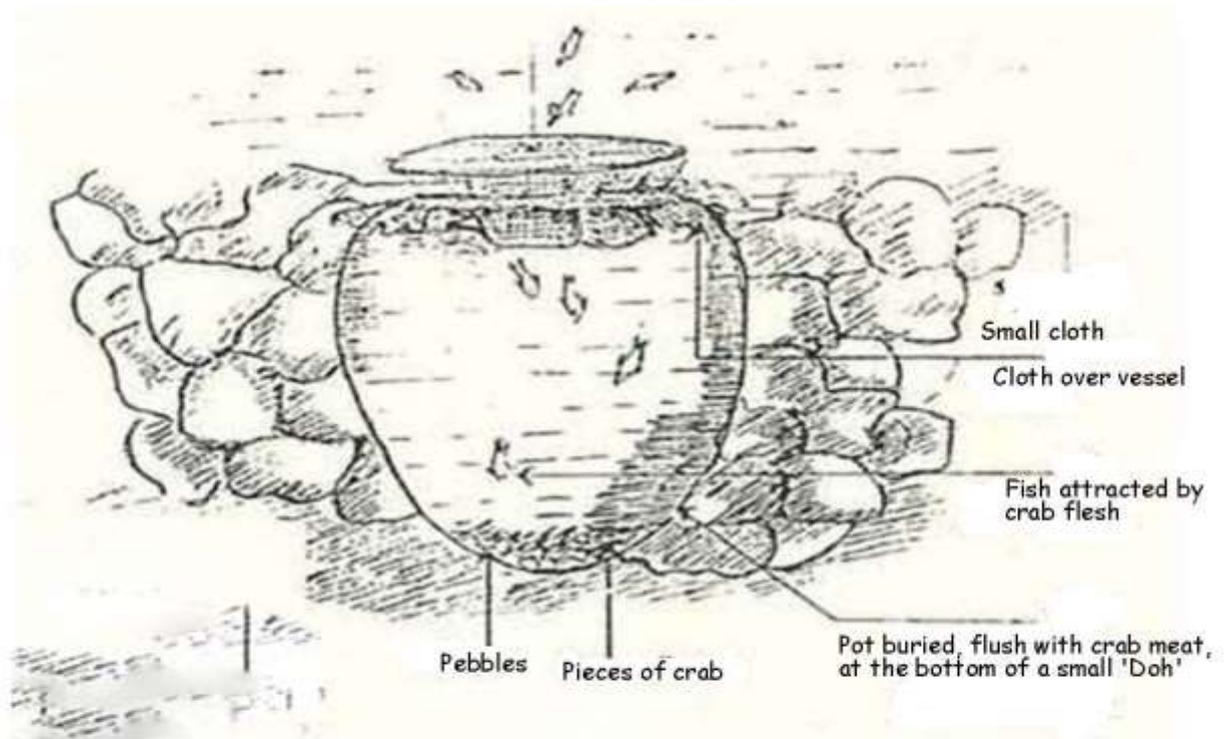
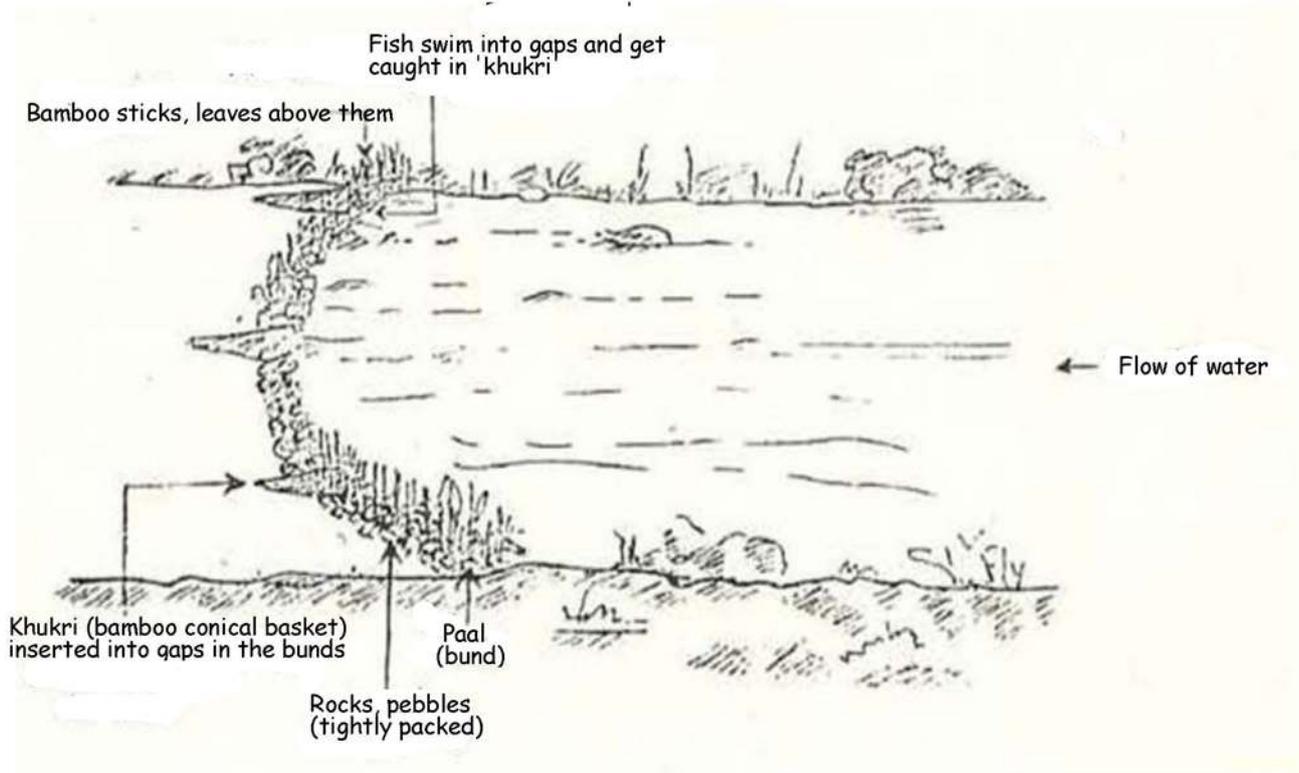


Figure 3: Paal



Traditional Fishing Trap (Photo credit Vasumathi Sankaran)



Traditional Fishing Trap (Photo credit Vasumathi Sankaran)



Climate Change and the Perception of Tribals

Today, climate change is one of the most immediate and pressing environmental issues facing the world. Till some years back, national environmental laws, policies and plans only attracted marginal attention of the government and public in India. We have now renamed our Ministry of

Environment and Forests as Ministry of Environment, Forests, and Climate Change.

Interestingly, there is evidence that Traditional societies were also worried about climate change and its impact on their lives and did many things to minimise the damage it could cause. Some of the recorded experiences are reproduced below.'

"Earth's history shows that there is a gradual climate change over time, interspersed with abrupt climatic events such as rapid cooling, warming, wet and dry spell. Traditional communities, however, have relied on their indigenous knowledge in managing these events.

"Indigenous people are found living in all regions of the world; they own or occupy some one fourth of land area of the world, which contains 80% of biological diversity. Observations and interpretation of climatic phenomena have guided their seasonal and annual work schedule. In turn, this knowledge has helped climate science by observation on a much finer spatial and temporal scale.

"The tribal people of Rajasthan have collected a vast body of knowledge on disaster prevention and mitigation, early warning preparedness and response. Their knowledge is passed on from generation to generation. Tribal people have developed methods to overcome natural hazards by growing drought resistant early maturing indigenous crop varieties, gathering many wild fruits and vegetables, taking to wetland cultivation and livestock diversification.

"Some tribal observations regarding climate and even weather change and crop production are as follows. Ficus species: flowering and generation of new leaves indicates early onset of rainfall. Appearance of many butterflies indicates early onset of rainfall and the prospect of a good monsoon season. Appearance of ants indicates imminent rainfall and a good season. When frogs croak incessantly it is an indication of impending rainfall. Tribals assess the probability of floods by observing the colour of clouds, their location, intensity and frequency of rainfall. The unusual sounds and changes in waterflow, colour of water and direction of wind, and unusual behavior of wildlife like ants, birds and rats and snakes help in the assessment of climatic variation. A combination of scientific technologies and traditional knowledge have created more effective solutions for disaster management. Knowledge of storm routes and wind patterns help them to prepare for storms by

constructing appropriate shelters and wind breaks. Observing the colour of clouds that may carry hail stones helps in people taking timely shelter. "Floods are predicted from the height of birds' nests near rivers. Moth numbers can predict drought." (Aparna and Trivedi, 2011)

"Correlating observations from scientific and indigenous sources, it was found that Pacific islanders' knowledge of ocean currents, waves and movement of constellations, was precise. In Andean ethnoclimatology in particular, the ritual observation of the Pleiades constellation undertaken immediately after winter by individual Bolivian and Peruvian farmers forecast the timing and quantity of rain and the size of harvest for the following year. If the star cluster appears relatively large and bright the rainfall will be abundant and harvests substantial. A small and dim appearance anticipates poor rainfall. The farmers then delay planting of potatoes, their main crop. This has been historically documented for more than 400 years. This ritual climate forecasting tradition helps villagers identify El Nino years. Orlove et al. (2000-2002), in their trailblazing work, could explain how these observations worked. "The apparent size and brightness of Pleiades varies with the amount of thin, high cloud at the top of the troposphere, which in turn reflects the severity of El Nino condition over the Pacific. Because rainfall in this region is generally sparse in El Nino years, this simple method provides a valuable forecast, one that is as good or better than any long-term prediction based on computer modeling of ocean or atmosphere." (Orlove et al. 2002: p 428, as quoted in Nakashima et. al., D.J., 2012.)

Such observations are also found among Indian tribals, mostly in dry regions, practicing non-irrigated agriculture. Apatani valley in lower Subansiri district of Arunachal Pradesh lies at an altitude of 1524m. The Apatanis, an agricultural community, have their own indigenous knowledge of farming.

In the Apatani valley nearly 48% of land is under paddy-cum-fish cultivation. Their system of *Aji* cultivation is a combination of paddy and fish together with millets growing on the bunds. The fish are cultivated in a series of terraces, where a small pit is dug in each terrace.

Fingerlings are put in water in these pits. During monsoon, the paddy field is submerged under water and the fish come out of the pits and move around the whole field. During dry season, the water remains only in the pits and the fish go back to the pits. During rainy season when the field is submerged the fish get a large area to move around and better nutrition due to manuring of paddy fields. By using the rain water, both paddy and fish are produced in the same area. "The terrace paddy field is classified as *Jebi*, *Aane*, and *Ditor* in accordance with availability of natural and artificial water supply. *Ditor* is fully dependent on the irrigated water supply and the first two



types of fields may have sufficient water supply from natural and rain water. The house and granary are located on higher level from the cultivated field so that decayed and decomposed substances can easily be drained out to the field. It is a good system from a hygienic point of view on one side, and on the other the decomposed substances



serve as good manure, which helps in yield of bumper crop of paddy. Apatanis have also developed an efficient system of water management." [S.C. Rai 2005]

Neeraj Vedwan presents a study of a society in Himachal Pradesh, showing the human-environment interaction where knowledge of the climate is a function of livelihood practices. Perceptions of climate change by the local people are shaped by local knowledge of crop-climate linkage. Vedwan goes on to say:

"Kullu valley in Himachal Pradesh is drained by the Beas river. Cultivation takes place in the valley from above a height of 1200m. to an upper limit of 3000m. Earlier cultivation and habitation was along the sides of the valley floor to an approximate height of

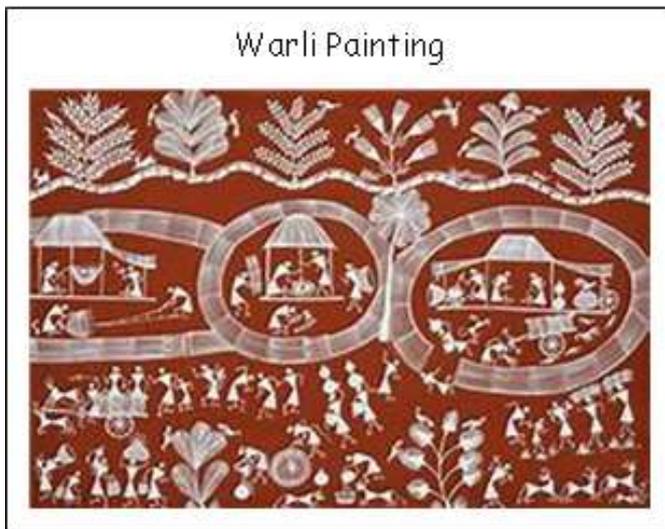
1500m. In 1960s and 70s apple as a commercial crop was introduced. Traditional system of diversified land use, of irrigated and non-irrigated agriculture and animal husbandry had declined and had been replaced with horticulture, that is dependent on high inputs. After having interacted with the apple growers to assess their perceptions of variability in production of apples, over a period of time, they were asked about the possible reasons for the variability in yield. They felt that climate was one of the variables.

"Mountain physiography is such that altitude, slope and aspect along with other characteristics like soil type and weather, often create multiple ecological niches, close together. Traditional agriculture uses these niches in a mix of agriculture and animal husbandry practices. Farmers are aware of even a small variation in these niches. Farmers are acutely aware of the fall in temperature as one goes up the valley but also know of the suitability of crops for sites. They felt that traditional crops are now growing at a much higher altitude because of warming as they require cooler climate. Locals pointed out that wheat was growing at a height where it could not grow earlier. They said that the apple belt had moved 30km. northwards in the last 50 years. Farmers considered hailstorms as extreme weather events because of the destruction they cause to crops including apples. These storms were limited to certain areas in the higher reaches and this acted as a barrier to expansion of apple cultivation in the upper reaches. In traditional agriculture, various ecological niches were farmed accordingly to serve as a hedge against climate variability. Most families owned land along the valley floor that was irrigated, and used it for growing rice. Non-irrigated land on higher elevation which tended to be steep was used for grazing or fodder collection. With increasing spread of horticulture, these irrigated terraces have been converted to apple orchards.

"These people [the landless and the poor, mostly from the lower castes] do not know how to cultivate the land. They are trying to grow crops on steep slopes, causing erosion. We have poisoned our environment. Honeybee population has declined. For pollination, we must rent beehives now from the government. Even butterflies, of which I remember numerous beautiful varieties, have declined a lot. Soil is no longer the same. These synthetic fertilizers drain nutrients from the soil and produce a lot of heat." (Observation by informant; as told to Neeraj Vedwan, and recorded by him in Vedwan 2006).

The accounts provided by people of the valley showed that climate change was triggered by many man-made interventions. The construction of Pandoh dam on the outskirts of the valley for generating electricity, was one of the causes of interfering with the natural order of things. One of the villagers reported that a researcher told him that the waterbody interferes with cloud formation. The *Chil* (pine) plantation which was a part of the afforestation drive caused marked change in weather. It flowers at the same time as apple and produces a lot of pollen. This pollen interferes with pollination process of the apple. Local perception of the climate is that there is decrease in snowfall as well as a shift in time. Early snowfall as before is what they welcome. It is long lasting and resistant to melting, contributes to nitrogen for plants, replenishes soil moisture, and prevents buildup of humidity in late March. (Vedwan 2006).

Respect for Nature Human beings can respect, or be in awe of, something, without fearing it. Such a relationship is exemplified in an attitude where the deeds, qualities or achievements of something or somebody are admired to a level where there is motivation to support the maintenance and furtherance of that which one admires. Though not common, there are examples of practices that indicate that certain



traditional strategies were a result of such respect for nature or for specific elements of nature, and not out of fear or economic self-interest. A typical example of such motivation is found among the stories of the *Warli* tribals of Thane district in Maharashtra. These stories are depicted through the well-known Warli paintings. A particular

painting depicts the story of a couple believed to be the ancestors of all warlis. This couple had five sons, but only the youngest son's wife conceived a child, and this made the wives of the other four sons very jealous. Therefore, when the child was born, the other four wives threw it on a tree and claimed that it had died. However, a kite observed all this and swooped down and rescued the child, whom it brought up. When the child, a son, was old enough, the kite returned the son to the parents and the grand parents. The grateful family asked the kite if they could do anything in return, to which the kite replied that perhaps, on certain

days, when it had not got anything to eat, it might swoop down and take one of the chickens belonging to the family. To this the family happily agreed. Till today, the Warli tribals do not attack a kite even when it takes their chicken, because they feel that they, as descendants of that family, are just repaying an old debt (also see Annexure XV).

Closely linked to these are strategies that evolve out of respect for the teachings or wishes of a revered individual. Though, invariably, the teachings themselves give many reasons why an area or resource needs to be conserved, in these cases it seems likely that it was not so much the content of the teaching as whose teaching it was, that motivates action for conservation.

Ethnocentric Strategies

Recent conservation strategies are increasingly focussing on the well being of human beings. Cultivation of plants and domestication of animals, which started over two thousand years ago, was the beginning of a strategy where nature was sought to be mastered and modified for serving human interests. With the dawn of the industrial age, the harnessing and modification of nature and natural resources got a major fillip. This was possible because of the growing, dominant, philosophy emerging from the Christian world which argued that the world was created for human beings and that all other creatures or life forms existed only to serve human interests. This all-pervading philosophy of the world soon smothered the more symbiotic philosophies that existed among traditional, local communities the world over.

The traditional awe, respect and even fear for different elements of nature were replaced by a centralised imperative for human survival and well being. The supremacy of human beings was argued to be a conscious act of the gods and destruction of nature and of other species, for human benefit, was shown to have divine sanction.

The growth of science and technology and the resultant sense of power and control of human beings over their natural surroundings and destiny, further bolstered this irreverent attitude.

Despite a vocal and committed movement for animal rights and for the rights of nature, the predominant attitude towards nature continues to be ethnocentric. Imperatives for conserving nature, in so far as they exist, are mostly motivated by imperatives for human well being. The only difference is that there is a growing realisation that human societies cannot survive unless nature survives. Though, essentially, an anthropomorphic philosophy of the world predominates today, in the last thirty years or so our understanding of what is in human interest has undergone a drastic change.

This has launched us into an era of 'sustainable development', with occasional forays into biodiversity conservation or environment protection. In essence, it is a period where the world community is becoming aware of the dangers that humanity faces if nature and natural resources continue to be destroyed at the present rate.

However, though this realisation may be real, it does not by itself result in adequate and appropriate action. Even national governments, though aware of the medium to long-term risks and dangers, are often unable or unwilling to make the short-term sacrifices required. Therefore, society is again faced with the dilemma that though it knows what needs to be done, it does not know how to get it done. The current inadequate and ineffective measures to prevent and reverse climate change are a blatant example of this reality.

In this century, we have entered a new phase where conservation is attempted through a series of social or legal contracts, within or between nations, where there are incentives for compliance and punishments for violation. Where threat perceptions are not adequate to mobilise public support, there is a falling back upon recreational and aesthetic values to motivate at least the better off because they have the resources to pay for the preservation of their recreation and scenic values. Though much of the battle for conservation still has, as its primary enemy, ignorance and greed, these are fast being replaced by immediate survival needs and demands for social justice. In an increasing proportion of a growing number of countries across the world, short-term survival of the poor and the disempowered is becoming a critical issue. As richer countries, and the rich in the poorer countries, refuse to share their resources with the masses, the only, perhaps the last, resort of these masses is nature. Their last resource is the world that they share with those who are even less empowered than they are, namely plants and other animals.

2.

CLASSIFICATION AND CATEGORISATION OF TRADITIONAL STRATEGIES

To properly classify and categorise traditional strategies for environmental conservation, has proved to be a difficult task. There are at least three reasons for this:

- i) There are varying levels of information available for various different traditional strategies and, as such, it is not always easy to conclusively determine the essential nature of each of the specific strategies.
- ii) Traditional approaches to conservation appeared to have been far more holistic than the current approaches and, as such, were very rarely if ever aimed only at conservation. It was assumed that every action that impacted on the environment also impacted on other aspects of life: ethical, aesthetic, cultural, social, religious, and spiritual, among others. Consequently, it is difficult to distinguish between those parts of a strategy that were aimed at environmental conservation and those that were aimed at achieving other objectives.
- iii) In any retrospective analysis there is the inherent problem that what is considered important and interesting now might not have been thought so in the era that the strategies were formulated. As such, the information passed down to us might be only of those aspects of the strategy that the people then thought worth of recording.

Nevertheless, based on a detailed analysis of the available secondary material and keeping in mind the specific objectives of the study, a preliminary listing of the different elements of traditional strategies that are relevant to the objective of environmental conservation have been attempted. It is expected that, through further study, the classifications could be fine-tuned and a more extensive analysis could be done in accordance with them.

Ninety-five sources incorporating one or more traditional conservation strategies have been surveyed and analysed as a part of this

study. The heads under which they have been classified and analysed are as follows.

Motivating Principles

- 1) Those that were based on **fear**, which included:
 - 1.1) Fear of god and other supernatural entities.
 - 1.2) Fear of social ostracisation, including community and social taboos.
 - 1.3) Fear of economic repercussions on the individual or on a larger social group.
- 2) Those based on a sense of **respect**, awe, love or reverence, including:
 - 2.1 Respect for, or awe of, nature or its elements.
 - 2.2 Out of ethical sensibilities.
 - 2.3 Respect for the wishes or teachings of individuals, living or dead.
- 3) Those based on **rational** imperatives, including:
 - 3.1 Economic profitability or well being
 - 3.2 Sustainable and continued use and interaction, especially for hunter gatherers, fisherfolk, shifting cultivators and nomads.
 - 3.3 A part of a social or legal contract.
- 4) For **aesthetic** value including:
 - 4.1 Recreational value
 - 4.2 Scenic value
 - 4.3 Species specific aesthetic value

Conservation Objectives:

Another system of classification would involve classifying strategies in terms of levels of conservation they sought to achieve. These could be broadly categorised as:

- i) Total protection of an area where no human interference is allowed.
- ii) Total protection of part of the area and regulated use of the remaining area.
- iii) Sustainable use of the whole area
- iv) Total protection of specific species
- v) Partial protection of specific species
- vi) Sustainable use of specific species

If it is neither of these then it is not considered a conservation strategy.

Planning and Implementation Methods:

The third type of categorisation would capture the methods and institutional structures used for the planning and implementation of the strategies. These could be classified as:

- i) Those planned and implemented by a leader or a small group of leaders, either on their own authority or on behalf of some abstract authority, and implemented exclusively by this select individual or group.
- ii) Those planned by a leader or a small group of leaders, either on their own authority or on behalf of some abstract authority, and implemented collectively by many or all of the people concerned.
- iii) Those planned and implemented collectively.

Relevance over time:

Another method of classification would be in terms of efficacy, both at any given time in a specific temporal context, and relevance over time. This would include:

- i) Those which emerged, as strategies, in a very specific time frame, often as a response to a short-lived crisis situation.
- ii) Those which were not specific to a short-term crisis but nevertheless specific to a period or era.
- iii) Those strategies which were independent of temporal changes and were fundamental enough to be relevant over time.

Universalisability:

Again, strategies could be classified in terms of how specific or universal they were in terms of the social, economic and political context within which they were practiced. These include:

- i) Those which were essentially effective in a very unique and specific context.
- ii) Those which had a wider application but were still not universally applicable.
- iii) Those which were based on very basic principles of human nature, social interaction and the environment and were, therefore, applicable almost everywhere.

Eco Systemic Relevance

The relevance of specific strategies might have been restricted to specific types of ecosystems. For example, a strategy designed for survival in a desert might be of little use in a tropical forest. Consequently, the strategies can also be classified eco systemically as:

- i) For deserts and other arid zones
- ii) For mountain regions
- iii) For wetlands, rivers and coastal areas
- iv) For rangelands
- v) For forest areas

Levels of Success

Though the primary effort in this study is to look at **successful** examples of traditional conservation strategies, it is important to recognise that not all traditional strategies were successful and, in any case, even the successful ones were not all equally successful. Consequently, the various strategies can be classified in terms of their level of success, as follows:

- I) Highly successful
- ii) Moderately successful
- iii) Minimally successful

Conclusions

To understand the objectives of traditional strategies for conservation of nature, how they functioned, what motivated people to formulate, adopt, and practice these strategies, and what success they had, were analysed and the findings summarised in four tables (tables 6 - 9), which are reproduced in Annexure II.

Table 6 lists 43 tribes and groups and indicates their motivations for conservation in terms of fear (of different types), respect or love, a need for promoting sustainable use, honouring a contract, and aesthetics of different types.

Table 7 further lists these various tribes and groups, indicating whether they were motivated by temporal relevance in terms of short term crisis, medium-term or specific-period needs, or long-term or permanent needs. Then it was determined whether they were motivated by matters of specific contextual relevance, or of eco-systemic relevance especially in relation to deserts and arid zones, mountains, wetlands, rivers, and rangelands.

As can be seen from the above categorisations, there is much overlap between the categories and as such no clear statistical picture emerges. However, keeping this in mind, of the 48 tribes and groups {Those which were dealt with together and had similar profiles are sometimes combined) that lent themselves to such an analysis, the following picture emerged.

	Motivation	Number of tribes/groups motivated by each type of motivation	% of tribes/groups motivated by each type of motivation ³
1.	Need for promoting sustainable use	18	38%
2.	Fear	17	36%
3.	Honouring a contract	13	28%
4.	Respect or love	8	17%
5.	Aesthetics	6	13%
6.	Ecosystemic relevance	4	9%
7.	Temporal relevance	2	4%
8.	Specific contextual relevance	2	4%

Table 8 and 9 tried to capture the motivations, across tribes and groups, for conserving various conservation areas, specifically common property resources, desert ecosystems, protected areas, river ecosystems, coasts, and sacred groves. These tables also sought to conserve activities like fisheries (fishing), shifting cultivation, and activities related to water conservation. An effort was also made to capture the motivations for conserving specific species like ficus tree, jujube tree, other trees, medicinal plants, other plants and flowers, snakes, and other totemic species. The motivations searched for were the same eight ones (along with their sub-classifications - listed above) which were searched for in tribes and groups (table 6 and 7). The picture that emerged was as follows:

	Motivation	Number of areas, activities & species motivated by each type of motivation	% of areas, activities & species motivated by each type of motivation
1.	Fear	9	60%
2.	Need for promoting sustainable use	8	53%
3.	Respect or love	5	33%
4.	Temporal relevance	3	20%
5.	Aesthetics	3	20%
6.	Eco-systemic relevance	2	13%

³ Total is over 100% as many tribes had more than one motivation

	Motivation	Number of areas, activities & species motivated by each type of motivation	% of areas, activities & species motivated by each type of motivation
7.	Specific contextual relevance	1	7%
8.	Honouring a contract	1	7%

Onge Dugout Canoe
(photo by Vasumathi Sankaran)



3.

MOTIVATIONAL STRUCTURES

The most important issue, from the point of view of learning from the past, is to understand the reasons that motivated traditional communities to explicitly adopt strategies aimed at conserving nature and its elements. Why did traditional communities decide to conserve specific species and sites, even when such an effort meant that they had to make sacrifices and face hardships? How did these communities ensure that the entire populace respected the imperatives for ensuring that some sites and species were protected or conserved?

Perhaps the most likely thesis is that traditional communities, or at least their leaders, recognised the need to conserve nature and yet saw the temptation that over exploitation held out. Realising that something stronger than just a social decree was required, if conservation principles were to be scrupulously followed, they decreed these as religious dictums and attached severe displeasure of the gods or the spirits, and resultant misfortunes, as an inevitable result of disobeying these decrees. For example Cipriani, commenting on the belief of the Onges in Little Andaman that their spirits do not like tubers and other edible roots to be eaten, says:

"This unconscious preservation may well be the result of a decree, in some remote past, by an Onge seer who realised the danger of killing off the entire plants and invented the guardian spirits as a deterrent.... The spirits select the Onges' food for them, in the sense that they regard everything as edible or poisonous, according to whether the guardian spirit is benign or malevolent. Given the curious adaptability of the spirits and the intensely practical way in which they operate, it is hardly surprising that their benevolence or malignity coincides remarkably well with those foods which tend to promote normal health!" [Cipriani 1966]

The fact that many of these decrees actually prescribed what now seem to be the most rational measures to have been taken, supports such an interpretation, for it seems too coincidental that such astute imperatives could have been arrived at through a random process, in community after community. According to Ishwar Prakash:

"In India, several plant and animal species have been considered sacred by one or more communities and therefore never destroyed (Presler 1971). The most widely protected of such organisms is the

peepal tree (Ficus religiosa), found depicted on a Mohanjodaro seal of around 2000 B.C. Other species of the genus Ficus are also considered sacred, and were not felled traditionally by all Hindu castes. It is notable that Ficus is now considered a genus of significance in the overall maintenance of tropical biological diversity - a keystone mutualist (Gilbert 1980). In particular, its preservation may have helped maintain high levels of populations of highly edible frugivorous birds, especially pigeons and doves." [Prakash 1980 in Gadgil 1985]

Again, according to Madhav Gadgil:

"In a similar fashion, no cobra is killed near certain temples and it is believed that no snake-bite will ever be fatal in the same locality (personal observations). These taboos may help to remove the fear of these very dangerous animals, and may have survival value as, for example, if many deaths from snake-bite are due to fear of death rather than from the poison (personal observations)." [Gadgil 1985]

Ramakrishnan [1996] states that:

"It is reasonable to assume that traditional Hindu society recognised individual species as objects of worship, based on accumulated empirical knowledge and their identified value for specific uses. Thus, Ficus religiosa (the peepul tree) and other species of the same genus form components of a range of ecosystem types, and support a variety of plant and animal biodiversity. The sacred basil called tulsi (Ocimum sanctum) is worshipped in all traditional homes as a Goddess and indeed is a multipurpose medicinal plant, according to the traditional Indian pharmacopoeia."

Echoing similar sentiments, Gadgil and Thapar state:

"The social relationship amongst members of such a tribe would be governed by kinship and mutual help. Their belief systems extend these relationships from the social to the natural environment, treating rivers as their mother goddesses, totemic animals as brethren, prey species as mutualists. Many elements of natural environment are offered protection from harm at human hands, as well as gifts of valuables, including human sacrifices, to ensure bountiful returns. The resultant protection of elements of environment be they ponds or groves or all members of species such as the pipal tree or specific plants and animals, can in fact serve to promote long-term persistence of biological resources. While couched in terms of religion, such practises might have helped territorial hunter-gathers to safeguard the health of their resource base. Many practises have continued on the Indian subcontinent to

the present day and have helped to protect a wide diversity of biological resources." [Gadgil & Thapar 1990 pp 209-223]

Many other similar instances are recorded. For example, for the Hill Kharias it is taboo to urinate, or to wash hands after defecating, in the hill streams, especially at their source. It is believed that the sources of hill streams are the sacred abodes of female deities, and such behaviour offends them [Das et al. 1993]. Providentially, such taboos also meet important sanitation requirements.



On the other hand, there are also many seemingly irrational or sometimes even destructive superstitions, which cannot be explained by this theory. Perhaps the best examples of these are the numerous animal sacrifices and occasional human sacrifices that are offered to the gods for granting specific favours or for general good will, without any evidence that these sacrifices are sought, or even welcomed, by the gods.

It can be argued that it is far more likely that these taboos and decrees were about randomly selected issues. Those communities that, by chance, chose strategies which led to sustainable utilisation of resources survived, and their experiences are now recorded, while others perished without leaving much of a trace.

Another contention could be that perhaps the choices that traditional societies made have determined the nature of our current reality. Consequently, the context within which we assess their choices for their rational content is not an independent or objective context but one that has been shaped by the very choices we seek to assess.

When we are confronted with evidence of vigorous conservation efforts for species that do not appear to be critical, like for example the monkey, we tend to consider it either an error or pure superstition. There is also the case of the snake, especially the cobra, which was widely protected. But there is a perception that it was protected more out of helplessness and fear. As there was little other defence against this formidable killer, perhaps it was believed that if one were 'nice' to it,

it would be 'nice' in return. Such a 'superstition' could also be attached to the widespread worship of the tiger.

This is not to say that the monkey, the cobra or the tiger do not have any ecological value. Clearly each of them does, as do all living creatures, but it seemed unlikely that in those days these species could actually have been considered as threatened, given their vast numbers and extensive habitats, and the insufficient ability to fight them off or kill them.

Of course, it has been argued that another explanation for why snakes were worshipped, was that it was believed that snake worship saved lives. Snake worshippers believed that snakes would either not bite them or, even if they did, their bites would do them no harm. But, even if this was true, there was on the other hand the possibility that the belief that snakes would not bite those who worshipped them could also lead to a level of carelessness which could result in a greater number of snake bites.

In short, there are arguments on both sides to the assertion that snake worship is dangerous.

However, the important thing that such an analysis, and the availability of only hindsight evidence, hides is that perhaps such 'conservation' was for entirely different reasons. Perhaps communities then knew much less, or were much less concerned, with the direct ecosystemic and socio-economic benefits of protecting sites and species. Perhaps they genuinely believed that these were abodes of the gods and spirits, or were of special religious and spiritual significance, and therefore warranted protection.

Even in 'modern' society, and among 'scientific' minded people, much is done out of spiritual or religious convictions. It is neither necessary nor perhaps possible to show that each of these convictions has some underlying, direct or indirect, socio-economic benefit, some functionality, hidden and yet obvious.

Some might believe that they are paying a tribute to the ingenuity and rationality of traditional people by ascribing to them the vision to see what was required for their socio-economic survival and to deliberately obfuscate this by wrapping it up in religious jargon. But, alternatively, this belief may not consider the possibility that traditional communities could have held values other than mere functionality, and reduce them to our materialistic levels, aimed at the physical well-being of a single species - the human being.

Unfortunately, at least for the present, this debate must remain inconclusive.

Whatever were the reasons for which communities sought to conserve nature, to ensure that all their members conformed to the conservation requirements and did not violate the various taboos, must have been a challenge by itself. Observing contemporary society where we have numerous laws aimed at nature conservation, which supposedly reflect the will of the people, but which are rarely followed, we can appreciate the effort it must have involved.

Essentially, in traditional societies, compliance with norms and taboos relating to environmental conservation seemed to have been achieved out of two broad sets of motivations. The first was fear: fear of the gods and spirits, fear of social pressures and ostracisation, and the fear of adverse economic impacts. The second was out of reverence, respect, love, ethical compulsions, or aesthetics.

3.1 FEAR

Perhaps the most common motivation for traditional conservation efforts was fear. Looking at the evidence that survives today, it is not always easy to determine all the things that people were afraid of, but some broad listing is possible.

Fear of the supernatural

Evidence seems to suggest that in a large number of communities, people dared not violate rules because they were scared of the gods and other spirits. These gods and spirits had the reputation of being very harsh on all those who desecrated sacred spots or did not show adequate respect to the totemic animals and plants. In some cases, the gods were also benign and, if they were properly respected, they in turn brought wellbeing and prosperity to those who worshipped them. Some examples of such beliefs are described below.

In Uttara Kannada, there are sacred groves or *kans* which have been protected for hundreds of years with the belief that any violation of the prescribed norms would bring severe retribution.

"The forests are the property of the gods of the villages in which they are situated, and the trees ought not to be cut without having leave from the Gauda or headman of the village, whose office is hereditary, and who here also is priest (pujari) to the temple of the village god. The idol receives nothing for granting this permission; but the neglect of the ceremony of asking his leave brings his vengeance on the guilty person." [Buchanan 1870 in Chandran 1991]

At the other end of India, in Ladakh, aquatic resources were also conserved out of fear of the gods. The Ladhakis live in a water scarce land and have to be very careful about the use of water. They not only

conserve water but worship its sources. Even aquatic life forms, like fish, are protected and the Ladhakis never kill or eat fish or any other creature that lives in the water. They also have specific gods for springs and other water sources. Consequently, the Ladhakis observe various water related taboos and the violation of these taboos supposedly brings divine retribution:

"It is feared that, out of anger, the gods may manage to dry up the channel which, in turn, would cause damage to the crops and hardship to the people." [Mann 1984]

In north-eastern India, the Garos of Meghalaya do not erect temples for the spirits they worship, for they believe that the spirits live in forests near the village. They consider it a sin (*asimalja*) to cut such forests. Such places are especially left for the spirits and avoided by the people. If anyone works in such areas, fells trees or even cuts grass, it is believed that the anger of the spirits would be aroused against the villagers. [Sangma 1979]

Khasi women wearing their traditional Jainsem and shopping for *kwai* (local paan) leaves



The neighbouring Khasis, again in Meghalaya, also maintain sacred groves. There are many sacred groves in Meghalaya and one such is in Mawphlang, called Law Lyngdoh.

Mawphlang Sacred Grove, Meghalaya
(photo on this and the next page by the IIPA Research Team)



"The belief here is that anyone who damages the grove is penalised to death by the forest spirit. All forms of wildlife, especially snakes, are protected and it is believed that if one snake is killed, many snakes would be born to kill the culprit." [Mitra et al. 1994]

Another example is the Mawsmi grove near Cherrapunji, Meghalaya, which is believed by the local people to be inhabited by a powerful and malicious spirit "who proscribes death for those who damage or destroy the forest". [Mitra et al. 1994]

Also in Meghalaya, reportedly there is snake worship among the Khasis, of a mythical snake called U Thien.

"... U Thien is worshipped and is propitiated by the offering of human blood. It is believed that the Thien attaches itself to homes and families and is the bestower. It needs regular and periodic propitiation by the offering of human blood, and in the event of its being neglected it brings disease, ill luck and ruin to the unlucky family which has angered it." [Mehra 1956 pp 133-139]

Young Khasi boy



Many examples have been recorded from Maharashtra of experiences which reinforced people's belief that transgression of the rules associated with sacred places could bring swift and cruel punishment. This further laid the basis for fear-based conservation.

This sentiment was used successfully in conserving the biodiversity in the fringes of the protected area of Kalakad Mundanthuri Tiger Reserve. The villagers used to collect timber and minor forest produce from the Reserve. The forest department engaged an NGO called Arumbugal Trust to dissuade the villagers from using the forest produce. For this they produced a street play which was staged in these villages. The actors pretended to be the malevolent spirits of the forest trees, and informed the people that the recurrence of chicken pox and other viruses were curses they were invoking on the people as punishment for destroying the trees. According to the Forest Department, it was a very effective strategy (observed in the field - Sankaran).

"There are on Little Andaman a number of creepers with edible fleshy roots, sometimes as thick as a man's wrist, sticking out horizontally at least fifty to sixty centimetres from the main stem, only just below the surface. They invariably grow in light soil, where there are no rocks, and are very easy for the Onges to reach with their digging sticks. These and the yams - sometimes as big as a football - which are to be found everywhere, the Onges have to steal from the spirit who owns them. The creepers themselves, twining up into the trees, and the shorter-stemmed yams, are never disturbed. The Onges merely dig down, at a respectful distance from the plant, certain of finding what they want. On no account must there be any signs of the theft for the spirit to see, so they quietly take off roots or tubers some way from the main stem and leave the rest, patting the earth down afterwards and covering the place with leaves. The guardian spirit, not apparently all-seeing, notices nothing, as the plant continues to flourish, improved by the root pruning. Everyone, guardian spirit and Onges alike, is happy." [Cipriani 1966]

In fact, according to Cipriani (1966):

"Providentially, the exactitude of the Onges' botanical and zoological knowledge is matched by the magnitude of their superstitious fears. Were it not for this all the edible vegetation on the islands would have disappeared long ago as a result of their incredibly thoughtless destruction. The effect, therefore, is almost that of a purely involuntary, embryonic form of 'agriculture', contrasting strangely with their persisting, persistent (sic) and complete lack of interest in any formal care, however primitive."

Cipriani describes the Onge religion as a "least developed religion" whose main ingredients are "the fear of and protection from spirits".

Another example is that of the giant banyan tree (*Ficus bengalensis*) in Gutibayalu village in Anantapur district, Andhra Pradesh. The tree is, or so myth has it, the offshoot of one of the pillars used during the *sati* of a local woman called Thimmamma, in 1433 AD. A small temple, dedicated to her memory, is situated under the tree. This tree is supposed to have the largest canopy in the world (5.2 acres). Local villagers do not pluck a leaf or even collect dead branches from the tree. They are terrified of causing any damage to the tree as many instances of terrible misfortunes visiting those who dared to meddle with the tree are regularly told in the region. [Rao 1996]

Similarly, in Goa, the *audumbar* tree is believed to be the resting place of Lord Dattatraya; the *peepal* is also a divine tree, and many other trees are considered to be the abode of spirits.

"While most of Maharashtra has been ruthlessly denuded of trees, many green oases are conserved as Devrayees - God's jungles. In Goa also there are patches rich in biodiversity, conserved on account of the belief that one attracts a divine curse if one takes away anything from the spot - even a twig. One may consume anything on the spot but not take away. Nothing can be more ecologically sound than this simple principle." [Alvares 1991]

The Kadars are hunter gatherers of the Western Ghats, for whom collection of honey is very important. Earlier they had rights over specific cliffs for collecting honey. However, their honey collection was regulated by some rules:

"For example, many hunters believe that any violent movement of the rope was an indication of the God of the Honey Rock's refusal to give permission to hunt. In these areas they would not go for honey hunting stating that an evil fate would befall anyone who did. Superstition? Yes, perhaps but the end result was that not all colonies were harvested. This helped to ensure a good population of bees in the area as well as provide conducive ecological conditions for a swarm to return to the same area every year." [Nath et al. 1995]

The forests of the Ho are the abodes of their patron spirits and of their village deity. Such forests are not allowed to be cut in any circumstances.

"It is a grove of sarjom trees which form the vestigial part of the original forest that was cleared to establish the village. This grove

is the most sacred centre of the village and its destruction in any manner is unthinkable for the Ho." [Gupta 1981]

In Kodagu District, earlier known as Coorg, Karnataka, there still exists the 600 ha Irulibane forest that is dedicated to three deities - Pakathamme, Podamme and Balakka - all associates of Lord Ayappa. The forest belongs to three villages. According to M. A. Kushalappa, a 65-year-old farmer, "*The deities are fearsome and can destroy even those who think of going there. No one goes anywhere near the grove.*" Many stories abound about the vengeance that Ayappa and these deities have wreaked on those who chose to ignore the rules. [Mitra et al. 1994]

There are numerous other examples of what appear to be fear-based conservation imperatives, both for sites and for specific species. In fact, many species have totemic value and associated or independent taboos. These also involve inherent threats to the well-being of individuals and communities, if the taboos are broken. For example:

"Totemic objects and totemic rituals also form part of Hakkipikki religion. The phenomenon of totemism is observed at two levels, namely, the clan and the community. Totemic objects are believed to have direct relationship with the supernaturals, and any insult and/or harm to them would mean an insult to supernaturals. This may have serious consequences." [Mann 1984]

Similarly, the Bhomkas, who are tiger-worshippers of Hoshangabad, believe that the tiger attacks human habitations if not properly worshipped. If any tiger enters a village and begins to commit depredations, these Bhomkas approach the tiger-god and offer him worship. [Battacharya 1947]

However, what is not clear is the origin of such fear-based strategies. Various theories can be postulated, though there does not seem to be enough evidence to clearly establish any one.

Fear of losing benign supernatural intervention

There are also examples of species being protected because by protecting them the community hopes to get some benefits, as opposed to the fear of harm if they are not protected, as described earlier.

The distinction being sought to be made here is that in the earlier cited examples there was an assumption that if the species and habitats were not protected, individuals of those species or spirits living in the habitat, would retaliate by causing adverse consequences. In these examples, on the other hand, it is believed that the species or the spirits have the power to protect communities and individuals from adverse events, which are not caused by them. Therefore, their protection (and worship) can motivate them to use these powers.

For example, in Chamba district a 'golden snake' is given milk and in Bengal the snake goddess *Manasa* is worshipped widely. It is generally believed that the worship of *Manasa* averts all danger from snakes, and if she is pleased, her devotee gains wealth and fame and also gets a hidden treasure or power through her favour [Nath 1964]. In Tirunelveli there is a temple called Sankaranainar Kovil dedicated to Shankar and the goddess Gomati. It has a snake mound where serpents are worshipped in the hope that chronic stomach ailments will be cured by propitiating the deity. [Mehra 1956]

The Gonds and Kolams:

"...call tiger as Dado. Snake (Taras or Bowrnak of Gond) is supreme deity to seven brother kin groups, especially Mesram Clan belonging to Gonds. The respective clan members of particular totem species believe that these animals or plants protected their ancestors while they faced dangerous situations and hence, they developed a sacred relationship with them." [Elwin 1986]

3.2 Reason

In some cases, the fear of divine retribution has been supplemented by

Box 4: Cholanaicken System of Sharing Resources

The person or the party who first sights a beehive and marks the tree it is on, obtains exclusive rights to collect honey from it, then and in subsequent years. This rule is customarily never transgressed.

Similarly, the dammer from a tree can only be extracted by the person who has 'prepared' a dammer tree for tapping..... No other Cholanaicken can then tap this tree or collect the dammer from it. As in the case of the honey-comb, the right of collection of pepper rests with whoever first sights the creeper.

The Cholanaicken have well-defined principles that allow the members to gather and extract minor forest produce within their respective chenmam. There is no restriction on gathering edible tubers, roots, fruits and leaves for self-consumption, and for this one is free to move about in the entire forest as and when needed. But people usually gather edibles only in their own naadu. However, there are rigid norms regarding the collection of minor forest produce. Trespassing into the territory of another Cholanaicken to collect minor forest produce is considered an offence as these items are collected for bartering and hence have greater economic value. The offender is liable for punishment, or subjected to the evil eye. [Mishra 1980]

the fear of socially imposed strictures and punishment, including ostracisation. Essentially, in such a motivational structure the citizen might or might not face the wrath of the gods, in case a rule was broken, but certainly that of his or her own community.

It can further be argued that, in any case, where worship or conservation emanates out of fear of social ostracization, or worse, then it is fear based. But a distinction is sought to be made here between the seeming irrational fear of spiritual or divine retaliation, and the fear

of consequences for violating norms that have been rationally formulated for the good of society.

Such a motivational structure could involve levying of fines and other penalties; loss of face or stature; or in extreme cases, the offender being thrown out of the community or village.

It can be argued that such a structure evolved out of the type of system discussed earlier, with fear at its root. However, as the realisation came about that what had been decreed by the gods was not actually for the good of the gods but for the good of the community, the need to constantly invoke divine intervention became less frequent, till it finally disappeared.

Such a transition also presupposes that the social groups were relatively well structured, with appropriate institutions to establish a consensus on what needed to be conserved, and how, and to lay down the law and ensure its compliance. Such a transition must also have become inevitable as the hold of religion and the belief in supernatural powers diminished, and as a scientific tenor took hold.

In fact, in its essence, it is similar to the modern state where conservation is supposed to be achieved through a set of laws that, if violated, attract fines and other penalties. The most common instances of this were those related to the equitable sharing of resources and the sustainable use of commonly used ecosystems like grasslands and pastures.



Given below are some examples of reason based conservation, as defined above.

- The Birhors of Chotanagpur paid a fine and gave a feast to the clan members if taboos were broken. [Frazer 1910]
- The

Cholanaicken tribals of Kerala have elaborate social procedures to conserve and share natural resources.

They have prescribed rituals to demarcate the ranges from which individual families can collect various resources. From the common

lands, resources can be extracted but according to strict rules which give the right to a particular honey comb or tree to the first person who spots it and reserves it (Box 4).

Water harvesting by Cholanaicken



3.3 SUSTAINABILITY AND EQUITY

As already mentioned, societies gradually evolved from solely or primarily 'god fearing' societies to those where other principles for establishing and enforcing social norms emerged. Even where the ultimate authority for social norms remained divine will or sanction, the operative principles evolved into ones which were handled by the earthly society. Consequently, intermediate, social reasons were offered in support of social rules and norms: reasons which drew upon the principles of common social good and of future benefits. Punishment to offenders was no longer a prerogative of only the gods or administered by 'agents' of the gods in the name of the gods. Social groups progressively arrogated to themselves the functions of ordering society for, and on behalf of, the society itself.

Two of the main principles that emerged to determine rules and norms with regards to the use of natural resources were the principles of sustainability and equity: principles which even today predominate modern environmental debates.

Gadgil and Guha give a useful categorisation of the ways in which various communities voluntarily restricted their use of resources, keeping in mind their long-term interests. They have identified ten different ways in which communities try and restrict their use of natural resources to promote sustainability (See Annexure III: Practice of Self Restraint). These are:

1. Quantitative restrictions on the harvesting of specific resources from specific localities.
2. Abandoning the harvesting of certain resources as their densities decline.
3. Abandoning specific sites if yields are reduced.
4. Banning the harvesting of certain species in certain seasons.
5. Banning harvesting in certain sites in certain seasons.
6. Banning the harvesting of species during certain life history stages, by age, sex, size or reproductive status.
7. Never harvesting certain species.
8. Never harvesting certain sites.
9. Banning certain methods of resource harvesting.
10. Banning the employment of certain methods of harvesting for certain age or sex classes, or for certain social groups.

Good examples of such prudent use patterns can be seen in the way in which various communities have organised themselves for the use of

Box 5: Regulating the Use of Commons

"Rural societies in India have at least here and there, if not universally, shown an awareness of the possibility of such an outcome, and have tried to regulate the use of commons. Such regulation serves the dual purpose of restricting the use of common property resources, often referred to as CPR, to the particular village community, to the exclusion of others, and also preventing over-exploitation and unsustainable use by the local community itself. Often, however, the first purpose has dominated, to the relative neglect of the second. Instances of community management have been documented to some extent. Jodha (1985 a & b) for example, has shown how in the feudal days the use of CPRs was regulated through measures like grazing tax, livestock related levies payable during ceremonies, compulsory contribution of labour for digging and desilting water ponds, and penalties for unauthorised use. There are also examples of how through tradition and religious veneration forests were protected by local communities (Gadgil & Vartak 1976; Guha 1985; Gadgil & Iyer 1987). Robert Wade (1988) has documented such community management both in respect of grazing and irrigation still prevailing in several villages of Andhra Pradesh." [Nadkarni 1990]

common property resources. MV Nadkarni says (Box 5: Regulating the Use of Commons) that many communities have evolved methods of regulating the use of commons, though primarily by restricting the use of the commons by their own community.

In some cases, though the

motivating force might be some divine entity, the expectation of rewards is the real basis for conservation.

It was postulated, and widely accepted, that the renewal of natural resources was critical to the survival and well being of communities and therefore in their interest. From this it followed that the community's use of natural resources must be regulated so as not to compromise future access. Carrying capacities were determined and rules were established. The violation of these rules was punishable by fines and other harsher means. Certain areas were left untouched or minimally harvested to facilitate the renewability of resources by acting as seed banks and performing other critical ecological functions. There were closed seasons for species and sites and restrictions on cutting young plants or killing or capturing young animals.

For example, among the fishing communities of Goa there was a strict demarcation of fishing territories, as there was among the hunting and pastoral communities of western Maharashtra:

"For most of evolutionary history human societies have been organised in hunting-gathering tribes each with its own exclusive territory (Lee and De Vore 1968). This territoriality persisted in one form or the other with all Indian castes till recent times. Thus, the beach-seine fishermen of Goa on the west coast report that seines from each fishing village would operate on the coast within a well-defined limit. Similarly, **Nandivalas** are a nomadic caste of

Nandivalas take their name from Nandi, a trained bull dressed in smart clothes with fringes of jingling bells and bell necklaces. They beg from house to house leading the Nandi and making him nod at the signal of a peculiar note they sound on the drum by percussion with a bent stick.



entertainers of Western Maharashtra. They also engage in extensive hunting, with dogs, for porcupines, monitor lizards, wild pigs, etc. Each group of the Nandivalas entertains and hunts within a well-defined territory. Similarly, pastorals like the Dhangar shepherds of Western Maharashtra wander extensively, grazing over an area defined for and hereditarily controlled by various groups of shepherds (Gadgil and Malhotra 1983). This territoriality had two significant consequences. Firstly, the pressure of exploitation was evenly dispersed over the exploited plant and animal populations. Secondly, each group had an awareness that the resources of its hereditary territory had sustained its descendants, who would inherit the territory and their mode of resource exploitation, for generations to come. This facilitated the culture of evolution of a variety of other restraints on the exploitation of living resources." [Gadgil 1985]

Another set of examples of community practices to ensure sustainability was the way different tribal societies carried out shifting cultivation (for details see section 4.2, on shifting cultivation). For example, the Khasis of Meghalaya varied their *jhumming* practices depending on the requirements of the ecosystem. According to Ramakrishnan [1985]:

"Where the forest cover is sparse, the soil is even more infertile and forest regeneration is slow

Box 6: Village Forests

"Many Indian villages maintained a village forest on communal land. The village forests were protected and carefully exploited by the village community as a whole. There were often well specified limits on the quantum of exploitation for material such as fuel wood from these village forests. Thus, even today, only one member of each household gathers fuelwood once a week from the village forest of Gopeshwar in Chamoli district of Uttar Pradesh. In consequence, this village forest is still well preserved, although most of the neighbouring land has been completely deforested." [Morab 1981]

because of low temperature and high soil acidity. As at higher elevations, modifications have been made by the tribals in following this practice. Thus, at higher elevations of the Khasi hills of Meghalaya (Mishra and Ramakrishnan, 1981) clear-cutting of forest is no longer feasible. Therefore only a few branches of the scattered pine trees along with the undergrowth are slashed. To conserve the nutrients in short supply the slash is arranged in parallel rows, covered over by a layer of soil before burning. Crops are

sown only on the ridges while the alternating furrows are compacted." [Ramakrishnan 1985 pp 1-29]

Equity was assured by developing systems by which the access to resources was provided equally to everyone in the social group. Where

Box 7: Supervision

"The Gumpa (a monastery) at Korzok had appointed a 'Lorapa' or a village official who looked after irrigation and other agricultural activities. Besides the Lorapa, the Goba had another official working under him called 'Sashung' who did the work of the watchman and constantly moved around the pastures and 'rebos' (nomad's tents) to see if any person unauthorisedly grazed in another group's pasture. Though there are no clearly visible boundaries between the pastures of different groups, the nomads are aware of the boundaries, which happen to be some physiographic feature easily identifiable." [Sankaran 1996]

certain sites were preferred over others, random allocation strategies were adopted to ensure that no one family or person got preferential treatment. Other restrictions were imposed to ensure that no individual or family got undue advantage over others. This was especially

common among grazing and fishing communities and those involved in shifting agriculture. Systems were also developed to ensure that where productivity from various ecosystems was not comparable, the overall produce was equitably shared, irrespective of who worked which site. (See also Annexure IV: Cattle Herders of Ura and Annexure V: Pasture allocation of the Changpas of Ladakh).

There is a common belief that traditional communities are essentially very intelligent and they not only clearly know where their interests lie but also have the will and ability to pursue these interests. Of course, a close look at history might not support such a belief. It is true that if one looks at the communities which have survived and flourished, they have managed their natural resources well and intelligently. In some senses this is almost a tautology for, in most traditional systems, communities could not have survived and flourished unless they managed their natural resources well. However, from this it does not follow that all, or even a majority, of the traditional communities did actually manage their resources well. In fact, archaeological and other evidence suggests that many communities declined and disappeared, and though the reasons why they perished are not always clear, there is some evidence to believe that in many cases environmental degradation was either the primary, or at least one of the contributory factors for their decline. Consequently, to assume that traditional communities were always wise in their interaction with nature, especially in so far as it

related to the sustainability of their life support systems, does not seem to be correct.

But if one looks at the communities which survived and flourished, very often one sees innovative and imaginative strategies for conserving nature

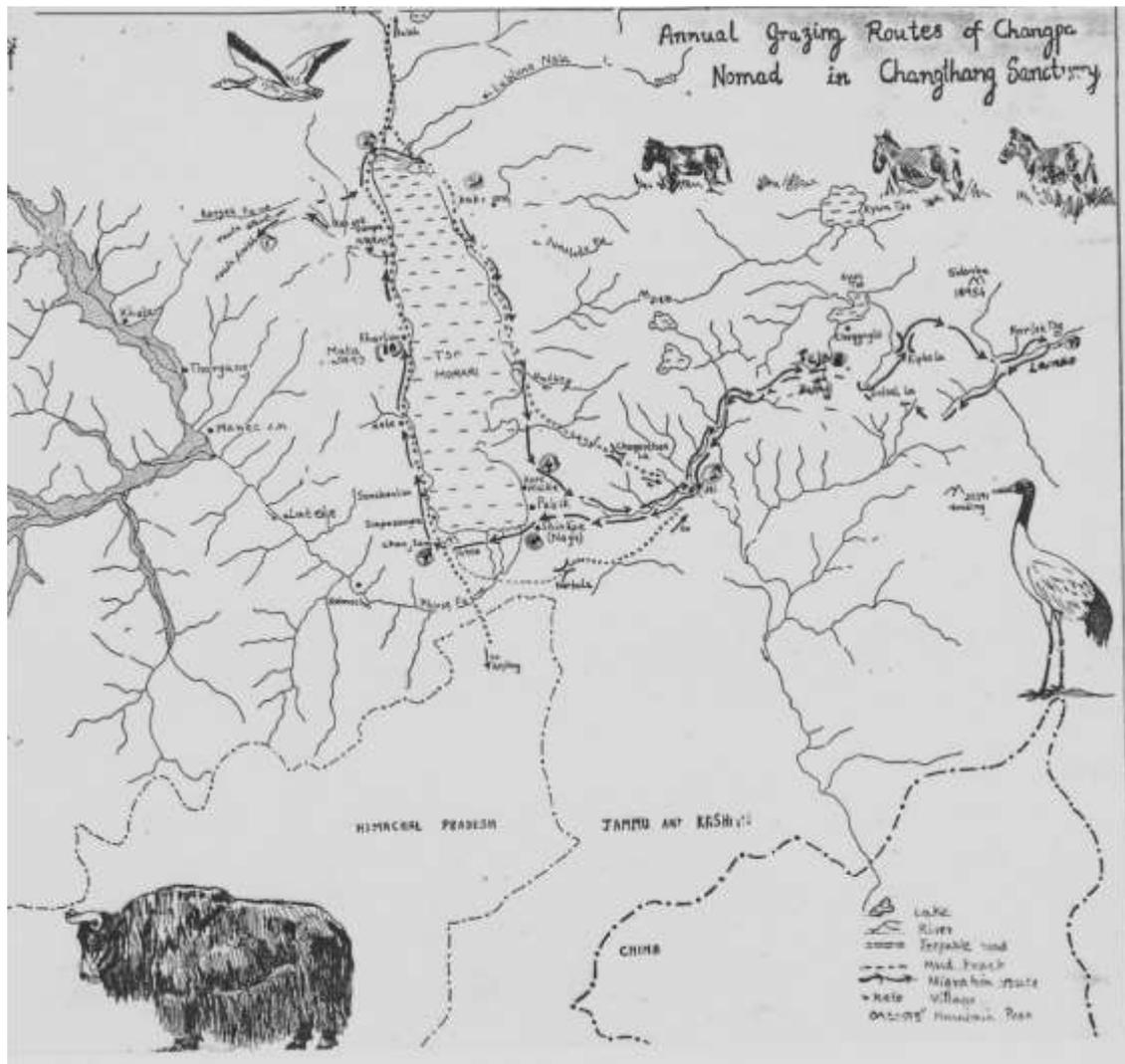
and ensuring that their use of natural resources was kept at sustainable levels. Perhaps, this was only possible because the populations and demands of the community were well within the

Ladakh: The Goba (Changpa headman) showing his 'Krishi Deb' (photo credit Vasumathi Sankaran)



carrying capacities of the natural resources available to them. Whether the innovativeness and imaginativeness of the communities would have saved them when their resources shrank, their population increased, or both happened, is a moot question. By one interpretation it can be argued that modern day communities are actually the same traditional communities which have increased in population and have a reduced resource base. If this is correct, then clearly these communities are no longer able to maintain their use at a sustainable level.

Map showing the grazing routes of the herds of Changpas in Changthang Sanctuary
(Map and sketches drawn by Pratibha Pande)



However, if attention is focused on the period when these communities flourished, and flourished in harmony with nature, some interesting examples come to notice. Essentially, these examples highlight the ability of a community to recognise the carrying capacity of natural resources, including of specific elements of nature. The community's ability to then communicate to its entire population their assessment of the carrying capacity and their concern about not exceeding the carrying capacity, also plays a key role. There is also an uncanny willingness among all or at least most members of the community to contain their own consumption within the bounds of sustainability, and conform to the institutions and practices created, sometimes very innovatively, to ensure that immediate consumption patterns not end up destroying the environment.

It is not always clear what the motivations of each of the individuals in such a community were. Was it just that all of them were

public minded citizens who could not but act in a manner such that it conformed to the larger public interest? Perhaps so, but a very unlikely scenario. It is much more likely that, on the one hand, the regulation and enforcement of the socially prescribed norms regarding natural resources were effective, and on the other, that the size of the community was small enough for every individual to very quickly have to face the consequences of violating the laid down social norms. Whether there were examples of societies, especially large and heterogeneous societies, where citizens followed the prescribed norms because they believed in contributing to collective good, is not known. Judging also from present day social behaviour, this seems highly unlikely.

Given below are some interesting examples of how societies sought to conserve nature because they wanted to maximise their economic profits, ensure sustainable use, and abide by social and legal contracts.

According to Chandra [1987], the inhabitants of Kinnaur, in Himachal Pradesh, ensure that their herds of livestock are in consonance with the local environmental conditions. Consequently, in the moist zones, where fodder and pasture lands are abundant, the people domesticate larger animals like cows (and dzo and dzomo). However, in the dryer zones, they only domesticate smaller animals like sheep, goats, or the occasional mule.

Another strategy that led to the sustainable utilisation of resources was nomadic or seasonal translocation. Pandya [1993] reports an interesting example of this from the Andaman and Nicobar Islands. According to him, the Onges believe that they should not consume the food consumed by the spirits. Accordingly, they seasonally translocate themselves. This is facilitated by their tribe being divided into two groups, one being forest dwellers and pig hunters and the other being coastal dwellers and turtle hunters. During November to February, when pig hunting is banned, the forest dwellers move to the coast and are fed by the turtle hunters. However, when the spirits are in the sea, from March to October, the turtle hunters move inwards and are supported by the pig hunters. According to Pandya *"This pattern of translocation, essential to every seasonal cycle, reflects not only an awareness of spirit movements, which alters the season and availability of food, but also signifies the coexistence of the humans and the spirits."* [Pandya 1993] (See Annexure VI for more examples of resource sharing)

It is important to mention here that though such traditional methods of ensuring sustainability might be effective in ensuring sustainable access to fodder for the cows and yaks, these practices are not necessarily in keeping with the requirements of biodiversity conservation. As was observed in the Great Himalayan National Park, in

Himachal Pradesh, the grazing of sheep in the high-altitude thatches (grazing grounds) might be sustainable for the sheep herders but reduced the availability of grazing grounds for wild animals, and also replaced unpalatable wild plants with palatable ones, thereby changing the nature of the ecosystem. The presence of livestock from outside, even though periodic, resulted in disturbance for the wild animals living in the area (Singh et. al. 1996).

3.4 ETHICS

The evolution of the ethical or moral idea, from the beginning of human existence, makes a fascinating study. Though strong evidence no longer exists, there appear to be good reasons to believe that many, if not all, of the ethical notions which, today, are taken as a fundamental part of our cultural ethos, developed out of practical considerations regarding the survival and well being of groups and communities. For a detailed discussion of this thesis, see Westermarck (1924).

Earliest religions are often classified as animistic and involve the worship of elements of nature including the sun, fire, water, land, the air and various plants and animals. Though the specific reason why any one or more of these were deified is not always clear, what seems to have followed is a whole host of ethical imperatives relating to nature and its elements. Interestingly, even when 'animistic' religions faded away or evolved into more spiritualistic systems of worship, some of the fundamental values associated with the environment persisted as a part of the cultural ethos.

Perhaps one of the most widespread of this was the ethical value in not killing or otherwise harming living creatures. Though in its essence such a value finds place in almost all semi-modern and modern ethical and religious systems, in its most common occurrence it focuses only on other human beings. Therefore, there is perhaps no religion or ethical system being practised even today where the killing or otherwise harming of other human beings is not broadly classified as wrong or a sin. Very often exceptions are provided, but they prove the rule.

However, in many of the traditional religions and moral systems, both in the east and the west, the taboo on taking life or otherwise harming living creatures extended beyond the human species. In one of its forms, Jainism not only forbids the conscious taking of the life of another living creature, but also requires that everything be done to prevent the inadvertent killing or harming of other life forms. Consequently, the exhortation to wear a cloth over the mouth so that insects do not inadvertently get swallowed. In another form, even the killing of live plants for food or any other purpose is forbidden, and only

fruits and other seeds which have fallen off the host plants are considered 'dead' and therefore fit for consumption.

Both in India and in the Americas, the imperative not to harm elements of nature has sometimes extended to what are usually considered non-living resources. The baiga tribals of Central India, for example, refuse to plough or otherwise cultivate the land because they believe that the earth is their mother and ploughing and cultivating would be disrespectful and hurtful. Similarly, the American Indian tradition also attaches sacred values to the earth, the rocks and stones, and to other inanimate elements of nature. Interestingly, however, some of these systems allow the breaking of live plants and even the hunting of animals, in so far as they are done to meet the basic needs of the community.

However, such actions are always supposed to be accompanied by a sense of regret and apology and a request for forgiveness from those elements that are being so used. It is an interesting moral dictum where not the action or its motivation, but the emotions that accompany that action, determine its ethicality.

Anthropomorphisation of plants and animals is also a prevalent practice in many societies, both traditional and modern. So, for example, children are taught not to pluck flowers at night because flowers sleep at night it is unfair to 'attack' them then. Similarly, there are many stories about how animals behave in a human fashion and express emotions and reactions which are essentially human. For example, there is a common

belief that if you kill a cobra, its mate will seek you out and kill you, out of revenge.

Underlying the story, there is also a feeling that by killing the mate you have in some senses justified being yourself killed, because something unethical has been done.

Apart from species, many sites also have ethical imperatives attached to their conservation. Some examples from the literature are given in Box 8.

3.5 AESTHETICS

Human aesthetics have always been heavily dependent on natural values. In fact, there are schools of thought which hold that basic aesthetic values are derived from nature. Colours, the combination of colours, sizes, shapes and even sounds and smells in nature determine significantly human choices and preferences.

Box 8 The Purana and Plants

"That the Purana treats the plants with importance can be estimated from the discussions it contains about the (i) origin of plants, (ii) utility of plants, (iii) importance of plants in ecological balance, and (iv) classification of plants. These discussions are briefly narrated below.

"(i) Origin of plants: According to the Purana, plants are sacred in origin. It states that Osadhi, fruits, and roots have originated from the dermal hairs of Brahma (9.45). According to the Purana (8.150) Osadhi means a plant which dies after the ripening of its fruits; thus, Osadhi includes all crop plants. The Purana continues that Kasa has originated from the hairs of Prajapati (75.40), and Iksu has sprung into existence from the nasal drops of Tvasta (78.7). There are some other mythical stories about the origin of the following plants (69.323); syama, savala, arjuna, harita, krsna, dhumra, aruna, and tula.

"The Purana makes an interesting observation when it (69.339 to 341) states that lata (climber), valli (twinner), and virut (herb) are the precursors of vrksa (tree), gulma (shrub), and herbs respectively. It states categorically that trees and shrubs originate from lata and valli, while virut gives rise to all herbaceous plants.

"The Purana, however, consistently maintains that the rain aids the appearance of plants on this planet (8.81, and 131 to 133); in one place (5.13) it states that seeds cannot originate without water.

"(ii) Utility of plants: The Purana states that man can obtain garments, ornaments, fruits, dyes, and honey from the plants; and once man survived depending solely on plants (8.82, 89 and 90). It continues that houses can be built only with the timber available from the trees (8.125 & 126).

"(iii) Importance of plants in ecological balance: The Purana (8.92 to 95) states that various types of natural calamities occur whenever man starts felling trees on a massive scale. The adverse effects of irresponsible grabbing and felling of trees have also been discussed in brief (8.137 to 139). The Purana (3.14; 8.134), however, maintains that natural seasons have profound effects on plants." [Sensarma 1988]

Whatever be the merits of such a thesis, it is much more certain that human societies, from perhaps the beginning of time, have aesthetically responded to nature and its elements. The wonder of a flower or of colourful birds must have been a part of human society from its very provenience. Even today, the most urbanised social groups value, sometimes fiercely, their parks, wilderness areas, green patches, lawns and gardens, and even their potted plants.

Unfortunately, the aesthetic values attached to elements of nature, especially to species of plants and animals, have perhaps contributed as much, if not more, to their destruction as they might have to their conservation. Flowers have been plucked and collected for thousands of years for their beauty and fragrance. Certain species that became very popular have even got wiped out from the wild. Beautiful birds have been killed for their feathers, which have adorned both traditional headgear and modern hats. Fur bearing animals have been killed, so that their pelts can adorn human bodies, walls, and floors. Even

the musk deer, which has the misfortune of producing an exceptional fragrance to facilitate its mating, has been ruthlessly slaughtered so that men and women could capture its fragrance for themselves. Songbirds, talented mimics, and other pleasing species have been captured in their thousands to be displayed as pets and, in many cases, been transported and deliberately or otherwise introduced into foreign environments, where they have created much havoc for the local species. Despite this, there are instances where species have been preserved because of their aesthetic value. This is more and more a trend, and aesthetics and recreation have not only become a high priority among populations whose other basic needs had been fulfilled, but also a multibillion-dollar business.

3.6 LOVE AND RESPECT

It would be exceedingly cynical to surmise, from the evidence that survives, that fear was the only real motive for people to conserve biodiversity. In fact, it can be argued that as fear was the most public of the motivations, or that element which was most often used against those who were inclined to violate the laid down norms, it appears to be far more important and universal a motivation than it really is. It is most likely that a lot of people conserved biodiversity and the environment out of a host of other motives, including love and respect, though these were personal and therefore did not get adequately projected in the literature.

As a parallel, one could argue that though the deterrent and retributive aspects of modern day law are projected as the real basis why most people follow the law, the reality might be different. In fact, a majority of the laws are followed by a majority of people for various other reasons, including moral compulsions or social sensitivity. Nevertheless, if a later society was to judge us, based on the literature available, they might also feel that whatever laws were followed, they were followed mainly because of the fear of punishment. Nevertheless, if a later society was to judge us, based on the literature available, they might also feel that whatever laws were followed, they were followed mainly because of the fear of punishment.

Fortunately, there are a few examples where one can clearly detect, among traditional societies, an urge to conserve out of love or respect for nature and its elements, or for what they symbolised.

The Bisnoi sect of western India is known for its love and respect for other living beings - plants and animals. All kinds of animals, be it the black buck, gazelles, jackals, foxes and snakes, Indian birds like partridges and quails, or the many species of migratory birds that come in the thousands in the winter, are all part of the Bisnoi landscape. The Bisnois are known to have sacrificed their own lives to stop the cutting of their beloved *khejri* trees (see Annexure VII). The Warlis, who love and worship nature as 'Hirva', have a similar tradition of conserving plants and

Box 9: The Warli Tradition

"Warlis live in harmony with their environment, their culture incorporating the spiritual and the material, the living and the non-living, into one integral whole. Being part of living nature, the environment is not exploitable. These holistic concepts may not be verbally expressed but are evident from their myths and lifestyle.

"Warlis were among the first 'Greens', with nature personified and worshiped as 'Hirva' (green). Hirva was the source of all wealth, with the Warlis identifying themselves with Pardhi, the hunter-companion of Hirva. Nature's produces were gifts of Hirva, rather than the fruits of their own labour or their possessions.

"The conservation of many plants and animals in their jungle environment is a part of the Warlis' culture, embedded in and perpetuated by customs and religious beliefs. Their traditional sacred groves are among the few remaining areas in India with climax forests and wide diversity of species, since no animal or plant can be harmed in them. Their respect for all life reaches down to the smallest creature and plant. [Perreira 1992]

animals in their natural environment. The sacred groves of the Warlis are among the few remaining areas in India with a wide variety of species, since no animal or plant can be harmed in them (see Box 9 above).

An interesting phenomenon in traditional belief-systems is the special value attached to specific species. Often this value is religious in the sense that the species is seen to be of special significance to the gods and, perhaps consequently, played a special part in religious rituals. Clearly, the best example of this, in India, is the cow which, to Hindus, is holy and cannot be killed or injured. Even among non-vegetarian Hindus, eating of beef, especially cow beef, continues to be rare.

Furthermore, the traditional systems of medicine have also given a great incentive for the conservation of specific species. Not only are certain species identified as having medicinal value, but also these and many others are essential ingredients of potions and salves made by *vaid*s and *hakims*.

It is not always certain which of the various plants, herbs and other ingredients put into such medicines actually contain the required active ingredients. Some believe that many species are purposely mixed

so that it becomes difficult to identify the critical species, thereby ensuring that everybody does not know the identity of the medicinal plant.

Box 10 - Hill Kharias of Similipal Hills

"Hill Kharias are primarily hunters and food gatherers. Most of them are found around Similipal hills. Numerous forest deities have been conceptualized by Hill Kharias. They may be divided into two groups. The first is a group of some major deities that are considered the custodians of the natural resources of Similipal. The second group includes deities who represent the hills of Similipal. Each hill in Similipal is considered a deity. Most deities are female and are called *Thakurani*. The presiding deity *Badam* and his family members are said to inhabit the caves in the sacred hill *Athara Deula* in Similipal.

"In almost all rituals at the village and clan level, forest deities are propitiated to enhance the natural resources of the forest as well as to ensure bountiful food-gathering and hunting. Other deities are worshiped to avert diseases and other misfortunes from befalling the village. They usually propitiate their deities in a grand manner twice a year. During the month of September-October (*Ashwina*), they organize a village level ritual known as *Jungla pooja* or *Kabadi pooja* to satisfy the deities before collecting the Sal resin in the forest. During the month of April-May (*Baisakh*) another *Jungla/Kabadi pooja* is organized to satisfy the deities for honey collection. Arrowroot is another major resource that the Kharias harvest. Before collection of this resource also the deities are propitiated. Propitiation rituals are performed at the site of collection of the natural resource. In addition to the above three rituals Hill Kharias also organize a major ritual called *Maghuani pooja* in the month of January-February (*Magha*). In this ritual, they worship *Badam*, the presiding deity of Similipal hills, and other forest deities for successful forest expeditions as well as for the sustenance of forest resources. Also, all the deities are offered newly grown plant resources. As per tradition no Kharia harvests any kind of forest resource between the *Makara pooja* in the month of January (*Pausa*), and the *Kabadi pooja*. Their year ends with *Makara pooja*." [Dass 1993]

It is not always certain which of the various plants, herbs and other ingredients put into such medicines actually contain the required active ingredients. Some believe that many species are purposely mixed so that it becomes difficult to identify the critical species, thereby ensuring that everybody does not know the identity of the medicinal plant.

Whatever be the motives, the practice of mixing many kinds of plants in a medicine has also resulted in all these various species being conserved as, to the common person, they are all medicinal.

The same happens in religious rituals where various species are prescribed for use, thereby giving a strong incentive to conserve all of them.

A good example of such multiple uses is recorded from Goa:

"The relation of man to the trees has been well acknowledged and the diversity of vegetation is conserved through rituals..... neem is used on one occasion. Similarly, various other trees have their appropriate days and places in rituals. Vatapoornima is intended for worship of the banyan tree by married women on the full moon day in the month of Jyaistha. There are about a dozen vratas and pujas for which leaves of dozens of varieties of specified trees, plants and grasses are offered. These include the ordinary hariyali for Ganesh and the leaves of rare, selected varieties of trees. A variety of fruit both edible and non-edible decorates the altar for the Ganesh festival in the form of Matoli.

"Yagnas or sacrificial fires use twigs of various specified trees. Besides different vratas different deities have their own favourite types of flowers and colours: red for Ganesh, yellow for Vishnu, white for Shiva and so on. Exchange of twin leaves of aapta (Bauhinia variety) on Dussera is practised as a token of friendship and so is the playing of Holi with coloured water prepared by soaking the dry flowers of palash (Flame of the Forest). The use of synthetic colours for Holi is a recent practice. These are some practices that show the intimate relation between man and nature, closely linked with cultural rites. Burning at Holi festival is perhaps the only anti-ecological custom and perhaps the use of indecent words and shouting are a safety valve to release the antisocial instincts of people." [Alvares 1991]

Another instance which established the value of medicinal plants in conserving the sites where they are found, is reported from Kerala:

"Spread along the lower elevation of the Kerala landscape, the kavu is an unique system built over the ages. Upper caste Hindu families put up shrines on their estates and installed deities for daily worship and for guarding themselves against evil. According to custom, trees considered sacred were planted, resulting in lush green forests that religion protected from deforestation.

"But these treasure houses of lush green vegetation are fast disappearing today. Of the ones that still remain, a large number are to be found in Alleppey where kavus also doubled as nurseries for Ayurvedic medicinal herbs. And the different gods of the primitive pantheon can also be seen in these groves. Those associated with Naga (the serpent god) and Bhadrakali (Bhagavathi) are found statewide though Naga worship is the more popular one." [Perumal 1993]

Box 11: The Indian Deities' Association with Flora

"Though, generally speaking, identifying plants with deities was a tradition resulting from Aryan migration, such as the association of the soma plant with the moon, a large number of plants that are associated with deities belong to the traditional flora of India. The association of tulasi and amalaka with Vishnu; bilva with Shiva; and lotus with Sri-Lakshmi, are examples. In such cases the association of the plant with the deity would be pre-Aryan. [Gupta 1993]

"Flowers offered in various months of the year to the various deities find mention in Garuda Purana. "The vow of Ananga-Trayodashi falls on the 13th day of the moon's increase in the month of Mrgasirsha.

"Yogesvara should be worshipped on this day with offerings of datura, twigs of mallika, vilva leaves, twigs of kadamba, sandal paste; god Nateshvara with kunda flowers and plakshha twigs. In the month of Phalguna god Vivesvara is to be worshipped with muruvaka flowers, pot herbs, chuta tree flowers and twigs of vata; in Vaisakh god Sambhu to be offered flowers of ashoka, twigs of udumbara and nutmeg. In the month of Jaistha, Pradyumna an incarnation of Kamadeva, the god of love, is to be worshipped with champaka flowers and vilva twigs. In Asadha, gods are worshipped with flowers of aparmarga and agaru twigs, and in Shravana with karavira flowers. Ashvina, god Suradhiva, lord of celestials, is worshipped with flowers of vakula, twigs of madhavi, champaka flowers and twigs of khadira; and Rudra is worshipped with twigs of vadan. At the end of the year puja is performed with a milkpot, and herbs and lotus flowers are offered to deities. Puranas also mention that he who gives libations of first fruits in vessels made of palasa, nyagrodha, kasmari, madhuka, phalgu, bilva, venu, get the benefit of all Yajinas." [Gupta 1993]

Even in ancient Indian texts, like the Puranas, there are lists of species fit for religious purposes. There are also justifications for planting trees.

"According to the Purana, (75.71 to 75.72) the following trees are Yajniya (fit for religious purposes): plaksa, nyagrodha, asvattha, vikamata, udumbara, vilva, candana, sarala and khadira. In another place (75.75 & 76) the Purana grades the flowering trees as ayajniya i. e., unfit for religious uses: slesmatmaka, naktamala, kapittha, salmali, nipa and vibhitaka."

"The Purana (75.32 & 33) lists the following plants and plant products as fit for use in sraddha ceremony: candana, aguru, tamala, usira, padma, utpala, and the oil tila. And the following are not to be used in sraddha ceremony: bhandira, upakama, kurndaka (75.34), balbaja, varana, anjana, abhyanjana (75.51), iasuna, grnjana, palandu, pindamulka (78.12), vartaku, a saka (78.48)." [Sensarma 1988]

"The utility of trees in a hot country was recognised by people from very early times. The merit of planting trees is given in many ancient texts. In Matsya Purana, a legend mentions that Parvati planted a sapling of ashoka and the gods asked her the merit of planting trees. To this Parvati replied: "A vapi is equal in fruit to 10 wells, a pond to 10 vapis, a son

to 10 ponds and a tree is equal in merit to 10 sons." The merit for the performance of rite of consecration of trees and orchards is also mentioned in Agni Purana." [Gupta 1993]

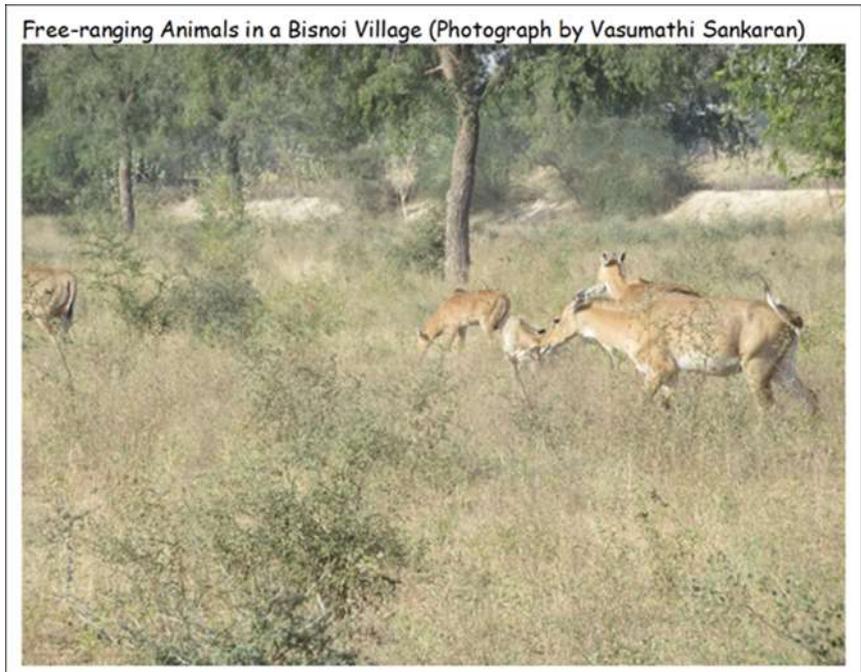


Certain species are identified with particular gods, or with particular seasons or months, or even with particular days of the month.

Trees such as Pongamia

glabra, mango, jackfruit, Nauclea parviflora (*karam*) and Ficus religiosa (*jitia pipar*) are also regarded as sacred.

Even for the making of idols and sculpted images, species of trees from which wood was allowed to be taken, were prescribed. Also, perhaps



to ensure that a proper sense of respect was shown to the tree, an elaborate ritual was prescribed.

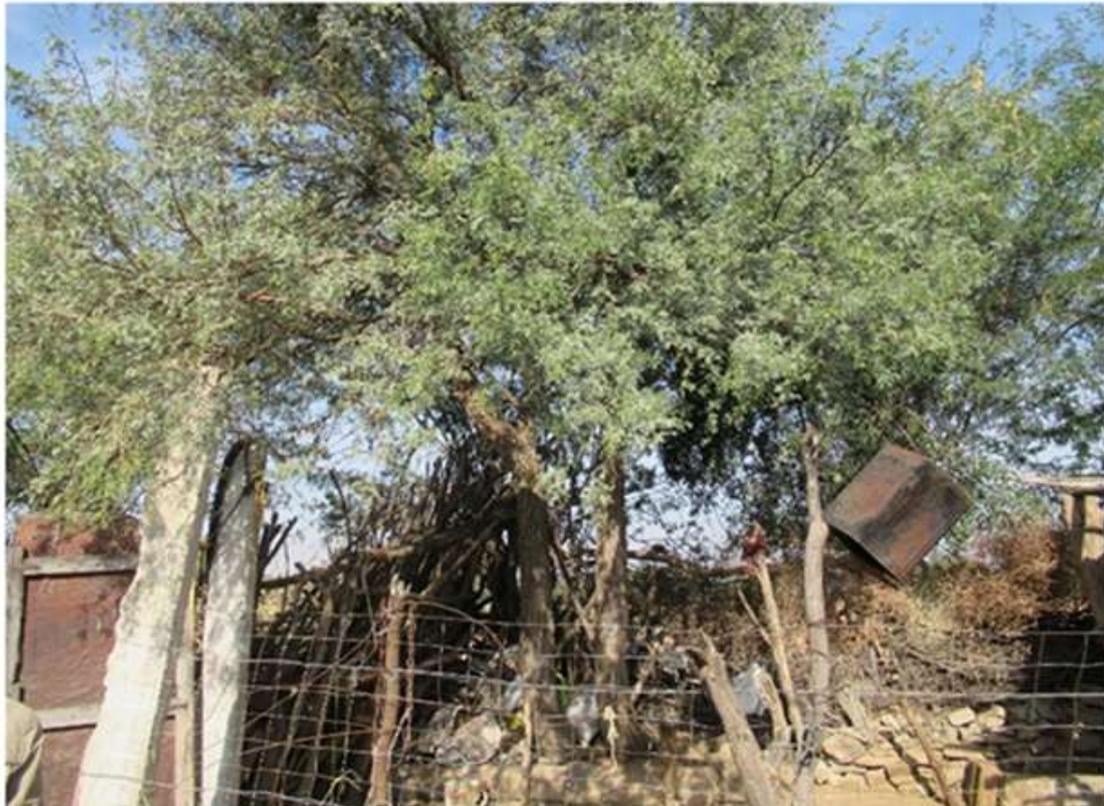
So much importance was given to plants, particularly to trees, that a whole ritual was laid for the felling of trees, particularly for

making carvings of deities, to worship. Not every wood was used for image making, nor could anyone worship an image unless the scriptures sanctioned

it. Images for worship by the brahmins were made from *deodara, chandan, sami, madhuka*; for kshatriyas images were made out of *arishta, aswattha, khadira, vilva*; for vaishyas from *jivika, khadira, sindhuka, syandana*; for shudras out of *tinduka, kesara, salya arjuna, amara* and *sala*.

The prescribed ritual for felling the selected tree was an elaborate one. The sculptor had to perform certain rites such as marking off on its trunk the various portions of the image to be made. Next, he had to propitiate the tree with various offerings and to worship at night the gods, *manes, rakshasa, naags, asuras, ganas* and *vinayakas*. In the morning, after sprinkling water on the tree and smearing the blade of his axe with honey and clarified butter, he would cut round the tree rightwards, beginning from the northeast corner.

The Khejri Tree in a Bisnoi Village (Photograph by Vasumathi Sankaran)



4.

CONSERVATION OF SITES

4.1 SACRED GROVES AND SITES

Perhaps the most effective institution for conserving biodiversity was the recognition by the traditional communities, of sacred groves and sites.

"Stretching into prehistoric times, the concept of the sacred grove in India has its roots in antiquity, even before the era of the Vedas which presents the only recorded remains of the thoughts of the ancient Aryans who migrated into the sub-continent. In their migration from the steppes of Central Asia, through Balkh in Khorassan (Dandekar 1979) to the Indian sub-continent, the ancient Vedic people of prehistoric times assimilated new environmental value systems of the original inhabitants of the Indian sub-continent. Though many traditional societies value a large number of plants species from the wild for a variety of reasons such as for food or medicine, sacredness attached to species in India is perhaps a more recent aspect of post Vedic Hindu rituals. Thus, the existing concept of sacred groves at the landscape or ecosystem level of the original pre-Vedic inhabitants of India was interpreted by the migrants of the Vedic age down to the level of particular species.

Buddhism and Jainism, which initially branched out as revivalistic offshoots of Hinduism, also led to a renewal in practices with conservation value. One branch of this religious revival was the creation of a sect of Jains (the Digambara Jains) implacably set against killing any living organism. Another branch was the concept of the 'sacred landscape' represented by the holistic ecological philosophy of Sikkimese Buddhists." [Ramakrishnan 1996]

Vedic civilization is thought to have been between 4500 and 1800 BC. Starting from vedic times and extending to puranic times (200BC to 100AD) there were injunctions to preserve biodiversity. Literature of the time talks about both protective as well as productive forestry. Sustainability was ingrained in the system of vedic times.

"Vedic tradition affirms that a village is considered complete only when the three types of forests - Mahavan, Shrivan, and Tapovan - surround it. Of these the Mahavan is like the protected forest of today. It adjoins a village and is a refuge to all species. If these

forests were cleared another kind of forest was established in their place, which is like the production forest of today. These were called the Shrivani. Food fodder and timber could be extracted from these. Besides, they protected the air and water quality. The third type called the Tapovan were the sacred forests, where animals or trees were not harmed. During the vedic age each village had its committee of five elders called the Panchayat to protect and maintain the forests around it." [Kumar 2008].

As much has been written and continues to be written, on sacred groves, it is not intended here to give an exhaustive account. However, it is significant to distinguish between various types of sacred groves.

One type of sacred grove found in different parts of the country was such that no human use was allowed in it. There were, and in some cases still are, powerful taboos to the use or destruction of any resources in such sacred groves. One example of such sacred groves was the groves of the Garos, in Meghalaya, where no one could work, fell trees or cut grass without arousing the anger of the spirits against the villagers. The villagers also prepared a mound of stones called *Kosi*, which they considered a sacred place and where they offered annual sacrifices. No one was permitted to cut or remove anything from there except on the days fixed for certain sacrifices. [Sangama 1979]

Similarly, the Ho preserved certain parts of the forest around every village and believed this to be the abode of their village deity. No one was allowed to cut anything from this grove. In Meghalaya, the Khasis also have sacred groves where it is prohibited even to touch a leaf or a tree. In Kodagu district of Karnataka, many groves were set apart, mainly in the name of Lord Ayappa, where human beings were not allowed to enter. In Kerala, sacred groves called *Sarpa Kavus*, were very common. No one was allowed to trespass and even the taking of a dry twig was forbidden.

There were, however, other types of sacred groves where some use was permitted. For example, in the sacred *Kans* of Uttara Kannada, no felling of trees was permitted. However, the collection of various non timber forest produce and, in some cases, of fallen leaves, was permitted, if no other sources were available and if it did not endanger the ecology of the *Kan* [Chandran and Gadgil 1991]. In some other sacred groves, the removal of dead wood was allowed, though the cutting or removal of any live plant or animal was strictly forbidden. In Bihar, sacred groves are found mainly in the Chhotanagpur area in the southern part of the state. These are locally known as *Sarnas*. The *Sarnas* are sometimes called *Jaheras* or *Jahera thans*. Though ordinarily a tree is not allowed to be

cut or damaged in the *Sarnas*, the local priest (*pahan*) can give permission for the cutting of trees there. Similarly, in the Pune district of Maharashtra, trees cannot be cut from a sacred grove for personal use. They can, however, be cut for building a temple or a school and dead wood can be taken out for the *Holi* festival. In some cases, for example in the sacred grove of Sakeri village in Pune district, every household is allowed to cut one bamboo for personal use during *Holi*. In other parts of Maharashtra, the cutting of trees or the selling of produce from such sacred groves is banned. In another example from Maharashtra, from the sacred groves of Tivri in Ratnagiri district only wood for cremating the dead can be extracted. [Mitra et al. 1994]

There are also other types of sacred sites, especially many sacred ponds. These have all played an important part in conserving nature.

"In Bangladesh every shrine has at least one pond attached to it, and the animals in such ponds are inviolate. Two such sacred ponds are of biological interest, for they harbour populations of endangered species; the Byazid Bostami has the turtle *Trionyx nigricans*, and Khan Jahan Ali has marsh crocodiles. The former is of particular interest since it is the only known population of this turtle in the world. It is notable that the Muslim shrine of Byazid Bostami was apparently built around 800 A.D. at a spot which was earlier occupied by a Buddhist shrine. Thus, the tradition of protection of the turtle and the sacred pond is likely to be an ancient tradition assimilated by Islam." [Khan 1980 as quoted by Gadgil 1985]

There is thus good evidence to support the belief that sacred groves contribute significantly to the conservation of nature and biodiversity. According to Chandran and Gadgil "*These groves therefore represent a sample of vegetation in its climax state. Today these groves serve critical functions like sheltering rare plants, protecting water sources, and being the only remnants of tree vegetation along the countryside; they are also the main sources of leaf litter.*" [Chandran & Gadgil 1991]

Similarly, according to botanist M.D. Vartak:

"These groves are important today because they are the sanctum sanctorum of rare and endangered plant species, many of which may have disappeared from the region outside the grove. Besides being indicators of forests that might have flourished in the region, these groves are a laboratory for botanists, a bank of plant diversity and germplasm for geneticists and a community's medicine chest." (M.D. Vartak, as quoted in Mitra 1994)

The same story is told about Meghalaya, where it is stated that:

"The sacred groves of Meghalaya, totaling about 1,000 sq. km. of undisturbed natural vegetation, are found scattered in small pockets all over the Khasi and Jaintia Hills." (A.S. Chauhan, as quoted in Mitra 1994)

Chauhan says these groves are a reservoir of rare plant species, some not found anywhere else in the world.

"With more than 700 of the known plant species on the verge of extinction, these sacred forests are now even more precious as the pressure of population on land and forest bears down uncontrollably." (Chauhan *ibid*)

Apart from Meghalaya, Chauhan says sacred groves don't exist in other regions in the northeast. [Mitra et al. 1994]

In fact, the value of sacred groves in Meghalaya was recorded more than a century ago by the English Botanists J.D. Hooker and N.L. Bor. They pleaded then for the preservation of this treasure house of plants in

"all its primeval grandeur". Mawphlang is still undisturbed and according to officials of the Botanical Survey of India, "there is no change in this forest since Bor's record".

However, large proportions of these sacred groves and sites have either disappeared or are under great pressure. According to Ramakrishnan [1996], the sacred grove at Shillong Peak in Meghalaya lies completely deforested now. Similarly, sacred groves in Maharashtra, also known as *Dev Rohatis*, have also almost disappeared. Even the *Sarpa Kavus* of Kerala are fast disappearing, and the land is being converted to other use.

Inside the Mawphlang Sacred Grove



According to Ramakrishnan [1996] (see Box 12) the Rathong Chu, in Sikkim, is considered a sacred river. It is believed to be the source of the nine holy lakes and is itself considered to have 109 hidden lakes. Each of these lakes is said to have presiding deities, both good and evil.

The Rathong Chu river is the focus of religious festivals which are considered the holiest of the holy. It is believed that during these festivals the Rathong Chu turns white and starts to sing. Thousands of people participate in the festivities and water from the river, which is kept in vases, is believed to be the indicator of what the future holds. If the water overflows, it indicates prosperity; if it declines then it foretells unwelcome events such as drought and disease; and turbid water predicts unrest and conflicts.

Box 12: Demojong (Sikkim) - Land of Hidden Treasures

"Of the four Buddhist sects, Nyngmepa, Kagupa, Gelugpa and Sakyapa represented in Sikkim, the Nyngmepa sect, initiated by the Buddha incarnate, Maha Guru Padmasambhava, is the most significant. Whilst Sikkim, as a whole, is considered to be sacred by Sikkimese Buddhists, according to the sacred text *Neysol*, the area below Mount Khangchendzonga in west Sikkim, referred to as *Demojong*, is the most sacred of all, being the abode of Sikkim's deities. The air, soil, water, and biota here are all sacred to the people of Sikkim, because of the interconnections that are perceived to exist between them. Any human-induced perturbation is considered to spell disaster for Sikkim as a whole, because disturbance will have been caused to the ruling deities and the treasures (*ters*) placed in the landscape. Interestingly, it is believed that there is no way of knowing where the *ters* are hidden, as they will be revealed only to the right person at the right time.

"Padmasambhava, who is highly revered and worshipped by Sikkimese Buddhists, is considered to have blessed Yoksum and the surrounding landscape of Demojong, in the district of West Sikkim, by having placed within it a large number of hidden treasures (*ters*). Many sacred treasures are also believed to have been hidden by Lhatsun Namkha Jigme in the Yoksum region, and it is believed that these *ters* will only be slowly revealed to enlightened lamas and discovered at appropriate times. Conserving and protecting these treasures from polluting and disturbing influences is considered to be vitally important for human welfare.

"The area below Mount Khangchendzonga in the landscape of Demojong is the core of the sacred land of Sikkim. Yoksum is considered to be a *Lhakhang* (altar) and *Mandala* where offerings are made to protective deities. It is believed that if the land and water here come to be desecrated, no meaningful performance of Buddhist rituals will be possible. Any large-scale human-induced perturbation in the holy land of the Yoksum region would destroy the hidden treasures, the *ters*, in such a manner as to severely reduce the chances of a visionary ever recovering them in the future (it is said that the last such discovery was made by Terton Padma Lingpa, who lived 540 years ago). Also, any major disruption to the river system would disturb the ruling deities of the 109 hidden lakes of the river, thus leading to serious calamities: during a period of bloodshed in the past, for example, the lake Khecho-Palri is thought to have moved away from the river it supplied with water.

"The very cultural fabric of Sikkimese society is dependent upon the conservation of the entirety of this sacred landscape of interacting ecosystems. In Sikkim, the heritage-conservation issue is not merely a question of protecting a few physical structures of ruins: the uniqueness of this heritage site is that the system of value, or 'world view', interprets the landscape in a very holistic sense – the soil, the water, the biota, the visible water bodies, the rivers and the less obvious notional lakes on the river bed – are considered as an ensemble along with the physical monuments, and perceived as an overall whole." [Ramakrishnan 1996]

Interestingly, these beliefs of the Sikkimese led, recently, to popular opposition to the construction of a dam on the Chu river: the Chu Hydel Project. This opposition led to the government having to scrap the project (see Box 13 below).

Box 13 - Decision to scrap Chu Hydel Project welcomed in Sikkim

Press Trust of India, Gangtok, August 25, 1997

"The Sikkim Government's decision to scrap the Chu Hydel Project after having spent Rs 14 crore has been welcomed by the Concerned Citizens of Sikkim (CCS) - a non-governmental organisation which had highlighted the issue. "We are happy that the Government took the historic decision and we got what we fought for", an elated Pema Namgyal, a CCS activist, said.

"The decision, taken to honour the sentiments, religion and culture of the people of Sikkim, was announced by Chief Minister Pawan Chamling on Wednesday at a public meeting attended by tribals and lamas from different monasteries.

"The resolution evoked varying reactions from political parties in the state. Though some welcomed it, others questioned the delay in the decision and its declaration before the panchayat elections. Public resentment had built up against the hydel project on the sacred river Rathong Chu, believed to have 109 'hidden' lakes, which were sacred according to religious leaders.

"In its crusade, the CCS had the backing of the people and also support from a body of monks and two tribal organisations. Rimpoches and other religious heads had said that a hydel project such as this would adversely affect the basic tenets on which the Sikkimese Bhuddist beliefs are based. "Yoksum is the core of the sacred land and no meaningful performance of Buddhist rituals are possible if this land and water is desecrated." Disturbing the river water and diverting it through the canal system of the project would disturb the ruling deities of these hidden lakes, they said."

4.2 SHIFTING CULTIVATION

One way in which tribal societies living in hilly terrains ensured that their agricultural activities were sustainable, was through *jhumming* or shifting cultivation. Though widely considered, in today's context, to be a reason for the destruction of forests, in its traditional form it was perhaps a way of conserving forests.

Essentially, *jhumming* involves cutting and burning the vegetation in a patch of forests and then planting various crops in the ashes. The area is cultivated for one to three years, after which it is abandoned and allowed to grow back for 5 to 20 years (the *jhumming* cycle).

It is interesting that *jhumming* is done in India in mostly those places where the soil is thin or otherwise unsuited for other kinds of cultivation. In such soils, if *jhumming* was not prevalent, perhaps more and more land would have been cleared for cultivation and then abandoned once the soils were exhausted, leading to the clearing of forest lands.

According to Ramakrishnan [1985]:

"With a rich species diversity in these forests that have evolved over many hundred years, the stability of all the diverse living organisms including man has been maintained by nature more effectively than any human planning and 'developmental' activities could achieve. The maintenance of the soil cover and its fertility in these high rainfall areas is crucial for agriculture which is the basic

economic activity of man all over the world and of the humid tropics. In the humid tropics, the soil fertility needed for agriculture is best maintained through a species-rich forest cover. This empirical knowledge developed through intuitive experience of the tribal farmer, through his 'rotational bush-fallow agriculture' (commonly known as jhum in India) (Ramakrishnan 1984) has brought him closer to his natural environment than anywhere else, making him a well integrated whole with nature.

"One of the important economic activities of the tribal man in the north-eastern hills which has kept him so close to nature is the age-old practice of shifting agriculture (commonly known in the country as jhum). Essentially this form of agriculture depends upon harvesting solar energy through the forest and a variety of crops grown on a plot of land. Thus, the solar energy captured by the forest cover is released in the form of manure during the slash and burn operation for use by a variety of crops sown together which also offer a well-organized canopy cover for efficient capture of solar energy."

The rich species diversity on the jhum plot ensures maximum protection to the soil cover, only after the crop cover is established (Toky and Ramakrishnan, 1981b; Mishra and Ramakrishnan, 1983a); in the earlier phase of cropping the losses of sediment and nutrients through water is heavy indeed. Crop diversity ensures stability of the system by checking large-scale damage through pests and disease attacks. A variety of crops positioned in different layers above ground ensure optimizing productivity through efficient light capture, and different layers below-ground ensure a stratified root system to obtain maximum nutrition from the soil. In fact the spatial distribution of the different crop species along the slope itself is based on the empirical knowledge developed through long experience. Thus some of the tuber crops which are more efficient in nutrient uptake and use are toward the top portion of the slope which is relatively poor in soil fertility whilst those which are less efficient in nutrient uptake and use, like some of the cereals, are placed down below where the soil fertility would obviously be high." [Ramakrishnan 1985]

According to Elwin [1986]:

"There is much misconception", says The Mandla District Gazetteer, "as to the amount of permanent damage done to the forests by the axe cultivation of the Baiga, which has been claimed for the denudation of the sources of the Upper

Nerbudda and her tributaries. Mr. Bell discussed this matter at length with many Baigas, and the allegation is not in accordance with either their assertions or his own observation. They claim that the jungle only grows thicker and stronger after the abandonment of a bewar, and they have shown not one, but fifty abandoned bewars where the sal reproduction was strong and luxuriant enough even to impede progress."

There are four critical aspects of shifting cultivation which make the activity not only environmentally sustainable but also preferable to other types of agricultural practices, in the specific ecosystems that they are practiced in.

1. The identification and location of the *jhum* sites. As the idea is for these sites to regenerate on their own once they are abandoned, their location is usually in the heart of natural forests so that natural seed banks are available to assist in the regeneration. For the same reason the various *jhum* areas are not close together, nor any one so extensive, so as to inhibit natural regeneration. According to Alvares [1991]:

"Since kumeri involves a rotation of forest plots, forest regeneration is integral to the system. The recycling of land use is a form of conservation practice which prevents land wastage. As Kumeri farming comprises several scattered plots in the forest, damage from pest attacks cannot spread from one plot to another. The forest belt surrounding the plot serves as a wind break to reduce evaporation and protect the soil when the land is cleared."

The dispersal of sites also enables seeds from the surrounding forest belts to germinate, hence hastening forest regeneration.

2. The areas are *jhummed*, for periods ranging from 1 year to 3 years, after which they are abandoned. The method of cultivation followed is such that it conforms to the ecological requirements of the area. According to Ramakrishnan [1985]:

"The practice in its typical form (Toky and Ramakrishnan, 1981a) essentially involves clear-cutting of a plot of 2 to 2.5 ha of land on steep slopes of 30 to 40° angle, by a family of 5-6 members, allowing the slash to dry during the dry winter season, followed by burning the slash in March-April. The more difficult operations are done collectively by more than one family; otherwise the family unit is independently responsible for cropping a plot of land. Though the land is

owned by the village through the village head man who regulates its use, the plot allotted to a family for jhum normally remains with that family after a token payment. The typical jhum is practised extensively all over the north-east."

According to Alvares [1991]:

"There are basically five stages in Kumeri cultivation. Felling an area of forest; firing the dead vegetation; planting or sowing seeds without the plough; weeding; and eventually harvesting. The area of forest land cleared is used for two or three years after which the plots are abandoned, and new lands are felled for cultivation. This is repeated until the original plot is returned to and the rotation is started all over again, since the forest has regenerated itself in the original plot."

It is the length of the Kumeri cycle (the number of years taken before the tribal returns to the original plot) which is the most important feature of Kumeri cultivation. If for some reason the tribal is compelled to return to the original plot and clear it before it has regenerated as forest, only then does an ecological problem appear. Additional problems could arise if large numbers of people take to Kumeri plantation in the same forest areas. This would not only mean shorter cycles for everyone but also undermine the ability of the forest system itself to regenerate. Ecologists have proved that tropical forests left to themselves can restore themselves completely within the decade.

"There are several principles in Kumeri cultivation, which are nothing more than basic ecological principles. For instance, the farmer utilises a plot of forest land for a few seasons and then abandons it, to allow it to restore its fertility by natural means. Thus, the tribal safeguards the once cultivated plot for future use.

"It is also an extremely suitable and viable form of agriculture in tropical slopes where soils are poor. Tropical vegetation grows very rapidly in fallow land and restores the soil. Studies have shown that Kumeri cultivation is basically an initiative of the tropical forest ecosystem and ecologically more conservative than permanent field cultivation. This is because it simulates the structure/functional dynamics and equilibrium of the natural ecosystem, closer than any other

agricultural system human beings have devised. It is also common knowledge that in many marginal farming areas of the world, particularly hillslopes there is as yet no suitable substitute for Kumeri.

"Thus, under conditions of low population density, low technology, poor humid soils and limited availability of land, Kumeri is a highly adaptive form of agriculture. The unpleasant truth is that no alternative food production system for most hill areas, has yet proven to be both biologically and economically workable. One researcher calls Kumeri the "almost complete moulding of human practices to fit the environment as it is". [Alvares1991]

According to Elwin :

"One of these 'bewurs' lasts the Byga, at the outside, three years. He usually leaves sufficient wood on the ground the first season to last for a second season's burning. The third year, if by chance he should make up his mind to stick to one field for so long, his labour is much enhanced, as he has to cut and drag the requisite wood for some little distance and lay it over his field ; in addition to this the out turn of the crops falls off every year; so that, altogether, the Byga has every inducement to change the locale of his cultivation, and, where no restriction has been put on his movements, as a rule he does so. According to him the Juang usually cultivate for two years." [Elwin 1986]

A Podu (or Shifting Cultivation) field bordered by a patch of secondary Forests in Bonda Hills (Orissa). Photos by M. Merlin Franco



3. Perhaps the most important condition for making *jhumming* sustainable is the length of the cycle, i.e., the time given to the *jhummed* site to regenerate before it is *jhummed* again. This can be six or seven years, for the

'Bygas' [Elwin 1986], ten years for the Juang [Elwin 1948], to even 20 years for some of the tribal groups in Mizoram. [Singh 1996]

The length of the cycle has widely been seen as one of the most important safeguards against the degradation of forests by *jhumming*. It has also been widely believed that increased population pressures and shrinking forest resources have shortened the cycle. Though countrywide analysis of this is not available, an assessment of the situation in Mizoram, done by Daman Singh [Singh 1996] is very revealing.

According to her, there is no time series data available to

judge temporal trends. However, she analyses *jhumming* cycle duration data of 352 villages (51 percent of all villages in Mizoram) and finds that the cycle varies from

Box 14: The Jhumming Cycle

"It takes six or seven years before one of these old 'bewurs' is sufficiently covered with wood again to make it worth the Bygas' while to cultivate it a second time. In three years it is probably densely covered with brushwood, but this, if burnt, leaves so little ash that it has to be largely supplemented with timber; and as this has been previously cut all round the clearing, it becomes a work of supererogation to take up one of these old plots before the wood has grown well when other and more suitable land is available." [Elwin 1986]

2 to 18 years, with the average at 6.54 years. More significantly, she attempts to co-relate the average *jhum* cycle of a block with block level data on three parameters: rural population density, number of villages per 100 sq. km, and number of cultivations per sq.km. In her own words:

"Interestingly, the statistical co-relation between the *jhum* cycles and all three parameters is extremely poor A pattern that may be discerned, despite the limitations of data, is that blocks with particularly high population pressures have shorter than average *jhum* cycles. But this does not mean that blocks with low population pressure have long cycles. This observation supports the hypothesis that population density only starts to impinge on the *jhum* cycle after crossing a critical minimum level." [Pg. 174]

4. Another factor which determines the impact of *jhumming* activities on the environment is the rate at which new or virgin forest areas are taken up for *jhumming*. Generally speaking, there appears to be reluctance among tribal groups to open up new areas for *jhumming*. In Mizoram, according to Daman Singh [*ibid*], the preferred areas are those which have few trees and are mainly covered with bamboo growth.

Such areas are usually those which have been *jhummed* earlier.

In Goa, according to Alvares [1991]:

"Though virgin forests give higher yields, Kumeri cultivation prefers secondary forest for farming. This is because clearing primary forests is quite an arduous and dangerous task, requiring more manpower and demanding a larger drying period for the felled vegetation."

4.3 RELIGIOUS VALUES

Apart from sacred groves, many other sites had within them temples, mosques, gurudwaras or other religiously important shrines. The presence of such shrines ensured, at least in the past, a certain sanctity to the ecosystem within which these shrines were located. However, since the advent of the motor vehicle, many of these areas are being subjected to an increasingly large number of pilgrims in an evergrowing fleet of buses, trucks, cars and jeeps. The garbage and mayhem that these pilgrims sometimes leave behind is evidence of the changing values even of the devout.

The Periyar Tiger Reserve, which has within it the Sabarimala shrine, is perhaps the worst affected of the national parks and sanctuaries, with millions of pilgrims descending upon it during the two months of festivals. Many other parks and sanctuaries, including Sariska, in Rajasthan, and Gir in Gujarat, are also afflicted by pilgrim traffic (for quantum of pilgrim traffic in various parks and sanctuaries in India, see Mehta et. al. 2003, vol 3, table 2.10, and vol 4, table 3.10).

Though the presence of growing religious shrines represents a potential pressure on the ecosystem, this could conversely be converted into an opportunity for its conservation. This is worth considering, especially because a large number of parks and sanctuaries in India have religiously and otherwise historically significant sites within them.

Out of about 200 national parks and sanctuaries surveyed, half were seen to have such sites. The list is given in Annexure XI.

5.

CONSERVATION OF SPECIES

Even in contemporary India, there are many species of plants and some of animals that are avidly protected and conserved. Perhaps the best example is the cow, which is treated by Hindus as being sacred, a mother figure, and the killing of cows and the eating of cow meat (cow beef) is vehemently, even violently, opposed by many Hindus.

Among plants, two species of *ficus* trees, the *peepal* and the *banyan*, are considered sacred, though not to the extent that cows are.

There are many other animals and plants that are treated as sacred to varying degrees by various communities, and attract different levels and types of care, respect, and protection.

5.1 AS TOTEMS AND TABOOS

One of the most widespread and effective ways of giving elements of nature a special status was to raise them to the status of a totem. Interestingly, this practice is found among tribal people all over the world.

Box 15: Why Totemism
"According to Niggemeyer, totemism is present where a definite group of human beings is set in certain relations to an animal, a plant, a heavenly phenomenon or an object, after which they are named, and in connection with which the views prevail that the members of this group as such may not marry among one another, and that the object after which the group is named must be respected in some way by the members of the group."
[As quoted in Ferreira 1965]

Totemism, as such a practice is called, involved one or more of the following:

1. Acknowledging that a species of plant or animal, or some other element of nature, has a special status or relationship vis-a-vis a tribe, clan or individual.
2. This special status or relationship calls for a certain type of behaviour from the person or community towards the totemic object.

Such behaviour could include both taboos and positive responses.

This status could be one or more of at least the following:

- 1.1 The person or persons are named after it.
- 1.2 They are descended from it or their spirits join it.
- 1.3 They are related to it or it resembles their totem.

Box 16: Totemism

"TOTEMISM.....When we refer to totemism we mean that a tribe has a social organisation usually of the sib(clan) pattern, which is associated with a form of supernaturalism, consisting of certain typical attitudes towards species of animals or birds or other class of natural objects. The descent may be traced from a totemic plant or animal; the killing and/or eating of the totemic species may be a taboo, but may take place on ceremonial occasions; the death of a totemic animal may be ceremonially mourned. Totem and totemites may be supposed to share physical and psychical traits; the totem may be looked upon as a guardian angel of the totemites. Totemic emblem may be worn as a charm and even depicted on the body. Ceremonies may be performed to pray for the increase of the totemic species. The sibs of the totemic tribe are named after the totem eg. Delki Kharia have totemic exogamous clans. These are Mura (tortoise), Soren or Soreg or Toreng (rock or stone), Samad (a kind of deer), Cag (quail), Carliha (a fruit), Charhad (a bird), etc." [Madan & Majumdar 1963]

- 2.1 A person or community cannot harm, kill or eat a totemic animal or plant (or object).
- 2.2 Totems are to be protected from all harm.
- 2.3 Totems are to be worshipped or revered.
- 2.4 While confronting or passing by a totem, a certain type of behaviour has to be observed.
- 2.5 Ornaments or body markings symbolising the totem, are to be worn.
- 2.6 Totems are to be shown respect through various rituals involving seasons, times of the month or day, gender, age, and even professional taboos.
- 2.7 Offerings are to be made to totems.

Box 17: Tribals' Association with Totemism

"Tribal communities all over the world live close to nature. We have empirical ethnographic data outlining the nature of relationship and interactions tribals have with various elements of creation. An over acknowledgement of the 'gifts received from nature' finds its expressions in their worship of its various manifestations: plants, animals, hills, rivers and many other objects. In closer analysis of the tribal world view, we discover that objects of nature are not seen as inanimate entities but as persons, as fellow human beings. A substantial part of the tribal lore - myths, legends, folk tales, folk songs - reaffirms the concern of a tribal community for its ecosystem and efforts to conserve the resources of its neighbourhood.

"This concern institutionally finds expression in *totemism*, a practice that refers to a cultural phenomenon in which human groups and individuals occupy defined positions in a network of relationships with objects of the ecosystem of their immediate neighbourhood." [Ratha 1993]

Though perhaps it is difficult to intimate the exact numbers, a large number of plant and animal species (and other natural features) have been totems to one or more communities. This has, for most,

resulted in various levels of protection. According to one estimate, over 600 tribal clans believed in totemism and each of these had one or more totem species (see Table 1).

Name of the Tribe	Reference	Location	Totems				Total
			No. of animals, reptile, fish, bird, insect clans	No. of plant vegetable, flower, grass, leaf, fruit, root, clans	No. of inanimate objects and other formation clans	No. of other unclassified clans	
Birjia Asur	Risley (1891)	Bengal	10	3			13
Birjia Asur	Roy (1917)	Chotanagpur	34				34
Birhor	Roy (1925)	Chotanagpur	12	10	7	8	37
Munda/ Mundari	Risley (1891)	Bihar, Bengal, Orissa, M.P.	142	83	72	42	339
Santal	Fazer (1910)	Bengal	7	3	1	1	12
Bhumij	Risley (1891)	Bihar, Orissa, Bengal	11	4		5	20
Bhumij	Roy Chowdhury (1929)	Mayurbhanj, Orissa	5	3	2	5	15
Juang	Risley (1891)	Orissa	12	10	1	1	24
Juang	Elwin (1948)	Keonjhar, Orissa	5	12	3		20
Korku	Driver (1893)	M.P.		5	7		12
Gond	Risley (1891)	Bengal	15	1	4	12	32
Gond	Ferriera (1965)	M.P., Bihar, A.P., Orissa, Maharashtra	39	17	6	13	75
Muria Gond	Elwin (1947)	Bastar, Bihar	29	3		4	36
Oraon	Roy (1915- 1928)	Chotanagpur	43	19	4	2	68
Kuttia Kond	Niggemeyer (1964)	Orissa	5	1		8	14
Bhil	Luard (1909)	Malwa	19	23	15	69	126
Bhil	Ethnoven (1920)	Gujarat	12	5			17

[Source: As quoted in Ratha 1993]

However, from the fact that a species of plant or animal is a totem, it does not always follow that it is not harmed or killed, as we will see in the following quotes:

"Other (Naga) clans trace their descent from a dog (which also turned into a man), though the members of this clan do not, as might be expected, avoid eating dogs", cites Ferriera [1965].

".... that the soul of the baby goes into the mother when the green pigeon is calling. The green pigeon is fond of the fruit of the Ficus tree, and both green pigeon and Ficus tree are denoted by the same term--renko. Although the Ficus tree is to some extent tabooed, that is, it must not be cut or damaged, the Andamanese do cut it and use the bark of its aerial roots for personal ornaments." [Ibid Ferreira 1965]

As in other traditional strategies of conservation, in the practice of totemism too, the fear of serious consequences of breaking a taboo or otherwise annoying or disrespecting a totem is an underlying theme. There is also, as elsewhere, the expectation in many cases that the totem will protect and benefit those who give it the due respect.

In other words, some totems are seen as capable of doing harm if not properly treated and others as doing good if properly treated, and still others as having both these characteristics.

Totems as the basis of names

A common practice is for clans or individuals to be named after their totems. According to Ferriera [1965], among the Andamanese, many persons are named after names of trees, fish, and other objects.

Madhav Gadgil [1985] notes that the *Mores* and *Ghorapades* from Maharashtra derive their clan name from their totemic animals, the peafowl and the monitor lizard, respectively. He goes on to say that these two clans will protect these animals despite the fact that other clans of the same Maratha caste will hunt them or eat them.

The *Sor* tribals of Madhya Pradesh have about 28 clans, of which 12 have been named after plants. These clans worship their totemic plants and never use them in any form. Table 2 gives the details:

Table 2: Clans, Related Plants and the Mode of Conservation				
Sl No.	Clan type	Local name of the plant/product	Botanical name	Taboo/conservation and other
1.	Chheyolia	Chheola	<i>Butea monosperma</i>	They worship the plant and do not use it in any form
2.	Hardua	Haladi	<i>Curcuma longa</i>	Worship, cultivate and eat
3.	Bhataiya	Bnatta	<i>Solanum meloncena</i>	Do not eat fruits
4.	Badele	--	--	Do not make any wooden item by own hands, and worship its wooden implements
5.	Chakaria	Chak	<i>Saccharum munja</i>	Women never use ring made of this grass to put and support water vessel or other

Table 2: Clans, Related Plants and the Mode of Conservation				
Sl No.	Clan type	Local name of the plant/product	Botanical name	Taboo/conservation and other
				load on their heads
6.	Chandeliya	Chanden	Santalum album	Worship the wood and never use it
7.	Kentha	Kaith	Feronia limonia	Worship the tree and do not eat its fruits
8.	Kansoriya	Kans	Saccharum spontaneum	Worship and do not use its rope
9.	Patele	Pata	Any wood	Do not sit on any wooden stool or bench
10.	Rajoliaya	Rajgira	Amaranthus peniculatus	Worship the plant and do not eat its seeds
11.	Surajmukhi	Surajmukhi	Helianthus annus	Worship and never harm it
12.	Saneria	Sunn	Crotalaria juncea	Do not sit on the cot made of its fibre

(Source: Jain 1990)

Box 18: The Proto-totemic Background:

"There is no evidence of a proto-totemic complex anywhere in India. But beliefs and practices of a ritual nature connected with animals and plants are found at all cultural levels in the Indian population. They range from the merest magical notions to actual worship of animals and plants in the form of spirits or deities, or as symbols of spirits and deities, or as objects closely associated with them in one way or another. Most of them lie scattered in shreds and patches at various cultural levels. Some of them have evidently had a late origin and are presumably connected with the development of Hinduism as such; others probably originated with the aborigines and then entered the folds of Hinduism at its lower reaches; and still others seem to have a hoary antiquity. The earliest primitive population in India consisted no doubt of hunters and food-gatherers, as is evidenced by the small groups of such tribes who still survive in the hills and jungles of South India and, to a less extent, elsewhere on the subcontinent. If we divide the concept of proto-totemism, as we have done in an earlier chapter, into beliefs and practices of a ritual nature relating to animals and plants of a loose and floating character and the proto-totemic complex proper which is an organized form of such beliefs and practices found mainly in the ranks of specialized hunters, there is no adequate reason to deny the existence of beliefs and practices of the first type among the early food-gathering and hunting tribes in India. The scarcity of the evidence relating to such notions can partly be attributed to losses resulting from other cultural influences which have played on these early cultures from early times, and partly to the inadequacy of ethnographic investigations." [Ferriera 1965]

Similarly, clans of the Sahariya tribals of Central India are also named after plants; they do not even touch the plant after which they are named. The details are given in Table 3.

Table 3: Sahariya Tribal Clans and the Conservation Methods of Totemic Plants				
Sl. No.	Clan	Name of the Plant	Local Name	Methods of Totem Conservation
1.	Umariya	Ficus racemosa	Umar	Worship the tree and never cut it
2.	Peepar Barodiya	Ficus religiosa	Peepal	Tag leaves on the forehead of bridegroom
3.	Dhanik	Anogeissus latifolia	Dho	Worship the tree
4.	Semariya	Salmalia indica	Semal	Worship the tree
5.	Samaria	Salmalia indica	San	Do not sit on a cot woven of its fibres
6.	Salaiya	Boswelia serrata	Salai	Worship the tree
7.	Jhilmiliya	Albizzia lebbeck	Siris	Worship the tree

[Source: Jain and Sharma n.d.]

Among the Koyas of Godavari gorge, each clan member prefixes the name of their totem object as their surname. For example:

Murram - Tortoise, *Turam* - a kind of cat, *Kurasam* - a kind of wild goat, *Madakam* - a kind of fish, *Korsa* -Tortoise

Village Deity of the Koya Tribe from Odisha.
Image from the Adivasi Mela at Bhubaneswar



Koya Tribal Dance



Among the Kolams of Adilabad district (Andhra Pradesh), the various phratries or clans have their own specific tree and animal totems (Table 4).

	Name of the Phratry/Clan	Totem Tree	Totem Animal
1.	Yedu Dayyal Kher (Seven Spirit Brother Group)	Maredu (Belfruit) tree	Porcupine
2.	Aru Dayyal Kher (Six Spirit Brother Group)	Ippa tree (Madhuca longifolia)	Tiger
3.	Idu Dayyal Kher (Five Spirit Brother Group)	Andugu tree (Strychnos potatorum)	A kind of fowl whose feathers are in opposite direction
4.	Nali Dayyal Kher (Four Spirit Brother Group)	1.Jalli tree (Arachis fruticosa) 2.Deeveriteega (a kind of creeper)	1.Crocodile 2.Tortoise 3.Kavve (a kind of bird)

[Source: Anon - nd]

Among the Gonds, the *Markam gotra* is named after the mango [Elwin 1986]. The *Murmu* clan, of the Santhals do not eat or kill a babbler after which they are named. [Frazer 1910, in Ratha 1993]

Among the hill Kharias, various clans were named after specific species. Unfortunately, many of these totems are no longer remembered. However, a few of those which survive are listed below:

CLAN	TOTEM
Siala	a bird
Katulipania	jungle fowl
Sankiala	a bird
Sarulia	a bird
Salku	a bird
Bisoi	a fish known as Sal

[Dass 1993]

Though the type of relationship of the community, to the plant or animal it was named after, was varied, the plant and animal was usually accorded full protection and respect.

Totems as ancestors

Another common belief is that totems are either ancestors or had some special relationship with ancestors. A variation of this is the belief about the creation of the world and all the creatures in it (see Annexure XII). The Onges of little Andaman believe, according to Mann [1984] that they have descended from certain birds; if these birds are killed then the Onges' ancestors may take revenge.

According to Cipriani [1966] the Onges believe that birds harbour the spirits of the dead and, therefore, never eat them. They have similar

fears about lizards, jungle cats, bats, rats and snakes.

Box 19: Comments by Verrier Elwin

"...in one village I discovered, quite unexpectedly, a belief in totemism that was alive, and obviously not borrowed. This was in Amtera, in Niwas, among a very old family of Muria. Here they confessed to seven exogamous *goti*, each with a different tree as totem, with special rites which were obviously taken very seriously. The seven *goti* were these:

"*Belgaria Durwa*: "We believe the *bel* tree to be our Bara Deo. We call its fruit virgin coconuts. Once a year we break a branch of the *bel*, and burying it sacrifice a coconut over the place."

"*Karraiya Durwa*: "We believe the *karra* tree to be Bara Deo. We take the cooking-pan called *karaiha* to the *karra* tree, and cook *roti* there. Then we sacrifice the *roti* to the *karra* tree."

"*Tiljaria Durwa*: Their totem is the *tilwan*. They grind some of it, make it into bread, and offer it.

"*Bartaria Durwa*: The *bar* tree is their totem. They offer a *barhai* (she-goat) to the tree.

"*Sachera Markam*: Their totem is the *sachera* or *saj* tree. They cook its leaves in fresh rice and offer this to the tree.

"*Thaurgia Markam*: The totem is the *thaur*. They also make fresh rice mixed with its leaves and offer it.

"*Jhinjhigania Markam* The bamboo *jhinjhi* (clump) is the totem, and bamboo shoots are offered to it." [Elwin 1986]

According to Ferriera [1965], in North Andaman it is believed that there is a relationship between the "unborn souls of babies", the green pigeon, and the *Ficus laccifer* tree. It is believed that the souls of unborn babies live in *Ficus* trees and, if a child dies before it is weaned, then its soul goes back to the tree. Further, it is believed:

"... that the soul of the baby goes into the mother when the green pigeon is calling. The green pigeon is fond of the fruit of the *Ficus* tree, and both green pigeon and *Ficus* tree are denoted by the same term--*renko*. Although the *Ficus* tree is to some extent tabooed, that is, it must not be cut or damaged, the Andamanese do cut it and use the bark of its aerial roots for personal ornaments. The green pigeon is not tabooed. (ii)

Among some tribes there are several myths in which the monitor lizard appears as the first ancestor of the Andaman race with a dove or a civet cat as its wife, and a woodpecker as their son. These ancestors are supposed to have taught the arts and crafts to the Andamanese. (ii) Other myths speak of the transformation of human beings into animals such as crabs, lizards, turtles, fishes, birds and jungle beasts. In many versions of a great catastrophe which befell the ancestors, the legend relates how the ancestors were transformed into fishes and birds. In North Andaman one of the ancestors, Kolo by name, made wings for himself out of palm

leaves, was thus able to fly, lived a solitary life on the top of a tree, and in the end became a sea-eagle. This species of bird still bears his name, and the Andamanese regard the entire species as if it were human." [Ferriera 1965]

Ferriera, citing Frazer and Alann, states that the Andamanese consider the turtle and various animals as their ancestors or cultural heroes.

Ferriera also goes on to state that the Konyak believe that they, as also the whole of humanity, has descended from a mythical bird. One clan among them acknowledges a connection with a frog (which is believed to swallow the sun and so cause eclipses). The Konyak also believe that they earlier drove out a race of people descended from the monkey.

The Wozukamr clan of the Ao Nagas, according to him, claim descent from a woman who was impregnated by a feather of the hornbill. The hornbill is, consequently, a taboo to the clan. Another clan claims descent from a Hoolock gibbon which was caught in a trap and later turned into a man. Other clans trace their descent from a dog (which also turned into a man), though the members of this clan do not, as might be expected, avoid eating dogs. Other clans have connections with the sparrow, the worm, the gourd and even the sun. The sun clan is supposed to have descended from a woman who fainted in the sun and was, consequently, impregnated by it.

Among the Sema Nagas, the Wotzami clan do not kill or eat the Hoolock gibbon, and also acknowledge a vague blood-relationship with it "but do not always like to be reminded of this fact. They also believe that some members of the clan turned into Hoolock apes after their death." [Ferreira 1965].

Several Saharya clans are related to animals and consequently do not eat the flesh of such animals. [Jain 1992]

The Gonds and Kolams regard their totem animals as great grandfather. They, for example, call the tiger Dado (paternal grandfather). Some believe that the totemic species protected their ancestors from danger, and so they revere them. [Elwin 1986]

The Bhils of Rajputana trace their descent from tigers. [Battacharya 1947]

The Murmu clan, among the Santhals, do not kill or eat the babbler because it was supposed to have guided their ancestor to water when he was dying of thirst (and also because they are named after it). [Frazer 1910]

The Bhumij consider their totem as Bhayad or agnate. The clan with the Rul totem (a kind of fish) bury their dead in the sand of the

river so that the dead join their Bhayads. [Das 1931, as quoted in Ratha 1993]

Other relationships

Apart from ancestry, totemic species are also seen as having other types of relationships with clans and individuals. One of the most common tendencies is to anthropomorphise totemic species. This then invokes all the sensitivities and sentiments that fellow human beings deserve.

The Wotzami clan of the Sema Nagas believe that a woman of the tribe had three children, one a spirit, the second a human being, and the third a tiger. [Ferriera 1965]

The Sema also sometimes believe that the soul may occupy the body of a leopard or tiger during life, and after death take the form of a hawk [ibid]. The Saharyas also believe that there are various clans that are related to animals. [Jain 1992]

Many hill tribes of Andhra Pradesh regard various species of forest dwellers as their kith and kin. The Kolams and Gonds perform a mock marriage to a mango tree. [Elwin 1986]

The Birijja Asur of Chotanagpur treat the totemic species as their relatives [Roy 1917]. For the Oraon of Chotanagpur, the taboos associated with a totem are also extended to species that resemble it. So, for example, members of the tiger clan will not eat a squirrel for its



striped skin resembles the stripes on a tiger. [Roy 1917, Das 1931 as quoted in Ratha 1993]

In North Andamans, the personification of animals is common. According to beliefs:

Box 20: GADABA

Pottapad, Koraput District

"Balilargarh had eighty houses of Konds and Gadabas, with Judgridi, a Kond, as the village chief. One day while Judgridi was hunting, a vulture attacked his head so severely with its beak that he died. At the time of his death he said to his relatives, "Do not burn or bury me. Cut up my body and throw the bits away." Accordingly, they cut up the body and scattered the pieces over the countryside.

"Seven days afterwards, from the legs of the corpse grew every kind of tree, from its left arm a *jamun* tree, from its right arm a mango. From the nails of its hands grew a bamboo, from the nails of its feet a *sarai* tree. The tuft of hair became broom grass; the moustache became thatching grass; the hair on the chest turned into *dupi* grass. From his belly came every kind of creeper, from his liver every kind of flower, from his gall bladder the hibiscus flower.

"In this way Judgridi's body turned into every kind of grass, flower and tree." [Elwin 1954]

In the Hakkipikki religion, totemic objects are believed to cause harm if insulted. On the other hand, if they are respected then the world is protected. [Mann 1984].

The snake is a totemic object of the Mewara clan of Hakkipikkis and, as such, it is never killed [*ibid.*]. The Onges also never kill birds, which is their totem [*ibid.*]. The Andamese consider their totem as forbidden food. [Ferriera 1965] The Ao Nagas regard the

"...a species of ant makes a turtle-net and goes fishing. In South Andaman the monitor lizard is said to have invented scarification; the prawn discovers yam, cooks it on a fire and eats it; the fly hunts pigs and so also does the dove." [Ferriera 1965]

Levels of protection:

Different clans accord varying levels of protection to their totems. From total taboo, where a totemic species is not only not used, killed or eaten but also protected from harm, to the other extreme where though it is a totem, it does not consequently get much consideration.

Box 21: DIDAYI

Patroputta, Koraput District

"Before there was grass, the world was a flat clear plain. When human beings were born, Rumork told them to build houses of wood. They did so and made the roofs of leaves, but the cattle used to pull down the leaves and eat them and in the rains the roofs leaked. So, there was trouble for everybody; besides, there were not enough leaves for the hungry cattle and they got very thin. So, the people went to Rumork and said, 'We've made houses but they leak. Show us some other way to roof them and give us other food for our cattle.' Rumrok promised to arrange something and sent them away.

"One night Rumork went to wander round the world but could not find any grass. So, he pulled out some of his own hair and threw it in the air and it became thatching grass. He pulled out his beard and it became broom grass. His moustache became spear grass. The hair on his chest became the sacred *dupi* grass. The hair of his hands and feet became the tiny *daresajudi* grass. So, the world was covered with grass and looked green and beautiful." [Elwin 1954]

hornbill with respect and veneration [ibid.].

The Sor tribals of Madhya Pradesh do not use their totemic species in any way and the women of the clans cover their faces with a veil while passing near these plants [Jain, 1990] The Saharyas also do not eat the flesh of their totemic animals. Other taboos related to totems are listed in Table 4.

Box 22: BONDO

Pinnajangar, Koraput District

Mahaprabhu taught the different tribes and castes of men to weave, make pots, distill liquor, and to cultivate, and he showed the Bondos how to work with axes and hoes on their hillsides. But the ground was so hard that they could not even scratch up a little earth with their hoes to cover their seeds. They went to Mahaprabhu and asked him what to do. Mahaprabhu sent them home and when they had gone he broke one of the necklaces round his wife's neck and made the thread into a worm. He sent it to the Jangar Hills to eat and excrete the soil and thus make it fine and pliable.

Mahaprabhu said to the worm, 'During the day live in the ground and spend your time eating earth. At night come up and I will put a light in your tail. It will attract ants and insects which you will be able to eat, and it will guide you along your path.'

The worms increased in number and soon they had made the soil of the whole world soft and porous. Since they were born from a woman's thread so, just as young girls are beautiful and old women ugly, worms are red and handsome in youth but black and wrinkled as they grow old. [Elwin 1954]

The Saharyas also use some of the totemic species in worship and other religious rituals.

Among the Mundas and Oraons of Chotanagpur, totemic species are neither killed nor eaten. The Bhil men bow down when they come across their totem, the tiger, and the women veil their faces as a sign of respect. [Elwin 1986]

For the Gonds and Kolams, the killing of totemic species and the cutting of totemic trees is taboo [ibid.]. Among the Gonds and the Baigas, the Parteti never kill the crocodile, the Markam never kill the tortoise and the Baghel never kill the tiger. Some Baigas even dislike taking part in a beat for the tiger and believe that if they try to kill their totemic animals, they are sure to miss [ibid].

The Baghel Rajputs of Rajputana never hunted the tiger. If anybody laid a trap for the tiger they approached the tiger and disclaimed any responsibility for the trap. [Battacharya 1947]

The Birhor of Chotanagpur cover their eyes when they come across their totem, the Murum stag. Eating or killing a clan totem is considered equivalent to eating or killing a human being. It is also believed that a decrease in the population of the totemic species will result in a corresponding decrease in the clan population. [Frazer 1910 as in Ratha 1993]

The Oraons of Chotanagpur also do not kill, hunt, eat or use their totem [Roy 1915]. The Murana Gond of Baster region also do not injure or eat their totemic plants or animals, but honour and worship them and mourn them when they die. [Elwin 1947 as in Ratha 1993]

Given in Annexure XIII is information specifically extracted for this study, from Deb et al. (1994) on totems and rituals of various clans.

5.2 SOME COMMONLY TOTEMISED ANIMALS

Snakes

Another animal that is widely worshipped in India is the snake, especially the cobra. As already mentioned, the worship of the snake can also perhaps be explained in terms of the fear that people had of it. Considering they found themselves by and large helpless against this deadly killer, they perhaps resorted to worshipping it in the hope that such worship might give them some protection. The snake is a totem of many clans and most of these clans do not kill their totemic animal and often try to feed it by offering milk.

On the Malabar coast there were various snake groves and some part of every house was supposed to be set apart for the snake as a household god. Snakes were considered a part of the property and when a snake was seen inside or near a house, great care was taken to catch it without hurting or injuring it. Killing a snake was considered a grave sin and even to see a snake which had a head injury was believed to be a bad omen. [Thurston 1907]

"A home for snakes of various shapes and sizes, Mannarsala towers above the other principal Naga temples - Pambumekkattu, Amedamanagalam and Patirikunnathu - by its matriarchal descent line. In the ritual art 'Sarpam thullal', women go into a trance to interpret Naga sentiments to the accompaniment of the Pulluvas chant of the epics. A significant area of Malayali folklore, the Pulluvas' (tales of snakes) have come down through generations by word of mouth.

"Legend has it that a woman in the Mannarsala family once gave birth to a snake child. Coming from a poor family, the only dowry the woman brought in was a Naga idol. The snake child instructed her to worship it and vanished. In addition to the sanctum sanctorum of Nagaraja in the temple, there are shrines of his consorts Sarpayakshi and Nagayakshi, and his sister Nagachamundi. Snakes are left undisturbed here and one would not be surprised to see them beneath the deodar trees and the grove (kavu) nearby. Yellow snakes are a common sight at the Appooppa kavu. These, along with the innumerable Naga idols spread all over

the place conjure up an eerie ambience. Savithri Anatharjanam, the present head, came to Eringadapally mana (the mansion is known by that name) at the age of 12 as the second wife of the Namboodiri, whose first wife was the priestess earlier. She is affectionately called the 'Valiamma', (elder mother). She officiates at the poojas, the ceremonial Sarpam pattu conducted once in 41 years, the Pallippana performed by the Velan tribe the Pulasarpam pattu, and the Gandharvan pattu.

"Naga worship entails elaborate rites and these are conducted inside the Nilavara. Scores of people visit the temple for treatment of snake-bite. As a cure, a green paste, the ingredients of which are a closely guarded secret, is administered to the patients by the head of the temple. Childless couples also throng the temple for the Uruli kamazthal, a ceremony which is believed to grant them an offspring." [Santosh 1993]

In Kerala, sacred groves called *Naga Kavus* dedicated to snakes, were common. In the Ezhimala region there were hundreds of serpent groves attached to shrines and households. In Meghalaya, there is a famous sacred grove at Mawphlang, 25 km from Shillong, where all forms of wildlife, especially snakes, are protected. In some parts of the country it is believed that leprosy and leucoderma are caused by the anger of serpents. Snake gods are appeased on a birth and atonement is offered to them for wrong doing. [Mitra et al. 1994]

Even in the Vedic Age, snake worship was widely prevalent in India and there are references to Abibuduya, the serpent of the deep. Also, as an inscription at Banavasi, in Kanara in South India, a stone cobra was erected in the middle of the 1st century A.D. In Chamba district, Himachal Pradesh, the 'Golden Snake' is offered milk and in Bengal the snake goddess Manasa is worshipped widely. Such acts are supposed to protect the people from snakes. Among the Meithies of Manipur, the snake is believed to be a dead ancestor and is accordingly worshipped. Among the Khasis, in Meghalaya, a mythical snake called U Thien is worshipped and is supposed to have the powers of harming those who do not pay it adequate respect.

In Kerala, particularly among the Nayars, snake worship was very common. The Mannarasala Sree Nagaraja Temple is a big snake worship centre in Alappuzha district. One of the important snake shrines is called Berine kavu, which is in Chenganur taluk, at the great temple of Padmanabha Swami, in Trivandrum. One of the important deities that is worshipped is Ananta, the mighty serpent, on whose coils Vishnu reclines in an ocean of milk. There is, in Tirunelveli, a temple where serpents are

worshipped in the hope that such worship would cure stomach ailments.
[Mehra 1956]

Tigers

The tiger is one of those species which was very widely respected and even worshipped in many parts of the country. This may possibly have been due to the magnificence of the animal, a magnificence which is evident even today in the attention that it commands worldwide. However, as there are many other equally magnificent species in the wild, this could not be the only reason. The tiger was also seen as embodying the qualities of courage, of strength and endurance, perseverance, speed and intelligence - qualities that human beings admire. There was also a certain mesmeric quality in the worship of the tiger as it was perhaps among the greatest predators of human beings and their livestock.

Traditional communities found themselves relatively helpless against the onslaught of the tiger, as do modern rural communities. Their only defence seemed to have been to try and establish a 'spiritual link' with the tiger, such that their worship and sacrifice would give them protection and immunity.

In the mangrove forests of Sunderbans, in West Bengal, the people living in and around the tiger territory have taken tiger worship to new heights. There is a belief there that if somebody is eaten by a tiger then he or she would go straight to heaven. This has resulted in old men and women walking into the jungle and waiting for the tiger to come and eat them. Understandably, this has created major problems for the forest department.

The Sema Nagas of Nagaland hold the tiger, along with the python and the hornbill, in awe and respect. They also believe that the soul is conceived as a shadow and may occupy the body of a leopard or a tiger, during life.

In parts of Maharashtra, the tiger and the cobra are worshipped, and temples are erected in their honour. For example, within a few kilometres around the Waghjal tiger goddess temple, no tiger or panther is hunted, and it is believed that tigers and panthers will not kill human beings or domestic animals in that area. [Gadgil Mc 1985]

Among the tribes of Vishakapatnam district, there is at least one clan, the Killo clan, who have the tiger as their totem. In Chota Nagpur area Bhils bow down when they come across their totem, the tiger, and women veil their faces as a sign of respect. [Elwin 1986]

Among the Dudh-bhaina Baiga, tigers are never killed. In fact, they believe that even if they shoot at them, they would inevitably miss. The Baiga dislike being part of a tiger hunt and believe that even if they

are forced to participate in such a hunt, the tiger would not be killed. [Elwin 1986]

"In the pre-aryan society of India tiger-worship was in vogue from the remotest past. The seal engraved with the image of Siva, lord of beasts, that has been discovered at Mohenjo-daro has also, among other four principal beasts, the figure of a tiger engraved beside Siva. Siva, the god of the ancient non-Aryan race of India, is clad in a tiger-skin and it is a tiger-skin which is his seat. Probably the tiger was the most primitive vehicle of Siva. Later, when cow-worship started in society, Siva was made to ride on a bullock, but a tiger skin was preserved for his wearing-cloth and seat. The legitimate conclusion from the association of this beast with the god Siva is that the tiger-worship of primitive society has subsequently got mixed with the Siva cult. Another proof of the special vogue of tiger-worship in regions lying outside the pale of Aryan society in Northern India is the Baghel Rajput community in Rajputana. Perhaps they are the descendants of some primitive community of tiger-worshippers. In Central India also there is a tribe of tiger-worshippers. They worship tigers and never hunt them. If the Europeans lay any trap for a tiger, they approach it at night and addressing the tigers in the forest they say that the trap was not laid by them, nor was it laid after consulting them - hence they should not be held responsible for it. The Bhils of Rajputana think that they are descendant of the stock of tigers; in Nepal also, a festival by the name of 'Hagh Yatra' is held. This is also a sort of tiger-worship; in it the worshippers put on marks of tigers and perform dances. The tiger-god in Nepal is called 'Bagh-Bhairav.' In Mirzapur area of the United Provinces a tiger-god 'Baghesvar' is worshipped by the low-class people. Tiger-worship has been in vogue among the Santals of Chota Nagpur. The peasants of Bihar worship, in some places, a tiger god by the name of Vana-raj. The tiger-worshippers of Hoshangabad are called Bhomkas. If any tiger enters a village and begins to commit depredations, these Bhomkas approach the tiger-god and offer him worship. Tiger-worship on similar lines prevails in the Deccan. In a village in the Trichinopoly district three male figures can be found seated on the image of a tiger. They perhaps represent some ancient tiger-god." [Elwin 1948]

Tiger worship has had a particularly long history in Bengal. Dakshin Ray is one among the popular male village deities of Bengal who has been

shown as riding on a tiger. In fact, Bengal folk literature is full of stories of the tiger.

Ban Bibi Temple in Sundarban (Photo by Vasumathi Sankaran)



"In the Dharma Mangal Kavya, the narrative poetry of Western Bengal, there is a detailed story of a fight between the hero Lausen and Kamdal, a tiger-like character. There the whole life-story of the tiger, beginning with an account of his birth, has been described in the manner of a human character. But there is no allusion to the tiger-god Daksin Ray in it. Hence this story is an entirely distinct one, and it must have originated and developed elsewhere. Exploits of Daksin Ray, the tiger-god, have been described in narrative verse

known as Ray Mangal by a few medieval Bengali poets, chief among whom is one Krisnaram Das.

"In the Muslim community also, poems have been composed on this theme by some Mohommedan poets. The ravages of tigers are awful to the Hindus and Mahommedan alike. For this reason, both the communities have sought for means in the same way to get rid of these molestations. A story similar to the original one of Ray Mangal is current among the Muslim population of Lower Bengal, especially the 24 Parganas. Perhaps both have sprung from the same source. In a poem named Banabibi Johura a mixed

narrative composed of Dakshin Ray conceived by the Hindus and Banabibi conceived by the Musalmans, can be met with. This is undoubtedly the Muslim edition of the Ray Mangal narrative." [Battacharya 1947]

5.3 COMMONLY TOTEMISED TREES

India shares with much of the world a tradition for respecting and worshipping trees. As discussed in the section on totems, trees and plants have been considered to have a special relation with humans, variously being the abode of gods, ancestors, and relatives, and also the saviours and the possessors of wisdom, knowledge, potency, fertility, and of life itself.

Perhaps the most sacred of all trees is the *pipal* (*Ficus religiosa*).

"Long held by the Hindus to be the permanent abode of the gods, the pipal is considered to be not only the home of Krishna... but also, home to the holy Hindu trinity, Brahma, Vishnu, and Shiva." [Altman 1994]

Another widely worshipped tree in India is the banyan tree (*Ficus benghalensis*).

However, sacred status is not restricted to these few trees. Different communities, in different parts of the country, worship different species.

In Tamil Nadu, more than 250 Sthala Vrikshas have been recorded. They contain one or more trees of single, venerated species. Some of the oldest Sthala Vriksha date back to more than 500 years. Many species of trees have been recorded as being found in Sthala Vrikshas. Each of these is associated with a specific deity. According to Paulraj [1996], the distribution among deities is: Shiva - 65, Vishnu - 21 and Muruga - 13.

Paulraj goes on to say that the species recorded from Sthala Vriksha belong to 39 families, with 25 families represented by only one species each.

According to Elwin [1986], the tribals of Andhra Pradesh consider the following trees as sacred:

1. *Ippa* (*Madhuca longifolia*)
2. *Jammi* (*Prosopis cinararia*)
3. *Konda Juvvi* (*Ficus tuberculata*)
4. *Marri* (*Ficus benghalensis*)
5. *Ravi* (*Ficus religiosa*)
6. *Donera tree* (*Butea frondosa*)
7. *Lime tree* (*Melia azedarach*)
8. *Neem* (*Azadirachta indica*)
9. *Maredu* (*Aegle marmelos*)

10. *Neredu (Myrtus Cyneinum)*
11. *Jalli (Arachis fruticosa)*
12. *Andugu (Strychnos potatorum)*

In the North-eastern state of Meghalaya, the Khasi Oak (dieng sning, *Lithocarpus dealbatus*, also known as "Indian Chesnut Tree/

Box 23

Bura Deo

"Their principal deity, says Russel, of the Baiga, is Bura Deo, who is supposed to reside in a sal tree; he is worshipped in the month of Jeth (May), when goats, fowls, coconuts, and the liquor of the new mahua crop are offered to him. So, an old beaw-cutting Baiga of Taliyapani told me: "Bara Deo is older than Narayan Deo. He is of our family. He belongs to us. At first, he lived in an anthill. Then he went to Nanga Baiga in a dream, and began to live with him. Nanga Baiga took him to the forest, and put him in the stump of a saj tree. From that time, we have never cut the saj down to the ground; we always leave a stump."" [Elwin 1986]

Castanopsis indica Tree/ Dieng Sning/U Soh Ut) is considered sacred.

Among the tribals of Simlipal, in Orissa, the wood of the *Sal* tree (*Shorea robusta*) is known as *daru*, meaning god.

Holding a tree to be sacred means many things, but at the least it means that that tree gets some protection. The tree is also associated with special rituals. The Khasis, for example, use the

Khasi Oak for erecting sacred posts. The Jaintias also offer animal sacrifices near the Oak tree, and some consider it a phallic symbol!

The Oraon perform a wedding ceremony when they plant a fruit tree, and until the tree is "married", no fruit or flower is to be plucked or used.

People living around Sariska National Park, in Rajasthan, tie rakhis on stems of trees, on raksha bandhan, to demonstrate the affinity between trees and human beings. [Sjoblom & Singh 1993]

Other religious invocations for planting trees are listed in Annexure XIV.

5.4 TOTEMISED MEDICINAL PLANTS

A major reason why various plant species have been traditionally conserved was because they were seen to have medicinal properties. There were strong, indigenous, medical traditions in India which utilised a whole series of plants and other natural objects. Interestingly, many of the concoctions that they used in traditional medicine contained a large number of ingredients from many species of plants. In various traditions some or many of these ingredients were kept secret and only passed down from parent to child, sometimes only at the death bed of the parent. This must perhaps have been an effort to ensure that knowledge relating

to medicines was not made widely available but kept within certain families or groups. This is not dis-similar to the modern medical set-up.

Perhaps another explanation for this was that it was considered dangerous for people who did not have adequate skills and knowledge to start administering medication on the basis of little or incomplete information. However, an alternate explanation could also be that individuals or families who had the knowledge about medicinal plants, and the power that goes with this knowledge, did not want to share either the knowledge or the power with anybody else.

Perhaps the practice of using a multitude of species to prepare each medicine derived from the need to hide the identity of that one or few species which actually had medicinal properties. However, it also served the purpose of providing another reason for the conservation of a large number of species, all of which were seen as essential to the preparation of medicines.



Santal hut, Chota Nagpur
(Photograph by Vasumathi Sankaran)

6.

CONCLUSIONS AND RECOMMENDATIONS

6.1 This study, albeit a preliminary one, starkly brings out the urgent need to document and study traditional practices and thinking on the use and interaction with nature and natural resources. A reasonably extensive survey of the existing material was undertaken as a part of this study. The survey highlighted the paucity of authentic information on many of the conservation practices practiced or still being practiced in various parts of the country. It also brought out the fact that many of these practices had died out or were dying out (for example, see the extract on Onges given on page 19 under Motivational Structures) and, if they were not recorded soon, then perhaps they would be lost forever.

The survey did identify a fair amount of work, past and ongoing, on the anthropological, sociological and ethnobiological aspects of traditional conservation strategies (See references and bibliography). However, in comparison, almost nothing was being done to look at these practices from the ecological viewpoint.

It is recommended that the Government of India, specifically the Ministry of Environment and Forests, take urgent steps to encourage and support the documentation and analysis of such practices.

6.2 This survey has once again confirmed the very widespread traditions of conserving certain sites and species. Such practices are found in almost all parts of the country and still survive, though in a diluted and restricted form, in much of the country. Though no reliable estimates are available, it is clear that thousands of sites, comprising of forest areas, rivers, lakes, grasslands, mountains, coasts, deserts, and even parts of the seas, have been protected and conserved by the local communities over hundreds of years. Unfortunately, the official initiatives at setting up protected areas, which began under British rule at the beginning of this century, took scant notice of this rich tradition. Perhaps because there was nothing comparable in Britain and also because the British rulers lacked knowledge and understanding of the traditional methods of conservation, the network of national parks and sanctuaries they set up had little to do with traditional sacred sites. An important conservation opportunity was thus lost.

More regrettable is the fact that even after India gained independence, in 1947, the Indian government also did not recognise the potential for biodiversity conservation that the Indian traditional ethos represented. Instead of supporting and encouraging community initiatives at conservation, they also concentrated on furthering the British tradition of carving out national parks and sanctuaries in a manner, and at locations, such that rather than attracting community support and participation, such Protected Areas (PAs) became centres of conflict with local communities (See for example, Kothari et al. 1989).

In some senses it is too late to rectify the damage that has been done. Over the years both the sacred sites and the community's commitment to conserve them has dwindled and eroded. To ensure that various types of ecosystems survive and that large mammals do not become extinct, we need large conservation areas that are today found only among national parks and sanctuaries, and within a few reserve and protected forests. However, for the conservation and propagation of small mammals, birds, insects, reptiles, fish and a host of plants and micro-organisms, the habitat provided by the large number of sacred sites would be invaluable. These sites could be protected cheaply and sustainably, given the sentiments of the local people.

It is recommended that the Government of India and the State Governments urgently identify the sacred sites that are still viable or regenerable and develop schemes by which they can support local community efforts at conservation. Such a network of sacred sites would be an invaluable supplement to the network of protected areas already set up in India.

- 6.3** Similarly, there are a large number of species, of both plants and animals, which have been traditionally protected in different parts of the country. Many of these are today under severe threat. Current efforts at developing a fresh sensitivity towards these threatened species focus on their biological and perhaps aesthetic value. Whereas the scientific imperatives for conserving biodiversity are important, they unfortunately do not touch the hearts and minds of a majority of Indians, especially the rural populations whose support is most crucial.

India has perhaps a unique heritage of caring for plants and animals and of recognising their right to exist, irrespective of their direct or indirect value to human beings. Arguably there is no other region in the world where concern for other life forms was

so manifest both in thought and in action. Though there are traditions of sacred sites and species in Africa, South East Asia and especially among the Americal Indians in North America, none of these societies incorporate the peculiarly Indian value of '*ahinsa*'. In all these cultures animals were hunted for food though in some the killing of an animal was preceded by a ritualistic apology to victim. Whereas the myths and superstitions surrounding various species have faded, and inevitably so, and do not need to be resurrected or reinforced, the respect that Indians had for animals and plants still remains to a great extent. This needs to be strengthened and built upon so that society can be weaned away from the current growing 'scientific' perception that other living things should be allowed to survive only because we human beings need them. Such an attitude reduces other life forms to objects of functionality and elements of tradeoffs. It encourages people to choose short-term strategies that appear beneficial, at the cost of the environment.

It is recommended that the traditional attitudes of respect, love and concern for other living things⁴ be the main focus of environment education and awareness programmes. School and university syllabi should encourage students to discover, understand and appreciate the Indian heritage of respect for nature. To better achieve this, traditional conservation practices should, as already mentioned, be better documented and widely disseminated through the print and electronic medium.

- 6.4** Even among the existing parks and sanctuaries in India, there are many which have sites of religious or cultural significance. The section on Religious Values (3.3) lists a hundred that were especially surveyed for this study. The religious and cultural values associated with these PAs represent an important opportunity for enhancing the conservation status of these PAs and of getting popular support for their protection. Historically, the conservation ethos has had strong religious links, irrespective of any specific religion. There is also a tradition of showing respect to the gods by respecting the temple that he or she resides in and treating it with due reverence. This tradition survives till today and no one who is

⁴ See Annexure VII - The Bisnoi Tradition (Sankhala 1993); Box 9 - The Warli Tradition, Perriera (1992)

religious enough to visit a temple, a mosque, a church or a gurudwara would dare to show disrespect to it or to desecrate it. Devotees remove their shoes, cover their heads and speak in respectful voices. Conservation must benefit from this by projecting not just the building but the whole forest, park or sanctuary, as the home of the gods. This must be the message that the priests and preachers of these holy places send out to the devotees. The devotees, especially the local ones, must see the protection and conservation of the wilderness areas and of the animals and plants in it as the final form of worship.

It is recommended that the religious leaders responsible for these shrines and temples are actively involved in the conservation of the PAs within which they are located. They must be persuaded to acknowledge and propagate the religious and ethical imperative of showing concern for all of god's creatures, and especially those who live under god's direct protection.

- 6.5** An analysis of traditional strategies of conservation highlights some of the main elements of such strategies that were critical to their success. One such was the confidence among the local communities that they would continue to have control over the sites that they are conserving, either to ensure their continued conservation or, where these were sustainable use areas, to continue to use them sustainably⁵. It is clear that no community would have bothered to make the sacrifices and the effort that was necessary to conserve an area unless they felt reassured that no one else would undo their good work.

Many of the sacred sites were seen as the abode of gods, their gods. However, as they also believed that any violations of the rules laid down by the gods would bring down upon the head of the violator the severest form of punishment, this was enough to make them feel secure. Where such divine intervention was not assured, there were strict social rules and taboos, which were rarely broken, and which restricted the use of these sites and resources by outsiders. Communities were known to have gone to war to protect their sacred and sustainable use areas.

Consequently, if the support and participation of local communities is to be ensured and their opposition avoided, which is

⁵ See, for example, section 3.3 on 'Sustainability & Equity' in this report.

crucial for sustainably conserving protected areas, the local people must feel assured of a continued control of and interaction with the conserved area.

It is recommended that the government re-think its approach to conserving national parks and sanctuaries. It should suitably amend its laws and policies so that the local communities are provided a say in the management and in the formulation of policies and action plans for the area, and feel the confidence that their control over the area, albeit shared with the government, is legally secure. For this purpose, the local community should be legally made trustees of the park or sanctuary in a manner in which they are bound to respect and uphold mutually agreed strategies for conservation. The government, as a partner in such a relationship, would have the right to prevent any unauthorised activity from taking place in the PA. Similarly, the community would also have the authority to prevent such an occurrence, even if it is by a government agency, and would have the assured support of the law in this task.

- 6.6. Along with control and assured continuity, another important element that emerges from the study of traditional strategies for conservation, such that it is critical for the success of conservation strategies, is the social and economic stake of the community in the conservation area. Historical analysis brings out the fact that communities not only recognised that the conservation and protection of sacred sites and species ensured for them the goodwill of the gods and the spirits, but that such conservation also gave them indirect and direct economic benefits. Consequently, contemporary assessments have established that a large proportion of sites that were conserved as sacred also formed critical watersheds, or seed-banks, or sources of biomass during an emergency. It was a mixture of both these anticipated benefits that motivated the local communities.

Similarly, many of the species protected traditionally have now been assessed to be keystone species and species of great economic, social and medicinal value. Here, also, the local communities recognised both the spiritual and socio-economic advantages of protecting these species.

It is recommended that the Government of India review its policies and laws and make the necessary modifications to ensure that whatever direct economic benefits that emanate from national parks and sanctuaries go directly to the local communities. Most

significant of these benefits could be in the form of earnings from tourism and employment opportunities within the PA. At present, most of the tourist earnings go either to private entrepreneurs from urban areas or to government agencies. There is also no policy or practice of giving preference to local people in filling jobs in the PAs. This must be changed. Similarly, it must be ensured that the first right over water and other resources, that emanate from the protected area, is of the local people so that they can benefit, and see the benefits, to them of conserving the PA.

- 6.7 Another interesting issue that emerged while analysing traditional strategies for conservation was that they only worked where the people had a real option of both to conserve the area or species and meet their basic needs. Traditional communities employed various methods to ensure that their use of natural resources remain sustainable. Some of the more common of these were nomadism, shifting cultivation, restriction on the size of livestock herds, efforts to ensure that human populations did not become too large, self-imposed restrictions on the area, the season and the quantum relating to the extraction of natural resources, etc. Unfortunately, many of these traditional methods of ensuring sustainability are no longer prevalent or effective. Populations and aspirations have grown and are growing all over the country. Traditional options of shifting cultivation and nomadism are becoming more and more unsustainable. But the basic truth remains that communities are not going to be able to conserve anything unless they have real options to do this, that is, unless they can both conserve and meet their basic needs.

It is recommended that the Government of India and the State Governments recognise this as a basic truth and keep it in mind while designing and implementing laws, policies and schemes related to conservation. This would mean that in each case a clear assessment could have to be made of what the basic requirements of the local community are. If, even after providing them the first right over the local resources, these needs cannot be met in a sustainable manner from the natural resources available in an area, the government would have to support community efforts at enhancing the availability of natural resources. There must also be a broadening of the resource base on which the local communities depend, where appropriate. This would involve an 'ecodevelopment' approach to conservation, not only for national parks and

sanctuaries, but for all ecosystems which need to be maintained and used sustainably.

- 6.8 Another important characteristic of traditional methods for conservation was the great attention paid to issues relating to social justice and the equitable access to natural resources. This meant that members of the community, notwithstanding traditional caste and class divisions that were prevalent, felt that they had been given their fair share of, access to, natural resources. Very elaborate methods were developed within traditional communities of ensuring that no family or group got a sustained advantage over others. Such a sense of justice and equity went a long way in ensuring that the communities thought and worked together at conserving sites and species⁶.

In the modern world, the traditional divisions of caste and class are no longer acceptable. Consequently, it is even more important that access to natural resources, in so far as they are within the bounds of sustainability, be and appear to be equitable. This means that not only every member of the local community be assured an equitable share of the available resources, but also that the rural poor do not lose out to the urban populations in terms of use and access. Unfortunately, today in many PAs in India whereas local communities are prevented from meeting even their basic needs, corporations, governments and urban demands are being allowed to erode the ecological integrity of the area. In such a scenario it would be impossible to get the support of the local communities for conserving the area.

It is recommended that the Government of India and the State Governments urgently review their current laws and policies, and their administrative practices to ensure that no urban, commercial or corporate use be allowed in protected areas. Where any surpluses are available after the ecological needs of an area have been safeguarded, the first right over these surpluses must be of the local people. Even where no surpluses are available, the local people, while being stopped from accessing the PA, must be reassured that their sacrifices are not going to be exploited by the urban, the rich and the powerful.

- 6.9 In short, the lessons learnt from the past suggest that:

⁶ See, for example, section 3.3 on 'Sustainability & Equity' in this report.

- The most desirable and sustainable strategies for conserving sites and species is to support traditional community efforts manifested through the conservation of sacred groves and other sacred sites, and by the respect and concern that Indians have had for many specific species and for all living creatures in general.
- Even today, though many opportunities have been lost forever, it is critical to identify and support the remnants of traditional local practices towards conservation.
- Even among existing protected areas, a very large proportion have religious and cultural significance. Within the bounds of secularism, it would be beneficial to link the conservation of these areas with the religious sentiments and the cultural practices of the communities, especially the local communities.
- It must be recognised that India is perhaps unique in having a history of respect and concern for all living creatures. Apart from the scientific basis for conservation, it is important to revive and strengthen this concern for all life forms, as it is a more ethical and sustainable basis for conservation.
- Lessons from the past suggest that conservation can only be achieved if the people, especially the local people, are committed to it. Further, their commitment would not be forthcoming unless they had some control over, and a sense of security about, the resources sought to be conserved. They must also have some social and economic stake in such conservation, must have a real economic option to conserve, and must perceive that the use of, and access to, resources is equitable and socially just.

Clearly our current laws, policies and administrative practices, pertaining to protected areas and wildlife, do not accommodate these fundamental requirements. Whereas recent efforts at joint forest management and ecodevelopment have made a small beginning in this direction, much more needs to be done and much faster. It is, therefore, time that governments, scientists, NGOs and community groups came together and formed a joint trusteeship for conserving nature. Such a trusteeship should be based on the principles enumerated earlier and should benefit from the conservation ethos that is a part of our Indian heritage.



Indian hoopoe (*Upupa epops*)



Spotted owlets (*Athene brama*)

Two Maps, A Table, & Some Photographs

Given below are two maps that indicate the geographical spread of the strategies surveyed.

Map 1 shows the location of 36 tribes and 19 caste groups who have been surveyed for their conservation strategies. Almost all of them are forest dwelling tribes, who were and many still are, at least part-time, hunter gatherers. The caste groups too depend on collection of natural resources for their artisanal work and sustenance. Preliminary survey of literature did not reveal any information on hunter-gatherer tribes of Gujarat, Assam, Mizoram and Tripura.

Map 2 shows the location of the various tribal groups studied, superimposed on the shadings depicting forest cover, as per the 1991 survey of the Forest Survey of India.

Table 5 below lists all the tribes referred to in the text, as also the state/union territory of their origin. In one case, that of the Bhutanese, their place of origin is outside India, in Bhutan, which is indicated in the list.

NOTE: Names of tribes are spelt (and sometimes pronounced) variously. We have adopted one of the accepted spellings without trying to list all of them. Fortunately most of the alternative spellings are similar and the association can easily be made as, for example: Oaraons, or Oraons, or Oroan; and again: Sahariya or Saharya; and so on.

Reading Map 1: The names of the groups or tribes are written outside the boundary of the map of India, with pointers indicating their primary location (or greatest concentration of population). The names of states/union territories are indicated in CAPS, and in an abbreviated form, within the boundaries of the states/UTs (except in the case of A&N). The expansion of the abbreviations are given below.

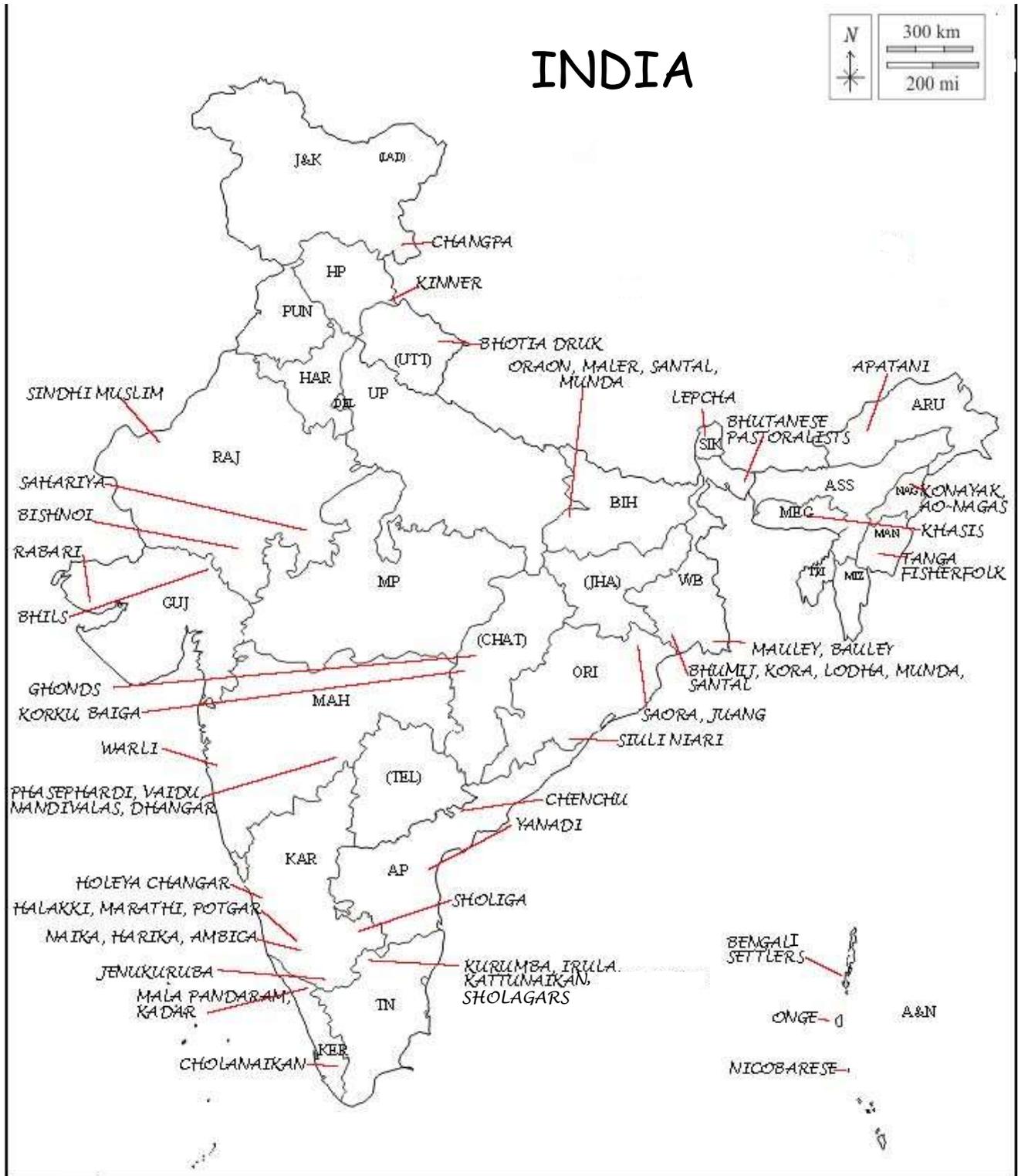
There are some abbreviate names in brackets, like (UTT) or (TEL), which stand for the new states that have come up since this map was made (in 1997). They are: (LAD) = Ladakh, carved out of J&K; (UTT) = Uttaranchal, carved out of UP; (JHA) = Jharkhand, carved out of Bihar; (CHAT) = Chhattisgarh, carved out of MP; and (TEL) = Telangana, carved out of AP.

Expansions of the abbreviations used in Map 1 for the States and Union Territories of India.

Abbs.	Sates/UTs
A&N	Andaman & Nicobar Islands
AP	Andhra Pradesh
ARU	Arunachal Pradesh
ASS	Assam
BIH	Bihar
DEL	Delhi
GUJ	Gujarat
HAR	Haryana
HP	Himachal Pradesh
J&K	Jammu and Kashmir
KAR	Karnataka
KER	Kerala
MAH	Maarashtra
MAN	Manipur
MEG	Meghalaya
MIZ	Mizoram
NAG	Nagaland
ORI	Orissa
PUN	Punjab
RAJ	Rajasthan
SIK	Sikkim
TN	Tamil Nadu
TRI	Tripura
UP	Uttar Pradesh
WB	West Bengal

Map 1:

Map of India indicating the primary locations of some of the groups and tribes discussed in the book. Most tribes are spread over the region, sometimes even across state boundaries. This map indicates their point of concentration.



Map 2:

Map of India showing the relationship between tribal population and Forest cover (1991)

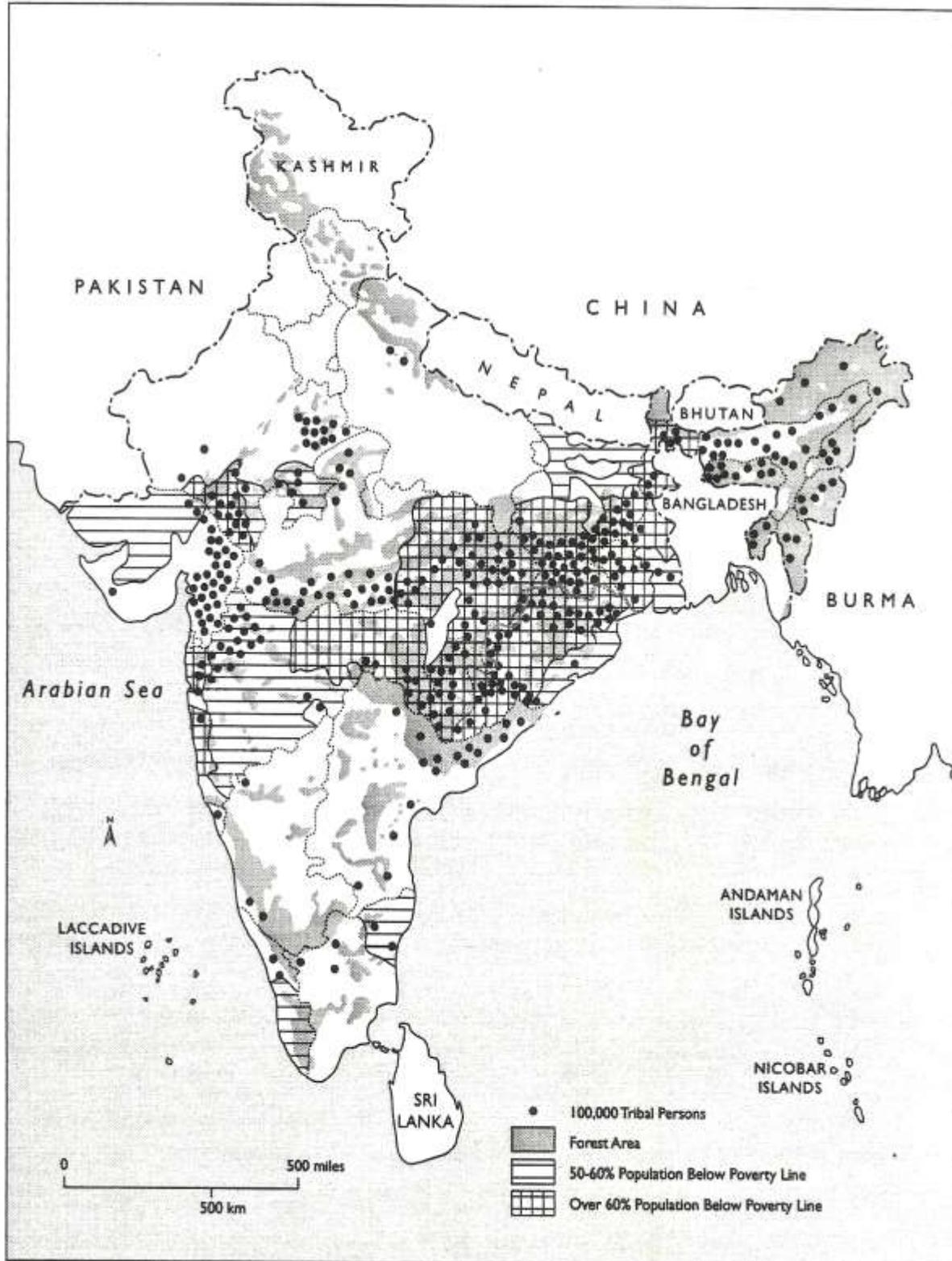


Table 5: Listing the Tribes Referred to in the Text

Caste/ Tribe	Origin
Onge	A&N Islands
Chenchu	Andhra Pradesh
	
Chenchu woman	
Elderly Chenchu woman	
	
Gonds	Andhra Pradesh

Caste/ Tribe	Origin
	
Gond women	
Kolam	Andhra Pradesh
Koya	Andhra Pradesh
	
Koya couple	
Yanadi	Andhra Pradesh
Apatani	Arunachal

Caste/ Tribe	Origin
Bhutanese	Bhutan ¹
Birijia	Bihar
Ho	Bihar
	
Ho tribal dance	
Maler	Bihar
Munda	Bihar
Oaron	Bihar
Santal	Bihar
Bhotiya/Duk	Himachal Pradesh/Uttar Pradesh (Uttaranchal)
Bhotiya shepherds 	

Caste/ Tribe	Origin
	
Bhotiya woman	
Kinner	Himachal Pradesh
	
Kinner woman	
Ambiga	Karnataka
Chamgar	Karnataka

¹ Not in India. Bhutan is a neighbouring country

Caste/ Tribe	Origin
Hakkipikki	Karnataka
Halakki	Karnataka
Harika	Karnataka
Holeya	Karnataka
Jenukuruba	Karnataka
Marathi	Karnataka
Naika	Karnataka
Potgar	Karnataka
Sholiga	Karnataka
Cholanaikan	Kerala
Kadar	Kerala
Mala Pandaram	Kerala
Changpa	Ladakh
Ladakhi	Ladakh

Ladhaki women



Korku	Madhya Pradesh
Sor	Madhya Pradesh
Baiga	Madhya Pradesh
Dhangar	Maharashtra

Caste/ Tribe	Origin
Nandivalas	Maharashtra
Phasephardi	Maharashtra
Vaidu	Maharashtra
Warli	Maharashtra
Tangai	Manipur
Garo	Meghalaya
Khasi	Meghalaya
Ao-Naga	Nagaland
Konyak-Naga	Nagaland
Hill Kharia	Orissa
Juang	Orissa
Saura	Orissa
Siuli Niari	Orissa
Bishnoi	Rajasthan
Rabari	Rajasthan
Sahariya	Rajasthan
Irula	Tamil Nadu
Kadar	Tamil Nadu
Kattunaickam	Tamil Nadu
Kurumba	Tamil Nadu
Sholagar	Tamil Nadu
Banley	West Bengal
Bhomka	West Bengal
Bhumij	West Bengal
Kora	West Bengal
Lodha	West Bengal
Manley	West Bengal
Munda	West Bengal
Santal	West Bengal

Sholiga hut



Dodde Sampige a holy tree of Sholigas in Billigiri Rangaswamy Temple Tiger Reserve



Rabari nomad of Kutch



Rabari woman



Decorations on a Rabari house



Rabari children





The Shompen Tribals of Great Nicobar Island

ANNEXURES

Annexure I

Fisheries

"Attakanithippa is an inhabited village inside Pulicat Lake in Andhra Pradesh. At the entrance to the settlement area live the Yanadis, a tribal community who are engaged in pursuing traditional fishing in the lake. There are about 30 families of Yanadis living in the hamlet.

"The fishing techniques used by the Yanadis are many. They have different techniques for catching prawns, crabs and fish and use a unique type of net for each type of prey.

Type of net	Type of prey
<i>Yantra Kayal</i>	Crabs
<i>Munalathi</i>	Fish
<i>Rendhalathi</i>	Fish
<i>Onealathi</i>	Fish
<i>Katcha</i>	Crabs
<i>Visuru valla</i>	Fish, crabs, prawns
<i>Kodalu</i>	Prawns, also small fish

"The *yantra kayal* is a net with large size mesh; it is cast in the water with a float or pressed down with a stick, and the crabs caught in it are carried in a *butti*, a big palm basket made locally. The *munalathi* net has a mesh that is three fingers wide, to catch fish of similar thickness, or larger. The technique of netting is similar to that of the *yantra kayalu*. The *rendalathi* and *onealathi*

Yanadi fishing technique 'visuru valai'



are nets with meshes of two and one finger width, for the relatively smaller fish. The *katcha* is a steel ring with net covering it, where bait is tied at the centre. When a crab comes to feed on the bait, it is trapped in the net. Usually, multiple *katcha* nets are tied in series.

"*Visuru vala* is a circular net, that is weighed down and thrown in the water. After some

time it is pulled in slowly, and the fish and prawn that are caught are collected. *Kodal* is a trap which is essentially a rectangular basket made of coconut leaf veins. One wall of the basket has three small openings through which prawns and fish enter and are caught. The *Kodal* is kept in knee-deep water during the night and collected in the morning.

"Groping is a manual technique, where both men and women carry a palm frond basket, sit in knee-deep water and use their hands to grope for prawns, which hide inside the slush, and collect them in the basket.

"The leading fisherfolk from the *kuppam* (fishing village) had a rule that juveniles should not be caught, These rules were strict and had to be followed.

"Fishing is also carried out in groups ranging from ten to fifty members. At the site, fishermen tie their boats to the sticks to anchor them. They carry rations with them, so the group can spend several days fishing. They tie their

Indigenous fishing technique in Chilika
(Photo credit: Vasumathi Sankaran)



nets together to make a huge circle of nets. This type of casting net is called *konda valai valikaradu* (pulling net). They collectively splash the water around the net, thereby chasing the fish towards the net. Thereafter, they draw the net towards the centre and collect the fish. Depending on the abundance of the catch and its demand, they determine how long to camp; if they find the going good.

Annexure II

Table 6 lists the one or more motivations that each tribe or group have for conserving nature. Similarly, Table 7 lists the objectives and scope of their conservation activities. Table 8 records the motivations for conservation of different areas, activities, and species, and Table 9 records the objectives for which different target areas, activities, and species are being conserved.

TABLE 6: MOTIVATIONS FOR CONSERVATION: TRIBES & GROUPS											
	TRIBES AND GROUPS	1. Fear	1.1 Fear of the super natural	1.2 Fear of societal reaction	1.3 Fear of economic impacts	2. Respect or love	3. Need for Promoting sustainable use	4. Honouring a social or legal contract	5. Aesthetics	5.1 Aesthetics - recreational	5.2 Aesthetics- species specific
1.	Andamanese	Y						Y			
2.	Apa Tani	Y					Y	Y			
3.	Baiga	Y	Y			Y	Y				
4.	Bhomka	Y	Y						Y		Y
5.	Bhotiya						Y	Y			
6.	Bhutanese						Y				
7.	Bishnoi					Y	Y				
8.	Changpas							Y			
9.	Chenchus							Y			
10.	Cholanaiken	Y		Y			Y				
11.	Garos	Y	Y								
12.	Halakki etc.	Y			Y				Y		Y
13.	Hill Kharias	Y	Y					Y			
14.	Ho, Kasi	Y	Y				Y				
15.	Jaintiya						Y				
16.	Jenukuruba							Y			
17.	Juang						Y				

TABLE 6: MOTIVATIONS FOR CONSERVATION: TRIBES & GROUPS												
	TRIBES AND GROUPS	1. Fear	1.1 Fear of the super natural	1.2 Fear of societal reaction	1.3 Fear of economic impacts	2. Respect or love	3. Need for Promoting sustainable use	4. Honouring a social or legal contract	5. Aesthetics	5.1 Aesthetics - recreational	5.2 Aesthetics- species specific	
18.	Kadars							Y				
19.	Kinner						Y					
20.	Konyak Nagas	Y	Y									
21.	Korku							Y				
22.	Ladakhi	Y	Y		Y							
23.	Malapandaram							Y				
24.	Maler						Y		Y			
25.	Mankhadias						Y					
26.	Manley & Banley						Y					
27.	Munda											
28.	Nayars	Y	Y									
29.	Nicobaris					Y						
30.	Onge	Y	Y			Y	Y					
31.	Oran	Y	Y									
32.	Phasephrdi, Nandivalas, Dhangars	Y	Y			Y						
33.	Rabari							Y				
34.	Harika.Ambika						Y					
35.	saharias	Y	Y			Y						
36.	santal								Y	Y		

TABLE 6: MOTIVATIONS FOR CONSERVATION: TRIBES & GROUPS											
	TRIBES AND GROUPS	1. Fear	1.1 Fear of the super natural	1.2 Fear of societal reaction	1.3 Fear of economic impacts	2. Respect or love	3. Need for Promoting sustainable use	4. Honouring a social or legal contract	5. Aesthetics	5.1 Aesthetics - recreational	5.2 Aesthetics- species specific
37.	Saora							Y			
38.	Sholiga					Y					
39.	Siuli Nihari fisher folk						Y	Y			
40.	Sor	Y	Y								
41.	Tanga fisher folk						Y		Y		
42.	Warlis					Y	Y				
43.	Yanadi								Y	Y	
TOTALS		17⁸	13	1	2	8	18	13	6	3	2

⁸ Totals in **bold** of heads, others of sub-heads

Table 7: SCOPE AND RELEVANCE OF TRADITIONAL CONSERVATION EFFORTS: TRIBES & GROUPS

	TRIBES AND GROUPS	6. Temporal relevance	6.1 Short term, crisis based	6.2 Medium Term, specific	6.3. long term or permanent	7. Specific contextual relevance	8. Eco-systemic relevance	8.1 Eco-systemic relevance-Deserts/arid	8.2 Eco-sytemic relevance-	8.3 Eco-systemic relevance-	8.4 Eco-systemic relevance-	Source(s)
1.	Andamanese											Pandya 1993, Cipriani 1966, Elwin 1986
2.	Apa Tani						Y					Furer Haimendorf 1962, 1946
3.	Baiga											Elwin 1986
4.	Bhomka											Elwin 1948, Battacharyya 1947
5.	Bhotiya						Y		Y			Hoon 1996
6.	Bhutanese											Ura 1993
7.	Bishnoi											Sankhala 1993
8.	Changpas											Sankaran 1996
9.	Chenchus											Furer Haimendorf 1985
10.	Cholanaiken											Mishra & Bhanu 1980
11.	Garos											Sangama 1979
12.	Halakki etc.											Gadgil et.al 1990
13.	Hill Kharias											Mehra 1956
14.	Ho, Kasi											Mitra et. al 1994
15.	Jaintiya											Deb Roy & Majumdar 1981
16.	Jenukuruba											18
17.	Juang											Elwin 1948
18.	Kadars					Y						Nath et. al. 1995

Table 7: SCOPE AND RELEVANCE OF TRADITIONAL CONSERVATION EFFORTS: TRIBES & GROUPS

	TRIBES AND GROUPS	6. Temporal relevance	6.1 Short term, crisis based	6.2 Medium Term, specific	6.3. long term or permanent	7. Specific contextual relevance	8. Eco-systemic relevance	8.1 Eco-systemic relevance-Deserts/arid	8.2 Eco-sytemic relevance-	8.3 Eco-systemic relevance-	8.4 Eco-systemic relevance-	Source(s)
19.	Kinner											Chandra 1987
20.	Konyak Nagas											Ramakrishnan & Patnaik1992
21.	Korku											Sankaran 1995
22.	Ladakhi					Y						Mann 1984
23.	Maler											Vidyarthi 1963
24.	Mankhadias											Adhikary 1974
25.	Manley & Banley	Y		Y								Mukhopadhyay 1976
26.	Munda						Y					Singh 1992
27.	Nayars											Mehra 1956
28.	Nicobaris											Sahay 1981
29.	Onge						Y					Pandya 1993,
30.	Oran											Chowdhury 1994
31.	Phasephrdi, Nandivallas, Dhangars	Y			Y							Gadgil 1985
32.	Rabari											Sankaran 1988
33.	harika.Ambika											Gadgil 1987
34.	saharias											Ratha 1993
35.	santal											19
36.	Saora											Sarma 1991

Table 7: SCOPE AND RELEVANCE OF TRADITIONAL CONSERVATION EFFORTS: TRIBES & GROUPS

	TRIBES AND GROUPS	6. Temporal relevance	6.1 Short term, crisis based	6.2 Medium Term, specific	6.3. long term or permanent	7. Specific contextual relevance	8. Eco-systemic relevance	8.1 Eco-systemic relevance-Deserts/arid	8.2 Eco-sytemic relevance-	8.3 Eco-systemic relevance-	8.4 Eco-systemic relevance-	Source(s)
37.	Sholiga											Morab 1981
38.	Siuli Nihari fisher folk											Gadgil & Romila 1990
39.	Sor											Jain 1992
40.	Tanga fisher folk											Goswami & Singh 1970
41.	Warlis											Pereira 1992
42.	Yanadi											Raghaviah 1962
	TOTALS	2⁹	0	1	1	2	4	0	1	0	0	

⁹ Totals in **bold** of heads, others of sub-heads

TABLE 8: MOTIVATIONS FOR CONSERVATION OF DIFFERENT AREAS, ACTIVITIES, SPECIES											
	CONSERVATION AREAS/ ACTIVITIES/ SPECIES	1. Fear	1.1 Fear of the super natural	1.2 Fear of societal reaction	1.3 Fear of economic impacts	2. Respect or love	3. Need for Promoting sustainable use	4. Honouring a social or legal contract	5. Aesthetics	5.1 Aesthetics - recreational	5.2 Aesthetics- species specific
1.	Common property	Y			Y		Y		Y		Y
2.	Desert ecosystem						Y				
3.	Ficus tree	Y	Y								
4.	Fishing						Y				
5.	Jujube tree										
6.	Medicinal plants					Y					
7.	Other Plants/ flowers	Y	Y			Y	Y				
8.	Protected Areas	Y	Y								
9.	River ecosystems	Y	Y					Y	Y		
10.	Sacred grove	Y	Y	Y		Y	Y				
11.	shifting cultivation					Y	Y				
12.	Snake	Y	Y				Y				
13.	Totem	Y	Y								
14.	Trees	Y	Y			Y		Y			
15.	water conservation						Y		Y		
TOTALS		9 ₁₀	8	1	1	5	8	1	3	1	1

¹⁰ Totals in **bold** of heads, others of sub-heads

TABLE 9: THE OBJECTIVES FOR WHICH DIFFERENT TARGET AREAS, ACTIVITIES, AND SPECIES ARE BEING CONSERVED												
	CONSERVATION AREAS/ ACTIVITIES/ SPECIES	6. Temporal relevance	6.1 Short term, crisis based	6.2. Medium Term, specific period	6.3. long term or permanent	7. Specific contextual relevance	8. Ecosystemic relevance	8.1 Eco-systemic relevance- Deserts/ arid zones	8.2 Eco-systemic relevance- Mountains	8.3 Eco-systemic relevance- Wetlands, rivers and coasts	8.4 Eco-systemic relevance- Rangelands	Source(s)
1.	Common property											Nadkarni 1990, Gadgil 1987
2.	Desert ecosystem	Y		Y			Y		Y			Sankhala 1993, Malhotra & Bharara 1988
3.	Ficus tree											Rao 1996
4.	Fishing											Rao 1980
5.	Jujube tree											Mitra 1925
6.	Medicinal plants											Perumal 1993
7.	Plants & flowers											Gupta 1993, Sensarma 1988
8.	Protected Areas											Gadgil & Meher 1996
9.	River ecosystems											Ramakrishnan 1996,
10.	Sacred grove						Y		Y			Chandran & Gadgil 1991, Gadgil & Birkes 1991, Gadgil & Chandran Subhash 1992, Agarwal & Narain 1992, Rodgers 1994
11.	shifting cultivation											Clason 1975, Ramkrishnan 1985, Ramakrishan & Patnaik 1992
12.	Snake	Y										Santosh 1993, Mehra 1956
13.	Totem											Ferreira 1965, Ratha 1993
14.	Trees					Y						Paulraj 1996, Sensarma 1988
15.	water conservation	Y										Agarwal & Narain 1992, Kolarkar et al. 1983
TOTALS		3		1		1	2		2			

Annexure III

Practice of Self Restraint

"The whole range of practices of restrained use of resource by humans may be classified under ten broad categories.

(I) Quantitative restriction on the harvesting of a given resource, or from a given locality: The imposition of such quotas implies that harvesting is halted at resource densities greater than those at which individuals would find the net gains too low to continue harvesting. As a corollary, these quotas are likely to enhance total yields on a long-term basis, at a sacrifice of some immediate return. These are therefore likely to be genuine instances of restraint.

(II) Harvesting certain resources may be abandoned when the resource densities fall. Thus, in New Guinea, the hunting of birds is reported to be abandoned for a period if the populations decline. Such a response is expected from harvesters attempting to maximise short-term net gain, since a fall in resource density would progressively increase the cost of harvesting. It is possible, though less probable, that harvesting may be abandoned well before this level is reached, in the interest of long-term yields.

(III) Harvesting from a certain habitat patch may be abandoned if yields from the patch are reduced. Thus, in Torres Strait fishing in certain regions may be stopped if the fish yields there have declined. Again, this is a response expected from a forager attempting to maximise immediate net returns and could be related to long-term resource conservation only if concrete quantitative evidence is available that harvesting is abandoned in advance of the returns reaching a value low enough to justify abandoning harvesting.

(IV) Harvesting from certain species may be abandoned in a certain season. Thus, in India, many communities observe a taboo in hunting certain animals for four months, from July to October. It is possible that this taboo is a consequence of returns being too low to justify harvesting for immediate gains in that season. Conversely if in fact net returns in that season are likely to be high, it is likely to be a conservation measure.

(V) Harvesting from a certain habitat patch may be abandoned in a particular season. Again, this could possibly be a response to an excessively low level of net gain from that habitat patch in that season. This should be verified by comparing with net gains in other seasons and if possible, by quantitative assessment.

(VI) Certain life history stages, by age, sex, size or reproductive status may be immune from harvest. Thus, in many parts of India, as in the village of Kokkarebellur in the state of Karnataka, birds breeding at a heronry may be left unmolested though they may be hunted elsewhere and in other seasons. If such protected stages appear critical to the population replenishment, and if they are likely to yield as high or higher net returns than the unprotected stages, it is reasonable to assume that this measure is designed specifically to conserve resources. On the other hand, if these stages are unlikely to yield higher net returns in comparison with the unprotected stages, they might be left out of harvest simply in the interest of maximizing immediate net gain.

(VII) Certain species may never be harvested, either because of relative difficulty in procuring them, risk of injury during the hunt, or because they may carry parasites that can affect humans. If these conditions do not operate, then conservation can indeed serve longterm interests of human resource use if a species thus protected enhances the availability of some other species that are harvested by humans. This is likely for some widely protected species such as trees belonging to the genus *Ficus*, but much less likely for a wide variety of species protected as totemic to a given tribal group.

(VIII) Certain habitat patches may never be harvested or subject to very low levels of harvesting through strict regulations. It is extremely difficult to arrive at workable prescriptions on quantitative quotas, closed seasons or protected life history stages that would decidedly guard against resource decimation. Providing refugia (sacred groves, sacred ponds, etc.) may then be easily perceived as the most efficient way of guarding against resource depletion.

(IX) Certain methods of resource harvesting may be totally prohibited or strictly regulated. Thus, fishing by poisoning river pools is severely regulated by tradition in many parts of India. If these methods are likely to provide as high or higher net returns, than permitted methods, their regulation may serve interests of long term resource conservation.

(X) Certain age, sex, classes or social groups may be banned from employing certain harvesting methods or utilizing certain species or habitat patches. Thus, in New Guinea, adult males are banned from hunting rodents. This could contribute towards long-term resource conservation by moderating the total amount of harvests. It could also assist in long-term conservation by restricting access to a limited number of individuals who may more readily come to use the resource in a prudent fashion. It is of course quite possible that such restrictions may merely

benefit certain segments of the community in positions of power, without serving the interests of long-term conservation.

In peasant societies the practice of restrained use relates to cultivation itself, linked to the philosophy of minimizing risk rather than maximizing immediate profit. The use of a whole variety of crops and crop rotation practices and careful community-based maintenance of irrigation ponds may all be a part of such an approach. This approach would also encompass the non cultivated lands from which the villagers gather fuel, fodder, small timber, leaf manure and so on.

Sundarbans -Embankment built to store rainwater for agriculture



"Thus, a variety of practices of restrained resource use from these non cultivated lands have been reported from peasant societies at equilibrium with their resource base. For example:

(i) Quantitative restriction on amount of harvest from a given locality, restrictions on the amount of wood or grass harvested by the family or their livestock from community land.

(ii) Restrictions on the harvest in certain seasons. Thus, green leaves of trees may be permitted to be lopped only after the rainy season i. e., after the trees have ceased to put on new growth.

(iii) Certain species, eg. trees belonging to the genus *Ficus*, may be totally protected.

(iv) Certain habitat patches may never be harvested. Thus, in the case of Mizoram in northeastern India, the community wood lots from which regulated harvests are permitted, called supply forests, are complemented by sacred groves, aptly called 'safety forests', from which no harvest is permitted.

(v) Certain methods of harvest may be totally banned. Thus, in the Aravalli hills of Rajasthan, in India, there are patches of forests called Orons, from which all harvest by using metal tools is banned, although wood may be removed by breaking twigs by hand.

(vi) Specific age, sex, classes or social groups may be banned from employing certain harvesting methods, or utilising certain species or habitat patches." [Gadgil & Guha 1990]

Annexure IV

Cattle Herders of Ura

"Cattle herders of Ura have a clear idea of how many cows each pasture can and has been supporting in the past. This is a key concept, and also a difficult one, in the allocation of pastures. One would expect that the stocking capacity would generally be decided on the basis of an adult equivalent by taking a number of calves as adult cattle. Oxen in the herd should also be taken into account when calculating carrying capacity. However, among the herders of Ura, only cows above 4 years are acknowledged for the purpose of allocating pastures. It is as if other animals, not at all productive or at that time unproductive, do not matter in this calculation for finding carrying capacity. Disregard for all other cattle except these cows imparts disincentives to keep animals other than adult cows. Oxen, infertile females and calves are, so to speak, disenfranchised when the claims to grazing lands are weighed. Denial of suffrage to oxen, infertile females and calves has environmental justification in subtropical pastures.

"When the pastures are divided among yak herders in Haa, male yaks and calves are not excluded in the head count. This interesting variation will be explained later on.

"Puzzling though it is, the cattle herders of Ura have a rule of thumb about the carrying capacity of each pasture for cows over 4 years. The convention in Omdaar provides cattle herders with an opportunity to negotiate which of the twenty-two pastures they each would prefer to utilise. These negotiations take place after they have reached an agreement about the number of the contenders' cows, above 4 years, and the carrying capacity of each pasture (defined only with respect to cows above 4 years). The herders know the carrying capacity as an historically and traditionally determined figure, historical and traditional in the sense that the methodology of calculating stocking size is beyond recollection by the present herders. But the number itself is not absolutely sacrosanct. Unexpected changes in the condition of the pastures are surveyed and assessed by the herders before they meet. Possible decline in the quality of pastures owing to a landslide; encroachment of bamboo forests which cannot be penetrated by cattle; or lower grass yield due to low rainfall on a slope - if any of this has been observed by herders in such pastures, the number of cows is reduced, since the carrying capacity is adjusted around the 'notional carrying capacity' which is a fixed number arrived at long ago.

"The cattle herders of Ura are expected to occupy the pastures for the winter season after allotment by lottery. During that season a herder has control and utilisation of the pasture. She also has obligation and responsibility to manage the pasture so its quality is maintained for future herds. This is an active form of management termed 'brocksel', i.e. clearing the pasture. It is failure to notice the kind of restorative measures carried out by herders which leads to opinions that herders are environmentally destructive. Migratory livestock farming is part of the forest system. The species mix and regeneration process is affected by livestock, although not necessarily in the negative way which is widely presupposed in today's anti migratory-livestock literature. The replanting of wild fodder trees and plants, the selective thinning of bamboo forest by herders, the availability of cattle compost as forest plant nutrients are a few of the management activities that have obvious positive effects.

"The lottery gives a herder the right to pasture for the season but also attaches duties for improving the pasture. A herd's consumption during one season must not deplete the future flow of goods and services such as grass and fodder, and footpaths in the forest.

"The yield of winter pastures can be reduced because of several factors. As animals graze and fodder is cut, unpalatable plants and shrubs may displace the palatable ones. If the growth of the unpalatable species is not restricted by manual cutting, the species mix is changed in favour of the unpalatable. If the herder does not carry out restorative measures, especially to reduce the rate of bamboo growth, the situation of the herder who gets that particular pasture the following season will be worsened. Further, the herder may use lops and tops of wild fodder trees and fodder vines but may not fell them for this would permanently deprive the succeeding wave of herders who follow him into this pasture. Saplings of wild fodder trees are uprooted from the forest and planted in more convenient places for more intensive care. Herders propagate wild fodder trees and fodder vines which are fed to the cattle only when surface herbage growth is fully consumed. This usually happens by the end of January. From then till the cattle begin their movements towards summer pastures in Bumthang, they subsist heavily on wild fodder trees and fodder vines. Another restorative measure included repairing the labyrinth of forest tracks, which give cattle access to grazing area in the depth of the jungle.

"There are those who tend to predict an almost sure likelihood of such environmental disasters in situations where resources are managed communally. Their apprehension is highly misplaced. It probably stems

from an unquestioned belief that peasants are irrational, a belief which empirical finding could easily disprove; and an assumption in behavioural theories that individuals will manage resources for their own short term benefits without taking the future needs of the group, of which they are a part, into consideration.

"It has been mentioned that while determining the occupancy rate in the winter pastures of cattle in Ura the herders take account of only cows above 4 years old. This generates disincentives for these herders to keep oxen, calves or infertile cows in the herd. This disincentive compels the herders to export their unproductive cattle, mainly oxen, to other parts of Bhutan. The herds of Ura are therefore dominated by cows. The yak herders of Haa, however, do not differentiate yaks either by age or sex during allocation of pastures. Each yak is taken as a livestock unit during the division of communal pastures. To a certain extent, this lack of disincentive to reduce the number of male yaks is economically justified because they are, unlike oxen, profitable meat animals. Male yaks are slaughtered at about 6 and their carcass can be sold for about Nu 8000. In late 1992 the price of yak meat was Nu 65 per kg compared with Nu 15 per kg for beef in Thimphu markets.

"Pasture distributive rules such as the ones described here are profoundly important as rules of the game, yet both policy makers and researchers do not pay sufficient attention to these. While we cannot assume that all existing institutions are completely optimal on both distributional and efficiency grounds, the persistence of pasture distributive rules for centuries without damaging the forest calls for greater faith and credibility in the system.

How Cattle Herders of Ura allocate Pastures

"There are twenty-two winter pastures in sub-tropical regions, which collectively belong to cattle herders of Ura. The herders and herds descend towards these pastures within weeks of each other. Although some herders may drive their herds a bit earlier than others towards these pastures, unilateral entry is forbidden. They must await the arrival of all the other herds. All the herders and their herds finally camp in the spacious meadow in the pasture named omdaar for a few days, usually in early November. Here, they convene daylong discussions on allotment of pastures (actually this is usually done throughout the night because the day is taken up by chores).

"Communal pastures of herders in Ura are, as far as possible, allocated by consensus. But good pastures are vied by many herders, which makes it difficult to resolve their allotment through discussion. It is then that

the herders resort to allocation by lottery. The names of the pastures are written down on pieces of paper and thrown in a jumble in a bag. Who gets what depends on blind chance. A large number of herders from Bhutan, who own communal pastures, use this particular mode of allocation.

"Both systems of pasture distribution show great regard for an agreed and just principle of transfer of pastures among herders within the same community, to each for a specific period. Both stress establishing broadly equitable access to pastures over both time (winter and summer seasons) and space in the sense that over the long run throwing of die or drawing a lot will assign a herder to any pasture within equal probability. In the long term perspective, a herder will stay equally long in all the pastures. We find the actual allotment of pastures is determined at random by the throw of dice or the pick of a lot. At the same time, because each herder has an equal chance to get a specific patch of pasture, herders set egalitarian sub-rules about how many livestock units can be assigned to certain pasture areas and how winter pastures can be combined with summer pastures.

"The obligation to pass on the pastures in a state as productive as it was when received, is an ingrained herders' norm, even though not enforced by explicit sanctions. The propensity to follow the norm is conditioned by the knowledge that mutual co-operation in not over-exploiting the pasture will keep the pasture ecology stable. If one herder leaves the pasture allotted to him in a depleted state and others are tempted to follow his behaviour of negligence towards it during their turn, it may eventually leave the pasture degraded. Such negligence could end up in environmental disaster where every herder would be disadvantaged." [Ura Karma 1993]

Annexure V

Pasture allocation of the Changpas of Ladakh

"Each *Changpa* village has a headman called the *Goba*. The *Goba* of the village inherits from his predecessors a written book of rules, and a list

Changpa woman with her lamb



of pastures and households for the area under the village's control, and the households that use the pastures to which they have customary rights in. The *Goba* of Korzok, Namgyal Ringzhin, In 1995, shared his register or *Kishi Deb* as it is locally called, which contained names of all heads of households, the total number of household members, recorded births and deaths of that year and livestock statistics, with Vasumathi Sankaran and her team. At the time of selection of pastures, the *Changpa* households who are full time pastoralists, decide which households they want to group with for the next three years. The group will

then be permitted to use dedicated routes to pastures allotted to them for the next three years. Each group will follow only the routes allotted to them and occupy the specified pastures. At the next triennial meeting, another set of *Changpas* will be allotted these routes and the group that previously used these routes will be allotted other routes. This helps all households to have access to all the pastures belonging to the village. The register helps in allocating pastures in cyclic order so that every *Changpa* household is successively allotted every pasture, and also gets the opportunity to travel every route. Groups may be small or large depending on the productivity of the pastures they occupy. At Korzok one group had 70 rebos and another had 15 rebos. The map shows the route and approximate length of stay in each pastureland.

"The *Goba* has an assistant called the *Shasung*, who performs the role of a watchman and travels to all pastures to ensure that people adhere to their designated routes and pastures. The *Goba* often knows much in advance where trouble is brewing and who the guilty party is.

"Tundup Tashi, whose household grazed the animals of the *Gompa* (monastery) and the animals of the sedentary households of Korzok, was interviewed to assess the ecological and environmental knowledge of the nomads. According to him, increased tourist traffic over the past few years had resulted in the deterioration of pastures along the main route

to Korzok. Many of the tourists came on ponies which grazed all day along the route, without restriction.

Elderly Changpa woman



An indicator of the deteriorating pastures was the disappearance of many flowers which bloomed in early summer. He felt that trampling and browsing of flowers by tourists reduced seeding and therefore hampered good stocking of pastures for the next season. He shared that Changpas occupy higher pastures during

early summer, when lower pastures have flowered, and they only come to lower pastures after seeding is completed. This is also the time when the higher pastures start flowering and seeding. In his opinion, therefore, it is not the nomads who are harming the grassland ecology. His understanding of his environment and that of the grassland ecology was evident.

A Changpa baby



"Towards the end of October, the Changpas take stock of their herd of sheep and decide on the number of animals to be culled. This decision depends largely on the capacity of the winter pasture to support the animals.

Some animals are killed for the local meat supply, and some are sold to replenish their stock of grains, mainly barley. The low winter temperatures ensure that the meat remains fresh for five to six months. In addition to their flock of sheep, each household may possess one or more yak, depending on their wealth and status. Yaks do not require constant herding after they have served their purpose as beasts of burden; they are then released in the higher pastures, and brought down when required. Not many yaks are slaughtered for consumption." [Sankaran 1996]

A Changpa couple



Annexure VI

More Examples of Resource Sharing

"Ladakh has abundant sunlight and good soils, but without water it is a vast barren desert. No agriculture is possible without irrigation. Glaciers are the only source of water. But they melt slowly through the day and water is available mainly in the late evening, too late to cultivate the fields. Also, as the growing period is short all farmers need irrigation almost at the same time.

"Given these enormous odds, the Ladakhis have developed an excellent irrigation system. Villagers tap the streams coming down from glaciers with the help of small channels. The water, thus diverted from the streams towards the evening, is taken to small tanks locally known as zing. The stored glacier water is then used the next day in the fields. Each village has a vast network of canals and zings.

"To ensure equity in the distribution of the scarce water, the villagers elect a village water official, known as churpun, at the start of each agricultural season. The churpun ensures that each farmer gets adequate water so that even the last field in the village is irrigated. Thus, there are no waterless or landless persons in a Ladakhi village and agricultural productivity and survival are assured even in these harsh conditions. Not surprisingly, these streams are worshipped and carefully maintained by the community. No activity that may pollute the streams, including washing of clothes, is permitted." [Agarwal & Narain 1992]

Allocation of fishing rights in Orissa/Andhra Pradesh

"Generally, soon after the eighth day of the dark fortnight of Margasirsha, the villagers start their preparatory arrangements for fishing. They mend their nets, tan them, and sometimes a few of them make new ones. At the direction of the leaders, a meeting of the general body is held. In this meeting, calculations are made as to the total number of large boats, small dug-outs, nets and the number of persons who are to participate in fishing. Discussions are also held regarding the formation of boat-groups. The usual size of a boat-group varies from 5 to 10. The membership of a particular boat-group continues all through the year; that is, till the end of the term of their collective fishing. Records of names of the persons selected for the various boat-groups are kept by the village accountant.

"In order to facilitate the members of each boat-group to attend their agricultural pursuit and other domestic work, there is a system of rotation of duties. A man works by turns for a certain period, say, about a fortnight or so, and then returns to the village for personal agricultural

work. All these arrangements are made in various boat-groups under the direction of village leaders.

"It is here necessary to mention that village-level fishing thus organized is divided further into two or more groups to fish in different parts of the rivers. But the earnings of each group are distributed among all the boat-groups of the village. In other words, if a fishing party earns a good fortune, while the other fishing parties fail in their enterprise, the earnings of the successful party are distributed among all the boat-groups, that is, all men and boats of the village are taken into account when the yield is distributed. For instance, during the month of January 1965, a fishing party consisting of eight boat-groups out of the 20 boat-groups of the village had earned an amount of Rs. 5,500.00 during one week. But the other twelve boat-groups could earn nothing during that month. Yet the amount earned by the eight boat-groups was divided equally among all the twenty boat-groups." [Panda 1971]

Bisnoi (Bishnoi) Woman Breastfeeding a Baby Deer



Annexure VII

The Bisnoi Tradition

"By far the most remarkable examples of protection of certain species is that of the Bisnoi sect of western India (Ishwar Prakash and Ghosh, 1980 ; Gadgil, 1980a). This Hindu sect, founded in 1485 A.D., enjoins its followers never to cut a green tree, or kill any animal. They hold as especially sacred the khejri tree (*Prosopis cineraria*), which is by far the most economically valuable tree in the desert tracts in which this sect originated. It is recorded that in 1630 A.D., 363 Bisnois sacrificed their lives to prevent the king of Jodhpur from cutting down *P. cineraria* trees to furnish the fuel for the lime kilns to build a new palace. The Bisnois also protect wild animals including the blackbuck and the chinkara. To this day, the tradition is very much alive and the Bisnoi villages are a refreshing scene of greenery and plentiful wildlife in the Indian desert." [Gadgil 1985]

Prospering from the Desert

"The Thar, home of the Bisnois, covers more than 1.3 million square kilometers, 15 percent in Pakistan and 85 percent in India, at the eastern end of the great desert belt extending from the Atlantic through the Sahara and Arabia. It has been nominated as, but not yet declared, a biosphere reserve.

"Some 500 years ago, the Thar was overrun by invaders from the West. Looting, plundering, forced conversion, and killing were the order of the day. In reaction, Hindu society became a closed culture with innumerable social parasites and exploiters. Need gave way to greed. The cutting of trees, and the killing of animals for sport and trade became a destructive way of life. Drought, famine, migration, death, and poverty prevailed.

"Moved by the hopeless lot of the people, the heir apparent of the village of Pipasar meditated and prayed for a solution to the problem. He came to realise that the real problem was the ecological devastation of the desert. He laid down certain principles that could help overcome the people's misery and later came to be known as Guru Jameswarji, who taught the significance of conserving trees and wild animals. He considered the khejri tree (*Prosopis cineraria*) and the blackbuck (*Antelope cervicapra*) to be indices of environmental quality. Because the guru's principles numbered twenty-nine, his followers became known as Bisnois ('twenty-niners' in Rajasthani). The principles spread like wildfire among the semi-pastoral and marginal agriculturists of some five centuries ago, when ecology in its present form was unknown.

"In their passion to preserve the khejri tree, the Bisnois have no parallel in human history. Legend has it that some 250 years ago, when the 400-year-old Mehrangarh fort at Jodhpur needed repairs, Maharaja Ajit Singh's men could find no sizable trees to fire the lime kilns except in the Bisnoi village of Khejarli. But the Bisnois protested the cutting of their trees, even at the cost of their lives. The first victim was a woman named Amrita. Then her daughters were slain. Thereafter, the sacrificial ceremony was simple. One by one the Bisnois came, bathed, and had their head chopped off by their own relatives in protest against the cutting of the trees. The story goes that 363 trees were cut but only after 363 men, women and children had been beheaded. The maharaja was shocked and since then no tree has been felled and no animal killed in Bisnoi villages. The incident can easily be passed off as fiction, but the rich environment, density of trees, and large number of birds and antelopes visible in Bisnoi country, in stark contrast to the adjoining overfelled and wasted land, give substance to the story. The Bisnois, who are vegetarians, eating only nuts, fruit, and grains, continue to be the custodians of the flora and fauna of the desert in the name of their guru.

"The Bisnois' agricultural fields are marked by their open character. Damage done to their crops by wild animals and birds is considered as the latter's share in their agricultural system. In fact, when the first furrow is made and the first handful of seed is sown, it is done in the name of the birds; the second, for the wild animals - the blackbuck and the gazelle (*Gazella gazella*) - and the third for guests and charity. Only then is it the family's turn. Since crop failure is the rule rather than the exception, the farmers hope that someone's luck will work for better rains and ensure immunity from rust, disease, and pests. Thus, the agricultural gamble is played in everyone's name. Naturally, everyone has a stake and a share in the product. Wild animals and birds are therefore an integral part of the Bisnoi agrarian culture.

"Since no animal or bird may be killed for any reason within Bisnoi territory, any stray movement of a stranger is watched by whole villages; at the slightest doubt, all the men, women, and children come out to scatter the animals and chase the intruder away. Anyone defying their customs is severely dealt with; sometimes casualties occurring on both sides.

"Centuries of Bisnoi protection of wildlife have led to mutual understanding, and the wild animals repose utmost confidence in the Bisnois and their settlements. This protection is not limited to antelopes; not even the predators - jackals (*Canis aureas*), foxes, and snakes - may

be killed. The wolf (*Canis lupus*), a disaster incarnate for ranchers and shepherds, is protected here. The howl of the jackal is considered a good omen and a sign of a good environment in the village; its absence is believed to spell disaster. Truly, long before biologists discovered it, the Bisnois knew the role of predators in maintaining a natural balance.

"Antelopes, gazelles, foxes, partridges, quails, and many species of migratory birds, including the demoiselle crane (*Arthropides virgo*), which migrates to the region in the thousand during the winter and can devastate crops, are all part of the Bisnoi environment. The greenery of the khejri trees, good crops, prosperous houses, and healthy and well-to-do people are the hallmarks of the Bisnoi ethos, in contrast with that of other people living in the same environment with similar resources. The difference is in the former's understanding of desert ecology and care for the environment. Bisnoi settlements are an example of a perfectly functional (though undeclared) biosphere reserve, a place where ecology and economy have been balanced well." [Sankhala 1993]

A Bisnoi Woman Hugging a Tree to Save it from being Felled



Annexure VIII

Religious Linkages of Plants

"Branches or shoots of karam and jitia pipar are set up to represent the divinities worshipped at the karam and jitia festivals. Wood of these trees as also of trees of a sacred (sarna) grove may not be burnt or otherwise desecrated by an Oroan. In some villages only such families as have adopted the jitia festival abstain from burning the wood of the jitia pipar tree. Some Oroans will not sit or tread on a tund (*Cedrela toona*) tree or make a door frame or lintel from tund wood. This custom is borrowed from their Hindu neighbours who observe the taboo as tund wood is used as planks for the rath or car of the Lord Jagannath. The wood of bael (*Aegle marmelos*), pipar (*Ficus religiosa*) and gulaichi (*Plumeria acutifolia*) plants may not be cut down by an Oroan. An erendi or castor oil plant may be cut down only for use in the Phangua festival; a karam tree and bhelwa (*Semicarpus anacardium*) tree may be cut down only for use at the Karam and Kadlata festivals. An Oroan may not burn a karam tree nor make or build a door frame from it, or use its wood for fuel. The other trees named above may be burnt only when they dry up." [Roy 1928]

"Just as most gods and goddesses in India are associated with some tree, shrub or creeper, all the nine planets which are believed to control the destiny of man, are similarly associated with plants. Ravi (Sun), after whom Ravivara or Sunday is named, is offered the burnt offerings of aak plant; lasa is sacred to planet Soma (moon) after whom Somavara or Monday is named. Planet Mangla (Mars), hence Mangalavara or Tuesday, is identified with Kartikeya and khadira is sacred to him. Planet Budh (Mercury), hence Budhvara or Wednesday has aparmarga as its sacred plant. Aswattha is sacred to planet Brihaspati (Jupiter) after whom Brihaspativara or Thursday is named. The plant urumbasa (cannot be identified botanically), is sacred to the planet Shukar (Venus) and Shukarvara or Friday is named after him. Saturday or Shanivara is named after the planet Shani (Saturn) and the plant sacred to it is sami. Dharbha ghas is sacred to Rahu and blades of kusa ghas to Ketu. Rahu and Ketu are not planets, but the ascending and descending nodes, and are accepted in Hindu astrology:

"The merit of offering flowers, incense and lamps to deities was given by Shukra of Bhrigu's race when he was priest of the Daityas, to the Daitya king Vali, son of Virochana: "Flowers gladden the mind and confer prosperity. The man who in a state of purity offers flowers to the deities, finds that the deities become gratified with him and bestow prosperity upon him.

"A detailed account is given in the Mahabharata regarding the types of flowers that ought to be offered to the deities; "flowers that have an agreeable scent should be offered to the deities; flowers without thorns and white in colour are most acceptable. Garlands of aquatic flowers like the lotus should be offered to gandharvas, naags and yakshas. Red flowers, painful to touch, growing on thorny plants, deep red or black in colour should be offered to evil spirits and nearer (sic) beings. Flowers which gladden the mind and heart, of a beautiful form and agreeable to touch when pressed are worthy of being offered to human beings. Flowers growing on mountains and valleys, beautiful to look at and with an agreeable scent should be offered to deities. The deities become gratified with the scent of flowers; the yakshas and rakshasas with their sight, the naags with their touch and human beings with all three, viz. scent, sight and touch.

"All exudations except that of *Boswellia serrata* are agreeable to the deities. The best exudation that is made into dhup or incense is of *Commiphora mukul* and of *Aquilaria agallocha*. It is agreeable to the yakshas, rakshasas and the naags. The dhup made of kunduru is desired by the Sala and deodara are ordained for human beings. About offering of lamps: light is energy and the flame has an upward motion. The gift of light which is energy, enhances the energy of man. Bhishma advised Yudhishthira: "It is recommended that a man of intelligence should smear his limbs with unguents made of priyangu, vilva, tagara and kesara.

"Just as there are religious prejudices in favour of some plants, there are also prejudices against their use. Flowers growing in cemeteries or in places dedicated to the deities are not used in marriages or in rites for prosperity or for acts of dalliance. There is a taboo on wearing garlands of red flowers and instead, flowers of white colour are recommended. Red flowers however, can be worn in the hair. A variety of *Acacia nilotica* named Ram Kanta or Ram Kanti is never used on auspicious occasions as it is symbolic of Rama's wrath. Similarly, the tamarind tree in spite of the legends connected with it, is never used for auspicious ceremonies; as its fruit is sour, it is believed that the ceremony will turn 'sour' and thus become fruitless and lose its meaning." [Gupta 1993]

Note on Rahu and Ketu

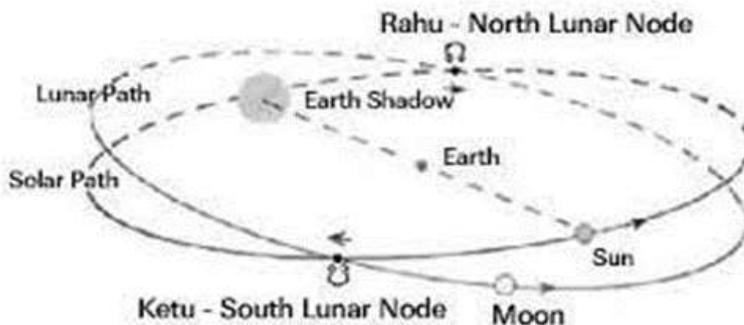
Are Rahu and Ketu Planets?

Whereas they are considered as shadow planets (*upagrahas*) in Indian astrology, they are considered to be nodes in astronomy.

A node, in astronomy, is the intersection of the orbit plane of some celestial body, such as the Moon, or other planets, or comets, with the plane of the ecliptic (the apparent path of the Sun among the stars) as projected on the celestial sphere.

In Indian astrology, the lunar nodes of the Moon are divided into two: the North Node and the South Node. Both tell a story of fate and destiny, in this life (the North Node) and your past lives (the South Node). Every

year and a half, the lunar nodes change signs.



The lunar nodes are directly opposite each other in the chart. They aren't planets but rather mathematical

points on the chart that fall in two opposite zodiac signs. (For example, if your north node is in Capricorn, your south node will be in its opposite sign of Cancer, and so on.)

Astronomically, Rahu and Ketu denote the points of intersection of the paths of the Sun and the Moon as they move on the celestial sphere, and do not correspond to a physical planet. Therefore, Rahu and Ketu are respectively called the north and the south lunar nodes. [Source: Wikipedia]

It is also believed that the nodes generate electromagnetic force which reinforces the qualities of planets that come near them.

Annexure IX

Distribution of Sacred Groves in India

"Sacred groves occur under a variety of ecological situations in India. In particular, they have evolved under resource-rich situations such as those of Meghalaya in north-eastern India, the Western Ghat region in southern India, and the Bastar region in the state of Madhya Pradesh, in central India. These examples contradict the point of view that forest conservation measures must always follow from some perception of resource scarcity (as is the case in the arid regions of Rajasthan... Religion and culture are the overriding considerations in the Indian context.

- According to a report by the Centre for Earth System Studies, there are at present 240 groves in the western region of Kerala, in southern India. These kavus, which contain many endangered species and rare medicinal plants of the Western Ghats, are often linked to temple premises. The famous Iringole Kavu (20 ha) is the largest of these groves.

- In the Maharashtra region of the Western Ghats further north, Gadgil and Vartak report a similar number of groves, referred to locally as deorais. Like elsewhere in the country, many of these groves have been degraded by humans owing to a general decline in value systems.

- Known as sarnas, the groves of the Chhotanagpur region of Bihar in northern India were established around 2400 BC as an abode for the godly spirits of the Munda tribe. Permission to remove trees could only be undertaken through the sacrificial offering of animals by village priests. However, today many of these groves have been degraded.

- Variously called vanis, kenkris, oroans or shamlet dehs, the groves of the arid region of Rajasthan, in northwestern India, act as biodiversity refugia for the inhabitants of the desert.

- The Bishnois sect, founded about 500 years ago in the Rajasthan desert, accords absolute protection to the khejadi tree (*Prosopis cineraria*), a multipurpose legume tree valued by local people for its pods for food, leaves for fodder and manure, and branches for construction material. The tree supports both plant and animal biodiversity within the boundary of a village ecosystem. It is said that some 350 years ago, many Bishnois even laid down their lives when the Prince of Jodhpur tried to fell khejadi trees for his lime kilns.

- In Meghalaya in the northeastern hill region, many sacred groves are still well protected through the religious belief that local gods and ancestral spirits live in the groves (in spite of the advent of Christianity and decline in the traditional value system). The removal of plants or plant parts is considered to offend the ruling deity and to lead to local calamities. Set in a degraded surrounding landscape, the Mawphlang grove, close to Shillong town, is one of the best preserved; the Mawsmi grove in Cherrapunji, representing about 6 km of mixed broad-leaved rain forest only disturbed in the peripheral margins, looks like an island in a bleak desertified landscape. In all, twenty-one sacred groves with varying degrees of human disturbance have been recorded in the

Cherrapunji region. Though ceremonies were routinely performed to propitiate the ruling deity of the groves, many such rituals have been stopped over the last few years.

•Elsewhere, in the northeastern state of Mizoram, community woodlots, called `supply forests', are maintained, from which only regulated harvests are permitted. Sacred groves also exist which are `safety forests' from which any removal of biomass is strictly prohibited. [Ramakrishnan 1996]

The traditional land use and resource management systems underwent radical changes in the course of the 19th century, with the state claiming common property resources like forests, grazing lands and even shifting cultivation lands. Nevertheless, the retention of essentially the same old landscape names by the village communities largely reflects the past landuses. A case study conducted in Uttara Kannada in a 25 km² area enabled the reconstruction of the traditional landuse system. Percentages of land under different landuses in the focal area are given in the table below. (Indeed, the figures in the data are related to a situation that prevailed more than a hundred years ago and are approximate.)

<i>Sl. No.</i>		<i>Landuse Percentage of area</i>
1.	kans	5.85%
2.	Supply forest	24.14%
3.	Shifting cultivation lands	23.40%
4.	Grazing lands	6.46%
5.	Fields and other cultivated lands	28.19%
6.	Area under miscellaneous uses	6.12%
7.	Ponds and rivers	2.00%
8.	Hamlets	3.84%
Total		100.00%

"Significantly enough, the community was able to maintain nearly 6 percent of its lands under inviolable reserves. The ordinary forests and kans merged with each other and also with those of neighbouring territories thus facilitating high diversity and free mobility of wildlife vital for the welfare of early peasantry who had substantial dependence on hunting and gathering." [Chandran & Gadgil 1991]

Annexure X

The Baiga Tradition

"The Baiga were established in the practice of bewar by Bhagavan himself who, when he called all the tribes of the world together to make a king, at first chose the Baiga. But Nanga Baiga begged that the Gond, his brother, might be king in his place. Bhagavan was pleased at this request, and, as a mark of favour to him took Nanga Baiga by the hand and placed him on his throne by his side. He granted his prayer to make the Gond king, but then gave the Baiga an even greater blessing.

"All the kingdom of the world", he said, "may fall to pieces, but he who is made of earth and is Bhumiraja, lord of the earth, shall never forsake it. You will make your living from the earth. You will dig roots and eat them. You will cut wood and carry it on your shoulders. Your wife will pick leaves and sell them. You must not tear the breasts of your Mother the Earth with the plough like the Gond and Hindu. You will cut down trees and burn them and sow your seed in the ashes. But you will never become rich, for if you did you would forsake the earth, and then there would be no one to guard it and keep its nails in place." Then Bhagavan showed Nanga Baiga how to cut bewar and sow seed in the ashes of burnt trees; and when he had taught him everything, he called him to receive gifts of seed." [Elwin 1986]

"The Dihuri and Pradhan lead the villagers out into the forest, into the area where that year's clearing is to be made. The Pradhan and Dihuri are given their clearing first, and then other clearings are distributed to the rest. The first tree to be cut should be a *Terminalia tomentosa*. If this falls to the east, the people expect a good fire. Sometimes the Bhuitar takes a hen to the jungle and two bits of *Shorea robusta* wood. The other men make a circle round him. He takes a pot of water in his hand, goes round the circle seven times, puts down the water in the middle and all cry 'Haribol' very loudly once and then there is a deep silence. If there is any echo, they cut the first tree in its direction.

"The clearings are fired in Baisakh. The village elders first assemble in the Darbar and fix the date. The next day the Dihuri bathes and takes fire from the one always kept burning in the Darbar. A leaf-pipe is lit, some scraps are placed in the bowl, and the Dihuri prepares to leave the village. He prays to Karikar (the god of fire).

"Eat everything today. Let the wind blow well. You are greatest of all. The Dihuri goes to the clearings and first fires his own, saying,

"O gods, we set fire to our clearings. Let the trees and shrubs burn well. May there be no rain, but a good breeze."

"Then the others take fire from the first clearing and each deal with their own. Two days later, the people assemble in the Darbar and decide to go and see if there is anything left to burn.

"They go to the clearings, and gather anything left unburnt and see that it is consumed. The ashes are raked, but not very vigorously, over the clearings, to get some sort of even distribution.

"When the ground has cooled, it is dug over with the hoe or sometimes with a plough. Seed is sown after the rains begin. In Jeth they go to the clearings and offer a chick under a bamboo tree in the name of Mahapat, the Seven Kaniya, and Rusi and Rusain. They cut the top of the bamboo and go home. The next day they go and see whether or not the earth below the bamboo is damp. If it is, they expect the rains to come early and prepare themselves accordingly." [Elwin 1948]

Baiga tribal dance



Baiga women



Annexure XI

TABLE 10

National Parks/Sanctuaries Attached to Religious and Historical Sites Across India

TABLE 10			
<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
1.	Andhra Pradesh	Eturnagaram Sanctuary	Madaram is of historical value to the tribals.
2.	Andhra Pradesh	Kolleru Sanctuary	Peddinthamma Devi temple in Kolletikota village
3.	Andhra Pradesh	Nagarjuna Sagar Srisailem Sanctuary	Ikshwaku fort (Eagalapenta); Prataparudra fort (Mannanur); Nagarjunakonda & Simhapuri (Buddhist relics); Bhramarabe Shakthipeetha; Mallikarjuna Jyothirlinga; (several more spots listed)
4.	Andhra Pradesh	Pakhal Sanctuary	Pakhal lake, Gundam temple
5.	Andhra Pradesh	Papikonda Sanctuary	Perantapalli ashram on bank of river Godavari
6.	Arunachal Pradesh	Pakhui Sanctuary	Adjacent is site of Banasur times of legendary importance
7.	Bihar	Bimbandh Sanctuary	Bhimbandh hot spring, Rishikund
8.	Bihar	Dalma Sanctuary	Shiva temple; Dalma Devi cave
9.	Bihar	Rajgir Sanctaury	Jain temple
10.	Bihar	Valmiki Sanctuary	3 temples of Hindu gods
11.	Goa	Bhagwanmahavir National Park	Kadamba temple, Tambdi, of historical interest; Dudhsagar and Mahadev temples, at Sonauli and Collem, respectively, of religious interest

TABLE 10

<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
12.	Goa	Bondla Sanctuary	Lord Siddha's temple, mid-way between Bondla and Tisca; 3 idols of 6th, 8th and 14th century
13.	Gujarat	Gir National Park	Religious: Banej, Kankai, & Tulsishyam; Sirwan settlement of African indigenous people (Sidis)
14.	Gujarat	Marine National Park	Religious: Pirotan island Pir dargah; Krishna temple at Bet-Dwarka
15.	Gujarat	Barda Sanctuary	Shiva temple at Kileshwar
16.	Gujarat	Dharangadhra Wild Ass Sanctuary	Vernu, Jognima, and Mota-Wasadada temples
17.	Gujarat	Narayan Sarovar Sanctuary	Narayan sarovar on boundary of sanctuary is a famous pilgrimage spot
18.	Gujarat	Ratanmahal Sanctuary	Old Shiva temple on top of plateau
19.	Himachal Pradesh	Pin Valley National Park	Just outside are monasteries of Tabo and Key
20.	Himachal Pradesh	Kais Sanctuary	Temple of Bijni Mahadev
21.	Himachal Pradesh	Kanawer Sanctuary	On boundary & outskirts: Manikaran Guru Gobind Singh gurudwara and Rama temple; Khirganga and Mantlai holy lakes and natural springs
22.	Himachal Pradesh	Majathal Sanctuary	Harsang and Bara Deo temple
23.	Himachal Pradesh	Naina Devi Sanctuary	Nainadevi temple
24.	Himachal Pradesh	Renuka Sanctuary	Religious: Parshuram and Renuka temple
25.	Himachal Pradesh	Shikari Devi Sanctuary	Shikari Devi temple at top of main ridge; Budha Kedhar holy spring
26.	Himachal Pradesh	Shimla Water Supply Catchment Sanctuary	Kaludev temple

TABLE 10			
<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
27.	Himachal Pradesh	Tirthan Sanctuary	Tirth, origin of river Tirthan, has religious significance, with people of the valley visiting it every 5 years with their goddesses. Raktisar, the origin of river Sainj, is also a place of religious significance and pilgrimage, like Tirth.
28.	Himachal Pradesh	Tundah Sanctuary	Banni Mata temple
29.	Jammu & Kashmir	Dachigam National Park	Mahadev peak considered abode of Shiva, visited during August (Shravana-Purnimashi) by the Hindus.
30.	Jammu & Kashmir	Hemis High Altitude National Park	Markha and other gumpas ¹¹ in various villages
31.	Jammu & Kashmir	Kishtwar National Park	Bramha peak with Trisandha pilgrim centre
32.	Jammu & Kashmir	Lungnag Sanctuary	Gumpas at various villages
33.	Jammu & Kashmir	Ramnagar Sanctuary	Monument in memory of some saints who stayed here
34.	Jammu & Kashmir	Surinsar Mansar Sanctuary	Surinsar and Mansar lakes are sacred lakes.
35.	Jammu & Kashmir	Changthang Sanctuary	Antay gompa
36.	Jammu & Kashmir	Karakoram Sanctuary	Deskit Gompa, and Samtaling Gompa
37.	Karnataka	Bandipur National Park	Religious: temples of Gopalswamy, Belladakappe-Mahadeswara, Bargi-Marigudi, Basaveswar (Begu)
38.	Karnataka	Bannerghatta National Park	Champakadami temple, and prehistoric burial areas

¹¹ Gumpa, also sometimes spelled gompa - "is a meditation room where practitioners meditate and listen to teachings" of Tibetan Buddhism.

TABLE 10

<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
39.	Karnataka	Adichunchanagiri Sanctuary	Pilgrim centre
40.	Karnataka	Brahmagiri Sanctuary	Irupu Srirama temple, at start of Lakshmantheertha river; Bankal falls
41.	Karnataka	Dandeli Sanctuary	Kavla caves, Ulvi temple, Syke's point, Nagjeri Viewpoint, Vincholi rapids, Chimteri rocks
42.	Karnataka	Melkote Sanctuary	(Melkote temple on outskirts)
43.	Karnataka	Mookambika Sanctuary	Mookambika temple, Kollur; Kodachadri hilltop
44.	Karnataka	Shetithally Sanctuary	Maleshankar temple; Hanegere
45.	Karnataka	Someshwara Sanctuary	Temples: Sanetwara; Madamakki-Veerabhadra; Hebri-Ananthapadmanabha; Belve-shankarnarayan; Belanje; Albadi Mahalingeswara; Shadiwane
46.	Kerala	Periyar National Park	Religious: Sabarimala temple visited by lakhs of pilgrims in summer; Mangala Devi temple in buffer zone.
47.	Kerala	Neyyar Sanctuary	Religious: Agasthiar peak, believed to be abode of Agasthiar Muni, is visited by thousands of pilgrims
48.	Kerala	Wynad Sanctuary	Ficus tree in Rampur reserved forest, believed to be abode of goddess, is centre of annual festival by hill tribes; also a festival near Ponkly
49.	Maharashtra	Sanjay Gandhi National Park	Kanheri caves; Gandhi Smruti Mandir; various temples
50.	Maharashtra	Tadoba National Park	Pilgrimage for local people
51.	Maharashtra	Bhimashankar Sanctuary	Bhimashankar temple, one of the 12 Jyotirlingas of india

TABLE 10

<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
52.	Maharashtra	Great Indian Bustard Sanctuary	Temples: Sant Dhyaneshwar at Newasa, and Kamaladevi; Karnala fort; Chrigoda taluka, capital of Maratha Sardar Shinde
53.	Maharashtra	Kalsubai Harichandragad Sanctuary	Kalsubai peak (highest in Sahyadries - 5427'); Ratangad of historical importance; Harishchandragad of religious importance.
54.	Maharashtra	Nandur Madhmeshwar Sanctuary	Sangmeshwar temple
55.	Maharashtra	Tansa Sanctuary	Mahuli fort; Tansa dam; temple
56.	Madhya Pradesh	Kanha National Park	Religious: Shravan Tal; sShravan Chita; Dashrath Machan
57.	Madhya Pradesh	Satpura National Park	Bada Mahadeo temple with fair on mahashivratri; Nagdwari temple with fair on nagpanchami.
58.	Madhya Pradesh	Barnawapara Sanctuary	Turturiya (religious place)
59.	Madhya Pradesh	Ghatigaon Great Indian Bustard Sanctuary	Shikargarh, Deokhoh, Tighara dam, Dhuan temple
60.	Madhya Pradesh	Kheoni Sanctuary	Shanker temple (ruins); Watchtower
61.	Madhya Pradesh	Narsingarh Sanctuary	Temples: Chota Mahadeo, Bade Mahadeo
62.	Madhya Pradesh	Pachmarhi Sanctuary	About 100 rock shelters with prehistoric rock paintings; Jata Shankar pilgrimage spot 2 km outside; Chouradev peak (1308 mtr), 15 km south of Pachmarhi, visited by thousands of Hindu devotees yearly
63.	Madhya Pradesh	Ratapani Sanctuary	Bheem Baithica (historical), Kehri Mahadeo, and Kerwana hot spring (religious)

TABLE 10

<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
64.	Madhya Pradesh	Sanjay (Dubri) Sanctuary	Temple near Banas river; reserved forest block Madwas, compartment no. 214, along Bargadi nala, is where Rewa king captured the white tiger Mohan
65.	Madhya Pradesh	Singhori Sanctuary	Chowkigarh Ka Kila (historical); Singhora Devsthan (religious)
66.	Madhya Pradesh	Sitanadi Sanctuary	Michkurishi hill (religious)
67.	Madhya Pradesh	Son Gharyal Sanctuary	Ancient temple 'Chandreh' and old rest house on bank near confluence of Son Banas; Bardi and Khalai Forts
68.	Orissa	Simlipal National Park	Historical and religious: ruined temple and tank at Athardeuli; old ruined fort at Rajupal
69.	Orissa	Bhitarkanika Sanctuary	Religious: ruined temple of Shiva and Naik Babu Thakur in Bhitarkarnika forest block
70.	Orissa	Satkosia Gorge Sanctuary	Tikarpara temple; annual fair at Binkei goddess temple; Shiva temple at Baigani peak with fair on shivaratri.
71.	Orissa	Simlipal Sanctuary	Religious and historic: ruined temple and tank at Athardeuli indicative of old habitation in central Simlipal; ruined fort at Rajupal
72.	Punjab	Bir Moti Bagh Sanctuary	Pir Bawa, Mari
73.	Punjab	Harike Lake Sanctuary	One gurdwara Nanaksar is at the entry point, another, Rakabsar, is 15 kms away.
74.	Rajasthan	Desert National Park	Religious site near Miajlar, with the guru worshipped by Sodha rajputs.

TABLE 10

<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
75.	Rajasthan	Keoladeo National Park	Religious: Keoladeo, Sautan, Sita Ramji ka, old Shiva, old Hanuman temples
76.	Rajasthan	Ranthambhore National Park	Ranthambhore fort, including Darga, Kamal dhar, Khatola, Soleshwar; Ganesh temple; Ada Balaji; Kasturi Masjid; Misdara, Kachida
77.	Rajasthan	Sariska National Park	Historical: Kankwadi fort; archaeological: Neelkant temple (ruins); religious: Pandupol and Bharthari temples, Talvriksh hot springs
78.	Rajasthan	Bhainsrorgarh Sanctuary	Padujhar Mahadev; spring fall on Mahadev
79.	Rajasthan	Jaisamand Sanctuary	Shiv temple at Jhoomar Baori; Roothi Rani and Hawamahal Palaces at Jaisamand; Jaisamand lake
80.	Rajasthan	Jamva-Ramgarh Sanctuary	Jamva Ramgarh lake
81.	Rajasthan	Jawahar Sagar Sanctuary	Baroli historical temples
82.	Rajasthan	Kaila Devi Sanctuary	Kailadevi temple adjacent
83.	Rajasthan	Kumbhalgarh Sanctuary	Temples: Ranakpur Jain, Parsuram Mahadeo, Muchchala Mahaveer Jain, and Someshwar Mahadeo; Kumbhalgarh fort; Prithvi Raj ki Chhatri; Harganga
84.	Rajasthan	Mount Abu Sanctuary	Gurmukh, Adhar Devi Delwara, Guru Shikar, and other temples, Achalgarh fort
85.	Rajasthan	Nahargarh Sanctuary	Amber fort
86.	Rajasthan	National Chambal Sanctuary	Patan and Kakarawada temples

TABLE 10			
<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
87.	Rajasthan	Ramgarh Sanctuary	Ramgarh palace, Chothmata, Rameshwar Mahadev, Ramjhar Mahadev
88.	Rajasthan	Sariska Sanctuary	Temples: Neelkant (ruins), Pandupol, Bharthari, Talvriksh; Kankwadi fort
89.	Rajasthan	Shergarh Sancturay	Shergarh fort, village, and temple
90.	Rajasthan	Sitamata Sanctuary	Sitamata temple
91.	Rajasthan	Todgarh Raoli Sanctuary	Village Todgarh, where Col. Tod stayed and worked; temples of Dudhaleshwar Mahadev, Mangatji, and Goramji
92.	Sikkim	Khangchendzonga National Park	Peaks with religious importance: Khangchendzonga (guardian deity fo Sikkim), Siniolchu, Pandim, and Pernidhangchen
93.	Sikkim	Fambung Lho Sanctuary	(Adjacent area has Karma Gyalwapa monastery with 100 monks, and an exotic birds enclosure in the compound)
94.	Tamil Nadu	Anamalai Sanctuary	Many temples, Mr. Hugo Wood's grave
95.	Tamil Nadu	Kalakad Sanctuary	Religious interest: Nambi coil
96.	Tamil Nadu	Mundanthuri Sanctuary	Agasthia peak
97.	Tamil Nadu	Point Calimere Sanctuary	Religious place (Ravan's feet)
98.	Uttar Pradesh	Govind Pashuvihar Sanctuary	Religious and historical: Har ki Dun; Majhi van
99.	Uttar Pradesh	Kaimur Sanctuary	Prehistorical cave paintings in Kandakot, Rajpur, near Mukla fall; Mukla and Sirsi falls on outskirts; Shiva temple near Shivaduar block

TABLE 10			
<i>Sno.</i>	<i>NAME OF THE STATE</i>	<i>NAME OF THE NATIONAL PARK/ SANCTUARY</i>	<i>PLACES OF RELIGIOUS/ HISTORICAL INTEREST</i>
100.	Uttar Pradesh	Kedarnath Sanctuary	Temples: Kedarnath shrine, Madmaheshwar, Tungnata, Rudranath, Ansuya devi, Kalimath
101.	Uttar Pradesh	Mahavir Sanctuary	Jain temples
102.	West Bengal	Sunderbans National Park	Tiger goddess temple at Narayantala creekside

[Source: Mehta, Raman et. al., 2nd Survey: Management of National Parks and Sanctuaries in India (Vol 1), RaaG, 2003].



Annexure XII

How the World was Created

"Central to Kadar's religious beliefs is a myth according to which the mountains, the forests and all living beings are the creation of a divine couple who have emerged from the earth. This couple known as the Malavai and Malakuratti, is supposed to have made also the first humans, a man and woman. Their progeny lived in a paradisaical state, in which men did not have to dig for tubers, but only to reach out for delicious fruits which grew in the jungle in great abundance. At that time there was no need for stalking game, for the forest was full of large black monkeys whose tails were so long that they could easily be caught with bare hands. But this happy state of affairs came to an end when some mischievous boys and girls went into the jungle and, out of mere curiosity began to dig into the ground with sticks. Though there was no need for this, food being plentiful above the ground, they dug for roots and the deeper they dug, the further away went the roots. Yet the children dragged them out of the earth. Ever since that foolish act the whole tribe has been doomed to the necessity of digging for food with digging sticks. The fruit and the long-tailed monkey have gone forever and life has become hard. This does not specify any sinful intention of those children, but there is a clear implication that man's condition has greatly worsened since the carefree days of a primeval golden age." [Furer-Haimendorf 1985]

"Although tribes in India tell the creation in various ways (cosmic egg, dismemberment, sacrifice, earth-sky copulation or splitting, godhead's desire), the most numerous are those in which the world emerges from the primeval waters. Within this general rubric, three subtypes are found among Indian tribes:

Types: A. 1-2-3-4-5-6 (A'. 1-2-3-5-6); B. 1-4-5; C. 1-2-6

Key:

- 1- flood/primeval waters.
- 2- gourd/basket floating on water.
- 3- brother and sister in gourd, rescued from flood.
- 4- earth diver
- 5- creation of earth (from clay brought by diver or another source).
- 6- brother and sister are made not to recognize each other; they marry and people the earth (creation of the race).

"Type B will be recognized immediately as the standard Earth Diver myth (T.A812) which has wide, but by no means world-wide, distribution. Type C is also readily identifiable as the Deluge (T.A1010). However,

types A and A' are curious. Element 2 can be viewed as homologous with the ark or canoe in North American Indian myths. Elements 3 and 6 involve the primeval male and female (here brother and sister; one mother-son variant exists) who marry to people the earth. The motif of incestuous progenitors of the race is not peculiar to the tribes of central India, but its structural position, split as elements 3 and 6 encasing the diver myth within the deluge myth, is unique.

"Types A and A' represent what may be termed the fundamental substratum of the creation myths of the tribes of central India. The importance of the presence of the incestuous pair (elements 3 and 6) in type A and A' cannot be overestimated in this regard. That it is a distinctive mark of central Indian tribal culture is indicated by the fact that (a) it exists throughout the myth corpus with significant numerical frequency (in over 50% of the creation myths), (b) it is also prominent in other folk genres in the area, and (c) it has survived, though in muted form, despite extensive Hinduisation." [Blackburn 1977]

Annexure XIII

TABLE 11

Clans, Their Totems and Rites of Passage

Table 11: Clans, their Totems, and Rites of Passage			
Tribe: <i>BHUMIJ</i> (Village: Ghoti-doba)			
S. No	Clan	Subclan	Totemic species
1	<i>Hansda</i>	<i>Chilbinda Hans</i>	<i>Swan Kite, Swan Duck,</i>
2	<i>Kauri</i>	<i>Bandu</i>	<i>Swan, Wild Yam, Swan Crow</i>
3.	<i>Chalki</i>		<i>Tiger</i>
4.	<i>Bhuiya</i>		<i>Edible figs, Buiya fish</i>
5	<i>Sari</i>	<i>Tesawu</i>	<i>Tesa bird conch Sankharibu</i>
<p>Taboos: All Hansda people observe the taboo against the swan. Chalki people are not allowed either to kill or to even touch a tiger skin.</p>			
Other Species Protected			
<p><i>Karam, Neem, Aswath (Ficus religiosa), Bat (F. bengalensis), Bel (Agela marinelos) Amlki use of the wood of these species is strictly prohibited.,</i></p>			
Rites De Passage			
Event	Associated species		
Menses	<i>Banana, Tulsi</i>		
Wedding	<i>Mahul, Sidha (Lagerstromia parviflora), twigs, Banana and Hartuki (Terminalia chebula) fruits.</i>		
Cremation	<i>Neem wood, Tulsi plant</i>		
Festivals			
Festival	Month	Species associated	
<i>Karam</i>	<i>Bhadra</i>	<i>Amlaki, Haritaki, Bel, Karam</i>	
<i>Salui</i>	<i>Falgun</i>	<i>Sal, Mahul, Am</i>	
<i>Kali</i>	<i>Kartik</i>	<i>Pyna lata</i>	
Tribe: <i>KORA</i> (Village: Kendua)			
S. No.	Clan	SubclansY	Totemic species
1.	<i>Kisku</i>		<i>Ban fish (Bodo machili), Coucal (bird)</i>
2.	<i>Hembrom</i>		<i>Supari (Betel nut) and mouth parts of Chagal (goat)</i>
3.	<i>Soren</i>		<i>Sal fish</i>
4.	<i>Singh</i>		<i>Sparrow, Pulk Puk bird (Blue bird with red throat, found in summer)</i>
5.	<i>Hansda</i>		<i>Swan (Duck) both big and small</i>
6.	<i>Hiret</i>		<i>Sal fish</i>
7.	<i>Tudu</i>		<i>Kamal alu (end of tuber)</i>
8.	<i>Bera</i>		<i>Squirrel</i>

Other Species Protected/Worshiped

Plant: *Sal, Am, Mohul, Anar, Bel, Tulsi, Roshin Lal Gach, Sidha*

Rites De Passage

Event	Species associated
Birth	<i>Tulsi</i>
Menses	no specific item
Marriage	<i>Mohu, Sidha, Am leaves, Harituki fruit, Durba grass</i>
Death	<i>Tulsi, Sar, Supari, Harituki, Job patta (Ashoka tree), Sal Dhuna</i>

Festivals

Festival	Season	Associated species
<i>Salui pooja</i>	<i>Chitra</i>	<i>Sal, Mohul flower, Am flower and fruit, Bel leaf, Tuls</i>
<i>Roshin pooja</i>	<i>Jesta (13th)</i>	<i>Roshin fruit, Am leaf</i>
<i>Mansa pooja</i>	<i>Sravan Lal</i>	<i>gach, Poddar flower, Lotus leaf, Banana</i>
<i>Ganga pooja</i>	<i>Jesta (10th)</i>	<i>Tulsi, Am leaf</i>
<i>Dak Sankranti</i>	<i>Ashwin</i>	<i>Banla alu</i>

Tribe: **LODHA** (Village: Patharnala)

S. No.	Clan	Subclan	Totemic species
1.	<i>Bugta</i>	<i>Boro (Bhukta)</i>	<i>Chirka alu (Yam) Choto</i>
2.	<i>Mallik</i>		<i>Sal fish</i>
3.	<i>Kotal</i>		<i>Grasshopper</i>
4.	<i>Layek (Laik)</i>	<i>Boro Choto</i>	<i>Sal fish</i>
5.	<i>Pramanik</i>		<i>Manik bird (White throated black bird)</i>
6.	<i>Dandapat</i>		<i>tiger</i>
7.	<i>Ari (Ahari)</i>		<i>Turtle/Chand fish</i>
8.	<i>Bhuiya/Bhunia</i>		<i>Sal fish</i>
9.	<i>Digar</i>		<i>Porpoise</i>

Other Species Protected/Worshiped

Plant: **Sal (Sorea roubusta), Mohul, Bel, Tulsi, Haldi, Am Juba, Basak, Ficus**

Animal: **Elephant**

Rites De Passage

Event	Species associated
Birth	<i>Tulsi, Haldi</i>
Menses	7 types of flowers: <i>Jaba, Bel, Basak, Ganda, Gulab Y, Lebu,</i>
Marriage	<i>Am, banana, Mohul, Sal (Branches)</i>
Pregnancy	Jackfruit (is prohibited)
Death	<i>Ashud, Judi (Ficus religiosa) (no flowers)</i>

Gulab (rose) is not an indigenous species of the region, nor does it occur in the

wild. The Lodha collect it from the gardens. It is likely that some other species that is not found in today's forests has been replaced with the rose.

Festivals

Festival	Season	Species associated
Salui pooja	Chitra	Sal (<i>Shorea robusta</i>)
Gorooi (goroyi)	Kartik (Amavasya)	Lotus, rice (ear)
Roshin	Jesta (13th)	Roshin fruit
Sankranti	Poosha	no wild species
Ambabati pooja	Ashad	no wild species

Tribe: **MUNDA** (Village :Baduida (Tola: Upardiha))

S.No.	Clan	Subclan	Totemic species
1.	Tuti Kili		Tuti plant
2.	Mundu Kili		Bor (<i>Zizyphus</i>)
3.	Soi Kili	Tuing Jang Tula	Soe Fish
4.	Horo/Kachua		Tortoise
5.	Nag Kili		Snake
6.	Chamru		Lotus
7.	Kanchi		Shan

Other Species Protected/Worshiped

Plant: *Sal, Karam, Bel, Tulsi, Harituki, Tetul, Kejur*

Rites de passage

Event	Associated species
Marriage	<i>Gulaj and Akanda Flowers, Bel leaves, Tulsi, Durba</i>
Death	<i>Banana, Bel leaf, Tulsi, Fig, Sal, Aswath, Bat, Plum-twigs.</i>
Sradh	<i>Sal, Dumuru, Aswath, Bar, Kul</i>

Festivals

Festival	Season	Species associated
Karam	Chitra	<i>Lotus, Bel, Tulsi, Harituki, Mung dal</i>
Salui	Chitra	<i>Sal, Mohul, Am</i>
Garam pooja		<i>Date, Doka, Tetul</i>

Tribe: **SANTAL** (Village: Kesia)

Sl. No.	Clan	Subclan	Totemic species
1.	Hansda		Swan
		Chilbinda	Kite, Swan
		Hans	Duck, Swan
		Bandu	Wild Yam, Swan
2.	Murmu	Murut	Palash (<i>Butea sp.</i>)
		Champa baha	Champa
		Murmu-ot	Murum mushroom
		Hawal	Rat snake

3.	Besra	Sarna Champa	Wild fowl Champa
4.	Hembrom	Sal Gua Hat	Sal (<i>Shorea robusta</i>)
5.	Mandi	Gua Champa	Betel-nut, weed grass Champa, weed grass (<i>Ischemum rugosum</i>)
6.	Saren	Turku Luman	Tassar moth, larva and pupa

Other Species Protected/Worshipped

Amlaki (Emblca officinalis), *Karam (Adina cordifolia)* and *Aswath (Ficus religiosa)*, are held as sacred species, and their wood is not used either for fuel or for making implements.

Rites De Passage

Event	Associated species
Naming ceremony	<i>Asan (leaf) (Terminalia tomentosa)</i>
Wedding	<i>Am (leaf) (Mangifera indica)</i>
Cremation	<i>Neem and Mahul twigs (Azadirachta indica, Bassia latifolia)</i>

Festivals

Festival	Season	Associated species
Salui/baha	Falgun (Fullmoon)	Sal, Mahul
Karam	Agrahayan (Fullmoon)	Karam
Magh Sim	Magh	Tulsi, Kul (<i>Zizypus</i>)
Jam sim	Baisakh (Fullmoon)	Amlaki, Bel, Satomuli
Mahamore	Jaistha/Ashadh	Satamul, Khudijam (<i>Syzigium</i>)

Taboos

The above species, associated with the clan names, are neither destroyed nor used by the members of the respective clans. However, members of other clans are allowed to use those species. Thus, the swan is a taboo for all Hansda people, but not a taboo for other Santal clans. [Source: Deb et. al. 1994]

Annexure XIV

Religious Support for Tree Plantation

"1. The Skandha Purana

One who plants by the roadside a tree which produces shade, flowers and fruits frees his ancestors from sin". (Quoted by Hemadri, Chaturvaraga Chintamani, P.1033)

2.The Mahabharata

Tree-planting is productive for religious merits in the next world. The tree-planter gets 'moksha' for his deceased ancestors as well as for his descendants.

A man should, therefore, plant trees." (Quoted by Hemadri p.1030)

3.The Vishnu Purana

Trees gladden gods by their blossom; guests by their fruits; and the travellers by their shade." These short quotations show how ancient sages motivated tree planting through the use of religion. The list of trees recommended for planting depended upon the geographical location of the texts and the traditions followed by the people.

4.The Mahabharata recommends a group of trees: 'ashwattha', 'neem', 'vata' (banyan tree), 'tamarind', 'kapittha' (wood-apple tree), 'bilva' and 'amalaki' (Emblica myrobalan).

5.The Varaha Purana also recommends 'ashwattha', 'neem', 'banyan', 'jati' (jasmine plant), pomegranates, sweet-lime, etc. Varahamihira who belonged to Ujjain, Malwa, and lived in the early part of the 6th Century AD, recommended a number of trees to be planted on the banks of tanks and rivers. But, according to him, the 'neem', 'ashoka', 'shirisha' and 'priyanga' trees are auspicious and should be planted both in the gardens and near houses. He quotes sage Kashyapa of 5th Century AD, an authority in this time, who highlighted the importance of planting 'champka', 'dumbara' (fig tree) and 'parijata'.

"This indicates that the sages did not stop with vague assertions about the merits of planting trees but also recommended specific lists of trees worth planting. They have given guidelines about the preparation of soil, fertilization, distance to be maintained between the trees, grafting of trees, the seasons in which particular graftings are desirable and astrologically the favourable 'nakshatras'."¹² [Tagare 1993]

¹² The period of constellation is decided by the astrologers of the society who keeps their eyes on the planetary movements. The period of various constellations in relation to the English calendar is given here, for the rainy season, 1990. 1Rohini' :25th May-7th



June, `Magha':16th Aug-29th Aug, `Murgshirsh':8th June-21June, `Purva':30th Aug-12th Aug, `Adra': 22nd June-5th July, `Uttara':13th sept-26th Sept, `Punarvasu':6th July-18th July, `Hasta': 27th Sept-9th Oct., `Pashya':19th July-`st Aug, `Chitra':10th Oct.-23rd Oct., `Ashlesha': 2nd Aug-15th Aug, `Swati': 24th Oct-5th Nov.

Annexure XV

Warli Art

"Executed mainly in red and white with the occasional use of green and yellow with themes taken from the everyday events of eons ago, the scenes usually depict hunting, dancing, music, horse and elephant riders, animal fights, honey collection, decoration of bodies, disguises and masking and household scenes. Animals such as bison, tigers, lions, wild boar, elephants, antelopes, dogs, lizards, crocodiles, etc., have been abundantly depicted in some caves. Popular religious and ritual symbols also occur frequently.

"The tribe known as Warli, are found in Thane, a district in the north of Maharashtra on the west coast of India. The origin of the Warlis, the tribe who live here, is unknown, but many scholars and folklorists believe that it can be traced to as early as the tenth century AD. The whole tribe paints, as it is a vital part of their day-to-day living. They live very frugally and shun contact with outsiders. Their art was eventually rediscovered in the early 1970s, and became popular for its unique simplicity.

"Their art form is a way of passing on their common folklore amongst a people who traditionally do not use the written word for communication. The themes chosen by the artists are mainly from nature. Harvest is one of their major themes. One other very popular theme is that of a wedding festival. The subjects found in these paintings are fields swaying with healthy crops, birds flying in the sky, groups dancing around a person playing music, dancing peacocks, women cooking or busy in their other house chores and children playing. Warli art always contains groups of people. The paintings are on mud, charcoal and cowdung treated surfaces, and done with white rice paste.

"Vedas' were originally an oral tradition and were only later compiled into written form as early vedic times did not have a script. Stories imparting moral principles were traditionally told to entertain children. The Panchatantra stories are an example of the same.

"Summing up one can say that oral tradition of tribals was closely linked with the environment. Their analyses of nature and method of transmission of the data will by itself constitute a fascinating study.

"Societies on the initial stage of information relied on plants as medicine. Despite popularity of the allopathic system of medicine indigenous communities continue to rely on the plant-based system of medicine. This indigenous system of medicine employs spiritual healing along with herbal medicine and is economical. Knowledge about plants and

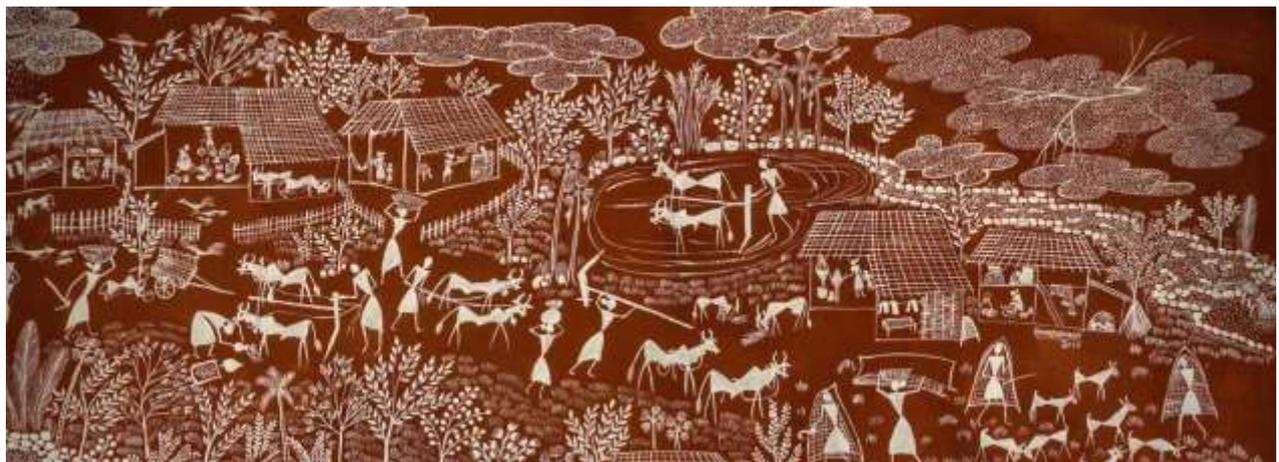
rituals connected with the healing process is transmitted from one generation to another through:

a. Divination - where the herbal medicine man acquires knowledge from divine forces through dreams and hallucinations, mostly under the influence of liquor. The diviner is guided by divine forces who teach him about the plants that can be used as medicine and the chants associated with the healing process. He is guided often to the place where the plants occur.

b. Hereditary healer - where knowledge is transmitted from one generation to the next. It is often the son who inherits the knowledge from the father.

c. Discipleship - In this category the student learns from the herbalist who is willing to teach.

d. Kinship - this method of learning was observed especially among the Bonda community, where the herbalist is accompanied by a male cousin while collecting plants, administering medicines and performing rituals associated with healing. This kinship continues for ever and the cousin never becomes an independent practitioner." [Franco and Narasimhan 2012]



Warli Painting

REFERENCES & BIBLIOGRAPHY

- Adhikary, A.K. (1974). 'The Nomadic Mankaria - a Study in their Aspect of Articulation with the Settled Peasantry'. *Man in India*, Vol. 54, 18, Church Road, Ranchi.
- Agarwal, Anil and Narain, Sunita. (1992). 'Traditional Systems of Water Harvesting and Agroforestry' in 'Indigenous Vision', *India International Centre Quarterly*. New Delhi.
- Altman, Nathaniel. (1994). *Sacred Trees*. Sierra Club Books, San Francisco.
- Alvares, Claude. (1991). 'Fish, Curry and Rice', in *A Citizens' Report on State of the Goa Environment - ECOFORUM*, Other India Press, Mapusa.
- Andrews, Harry and Whitaker, Romulus. (1994). Paper 'Irula Venom Centre - India'. Prepared for the 1st Meeting of the IUCN/SSC Specialist Group on Sustainable use of Wild Species, Buenos Aires.
- Anon. mimeo from Tribal Research Institute, Andhra Pradesh, Hyderabad. Chapter 2. Untitled. Undated
- Aparna, Prateek and PC Trivedi, Department of Botany, University of Rajasthan, India. *Indian Journal of Traditional Knowledge*, Vol 10 (1). Jan 2011, Pp 183-189
- Auboyer, Jeanine. (1961) *Daily Life in Ancient India: From Approximately 2000 BC to AD 700*. Asia Publishing House, Bombay
- Bahadur, K.P. (1979). *A History of Indian Civilization*. Ess Publication, New Delhi.
- BAHUGUNA, SUNDER LAL. (1993). 'Forest - The Basis of our Survival'. Paper presented at first Congress on Traditional Science, Bombay.
- Battacharyya, Asutosh. (1947). 'The Tiger- Cult and Its Literature in Lower Bengal'. *Man in India*, Vol.27, pp 55-70.
- Bharucha, Erach. (2016). *Living Bridges: Folk Cultures of India Then and Now*. Harper Collins Publishers, India.

- Bhatnagar, Manju. (1988). 'Birds and Animals in Indian Sayings'. *Man in India*, Vol.68, 3.
- Bhattacharya, Sayan (2014), (*Department of Environmental Studies*. Rabindra Bharati University, Kolkata, India). 'Forest and biodiversity conservation in ancient Indian culture: A review based on old texts and archaeological evidences'. *International Letters of Social and Humanistic Sciences*, 19, 35-46. ISSN 2300-2697.
- Blackburn, Stuart H. (1977). 'Creation Myths in Tribal India - Problems in Cultural Diffusion'. *Man in India*, Vol.57(3), pp 191-207.
- Chandra, Ramesh. (1987). 'Quest for Environmental Adaptation in the High Land Society-Case of Kinners'. *Man in India*, Vol 67 (3), pp 177- 193.
- Chandra, Sarat & Mitra, M.A. (1925). 'On the Cult of the Jujube Tree'. *Man in India*, vol. 5.
- Chandran, Subhash M.D., Gadgil, Madhav. (1991). 'Kans Safety Forests for Uttar Kannada'. *Der Forestlichen Versuchs - und Forschungsanstalt, Baden - Württemberg 79100 freiburg in breisug*.
- Chaudhury, Bikash. Roy. (1969). 'Some Fishing Communities of West Bengal'. *Man in India*, Vol. 49, 3.
- Chowdhury, Bhagirathi. (1994). 'The Oraon - An Ethnographic Study'. *Tribal and Harijan. Research- cum- Training Institute, Bhubaneshwar*.
- Cipriani, Lidio. (1966). *The Andaman Islanders*. Ed. and translated by D. Tayler Cox, Weidenfeld and Nicolson, London.
- Clason, A.T. (1975). 'Archeo-zoological Study in Ancient India: Aspects of Stock Breeding and Hunting in Prehistoric and Early Historic Times'. *Eastern Anthropologist*, 28:1.
- Dandekar, R.N. (1979). *Vedic Mythological Tracts. Select Writings I & II*. Ajanta Publ., Delhi
- Daniels, R.J.R., Joshi, N.V. AND Gadgil, Madhav. (1990). *Biological Conservation. Centre for Ecological Sciences, Indian Institute of Science, Bangalore (mimeo)*.

- Das, Bhuban Mohan. (1956). 'A Note on The Hira Potters of Assam'. *Man in India*. Vol. 36, pp 199-202.
- Dass, Dr. P.K. (1993). *Conservation Practices of Hill Kharia and Birhor. (Food Gathering and Hunting Tribes)*. Department of Anthropology, Utkal University, Bhubaneswar. Commissioned especially for this Report.
- Deb Roy, H.L. and Majumdar, D.N. (1981). *A Tribe in Transition: The Jaintias of Meghalaya*. Cosmo Publications, Delhi.
- Deb, Debal, Vasulu, T.S. & Malhotra, K.C. (1994). *Conservation Related Traditional Practices. (Among Five Tribal Populations of Midnapore District, West Bengal)*. Commissioned specially for this study.
- Elwin, Verrier. (1948). 'Notes on the Juang'. *Man in India* vol. 28, pp 39-115.
- Elwin, Verrier. (1954). 'Tribal Myths of Orissa'. Adimjati Sevak Sangh, Delhi.
- Elwin, Verrier. (1986). *The Baiga*. Gian Publishing House, Delhi. First Published in 1939.
- Ferreira, John. V. (1965). *Totemism in India*. Oxford University Press Delhi.
- Fox, Richard G. (1969). 'Professional Primitives: Hunters and Gatherers of Nuclear South Asia'. *Man in India* vol. 49.
- Franco, M. Merlin and D. Narasimhan. (2012). *Ethnobotany of the Kondh, Poraja, Gadaba and Bonda of the Koraput region of Odisha, India*. Published by D. K. Printworld (P) Ltd. First published in India.
- Furer Haimendorf, C.Von. (1985). *Tribal Population and Cultures of the Indian Sub-Continent*. E.J. Brill, Lerden-Koln.
- Furer- Haimendorf, Christoph Von. (1962). *The Apa Tanis and Their Neighbours - A Primitive Civilisation of the Eastern Himalaya*. Routledge and Kegan Paul, London
- Furer-Haimendorf, C.V. (1946). 'Agriculture Among Apa Tanis'. *Man in India*, Vol. 26, pp 20-64.

- Gadgil, Madhav & Berks, Fikret. (1991). 'Traditional Resource Management System'. *Resource Management and Optimization*, Vol. 8 (3-4), pp 127-141.
- Gadgil, Madhav & Guha, Ramchandra. (1990). *Ecological Prudence and the Modes of Resource Use*. Centre for Ecological Sciences, Indian Institute of Science, Bangalore (mimeo).
- Gadgil, Madhav & Malhotra, K.C. (1983). 'Adaptive Significance of the Indian Caste System an Ecological Perspective'. *Annals of Human Biology*, Vol. 10, no. 5, pp 465-478.
- Gadgil, Madhav & Thapar, Romila. (1990). 'Human Ecology in India: Some Historical Perspectives'. *Interdisciplinary Science Review*, Vol. 15, No.3, pp 209-223.
- Gadgil, Madhav and Chandran, M.D. Subhash. (1992). 'Sacred Groves', in *Indigenous Vision, India International Centre Quarterly*, 19 (1-2), pp 183-187.
- Gadgil, Madhav and Homji, Mehar. (1996). *Role of Protected Areas in Conservation for Productive Agriculture*. Indian Council of Agriculture Research, New Delhi.
- Gadgil, Madhav and Malhotra K.C. (1982). 'Ecology of a Pastoral Caste: The Gavli Dangars of Peninsular India'. *Human Ecology*, 10, pp 107-143.
- Gadgil, Madhav and Malhotra, Kailash. (1981). 'What Price Development'. *Science Today*. February 1981.
- Gadgil, Madhav. (1985). 'Social Restraints on Resource Utilization : The Indian Experience', in *Culture and Conservation* in *The Human Dimension in Environmental Planning*, Mcneely, J.A. and Pitt, D. (Ed.). Croom Helm. London Sydney Dover.
- Gadgil, Madhav. (1987). 'On the Diversification of Common Property'. *Resource Use by the Indian Society*. IISC, Bangalore (mimeo).
- Gadgil, Madhav. (1987). 'Diversity: Cultural and Biological'. *Tree*, Vol. 2 no. 12. Elsevier publications - Cambridge.

- Gadgil, Madhav. (1987). 'Social Restraints on Exploiting Nature: The Indian Experience'. *Development: Seeds of Change*.
- Gadgil, Madhav. (1987). *Culture Perceptions and Attitudes to Resource Use*. Centre for Ecological Sciences, Indian Institute of Science, Bangalore (mimeo).
- Gaston, Anthony S. (1977). 'Where Have all the Forests Gone.....?' *India International Centre Quarterly*, Spring 1977
- Goswami, M.C. and Singh, CH. Budhi. (1970). 'Tenure and Allocation of Phoompham among the Thanga Fishermen of Manipur'. *Man in India*, Vol 50(4), pp 379-389.
- Gupta, Amitava Das. (1981). 'A Study in Nature-Man-Spirit Complex in Nature' in *Man-Spirit Complex in tribal India*. (Ed.) R.S. Mann. Concept Publishing House, New Delhi.
- Gupta, Shakti. M. (1993). *Plant Maths and Traditions in India*. Munshiram Manoharlal Publishers Pvt. Ltd., Benares
- Hemadri, Koppula. (1987). 'Folklore Medicine in India' *Vivekanand Kendra Patrika*, 16(1) : 31-38.
- Hemadri, Koppula. (1992). 'Tribals of Andhra Pradesh: Their Knowledge of Nutritional and Medicinal Herbs'. *Indian Medicine*, 4(3): 1-6.
- Idyarthi, L.P. A (1975). 'The Future of Traditional Primitive Societies: Case Study of an Indian Shifting Cultivation Society'. *The Eastern Anthropologist*, 28:1 pp 313-326.
- Jain, Ashok K. & Sharma H.O. (undated). *Ethnobiological Studies of Sahariya Tribe of Central India*. School of Studies in Botany, Jiwaji University, Gwalior.
- Jain, Ashok K. (1990). 'Tribal Clans of Central India and Their Role in Conservation'. *Journal of Environmental Conservation*, Vol. 17.
- Katwa, S.S. (Assoc. Professor, M.L.Sukhadia University, Udaipur) (undated). *Grasses Used as Famine Food from the Aravalli Hills of South-East Rajasthan* (mimeo).

- Klaus, Bachmann. (1993). 'Putting Meaning Back into Myth'. *The Sunday Times of India*. 10/1/1993.
- Kolarkar, A.S. & Singh, N. (1984). 'An Ancient System of Water Harvesting'. *Indian Farming (October 1984)*.
- Kolarkar, A.S. & Singh, N. (1990). 'Runoff Farming in Arid Tract of India: A Review'. *Indian Journal of Soil Conservation*, Vol. 18, No.3.
- Kolarkar, A.S., et.al. (1983). 'Khadin - A Method of Harvesting Water for Agriculture in Thar Desert'. *Journal of Arid Environment*. 6, 59-66.
- Kothari, Ashish, Pratibha Pande, Shekhar Singh, Dilnavaz Variava (1989). *Management of National Parks and Sanctuaries in India - A Status Report*. Indian Institute of Public Administration, New Delhi.
- Kumar, B.M. (2008). (College of Forestry, Kerala Agricultural University). 'Forestry in Ancient India: some literary evidences on protective and productive Aspects', *Asian Agri-History*, vol 12 No 4.
- Lannoy, Richard. (1971). *The Speaking Tree: A Study of Indian Culture and Society*. Oxford University Press, Delhi.
- Lyngdoh, Rev. & FR. Sngli. (1966). 'The Bhoi Land-tenure System'. *Man in India*, Vol.46, No.2.
- Madan, T.N and Majumdar, D.N. (1963). *An Introduction to Social Anthropology*. Asia Publication House, Bombay.
- Mahapatra, Sitakanta. (1973). 'The Meria Sloka: Songs of the Kondh Accompanying the Rite of Human Sacrifice'. *Man in India*, Vol. 54,1.
- Malhotra, K.C., Shah, S. & Hayden, R.M. (1993). 'Association of Pomegranate (*Punica Branatum*) with the Sacred Complex at Madhi, Maharashtra'. *Man in India*, Vol. 73(4) pp 395-400.
- Malhotra, K.C., Khomna, S.B. & Gadgil, Madhav. (1983). 'Hunting Strategies among three Non-pastoral Groups of Maharashtra'. *Man in India*, Vol.63(1), March 1983.
- Malhotra, Kailash C. & Basak, Juthika. (1984). 'A note on the Cultural Ecology of Plants'. *South Asian Anthropologist*, 5 (1), 45-47.

- Malhotra, S.P. and Bharara L.P. (1988). *Role of Human Factor in Desert Development*. Base paper for National Seminar on Integrated Socio- Ecological Development of Deserts - CAZRI, Jodhpur.
- Mann, R.S. (1981). 'Animism, Economy, Ecology and Change Among Negrito Hunters and Gatherers', in *Nature- Man-Spirit- Complex in Tribal India*. Concept Publishing house, New Delhi.
- Mann, R.S. (1984). *Anthropological and Sociological Theory: Approaches and Applications*. Jaipur, Rawat Publications.
- Mehra, J.D. (1956). 'Snake Worship Among the Nayars of South India'. *Man in India*, Vol. 36, pp 133-139.
- Mehta, Raman, Uppal, Vishai and Singh, Shekhar. (2003). *2nd Survey: Management of National Parks and Sanctuaries in India* (in 4 volumes), RaaG.
- Mishra, P.K. & Bhanu, B. Anand. (1980). 'Boundary Maintenance Among Cholanaikkan - The Cave -men of Kerala'. *Man in India*, Vol. 60 (1-2).
- Mitra, Amit, et. al. (1994). 'The Spirit of the Sanctuary'. *Down to Earth*, Vol 2 No.17, January 31, 1994.
<https://www.downtoearth.org.in/coverage/the-spirit-of-the-sanctuary-29329>
- Mitra, Sarat Chandra. (1925). 'On the Cult of the Jujube Tree'. *Man in India*, Vol.5.
- Mohan, R. Krishna & Murthy, P.V. Bhirava. (1992). 'Plants used in Traditional Medicine by Tribals of Prakasam District, Andhra Pradesh'. *Ancient Science of Life*, Vol. XI, no. 3&4 pp 176-181.
- Morab, S.G. & Mann, R.S. (1981). 'Ecological Structure and Economic Organisation". in Mann edited, *Nature-Man-Spirit Complex in tribal India*. Concept Publishing House, New Delhi.
- Morris, Brian. (1976). 'Settlement and Social Change among Hill Pandaram'. *Man in India*, Vol. 56, pp 135-149.

- Morris, Brian. (1981). 'Hill Gods and Ecstatic Cults : Notes on the Religion of a Hunting and Gathering People'. *Man in India*, vol. (61) September 1981.
- Mukhopadhyay, Sankarananda. (1976). *A Profile of Sundarban Tribes*. Firma KLM Private Limited, Calcutta
- Murthy, K.N.K., Sharma, K.D. & Vangani, N.S. (undated). *Efficient Rainwater Harvesting from lands of India*. (Mimeo). Central Arid Zone Research Institute, Jodhpur.
- Nadkarni, M.V. (1990). 'Use and Management of Common Lands - Towards an Environmentally Sound Strategy' in Karnataka'. *State of Environment Report IV*. (Ed) Cecil J. Saldanha, Centre for Taxonomic Studies, St. Joseph's College, Bangalore
- Nakashima, D.J., Galloway McLean, K., Thulstrup H.D., Ramos Castillo, A. and Rubis, J.T. (2012). *Weathering Uncertainty: Traditional knowledge for Climate Change Assessment and Adaptation*. Paris, UNESCO and Darwin, UNU, 120pp
- Nandi, S.B. (1977). 'Status of Women in Polyandrous Society'. *Man in India*, vol. 57(2).
- Nath, Anjan K. (1980). 'Boat Worship in Ancient Kamrupa'. *Man in India*, vol. 60(1-2), pp 90-97.
- Nath, Snehlata. (1995). 'The Honey Hunters of Tamil Nadu : Climbing through a Period of Change'. *Forest, Trees and People*, Newsletter, 29.
- Panda, S.N. (1971). 'Economy and Society Among the Fishermen of Coastal Orissa'. *Man in India*. Volume (51).
- Pandya, Visvajit. (1993). *Above the Forest - A Study of Andamanese Ethnoanemology, Cosmology and the Power of Ritual*. Oxford University Press, Delhi.
- Paulraj, S. (1996). "Conservation of "Sthala Vriksha"". A Biodiversity' approach paper presented at the seminar on Sacred Groves of India : Their Biodiversity and Conservation. WWF State Organization, Hyderabad.

- Pereira, Winin. (1992). 'The Sustainable Lifestyle of the Warlis', in *Indigenous Vision. India International Centre Quarterly*, 19(1-2). Delhi.
- Perumal, P. (1993). 'A Vanishing Tradition'. *Telegraph*, 20/03/1993.
- Pillay, K.K. (1969). 'A Social History of the Tamils - Part I', *Madras University Historical Series - No. 25 I*. University of Madras.
- Raghaviah, V. (1962). *The Yanadis*. Adim Jati Sevak Sangh, Delhi.
- Ramakrishnan, P.S. & Patnaik, Suprava. (1992). 'Jhum - Slash and Burn Cultivation'. in *Indigenous Vision. India International Centre Quarterly*.
- Ramakrishnan, P.S. (1985). 'Tribal Man in the Humid Tropics of the North-East'. *Man in India*, vol. 65(1), pp 1-29.
- Ramakrishnan, P.S. (1996). *Conserving the Sacred: from Species to Landscapes*. (Mimeo).
- Rai, S.C. (2005), 'Apatani Paddy cum Fish Cultivation: An Indigenous Hill Farming System of North East India.' *Indian Journal of Traditional Knowledge (IJTK)*, volume 4(1), January 2005.
- Rao, M. Kodanda. (1980). 'Process of Ecologic Adaptation Among the Jalaris of Coastal Andhra'. *Man in India*, vol. 61(1), pp 69-75.
- Rao, N. Subba. (1980). 'Socio-Economic and Cultural Profile of a Coastal Fishing Village in Andhra Pradesh'. *Man in India*, vol. 60 (3-4).
- Rao, N.R.K. (1996). *Thimmamma Marriman'*. Paper presented at the Seminar on, Sacred groves of India : Their Biodiversity and Conservation. workshop organized by WWF regional Office, Hyderabad.
- Ratha, S.N. (1993). 'Forest and Tribal Culture: An Overview of the Man-plant-animal Relationship'. *ADIVASI*, vol. XXXIII No. 1. March 1993, Bhubaneswar.
- Rodgers, W.A. (1994) 'The Sacred Groves of Meghalaya'. *Man in India*, Vol. 74 (4) pp 339-348. 18, Church Road, Ranchi, India.

- Roy, Dunu. (1992). 'Myth, Fable and Gile - The Art of Survival in Shahdol'. *in Indigenous Vision*. India International Centre Quarterly, 19 (1-2).
- Roy, S.C. (1928). *Oraons Religion and Customs*. Industry Press, Calcutta.
- Sahay, Vijoy, S. (1981). 'The Nicobarese - A Study in Nature-Man-Spirit Complex'. in R.S. Mann edited *Nature-man-spirit Complex in Tribal India*. Concept Publishing House, New Delhi.
- Sangama, Milton S. (1979). 'History and Culture of the Garos'. *Book Today*.
- Sankaran, Vasumathi. (1988). *Pastoralists of Western Rajasthan - A Report*. Unpublished.
- Sankaran, Vasumathi. (1992). 'Socio - Ecology of Bhils -A Community Adapting to Resource Constraints'. *Man in India*, vol. 72(3): 353-358.
- Sankaran, Vasumathi. (1996). *Customary Rights in Sustainable use of Pastures by Changpas of Ladakh*. Paper presented at the seminar organised by the *Anthropological Association of India* at National Museum of Natural History, New Delhi.
- Sankaran, Vasumathi. (1995). *Korkus*. Paper presented at the Second Traditional Sciences Congress, Madras.
- Sankhala, Kailash. (1993). 'Protecting Indigenous Peoples in Protected Areas', in *The Law of the Mother*, Elizabeth Kempf (ed.), Sierra Club Books, San Fransico.
- Santosh, K. (1993). 'A Temple for Snakes'. *Hindu*, 23/07/1993.
- Saraswati, Baidyanath. (1967) . 'The Ladakhi Custom of Cremation'. *Man in India*, volume 47, 1976.
- Savyasaachi. (1994). 'The Tiger and the Honeybee'. *Seminar*, 423.
- Sensarma, Priyadarsan. (1988). 'Ethno-Botanical Investigation in Indian Puranas: The Vayu Purana'. *Man in India*, vol 68 (3) .
- Singh, Daman. (1996). *The Last Frontier : People and Forests in Mizoram*. Tata Energy Research Institute, New Delhi, 1996.
- Singh, K.S. (1992). 'Profiles of Indian Attitudes to the Environment'. in *Indignous Vision*. *India International Centre Quarterly*, 19 (1-2).

- Singh, Shekhar, et. al., (1996). *Great Himalayan National Park: A Report on the Human Nature Interaction in and Around the Park*. Indian Institute of Public Administration, New Delhi. [Download](#)
- Sivathamby, K. (1974) 'Early South Indian Society and Economy: The Tinai Concept', *Social Scientist*, monthly journal of the Indian School of Social Sciences, Thiruvananthapuram, vol. 3 pp 25-29.
- Sjoblom, Disa, and Singh, Aman. (1993). 'An Indigenous Land Tenure System in Review to Rehabilitate a Protected Area: The Case of Sariska National Park in Rajasthan'. *Forests, Trees and People*, Newsletter No. 22.
- Steward, Julian. (1951). 'The Maler - A Study in Nature-Man-Spirit Complex of a Hill Tribe in Bihar'. in R.S. Mann edited *Nature-man-spirit Complex in Tribal India*. Concept Publishing House, New Delhi.
- Tagare, G.V. (1993). 'Dharma Shastra and Environment'. *Honey Bee*, Vol. 4 (2&3)
- Thurston Edgar, A&B, and Rangachari, K. (1909). 'Castes and Tribes of Southern India'. Vol. I. Cosmo Publishing House, Delhi printed in 1909. reprinted in 1975.
- Ura, Karm. (1993). 'Gambling for Sustainability - Local Institutions for Pasture Management in Bhutan'. *Forest, Trees and People*, Newsletter No. 22.
- Vedwan, Neeraj, (2006). (Dept. of anthropology, Montclair State University), 'Culture Climate and Environments: Local Knowledge and Perception of of Climate Change Among Apple growers in North-western India', *Journal of Ecological Anthropology*, Vol. 10
- Vidyarthi, L.P. & Roy, B.K. (1977). 'Tribal Culture of India'. *Forest Tribal Interface*, Chapter II. Concept Publishing Co. Delhi
- Vidyarthi, L.P. (1963). *The Maler: A Study in Nature-man-spirit Complex of a Hill Tribe*. Bookland, Pvt. Ltd., Calcutta.

Westermarck, Edward. (1924). *The Origin and Development of the Moral Ideas*. Vol 1 ([Download](#)), Vol 2 ([Download](#)). Macmillian and Co. London



Young Mizo Women



Onge man (above) with a skull of the Dugong (photograph by Vasumathi Sankaran)



Vasumathi Sankaran (3rd from right) with a group of Kinauris