CULTURAL LANDSCAPES
The Basis for Linking Biodiversity Conservation with the Sustainable Development

Editors
P.S. Ramakrishnan, K.G. Saxena
K.S. Rao and G. Sharma

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United Nations Educational, Scientific and Cultural Organization
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Foreword

With the accelerated loss of biodiversity from the plains of the globe, mountain landscapes, in the contemporary context, from the last outposts of biodiversity "hotspots" where conserving and sustainably managing this biodiversity is critical to address the rapidly emerging environmental uncertainties, not only of the mountain people but of humanity at large. Societies living in the mountains still try relate and identify themselves with a "natural cultural landscape" that they have carved out for themselves. UNESCO has been actively engaged in the conservation of biodiversity of the mountains through its MAB (Man and the Biosphere) programme specially through the UNESCO designated biosphere reserves and world heritage natural sites. These programmes provide a holistic approach to the conservation of biological and cultural diversity, which together hold the key to sustainable development.

UNESCO New Delhi's research initiative on "Cultural Landscapes: The basis for linking biodiversity conservation with the sustainable development in Arunachal Pradesh", in the mountain region of the north eastern India is an attempt towards building knowledge base on the links between biological and cultural diversity and to mainstream it into practices to ensure environmental, economic, social and cultural sustainability and human well-being of the region. This study over the years has emphasized on the sustainable management of 'natural cultural landscape' which is an effective route towards conservation of biological diversity. This study which was operationalized through an inter-institutional arrangement, has now culminated in this synthesis volume edited by Professor P.S. Ramakrishnan of Jawaharlal Nehru University and his co-workers. The volume has a wealth of information on the cultural landscapes from Arunachal Pradesh and Sikkim Himalaya. Linking natural and social processes in the context of biodiversity conservation and management, the volume has
emphasized on the role of culture in shaping the landscapes. This volume should be of value to a wide variety of audience, scientific community at large, policy planners and administrators and governmental and non-governmental agencies concerned with environmental conservation.

It is a pleasure for UNESCO to thank the MacArthur Foundation, USA for their continued generous financial support for this important study and to bring out this publication of contemporary interest. We would like to thank the team of experts from the collaborating institutes, G.B. Pant Institute of Himalayan Environment and Development, North Eastern Regional Institute of Science and Technology, Centre for Cultural Research and Documentation, the Mountain Institute, India and Delhi University for undertaking this important study. Our sincere thanks to Professor P.S. Ramakrishnan and Prof. K.G. Saxena of the Jawaharlal Nehru University for providing the academic coordination throughout the study period. The National Institute of Ecology provided the logistic support for the concluding workshop and synthesis of the volume; we appreciate their assistance and effort. I would also like to thank my colleague Dr. Ram Boojh for overall planning, coordination and management of this important project which has led to this synthesis volume.

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Human-Nature Relationships Through the Ages

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Introduction

For the animist, nature is ‘sacred’, being the focal point around which life activities revolve. For the ancients, what is mysterious is also ‘sacred’. The sacredness attributed to nature provides the anchor to explain order within what may seem to be chaotic earth, at the same time providing the basis to rationalize natural phenomena that was encountered and/or experienced. ‘Sacredness’ is a belief system that is universal, in that it has got embedded both within animistic and organized religions, and has evolved over time, independently, in different parts of the world. This continually evolving concept of sacredness, along a time gradient, found its expression in a variety of different ways through ages, when animistic societies became part of organized religious belief system/s (Ramakrishnan et al., 1998). Indeed, sacredness is all about viewing nature and natural resources around, obviously with attached ‘intangible’ psychological values; very often these values being converted into ‘tangible’ benefits that enable natural resources to be managed in a sustainable manner (Ramakrishnan, 2001; Ramakrishnan et al., 2004).

What Contributes to the Belief System?

Anything that is awe-inspiring is considered to be ‘sacred’, not only in the animistic belief system but even in the context of organized religions. The awe-inspiring item may be a natural phenomenon like fire, and/or seemingly distant natural object/s that may be inaccessible or accessible with great effort, such as natural sites, with unique landscape formations, distant mountain peaks, etc. Such natural formations of aesthetic beauty may also be viewed as objects of worship. Sacred sites may be the outcome of mythological beliefs and stories woven around a given landscape which may have natural formations and human-created structures in the form of
‘stupas’ (pillars) as in the Hindu and Buddhist traditions or temples, monasteries, natural rock formations, rock carvings, etc. In any case, if one were to get to the bottom of this belief system, one may be able to dig into a whole range of benefits that the society is seeking – intangible ones often impacting at spiritual/psychological levels, and tangibles that sustain their livelihood needs, both together contributing to the larger human wellbeing. Therefore, the challenge before the scientific community lies in being able to put meanings into, what may just seem to be mere belief systems, and link it with the decision-making process in the contemporary context of nature-culture linkages and interactions.

There have been some attempts to develop a historical perspective of nature worship as it evolved, from a socio-ecological system perspective. In the Indian context, it has been suggested that supernatural power got associated with specific trees, groves or ponds and natural sites, as in many other global situations too; sacredness also got associated with abstract forces of nature – such as earth, fire, wind, water (Gadgil and Guha, 1993). At this juncture, attempts to evolve an eco-cultural evolutionary tree seems to be somewhat conjectural, in the absence of limited interdisciplinary analysis in this area; be that as it may, what we are concerned with here is, more on the contemporary societal value of these ‘intangibles’ and the possibilities of deriving the ‘tangible’ benefits accruing humans.

**Awe-inspiring Natural Formations**

At a more evolved level, people of the Vedic period in India, talk of the ‘Cosmic tree’ (also called the tree of life), which embraces the entire Universe - the mythological axis ‘Mundi’, of the old world. For the Vedic humans, the ‘Cosmic tree’ is the symbolic power, embracing the entire Universe. This tree is seen as the Goddess of Nature who nourishes all life, and is seen as rooted in the ‘Brahman’, the Ultimate (Box 1). Many sacred edifices such as the Buddhist ‘stupas’, in the shape of a ‘mandala’ of Mount Meru, and/or the mythological axis ‘Mundi’ of the world are symbolic transient matter and energy expressed into material forms and constructions (Hay-Edie and Hadley, 1998).

Moving from this awe-inspiring symbolism attached with the ‘Axis Mundi’ - the Cosmic tree, and sacred edifices linked to it, such as the Buddhist ‘stupas’ of Borobudur in Indonesia or the even more symbolic ‘Shiva Linga’ worshipped as the deity of protection and destruction in the
Hindu belief system, it is not difficult to visualize natural landscape units such as the imposing mountain systems that are worshiped by diverse communities all over the world, as the next logical step in linking cultural diversity with natural landscape level diversity. Awe-inspiring as they are, mountains seem to personify power, and the attendant sacredness, being seen to be of a high order – in all its splendors and with the most impressive features, distant and yet over-whelming (Box 2).

**Unique Natural Sites**

At yet another level, a variety of more specific natural sites where humans live as part of the given cultural landscape are revered. These may be also in the form of water bodies, caves, or sites of worship (Box 3).

**Seeking Sustenance from Nature**

Being dependant upon nature around them not only for deriving intangible benefits, but tangible benefits that impinge upon their livelihood needs, traditional societies always had a sense of collective rather than individual ownership of natural resources around them. Such a value system has in the past ensured sustainable management of natural resources, with inter-generational equity concerns. These communal-centric concerns towards natural resources around, that are cemented through myths, superstitions, rituals and ceremonies and spread over a calendar year, also given expressions through folk dance, music and artistic endeavors, had ensured sustainable use of the natural resources around, though at a subsistence level. Such an philosophic view point of nature of traditional societies contrasts with the individualistic and market-oriented approach to problem-solving, with all its implications for unsustainable management of natural resources. It is in this context, cultural dimensions linked with

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**Box 1.** The Axis ‘Mundi’ - The Tree of the Cosmos (in: ‘Kathopanishad’) (Saraswati, 1998)

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Its root is above, its branches below
This eternal Fig tree
That (root) indeed is the pure – that is Brahman
That indeed is called the Immortal
On it all the worlds do rest
And no one so ever goes beyond it
This verily is ‘That’
```
Standing out very prominently from its surroundings, and worshipped by the Hindus and Buddhists of the Asian region, and tucked away in the folds of the Himalaya, the symmetrical Mount Kailas rises above the Tibetan plateau, and is the legendary Mount Meru or Sumeru, the ‘Mandala’ of the Buddhists (the cosmic axis around which the axis of the Universe is organized for both Buddhists and the Hindus). For Hindus, it is the dwelling place of Lord Shiva, one of the three forms of the supreme deity who is also seen as the carrier of the majestic river Ganga, personified as a Goddess. Buddhists compare Kailas to the legendary mount Meru, and see it as a ‘Mandala’. As the source of sacred rivers, Indus, Sutlej, Brahmaputra and Ganges, flowing like the spokes of an eternal wheel. Buddhists see Kailas as the abode of the deity, ‘Demchog’, embodiment of the masculine compassion and feminine wisdom. For the Hindus in Bali, Indonesia, the mountain, Gunung Agung is sacred because, it is seen as representing the axis around which the Universe is organized.

Mount Everest: Straddles the border areas of Nepal and China, the highest peak in the world and is an object of worship for people in the region; Tibetans reverentially call it ‘Chomolungma’, the mother Goddess of the Earth; in Nepal it is known as ‘Sagarmatha’ (mother of the Universe).

Mount Kanchendzonga, the second tallest peak, next only to Mount Everest in the Himalaya, is deeply venerated; this peak and the land below is suggested to have been blessed by Padmasambhava, an incarnate of Buddha; Arising from this belief, the Yoksum area, known as ‘Demojong’ for the Tibetan Buddhists, located , in West Sikkim is seen to be sacred. Believed to have a large number of hidden treasures (‘ter’) of spiritual value embedded within the land and water bodies, to be slowly revealed at appropriate times only, this entire landscape is to be conserved with least human disturbances imposed on this landscape.

Nanda Devi is the abode of Parvati of the Hindu Goddess, with its majestic peaks, which also includes the entire basin down below that includes the sacred Hemkund lake that is revered by the Sikh and the Hindu communities alike. With many fairs and festivals all the year around, and a major one every twelfth year, one could see many of the local devotees moving in a ritualistic procession to worship Nanda Devi, the Goddess, during the festival season. This part of the Nanda Devi Biosphere Reserve is a world heritage site.

Japanese, through their ritual ascent of the Mount Fuji are said to attain peace and enlightenment through meditation and transformation, as they gather inner strength to help each other.

For the Maoris of New Zealand, the mountains are sacred. Maori mythology holds that all life forms came from the sky and the earth, and humans are linked to the mountains. The sacred mountains of Tongariro, Ruapehu and Ngauruhoe, donated to the government by the indigenous community way back in 1888, now stands protected as a National Park.

According to the local belief of the Kikuyu tribe, Ngai, the Creator of all things dwells on Kirinyaga, a high point in Mount Kenya. East Africans traditionally bury their dead facing the sacred peaks of Kilimanjaro/Mount Kenya.

Mount Olympus, a trans-national cultural heritage of Europe, the highest peak in Greece is symbolic of the European cultural heritage. In spite of repeated attempts to pollute its environs, in the name of development, Europeans from all walks of life have resisted many attempts to ‘develop’ the area as a tourist resort.
The larger diffused cultural landscape region of Garhwal mountain region of the Central Himalaya, with humans living as part of the cultural landscape, with all its beauty, traced by the sacred river Ganga and its tributaries, with a series of temples of worship located at sites all along the route traced by the river system, and embellished through religious fairs and festivals, form a sacred land of religious/cultural tourism, for the people living in the entire Indian region.

The Demajong cultural landscape of Sikkim for those following the Tibetan Budhhist philosophy, with the sacred land, river and lakes of the Yoksum region are not to be drastically altered in any manner. Large-scale perturbations to the landscape system is suggested to end up in calamity for the Sikkim region as a whole.

The Sikh religious shrine Hemkunt Sahib in Garhwal Himalaya, along with the lake of the same name surrounded by seven snow covered peaks, and at an altitude of about 4300 m. is a revered by the Sikhs; it is believed that this site finds a place in the Sikh religious text – the ‘Guru Granth Sahib’. This forms the basis for conservation of this religious landscape and the linked religious tourism.

The conserved holy forested hill of Tirumala of the southern India, the site for the ancient Vaishnavite temple of Tirupathi Balaji is a famous pilgrimage site for the Hindus of the Indian subcontinent.

Ibusuki and Kyushu sacred woods in Japan is a place of worship for ‘Kami’ – the nature spirit, found in trees, rocks and streams.

Ethiopia, the source of the Blue Nile river considered a holy site along with Abay, the stream flowing down to Lake Tana, another sacred site, by the Ethiopian orthodox church.

Bear Bute High Ridge: Sacred for a few thousand native American Indians of South Dakota, USA, this natural feature is a source of vision and quests, spiritual power and knowledge.

Lake Guata Vita is a sacred site for the indigenous Muisca people of Columbia.

livelihood needs of local communities become significant, indeed, with their diverse expressions (Box 4).

To cite an example of shifting agriculture (known as jhum in India), which is widespread all over the developing tropics of the world, this traditional way of life has always been linked with the culture and the spirituality of the people practicing this land use within the forested landscape. With over 100 different ethnic societies and their culture-specific belief systems, dance and music forms, the socio-cultural practices in the form of festivities and cultural celebrations that are diverse, in a small geographical region of the north-eastern hills, the diversity in the culture
Culture-nature interconnection, for example, is reflected in the way the nomadic Gaddis of the remote western Himalayan (Himachal Pradesh) region perceive the Universe, as being on a vertical axis. Moving up and down the hill slopes covering long distances from the sub-temperate lower hills reaching up to the alpine meadows closer to the snowline along a vertical pathway, grazing cattle is a way of life for the Gaddis. Arising from this, they see a cyclical movement of all living creatures including humans along a vertical axis, this being lead by the nomadic Lord Shiva, the Hindu God himself, who normally resides in Mount Mani Mahesh, Kailash during the summer months, but moving down the slope during the winter months. In other words, here spirituality is brought in to justify their nomadic (rotational grazing of animals along an altitudinal gradient) way of life. Indeed, the spirituality ascribed to the vertical axis on which the universe revolves, not only justifies the rotational grazing practices of the Gaddis, but also the way their dwellings are constructed around a vertical pole. The horizontal plane is seen by them, as representing the chaotic temporal world.

Kanis of Agasthyamalai hill region of the Western Ghat mountain range were traditionally dependant upon the traditional shifting agriculture involving slash and burn of the forest followed by a cultivation phase on that land, until recent times. Now, they eke out their living from the forest through hunting of wildlife and gathering of non-timber forest products (NTFPs). Arising from their close connectivity with forests, specific areas like grasslands, rock shelters, marshy swamps and large trees with huge buttresses are considered abode of the lesser Gods, the mountain peak itself being seen as the abode of the supreme God, ‘Agasthyamuni’.

A more sophisticated level of nature-culture relationship comes to the fore in the case of the hill people of the Central Himalayan region in India. When the ‘Chipko’ (hugging the trees) movement by the people of Gopeshwar in Chamoli District of Garhwal region got started in 1973, as a protest against forest conversions taking place over the past hundred years, the common perception was that this protest movement against deforestation was primarily focused around sharing benefits with timber extractors from outside. However, it is becoming more and more evident that the root cause for this internationally well-known movement is the systematic elimination of Oak forests being replaced with Pine plantations. Collectively called the ‘Banjh’, the Oaks (*Quercus* spp.) happen to be socially and culturally valued set of species for the locals; these species also have ecological keystone value within the forested ecosystems in the mid-elevation ranges of the Central Himalayan region. Oaks as keystone species is a source of high quality litter of value for soil fertility management of traditional hill agriculture, a moisture conserver within the soil profile with its thick and spread-out root mat going down to great depths; because of these qualities, they support much of the associated rich biodiversity within the forest ecosystems. These perceptions linked with the livelihood needs of the mountain people can be seen as the basis for the underlying cause for the ‘Chipko’ movement.
mediated biological diversity is mind-boggling, indeed. Whether it be in the north-east India or elsewhere, socio-cultural events and animistic celebrations coinciding with different facets of shifting agriculture are still prevalent. This deep-rooted cultural value linked with livelihood concerns are in spite of modernization and/or the spread of Christianity, as in the north-eastern hill region. Some of the festivities are grand and more important than others – for the Wanchos it is ‘Ojiyele’, celebrated for over a week soon after crop sowing under jhum; for the Garos of Meghalaya, it is the 100-drum dance, after jhum harvest, paying obeisance to the ruling deity, ‘Misipa’. Indeed, all socio-cultural events centred around a shifting agricultural (jhum) calendar is towards propitiating Nature and animistic spirits, as detailed in Box 5.

Being widespread all over the developing tropics, interconnected eco-culture driven economic considerations have been the key enabling factors for sustaining shifting agriculture as a land use system, in spite of various attempts made from time to time, to wean away these farmers towards an alternate systems that are ecologically inappropriate alternatives, generated by agricultural scientists in their experimental gardens. This rejection also emerges from the inappropriateness of the text-book based formal science based technologies offered to the farmer by the agricultural science community that are unsustainable, often also causing severe social disruptions, with implications for the cultural identity of the people involved.

What emerges from this discussion is that humans over a period of time have modified nature in a variety of different ways; these modifications have been given animistic religious sanctity, though nature worship. Even if small encroachments are to be made into nature, causing small perturbations like slashing and burning of a small plot of 2-3 ha. of forested plot as part of shifting agriculture, apart from making amends through sacrificial offerings made to nature during animistic religious rituals, further amends are made through compensatory ‘sacred forests’ protected and worshipped. Thus, in many parts of north-east India, at least one patch of sacred grove existed at one time, close to each village. Many still are given varied levels of protection, in spite of drastic changes that have occurred in the belief system of the traditional societies living in the region (Khiewtam and Ramakrishnan, 1989). With the advent of Christianity, large numbers have been wiped out and even the few still remaining ones are often degraded and under threat of being lost.
Traditionally being animistic in their religious beliefs, shifting agricultural farmers consider themselves to be part of nature and natural resources around, and therefore look and view natural phenomena with respect and reverence. As an expression of their respect and reverence for nature, they tend to have a set of rules, rituals and taboos, interpreted through the village elder or the priest, with impacts that may be positive, or that may cause disaster. Indeed, these traditional societies tend to have a shifting agricultural calendar right from the stage of slash- ing and burning of the forest, through seeding and sequential harvesting of the yield/s from their mixed cropping system. The work related calendar is linked with socio-cultural festivals and ceremonies – the expressions of which may vary depending upon the ethnicity and locale of the given ethnic group, but the psychological basis remains. A few examples of these culture-lined expressions are:

In the Garo hills of Meghalaya, in India, the community believe that the first Garo to settle on their land was ‘Bone Nirepa’ and Jane Nitepa, who started jhum, with blessings from their deity Misipa.

The animistic Wanchos of Arunachal Pradesh in India, like many other ethnic groups in the region, traditionally sacrifice cocks, pigs, buffalos, and even the socially treasured ‘Mithuns’ to propitiate the spirits of nature, on different occasions, for a bumper crop.

Baigas of Madhya Pradesh in India consider that using a plough implies tearing the breast of the mother earth. Therefore, direct dibbling of seeds after slash and burn is done without ploughing the land, like many others.

For the Lua (Lavu’a) of the northern Thailand, spirits grant protection through the village priest – they believe in ancestral spirits, house spirits, field spirits, and the spirit ‘Chao Ti’ for the protection of the land, all of whom are propitiated before slash and burn operation.

Karens of Thailand with a strong attachment to their territory, are concerned about the ‘Crop Grandmother’ sitting on the half-burnt stumps in the jhum plots, which forms the basis for them to protect the stumps from damage till the harvest is over. They worship the lord of the ‘land and water’, to help rice grow and to call back the ‘soul of rice’ at harvest time.

Sharing the belief on the sacredness of rice along with the Karen’s, the Akha tribe in northern Thailand refer to the totality of Akha myths, traditions, customs and ceremonies as ‘Akhazang’, and expect all Akhas to carry this tradition forward; those who do not follow the code of conduct are expected to leave.

For the Meo hill tribe in northern Thailand, it is the ancestral spirits prevent the people from abandoning shifting agriculture.

The tradition of maintaining a sacred grove for each village, with many religious ceremonies performed within the groves during the year, in order to propitiate natural elements, is indicative of the sacredness attached to them, by different tribes of northeast India. It is another matter that many of these traditions are getting eroded, due to modern influences on the society. The Mawsmai sacred grove in Cherrapunji and Mawphlong grove nearer to Shillong in Meghalaya are two examples of relatively well protected sacred groves in the region.

The Buddhist Dai (T’ai) tribe of Xishuangbanna in Yunnan Province in southwest China, a shifting agricultural province, have many holy hills, ‘Nong Ban’ and ‘Nong Meng’, belonging to a village or a cluster of villages, and they are spread over a large area, forming hundreds of small or large forested reserves.
What one could also see, coming out of this discussion, is that traditional societies have always used nature and natural resources around them in a sustainable manner, through small-scale perturbations only. In this process, each ethnic group has sculptured a ‘cultural landscape’ around them, viewing themselves as part of an integrated socio-ecological system. However, external impacts at the social, cultural, ecologic and economic levels have brought in a variety of distortions in the way these traditional societies now perceive nature around them. With a fractured cultural landscape now around them, and without any alternatives that are socio-ecologically viable put in place, many traditional societies are under severe pressure in the Indian context, as elsewhere in many other parts of the world too.

**Fire: Awe-inspiring Ecological Element**

What is seen as a unique and awe-inspiring phenomenon, fire, for example, have been revered by humans since time immemorial; fire worship has been a tradition in India, right from the pre-historic Vedic period that goes back to antiquity. The three monumental treatises which enshrine the Hindu philosophy of life, the Rgveda, Samaveda and Atharvaveda, all exalt ‘Agni’, the God of Fire, and this energy being seen as the primordial element for maintaining cosmic order (Rta) (Vannucci, 1994). As Martha Vannucci puts it, sacredness in the Vedic context begins with the Lord ‘Agni’, the primeval Fire God. For the Vedic people, ‘Agni’ is the embodiment of knowledge, wisdom and mental power, burning away dirt and confusion and therefore seen as a benefactor (‘Agni-Mitra’); used unwisely, this energy is personified as ‘Agni-Asura’ (the demon), the destroyer. From here, Vannucci builds up connectivity between Lord ‘Agni’ and Lord ‘Savitri’, an aspect of ‘Varuna’, the life giving water, and indeed, the essence of life itself. Pulling all the Vedic strands together, she builds up the interrelationships between energy and the environment, comprising of both the organic and the inorganic, and in an integrative sense, the cyclical flow of energy, which also is the basis for the functioning of the ecosystem in a purely biophysical sense too.

Arising from this concept of fire as an awe-inspiring phenomenon, it is not difficult to see fire and fire-related sites as symbolic of reverence. A good example of this is the very symmetrical Mount Fuji located at the centre of the Japanese archipelago, a cone-shaped volcano at a height of 3776 m. Revered and treasured by generations of Japanese people since
time immemorial, this volcanic mountain peak has inspired generations with a rich harvest of folklore, literature, paintings and works of art. Intermittent eruptions of fire and flowing lava from Mount Fuji, with abundant rain and snow contributing to richness of the water resources, it seems as if the connectivity between fire and water is ensured; this linkage is exemplified through volcanic eruptions on the one hand, and the linked underground streams, springs and lakes that exist here, on the other. It is not until the ascetic Shugen sect began their religious practices at this mountain site, did people begin climbing the mountain as an act of religious worship (Montonaka, 2001).

In the contemporary context, fire can be seen as a powerful tool for ecosystem management – wisely used it could be seen as contributing towards ecosystem health, whether it be natural and/or human managed. Unwisely done, it can cause disaster. The recurrent forest fires, for e.g., occurring in Indonesia is an example of the destructive role of fire; this has become a recurring event in the region. Some of these recent fire events have had over a hundred ‘hot spots’, often started spilling over into neighboring countries in the form of health-threatening haze, posing health risk to people and upsetting life in the region, though temporarily. Such highly damaging fire events have become a common phenomenon in the tropical rainforest rich countries in the region, as a whole, the root cause being usage of fire for forest clearings on a large-scale for raising plantation crops.

On the other hand, foresters often have used fire as a powerful tool to ensure healthy regeneration of forested ecosystems. Thus, for e.g., in many parts of the tropical world, light fire is often used in order to have regeneration of good grass cover at the ground level, thus ensuring new growth of value for cattle grazing. If properly used, it can contribute towards ecosystem health; misused, it could be damaging.

There exist many forested ecosystems in different parts of the world that are fire-adapted, and indeed, fire-managed. Here fire is seen as an effective tool for ensuring the structural and functional integrity of the given ecosystem itself. Fire suppression over a period of time in some of these ecosystems, arising out of ignorance, has often lead to degradation setting in the characteristic natural forest ecosystems of the given region. A good example of this is the Australian Eucalypt forests in that country. Eucalypt forests in Australia are natural fire-managed ecosystems, forests being subject to both rare catastrophic fires and more frequent milder fires; the
fire events themselves may be natural lightning-induced or initiated by the aborigines living in the area (Box 6).

What emerges from this discussion on fire is that, if properly managed, fire can be a boon, particularly if highly intensive and/or extensive fires are checked by fine-tuning fire management practices; fire in such situations plays a key role in ensuring ecosystem integrity. Also, under situations, fire has to be viewed as detrimental to ecosystem integrity, unless of course it is managed for a given objective such as for regeneration palatable grass cover for cattle.

One of the conclusions emerging from the discussions so far is that traditional human societies have managed natural resources around them in a variety of different ways, using fire as a tool, or else through forest clearings done for their traditional agricultural practices like shifting agriculture. During this interactive processes with nature around they have sculptured the landscape around them in a variety of different ways, creating a dynamic cultural landscape around them.

The Concept of Eco-cultural Landscape

Humans are relatively newcomers to a complex set of landscape systems driven by natural forces. As hunter-gatherers with a territoriality of their own, they have been dependant upon a whole range of plant and animal biodiversity, for meeting with their varied subsistence needs. Moving from the hunter-gathering stage, incipient management of the biophysical landscape around them was the first step towards its domestication. Thus, what is referred to as ‘domiculture’, is an attempt by indigenous people of Australia and Papua New Guinea, for eg., to concentrate biodiversity of economic value to society as part of forest management, selecting species from the surrounding landscape itself and growing them in strips or small patches, as a first step towards organized agriculture (Haynes and Chase, 1982); similarly, the Kayapos of Aamzonia on trekking expeditions had ‘trail-side plantings’ and ‘forest gardens’ of economically valuable species, to be harvested on their return journey, a form of ‘domiculture’ as the beginning towards organized agriculture. What is planted during long treks was seen as the source of food on their return journey to their ancestral village.

Moving beyond the phase of ‘domiculture’, it is possible to visualize a whole range of traditional agricultural typologies ranging from shifting agriculture to the modern. These human-managed ecosystems along with
Benign Role of Fire Events on Ecosystems

For a long time, ecological paradigm based on Clementsian ideas of ecosystem developmental processes (succession leading to a climax ecosystem) looked at catastrophic disturbances in ecosystems as not desirable events for ensuring ecosystem integrity; however, in more recent times, we know for sure that recurring disturbances, such as fire events can often be an integral component of ecosystem structure and function under a variety of situations (eg., ecosystems developed under a Mediterranean climate, with winter rains, and summer rainfall associated with lightning and thunderstorms). Eucalypt forest ecosystems along coastal Australian region, the northern Canadian and Alaskan boreal forest ecosystems, western U.S. forests and scrublands, and a variety of natural ecosystems along the south-eastern coastal plains of USA, all under similar climatic conditions are all natural fire-prone systems, and indeed, managed by fire events. Such fire-managed ecosystems tend to have more frequent low-intensity fire events, but sometimes with high well-spaced out high intensity burns. With fire being seen as a powerful evolutionary force in these fire-managed ecosystems, unique fire-linked adaptive traits contribute to the overall integrity of the fire-managed ecosystems. Long-term fire control measures adopted by the foresters of Australia, arising from a lack of clarity about the role of fire in Eucalypt ecosystem management had, in the past, lead to degeneration of Eucalypt tree cover, ending up in drastically altered scrub-jungles of no human value in the Australian context. Increased incidence of the rare ‘die-back’ disease caused by *Phytophthora cinnamomii*, a fungal pathogen, gradual decline in soil fertility due to poorer quality organic litter, and declining nitrogen economy in the absence of nitrogen-fixing legumes that come up in large numbers after fire-induced seed scarification of their rich soil seed bank, etc. were shown to be some of the consequences of fire suppression, leading to ecosystem degradation.

Man’s historic role in changing fire frequency and intensity is variable. Advent of man under all ecosystems, perhaps lead to increased fire frequency, with variable intensity, depending upon the frequency of events. Generally speaking, the indigenous traditional societies living as part of these fire-adapted ecosystems, did perceive the value of fire for ecosystem integrity, and accepted it as an essential ingredient of the forested cultural landscape around.

Fire Damage to Ecosystems

In contrast, fire events are destructive in many parts of the world (eg., tropical Asia and Africa) resulting in invasion by grasslands, with these grasslands themselves becoming fire-susceptible, often leading to further land degradation. Indeed, invasion by a difficult-to-eradicate and fire-susceptible grass such as by *Imperata cylindrica* in the Asian tropics, is a good example of fire tending to perpetuate itself through such fire-susceptible species (eg., shifting agricultural landscape in Asian tropics) (Ramakrishnan, 1991; 1992). Also, under many situations under shifting agriculture, frequent perturbations caused by fire during slash and burn operations could end up in invasion by exotic weeds, eventually leading to an arrested succession of weeds that spread across vast areas of landscapes otherwise should be under good rainforest cover. In the Indian context, therefore, fire is to be seen as an undesirable element, except when done in a controlled way for promoting herbaceous undergrowth within forests, as is often done even now by many rural communities who maintain cattle. With what we know of the role of fire in managing native Australian Eucalypt forests, introduction of Eucalypts in the Indian sub-continent has to be viewed with some degree of caution (Ramakrishnan, 1985).
natural ecosystem types together form distinctive ‘cultural landscape’ units sculptured by the humans living in the area. Some of these cultural landscapes carved out by traditional societies may be unique in a socio-ecological sense that they could be seen as possible world heritage sites, based on well-defined criteria (Box 7), for identifying such cultural landscapes of heritage value, as part of the UNESCO’s initiative.

What we are concerned with here are about living cultural landscapes; to be more specific, heritage cultural landscapes that have been recognized for a variety of reasons, as one could see from some of the examples listed here (Box 8).

A historical evaluation of the complex relationships determining the integrity of the given cultural landscape, as perceived by traditional human societies, contrasted with modern societal responses towards managing natural resources should provide valuable lessons for developing sustainable natural resource management practices (Ramakrishnan et al., 1998).

Box 7. UNESCO’s Cultural Landscapes as ‘World Heritage’ Sites: Criteria (Rossler, 2001)

The UNESCO World Heritage Convention, 1972 is a unique international instrument for conserving cultural and natural heritage of outstanding universal value. This provided an opportunity for protecting natural sites and archaeological sites of outstanding universal value, from a historical, ethnobiological or aesthetic perspective.

UNESCO’s World Heritage Convention recognizes three categories of cultural landscapes, namely, (i) ‘clearly defined landscapes’, designed and created intentionally by humans, such as garden and parklands; (ii) ‘organically evolved landscapes’ that may still be organically evolving or relicts; and (iii) ‘associative landscapes’, by virtue of religious, artistic or cultural associations.

This linkage between the tangibles and the intangibles at the cross-cutting area of ecology, economics and ethics are spread across a range of disciplinary realms - biophysical, social, economic, anthropological cultural and spiritual; a linkage which is now gaining momentum in the area of conservation linked with sustainable natural resource management.

More recently initiated ‘Globally Important Ingenious Agricultural Heritage Systems’ (GIAHS) of FAO, Rome, are about multi-species, complex agroecosystems maintained by traditional societies that are managed casually or at low intensities, as an integral component of a cultural landscape; these unique agricultural systems are dynamic and evolving in space and time within the given landscape, with strong socio-cultural interconnections (Ramakrishnan, 2003).
Box 8. Cultural Landscape: Those Recognized by UNESCO and/or Meriting Recognition as World Heritage Site Status (Rossler, 2001; Ramakrishnan et al., 2006)

**Living Cultural Landscape**

Rice Terraces, Philippine: Over 2000 year old high rice terraces of the Ifugaos of the Philippine Cordillas managed all along in a sustainable way forms the basis for ensuring sacred cultural traditions and the delicate ecological balance – a landscape of great beauty and eco-cultural harmony.

The Ziro valley, land which is the abode for the Apatani ethnic group of Arunachal Pradesh, is another cultural landscape which merits recognition under this category, for its unique forest management system/s linked with wet rice agricultural system in a biophysical sense. With a traditional agricultural system based on internal recycling of resources and labour energy coming from the village itself as the input, this rice-fish based system is comparable to the ‘green revolution’ agriculture of Haryana and Punjab, but has an ecological efficiency (energy output/input ratio) of around 50-60 units compared to 0.5 unit for modern Indian agriculture and 0.1 unit for the more modern industrial agriculture of USA and Japan, and therefore merits recognition as a FAO world heritage site under its GIAHS (Globally Important Agricultural Heritage System) category. Indeed, like many others coming in this category, this cultural landscape is linked with animistic cultural and religious traditions that contributes towards their complete harmony with nature on the one hand, seeking peace with other ethnic groups living all around through the month-long ‘Binii Anjin’ festival (Ramakrishnan, 2006).

**Associative Cultural Landscape**

Lying at the heart of the Tongario National Park, this mountain landscape of the Maori people in New Zealand, the peaks are viewed with reverence by the Maoris, the association being both physical and cultural, connecting them to their Pacific origin in the Hawaikis.

An associative cultural landscape from the Indian context would be the Nanda Devi cultural landscape which is a UNESCO world heritage site with its mountain peaks standing out majestically within the boundary of the Nanda Devi Biosphere Reserve in the Garhwal Himalaya. Being the seat of the Mountain Goddess, Nanda Devi, this cultural landscape is revered by all in the region, through many festivals and ceremonial processions.

**Itineraries and Routes**

Yoshino Kinpusen, Koya-san Kongobuji temple Kumano Sanzan form sacred sites of the Kii mountains and Kumano pilgrimage routes for the Japanese, arising from a blend between nature worship linked with Buddhism or Daoism coming from the Chinese mainland, is a distinctive Shintoist/Buddhist sacred site complex for the Japanese.

In the Indian context, a distinct possibility for consideration as a world heritage mountain complex of Garhwal Himalaya is the pilgrimage route traced by the
Cultural basis for biodiversity conservation: The emerging scenario

Unfortunately, there is this rapidly developing disjunction between cultural diversity linked biological diversity, arising from the interconnections that links cultural with biological diversity linked with livelihood concerns of traditional societies being rapidly ruptured, in the name of ‘modernization’ and rapidly changing human values. In the Indian context, with many of the traditional societies being confined to highland mountain regions, upward migration of lowlanders for extraction of the rich biological and mineral resources in the past has adversely impacted upon the cultural landscape that these communities have always treasure. The continued governmental policies to exploit natural resource towards rapid industrialization of the country, and the governmental policies to promote establishment of large-scale industrialized plantation (coffee, tea and rubber, for eg., in the Western Ghats) economies through energy intensified plantation practices in fragile mountain environmental conditions, have further de-linked the locals from their cultural moorings. The case of the Kanis, the hill tribe living in mountainous Agasthyamalai Biosphere Reserve in Kerala part of the Western Ghats is a case illustrative of marginalized existence of these traditional people, with eroded cultural identity, with no viable solutions put in place (Box 9).

Contrasting the Kanis of the Western Ghats, we have the case of the north-eastern hill region where the diverse ethnic groups in the region are still trying to find their feet, against all odds, to evolve with the cultural landscapes that they still value and wish to conserve them as effectively as possible. Though impacted by external pressures as in the case of the Kanis discussed above, they are still in a relatively better shape, because of the socio-political history of the region, starting from the colonial period where they were insulated and left-alone by the then rulers, which is now
Considered to be a sacred mountain, being the abode of the legendary saint, Agasthyamalai is the land of the sage, Agasthyamuni, and therefore the whole forested area is ‘sacred’ to the local ethnic community, the ‘Kanis’, with entry to the area being restricted, in olden times to the traditional ‘Siddha’ system of traditional medical practitioners only. In recent times, over-extraction of medicinal plants from the wild, and expansion of rubber plantations deep inside the forested areas and a range of encroachments have brought in distortions in the Kani cultural landscape, leading to socio-ecological disruptions, with little in terms of solutions to the livelihood problems for the local people put in place. What is therefore required is to reconstruct/restore the Kani cultural landscape, by involving all the relevant stakeholders who are now part of the changed scenario. In such an effort, the objective has to be to restore the natural capital that touches upon not only the tangible benefits, but also caring for the intangible values – the sacredness attached to the cultural landscape by the Kanis, thus giving an opportunity to the so empowered society to chose their own developmental pathway, based on a value system that they understand and appreciate.

modified with democratic processes put in place, with special constitutional provisions for conserving their rich cultural heritage (Box 10).

Thus, whilst the Kanis in Agasthyamalai in the Western Ghat region of Kerala is engaged in a losing battle to sustain their cultural landscape, the north-eastern hill region remaining relatively better insulated in a socio-political sense is better placed towards conserving their cultural diversity linked biological diversity.

**Conclusions**

What does all this imply? One is not talking about keeping these traditional societies fixed to the past, without change. One is not also trying to romanticize the past traditions and belief systems. What one is arguing for, is to learn from the past, adapt the best practices available with them, and gradually build upon it for the future, so that the changes come from within, rather than a value imposed from outside to which they cannot relate to. Whatever changes that happen should come from within, based on a value system that traditional societies understand and appreciate and therefore can participate in the process of change itself. Conserving biodiversity is a key concern not only for the wellbeing of the locals, but also for the human society at large, with benefits first accruing to the local communities, and then alone to others. Linking the intangible with tangible
benefits, ultimately, is the key for conservation based development of the
cultural landscapes that are dynamic and have always been, in any case,
changing over space and time. The key issue here is that change has to
come from within rather than imposed from outside!

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Cultural Landscapes for Biodiversity Conservation and Sustainable Development

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Introduction

The interrelationship of humans with nature has been depicted and described in many ways from times immemorial. Ancient Indian scriptures describe the inseparable connection between the nature (prakriti) and the man (purush). Such a relationship still exists in many traditional societies and landscapes all over the world (Ramakrishnan et al., 1998, 2005; Boojh and Ramakrishnan, 1983). Human interaction with nature over millennia results in the evolution of the landscape which gets manifested in the visible features of an area of land including the physical elements of landforms. The landscapes reflect the living synthesis of people and places which creates a distinct identity and image of a region. A cultural landscape is described as the combined works of nature and humankind, expressed by a long and intimate relationship between peoples and their natural environment (Gibson, 1989; Pannell, 2006). Since the notion of landscape does include culture as well, adding cultural before a landscape is an expression of human interaction with the environment and the presence of tangible and intangible cultural values in the landscape. The human geographers define a cultural landscape as “a concrete and characteristic product of the interplay between a given human community, embodying certain cultural preferences and potentials, and a particular set of natural circumstances. It is a heritage of many eras of natural evolution and of many generations of human effort (Fowler, 1999).”

Carl Saur, the American geographer, who is considered to have first formulated the concept of cultural landscapes in 1925, stated that role of nature and culture in a cultural landscape is fashioned from a natural
Cultural Landscapes

landscape by a culture group where culture is the agent, the natural area the medium and the cultural landscape the result (Anschuetz et al., 2001). Conservation and preservation of the cultural landscape is not a new concept. There are examples of man-made landscapes, including elaborate gardens designed and built by various ancient civilizations. The gardens and viharas of Asoka and those of Mughals in India are such examples. The Tang emperor Xuan Zhong in China issued a decree banning fishing and cutting down trees in the Nine Bend River cultural landscape. However, the global efforts towards defining, recognition and conservation of the cultural landscape have gained momentum during recent past with the advent of the World Heritage Convention as the first international legal instrument to recognize and protect cultural landscapes.

The World Heritage Convention

The World Heritage Convention also known as the Convention concerning the Protection of the World Cultural and Natural Heritage was adopted by the general conference of UNESCO in 1972 for the purpose to ensure the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage of “outstanding universal value”. The Convention was founded on the premise that certain places on Earth are of outstanding universal value (OUV) and as such should form part of the common heritage of humankind. The countries who sign the Convention becomes State Parties and together form an international community, united in a common mission to identify and safeguard the world’s most outstanding natural and cultural heritage. The Convention links together the concept of nature conservation and the preservation of cultural sites recognizing that cultural identity is strongly related to the natural environment in which it develops. Just as the creative works of humankind are often inspired by the beauty of their natural surroundings, some of the most spectacular natural sites bear the imprint of thousands of years of human activity. World Heritage List reflects the diversity of the world’s outstanding cultural and natural sites, decided by the 20 member World Heritage Committee based on the criteria for inscription (Table 1). When the very characteristics for which a site was originally inscribed on the World Heritage List are threatened, the site is placed under the List of World Heritage in Danger to draw the attention of the international community to mobilize resources for emergency preservation measures to restore lost attributes of sites endangered by
natural conditions or human activity such as: armed conflict and war, earthquakes and other natural disasters, pollution, poaching, or unplanned construction.

The World Heritage List includes 936 properties forming part of the cultural and natural heritage which the World Heritage Committee considers as having outstanding universal value. These include 725 cultural, 183 natural and 28 mixed properties in 153 States Parties. As of March 2012, 189 States Parties have ratified the World Heritage Convention (UNESCO

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Table 1. Criteria for inscription on the world heritage list

<table>
<thead>
<tr>
<th>World Heritage category</th>
<th>Criteria</th>
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<tbody>
<tr>
<td>I</td>
<td>Represent a masterpiece of human creative genius</td>
</tr>
<tr>
<td>II</td>
<td>Exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design</td>
</tr>
<tr>
<td>III</td>
<td>Bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared</td>
</tr>
<tr>
<td>IV</td>
<td>An outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history</td>
</tr>
<tr>
<td>V</td>
<td>An outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change</td>
</tr>
<tr>
<td>VI</td>
<td>Directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance.</td>
</tr>
<tr>
<td>VII</td>
<td>Contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance</td>
</tr>
<tr>
<td>VIII</td>
<td>Outstanding examples representing major stages of Earth’s history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features</td>
</tr>
<tr>
<td>XI</td>
<td>Outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals</td>
</tr>
<tr>
<td>X</td>
<td>Contains the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation</td>
</tr>
</tbody>
</table>
Cultural landscape

The ‘cultural landscape’ category was created under the WH Convention in 1994 to recognize the landscape with special relationship between man and nature especially when it attains an outstanding universal value. Although, every landscape is associated with some inherent cultural value, one which has an outstanding universal value in terms of the interaction between people and their environment is recognized as “World Heritage Cultural Landscapes.” Cultural Landscapes have been defined by the World Heritage Committee as distinct geographical areas or properties uniquely represent(ing) the combined work of nature and of man. The inclusion of cultural landscapes on the World Heritage List was the result of the new anthropological dimension acknowledged in the definition of cultural heritage of ‘outstanding universal value’ (Titchen and Rossler, 1995). The OUV of a site is measured on a comparative basis with similar types of heritage in other parts of the world. A cultural landscape is then reviewed by professionals and, finally, by the World Heritage Committee to determine if it’s a universal example. As per the Convention, the cultural landscapes represent the “combined works of nature and of man” designated in Article 1 of the Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (Haber, 1995; UNESCO, 2005).

The term “cultural landscape” embraces a diversity of manifestations of the interaction between humankind and its natural environment. Cultural landscapes often reflect specific techniques of sustainable land-use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. Protection of cultural landscapes can contribute to modern techniques of sustainable land-use and can maintain or enhance natural values in the landscape. The continued existence of traditional forms of land-use supports biological diversity in many regions of the world. The protection of traditional cultural landscapes is therefore helpful in maintaining biological diversity.

Categories and Subcategories

The World Heritage Convention has determined different categories
of landscapes. Some of them are landscapes that we see in daily life, while others are archaeological landscapes, something that comes to us from the past and don’t have a function in modern life. But cultural landscapes must cover all the ways in which man and nature interact. The World Heritage Committee has identified and adopted three categories of cultural landscape, ranging from (i) those landscapes most deliberately ‘shaped’ by people, through (ii) full range of ‘combined’ works, to (iii) those least evidently ‘shaped’ by people (yet highly valued). The three categories extracted from the Committee’s Operational Guidelines, are presented in Table 2 (UNESCO website)

Table 2. The three categories of World Heritage Cultural Landscapes

<table>
<thead>
<tr>
<th>Cultural landscape category</th>
<th>Criteria as per World Heritage Operation Guidelines</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>Clearly defined landscape designed and created intentionally by man. For example, garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles. Representative of this category are the Garden Tomb of Humayun (India), the Shalimar Gardens in Lahore (Pakistan) and Studley Royal (UK).</td>
</tr>
<tr>
<td>II</td>
<td>Organically evolved landscape results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories:- relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form. - continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time. Rice Terraces of the Philippine Cordilleras are an example of ‘continuing landscapes’.</td>
</tr>
<tr>
<td>III</td>
<td>Associative cultural landscape. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent. The Tongariro National Park, New Zealand, is the first cultural landscape to be inscribed on the World Heritage List. It is an ‘associative cultural landscape’ for the Maori community that have sacred associations with the mountains</td>
</tr>
</tbody>
</table>
There are only 66 Cultural landscapes inscribed on the world heritage list so for which is less than 10 percent of the total World Heritage sites (UNESCO website). These represent diversity of examples from several regions of the world.

**Intangible heritage**

UNESCO adopted the Convention for the Safeguarding of the Intangible Cultural Heritage in 2003 to provide legal safeguard to practices, representations, expressions, knowledge and skills that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. Such heritage may be manifested in domains such as oral traditions and expressions, performing arts, social practices, rituals, festive events, knowledge and practice about nature and the universe, and traditional craftsmanship. This definition provided in Article 2 of the Convention also includes the instruments, objects, artefacts and cultural spaces associated with intangible cultural heritage.

The intangible cultural heritage is manifested in the following 5 domains (UNESCO website):

(a) oral traditions and expressions, including language as a vehicle of the intangible cultural heritage;
(b) performing arts;
(c) social practices, rituals and festive events;
(d) knowledge and practices concerning nature and the universe;
(e) traditional craftsmanship.

Following is a representative list of examples of Intangible Cultural Heritage of Humanity from India recognized by UNESCO.

1. Chhau dance, Eastern India 2010
2. Kalbelia folk songs and dances of Rajasthan 2010
3. Mudiyettu, ritual theatre and dance drama of Kerala 2010
4. Ramman, religious festival and ritual theatre of the Garhwal Himalaya 2009
5. Kutiyattam, Sanskrit theatre, Kerala 2008
6. Ramlila, the traditional performance of the Ramayana 2008

**Biosphere reserves and cultural landscapes**

UNESCO biosphere reserves represent globally recognized model
regions for sustainable development linked habitat conservation. These
sites seek to reconcile conservation of biological and cultural diversity and
economic and social development through partnerships between people
and nature. Biosphere reserves are rarely places of ‘wilderness’ - much
more often they are cultural landscapes that have evolved over centuries
through human use (UNESCO, 2011). In most of the cases a new
biosphere reserve is proposed as a representative of a certain type of
landscape where sustainable development initiatives are experimented in
close collaboration with local communities. Biosphere reserves are the
main instrument of the UNESCO programme “Man and the Biosphere
(MaB)” with 580 sites in 114 countries worldwide (as of May 2012)
forming together as a world network. Many of the biosphere reserves are
either representative of a cultural landscape or contain important cultural
landscapes embedded within them. The UNESCO designation as
biosphere reserve helps a dynamic management system which promotes
conservation and management of the large landscapes while ensuring
sustainable development. Many biosphere reserves are created by making
the sacred natural sites as the core zone with surrounding buffer and
transition areas for socio-cultural interaction and economic development.
The zoning of a biosphere reserve in functional areas is done through a
process of analysis and allocation of three-dimensional spaces to specific
uses to achieve ecological, economic and social objectives. Biosphere
reserve concept is useful for landscape management and for the
cconservation of biological and cultural diversity and economic and social
development through partnerships between people and nature. These sites
are ideal to test and demonstrate innovative approaches to sustainable
tourism linking their zoning concept to functional dynamics.

**Globally important agricultural heritage systems (GIAHS)**

Globally Important Agricultural Heritage Systems (GIAHS) are defined
as “remarkable land use systems and landscapes which are rich in globally
significant biological diversity evolving from the co-adaptation of a
community with its environment and its needs and aspirations for sustainable
development”. In order to safeguard and support world’s agri-cultural
heritage systems, FAO started this initiative in 2002 for the conservation
and adaptive management of GIAHS. The initiative aims to establish the
basis for international recognition, dynamic conservation and adaptive
management of GIAHS and their agricultural biodiversity, knowledge
Cultural Landscapes

systems, food and livelihood security and cultures throughout the world.

The GIAHS initiative has identified pilot sites in Peru, Chile, China, Philippines, Tunisia, Algeria, Kenya and Tanzania. In these pilot systems dynamic conservation and management approaches will be developed and implemented, to assist national and local stakeholders in the conservation and adaptive management of the systems and their components (FAO website).

Satoyama Initiative

The “Satoyama” is one of the important approaches to realizing “living in harmony with nature” based on cultural landscape approach (Boojh, 2010 a). The Satoyama Initiative, led by the Government of Japan in close cooperation with various partner organizations, is a global effort and approach to realize societies in harmony with nature. In Japanese, Satoyama refers to managed woodlands or grasslands (yama) adjacent to villages (sato). The word communicates about the harmonious relationship between humans and nature. The Japanese ecologist Tsunahide Shidei used the word Yamazato (village in mountainous area) back-to-front to read Satoyama (mountain in a village area). The word later expanded its scope to embody a symbiotic relationship between ecosystems and humans to produce a bundle of ecosystem services for human well-being. Another word Satoumi is used to denote to lakes and marshes sustainably managed by local communities who benefit from them. Similar to the Satoyama and Satoumi landscapes in Japan, socio-ecological production landscapes formed through harmonized human-nature relationships are found all over the world. Words such as muyong, uma and payoh in the Phillipines, mauel in Korea, dehesa in Spain and terroirs in France, indicate managed landscapes that are characterized by a wise use of biological resources in accordance with traditional cultural practices that are compatible with conservation and sustainable use.

Eco-agriculture landscapes

Ecoagriculture is practiced by thousands of rural communities worldwide. In these ecoagriculture landscapes, multi-stakeholder groups work together to develop management solutions that support and increase synergies among agricultural production and profitability, food security, rural livelihoods, and ecosystem conservation. Ecoagriculture occurs in diverse contexts, ecosystems, and farming systems, as illustrated by the
example of Qinghai Tibetan Plateau, China. The plateau has been home to yak and sheep herders for thousands of years. These herders depend on the health of the grasslands for their food production and livelihood. In recent years, a combination of overgrazing, increasing temperatures and droughts have led to escalating grassland degradation. Researchers are exploring integrated sustainable rangeland management approaches that will provide watershed services and sustainably generate income in the region. For decades, scientists in China have been researching alpine grassland degradation on the Qinghai Tibetan Plateau, a 2.5 km² area that spans China’s most western provinces, including Tibet, Qinghai, parts of Gansu, Sichuan and Yunnan, and stretches into India, Nepal and Bhutan. With an average elevation of 4,500 m, the Qinghai Tibetan Plateau has been home to yak and sheep herders for thousands of years. These herders depend on the health of the grasslands for their food production and livelihood. In recent years, a combination of overgrazing, increasing temperatures and droughts have led to escalating grassland degradation.

Alpine grassland degradation has implications at both local and downstream regions. At the local level, grassland degradation leads to a loss of plant diversity. Where sedges and perennial grasses once flourished, degraded alpine grassland is dominated by secondary vegetation such as forbs. Increased soil erosion makes the grasslands and downstream regions more susceptible to floods and droughts because the soil is unable to retain water. Decreased grassland production and water availability also has an enormous impact on yak and sheep production, leaving herders concerned about the future of their livelihood (http://www.agriculturebridge.org/case/Sustainable-Alpine-Rangeland-Management).

Sinharaja forest, Sri Lanka is another example where sustainable agricultural practices have slowly helped reduce the siltation of the Sinharaja watershed. More importantly, they have also increased sustainability and productivity of tea production on already cultivated lands.

**Rice terraces of the Philippine Cordilleras**

The Rice Terraces of the Philippine Cordilleras are recognized as ecoagricultural landscapes as well as GIAS and also world heritage cultural landscape by UNESCO. Located in Ifugao Province, in the remote areas of the Cordillera mountain range on the northern island of Luzon, Philippine archipelago, it was inscribed on the world heritage list in 1995. It is an
outstanding example of an evolved, living cultural landscape that can be traced as far back as two millennia ago in the pre-colonial Philippines. While the historic terraces cover an extensive area, the inscribed property consists of five clusters of the most intact and impressive terraces, located in four municipalities. They are all the product of the Ifugao ethnic group, a minority community that has occupied these mountains for thousands of years. This has now been put on the world heritage in danger list in 2001 due to degradation of the terraces. With ineffective management system, some 25-30% of the terraces are now abandoned, irrigation system has been neglected and landscape is highly eroded.

Indian scenario

India is a country with rich tradition of interaction of nature and culture which has resulted in many unique and diverse cultural landscapes. These include sacred sites, forests, rivers, mountains and water bodies. The mosaic of ethnic diversity and biodiversity of the northeastern India provide examples of several cultural landscapes which are cradle of biodiversity of the region (Ramakrishnan et al., 1998; 2005, 2006a,b). UNESCO work on cultural landscape in the north eastern India with a group of scientists led by Professor PS Ramakrishnan focuses on cultural landscape based biodiversity conservation and sustainable development of the communities traditionally living in the landscapes around them and are dependent upon the biodiversity contained therein (Ramakrihnan, 2006a,b). The people utilize and manipulate the biodiversity to meet their livelihood needs, while at the same time conserve and enhance the same. Through small-scale perturbations that they cause to natural forest ecosystems with which they are closely integrated themselves, they also create a variety of ecological niches within the natural system. In a variety of agroecosystems, biodiversity at the sub-specific level (e.g., crop biodiversity) are enhanced. Being dependent upon this biodiversity, the cultural landscape that each ethnic group have created around themselves have a distinct imprint of its own, which is the product of the given socio-ecological system, and the traditional ecological knowledge (TEK) that the given ethnic group possesses. Therefore, there is an increasing realization that conserving and sustainably managing the given ‘cultural landscape’ is important for conserving biodiversity with concerns for socio-cultural integrity of the given ethnic group. The cultural landscape when seen from ecological, social and economic dimensions of natural resource management becomes
a powerful tool for linking biodiversity conservation with sustainable development of the local communities. Apart from ethnic cultural landscapes of Arunachal and Sikkim, many other areas in biodiversity rich north eastern India can qualify for a cultural landscape category with outstanding universal value. There is also initiative to declare Ganga River and associated systems as cultural landscape. The Western Ghat has been proposed as the World Heritage site which also contains several cultural landscapes embedded in this serial nomination.

**Majuli, ‘cultural landscape’**

Assam’s river-island, Majuli, is the largest freshwater river-island in the world located in the middle of the mighty Brahmaputra River. This has already been nominated for inscription on the UNESCO World Heritage list. The Majuli was shortlisted in the World Heritage Site (WHS) ‘Tentative List’ at the World Heritage Committee session at Suzhou in China. Subsequently, a comprehensive nomination dossier was submitted in 2006, followed by additional information in 2008. A revised dossier has now been submitted in 2012. The island situated in Jorhat district of northern Assam is about 80 km wide and about 10-15 km long, with a total area of 875 km² in midstream of the delta system. A mixed community of various ethno-cultural groups, the Majulians have migrated to the island over centuries, bringing along their traditions and skills. These communities are united by the social institution of Sattra, which was introduced by the Vaishnava revivalist, saint Sankardeva, in the 16th century. The island faces a greater threat from flood and erosion by the Brahmaputra than from external and modern influences. Moreover, the ecosystem and age-old cultural and social system are under pressure following the displacement of the local people and an increase in the population.

**Rock Shelters of Bhimbetka**

Bhimbetka situated in Vindhyan Hills in Madhya Pradesh, India reflects a long interaction between people and the landscape closely associated with hunting and gathering economy, as demonstrated in the rock art and in the relicts of this tradition in the local adivasi villages on the periphery of the site. The area has abundant natural resources - perennial water supplies, natural shelter, rich forest flora and fauna, and these conditions of plenty seem to have been conducive to the development of sustainable and persistent societies and the creation of notable rock art. The site includes
five clusters of rock shelters, with one large complex in the buffer zone. The rock shelters display persistent traditions of rock painting, spanning periods from the Mesolithic to the Historic. They also display a profusion, richness and variety of mural subjects and, as a collection, form one of the densest known concentrations of rock art. Many of the rock shelters within the area are set within fairly dense forest, which displays a high diversity of flora and fauna, still harvested by the local people. Overall the landscape has a strong appealing aesthetic quality, derived from the beauty of the naturally sculpted rock formations and the contrasting lush, densely wooded vegetation, which together give the place a ‘timeless’ quality (UNESCO website).

**Hampi as a Cultural Landscape**

Although Hampi is inscribed on the world heritage list under cultural heritage, it has all the manifestation of cultural landscape. The Tungabhadra River makes an inseparable element of the natural landscape of Hampi (Fritz and Michell, 2003). The site was the seat of Vijayanagar Empire in 14th century but is commonly referred to as Pampaksetra, literally the abode of goddess Pampa, daughter of Lord Brahma, considered the Creator of the universe in Hindu mythology. She is also believed to be the consort of Lord Shiva, the Destroyer in the trinity of Hindu gods (Fritz and Michell, 2003). In Ramayana this area is referred to as the monkey kingdom, Kishkinda kshetra. The worship of Goddess Pampa and Lord Virupaksha or Shiva continues to this day in the Virupaksha temple complex on the banks of the Tungabhadra. Other incarnations or forms of Shiva can also be found in temples or rock carvings in the landscape. Rock reliefs of goddess Kali referred to as Ellamma are also worshipped in many areas.

**Dahod (Gujarat) India**

In Dahod district of rural Gujarat, India medicinal plants hold great traditional importance, but much of the knowledge about the various species and how to tend them has been lost as families struggle to cope with poverty. Cultivation of indigenous food crops has also dried up as multinational and hybrid seed producers have moved into the market. While these new varieties may promise higher yields, they also require more water and chemical inputs than their indigenous cousins. Families try to save seed to plant the next crop cycle, but this can be an impossible
task, as drought often forces them to consume their seed stores. If this happens, they must borrow money, often lent at exorbitant interest rates, to buy new seed and chemical inputs for their crops, contributing to the cycle of poverty. Vanita Mahila Mahasang, a women’s federation, was created to teach Dahod’s women – who are increasingly responsible for households – alternative ways to cultivate crops and medicinal plants that will help them both mitigate the effects of poverty and begin to conserve and recover their traditional biodiversity. (http://www.ecoagriculture.org/documents/files/doc_63.pdf and http://utthangujarat.org)

Conclusion

Cultural landscapes are significant places linking nature and culture and as such they determine the local identity as well as cultural identity of the area. They can become an effective tool to conserve biodiversity as they are embedded in local traditions and belief systems (Boojh, 2008 a,b, 2010 b,c). From conservation ecology point of view these sites are of great value in protection of ecosystem services including biodiversity, freshwater sources, forests and livelihoods. The inclusion of cultural landscapes as a heritage category in the framework of an international treaty (World Heritage Convention) has provided a modern sense to the whole notion of conservation and sustainable development of these unique areas. In the past, the cultural landscapes were in the private domain reserved for the elite or ruling classes, the Convention has put them under universal public domain for the collective good of humanity. The recognition under the Convention enhances the socio cultural and economic value of the cultural landscape with increased tourist and visitor access to such sites. Most of the natural landscapes all over the world are embedded with culture heritage providing conservation of these sites through dynamic cultural connections with landscapes.

Cultural landscapes also offer valuable lessons to be learnt from traditional landscaping techniques and the way in which landscapes were created. The recognition and inscription of cultural landscapes on World Heritage list has provided a new impetus towards identification of potential sites for inclusion under the world heritage. This has contributed to the conservation and management of cultural landscapes through appropriate recognition and protection at the international level. Cultural landscapes also form the basis for biodiversity conservation and linked sustainable development of the communities dependent on these landscapes.
Agricultural and rural landscapes can offer useful solutions to contribute to the food security and adaptation of rural communities towards climate change. Cultural landscapes can provide the basis for the crops of tomorrow’s world and their genetic pool and for the identity and beliefs of the people who live within. Their inclusion in UNESCO’s World Heritage List provides an important step towards the international recognition of these type of sites, but also encourages national and regional authorities to enhance conservation and protection measures. The cultural landscapes with biosphere reserve designations again provide advantages of long term conservation through legally protected core area which is reinforced and strengthened through the traditional belief systems. These legal instruments apart, there is a need to include the values and management systems developed at these unique sites into the policy and planning processes and education system.

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Ziro Valley and the Surrounding Hills: A Mega-cultural Landscape

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Introduction

Arunachal Pradesh is one of the mega biodiversity hotspot of the world and blessed with rare and endemic flora and fauna. The landmass of the state is about 83,743 km² with a population of 1,382,611 (Census, 2011). Of this, the tribal population of the state is about 7,05,158 persons, which is about 64.22% of the total population of schedule tribe. The population density of the region is 17 persons per km². The rural population is 10,69,165, which is 77.32% of the population (Census, 2011). With a high ethnic diversity, the north-eastern hill State has 26 different tribes and over a hundred 110 sub-tribes and minority groups tribes, speaking 42 different dialects. Of the 16 administratively organized Districts, Subansiri is an important cultural landscape, having 5 distinct ecological zones – the foothill region, rolling grasslands, the plateau region (the Apatani plateau and the Tale plateau) and the northern and the north-eastern hill regions. This region act as the catchment area for the major river Brahmaputra which is spread across the hills and plains of the north-east has a large catchment area spread across the hills and the Assam plains, with very many tributaries such as Kameng (Bhareli river), Subansiri river, Siang river, Dibang and Lohit joining it. In the cultural landscape itself, Subansiri river is the main one that flows west-east across the Upper Subansiri district. The headwater of the river starts from Tibet, which is formed by rivulets - Char Chu, Chayul Chu and Yume Chu. Subansiri river being one of the major tributaries of Brahmaputra. Kamla river is one of the major ones of Lower Subansiri District that passes through the Apatani landscape, flowing from north-west to south-east, intersecting the district, with very
many streams, and is a perennial source of water for irrigating terrace cultivation. Another source of water is the Khru river, of the Lower Subansiri district.

The Mega-cultural Landscape

In the mega-cultural landscape under consideration, different indigenous communities (ethnic groups) coexist in the vast Tani landscape, comprising of tribes like Apatani, Nyishi, Hill Miri and Galo (Table 1).

Table 1. Study sites and major ethnic tribes in the mega-cultural landscape

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Place</th>
<th>District</th>
<th>Inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ziro</td>
<td>Lower Subansiri</td>
<td>Apatani</td>
</tr>
<tr>
<td>2</td>
<td>Yazali</td>
<td>Lower Subansiri</td>
<td>Nyishi</td>
</tr>
<tr>
<td>3</td>
<td>Pistana</td>
<td>Lower Subansiri</td>
<td>Nyishi</td>
</tr>
<tr>
<td>4</td>
<td>Kamporijo</td>
<td>Lower Subansiri</td>
<td>Nyishi</td>
</tr>
<tr>
<td>5</td>
<td>Raga</td>
<td>Lower Subansiri</td>
<td>Nyishi (Hill Miri)</td>
</tr>
<tr>
<td>6</td>
<td>Dolungmukh</td>
<td>Lower Subansiri</td>
<td>Nyishi</td>
</tr>
<tr>
<td>7</td>
<td>Palin</td>
<td>Kurung Kumey</td>
<td>Nyishi</td>
</tr>
<tr>
<td>8</td>
<td>Mengio</td>
<td>Papum Pare</td>
<td>Nyishi</td>
</tr>
<tr>
<td>9</td>
<td>Kimin</td>
<td>Papum Pare</td>
<td>Nyishi</td>
</tr>
<tr>
<td>10</td>
<td>Puchgeku</td>
<td>Upper Subansiri</td>
<td>Nyishi (Hill Miri)</td>
</tr>
<tr>
<td>11</td>
<td>Gasigaon</td>
<td>West Siang</td>
<td>Galo</td>
</tr>
<tr>
<td>12</td>
<td>Doimukh</td>
<td>Papum Pare</td>
<td>Nyishi</td>
</tr>
</tbody>
</table>

The resource available in the Tani landscape has been shown in various landuse and land cover (Table 2). The major land use and land cover of the Lower Subansiri district viz., Settle cultivation, Evergreen/Semi evergreen forest (Dense), Degraded/Scrub land, Forest Plantations, Barren rock/stony waste, River, Lake/pond/tank/reservoir, River sand, Current shifting cultivation, Abandoned shifting cultivation, Grassland, Snow cover and Landslide/open area (Table 3).

Whilst Apatanis are involved with settled rice farming practices along with the well integrated pisciculture; similar practices also to be found in Yachuli area inhabited by Nyishis, and in Raga area of the Hill Miris.

Indeed, the Apatani settled farming system is better studied and documented. Evergreen/semi-evergreen natural forest patches and Pine plantations not only is a source of timber but also is a source of organic residues for soil fertility management of agricultural systems Jhum is
Ziro Valley and Surrounding Hills

Table 2. Land Use and land Cover based on the Community Residing in the Megacultural Landscape

<table>
<thead>
<tr>
<th>Resources at the different landuse system</th>
<th>Communities</th>
<th>Apatanis</th>
<th>Nyishis</th>
<th>Hill Miris</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settled cultivation</td>
<td>Apatanis</td>
<td>Paddy, fishes, vegetables, etc.</td>
<td>Paddy, fishes, vegetables, etc.</td>
<td>Paddy, millets, vegetables, etc.</td>
</tr>
<tr>
<td>Evergreen/Semi evergreen forest (Dense)</td>
<td>Natural forest</td>
<td>Natural forest</td>
<td>Natural forest</td>
<td>Natural forest</td>
</tr>
<tr>
<td>Forest Plantations</td>
<td>Pine forest, bamboo forest</td>
<td>Pine forest, bamboo forest</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Barren rock/stony waste</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>River Jhum</td>
<td>Kamla river</td>
<td>Kalpangi river</td>
<td>Subansiri river</td>
<td></td>
</tr>
<tr>
<td>Abondandend jhum land</td>
<td>-</td>
<td>Paddy, maize, millets, etc</td>
<td>Paddy, maize, millets, etc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Fallow for 3-4 years</td>
<td>Fallow for 3-4 years</td>
<td></td>
</tr>
</tbody>
</table>

practiced by the Nyishis and Hill Miris. The river Kalle, which coming down from the hills serves as the primary source of water for the wet rice cultivation system; the water coming down also brings in nutrients which enriches the soil down below. Since the river is a perennial water source, the people exploit and utilize the available water for proper growth of crop as well as the survival of the fishes. Also, the river brings about soil rich in natural fertilizers that are the only source of manure for the cultivation purpose. Silt, clay and grit that are deposited on the beds serves as a means for preparing canals and household construction.

Apatani Cultural Landscape of the Ziro Valley

The Apatanis have a very skilled and a uniquely evolved system of natural resource management in their settled Paddy cum Fish (the common carp, *Labeo rohita*) agroecosystem, wherein their highly evolved agricultural system is based on an elaborate water management technology (Plate 1).

As indicated above, Apatanis are known to be efficient natural resource managers, as they have optimally utilized the limited natural resources in
Table 3. Land use and Land Class Categories in the Mega-cultural landscape

<table>
<thead>
<tr>
<th>Landuse and land class</th>
<th>Ziro (km²)</th>
<th>Yachuli (km²)</th>
<th>Pistana (km²)</th>
<th>Dollung mukh (km²)</th>
<th>Raga (km²)</th>
<th>Lower Subansiri district (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tribes</td>
<td>Apatani</td>
<td>Nyishi</td>
<td>Nyishi</td>
<td>Nyishi &amp; Hill Miri</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village</td>
<td>4.47</td>
<td>6.84</td>
<td>3.44</td>
<td>0.11</td>
<td>3</td>
<td>17.85</td>
</tr>
<tr>
<td>Town</td>
<td>1.84</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.84</td>
<td>0.06</td>
</tr>
<tr>
<td>Settled cultivation</td>
<td>21.66</td>
<td>11.61</td>
<td>7.27</td>
<td>1.05</td>
<td>2.17</td>
<td>43.75</td>
</tr>
<tr>
<td>Evergreen/semi evergreen forest (Dense)</td>
<td>247.86</td>
<td>545.47</td>
<td>303.43</td>
<td>355.42</td>
<td>860.21</td>
<td>2312.35</td>
</tr>
<tr>
<td>Degraded/scrub land</td>
<td>13.20</td>
<td>137.99</td>
<td>54.75</td>
<td>18.29</td>
<td>94.11</td>
<td>315.33</td>
</tr>
<tr>
<td>Forest plantations</td>
<td>26.01</td>
<td>6.35</td>
<td>0.03</td>
<td>-</td>
<td>-</td>
<td>32.39</td>
</tr>
<tr>
<td>Barren rock/stone waste</td>
<td>-</td>
<td>0.05</td>
<td>-</td>
<td>0.28</td>
<td>0.06</td>
<td>0.39</td>
</tr>
<tr>
<td>River</td>
<td>-</td>
<td>2.41</td>
<td>1.14</td>
<td>3.92</td>
<td>6.01</td>
<td>13.48</td>
</tr>
<tr>
<td>Lake/pond/tank/reservoir</td>
<td>-</td>
<td>0.98</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.98</td>
</tr>
<tr>
<td>River sand</td>
<td>-</td>
<td>0.11</td>
<td>-</td>
<td>0.20</td>
<td>0.66</td>
<td>0.98</td>
</tr>
<tr>
<td>Current shifting cultivation</td>
<td>1.15</td>
<td>17.64</td>
<td>18.24</td>
<td>0.28</td>
<td>15.66</td>
<td>52.98</td>
</tr>
<tr>
<td>Abandoned shifting cultivation</td>
<td>0.27</td>
<td>18.43</td>
<td>4.77</td>
<td>0.27</td>
<td>31.10</td>
<td>54.84</td>
</tr>
<tr>
<td>Grassland</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Snow cover</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Landslide/open area</td>
<td>-</td>
<td>0.13</td>
<td>1.33</td>
<td>0.01</td>
<td>1.47</td>
<td>0.05</td>
</tr>
<tr>
<td>Total</td>
<td>316.45</td>
<td>748.01</td>
<td>393.08</td>
<td>381.16</td>
<td>1012.99</td>
<td>2851.69</td>
</tr>
</tbody>
</table>

Source: State Remote Sensing Application Centre: Disaster Management Information System: Atlas for Arunachal Pradesh

The confined Ziro valley, surrounded by hills sustainably, through a clear-cut distinctions between land based on the use to which it is linked to (Table 4) for sustainable management of natural resources. This apart, they do have human-managed forests traditionally nurtured by them as: (i) Pine forests and (ii) Bamboo forests, which they see as key resources to meet with not only their day-to-day household needs.

The pine forest is one of the human-managed systems organized as
privately owned forest, clan forest, or community forest. This forest is found mostly at the foothills of the valley adjacent to the settled farmland of the community locally called as ‘Sartii’ (Plate 2). This plantation meet various requirements of the indigenous such as timber, planks, poles, fuel wood, etc. The common pine species found are *Pinus wallichiana* and *P. longifolia*. Besides, the other species of Pinaceae found are *P. khasiana*, *Cryptomeria japonica*, *Cupressus* spp. etc.

Bamboo forests is another important component of the Apatani cultural landscape; being an important resource for the community, this culturally valued resource is raised closer to human habitations (Plate 3 and 4) and is locally known as ‘Bijje’, raised as a monoculture of *Phyllostachys bambusoides*; bamboo forests are common and is of multi-purpose value for the locals.

Sub-tropical mixed natural Pine forests occur between altitudes of 1000 m to 1800 m. *Pinus kesia*, *P. roxburghii*, *P. wallichiana* and *P. merkusii*, are found along with other tree species, such as, *Alnus* sps., and *Elaeocarpus* sps. (Plate 3). The secondary natural forest patches closer to the villages are under high anthropogenic pressure (Plates 5, 6).

**General Considerations**

Interaction between Apatani highlanders and the neighboring lowlanders (Nyishi, Hill Miri, Tagin, Galo), of this mega-cultural landscape (Fig. 1) which was common in olden times, based on locally produced commodity exchanges has, in recent times, been changing due to
government-sponsored developmental initiatives, improved educational facilities and linked job opportunities, growing tourism industry and expansion of a market economy. This interaction in earlier days were confined to trade such as woven clothing materials, made of cotton, wool, mixed silk cotton, etc., apart from other household items such as local ornaments and household items. However, in recent times, this has drastically changed due to government-sponsored developmental initiatives – improved educational facilities, job opportunities, tourism industry, expansion of marketing systems, etc. have had its impact not only in reducing conflicts, but also promoted inter-ethnic marriages.

Fig. 1. The cultural landscape. 1 - Ziro, 2 - Yazali, 3 - Pistana, 4 - Kamporijo, 5 - Raga, 6 - Dolungmukh, 7 - Palin, 8 - Mengio, 9 - Kimin, 10 - Puchgeku, 11 - Gasigaon and 12 - Doimukh.

Increasing population pressure and rapid changes in land use practices, moving from traditional systems towards plantation economies such as through Kiwi plantations, increasing built-up areas to meet with local needs as well as to cater to tourism, etc. has put pressure on traditionally sustainable land use management practices. The challenge that now facing the diverse ethnic groups in this mega-cultural landscape is all about ensuring sustainable land use management, with concerns for conservation and sustainable management of natural resources, in this ‘hot-spot’ region of biodiversity.

References
Plate 1. A view of the Apatani Water Management in Rice Plots

Plate 2. A Pine Plantation (Sartii) in the Apatani Valley
Plate 3. A Bamboo Grove (‘Biije’) of the Apatanis in Ziro Valley – a Monoculture of Phyllostachys Bamboosoides

Plate 4. A Network of Bamboo Groves in Ziro Valley
Plate 5. A relatively undisturbed Forest Cover closer to Ziro Valley

Plate 6. A disturbed secondary Forest Patch closer to Ziro Valley
The ‘Tani’ Mega-cultural Landscape

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Introduction
Cultural diversity, with its closely linked biological diversity has always played a key role in the area of sustainable management of natural resources and linked livelihood/developmental concerns of humans right through pre-historic times; this being still reflected in the way in the functional attributes of traditional societies. Indeed, these two diversity related socio-ecological dimensions are closely interconnected and mutually supportive of one another, the connective link being the rich traditional ecological knowledge (TEK) (Ramakrishnan, 2008a,b). TEK in the land use context being spread across a range of scalar dimensions (sub-specific, species, ecosystems and landscape levels), traditional institutions contribute towards addressing a range of sustainability issues through a range of tools that traditional societies have, namely, customary laws and linked inheritance rights and land tenure systems and customary inheritance rights, etc. This study, therefore, looks at the varied dimensions of TEK, the basis for conservation and management of culture linked natural resources.

The ‘Tani’ Cultural Landscape of Arunachal Pradesh

Community organizational attributes
Like any other cultural landscape unit of traditional societies living across space and time (Ramakrishnan, 2008b), the Tani cultural landscape of the traditional societies of Arunachal Pradesh has its own eco-cultural identity which is reflected in a variety of different ways as indicated in (Table 1); the people living in the area though they belong to diverse ethnic groups as we see them today, they also share many cultural attributes, yet maintaining their distinctiveness, as they all belong to a common Abotani
Table 1. Community Structure and Dynamics of Major Tribal Groups Across the Study Sites

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Apatani</th>
<th>Nyishi</th>
<th>Hill Miri</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution of each tribe</td>
<td>Ziro</td>
<td>Raga, Palin, Puchgeku, Dollungmukh, Doimukh, Kimin, Mengio, Pistana, Yazali, Kamporijo</td>
<td>Raga</td>
</tr>
<tr>
<td>Language/Dialect</td>
<td>Apatani dialect</td>
<td>Nyishi dialect</td>
<td>Hill Miri dialect</td>
</tr>
<tr>
<td>Housing pattern</td>
<td>Most of the houses are made up of bamboo and pine wood. Roofs are made from tin sheets and split bamboo. Concrete houses are also observed in the villages. Floors are made of bamboo and wooden planks. Stairs are mostly made of wood, cement and bamboo. Houses are compactly arranged in rows and are attached to each other. Village granaries are located in the field, away from houses.</td>
<td>Houses are made from wood and mostly bamboo. Walls of the houses are made of split bamboo which is given additional covering of banana stem (pseudo stem of <em>Musa</em> sp.) especially in wind prone areas. Roofs are mostly made from took patta (<em>Livistona jenkinsiana</em>). Floors are made up of split bamboo. They have separate granaries.</td>
<td>Similar to Nyishis. Houses are made from wood, wooden planks and bamboo.</td>
</tr>
<tr>
<td>Clan/sub clan or social division</td>
<td>Caste system is prevalent.</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Religion and belief</td>
<td>Most of the people follow Donyi Polo and Christianity.</td>
<td>Belief in Donyi Polo and Christianity</td>
<td>Donyi Polo and Christianity</td>
</tr>
<tr>
<td>Inheritance of property</td>
<td>Patriarchal kind of society and eldest son gets the major share of property. Women do not get any share in property however they are entitled to inherit beads and other traditional ornaments of the family.</td>
<td>Similar to Apatanis–Patriarchal society.</td>
<td>Patriarchal society.</td>
</tr>
<tr>
<td>Category</td>
<td>Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marriage system</td>
<td>Marriage between people of same status takes place, dowry system is prevalent, marriage usually monogamous.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marriage is usually monogamous though polygamy is also common, no dowry system exist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>Settled type of cultivation with vegetable garden. Paddy cum fish culture is practiced by the people.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Practice Jhum and terrace cultivation Jhum is practiced by the people.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crops grown</td>
<td>Rice, maize, pumpkin, ginger, peas, sweet potato, varieties of yam, cucumber, <em>Brassica</em> sp., tomato, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rice, maize, millet, chili, peas, cucumber, tomato, ginger, <em>Brassica</em> sp. etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of manure</td>
<td>Pig excreta, poultry dropping, cow dung, rice husks, waste product of local beer, ashes from household burnt, remains of burnt straw, decomposed straw, weeds and stalks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implement used</td>
<td>It is mostly made at home and some are also bought from the market. Dipia (Hoe), Palee (for weeding), Tagi (Sickle), Dele (Khurpi), Elio (Apatani 'dao'), Yahii (Axe), Yagii (woven cane basket), Nyatu (knife), Yalch (Axe), Lorum (knife for digging earth).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implements used in agriculture are mostly made at home and some are also bought from the market.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal husbandry</td>
<td>Mithun, cow, pig, poultry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handicrafts</td>
<td>Bamboo and cane articles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mithun, pig, poultry, cow Mithun, pig, poultry, cow</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bamboo and cane articles.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cultural Landscapes

cultural heritage, but occupy distinct environmental niches, the Apatanis being confined to the Ziro valley, whilst the other two ethnic groups – the Nyishi and the Hill Miri hill tribes living in the surrounding hilly terrain.

**Cultural Attributes of Diverse Ethnic Groups of Tani Landscape**

A range of cultural celebrations and festivals spread all the year round characterize the diverse ethnic groups; what is given here is only indicative of the rich cultural heritage of these traditional societies. Ethnic groups (Apatanis and Nyishis, for e.g.) living in the mega-landscape, though they may be part of organized modern religion – Christianity, still maintain to a very large extent their traditional nature worship based religious beliefs and practices; the traditional nature worship based religious activities are still maintained, as indicated in Table 2.

**Sacred Groves: Biodiversity Conservation Sites**

The concept of the ‘sacred’ is widespread across the Indian region and indeed, relatively well conserved in many parts of the developing tropics; quite a few of them still remain conserved as part of the protected area network in the developed temperate world too (Ramakrishnan et al., 1998). In the north-east Indian context, Khiewtam and Ramakrishnan (1989) carried out a review of the sacred groves still available in the Khasi hills of Meghalaya, this being followed more recently, for Arunachal Pradesh (Arunachalam, et al., 2004; Barbhuiya et al., 2008), which are just indicative of the widespread distribution of such protected ecosystems across the north-eastern hill regions, an aspect which needs to be explored in detail.

**Sacred Groves in the Apatani Landscape**

Many groves were observed having sacred values associated with traditional societies living nearby. There are three major types of sacred grooves i.e. Ranthii, Ficus grooves and Sango. Sacred groves (locally known as ‘ranthiis’) are located in the periphery of the Apatani villages and each ‘ranthii’ is associated with a given village, though there may be more than one, three as in the Hari village; indeed, each clan has its own ranthii - Nani–Tajang ranthii, Hong ranthii, Mudang Tage ranthii, Dutta ranthii, Bamin–Michi ranthii.

The myth centred around these groves is that they were created by the forefathers in the past, and therefore respected by the locals as a
Table 2. Some of the Cultural Celebrations of the Diverse Ethnic Groups of the Tani Landscape.

<table>
<thead>
<tr>
<th>Tribe</th>
<th>Festival</th>
<th>Months</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apatani</td>
<td>Murung</td>
<td>January</td>
<td>‘Murung’ festival is celebrated by at household level. Wherein pig is sacrificed and this festival is celebrated for wealth, better harvest and good health of the members of the house.</td>
</tr>
<tr>
<td>Donyi puja</td>
<td>-</td>
<td>-</td>
<td>A mature bamboo culm is raised near the house, which is surrounded by ‘Nyisiyani’ (most purest leaf) to pray (ritual) ‘Donyi’ to look after the home, fields etc. This ritual is also done when something is stolen from home, field, fish pond, etc. It is general believed that ‘Donyi’ will punish the accused.</td>
</tr>
<tr>
<td>Dree</td>
<td>July-August</td>
<td>-</td>
<td>It is a agriculture based festival celebrate for the good harvest of agricultural crops. Mass prayer are done for the well being of the community.</td>
</tr>
<tr>
<td>Tagins</td>
<td>Si-Donyi</td>
<td>January</td>
<td>Si represents the earth and Donyi is the sun. They believe that, the sun, the moon, the earth and the natural elements around them play a vital part in their day to day life. During the festival ‘Etting’, wherein rice powder is mixed with Apong (rice-beer) is made into a paste and everyone is liberally applied with it. Si-Donyi festival is being celebrated at community level. The local youths work day and night for about a month in preparation of the festival.</td>
</tr>
<tr>
<td>Nyishi</td>
<td>Nyokum</td>
<td>February</td>
<td>Nyokum is a agriculture based festival celebrate at pre-sowing time. It is celebrated for harvest prosperity, communal harmony, community integrations and global peace as well as it also marks the advent of the Nyishi New Year.</td>
</tr>
<tr>
<td>Hillmiri</td>
<td>Boor Boot</td>
<td>February</td>
<td>Boor Boot means get together to hail the spring and successful harvest of crops. The festival also invokes the spirit of Boor Boot to bless them with prosperity and prevent from diseases of any kind. The festival is performed at community level. The young members do all the work under the elders guidance. The Nibu (priest) performs Puja as well as conduct sacrifice. ‘Etting’ is generously applied to one and all. The festival is lasts for three days.</td>
</tr>
<tr>
<td>Galo</td>
<td>Mopin</td>
<td>April</td>
<td>This is normally celebrated in order to get rid of natural calamities diseases, effects of evil spirits and for good harvest, health, wealth and prosperity. In this festival, the Goddess of welfare, peace, wealth, prosperity and wisdom is appeased by grand celebration. The festival lasts for five days from the eighth of April before, sowing of paddy. The Popir dance is the most popular dance during the festival.</td>
</tr>
</tbody>
</table>
respect to ancestral spirits. The indigenous people believed that in these
groves dwell many spirits and their destruction would bring ill effect to the
person. These groves aren’t used for economic purposes, but are rather
kept undisturbed as being sacred, with the inherited belief that these groves
are to be conserved. Sacred species such as *Prunus persica* are often
grown in the backyard of the family and considered sacred; this tree is a
significant part of the Myoko festival, the wood from the sacred species
being used as a platform for performing rituals during the Myoko festival
period. Even trees naturally growing near community dwellings are often
times seen to be ‘sacred’ and are conserved by individual families or groups
of them. On the negative side, Apatanis also believe that evil spirits locally
called as Yapom and Doje may dwell in some of the groves, another
reason against destruction of such forests lest bad time befall them.

**Natural Resource Use/Management in Tani Landscape**

For domestic uses, however, Apatanis nurture tree plantations (Plates
3 and 4), a tradition that are to be found in many other hill tribes in the
region. This apart, there exist also natural forest types – evergreen and
temperate mixed forests occurring between 2800-4000 m. altitudes. As
highlanders living in the Ziro valley coexist with the lowland hill tribes such
as the Nyishi, Hill Miri and Galo tribes. Interaction among these tribes has
traditionally always been trade linked, involving traditional items such as
cotton, woven cloths, wool, utensils and ornamental beads; however, in
recent times arising from arising from land use developmental initiatives in
the region, drastic trade related changes are happening. Increasing
population pressure on land for jhum by the highlanders, drastic changes
in land use activities such as through Kiwi fruit plantations, and increased
tourism related pressures have had its adverse impacts on this mega-
landscape.

In the Tani landscape, animal husbandry practices are focused around
‘Mithuns’ (*Bos frontalis*) considered to be a symbol of wealth, with a rich
socio-cultural significance, being a sacrificial animal during festivals,
marriages, etc. Traditionally, Mithuns are reared by the neighboring Nyishi
community, who are considered to be expert in rearing these semi-domestic
animals, with a contractual arrangement with the Apatanis, for sale. Indeed,
Mithuns play a key role in the life of these traditional societies, being seen
as a mobile wealth by the indigenous communities, with immense socio-
cultural value. This apart, cows, goats, pigs and poultry are other animal
husbandry activities of the varied ethnic groups living in the Tani landscape. Apatanis living in the valley also have a very well organized rice cum pisciculture practice, which indeed is highly sophisticated, with high economic productive efficiency combined with equally high ecological (energy) efficiency—a valley rice cultivation system linked with pisciculture (Kumar and Ramakrishnan, 1990).

**Traditional Institutions of Natural Resource Management**

The Apatanis have a very strong Village Council known as ‘Bulyang’. Any community related conflicts and issues are resolved in the village level council before it is brought under the light of Judiciary. Conflicts related to forest/land/field or any other related issues of encroachment, illegal hunting, theft, robbery, property ownership disputes etc are resolved by the village council. The village council is governed primarily by the male gender that has command over the resolution and decision making on the conflict and related issues. The womenfolk’s have insignificant role in the process. The Village head man along with other village elders are entitled to operate the village council. Furthermore, issues related to forest management system are taken care such as illegal felling of trees, encroachments, etc. are resolved by the members of the committee. The village council (Panchayat) plays a key role in building bridges between the members of the same community as well as with others in the decision-making processes—issues such as punishment, fine imposition in cash or kind in the form of a ‘Mithun’ taken from the culprit (Table 3). In more recent times a number of institutional arrangements have come up in the Tani cultural landscape context:

**Joint Forest Management (JFM) Initiatives**

In 2007, JFM was initiated in Doimukh circle as a community participatory effort, through a notification of Forest Department with the organization of Village Forest Management Committees (VFMCs). The main objectives of the programme was towards restoration initiatives to be taken up in degraded unclassified State forest (USF) around the villages that have been under excessive biotic pressure arising from uncontrolled grazing, removal of fuel wood and timber and encroachments for jhum. Capacity building for all stakeholders was an important element, through frequent training programs initiated through the Arunachal Pradesh Forest Corporation Limited (APFCL); the objective here was to facilitate
Table 3. Apatani Customary Laws related to Natural Resource Management

<table>
<thead>
<tr>
<th>Offence</th>
<th>Customary law</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trespassing of paddy fields, bamboo</td>
<td>The offender has to pay twice the cost of bamboo groove, kitchen garden or vegetable destructed crops and also a fine of one – and millet crops full grown cow to the village authority.</td>
</tr>
<tr>
<td>Burning of house/ bamboo garden/</td>
<td>The offender has to pay the cost of pine grove with ill intention or will destructed property and a fine of one – full full causing of fire accidents. grown female mithun and one medium size mithun</td>
</tr>
<tr>
<td>Intentional destruction of boundary</td>
<td>The accused has to pay twice the cost of material damage and a fine of of a full grown cow to the village authority.</td>
</tr>
<tr>
<td>Intentional destruction of fencing</td>
<td>Similar to above</td>
</tr>
<tr>
<td>Intentional destruction water pipe in the paddy fields</td>
<td>Similar to above</td>
</tr>
<tr>
<td>Intentional destruction ritual place</td>
<td>Similar to above</td>
</tr>
</tbody>
</table>

harvesting and transportation operations as per management plan prescriptions, thus maximizing benefits for all stakeholders. The Forest Protection Committees and the Village Forest Management Committees (VFMCs) so constituted ensured gender participation. The emphasis was laid on sharing benefits, the State Forest Department taking 50% share, and the rest being utilized for village societal wellbeing. Large area was brought under bamboo plantation (*Bambusa balcooa, Bambusa tulda*) along with *Tectona grandis*, involving a cluster of villages (Table 4); the progress in the development of VFMCs was found best in 2007-2008 in Doimukh forest range (Fig. 1).

**Conclusion**

Formal and informal institution plays an significant role in the natural resource management of the rich biodiversity in the biodiversity hotspot of the world. The VFMC programme under JFM being a formal institution are restoring the degraded USF areas is directly and indirectly generating employment as well as developing resource base for improving the socio-economic condition of the indigenous communities. In case of informal institutions, village council of the indigenous community help the community to conserve the rich resource against anthropogenic pressure through the uncodified law i.e. customary law. The rich forest cover is still maintained
due to the enforcement of customary laws that excludes the non-indigenous community to access and extract the natural resources. Codification of customary law is important parts for the conservation of natural resources in northeast part of India.

Whilst the Apatanis living in the Ziro valley have a distinct cultural identity of their own, with a well organized sedentary farming system of their own which is indeed highly productive (Kumar and Ramakrishnan, 1990), they along with the surrounding hill tribes form a part of a larger

Table 4. VFMC in the Doimukh forest range (2007 to 2010)

<table>
<thead>
<tr>
<th>S.no</th>
<th>Village</th>
<th>Total area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tigdo</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Rono</td>
<td>17</td>
</tr>
<tr>
<td>3.</td>
<td>Mani-Chipu</td>
<td>13</td>
</tr>
<tr>
<td>4.</td>
<td>Midpu</td>
<td>13</td>
</tr>
<tr>
<td>5.</td>
<td>Gumto</td>
<td>17</td>
</tr>
<tr>
<td>6.</td>
<td>Rose</td>
<td>11</td>
</tr>
<tr>
<td>7.</td>
<td>Chiputta</td>
<td>13</td>
</tr>
<tr>
<td>8.</td>
<td>Midpu Panchayat</td>
<td>13</td>
</tr>
<tr>
<td>9.</td>
<td>5 Mile</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

**SOURCE:** Doimukh Forest range office, and Banderdewa forest division.

Fig.1. Trend of VFMC programme in Doimukh forest range

**SOURCE:** Doimukh Forest Range Office, and Banderdewa Forest Division
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landscape complex (Ramakrishnan, 1992). The uniqueness of this larger landscape complex lies in that the Apatanis and the surrounding hill tribes live in harmony with each other as part of the landscape complex, and is perhaps one of the best examples that one could find where they have learnt to live in harmony with one another. In this context, it is worth noting here that the Apatanis and the surrounding hill tribes provide one of the best examples of coexistence. One of the best example of this is the shared cultural heritage, for e.g., all the surrounding hill tribal communities participating in the month long Myoko festival of the Apatanis, as part of celebrations linked with the shared heritage values. Indeed, it is not surprising, therefore, that they tend to be a unique example as a coherent set of ethnic groups living in not only in harmony and peace, but also coming to each other help at times when it is needed most, an integral part of a notional Tani cultural landscape, in spite of contrasting perceptions that they may have, arising from biological diversity linked cultural diversity that they have dynamically conserved all along.

References


Plate 1: An Invitation to the Sun God to Bless’ Abotani’ during ‘Myoko’ Festival (left); an inside view of the Doniy Polo temple of the Apatanis.

Plate 2. A view of the sacred groves of the Apatanis.
Plate 3. Bamboo grove of *Phyllostachys bamboosoides*

Plate 4. Pine plantation
Biodiversity Linked Value Systems of the Monpas and Sherdukpens of Arunachal Pradesh

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Introduction

In the contemporary global milieu, it has been well acknowledged that biodiversity conservation approaches can not work without involving traditional communities inhabiting in the forested landscapes (Alcorn, 1993). These traditional forest dwellers being vulnerable people, largely depend upon the bio-resources for meeting with their livelihood needs (Gadgil and Berkes, 1991; Berkes, 2004). Arising from this, there is an increasing realization that biodiversity conservation is closely linked with sustainable livelihood/development of traditional societies, which has implications for sustainable management of natural resources based on effective use of biodiversity-linked traditional ecological knowledge (TEK), which in turn will contribute towards development of tribal communities, ultimately reducing the pressures on biological resources (Ramakrishnan, 1992a, b; Warren and Rajasekaran, 1993).

The Eastern Himalayan region, though geologically young, is characterized by rich floral and faunal biodiversity coupled with a rich ethnic diversity of the mountain people inhabiting diverse ecological niches over a range of altitudinal situations. The region is home to 175 known terrestrial mammal species, more than 500 bird species and 163 globally threatened species including Asia’s three largest herbivores—the Asian elephant (*Elephas maximus*), the greater one-horned rhinoceros (*Rhinoceros unicornis*), and the wild water buffalo (*Bubalus bubalis*), and its largest carnivore, the tiger (*Panthera tigris*), as well as several
large birds such as vultures, adjutant storks and hornbills. The northeast India, being at the confluence of three major bio-geographical realms of the world, is extremely rich in floral and faunal biodiversity with several endemic species (Myers et al., 2000). Since a substantial section of the forest cover is under the control of the people, efficient and sustainable management of the rich biodiversity through community participation alone will contribute towards effective and sustainable conservation of the rich biodiversity, whilst contributing towards economic wellbeing of the local communities. This is the context in which this effort to look at the the mega-cultural landscape along an altitudinal transect of the proposed Tawang-West Kameng Biosphere Reserve in western Arunachal Pradesh has to be seen (Dollo et al., 2005). Whilst using and indeed manipulating biodiversity to meet with a range of their livelihood needs, the local communities have not only conserved the available biodiversity but also enhanced the same, through small-scale perturbations using the rich traditional ecological knowledge (TEK) that they have and using the same towards an integrated approach for sustainable management of the cultural landscape that they have carved out around them (Ramakrishnan, 1992a,b, 2008a,b; Dasmann, 1991). This is the context in which the value of the concept of cultural landscape in Arunachal Pradesh assumes significance from the viewpoint of nature and culture (Dollo and Choudhury, 2006)

Study Area

Arunachal Pradesh, the north eastern border State of India is situated in between 26°28´-29°31´ N and 91°31´-97°30´ E, bounded in west by Bhutan, north by China, south by Assam and east by Myanmar. It covers a total geographical area of 83,743 km² amounting to 2.5% of the total geographical of the country, 15.76% of Indian Himalayan Region and 43.62% of the “Biological Hotspot”, the Eastern Himalaya. The state with its rich ethno-cultural diversity comprising 26 major and 110 sub/minor tribes, has a population of just over a million people (0.11% of total population of the country as per population census, 2001). This largely hilly terrain is characterized by flood plains, foothills and the Great Himalayan ranges and is ecologically a very fragile region.

The study area (91°30’ to 92°40’ E and 26°54’ to 28°01’ N) is a mountainous tract, towards the western part of Arunachal Pradesh covering an area 7,422 km², and with an altitudinal variation range between 100-7090 m. above sea level. It has five major tribal communities namely,
Monpa, Aka, Sherdukpen, Bugun, Miji (Sajolang) and two minor tribal groups, Lishpa and Chugpa. The study villages fall within the area of Dirang (Dirang, Namshu, Lish, Yewang, Chu and Zimthung) and Bomdila (Sera and Pedung villages) (Fig. 1), in west Kameng district of Arunachal Pradesh.

The Monpa is the dominant community with a population of 38,862, followed by Miji with 5779, Aka with 3531, Sherdukpen with 2547 and
the Bugun with 1046 persons as per 1991 Census data. By and large, the inhabitants are Buddhists though Mijis, Akas and Buguns believe in the indigenous animistic religion with elements of Buddhist and Hindu practices. All ethnic groups deal with land use related activities through village councils.

**People: Their eco-cultural Attributes**

Monpa tribe inhabits the western parts of West Kameng District and Tawang District, while the Sherdupen tribe lives in the southern part of West Kameng district. They belong to the Tibeto-mongoloid stock, with a language of Tibeto-Burman origin; largely, monogamous, occasionally they may practice polygamy/polyandry; cross-cousin marriages are allowed amongst the members. They live in double-storied houses, made of stone and wood, with wooden floors, often accompanied with beautifully carved doors and window frames; a small room is set aside for prayer (Rapse). The roof has a bamboo matting that keeps the house warm during the winter months.

The traditional dress of the Monpa and Sherdukpen is based on the Tibetan Chugba, although modernization has also brought in woolen coats and trousers amongst the younger generation. Traditionally, men wear a decorated skull cap. The women tend to wear a warm jacket and a sleeveless chemise that reaches down to the calves, tying them round the waist with a long and narrow piece of cloth. Ornaments that include silver rings, earrings made of flat pieces of bamboo with red beads or turquoises are worn as well. One can see a Monpa wearing a cap with a single peacock feather round their felt hats. Their language belongs to the Tibeto-Burman family written with the Tibetan script, but distinct from the Eastern Tibetan dialect; their sub-division into six sub-groups - Tawang Monpa, Dirang Monpa, Lish Monpa, Bhut Monpa and Kalaktang Monpa - arise from the slight variations in their language. On the other hand, Sherdukpen society has two broad groups - the Thong and Chhao, each being divided into many clans.

Among the Sherdukpens some of the traditional designs in dress revolve around some of the stories or tales like the popular one narrated as “a girl falls in love with a snake, who is a handsome youth in disguise. In his snake form he coils himself in her lap as she weaves; she copies the markings on her lover’s body and is soon making the most beautiful cloth that was ever seen”. Among the other popular designs among the Sherdukpens are the stylized peacocks carrying a baby bird on the back, the elephants with
riders, and flowers that are combined with geometric forms. The Sherdukpens wrap around a piece of cloth over the shoulder, which serves also as a sort of knapsack. Its central motif is always a right-pointing swastika, round which are a number of subordinate patterns, which vary considerably. The colours are red, blue, black and sometimes green and yellow on a white ground. Most of the weavers have forgotten the meaning of these symbols, but a few of the older women remember them; their interpretation varies from village to village. Several of these designs were either interpreted as flowers or as shrubs, which supply the black juice used for painting beauty-marks on the faces of young girls. The lines projecting from the main design are said to be the thorns of the plant. A Chinese fence design is generally used as the upper border of the Sherdukpen bags.

The Monpa dress mainly consists of Chuba (cover) made of coarse woolen stuff dyed red with madder, which reaches below the hips and a short loose drawers of wool. Monpas are generally fond of the head ornament and costume. Male generally wears a dome-shaped hat of coarse felt with edges of fur. Usually a Monpa man wear shoe of indigenous manufacture (usually Yak skin is used to make these traditional shoes) reaching just below knee. Monpa women wear a maroon, blue striped or white cotton cloth down to their knees and woolen jacket. They are also fond of ornaments and different kinds of ornaments are used by them.

As strong adherents of the Gelugpa sect of Mahayana Buddhism, which Monpas adopted in the 17th century, and with the well-known Tawang monastery playing a pivotal role in their lives, they follow a distinctive cultural tradition - the Gelugpa tradition, however, elements of the pre-Buddhist Bon faith is characteristic of those living in the foothill region. Buddhist altars with statues of Buddha and water offerings in little cups along with burning butter lamps are to be found in all homes. With strong faith in transmigration of souls and reincarnation, their life is largely centered around the Tawang monastery, with many young boys growing up as as Buddhist Lamas. Some sections – like the more traditional Bhut Monpa sect, have a hunter-gather lifestyle, with traditional beliefs that the main totem and clan idol is the spirit of the tiger, being a manifestation of the ancestral forest spirit.

The Monpas perform many pantomime dances of which the Ajilamu dance is very popular; many Monpa festivals are linked with crop harvest or the onset of the New Year. During Losar and Choskar festivals, the
Lamas read religious scriptures for a number of days; the villagers carrying religious books and being lead by the Lama go in a procession around the crop fields in order to ensure protection of the grains from insects and wild animals and for general prosperity of the people. They are also well-known for their wood carvings, Thangka paintings and carpet weaving.

Monpas manufacture paper from the pulp of the local sukso (*Daphne papyraceae*) tree; it may be noted that the Tawang monastery prints religious books on this locally made paper and using wooden blocks. Their cultural calendar, like all other hill societies, is linked with livelihood activities; in this context it may be noted that Monpas do sedentary farming (with cash crops such as rice, maize, wheat, barley, chili pepper, pumpkin, beans, tobacco, indigo and cotton), rear yaks, mountain sheep and cattle and trade in locally made products.

**Forest Typologies**

Forests are important repositories of terrestrial biodiversity and have always played a key role in influencing socio-ecological and cultural attributes of human societies including livelihood activities of traditional societies living in the area (Herrmann, 2006). Forest ecosystems are also home to numerous traditional societies and represent a vital part in their daily life. However, population growth and poverty have in many places led to the over-exploitation and destruction of forest areas. The estimated net annual loss in global forest area in the 1990s was 9.4 million ha (FAO, 2001). In view of the continuing loss and fragmentation of the world’s forests, and the declaration on forests and biodiversity made during the 1992 ‘Earth Summit’ in Rio de Janeiro, resource managers are looking for an enabling environment and the removal of disincentives that hinder sustainable forest management in several parts of the world. It is in this context that both ecological and the cultural significance of forests and contribution of culture in biodiversity need to be analysed. The diverse forest typologies existing in the study area are summarized in Table 1.

The forests of Arunachal Pradesh, in general, including the study District under consideration, have the following legal categories, with implications from the viewpoint of their management (Table 2).

The community-linked forests are managed by the local tribal groups, they obtaining a variety of forest products such as fodder, fuel wood, timber and Cane, and a variety of non-timber forest products through a consultative process to meet their domestic needs only. In recent times,
Table 1. Forest Types and Species Composition in the Study Area

<table>
<thead>
<tr>
<th>Major forest type</th>
<th>Tree species composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-tropical forests (800-1900 m)</td>
<td><em>Castanopsis indica, C. hystrix, C. armata, Quercus lamellosa, Q. griffithii, Q. spicata, Q. semiserrata, Q. fenestrata, Michelia obloma, Manglietta insignis, Ostodes paniculata, Ulmus lancifolia, Engelhardia spicata, Ficus spp., Acer oblongum, Schima wallichii, S. Khasiana,</em> etc</td>
</tr>
<tr>
<td>Pine forests (1000-1800 m)</td>
<td><em>Pinus roxburghii, Pinus wallichiana, Pinus merkusii, Tsuga dumosa, Betula alnoides, Lyonja ovalifolia, Alnus nepalensis, Rhus javanica, Quercus sp.</em> etc</td>
</tr>
<tr>
<td>Temperate forests Temerate broad leaved forest (1800-2800 m)</td>
<td><em>Quercus lamellosa, Michelia sp., Acer sp., Castanopsis sp., Quercus kamroopii, Q. glauca, Populus ciliata, P. gamblei, Photinia sp., Magnolia campbellii, Illicium griffithii, Lyonja ovalifolia,</em> etc</td>
</tr>
<tr>
<td>Temperate conifer (2800-3800 m)</td>
<td><em>Tsuga dumosa, Pinus wallichiana, Rhododendron spp., Abies spp., Cupressus torulosa, Taxus baccata, Picea spinulosa, Larix griffithiana,</em> etc.</td>
</tr>
<tr>
<td>Secondary forests</td>
<td></td>
</tr>
<tr>
<td>Degraded forests (up to 3000 m)</td>
<td><em>Mallotus tetracoccus, Callicarpa arborea, C. vestita, Bauhinia sp., Glochidion spp., Eurya acuminata, Rhus javanica, Alnus nepalensis,</em> etc.</td>
</tr>
<tr>
<td>Bamboo forests (up to 2000 m)</td>
<td><em>Bambusa tulda, B. pallida, Dendrocalamus hamiltonii, D. giganteus, D. hookeri, Pseudostachyum polymorphum, Phyllostachys sp.</em> etc.</td>
</tr>
</tbody>
</table>

*Source: Kaul and Haridasan (1987)*

Table 2. Legal Forest Status and Area (km²) under each Category in West Kameng District

<table>
<thead>
<tr>
<th>Legal classification</th>
<th>District</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area</td>
<td>%</td>
</tr>
<tr>
<td>Reserve Forest</td>
<td>1025.42</td>
<td>16.33</td>
</tr>
<tr>
<td>Wild Life Sanctuary</td>
<td>317.00</td>
<td>5.05</td>
</tr>
<tr>
<td>National Park</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Village Reserve Forest</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Anchal Reserve Forest</td>
<td>4.57</td>
<td>0.07</td>
</tr>
<tr>
<td>Protected Forest</td>
<td>0.51</td>
<td>0.01</td>
</tr>
<tr>
<td>Unclassified State Forest</td>
<td>4933.28</td>
<td>78.55</td>
</tr>
<tr>
<td>Total</td>
<td>6280.78</td>
<td></td>
</tr>
</tbody>
</table>
tapping of resin from Pine, excessive bamboo harvests and medicinal plant exploitation from the forests have led to conflicting situations between the people and the governmental agencies concerned. This conflicting situation often has ended up with unsustainable over-extraction of the forest resources by the local people, an aspect that needs to be addressed from the viewpoint of joint forest resource use and/or management.

**Traditional Classification of Forest Land**

Traditionally, the local communities living in the region have their own classification of the forests around them, based on land use categories; that of the Monpa and Sherdukpen communities is illustrative of this (Table 3). Oak forest provides leave litter for agriculture; besides supplementing the nutrient requirement of the agro-ecosystem, it is also used as a resource for fencing, erosion control, check dam construction and to meet with other household needs. Whilst earlier only community and village forests were the only concern of villagers from the management viewpoint, in recent times, emphasis is also placed upon community-based conservation of forests around the agricultural fields, this being well regulated by the traditional council – the Mangijomba of the Monpa tribe and Jung of the Sherdukpen. This is a more recent innovation of joint resource management;

<table>
<thead>
<tr>
<th>Community</th>
<th>Monpa</th>
<th>Sherdukpen</th>
<th>Description</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borang</td>
<td>Blu dongsek</td>
<td>Community forest</td>
<td>Extraction of timber, bamboo, cane, fuelwood &amp; other NTFPs for household needs</td>
<td></td>
</tr>
<tr>
<td>Ja-dung Borang</td>
<td>Khik dongsek</td>
<td>Village forest</td>
<td>do-</td>
<td></td>
</tr>
<tr>
<td>Ja-sesing</td>
<td>Sangthing dongsek</td>
<td>Individual forest dominant by oak tree</td>
<td>do-</td>
<td></td>
</tr>
<tr>
<td>Habrang Seshadoksha</td>
<td>Donsek achok</td>
<td>Sacred groves (community land)</td>
<td>Restriction of extraction except for ritual purpose. Good seed bank for varieties of spp.</td>
<td></td>
</tr>
<tr>
<td>Brog</td>
<td>Nyor see</td>
<td>Community/ village grazing land</td>
<td>Grazing land for cattle, yak and mountain sheep</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3. Traditional Classification of Forest Land by Monpa and Sherdukpen Community**

otherwise, previously, only community- and village- forests alone came under the purview of community/ village level management. In more recent times, individual ownership of Oak (Ja-sesing) and Pine (Lenchong-sing) forests are also coming into vogue, leading to land fragmentation and/or land use changes e.g., conversion of forest lands for agriculture/horticulture, with adverse implications for long-term sustainability of the forested landscapes.

**Biodiversity Linked Socio-ecological Dimensions**

Species diversity in the forest ecosystem context is profoundly influenced by cultural belief and management (Laird, 1999); an expression of this is the sacredness associated with species at that level (Ramakrishnan, 1996, 1998a,b; Khaneghah, 1998; Michaloud and Dury, 1998). Oak species and Oak-dominated forest ecosystems are ‘sacred’ for the mountain people in the central Himalayan region (Ramakrishnan, 1998a,b) with all its implications for addressing sustainable developmental concerns. Indeed, this sacredness attached to biodiversity has implications for peace linked human security too, as is obvious from the well-known eco-cultural ‘chipko’ movement of the Garhwal Himalaya, which gained global attention. This event happened because the socio-culturally valued ‘Banjh’ (*Quercus* spp.) native tree species of the region is valued as a keystone species for soil soil fertility management through its leaf litter, with obvious implications for sustainable food security for the mountain people in the region (Ramakrishnan, 2008a,b) This is the context in which the following discussion on cultural values based biodiversity management issues (Ramakrishnan, 2008a,b) assume significant.

**Traditional Institutions**

Many traditional societies all over the world value a large number of plant species from the wild for a variety of reasons—for food, fibre, shelter or medicine, as well as for intangible animistic values linked to them, as one finds in the north-eastern Indian context too (Boojh and Ramakrishnan, 1983; Kiewtam and Ramakrishnan, 1989). Based on a study done by the World Resource Institute on national laws and policies affecting forests and forest dwellers in the Asian region, the need for a community-based approach towards joint forest management was highlighted arriving at two major conclusions, namely, (a) national system of forest ownership and management that prevails throughout south and southeast Asia is not
sustaining forests and (b) legally securing community-based tenurial rights of forest dwellers can improve forest management reducing illegal forest-linked human encroachments, whilst enhancing the local livelihoods of the local who have a stake in forest conservation. Indeed, this is the context in which both the formal or the informal traditional institutions of Arunachal Pradesh become relevant from the viewpoint of sustainable management of the limited natural resources, by keeping stake-holder conflicts to a minimum.

Being a major hot-spot of biodiversity, the West Kameng and Tawang Districts of Arunachal Pradesh have many rare and threatened flora and fauna, and as is common in the region, local communities have a major control over the forested areas. Apart from using oak as a socio-culturally valued resource for soil fertility management, as is done elsewhere too in the mountain regions (Ramakrishnan, 2008a,b), oak-litter is also socially valued amongst varied cultural groups of Arunachal Pradesh. The Monpa and Sherdukpen communities are no exception to this value-system based practice. Indeed, they also do have a rich traditional ecological knowledge based approach towards conserving biodiversity in the landscape.

At the institutional level, every village has a TVC (Traditional Village Council), which is composed of representatives selected by the village households on a collective approach. Among the villagers one or more village headmen and subordinate council members are selected taking into consideration their influence, efficiency and honesty. With a rather informal set of rules and regulations, the welfare of the people and sustainable and equitable natural resource use are their prime concerns. With a carefully chosen village headman, who is well respected and well-versed in hereditary rights and privileges, they are empowered to promote equitable sharing of natural resources and their use patterns.

The Monpa community of the study site manages land and water resources through their traditional institutions in different tier system. The village council is called Mangma/Mangijomba and it is headed by Dzongpan (governor of the tribal village council). The Dzongpan operates within its jurisdictional territorial area around the village, the Dzong (province), controlling and/or dealing with all kinds of major disputes related with forest and water resources such as deforestation, jhum linked land holdings, NTFP harvests, fire events and grazing. All minor issues get sorted out through the village headman called Tsorgan/Goanburah (Tso= a group of 3-10 villages) through a collective decision-making process organized at
the Gumpa (the Buddhist monastery). More serious cases alone get referred by the Dzongpan to the formal judicial system of the country. From the management viewpoint, Monpas have distinct categories of forests - clan forest (Tsanpasa, Tsan), privately owned forest (Rangasa), community forest (Mangsa/Borang), Oak dominated forests having a special place (Ja-sesing). Well-defined rules ensure sustainable use of the forest resources; for example, if a person who is from the same village but from a different clan needs to extract forest resources strictly for local consumption, prior permission is easy to obtain. Outsiders may be allowed to use forest resources on the basis of negotiated monetary transactions.

Sherdukpens have their village council, the Jung, which is responsible for decision-makings related with the natural resources conservation/management, apart from the general administration of the village. This Jung (village council) consist of Thik Akhao (the village head), Jung Me (a council of elected members), Kachung (messenger) and other supporting staff. Thik Akhao is assisted by the village council, consisting of members elected by the villagers. The head of every household is expected to participate in the proceeding of the village council. Whilst the community operates on the basis of conservation and sustainable use of natural resources, irrespective of whether the forest resources are individually or collectively owned, special emphasis is placed on conserving Oak forests, an important resource, the leaf litter being seen as a good mulching material for sustainable agriculture. To cite another example on sustainability issues, extraction of bamboo by a family, is allowed only at intervals of 4-5 years, and that too to meet with individual household needs. Though traditionally villagers are not allowed to extract NTFPs for commercial purposes, in recent times, commercial exploitation of valuable medicinal and aromatic plant species such as Swertia chirayata, Illicium griffithii, Taxus sp. has started happening.

**Biodiversity Linked Intangible Values for Sherdukpens and Monpas**

Whilst working with socially valued species of traditional societies of the north-eastern hill region of India (Ramakrishnan, 1992a,b) and subsequently dealing with traditional rural communities in a global context (Ramakrishnan et al., 1998a), one broad generalization that emerged was that what is socially valued invariably has an ecological/economic value too.
Arising what we have discussed in the preceding pages, it is obvious that intangible/tangible values linked with biodiversity are indeed enabling factors towards sustainable conservation and management of biodiversity, at least in the context of the immediate future. Social fencing is one of the options available towards effective conservation of cultural diversity linked biodiversity, in the study area, i.e., West Kameng and Tawang districts at least as part of a short-term strategy. In the Zimithang area, the whole mountain is considered to be of religious value for the deity Shockseng Gompa, and therefore, extraction of plants from this hill region is avoided. Because of the religious dimensions linked to the species of *Rhododendron, Cryptomeria, Juniperus* and *Cupressus* are given protection in the name of the local deities; indeed, patches of forests get protection in the name of local deities. *Juniperus* sp. is also considered to be of highly religious value and used for incense-making not only by Sherdukpens but also by Monpas too; the religious value linked to this species could be gauged as the timber of this species alone is used by the Monpas for the construction of the ‘Chosum’, where Lord Bhudha is placed. Aconitum and Capsicums are used to ward off evil spirits. This is evident from the biodiversity-linked rich traditions embedded within the Sherdukpens and the Monpas, two out of the many species in Aruanchal Pradesh (Tables 4 and 5), to cite just two of the very diverse ethnic groups living in the region.

Impact of religion is seen in every aspect of socio-cultural life of the Sherdukpens and Monpas, having sustainable biodiversity conservation and use values being closely linked with their unique rituals and custom. High religious value is linked with Junipers, which is used for incense-making by both Sherdukpens and Monpas; indeed, the timber from this tree is used for construction of the ‘Chosum’ where Lord Bhudha is placed. Considering the forest to be sacred as the abode of their gods and spirits, both benevolent and malevolent, there are beliefs and taboos linked with the animal world. For instance, killing tigers is a taboo among the Monpas, Mishmis, Galos and many others. However, if some one kills a tiger by mistake or due to inevitable circumstances, then not only the person concerned but the whole village has to go through a series of restrictions and perform compensatory rituals (Chaudhuri, 2008), a tradition that is shared also with the Monpa farmers of Sangti valley of West Kameng district and Zimithang valley of Tawang District. Amongst the avifaunal species, these communities consider high-altitude avifaunal species, the
Black-necked Crane (*Grus nigricollis*) as a sacred bird, a species which visits this part of Arunachal Pradesh just during the harvesting season of paddy. This bird is seen as one who brings prosperity to the village.

**Ethnobiological Value of Biodiversity for Sherdukpens**

What is given in Table 6 is illustrative of the plant biodiversity linked conservation practices of the Sherdukpens.

**Socially Valued Tree Species of the Monpas**

**Oak trees linked with soil fertility**

Monpas generally have a good grasp over the importance of Oak-
Table 5. Plant Species used in Rituals and Festivals by Monpa Tribe

<table>
<thead>
<tr>
<th>Local Name</th>
<th>Scientific Name</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathua</td>
<td><em>Chenopodium album</em></td>
<td>Leaves and grains are used for making variety of ethnic foods during Losar and other Buddhist festivals.</td>
</tr>
<tr>
<td>Leepii</td>
<td><em>Glycine max</em></td>
<td>Used for making Churpi, which is extensively used in the rituals and festivals e.g. Losar.</td>
</tr>
<tr>
<td>Phupur</td>
<td><em>Fagopyrum esculentum</em></td>
<td>Powder grain is made into paste and sun dried, which is offered in Buddhist temple. It is also distributed to the persons present during rituals and festivals.</td>
</tr>
<tr>
<td>Phupur</td>
<td><em>Fagopyrum tartaricum</em></td>
<td>Powder grain is made into paste and sun dried, which is offered in Buddhist temple. It is also distributed to the persons present during rituals and festivals.</td>
</tr>
<tr>
<td>Bundagmo</td>
<td><em>Amaranthus spp.</em></td>
<td>A precious and culturally important crop used for making the ethnic food <em>Khapse</em> used in Losar.</td>
</tr>
<tr>
<td>Loosun</td>
<td><em>Allium sativum</em></td>
<td>It has cultural relations with Buddhist temple. It is used in rituals for curing different ailments.</td>
</tr>
<tr>
<td>Mann</td>
<td><em>Allium sp.</em></td>
<td>It has cultural relations with Buddhist temple. It is used in rituals for curing different ailments. It is also offer in Losar festival.</td>
</tr>
<tr>
<td>Mann</td>
<td><em>Allium sp.</em></td>
<td>It has cultural relations with Buddhist temple. It is used in rituals for curing different ailments. It is also offer in Losar festival.</td>
</tr>
<tr>
<td>Odong-Sing</td>
<td><em>Rhododendron arboreum</em></td>
<td>Flowers are used for offerings and leaves and buds are used as incense.</td>
</tr>
<tr>
<td>Sulu-Sing</td>
<td><em>Rhododendron lepidotum</em></td>
<td>Young leaves and stem are used as incense.</td>
</tr>
<tr>
<td>Tama-Sing</td>
<td><em>Rhododendron grande</em></td>
<td>Young leaves and stem are used as incense.</td>
</tr>
<tr>
<td>La-Sing</td>
<td><em>Rhododendron sp.</em></td>
<td>Use for packing Churpi and Ghee. The Ghee is used in Buddhist temple.</td>
</tr>
<tr>
<td>Lensong-Sing</td>
<td><em>Pinus wallichiana</em></td>
<td>Young leaves and stem are used as incense.</td>
</tr>
<tr>
<td>Ro-Sing</td>
<td><em>Pinus roxburghii</em></td>
<td>Young leaves and stem are used as incense.</td>
</tr>
<tr>
<td>Wang-sing</td>
<td><em>Cupressus torulosa</em></td>
<td>Young leaves and stem are used as incense.</td>
</tr>
<tr>
<td>Wangmu-Sing</td>
<td><em>Thuja oxydentalis</em></td>
<td>Young leaves and stem are used as incense.</td>
</tr>
<tr>
<td>-</td>
<td><em>Juniper recurva</em></td>
<td>Young leaves and stem are used as incense.</td>
</tr>
<tr>
<td>Mong</td>
<td><em>Triticum aestivum</em></td>
<td>Flour is used for preparation of Tormu, grains are thrown in every direction after the rituals to dispel/ward away evil spirits.</td>
</tr>
<tr>
<td>Sulu</td>
<td><em>Capsicum annum</em></td>
<td>Dry fruit is burnt to drive away evil spirits</td>
</tr>
<tr>
<td>Ning</td>
<td><em>Aconitum hetrophylum</em></td>
<td>Tuber is worn to ward away the evil spirits</td>
</tr>
<tr>
<td>Chandu</td>
<td><em>Aconitum ferox</em></td>
<td>Tuber is worn to ward away the evil spirits</td>
</tr>
</tbody>
</table>

**Source:** Primary Survey, 2009
dominated forests, from the viewpoint of the sustainability of their traditional agricultural practices, and therefore Oak leaf litter input is an integral part of agro-ecosystem for soil health management. Oak (*Paisang*) forests are generally sustainably managed along the periphery of their agricultural land; the leaf litter accumulating during the winter months is collected and used as mulch for improving soil fertility of their agricultural plots. Sustaining soil moisture and fertility through application of this organic residue, an age old practice, has implications for their food security.

Focused around this tree species is the well-known festival Chheskaran, which is celebrated during the month of March. The women folk collect the dry leaves of Paisang from private and community forests, storing the same, tightly packed, close to the agricultural fields in specially made bamboo structures. With the onset of the rainy season, leaf decomposition is rapid, and the decomposed litter is applied on to the fields; often times, however, dry leaves are directly placed and mulched on the crop field itself collected and mulched in situ. Indeed, Paisang forested stands are seen as an important component of the agricultural landscape, by the locals. However, in more recent times, one could see that these traditional technologies for sustainable soil fertility management are under increasing threat due to the emerging pressures that are external to the system. Fragmentation of land holdings and selective encroachments by the influential well-do-do sections of the local people into community land dominated by Paisang tree are leading to erosion in these otherwise valuable and affordable traditional technologies also adversely impacting on the cultural integrity of the Monpa community itself. However, in recent times, attempts have been made by the traditional institution *Chhopa* to lay down norms and rules towards sustaining the socially valued Oak species. The private and community forests are better demarcated, to avoid any conflicts, and those who over-exploit the forests are imposed a fine in kind in the form of yak, cow, pigs and sheep, depending upon the extent of illegal exploitation of the Paisang tree; in recent times, fines may be in terms of cash rather than in kind.

What is worth noting at this stage is that Oak species are socially valued right across the Himalayan region, indeed, this value system centred around Oaks extending to other parts of the globe too (Ramakrishnan et al., 1998; Ramakrishnan, 2008b).
<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Family</th>
<th>Status of specimen demand</th>
<th>Traditional conservation practices</th>
<th>Conservation initiatives and reasons</th>
<th>Regulatory authority</th>
<th>Role of traditional institution</th>
<th>Role of Community</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Swertia chirata</em></td>
<td>Gentianaceae</td>
<td>High in external market</td>
<td>Flowering plants are not uprooted, whole plant population is not collected from a single plot, Cultivated in home garden</td>
<td>Conserved for its medicinal and economic value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Adhatoda zeylanica</em></td>
<td>Acanthaceae</td>
<td>Low in external market</td>
<td>Easy access and decline of plants in forest</td>
<td>Council</td>
<td></td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Artemisia sp</em></td>
<td>Asteraceae</td>
<td>Low in external market</td>
<td>-</td>
<td>Community</td>
<td></td>
<td>-</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Xanthoxylum sp</em></td>
<td>Rutaceae</td>
<td>In local market only</td>
<td>Trees are not cut</td>
<td>Conserved for its medicinal and economic value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Xanthoxylum sp</em></td>
<td>Rutaceae</td>
<td>Low in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its medicinal and economic value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Quercus graphiti</em></td>
<td>Fagaceae</td>
<td>Low in external market</td>
<td>Trees are not cut</td>
<td>Conserved for medicinal value</td>
<td>Council</td>
<td>Check the illegal logging for firewood</td>
<td></td>
</tr>
<tr>
<td>Botanical name</td>
<td>Family</td>
<td>Status of specimen demand</td>
<td>Traditional conservation practices</td>
<td>Conservation initiatives and reasons</td>
<td>Regulatory authority</td>
<td>Role of traditional institution</td>
<td>Role of Community</td>
</tr>
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</tr>
<tr>
<td><em>Quercus</em> sp</td>
<td>Fagaceae</td>
<td>Low in external market</td>
<td>Trees are not cut</td>
<td>Conserved for medicinal value</td>
<td>Council</td>
<td>Check the overexploitation</td>
<td>Check the illegal logging for firewood</td>
</tr>
<tr>
<td><em>Punica</em> granatum</td>
<td>Punicaceae</td>
<td>In local market only</td>
<td>Cultivated in home garden</td>
<td>Conserved for its medicinal and economic value</td>
<td>Community</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Illicium griffithii</em></td>
<td>Illiciaceae</td>
<td>High in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its medicinal and economic value</td>
<td>Council and Forest Department</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Rhododendron</em> arboreum</td>
<td>Ericaceae</td>
<td>Low in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its religious value</td>
<td>Community</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Rhododendron</em> sp</td>
<td>Ericaceae</td>
<td>Low in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its religious and economic value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Orozylum</em> indicum</td>
<td>Bignoniaceae</td>
<td>Moderate in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its religious and economic value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td><em>Taxus baccata</em></td>
<td>Taxaceae</td>
<td>High in external</td>
<td>Trees are not cut</td>
<td>Conserved for medicinal reason</td>
<td>Council and</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Botanical name</td>
<td>Family</td>
<td>Status of specimen demand</td>
<td>Traditional conservation practices</td>
<td>Conservation initiatives and reasons</td>
<td>Regulatory authority</td>
<td>Role of traditional institution</td>
<td>Role of Community</td>
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<tr>
<td>Rubia cordifolia</td>
<td>Rubiaceae</td>
<td>High in external market</td>
<td>-</td>
<td>Conserved for its economic value</td>
<td>Community</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Acorus calamus</td>
<td>Acoraceae</td>
<td>Moderate in external market</td>
<td>Cultivated in home garden</td>
<td>Easy access and decline of plants in forest</td>
<td>Community</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Aconitum sp</td>
<td>Ranunculaceae</td>
<td>Low in external market</td>
<td>-</td>
<td>-</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Pinus sp</td>
<td>Pinaceae</td>
<td>Low in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its religious and economic value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Eucalyptus sp.</td>
<td>Myrtaceae</td>
<td>Low in external market</td>
<td>Trees are cut only for flag poles</td>
<td>Conserved for its religious value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Botanical name</td>
<td>Family</td>
<td>Status of specimen demand</td>
<td>Traditional conservation practices</td>
<td>Conservation initiatives and reasons</td>
<td>Regulatory authority</td>
<td>Role of traditional institution</td>
<td>Role of Community</td>
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<tr>
<td>Cupressus sp</td>
<td>Cupressaceae</td>
<td>Low in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its religious value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Thuja sp</td>
<td>Cupressaceae</td>
<td>Low in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its religious value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Canarium sp</td>
<td>Burseraceae</td>
<td>Moderate in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its religious and economic value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
<tr>
<td>Triticum aestivum</td>
<td>Poaceae</td>
<td>Moderate in external market</td>
<td>Cultivated in jhum field</td>
<td>Conserved for its religious and economic value</td>
<td>Community</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Capsicum sp</td>
<td>Solanaceae</td>
<td>Moderate in external market</td>
<td>Cultivated in home garden</td>
<td>Conserved for its religious, medicinal and economic value</td>
<td>Community</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Eleocarpus sphaericus</td>
<td>Eleocarpaceae</td>
<td>Moderate in external market</td>
<td>Trees are not cut</td>
<td>Conserved for its religious value</td>
<td>Council</td>
<td>Have imposed ban on collection by outsider in its jurisdiction</td>
<td>Check the overexploitation</td>
</tr>
</tbody>
</table>

**Source:** Primary Survey, 2009.
Multi-purpose Value of Minangmose for Monpas

Another socially valued species is the critically endangered indigenous tree species, Minangmose (*Gymnocladus assamicus* Kanj.). Monpas, living in the inaccessible and upland areas value this species as an ethnomedicine of value - for treating stomach disorders, as an antiseptic, to cure skin diseases and to relieve aches and pains and as a leach-repellent. The pods are used as an ingredient in soap-making and as an insecticide to control soil-borne pests in farmers’ fields. The leave litter is used as manure and is said to reduce the intensity of damage on agricultural crops from insect pests. In Buddhist temple, the powdered dry leaves and barks are used as incense, particularly during Losar festival times. The Monpa community believes that the body and soul are purified if the extract of crushed seeds and ripe pods of Minangmose are spread over the dead body of a person as well as whilst taking bath after the funeral. However impact of modernization is observed as there is limited use of Minangmose as ethno-medicine and detergent in villages located near town. In brief, as the plant species has been playing a critical role in Monpa’s socio-cultural and ritual life, community conservation of this species is observed.

With Minangmose becoming more and more an endangered species, in the context of modern influences in recent times, the *Chhopa* (traditional institution) has been brought into action, which plays a lead role to mobilize the entire community for conserving and sustaining this tree species. The traditional Chhopa institution headed by Gaon Burha (village head) is making attempts to conserve this species not only on the basis of their eco-cultural affinity with the species, but also involving Gompa (Buddhist temple) as well through governmental agencies; the government of Arunachal Pradesh is not only trying to create awareness about its conservation, but also trying to restrict access to this endangered species, and trying to conserve this species population in its natural habitat. With greater awareness being generated particularly amongst the younger population, and the governmental efforts to protect the intellectual property rights of the people, there is a hope towards conservation of this critically endangered species.

Conclusions

The Monpas and Sherdukpenbs have traditionally developed strategies of conserving and managing nature and natural resources. These socially sanctioned and culturally patterned protections of biological diversity
relating to spiritual and valued species by the communities are to sustain the continually evolving cultural practices, whilst conserving the rich biological diversity that they value. Interestingly enough, the Monpas and Sherdukpons believe that all the upper parts of these plants are pure and clean, therefore, can be offered to the God and Goddess for the wellbeing of mankind. Whilst traditional values have contributed towards conservation of biodiversity, these values are under threat from increasing anthropogenic from within and outsidd. Even their Buddhist temple architecture has had outside influences in more recent times, for example with Thai architectural influences coming in the Gompa in Chilipam area (about 30 km from Bomdila) was constructed recently, with strong Thailand architecture coming in its structural design. Whilst change in eco-cultural values is unavoidable with passage of time, the challenge lies in enabling these traditional societies to have an eco-cultural conservation linked sustainable developmental pathway, based on a value system that they understand and appreciate, and therefore participatory in this process, in its true sense!

In the recent past, there have been attempts to have a land use development pathway based on modern and inappropriate high-energy input technologies, which time and again has been rejected by the local communities living in the north-eastern hill region. It is obvious from this discussion that the two ethnic groups that we have considered here indeed do have a rich set of cultural traditions linked with conservation of biodiversity. However, the efforts of the governmental agencies even now is to impose a land use developmental pathway in the name of ‘modernizing’, which oftentimes tends to lead to social disruptions, with serious adverse consequences, which should be avoided at all costs. This case study on the Monpas and Sherdukpons is only illustrative of the rich cultural diversity that a few hundred ethnic groups living in the northeastern hill region of India possess in this biodiversity ‘hot-spot’ region. Conserving the rather intangible ‘cultural diversity’ is the key to conserve biological diversity, the two being intertwined with one another, which alone can contribute towards a value-system linked developmental pathway, which in the ultimate analysis is what sustainability science’ is all about!

References


Culture Linked Biodiversity Conservation Values of Monpas and Sherdukpins of Arunachal Pradesh

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Introduction

The concept of the ‘sacred’ from an ecological perspective has been an evolving concept from prehistoric times across the globe, a concept which has its origin from ancient humans viewing awe-inspiring and distant natural formations as sacred (Carmichael et al., 1994; Ramakrishnan et al., 1998). Evolving from this conceptual framework are cultural landscapes that are dynamic and complex socioeconomic expressions sculptured by humans around their immediate environment, an entity that is dynamic, evolving both in time and space based on a value system that humans understand and appreciate at a given point of time, with all its implications for conservation linked sustainable livelihood/development of traditional societies (Ramakrishnan, 1992, 2008a,b).

For many traditional societies, water is sacred, it being a life-sustaining entity. Indeed, wetlands as an ecosystem entity has been held in high esteem by humans everywhere, since ancient times, with strong cultural and spiritual values linked to them (Anonymous, 2009). With very many traditional societies living closer to high altitude wetlands in the Indian Himalaya and even those living in the larger plains of India viewing the water bodies as ‘sacred’, many myths, folklore and religious festivals are associated with them. Indeed, such unique nature-culture links built by the local and much wider cultural entities has contributed significantly towards conservation of wetlands and the associated biodiversity.
Sacred Lakes and Linked Value System

Wetlands, with strong social, cultural and spiritual values linked to them have been valued as ‘sacred’ since ancient times by traditional societies (Anonymous, 2009), and the high altitude wetlands of the Indian Himalayan region are no exception to this value system, with very many associate religious beliefs, festivals and linked local folklore. This unique nature-culture bondage focused around water bodies has greatly helped not only in conservation of wetlands and the associated flora and fauna, but also biodiversity at large.

There are many high altitude water bodies, in the studied Districts of Tawang and West Kameng, and playing a significant role in determining eco-cultural values, whilst ensuring productive ecological balance in the context of sustainability of the given cultural landscape units. Being considered ‘sacred’, there are very many norms and taboos strictly adhered to by the local people, contributing to sustaining a rich biodiversity in the region. To cite a few examples, there are many endangered high altitude wildlife such as rare and endangered mammals like Musk deer, Snow Leopard, Chinese Goral, Himalayan Goral, Red Goral, Blue sheep, Himalayan marmot, Pika in the region along with a rich avifauna; the catchment areas of the lake complex have a rich plant biodiversity too - Rhododendrons and Junipers along with a rich associated biodiversity. Traditional taboos and religious restrictions have all along helped in conservation of these wetlands along with a rich faunal and floral biodiversity in the region, along with many of the associated festivals and folktales linked to them. Table 1 is a summary statement on some of the more important wetland formations available in western region of Arunachal Pradesh.

Sacred Water Bodies of West Kameng District

The Tawang Monastery is the oldest and is an important religious focal point of the Buddhist people of Western Arunachal Pradesh, and is viewed as the guardian of the cultural values of the people in the region, and the wetlands too are sacred, playing an important role towards the wellbeing of the people in the region (Table 2).

Conservation Linked Belief Systems

For the Monpas and Sherdukpens, their Buddhist beliefs are focused around the Buddhist monasteries, with the Tawang monastery playing an
<table>
<thead>
<tr>
<th>Wetland and Lakes</th>
<th>Sacred Cultural Values associated</th>
<th>Associated fauna and flora and its conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangajang</td>
<td>The most sacred of all the lakes in this area is Dorjephamu, where it is believed that Goddess of prosperity exists. Pilgrims offer varied items to the Goddess, including flowers and coins placed in this lake. It is believed that an image of pig can be seen in the adjoining wetlands. It is reported that one idol retrieved from this lake once earlier is now kept in the temple, Bangajang Gompa.</td>
<td>The lake region supports plant species such as Saxifraga, Artimesia, Anaphalis, Frageria, Aster, Anemon, Aconitum and species such as Circium vrutum and Rheum australe. Threatened Species of mammals like Red Panda (Ailurus fulgens), Serow (Capricornis sumatraensis), Takin (Budorcas taxicolor) of which Serow and Takin are also listed in the Red Data Book of endangered animals.</td>
</tr>
<tr>
<td>Nagula</td>
<td>The Nagula wetland has high cultural and aesthetic value linked to it. Being highly sacred for local Buddhist people, they offer materials such as khada (piece of Muslin cloth), coins, etc., as offerings to the sacred lake.</td>
<td>Some of the rare and endangered faunal species found in this area are Musk deer (Moschus chrysogaster), Snow Leopard (Uncia uncia), Chinese Goral (Nemorhaedus griseus), Himalayan Goral (Naemorhedus goral), Red Goral (Naemorhedus goral), Blue Sheep (Pseudois nayaur), Pika (Ochotona sp.), Himalayan Marmot (Marmota himalayana) etc. along with bird species like Himalayan Monal (Lophophorus impejanus), Blood Pheasant (Ithaginis cruentus), Kalij Pheasant (Lophura leucomelanos), Ruddy Shelduck (Tadorna ferruginea), Rose finch (Carpodacus erythrinus), Dippers (Cinclus sp.), Accentors (Prunella sp.), various Redstarts, etc. The catchment area of these lakes are mostly occupied by the Rhododendron and Junipers sp. bushes along with Primula sp., Gentiana sp., Frageria sp., Aconitum sp. etc.</td>
</tr>
</tbody>
</table>
Zimithang

This lake complex along with the wetlands is highly sacred and culturally very much important. According to local tradition the lakes are associated with their deities. Buddhists give offerings to the lake such as khada (piece of Muslin cloth), and coins. The diversity of plants found in these areas are mainly of Junipers sp., Saxifraga sp., Srageria sp., Aster sp., Primula sp., Gentiana sp., Aconitum sp.; different species of Rhododendrons and Grasses. Among faunal species Musk deer (Moschus chrysogaster), Chinese Goral (Nemorhaedus griseus), Himalayan Goral (Naemorhedus goral), Red Goral (Naemorhedus sp.), BlueSheep (Pseudois nayaur), Pale Weasel (Mustela altaica), Pika (Ochotona sp.), Himalayan Marmot (Marmota himalayana) etc. Among birds Himalayan Monal (Lophophorus impejanus), Blood Pheasant (Ithaginis cruentus), Kalij Pheasant (Lophura leucomelanos), Ruddy Shelduck (Tadorna ferruginea), Dippers (Cinclus sp.) etc.

Thembang Bapu

This wetland complex is highly sacred and culturally very much important for the Buddhist Monpas, with very many folk tales associated to it. The local village people make offerings to this sacred lake, such as khada (a piece of Muslin cloth), coins, etc. Local people also believe that anthropogenic activities are prohibited, as it will adversely impact upon the sanctity of the lake. The woody vegetation is very restricted, with graminoid and forbs as the major life form. Some plant species found in the area are Saxifraga sp., Artemisia sp., Anaphalis sp., Frageria sp., Aster sp., Anemon sp., Aconitum sp., Leontopodium sp., Rheum sp., Rhododendron sp., etc. The area also has very rich diversity of rare medicinal plants like Cordyceps sinensis, Saussurea gossypiphora, Aconitum sp., Picrorhiza sp., and Rheum sp., etc. Blue sheep (Pseudois nayaur), Musk deer (Moschus chrysogaster), Chinese goral (Nemorhaedus griseus) are the major faunal species. The highly endangered Snow Leopard (Uncia uncia) is also found here. Some important bird species found in this area are Blood pheasant (Ithaginis cruentus), Satyr tragopan (Tragopan satyra), Monal pheasant (Lophophorus impejanus), Ruddy Shelduck (Tadorna ferruginea), Snow Pigeon (Columba leuconota), Red billed cough (Pyrrhocorax pyrrhocorax), Golden Eagle (Aquila chrysaetos) etc.

**SOURCE:** Primary Survey, 2010.
important role not only from a religious viewpoint but also contributing towards conservation of ecologically sensitive and biodiversity rich area around, the ecological dimensions being taken care of by their deities (Table 3).

Monpas of the Panchenpang valley believe that Khela, the mountain god and the protector of the faunal resources resides in certain hills and therefore, extraction of natural resources from these hills are to be avoided. Water bodies also do get conserved as they believe that the snake god Luhu resides within some of them; Tsoman-gamo is another deity that Monpas believe to be residing near the high altitude lakes and water bodies; Khela is protector of the mountains; Dun is an evil spirit living both on forested land and water bodies and therefore such locations are to be
<table>
<thead>
<tr>
<th>Deities</th>
<th>Worshiped for</th>
<th>Period of celebration</th>
<th>Offerings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chungba Sangze</td>
<td>Protector of faunal resources</td>
<td>November-December</td>
<td>Conifer, maize, Oroxyllum, etc</td>
</tr>
<tr>
<td>Jamu Wang Sing</td>
<td>It is a deity presiding over all forest areas.</td>
<td>November-December</td>
<td>Conifers, maize, Oroxyllum, etc</td>
</tr>
<tr>
<td>Gombu Chha Dakpa</td>
<td>Varied needs. To protect human beings from evil spirits. He is represented by the tormus of wheat flour.</td>
<td>As per needs</td>
<td>Wheat, Maize, Conifer needles, etc</td>
</tr>
<tr>
<td>Dam Chan Chhe Ge</td>
<td>Worshipped so that he may cure human being affected by evil spirits</td>
<td>As per needs</td>
<td>Maize, Conifer needles, Chilli, etc</td>
</tr>
<tr>
<td>Gepu Namse</td>
<td>To meet with all wishes and desires of the people who pray to him.</td>
<td>As per needs</td>
<td>Conifer needles</td>
</tr>
<tr>
<td>Zhandre Zi</td>
<td>He is worshipped so that he may be pleased to guide the soul to the heaven after death.</td>
<td>As per needs</td>
<td>Conifer needles, beans, maize, wheat, etc Goat, Sheep</td>
</tr>
<tr>
<td>Lopon Rimbuche</td>
<td>Protector of mankind against birds who prey upon men.</td>
<td>March-April</td>
<td>Wheat, Maize, Conifer needles, etc</td>
</tr>
</tbody>
</table>

**Source:** Primary Survey, 2010.
avoided; on the other hand Chung Ma is the care-taker of homes and human settlements.

In short, most of the tribes living in the region believe that forested landscape is the abode of Gods and Spirits, both benevolent and malevolent, taking care of the wildlife; for instance, killing of tiger is a taboo among the tribal communities of the region. If some one kills a tiger knowingly or unknowingly not only the concerned person but the whole village has to go through various restrictions along with linked rituals. Similarily Monpa farmers of Sangti valley of West Kameng district and Zimithyang valley of Tawang District also consider high altitude avifaunal species like Black-necked Crane (*Grus nigricollis*) as a sacred bird, visiting the area during the rice harvest season; therefore, this bird is seen as a sign of prosperity to the village.

To sum up this discussion, landscape/ecosystem management for the diverse ethnic groups of Arunachal Pradesh is firmly rooted in traditional values, and therefore, any developmental pathway which is not firmly rooted in the community values is likely to cause social disruptions (Ramakrishnan, 2010); this is with what conservation linked sustainable developmental values that these traditional societies cherish is all about.

**References**


Introduction

With wildlife hunting on the rise right across the tropical forests of South America, Africa and parts of South East Asia, there is a growing body of literature that demonstrates its adverse impacts on wildlife (Robinson and Bennet, 2000); the Himalayan region is no exception. The Himalayas, as an important ‘hot spot’ region of biodiversity has many endemic and threatened animal species (Baille and Groombridge, 1996; IUCN, 2003).

Traditionally, conservation of wildlife biodiversity has been ensured because of the rich cultural traditions of the local communities of the region (Borang, 1996; Solanki, 2002; Solanki and Chutia, 2004; Solanki et al., 2005), in spite of the traditional hunting pressure linked with their cultural traditions of the people living in the West Kameng and Tawang Districts of Arunachal Pradesh (Aiyadurai, 2008). Various animal parts are used for cultural/religious ceremonies, as a food source, and also as medicine for curing ailments. Sherdukpens view hunting also as a leisure time activity. Though ostensibly Buddhists, the religious belief system of Sherdukpens has a blend of Buddhism along with animistic beliefs; therefore, they do have many indigenous rituals too, such as Khiksaba, Smofangma, etc., involving sacrificial offering of pigs, goats, sheep and fowl. Hunting of
mountain ungulates is for meat, hide and trophies. With traditional ways of hunting using bows and arrows has in recent times increasingly been replaced with firearms, and therefore the hunting pressure has increased many-fold. Indeed, in recent times, there has also been a dilution of the traditional conservation ethics amongst the local tribal communities, which included taboos on hunting of wild animals with younger calves or pregnant females.

The People and their Socio-cultural Attributes

The Monpas

Monpa tribe inhabits parts of West Kameng district and Tawang district in Arunachal Pradesh, North East India. According to the Census of India (2001), the tribe has a total population of nearly 49,483 (West Kameng with 41,983 and Tawang with 7,500). They belong to the Tibeto-mongoloid stock, which have their own unique customs and regulations. A Monpa family is patriarchal. Though they are monogamous, they occasionally follow polygamous and polyandrous marriages. Cross-cousin marriage is allowed among the members. The community live in houses, which are mostly double-storied. Due to the cold climate of the region they inhabit, the Monpas, like most of other Buddhist tribes, construct their house with stone and wood with plank floors, often accompanied with beautifully carved doors and window frames. The roof is made with bamboo matting, keeping their house warm during the winter season. Sitting platforms and hearths in the living rooms are also found in their houses.

The traditional dress of the Monpa is based on the Tibetan Chugba, although woolen coats and trousers are worn as well. The men wear a skull cap felt with fringes or tassels. The women tend to wear a warm jacket and a sleeveless chemise that reaches down to the calves, tying them round the waist with a long and narrow piece of cloth. Ornaments that include silver rings, earrings made of flat pieces of bamboo with red beads or turquoises are worn as well. One can see a Monpa wearing a cap with a single peacock feather round their felt hats. Their language belongs to the Tibeto-Burman family written with the Tibetan script, but it is significantly different from the Eastern Tibetan dialect. The Monpas are sub-divided into sub-groups (Tawang Monpa, Dirang Monpa, Lish Monpa, Bhut Monpa and Kalaktang Monpa) because of their slight variations in their language. They are well built, fair in complexion and
medium tall in structure. They are hospitable, gentle and unassuming in temperament.

The Monpas are generally adherents of the Gelugpa sect of Mahayana Buddhism, which they adopted in the 17th century as a result of the evangelical influence of the Bhutanese-educated Mera Lama. The testimony to this impact was the central role of the Tawang monastery, which aligns with the Gelugpa tradition in the daily lives of the Monpa community. Nevertheless, some elements of the pre-Buddhist Bon faith remain strong among the Monpas, particularly in regions nearer to the foothills. In every household, small Buddhist altars placed with statues of Buddha are given water offerings in little cups and burning butter lamps. The belief in transmigration of the soul and reincarnation is widespread, as their life is largely centered on the Tawang monastery, where many of the young Monpa boys would join the monastery and grow up as Buddhist Lamas. The Monpas perform many pantomime dances of which the Ajilamu dance is very popular. Principal Monpa festivals include Choskar, Losar, Ajilamu and Torgya. Losar and Choskar are the major religious festivals of Monpas. Losar is celebrated to commemorate the entry of New Year. There is great marry making and dancing during Losar festival. In Choskar festival, the Lamas read religious scriptures in the Gompa for a number of days. Thereafter, the villagers carry the religious books on their back in the procession under the guidance of the senior Lama and procession goes around the cultivation fields. The significance of this performance is to assure better cultivation and protect the grains from insects and wild animals and also for the prosperity of the villagers in general. The Choskar is the harvest festival when the Monpas pray for good harvest and for protection of the grains from pests and diseases. The sub groups of Monpas of the Arunachal Pradesh - Dirang Monpas, Lish Monpas and Tawang Monpas, etc. speak language akin to Tibetan, but the local dialects are distinctive.

Monpas are known for their wood carving, Thangka painting, carpet making and weaving. They manufacture paper from the pulp of the local ‘Sukso’ (*Daphne papyraceae*) tree. A printing press in the Tawang monastery has many religious books printed on local paper using wooden blocks, usually meant for the literate Monpa Lamas, for their use. Sedentary farming, rearing of yaks sheep and cattle are the main livelihood activities. Cash crops grown are rice, maize, wheat, barley, chili pepper, pumpkin, beans, tobacco, indigo and cotton.
The Sherdukpens

As per Census of India report, 2001, the Sherdukpen tribe has a total population of about 4,200 only, mainly settled around a few villages, Rupa, Jigaon, Shergaon Thungre, and Doimara. This apart, they are dispersed around smaller settlements, locally known as pams or lurek (lu-hill, rek cultivation), closer to forest clearings, necessitated by their jhum cultivation. A sub-sect the Yanlos closer to the Sherdukpens are believed to have emigrated from Bhutan; though earlier they had a distinct dialect of their own, the Yanlos, but now are an integral part of the Sherdukpens. As part of the Tibeto-Mongoloid stock, their religious belief is a blend of Buddhism and animistic beliefs, with embedded non-Buddhist rites such as Khiksaba and Smofangma, performed by local priests with sacrificial offering of pigs, goats and fowl to propitiate very many spirits and deities linked with ‘nature’.

Sherdukpen villages are situated in a flat valley along the bank of the Duphla Kho river. Hamlets, variable in size, and which are locally known as Pams, are snuggled in the niches of towering hills or are picturesquely clustered on sunny slopes, not far away from water supply and cultivable lands. Each village has a well-defined territory for hunting and cultivation. Sherdukpens are divided into two classes – Thong and Chao, the former comprising of clans - Thongdok, Thongon, Thongchi, Khrime, Lama Guru, and Musobi, and the latter comprising of clans - Megejee, Mijiyi, Monoji, Dingla and Sinchaji.

The Sherdukpen houses are strong and made of locally available stone, wood, canes and bamboo, with a well-built stone wall, about four to six feet high, and is a double storey structure. The lower level is for domestic use, and the upper level is used as the granary(Zoh), with a small prayer room (Rapse) made on the back side. As among other tribes, house construction of the Sherdukpens involves ceremonies linked with varied activities, involving the Lama – site selection, bringing wood from the forest, laying the foundation, construction of the roof, and the completion of the house itself. Being a communal activity, a communal feast involving the Lama precedes occupation.

Conservation Linked usage of Faunal Resources

By the Monpas

Among Monpas it is believed that all animals except Tiger (locally called Bartak) are allowed to be freely hunted; tiger hunting being permissible only under strict community vigil and following well-laid out
procedures. (Mohanty, 2006). A sect of Monpas, the Bhut Monpas lead a hunter-gatherer lifestyle and believe that the spirit of the tiger is the manifestation of the ancestral forest spirit (Bisht, 2008). With increasing population pressure and developmental activities, the traditional conservation values are getting more and more diluted, and the Monpas are more and more becoming part of illegal wildlife trade, a serious threat to wildlife conservation. Arising from these changing value systems, human-animal conflicts are on the increase, which manifests itself in the form of crop raids and livestock depredation. The Monpas of the mid- and high-elevation areas of western Arunachal are pastoralists/agro-pastoralists, livestock rearing being one of the mainstays; arising from this conflicting situations often develop arising from situations linked with human-animal conflicts. However, wild animals do play an important role in the life of the Monpas (Table 1).

By the Sherdukpons

The Sherdukpons resort to individual and/or community hunting in their leisure time to supplement their food needs. Traditionally dogs are often used for hunting, all the dogs belonging to the participants in a hunt are entrusted to the charge of one man who usually drive them forward to comb out the jungle. The hunters lie in wait, and release their poisoned and/or non-poisoned arrows to kill the animals; they may also wait on wooden platforms built on trees or behind bamboo enclosures; in recent times, guns have replaced bow and arrows, with very limited use of hunting dogs. Whilst the catch is equally shared by all, the leader of the party and the successful marksmen may get the larger share. Consumption of meat is stopped for a year, if there is a death in the family.

During the holy month of Kro-Chekor festival, all forms of hunting and fishing are stopped, if anyone is found hunting and fishing then he is fined according to the village council laws. Interestingly enough, the Sherdukpons do not hunt the animal species, which they think as endangered or whose sighting is very low. Monkey, wild boar and bear are mainly hunted as they raid and destroy the agricultural crops. The hunting priorities linked with their belief systems is indicated in Table 2.

Avifauna of Western Arunachal Pradesh

Arunachal Pradesh has a rich variety of birds, with over 550 species identified (Islam and Rahmani, 2004), with a couple of hundred more added
Table 1: Various Animal Parts Traditionally used by the Monpas of Western Arunachal Pradesh

<table>
<thead>
<tr>
<th>Species</th>
<th>Local name</th>
<th>Scientific name</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asiatic black</td>
<td>Omsha</td>
<td><em>Urasus thibetanus</em></td>
<td>This species is hunted bear extensively for the gall bladder, for its medicinal value and its use for curing malaria and tuberculosis. Meat is consumed by Monpas; skin is also an utility item</td>
</tr>
<tr>
<td>Tiger</td>
<td>Vartak/Bartak</td>
<td><em>Panthera tigris</em></td>
<td>Bones are dried, powdered and applied as paste for curing body pain.</td>
</tr>
<tr>
<td>Musk deer</td>
<td>Grawa</td>
<td><em>Moschus moschiferus</em></td>
<td>Musk gland is a highly priced item in national and international market. Meat is consumed by the locals.</td>
</tr>
<tr>
<td>Leopard</td>
<td>Bartak/Bu</td>
<td><em>Panthera pardus</em></td>
<td>Meat is a food item, and is also of medicinal value for curing typhoid, malaria and rheumatic pain.</td>
</tr>
<tr>
<td>Assamese macaque</td>
<td>Pungzala</td>
<td><em>Macaca assamensis</em></td>
<td>Macaque meat is used for treatment of various ailments, including malaria</td>
</tr>
<tr>
<td>Arunachal macaque</td>
<td>Munzala</td>
<td><em>Macaca munzala</em></td>
<td>Hunted and killed as a crop raider in cultivated fields. In some pockets of Tawang District the locals kill it for meat.</td>
</tr>
<tr>
<td>Capped langur</td>
<td>Roksha</td>
<td><em>Trachypithecus pileatus</em></td>
<td>Meat is consumed and also used as medicine for malaria, typhoid, dysentery and small pox. They also use the skin particularly the tail as a sheath for their weapon and the long sickle (‘Dao’) they carry.</td>
</tr>
<tr>
<td>Rhesus monkey</td>
<td>Zala</td>
<td><em>Macaca mulatta</em></td>
<td>Has food and therapeutic value -flesh is used for treating malaria, typhoid and small pox.</td>
</tr>
<tr>
<td>Yak</td>
<td>Yak</td>
<td><em>Bos grunniens</em></td>
<td>Is of high utility value as a source of food; hair and skin are used for making a variety of household items.</td>
</tr>
<tr>
<td>Himalayan Goral</td>
<td>Gasha</td>
<td><em>Naemorhedus goral</em></td>
<td>Skin is used to make sacks for storing household items. Skin is used for making jackets. Meat is consumed.</td>
</tr>
</tbody>
</table>

**SOURCE:** Primary Survey, 2009-10.
Table 2. Hunting Priorities and Religious and Rituals related to it among Sherdukpen

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Hunted</th>
<th>Belief associated/ Conflict</th>
<th>Body parts in demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arunachal Macaque</td>
<td>Yes</td>
<td>They hunt it due to crop raiding behavior</td>
<td></td>
</tr>
<tr>
<td>Rhesus Macaque</td>
<td>Yes</td>
<td>Hunt is due to retaliatory behavior as it is a crop raider</td>
<td></td>
</tr>
<tr>
<td>Assamese Macaque</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capped langur</td>
<td>No</td>
<td>They believe it to be the protector of forest and natural resources</td>
<td></td>
</tr>
<tr>
<td>Barking deer</td>
<td>Yes</td>
<td></td>
<td>Meat, skin</td>
</tr>
<tr>
<td>Bharal</td>
<td>Yes</td>
<td></td>
<td>Meat</td>
</tr>
<tr>
<td>Chinese Goral</td>
<td>Yes</td>
<td></td>
<td>Meat</td>
</tr>
<tr>
<td>Himalayan Goral</td>
<td>Yes</td>
<td></td>
<td>Meat</td>
</tr>
<tr>
<td>Red Goral</td>
<td>Yes</td>
<td></td>
<td>Meat</td>
</tr>
<tr>
<td>Musk deer</td>
<td>Yes</td>
<td></td>
<td>Meat, muss, skin</td>
</tr>
<tr>
<td>Sambar</td>
<td>Yes</td>
<td></td>
<td>Meat, skin</td>
</tr>
<tr>
<td>Takin</td>
<td>Yes</td>
<td></td>
<td>Meat</td>
</tr>
<tr>
<td>Wild pig</td>
<td>Yes</td>
<td>Crop raider</td>
<td>Meat</td>
</tr>
<tr>
<td>Dhole</td>
<td>Yes</td>
<td>Livestock raider</td>
<td>Skin</td>
</tr>
<tr>
<td>Himalayan</td>
<td>Yes</td>
<td>Crop raider</td>
<td>Skin, Gall</td>
</tr>
<tr>
<td>Black Bear</td>
<td>No</td>
<td>They are sacred and therefore not hunted</td>
<td>bladder</td>
</tr>
<tr>
<td>Tiger</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porcupine</td>
<td>Yes</td>
<td>Not hunted as they are helpful to the farmers in controlling harmful rat population</td>
<td>Meat</td>
</tr>
<tr>
<td>All Snakes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Primary Survey, 2010.

to it subsequently (Choudhury, 2006). In 2004, the ‘Bird Life International Asia Partnership’ published a regional directory of Important Bird Areas (IBA) in Asia, which documents a total of 2,293 important bird areas in 28 countries/territories in the region. Indeed, the proportion of Asia’s land area within the IBA network is substantial, Arunachal standing out as one of the rich centres for Avifauna (Islam & Rahmani, 2004); the Western Arunachal covering a large area (Sangti valley; Shergaon, Mandla-Phudung and Kalaktang; Thungri-Changlang, Poshingla complex and Zimithang – Nelya IBA sites), is a ‘hot-spot’ of avian diversity, as noted below:
Sangti valley (27° 26’ 46” N, 92° 04’ 60” E): The Sangti valley, surrounded by denuded slopes with sparse temperate and broad-leaved forests, though rich in avian diversity is a lesser-known site with sparse temperate and broadleaf forest. The western side of the valley has villages and most parts of the valley is under paddy cultivation during summer; the harvested paddy fields attract many bird species including Black-necked crane (*Grus nigricollis*) during winter months.

Shergaon, Mandla-Phudung and Kalaktang (27° 23’ 60” N, 92° 17’ 67” E): Shergaon, Mandla-Phudung and Kalaktang are some of the least explored areas of Arunachal Pradesh bordering Bhutan. The forests of shergaon are contiguous with those of Eaglenest wildlife sanctuary (an IBA), while Sangti valley, another IBA, lies north of Mandla-Phudung.

Thungri-Changlang, Poshingla complex (27° 31’ 60” N, 92° 21’ 60” E): This is a remote area, thinly populated with many inaccessible areas where the forest cover is largely well conserved, and is an IBA. Thinly populated, with very many inaccessible areas, it has good forest cover.

Zimithang –Nelya (27° 42’ 28” N, 92° 22’ 38” E): Another remote area at the tri-junction of India, Bhutan and Tibet, with much altitudinal variation (2000 m to >5000 m), the forest cover varies from temperate, conifer to sub-alpine scrub. It also has high altitude lakes, good habitat sites for waterfowl (Islam and Rehmani, 2004).

**Hunting and Wildlife linked Cultural Values**

**Through Deities and Taboos**

Considering the utility value of the faunal species, some of which are described in the above table, the Monpa community has evolved over a time period, conservation mechanisms in the form of totems, taboos etc. Many animal parts are also used during rituals like bones of snake, tiger etc., but they are only collected from the dead animals. It is believed that killing of a tiger to be very inauspicious, and if someone kills one he has to perform a ritual for forgiveness for the sin committed. Among Monpas it is believed that all animals except Tiger (locally called Bartak) could be hunted. The Bhut Monpas (a sect of Monpas) lead a hunter-gatherer lifestyle and believe that the main totem and clan idol is the spirit of the tiger. Hunting is done only for gathering material for traditional attire and for customary rituals. On the day of ritual, no one is to undertake hunting, fishing and/or
land cultivation related activities, so to avoid injuring or killing any living being. Hunting is a taboo for the family members during the pregnancy period. Consumption of meat is stopped for a year in case of a death in the family.

Sherdukpen too have a rich cultural tradition linked with faunal conservation through totems, taboos and sacred sites. Every village has its own presiding deity to look after its welfare. As per belief, the deity, Gombu Chha Dakpa has six sons and they are suggested to be the protectors of human beings, wild flora and fauna from evil spirits.

*Through Folk Dance*

Folk dances have always been an integral part of the conservation measures of tribal people of Arunachal Pradesh, as indicated below:

Zuk Suba (the Deer dance) is a pantomime of the tale of an old shepherd and his two sons with a dog who passed their leisure hours hunting in the jungle. It shows how the deer was tempted on to a trap by the hunters. One day, after long and strenuous effort, the two sons and the dog entrapped a deer and took it to their home and sought permission of the father to kill it, but the villagers came to its rescue imploring for mercy and to set it free. Since then it has become customary to set free such animals as deer, sheep, cow and goat, a custom followed by the people till date. This dance sends out the message for conservation of wildlife, and against indiscriminate hunting and slaughter of animals. Langdong Suba (cow dance) has the moral that if anyone should kill a cow it will wait for him in the other world, and that Sangothung, the god of death, sends the cow to chase it and torment it. The other folk dances forms are: (i) Tadong (Horse dance) that demonstrates that if anyone beats or overloads his horse, Sangothung will send a horse to trouble his soul after his death; (ii) Phadong (Pig dance) shows why the Sherdukpen are reluctant to eat pork, for it demonstrates how a great pig punishes those who kill and eat too many pigs; (iii) Shawa dance, that signifies compassion to nature and the animal life; (iii) Shacham signifying the traditional values linked with avifauna; (iv) Yak dance, linked with yaks which contributes toward the prosperity of the Monpas, and therefore needs to be conserved; (v) the Lion and Peacock dance, linked with their ancient saint Tentelling who was meditating on the mount Gangrikarpo for three consecutive years in the Himalayan range. Surprisingly, on the other ridge of the same mountain dwelt two snow lions. The two snow lions saw the saint meditating for
such a long period of time without taking any food or drinks, and two ‘snow lions’ out of compassion for the saint offer milk to the saint, thus becoming intimate friends of the humans. The message coming from all these cultural traditions is that peace and harmony can happen in the world, only if there is complete peace, harmony and cohesion amongst all the living creatures on this earth.

Indeed, these mountain people believe that the forest is the abode of their numerous gods and spirits, both benevolent and malevolent in nature, with a variety of taboos linked with the wildlife. For instance, killing of tiger is a widespread taboo among the Monpas, Mishmis, Galos and many others. However, if some one kills a tiger by mistake or due to inevitable circumstances then not only the person but the whole village has to go through various restrictions and performance of rituals to appease their Gods. For, e.g., Monpa farmers of Sangti valley of West Kameng district and Zimithyang valley of Tawang District consider the Black-necked Crane (*Grus nigricollis*) as sacred bird, which visits them only during the rice harvesting season; they believe that this bird brings prosperity to the village, to cite an example.

### Hunting of Avifauna

Monpas follow Buddhism and they believe that life continues to exist after death in some form or other and likewise most Buddhist people they also believe in the existence of soul. They are basically hunting less as compared to the other forest dwelling tribes of Arunachal Pradesh. With increasing in population and developmental activities, the traditional values have become diluted as communities are becoming part of illegal wildlife trade, which can be recognized as one of the serious threats to wildlife of the state. Sometimes over-population of wild animals, domestic animals often results in man-animal conflicts, which manifests itself in form of crop raiding and livestock depredation. The mid- and high-elevation areas of western Arunachal are inhabited by pastoral and agro-pastoral indigenous, i.e., the Brokpa clan of Monpa community. Livestock rearing is one of the mainstays of Brokpa economy, while the conflict that exists due to livestock predation by wild carnivore species is also another reason of enhanced conflict among these pastoralist people.

Despite conservation measures rooted in their culture that invariably protects wildlife, both the tribes hunt mountain ungulates, which serve as an alternatives available for food and forms one of the major sources of
protein for tribal people. Over 60 species of birds are recorded as being
hunted by Brokpa clan (pastoralist people) of Monpas, and some of the
common avifaunal species are listed in Table 3.

Table 3: Avifaunal Species being Hunted by the Local Brokpas of West Kameng,
during Grazing Period

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>White browed Rosefinch</td>
<td>Carpodacus thura</td>
</tr>
<tr>
<td>Rufus vented Tit</td>
<td>Periparus rubidiventris</td>
</tr>
<tr>
<td>Rufus Sibia</td>
<td>Heterophasia capistrata</td>
</tr>
<tr>
<td>Gold Napped Finch</td>
<td>Pyrrhoplectes epauletta</td>
</tr>
<tr>
<td>White capped water redstart</td>
<td>Chaimarrornis leucocephalus</td>
</tr>
<tr>
<td>Black Redstart</td>
<td>Phoenicurus ochruros</td>
</tr>
<tr>
<td>Greenish warbler</td>
<td>Phylloscopus trochiloides</td>
</tr>
<tr>
<td>Eurasian Blackbird</td>
<td>Turdus merula</td>
</tr>
<tr>
<td>Buff-barred warbler</td>
<td>Phylloscopus pulcher</td>
</tr>
<tr>
<td>Spotted Nutcracker</td>
<td>Nucifraga caryocatactes</td>
</tr>
<tr>
<td>Duskey Warbler</td>
<td>Phylloscopus fuscatus</td>
</tr>
<tr>
<td>Red billed Chough</td>
<td>Pyrrhocorax pyrrhocorax</td>
</tr>
<tr>
<td>Olive backed pipit</td>
<td>Anthus hodgsoni</td>
</tr>
<tr>
<td>Alpine Accentor</td>
<td>Prunella collaris</td>
</tr>
<tr>
<td>Rufus ramped bush Robin</td>
<td>Cercotrichas galactotes</td>
</tr>
<tr>
<td>Yellow billed Chough</td>
<td>Pyrrhocorax graculus</td>
</tr>
<tr>
<td>Black faced laughingthrush</td>
<td>Garrulax affinis</td>
</tr>
<tr>
<td>Dark breasted Rosefinch</td>
<td>Carpodacus nipalensis</td>
</tr>
<tr>
<td>White Collared blackbird</td>
<td>Turdus albocinctus</td>
</tr>
<tr>
<td>Blendsford’s Rosefinch</td>
<td>Carpodacus rubescens</td>
</tr>
<tr>
<td>Stripped laughingthrush</td>
<td>Garrulax virgatus</td>
</tr>
<tr>
<td>Plain backed Thrush</td>
<td>Zoothera mollissima</td>
</tr>
<tr>
<td>Blue fronted redstart</td>
<td>Phoenicurus frontalis</td>
</tr>
<tr>
<td>Golden Bush Robin</td>
<td>Tarsiger chrysaeus</td>
</tr>
<tr>
<td>Yellow breasted Greenfinch</td>
<td>Carduelis spinoides</td>
</tr>
<tr>
<td>Rufus breasted Accentor</td>
<td>Prunella strophyta</td>
</tr>
<tr>
<td>Nepal House Martin</td>
<td>Delichon nipalense</td>
</tr>
<tr>
<td>Grey backed shrike</td>
<td>Lanius tephronotus</td>
</tr>
<tr>
<td>Long tailed shrike</td>
<td>Lanius schach</td>
</tr>
<tr>
<td>Hill Prinia</td>
<td>Prinia atrocularis</td>
</tr>
<tr>
<td>Eurasian Tree Sparrow</td>
<td>Passer montanus</td>
</tr>
<tr>
<td>Whiskered Yuhina</td>
<td>Yuhina flavicollis</td>
</tr>
<tr>
<td>Oriental Turtle Dove</td>
<td>Streptopelia orientalis</td>
</tr>
<tr>
<td>Striped throated Yuhina</td>
<td>Yuhina gularis</td>
</tr>
<tr>
<td>Winter Wren</td>
<td>Troglodytes troglodytes</td>
</tr>
<tr>
<td>Streak Rosefinch</td>
<td>Carpodacus rubicilloides</td>
</tr>
</tbody>
</table>
Conclusions

The tribes have historically relied on the wildlife resources not only towards conserving their cultural traditions, but at the same meeting with their livelihood related concerns. Their belief systems are a good blend of animistic values and Buddhist traditions, all expressed through a cultural calendar with a wide range of festivals and rituals. However, in recent times, there has been tendencies toward erosion in their values towards nature and natural resources around, which often gets expressed illegal wildlife trade, a serious threat to the wildlife in the region. The challenge lies in conserving this rich eco-cultural tradition with concern for ensuring an improved and sustainable quality of life for the people in the region (Ramakrishnan, 1992; Ramakrishnan et al., 2006); this sustainability paradigm is no where else more relevant than in the context of the biodiversity ‘hotspot’ north-eastern hill region of which this study site is an important component.
References
Cultural Landscapes: The Basis for Linking Biodiversity Conservation with the Sustainable Development in West Kameng, Arunachal Pradesh

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The Concept of Cultural Landscape in Landscape Ecology

Definition of Cultural Landscape
A cultural landscape is a geographic area that includes cultural and natural resources associated with an historic event, activity, person, or group of people. Cultural landscapes can range from thousands of acres of rural land to homesteads with small front yards. They can be man-made expressions of visual and spatial relationships that include grand estates, farmlands, public gardens and parks, college campuses, cemeteries, scenic highways, and industrial sites. Cultural landscapes are works of art, texts and narratives of cultures, and expressions of regional identity. They also exist in relationship to their ecological contexts, give us a sense of place; reveal our relationship with the land over time; and are part of our national heritage, and part of each of our lives (Bacon, 1946; von Droste et al., 1995; Jones, 2003; Flower, 2003; Antrop, 2005; Barrett et al., 2009)
Review of Cultural Landscape Concept and International Initiatives

Cultural landscapes are a legacy for everyone and the benefits from the preservation of cultural landscapes are enormous. Like the historic buildings, these special places reveal aspects of a region’s origins and development. Through their form, features and the way they are used, those cultural landscapes reveal much about our evolving relationships with the natural world. They provide scenic, economic, ecological, social, recreational and educational opportunities which help individuals, communities and nations understand themselves.

Neglect and inappropriate development put our irreplaceable landscape legacy alarmingly at risk. Too often the long-term environmental and cultural ramifications of short-term decisions are not understood and as a result we lose a unique portion of our cultural footprint. The constant effort it takes to protect our nation’s cultural landscapes is everyone’s responsibility and the preservation and interpretation can yield an improved quality of life and a sense of place and identity for future generations (Bradley, 2001; Gunderson and Holling, 2002; Eiter, 2004; Dodgshon and Olsson, 2006; Musacchio, 2009; Wu, 2010).

Four general types of cultural landscapes are recognised:

- **Historic sites** - a landscape significant for its association with a historic event, activity, or person. Examples include battlefields such as Kurukshetra and Panipat in India and house properties such as Sabarmati Ashram.

- **Historic Designed Landscapes** - a landscape that was consciously designed or laid out by a landscape architect, master gardener, architect, or horticulturist according to design principles, or an amateur gardener working in a recognized style or tradition. The landscape may be associated with a significant person(s), trend, or event in landscape architecture; or illustrate an important development in the theory and practice of landscape architecture. Aesthetic values play a significant role in designed landscapes. Examples include parks, campuses, and estates such as Muchal Gardens and Brindavan Gardens etc.

- **Historic Vernacular Landscapes** - a landscape that evolved through use by the people whose activities or occupancy shaped that landscape. Through social or cultural attitudes of an individual, family or a community,
the landscape reflects the physical, biological, and cultural character of those everyday lives. Function plays a significant role in vernacular landscapes. They can be a single property such as a farm or a collection of properties such as a district of historic farms along a river valley. Examples include rural villages, industrial complexes, and agricultural landscapes such as saffaron fields of Kashmir valley, Modipuram and Tatanagar.

**Ethnographic Landscapes** - A landscape containing a variety of natural and cultural resources that associated people define as heritage resources. Examples are contemporary settlements, religious sacred sites and massive geological structures such as Manikaran hot springs, Tirumal hills, etc. Small plant communities, animals, subsistence and ceremonial grounds are often components.

Meinig (1979) defined the landscapes as “a continuous surface we can see all around us with expressions of cultural values, social behaviour and individual actions worked upon particular localities over a span of time”. Ordinary landscapes are landscapes made by humans and thus are characterized by human-induced attributes rather than those landscapes where natural and biophysical characteristics form the most obvious attributes. Salter (1971) defines cultural landscapes to be “the artificial landscape man creates, remaking nature to better provide himself with his short-term needs of food, shelter, clothing, and entertainment”. Traditional landscapes can be defined as those landscapes having a distinct and recognizable structure, which reflect clear relations between composing elements and have significance for natural, cultural or aesthetic value (Antrop, 2000).

Antrop (1997) stated that “traditional landscapes are not synonymous with the concept of cultural landscapes”. A workable definition of cultural landscape, which would seem to encompass ideas of both cultural and traditional landscapes, is one “which results from many generations of human occupancy. Many features of present landscape were fashioned by permanent changes. The cultural landscape is evolved from the natural landscape by a cultural group” (Mayhew 1997).

Further refinement to these ideas, at the international level, is suggested in the terminology found in the UNESCO Convention Concerning the Protection of World Cultural and National Heritage, where three categories of cultural landscape are recognized (UNESCO 1972). Cultural landscapes, identified in this Convention are (i) landscapes designed and
created intentionally by man, that is, garden and park landscapes; (ii) organically evolved landscapes; and (iii) associative cultural landscapes, justified on the basis of religious, artistic and cultural associations of the natural environment rather than material cultural evidence. The second category is the most pertinent here. These are landscapes resulting from social, economic and administrative interaction over time in response to the natural environment. Such landscapes fall into two sub-categories: (i) a relict or fossil landscape in which the evolutionary process has come to an end, but which is still visible as a landscape; and (ii) one which retains an active contemporary role reflecting both a traditional way of life in association with evolutionary progress over time.

Another type of cultural-landscape category is the ‘indigenous cultural landscape’ (Bridgewater and Bridgewater, 1999). A review of the literature reveals the concept of cultural landscape is to be found most prominently in the studies by cultural/historical geographers. Sauer (1925) focuses upon the man’s record upon the landscape as fashioned from a natural landscape by a cultural group. Culture is the agent, the natural area is the medium and the cultural landscape the result. There is such a thing as a humane use of the earth; the simpler cultures are less destructive of the terrestrial basis of man’s existence than is our present technology; and the possessors of modern technology may find in the past experiences of man on the earth guidance toward a balance of the capacities of the land with the requirements of life that gives some promise of permanence (Leighly, 1963). Although many small regional cultural landscape studies were produced to support the concept of Sauer, the main impact was to finally lay to rest the doctrine of environmental determinism. This type of cultural/historical geography had lost its currency and effectively disappeared (Moss, 2001) and only in the past couple of years we begun to see something of a modernized and updated revival of these ideas of cultural landscapes in geography (Head, 2000).

Another approach which centres on the identification of unique landscape types as defined by local and regional artefacts such as house styles and fence rows. This approach is primarily followed by the local heritage conservationists. Nassauer (1995, 1997) has stressed the importance of examining culture in landscape ecology on the premise that “culture structures landscape” and “landscapes inculcate culture”. But neither has been examined sufficiently to produce cultural-landscape principles.
Present-day importance of cultural landscapes to sustainability and ecological integrity was dealt in detail by several workers (Baudry et al., 2000; Ihse and Lindahl, 2000). The longer-term evolution of related landscape-ecological values, over a 3000 year time span, has been analysed for the Noord-Brabant province of The Netherlands by Pedroli and Bolger (1990). Leitão and Ahern (2002) have recently reviewed critical stages in the evolution of ecologically-based physical planning methodologies. The majority of these have been termed ‘ecological’ methods because they are based on overlays of landscape information. These methods have inherent limitations which landscape ecology is capable of overcoming. How does the cultural landscape operate? What are the functional and structural relationships among its elements? A landscape study might answer: (i) How might the landscape be altered?, (ii) What differences might changes cause? Each one of these questions – and the answers they generate – has much relevance to the question of understanding the value and role of cultural landscapes in landscape planning.

The concern about the vanishing traditional cultural landscapes and new emerging landscapes has become a topic of interest to several workers in the recent times (Leitao and Ahern, 2002; Rescia et al., 2010; Martinez et al., 2010; Spulerova and Petrovic, 2011; Keighren and Withers, 2012; Burton, 2012; Hohn and Neumann, 2012; Jiao et al., 2012; Dobson, 2012). Landscape changes are seen as a threat, a negative evolution, because the current changes are characterized by the loss of diversity, coherence and identity of the existing landscapes. New elements and structures are introduced which look alike everywhere. Landscapes always change because they are the expression of the dynamic interaction between natural and cultural forces in the environment. Cultural landscapes are the result of consecutive reorganizations of the land in order to adapt its use and spatial structure better to changing societal demands. History has recorded many successive and even devastating landscape changes, which have left barely any relics today. All the important periods of landscape change also showed proper initiatives for adapted policy and rules for landscape management and protection.

It was only at the turn of the 20th to 21st century that the concern for landscapes as a cultural heritage has been emerging again. Awareness about the threat of globalization forces on local identity and regional diversity has been arising as well. Several initiatives have been taken to reorient research and policy concerning the landscape (Vos and Klijn, 2000; Leitao
and Ahern, 2002; Rescia et al., 2010; Martinez et al., 2010; Spulerova and Petrovic, 2011; Keighren and Withers, 2012; Burton, 2012; Hohn and Neumann, 2012; Jiao et al., 2012; Dobson, 2012). Policy makers became aware of the growing challenge when trying to preserve any value of traditional landscape and researchers increased the number of publications in this domain (Ramakrishnan, 1996; Antrop, 1997; Austad, 2000; Green, 2000; Wascher, 2000; Wascher and Jongman, 2000; Nohl, 2001; von Haaren, 2002; Mahanty, 2003; Anderson et al., 2005; Zimmermann, 2006).

The analysis of the proximate and distant causes of landscape change show the main driving forces acting simultaneously in varying mutual importance are: accessibility, urbanization and globalization. Natural hazards or calamity could be stated as an additional and unpredictable factor.

**Accessibility**-The accessibility of a place is an important factor in the site selection by humans. Controlled access is an important quality when creating a settlement (Roberts, 1987). The functional specialization of a place, such as a market place, harbor or defensive place, demanded different accessibility qualities. The growth of a place and the development of its economical or political power depended in a large extent on its geographical situation and its accessibility (Taaffe et al., 1996). The impact of transportation infrastructure upon the landscape is very diverse (Stanners and Bourdeau, 1995). Areas that are not easy accessible by people are often characterized as stable natural landscapes as could be visualised in the north-east India.

**Urbanization**-Most of landscapes across the world were created by rural habitations in the effort to organize their land for a better and guaranteed subsistence. This is the basis of the historical land zoning around villages based upon various land use forms of different intensity. The exponential growth of cities was caused due to increased mobility and communication networks post Industrial revolution (Bryant et al., 1982; Antrop, 2000). Cities form extended networks that affect large areas that contain a multitude of different functions. Urbanization is basically a change in life-style and can affect even remote villages (van Eetvelde and Antrop, 2001) as could be visualised in the north east India.

**Globalization**-As a driving force in landscape changes, globalization refers to all general processes and initiatives that affect decisions and actions at the local level. Economic globalization emphasizes hypermobility, global
communications and the neutralization of place and distance (Sassen, 2000). New global and regional hierarchies of cities emerge and vast areas become increasingly peripheral. Very often, these processes break the intimate relationship a local society has with its land.

Natural hazards/Calamities—In densely populated regions and intensively used land, the hazard for calamities increases and the number of people affected as well. Each time a disaster occurs, massive means are invented to reduce the impact and to restore the feeling of security that ‘it will never happen again’. In crisis situations there is rarely time for careful planning and detailed impact assessment. Only in the phase after the disaster, new options for landscape restoration are considered. Often interesting new opportunities might emerge that would never be thought of or difficult to realize otherwise.

Traditional rural landscapes resulted in a great diversity of sustainable landscapes. Those have a better legibility and give a clear character and identity to place and region. Landmarks and symbols are necessary ancestral roots. Also, they contain many forgotten lessons and landscape structure is crucial for the maintenance of diversity, both biodiversity and cultural diversity. These landscapes are a source of essential (barely studied) knowledge about sustainable management techniques. They possess unexplored wisdom and inspiration for making better future landscapes and offer a base for restoration. Lowenthal (1997) stresses three attributes when considering landscape as patrimony: (i) Materiality: landscapes are perceived with all our senses, which make them tangible; (ii) Landscape is used as container for a large variety of artifacts and gives them a broader context and hence enhances their singular values and (iii) Stability: landscape is the most fixed, immovable phenomenon in our environment. This quality makes landscape feeling like secure and reliable.

Austad (2000) formulated six strategies for agriculture to maintain cultural landscape values: (i) in the best-maintained and most ‘authentic’ cultural landscapes, semi-natural vegetation types should be protected and preserved as traditional agricultural systems are valuable because they had been sustainable for centuries and can be models for the future. (ii) revitalization and intensification of the outfields and low-intensity farming systems should be stimulated. (iii) more incentives and substantial financial support are needed for farming that maintains biological-historical values. (iv) organic farming and agro-forestry should be encouraged. (v) local knowledge and traditions should be combined with concepts of landscape
ecology to develop ‘new’ cultural landscapes and agro-systems. (vi) more research is needed on traditional sustainable agriculture as well as more applications of its results. These strategies all focus upon adapted use and functionality of the landscape based upon knowledge of its historical development and past functioning.

The appearance and condition of the future landscape will depend on the societal conditions that are shaping it. A growing trend towards homogenisation, loss of natural elements, problems with water and soil that need technical solutions, etc., is the result of continued population growth and their demand for infrastructure, natural resources and energy (both fuel and food). We would be needing a strong, comprehensive regulatory instrument (which may be landscape planning) with compulsory means at hand to resolve the numerous natural resource conflicts resulting from many land use demands placed on the landscape in such situations. Alternatively one could visualize a sustainable society that favours quality growth of industry, with primarily organic or environmentally compatible farming. The land uses would have a lower impact on the environment. Landscape planning would play more as an advisory role and the landscape plan would provide suggestions for setting priorities for further development in such situations.

How RS/GIS could be used in Studies for Cultural Landscape Assessment

Estes et al. (1980) list the following areas in which remote sensing can contribute to geographical studies: morphometric analysis, cause–effect analysis, temporal modes of explanation, functional and ecological analysis, and system analysis. Ley and Samuels (1978) assert that quantitative reductionism is not appropriate for humanistic geography and that field interviews are necessary to study insider’s perceptions. It is a common belief that quantitative methods, such as remote sensing, confirm positivist science and therefore do not have much to offer to realist human geography (Philo et al., 1998). It is understandable, then, that in much of existing work, remote sensing analysis is used to detect the material landscape, whereas ethnographic methods are used to study cultural meanings. Although Pratt (1989) insists that quantitative methods are not necessarily incompatible with realist and humanistic research, case studies taking remote sensing beyond the realm of the physical and material/spatial landscape into the cultural have been scant.
Remote sensing analysis not only provides a broad physical/spatial context in which cultural acts take place, but also offers additional stories about the cultural aspects of the landscape once synthesized with ethnographic research. By revealing material consequences of cultural change on the landscape, and by uncovering the discrepancy between human intentions and ecological reality, these stories shed new light on cultural practices, cultural changes, and culture–landscape relationships.

Human activities have become a dominant factor shaping most cultivated landscapes of the Earth (Goudie and Viles, 1997). Human, animal and machine labour expended in using the land can create outstanding cultural landscapes with high aesthetic, cultural and ecological value such as the paddy-field rice terraces of south-east Asia (Droste et al., 1995), but may as well result in land degradation as is the case in some karst regions in the Mediterranean (McNeill, 1992; Thirgood, 1981). The distribution of landforms such as steep slopes, fertile plains, inundated valleys in a landscape sets the frame for land use by determining factors such as accessibility, water and nutrient availability (Risser, 1990), but may over long periods of time also be changed through land use. On the other hand, land use serves distinct socio-economic purposes: land may supply materials and energy through hunting, agriculture or forestry, it may host infrastructure, or it may be needed to absorb waste and emissions (Haberl et al., 2004). Landscapes can be seen as the contingent and historically variable outcome of this interplay between socio-economic and biophysical forces.

During the evolution of cultural landscapes throughout the world, humans have developed adaptive land use techniques and created specific patterns of fields, farmsteads, remnant woodlots and the like that depended on both natural and socio-economic conditions (Grigg, 1974). In European agricultural landscapes, the long history of land transformation has led to regionally distinct regular patterns of geometrically arranged landscape elements, reflecting the historical and cultural background of the prevailing land-use system of a region (Bell, 1999). The spatial distribution of ecotopes, the so-called landscape structure, has therefore often been regarded as a mosaic of ‘frozen processes’; i.e. landscape structure assumedly mirrors the processes which had been going on in a landscape. This perception has even become a central paradigm in modern landscape ecology (Forman and Godron, 1986; Forman, 1995). While many ecosystem processes are difficult to observe directly, landscape structure...
can be derived from mapping as well as from remote-sensing data; therefore, landscape structure was often not only used to evaluate the ecological value of landscapes, but also to judge ecological aspects of the sustainability of land-use patterns (Odum and Turner, 1989; Wrbka et al., 1999a, b; Martinez et al., 2010). In recent years, however, indicators such as the human appropriation of net primary production (HANPP) have become available that allow researchers to measure specific aspects of ecosystem processes caused by land use on the landscape scale (Haberl et al., 2001), making it possible to relate landscape patterns and the underlying processes, as the human influence in landscapes, and thus test hypotheses such as the ‘frozen process’ paradigm.

In landscape studies, remote sensing techniques have been used widely to assess patterns of change, to evaluate use potential, to integrate environment with social change, and to identify the risk of land degradation (Sader et al., 1994; Casimir and Rao, 1998; Rasmussen et al., 1999; Bender et al., 2005; Kumar et al., 2006; Martinez et al., 2010). While the techniques are considered quantitative, they are increasingly combined with such qualitative methods as ethnographic interviews in the study of cultural landscapes (Behrens et al., 1994; Brondizio et al., 1994; Conant, 1994; Guer and Lambin, 1993; McCracken et al., 1999; Moran and Brondizio, 1998; Sussman et al., 1994; Wilkie, 1994). Typically, remote sensing images are used to detect changes in land cover, which are then linked with human causes or correlated with sociospatial data derived from ethnographic methods (McCracken et al., 1999; Sussman et al., 1994). In particular, remote sensing analysis has contributed to the study of landscape in the following ways: providing a large spatial and temporal context for landscape studies (Moran and Brondizio, 1998), supplementing the use of ethnographic data in evaluating land-use dynamics (Guer and Lambin, 1993), and enabling quantitative measurements of land-use intensity and diversity (Behrens et al., 1994).

Remote sensing methods have been used to deepen our understanding of landscape processes and land-use consequences. What has been lacking in most applications of remote sensing analysis, however, is the discussion of how it can supplement ethnographic research in the realms of cultural meanings and human perceptions as they relate to landscape. Many researchers relate quantitative methods with physical processes and spatial relations, while they see ethnographic fieldwork as designed to solicit meaning and cultural implications (Ley, 1981; Ley and Sammuels, 1978).
Remote sensing techniques, with their strong mathematical and statistical components (as in signature extraction and classification; Lillesand and Kiefer, 1994), are seen primarily as quantitative methods. In their applications, remote sensing and ethnographic methods are often divided to deal with two different sets of processes: the former are used to analyze processes related to land cover while the latter are used to address issues related to land use. While at the analytical level land cover and land use are connected, interactions are often lacking at the methodological level between remote sensing and ethnographic methods (Philip, 1998) terms such use as one of “multiple methods,” in which a number of methods are used to address different facets/stages of the research. Use of multiple methods is a welcome trend given its potential for more integrated research. It is not always easy, however, as it challenges researchers to become familiar with more than one kind of methodology. The challenge becomes greater as for mixed methods where different methods are used to study the same facets/stages of the research. Philip (1998) points out those quantitative methods are not necessarily devoid of meaning, but can be applied in ways that enhance certain perspectives and meanings. This is demonstrated clearly in Rocheleau (1995), where quantitative measures are fruitfully combined with qualitative methods to reflect a feminist perspective. Similarly, remote sensing analysis has the potential to contribute to the study of human perceptions and cultural practices. In fact, Robbins and Maddock (2000) have demonstrated that land cover categories of remote sensing image analysis carry deeply imbedded meanings that fall squarely in the realm of the social and the cultural. The fact that ground truth is required for remote sensing image classification implies its necessary connection with the lived landscape. Remote sensing images reflect the material basis of cultural landscapes that can only be understood through the meanings people assign to them and the perceptions people have of the environment. Furthermore, the reciprocal interactions between landscape and culture can be revealed in the analysis of remote sensing images: the material landscape not only demonstrates the consequences of cultural practices, but also carries messages about natural limitations on these practices. Therefore, remote sensing analysis has the potential to further inform us of the dynamics of the culture-landscape relationship.

In addition to areas and locations of land cover change, how can remote sensing analysis help us evaluate human perceptions of the landscape and local people’s ecological knowledge? If ethnographic data are gathered
from stories people tell about the meanings they attach to their lives and the landscape, how can remote sensing analysis reveal additional stories about land and culture? How can these stories deepen our understanding of the culture-landscape relationship?

**Stakeholder Perceptions about Cultural Landscape**

The communities in the study area belong to Monpa and Sherdukpen community. The main differences between the societies are summarized below:

<table>
<thead>
<tr>
<th></th>
<th>Sherdukpen</th>
<th>Monpa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main profession</td>
<td>Agriculture</td>
<td>Pastoral</td>
</tr>
<tr>
<td>Main crops</td>
<td>Tomato, potato, apple</td>
<td>Wheat, apple</td>
</tr>
<tr>
<td>Livestock</td>
<td>Cows, poultry</td>
<td>Yak, sheep, horse, dog</td>
</tr>
<tr>
<td>Livelihood</td>
<td>Settled</td>
<td>Semi nomadic</td>
</tr>
<tr>
<td>Villages</td>
<td>Rupa, Chillipam, Shergaon, Jigaon, Thonrii</td>
<td>Dirang, Mandalla, Nyukmadung, Kallaktang</td>
</tr>
<tr>
<td>Population</td>
<td>Less (appr.18000)</td>
<td>More</td>
</tr>
<tr>
<td>Caste</td>
<td>Thong and Chaos (in order)</td>
<td>Khuchulu, Saichokpa, Adijipo, Tirkipa, Nimo, Shermo, Opa, Mirakpa (in descending order)</td>
</tr>
<tr>
<td>Dead body</td>
<td>Cremate</td>
<td>Either cremate or chopped into 108 pieces and feed to fishes in the river</td>
</tr>
</tbody>
</table>

The traditionally pastoralist Monpa tribe have hierarchical class system. As the society is changing understanding this becomes important. Monpa tribe of Arunachal Pradesh are classified into eight classes (caste). They are, (i) Khuchulu, (ii) Saichokpa, (iii) Adijipo, (iv) Tirkipa, (v) Nimo, (vi) Shermo, (vii) Opa, and (viii) Mirakpa. The first four classes are considered as upper classes (caste) whereas the last four are considered to be lower classes (caste). In general, cremation of dead bodies is performed. However, the lower class communities in the upper elevation areas (Dirang, Nafra, Tawang) either cremate or chop dead body into 108 (107+1 head) pieces and feed fishes in the river (to appease 108 gods?). The local priest (Lama) decides whether the body is to be cremated or chopped off after performing religious rite (puja). Poor people who cannot meet the expenses of cremation (cremation is very expensive costing Rs 15000-20000 on ghee and fuel wood) may choose for body chopping. The people of upper caste occupy most of the land. When person of lower caste meets that of upper caste he/she removes his/her cap or takes out his
tongue as a mark of respect. Despite no social sanction on inter-caste marriage, generally people of higher caste do not prefer bride or groom from other caste. Both Monpas and Sherdupkens visualise the landscapes in different perspective. The transhumant Monpa visualises the entire transect of his summer abode to winter abode as one big landscape with intermittent halting places which holds the culturally significance and part of the life. Those Monpas recently stopped practicing the transhumant way of life continues to have similar perceptions, but now tend to give less importance to those plases which no longer provided them any aesthetic or economic benefit. The younger generations of Monpas who were never exposed to the transhumance and predominant part of Sherdupkens visualise the cultural landscape only upto the area where they have been visiting and exploiting the natural resources.

How they Visualize the Cultural Landscape?

Ecological Life support system were preserved because sustainable forms of land use such as terracing, stable shifting cultivation and moderate pastoralism were usually practiced. The harvesting of wild animals and plants was governed by religious beliefs and customary rules that made it sustainable. Genetic diversity was maintained as a result of the low pressure exercised over natural systems and by the imposition of religious taboos. Although, not necessarily always intended as conservation instruments, these rules were generally effective in maintaining population in equilibrium with the environment. These traditional natural resources management are shaped around local rules and regulations (Ntiamo-Baidu, 1995; Abayie Boateng, 1998), which are most often enshrined in religious or cultural beliefs and superstitions, and are enforced by prohibitions called taboos, which have no legal backing, but the belief systems have been strong enough in the past to make people obey the regulations (Ntiamo-Baidu, 1995).

Amongst most ethnic groups, there exist beliefs that regard the majority of water bodies as abode of deities, and thus taboo against making recurrent visits to these sites were effective in protecting these sources, especially those that served as potable water sources for a community or group of communities. Rivers and their immediate surroundings, especially forest, are protected on the basis that the spirit of the river resided in the area.
Delineation of Cultural Landscape

There are three principal mountain ranges around the district and these are Sela range, Bomdila range and Foothill range.

RS/GIS Based mapping and Analysis of Cultural Landscape

To understand the macro level landscape changes in the focal research area about 788 km² area with Bomdila and Rupa in west Kameng district of Arunachal Pradesh as central points was selected. The broad landscape view (Fig. 1 & 2) shows the main focal points of current research area. Doimara is the winter settlement of transhumant Sherdukpons. The area is mainly inhabited by Monpa and also by Miji (locally known as Sajolang and Damai), Khowa (locally known as Bagun), Aka (locally known as Hrusso) communities. Geological instability is high as denoted by the high concentration of earthquakes during the last 100 years.

Digital remote sensing data of two periods i.e., 1988 (TM data) and 2001 (ETM data) was analysed to assess the landscape changes. These changes will be related to the socio-economic changes that were

Fig. 1. Landscape View of Study Area.
documented in the literature for this period. The present land use of the area based on 2007/2008 remote sensing data is being processed for updating the information. The geographic features of the area are derived using 1961 topographical sheets.

The area is highly dissected by the drainage network (Figure 3) and the geological and anthropogenic activities are reported to cause extensive sediment flows in these drainage systems.

Fig. 3. Drainage Network of the Study Area
The assessment of the study area shows that the elevations increased steeply from east to west and south to north as the mountain ranges are generally occurring in East–West direction in the study area (Fig. 4). The study window shows both 1200-2000 and 2000-2600 m elevation zones have about 300 km² area while <1200 m elevation zone have only 71 km² area (Table 1).

Table 1. Area (km²) in various Elevation Zones in the Study Area

<table>
<thead>
<tr>
<th>Elevation (meters)</th>
<th>Area (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1200</td>
<td>71.25</td>
</tr>
<tr>
<td>1200 - 2000</td>
<td>310.60</td>
</tr>
<tr>
<td>2000 - 2600</td>
<td>296.48</td>
</tr>
<tr>
<td>&gt;2600</td>
<td>109.45</td>
</tr>
</tbody>
</table>

Assessment of slope in the study window showed that the area is highly dissected with steep slopes (Fig. 5). The area in each slope class in the study window shows less than 7° slope classes have about 20 km² area as compared to 196 km² in 7-20° slope class (Table 2).
Table 2. Area (km$^2$) in various Slope Classes in the Study Area

<table>
<thead>
<tr>
<th>Slope (degrees)</th>
<th>Area (km$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1</td>
<td>1.66</td>
</tr>
<tr>
<td>1 to 3</td>
<td>3.89</td>
</tr>
<tr>
<td>3 to 7</td>
<td>16.24</td>
</tr>
<tr>
<td>7 to 20</td>
<td>196.44</td>
</tr>
<tr>
<td>20 to 30</td>
<td>316.56</td>
</tr>
</tbody>
</table>

Assessment of area in various slope aspect classes showed that study area has more or less uniform distribution of area in each slope aspect (Fig. 6 and Table 3). The area in north, east and south east aspects is marginally greater than other slope aspect classes.

The assessment of remote sensing digital data of October 1988 indicated the area near to Bomdila and Rupa settlement and area near to the Kameng river in the low valley is extensively used for both settled and shifting agriculture (Fig. 7). As the population of the area increased with time, the agriculture also increased as seen from ETM data of 2001.
Such expansion of agriculture is generally occurred in dense or moderately dense forest (>60% and >40-60% crown cover). Even the scrub and open forests increased in the area (Table 4) during this period.

Fig. 6. Slope aspect Map of the Study Area

Table 3. Area (km²) in various Slope Aspect Classes in the Study Area

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Area (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>100.17</td>
</tr>
<tr>
<td>North - East</td>
<td>99.50</td>
</tr>
<tr>
<td>East</td>
<td>118.86</td>
</tr>
<tr>
<td>South - East</td>
<td>112.83</td>
</tr>
<tr>
<td>South</td>
<td>93.26</td>
</tr>
<tr>
<td>South - West</td>
<td>71.16</td>
</tr>
<tr>
<td>West</td>
<td>96.54</td>
</tr>
<tr>
<td>North - West</td>
<td>95.47</td>
</tr>
</tbody>
</table>

(Fig. 8). Such expansion of agriculture is generally occurred in dense or moderately dense forest (>60% and >40-60% crown cover). Even the scrub and open forests increased in the area (Table 4) during this period.
Fig. 7. Land use Map of the Study Area based on TM data of 1988

Fig. 8. Land use Map of the Study Area based on ETM data of 2001
Table 4. Area (km²) in various Elevation Zones in the Study Area

<table>
<thead>
<tr>
<th>Land use</th>
<th>TM 1988</th>
<th>ETM 2001</th>
<th>Net Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense Forest</td>
<td>452.05</td>
<td>328.45</td>
<td>-123.60</td>
</tr>
<tr>
<td>Moderately dense forest</td>
<td>82.99</td>
<td>74.30</td>
<td>-8.69</td>
</tr>
<tr>
<td>Farm land</td>
<td>47.80</td>
<td>96.99</td>
<td>+49.19</td>
</tr>
<tr>
<td>Scrub/Open forest</td>
<td>15.56</td>
<td>47.61</td>
<td>+32.05</td>
</tr>
<tr>
<td>Water/Shadow</td>
<td>189.40</td>
<td>240.45</td>
<td>+60.05</td>
</tr>
</tbody>
</table>

The land use change matrix of the area between 1988 and 2001 shows (Table 5) that it is undergoing an extensive transformation and the land use intensification is occurring rapidly with increased urbanization and road network expansion near to main drainage network. The macro-level analysis of the area and discussions with the officials of agriculture and watershed management departments of the State Government indicated that intensification of production processes (both forestry and agriculture) in the area together with diversion of land for major hydroelectric projects is a major cause of land use change.

Table 5. Land use change Matrix of the Study Window

<table>
<thead>
<tr>
<th>Land use classes in TM 1988</th>
<th>Land use classes in ETM 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense forest</td>
<td>265.86</td>
</tr>
<tr>
<td>Moderately dense forest</td>
<td>40.72</td>
</tr>
<tr>
<td>Farm land</td>
<td>2.42</td>
</tr>
<tr>
<td>Scrub/Open forest</td>
<td>0.13</td>
</tr>
<tr>
<td>Water/Shadow</td>
<td>19.33</td>
</tr>
</tbody>
</table>

Institutional Mechanisms

Documenting the existence, status and composition of institutions responsible for natural and man-made resources management

There are a variety of rules and regulations which prevent human contact with sacred groves such as taboo days, as noted earlier. Other regulations and controls are available on the exploitation of fisheries and other aquatic resources, and the use of adjacent lands for farming and logging. For example, there exist taboos against the clearing of vegetation for farming right up to the edges of streams and rivers (Abayie Boateng,
According to Abayie Boateng (1998), the benefit of this conservation method is quite obvious to any environmentalist, and local people are aware that it checks excessive evaporation from the rivers and streams. Other taboos, such as the disallowing of menstruating women to collect water from rivers, prevent the defilement of river deities and gods (McLeod, 1981). Needless to say, in the context of natural resources management, these taboos enhance biodiversity conservation and minimize the continuous use of natural resources (Ntiamoa-Baidu, 1995; Abayie Boateng, 1998).

The Polynesian concept, tapu, is defined as a ‘prohibition or a ban’. Social taboos represent good examples of informal institutions (North, 1994), which are based on cultural norms that do not depend on government for either promulgation or enforcement (Posner and Rasmusen, 1999). Institutions are here defined as the rules and norms that structure human interaction, including their enforcement characteristics and sanctioning mechanisms (North, 1990, 1994), and include any form of shared constraint that human beings devise to shape their daily interactions and transactions. Such institutions are decentralized and self-enforced by a community, where no external authority is available to guarantee that social actors will abide to rules and procedures (Knight, 1992). Formal institutions, in contrast, are rules that human beings devise, such as written rules, laws, and constitutions and are highly associated with the structural complexity of industrialized nations and their division of labour (North, 1990, 1994).

Anthropologists have ascribed various social functions to taboo - (i) they function to distinguish between sacred and profane entities in a culture (Durkheim, 1915); (ii) relate to animist and magical belief systems (Frazer, 1922); (iii) serve psychological ends (Malinowski 1922); and even (iv) serve ecological adaptations (Harris, 1971; Rappaport, 1968). Infact, it may be difficult to distinguish among ecological, social, or religious origins and functions of taboos (Colding and Folke, 1997, 2001). Taboo often apply to certain sets of natural resources, which are particularly vulnerable to overexploitation, and thus the imposition of temporal taboos regulates access to resource/s on either a sporadic, weekly, monthly or even seasonal basis (Colding and Folke, 2001). The institution of taboo have very often been neglected in conservation designs in biodiversity rich countries (Alcorn, 1995; Robbins, 1998), where protected area reserves remains the only major approach for protecting biodiversity (McNeely, 2003; Gadgil, 1998).
However, since most of the world’s biodiversity exist outside of protected areas (Murphree, 1994), informal institutions, such as sacred forests, may play an active role in nature conservation, and hence the need of the present study.

Traditional natural resources management system in practice in Arunachal Pradesh, can be classified into the following broad categories: (i) protection of particular ecosystems or habitats (such as sacred natural sites); (ii) protection of particular animals or plant species (as totem or tabooed species); and (iii) regulation of the exploitation of particular natural resource (such as a closed season for resource harvesting. However, the taboo system surrounding the sacred natural sites has been dealt as per classification of social taboos (Colding and Folke, 2001), principally into (i) segment taboos, (ii) temporal taboos, (iii) method taboos, (iv) life history taboos, (v) specific-species taboos and finally (vi) habitat taboos.

**Segment taboos**—The following group of taboo applies when a cultural group bans the utilization of particular species for specific time periods for human individuals of a particular age, sex, or social status (Colding and Folke, 2001). Thus, certain segments of a human population may be temporarily proscribed from the gathering and/or consumption of species. Anthropologists often refer to such taboos as specific food taboos (Rea, 1981). Segment taboos frequently pertain to pregnant women, children, menstruating females, and parents of newborns. Cultural perceptions, customs, and superstitious beliefs of human health risks are frequently related to such taboos (Ferro-Luzzi, 1980; McKay, 1980; Osemeobo, 1994). Thus, segment taboos are often related totemic beliefs, which reflect cognitive and linguistic categories, useful to the natives of these cultures (Begossi, 1992; Posey, 1992). Additionally, few anthropologists have hypothesized that segment taboos may also serve as strategic responses to avoid resource depletion (Ross, 1978; Hames and Vickers, 1982).

**Temporal taboos**—The temporal taboos apply when a cultural group bans access to resources during certain time periods, and are thus imposed sporadically, daily, or on a weekly to seasonal basis (Colding and Folke, 2001). Taboos imposed on a weekly to monthly basis are often referred to as a “closed season” in the literature, which often coincides with spawning or mating seasons of species (Johannes, 1978). In Arunachal Pradesh, as in rest of the country, many communities abstain totally from consumption of products from wildlife and suspend all hunting as well. And thus, temporal
taboos function to reduce harvesting pressure on particular subsistence resources (Ntiamo-Baidu, 1991). However, temporal taboo is less marked overall, except in case of the sacred natural sites, since no exploitation of resources takes place from these places, borne out their restricted size and resource availability, thereby rendering them non-economical, both in terms of time and space.

Method taboos-The method taboo applies when a cultural group bans the use of certain methods and techniques for the withdrawal or exploitation of the species (Colding and Folke, 2001). Invariably in all the cases of sacred natural sites (SNS), this relates to the precise regulation of resources. In case of the alpine habitats, principally in case of the sacred alpine meadows, this relates to the methodology applied towards managing the grazing pressure. Yet, other very effective means of lessening the intensity of resource use from the SNS are strict adherence to certain norms, before one makes a pilgrimage to SNS; the three months prohibitory period extended to each of clan members, when a death occurs in a family; and lastly the phenomenon of restricted days of hunting.

Life history taboos-The following category of taboos applies when a cultural group bans the use of certain vulnerable stages of a species’ life history based on its age, size, sex, or reproductive status (Colding and Folke, 2001). Example offered from the landscape, includes the institution of Mrigoli in Uttarakhand, wherein the hunters do not hunt the pregnant doe, or when they are in a flock. Infact, the hunting is restricted to male and older animals. In this way the communities are able to ensure continued population growth of their wildlife resources.

Specific-species taboos-This type of taboos applies when a cultural group totally bans the killing and detrimental use of specific species in both time and space (Colding and Folke, 2001). Anthropologists often refer to such taboos as general or permanent food taboos, because they apply to all members in a community and often concern foods (Rea, 1981; Balee, 1985). Reasons specified for not killing some animals in literature, range from species being perceived as toxic (Begossi, 1992), serving as religious symbols (Fargey, 1992; Sinha, 1995), or representing reincarnated humans (Osemefor, 1994; Wadley et al., 1997), to those avoided due to their behavioural and physical appearance (Begossi, 1992). Such reasons constitute strong sentiments behind self-enforcement of the taboos. However, in the case of Arunachal Pradesh, the taboo is enforced out of
the fear that the spirits will sanction violators by invoking illness upon people, or will cause the crop failure. Similar sentiments were also reported elsewhere (Ichikawa, 1993; Reichel-Dolmatoff, 1976).

Habitat taboos—The following category of taboos applies when a cultural group regulates both access to and use of resources from particular habitats in space and time (Colding and Folke, 2001). This taboo, in the present case, obviously extends to each of the SNS covered. A forest, part of a forest, a rivulet, or pond may never be subjugated to harvesting, hunting, fishing, or any other kind of resource use, often being protected by religious taboos and considered sacred to community members. These smaller or larger sacred areas, inclusive of all the SNS, encompass a number of ecological services, including the maintenance of biological diversity, provision of habitat for threatened species, regulation of local hydrological cycles, prevention of soil erosion, pollination of crops, and preservation of locally adapted crop varieties, and serving as wind and fire brakes (Gadgil, 1987; Gadgil and Chandran, 1992; Warren and Pinkston, 1998).

Stakeholder Views on the Existing Institutions

Rather than being specifically devised for nature conservation purposes, conservation measures of traditional societies are embedded in a large social context that fundamentally differs from those of contemporary societies (Berkes et al., 1995). Resource management mechanisms and practices of traditional knowledge systems often constitute an integrated system of knowledge, practices, and beliefs handed down through generations by cultural transmission (Gadgil et al., 1993; Berkes et al., 2000). Such knowledge systems differ from contemporary ones in being moral, ethically based, spiritual, intuitive, and holistic (Berkes et al., 1995). The issue of menstrual blood in traditional beliefs has been treated extensively in anthropology as a source of potent force (Douglas, 1966). Amongst the Akans it has been emphasized as a source of “impurity” to gods and deities (McLeod, 1981), because a woman during her menstrual period is believed to possess bad ‘tumi’. It may be conjectured that women, who were considered to be the most frequent users of water, were prohibited from entering the vicinity of rivers when they were menstruating to prevent degradation and conserve these vital resources. In most communities rivers provided the main source of drinking water (Ntiamoabaidu, 1995). The exclusion of women from certain religious festivals and ritualistic observances like their periodical segregation during their menstrual
period appears to be due not to any assumed inferiority on their status but
due to the tribals’ horror of menses, which is supposed to attract evil
spirits. If these taboos are transgressed, an expiation ceremony has got to
be undergone. A breach of the law would bring on the entire society divine
wrath. Thus, it is evident that the religious beliefs also exist in the form of
taboos. In other words the tribal faith has been reinforced by taboos.

Institutions need enforcement mechanisms to be effective (North,
1990). Resource management oriented formal institutions, which since
depend on third-party legal structures, may be financially costly to society
(North, 1990). Conversely, informal institutions (like most norms) do not
depend on third-party agencies for their promulgation and enforcement
(North, 1990; Posner and Rasmusen, 1999). Many Taboos of this synthesis
are self-enforced. Monitoring of compliance of norms is furthermore
facilitated due to the closeness of family members and strong kinship ties
(North, 1990). Totemic beliefs of “automatic sanctions” are effective
enforcement measures. For example, supernatural beliefs and their
associated sanctions may effectively enforce taboos (e.g., Frazer, 1922;
Gadgil and Vartak, 1974; McClanahan et al., 1997). Also, social
conventions and religious reasons (Chapin, 1991; Osemeobo, 1994), and
morphological appearance and behaviour of species (Zann, 1989; Begossi,
1992) are reasons, which render taboos self-enforced.

Furthermore, sanctions against violations of taboos may be determined
and meted out by chiefs and leaders. Such sanctions include monetary
fines, payment in cattle (Ntiamo-Baidu, 1991), or even sacrificing the
livestock, as well as other types of social pressure. This charge is sufficiently
deterrent to scare people from infringing or breaking the taboos.

The study brings forth the assertion that the institution of taboo needs
to be given its due importance, primarily since it has (1) low monitoring
costs, (2) low enforcement costs, and in many cases (3) low sanctioning
costs. Additionally, the transaction costs, or “the costs of protecting rights
and policing and enforcing agreements” (North, 1990) are duly kept low
too, because of the inherent enforcement characteristics of informal
institutions. The institution of sacred natural sites, along with the strict norms
and taboos that relates to resource utilization, invariably relates to the
sustainable resource management practices (Fargey, 1991; Dorm Adorbu
et al., 1991; Hagan, 1998; Chandran and Hughes, 2000). Temporal
taboo, and perhaps segment taboos, may promote local conservation of
subsistence resources. In summary, taboos contribute to the conservation
of habitats, and of biodiversity, both temporally and spatially. However, a much clearer understanding of spiritual and mystical beliefs, and the related local institutions associated with traditional natural resources management, is needed. Such an assessment would provide valuable insights into the changing values of local people in relation to the protection of forests and other natural resources (Falconer, 1992).

Collaborative research involving anthropologists and natural scientists may help explain the scientific and social value of beliefs related to traditional natural resources management in the study area. This may enhance the acceptability of these traditions, many of which have conservation potential. Needless to emphasize, there is an urgent need to set forth specific guidelines to safeguard the sacred areas and promote the traditional knowledge of conservation, namely: the revitalization and enforcement of traditional education; the delineation of boundaries; the improvement of relevant knowledge and their official recognition through a legal status (Decher, 1997; Dorm-Adzobu and Ampadu-Agyei, 1995; McWilliam, 2001; Swamy et al., 2003).

Assessment of Complimentary and Contradictory Policies and Strategies in the Traditional Institutions and Government Institutions

The cultural landscape of northeast India is characterized by several ethnic groups whose social responses, with varying degrees of difference, emanate from ethnic value-systems and the promotion thereof. Thus they can be grouped as ethnographic landscapes. The driving forces such as democracy, politics and modernization have decisively altered the age-old patterns of relationship and spatial consciousness of every tribe or ethnic group. The attachment a tribal society has for their land is a complex web of relationships, but the primary force is economics or livelihoods. These tribal societies derive their attachment to their land due to tradition, family ties, religion etc. (Berreman, 1960, 1963; Bradley, 2001; Blackburn, 2003/2004).

The individuality of a tribe is characterized by its cultural traits, language they speak, the codified rules/laws they follow, the geographical extent they are distributed and the socio-economic institutions that govern the natural resources in their perceived cultural landscape. Nonetheless in the course of evolution, the tribal societies in northeast India have developed certain traits and attitudes which are common to each other. These relate
to (a) sense of kinship; (b) adherence to traditional beliefs; (c) love for the language; and (d) deep attachment to the land.

The colonial government saw an advantage in acceding political recognition to each tribe by distributing certain administrative and electoral privileges to reduce the resistance from them. This was further strengthened under the Constitution of India post independence. With the inauguration of community development schemes under the planned development programmes throughout the country, particular ethnic communities began to express their economic aspirations as well, demanding their own development programmes. Despite the secularization of political affairs, the various religions continued to play an important role in social affairs. Some members of various racial groups have been converted to a new belief, while others have not, and this variety within the group has added to the variety of intra-racial relationships. Thus, the traditional bonds of ethnic kinship and religious loyalties that provide security and identity also create a bewildering set of problems for administrative and developmental tasks.

Contrary to the common belief, Buddhism did not come to northeast India from Bihar, as did Brahminism, but from Tibet into Arunachal Pradesh, and from Burma into Mizoram, from which it spread to other parts of northeast India (Sarkar, 1980). Buddhists in India generally follow the tenets of Theravada Buddhism, but the Buddhists of northeast India are mostly Mahayanists, who believe that Buddahood is open to all. The Ahoms, who invaded Assam in the beginning of the thirteenth century, brought a new set of values and beliefs. Like their kinsmen of Burma and their ancestors of South China, the Ahoms believed in the religious and cultural values of Tai, influenced by Buddhism. However, in the long six hundred years of their rule in Assam they made no attempt to impose their religion but concentrated instead on shaping the administrative system according to the experience of their ancestors. This led to oligarchical rule and a system of compulsory service instead of taxation. Thus, primordial loyalties to clan, tribe and religion are demanded and still receive far greater loyalty than the idea of the State. Loyalty to the social order, which was a fundamental aspect of civilization, did not allow loyalty towards the political notion of the State to grow particularly in areas unaffected or partially affected by movement for national independence (Dhar, 1982; Fernandes and Barbora, 2008).
Sacred Natural Sites (SNS) in the Study Area

Conservation of natural resources amongst traditional societies seems to have arisen out of their animistic religious belief system. Such belief systems are fundamental aspects of people’s culture, which strongly conditions their use of natural resources (Rai, 2007). The two ethnic groups of the West Kameng district, Monpa and Sherdukpen have a strong tie with nature and they understood that natural resources must be sustained than only their culture will survive and cultures must be maintained to assist in the management of these natural resources. They have made some sets of special rule and regulation enshrined in religious or cultural beliefs and superstitions for conservation and protection of the natural resources. Those rules and regulations they have followed since time immemorial and become so strong enough that each and every member of the community obeys it. There are wide range of prohibition through rule and regulation on utilization of the natural resources. Moreover, these two tribe have a strong affection towards the forest and in most of the cases they directly depends on the forest for their daily life. However, they have restricted the collection of any forest product from few forest patches, as they believed that these patches are the property of evil spirit/gods, deities and must therefore not to be damaged in any way. But in some cases the collections of certain forest product like fallen twigs and branches for fuel, fallen leaves for mulching purpose etc. are allowed only in some specific season. According to them, each forest patch is owned by a specific deity, whom they should offer puja periodically or daily to make him satisfy. For them if the deity will get anger the results will be in the form of crop failure in the village, epidemic among the villagers etc. Moreover, any violation of the rule and regulations by any villager has to be faced by huge penalty and even in certain cases debarred from certain religious ceremonies in the village for a considerable time period.

They also imposed certain rules for protecting some water bodies and their immediate surroundings within a forest or on the top of mountains which are the main sources of potable water to the villages. They have a strong believes that if those water bodies are disturbed or damaged the deity who is the owner of that particular resource will punish the villagers through various diseases. In certain cases they believed that if anyone tries to touch the water will be pulled down. Moreover, they thought that the anger of the deity may result into some natural calamities, which ultimately affect their agricultural crops. Further, they have protecting the forest nearby
those water bodies and nobody is allowed to go nearby, as they knew that any disturbance to the surrounding forest will affect the water body and the villagers may have to face a shortage of potable water.

Moreover, the sacred forest patches as well as the surrounding of the water bodies which are conserved and protected by the tribes are very rich in biodiversity. Many of these sacred natural sites are made up of forest patches which are a relic of past virgin forest and survived for hundreds of years and act as important biodiversity resources and often contain plants now locally rare and some of the largest trees in the area. Many important trees like *Taxus wallichiana*, *Illicium griffithii*, *Thuja* ssp., *Cupressus* ssp., *Rhododendron* ssp., etc., along with several other medicinally important herbaceous plants can be found in those forest patches. These forest patches are an integral part of the life of Monpa and Sherdukpen tribes which play a key role in their indigenous and traditional culture. Most of these forests are located at far distance from the villages, but still, the villagers’ protecting these forest patches through their religious beliefs, which are passed from generation to generation (Salick et al., 2007).

The following are some sacred natural sites which are conserved by the Monpa and Sherdukpen tribes of the district due to having special spiritual and religious significance and they protect and conserved those sites from destruction since time immemorial. Most of these sites are under the control of the village institute system controlled by the headman (Gaon Burah). These natural sites have well demarcated boundary beyond which no one is allowed to cross, however a few don’t have such well demarcated boundaries. Moreover few forest patches are attached to the Buddhist monasteries called as the “Gonpa Forest Areas” which are controlled and managed by the Lamas of the Gonpa authority.

**Bomdila Monestry (GRLM) Sacred Forest** - It is a small forest patch of about 0.5 ha near the Bomdila Monestry. The forest is managed by the Gompa authority. The Gompa is about 3 km from the Bomdila town at an altitude of 2520 m amsl and is connected by motorable road. The forest is composed of tree species like pine, *Cupressus* ssp., *Castanopsis*, oak, *Acer* ssp. etc. *Cryptomeria japonica* is also planted near the forest. Nobody is allowed to enter/through dirty things/collects anything from this forest. The local people believed that if anyone done these things will suffer from some skin disease and to get relief the person must go to the forest again and offer puja by lighting candle and agarbatti and have to confess that he/she done the mistake unknowingly.
Zanjang rung – Thungri, a small village inhabited by Sherdukpen tribe with 66 households is situated at a distance of about 17 km towards south of Rupa in West Kameng district. Zanjang rung is a temple at around 30-35 km away from the Thungri village. The temple is surrounded by a very dense forest of about 1ha and mainly composed of pine, *Cupressus*, oak etc. It is linked to the village by a trekking footpath. The forest has been left undisturbed since time immemorial. This is due to the strong belief of the villagers that the deity would be aggressive if they disturb this forest by any mean. According to the villagers there is a deity known as “Donikhlu Nah”, who used to roam here and there in this forest. The forest is well protected by the villagers and collection/cutting any forest product is prohibited. The villagers offer puja in the temple once in a year during May for the happiness, good health of the people of the village and also for good harvest of the food products. They believes that if they fail to do so the deity will get anger and the villagers have to suffer from many unwanted things like illness, crop failure etc.

Kitsheme - It is a small water body at the top of a mountain in Chillipam village. The water body is surrounded by dense forest composed of Walnut, Oak etc. Cutting trees, disturbance to the water body is strictly prohibited. The people in the Chillipam village believed that a deity known as “Lee” (Nag) resides there and if any anyone disturbed the water body Lee will get angry and the whole villagers will suffer from some unknown diseases. Actually this water body is the main source of drinking water to the village.

Shepchang - It is a large sacred forest on a hill top near the Phudung village. Phudung is a small village inhabited by the Monpa tribe and is around 12 km away from Dirang towards north. The forest is composed of pine and *Illicium griffithii*. A deity known as Shepchang phoo resides in the forest. Nobody from the village allowed entering into the forest and collection of any forest product is strictly prohibited. The place is connected to the village by two hours trekking road. They believed that if anyone entered the forest the deity will get anger and as a result he/she can never come back from the forest. The villagers offer puja to the deity from outside the forest once in a year during the month of December for the welfare of the villagers. They worship the deity from time immemorial. They informed that in the earlier days a priest from Tibet used to come there for offering the puja. After the cessation of movement of personnel between Tibet and India people from Tawang district belonging to the Phechilpa tribe starts
offering the puja. Currently the people from the village itself are doing the job of offering puja.

Namphai - It is also a forested hill near Shephang. Namphai is the deity resides there. People believe that if someone entered the forest will never come back as the person unable to find the path out of the forest. Every year the people from the village Sangti offer puja to satisfy the deity. Sangti is a small village on the way to Phudung village and is inhabited by Monpa tribe. From Sangti this sacred forest is at a distance of about 10/12 km and is linked by trekking footpath.

Nakjee - Nakjee is a hill around 30-35 km away from the Phudung village connected by trekking road. The forest is mainly composed of Illicium griffithii, pine, Quercus sps., Taxus sps. The villagers believe that a deity Dewgla lives there. Nobody is allowed to enter/ through dirty things/ collects anything from this forest. The local people believed that if anyone done these things will suffer from some unknown disease. The villagers offer puja every year to satisfy the deity from the village itself. There is a conflict between the people from Nafra and the Phudung village. The Miji tribe mainly inhabits Nafra. Actually Nakjee is situated at the border between Phudung and Nafra and as a result both the communities claims Nakjee belong to them. Now the district administration handling this conflict and the case is in court and the yet to be settle down it.

Diphung - It is a small forest near Phudung village on a hill mainly composed of pine, Illicium sps., Quercus sps. Diphung is the deity who resides there. For the welfare of the people and good harvest of agricultural product the villagers offer puja every year. During the puja a Cow or a Methun is released to the forest and nobody can bring it back. They believed that if anyone tries to do so the whole village will suffer.

Dunglai Gapu - This is a holy forest according to the local people on a hill which is covered by bushy trees. It is located at Sange and connected to the main road towards Tawang through footpath. The local people believed that “Dunglei Gapu” is the deity residing there and he is the supreme of all the deities. Eventually the forest is well protected by the local people and no one is allowed to enter and through dirty things, burn anything within the forest. According to them if anyone entered into the forest and did not follow the rules the deity will punish the person and he/she will unable to come back out of the forest. The people informed that few
years back some persons from an army patrolling team missing mysteriously within this forest. According to the villagers, the members from the army team did offence by burning meat and dirty the place and as a result the deity punished them. The villagers offer puja to the deity once in a year.

**Dungphu** - It is a deity who resides in a forest near Dirang basti. Dirang basti is a small village situated on the way to Tawang. The forest is linked to the village through kuccha road. Monpa tribe inhabits the village. The forest is composed of *Cuppressus* sps., pine, *Quercus* sps., etc. The forest is well protected by the local people and nobody is allowed to enter/through dirty things/collects anything from this forest and if any one violet it will suffer from some serious diseases. The villagers offer puja to the deity once in a year. They believe in this deity from the time immemorial. In the earlier days during the puja they used to sacrifice either a Cow or a Methun. But since recent few years they gave up this practice of sacrificing as advised by Dalai Lama. Now they just leave a cow or a methun to the forest during the puja.

**Ata Bangley** - It is also a forest near Dirang Basti on the slope of a mountain and similar believes exist like Dungfu. Ata Bangley is the deity. The forest is mainly composed of pine, *Illicium griffithii*, *Cuppressus* sps. The forest is about 2/3 km away from the village and is link by trekking road. The forest is well protected by the villagers. The lamas from the monastery offer puja to the deity once in a year in similar manner like the previous one. The whole village people present there during the puja.

**Rimbokpa Gonpa sacred forest** - It is a large forest mainly composed of pine surrounding the Rimbokpa Gonpa. The gonpa is situated at about a distance of 2 km from Dirang basti at the slope of a mountain and is connected to the main road by trekking footpath. The forest is well protected by the gonpa authority as well as by the local people and collection of any forest product is strictly prohibited. Moreover, no one is allowed to enter into the forest. The villagers are allowed only once in a year to collect the fallen leaves for mulching their agricultural field.

**Thangshakpa tho (Chhu)** - It is a large lake situated at the top of a mountain valley in Dirang. Thangshakpa is the deity who resides there. In Monpa language “tho” means a lake and “chhu” means water. It is situated at about 60 km away from the Sangti village connected by trekking road. Actually the lake is the source of drinking water to the Sangti village. The
lake is well protected by the local people and no one is allowed to go close to it. They offer puja to the deity once in a year far away from the lake. They believed that by offering puja the deity will please and the villagers will have good health. If anyone violets the rule and touched the water some natural calamities will results and the whole villagers have to suffer.

**Chamgor jamin** - It is also a lake like the Thangshakpa tho and is also a source of drinking water to the Sangti village. Chamgor is the deity which is a girl as in monpa language “Jamin” means a girl. They never go close to the lake. Similar kind of believes exist as the Thangshakpa tho.

**Khunchu wang chhu** - It is a small water body near the Dirang basti. Khunchu is the deity believed to be residing there. In Monpa dialect “Wang” means round and “Chhu” means water. The villagers told that the water is black in colour and nobody drinks it. However, no one from the village goes near to this water body as they believed that the water will pull down people towards it. Moreover, it was believed that if someone offers puja to this deity by saying his/her enemy’s name, his/her enemy surely suffers from some unknown disease. This beliefs exist within the village people since the time immemorable.

**Gupha mandir** - It is a small temple at the top of the hill at a distance of about 5 km from Bomdila town. The temple is linked to the main road towards Tawang by footpath. The temple is in a cave and the people believed that ‘Nag devta’ reside there. They always keep the surrounding of the temple clean. Nobody is allowed to cut the forest near the temple. The people offer puja to the ‘Nag devta’ for peace and good health.

**Shera Basti water body** - Once a stream existed (10-12 years ago) in the Shera basti which provided drinking water to the villagers. The Shera basti is mainly inhabited by Monpa people but now people from other community/religion also settled there. Nobody was allowed to touch the water after having non-veg food or having garlic, etc. They believed that by doing so the water will become impure and “Lee” the diety who reside in the stream will get anger and the people in the village will suffer from various diseases. But the stream does not exist now. The villagers claim that the people from other religion destroyed it.

**Lisomu** – This is a large stony structure of around 50 m² situated in the Thungri Village. The villagers believed that Buddha resides there. The
Lisomu is surrounded by pine and *Cupressus* sps. (Thangri in Sherdukpen). They worship Lisomu since time immemorial. Lisomu is situated at a distance of about 500 m from the village connected through footpath at the junction of two streams from the mountain. Nobody is allowed to visit Lisomu under influence of alcohol and without taking bath. The lamas or the priest have to offer puja in the early morning without having any food. According to the villagers if they fail to offer puja the people in the village will suffer from illness.

**Karpu** - It is also situated within the Thungri village. It is a small stony structure and is surrounded by few banana trees. The villagers never cut the banana trees. If anyone did so have to replace by planting a new tree otherwise he/she will suffer from serious illness. The priest offer puja to Karpu by calculating some sacred days from the local calendar of the Sherdukpen tribes for good harvest of the food crops.

**Management**

*Can integration of TEK and current management philosophy of government departments could be used for effective natural resource management – a policy assessment*

Hoeschele (2000) demonstrates the salience of indigenous knowledge and practices in India (which were unfortunately denied by state mapping efforts), and Bollig and Schulte (1999) examine the fine-grained ecological knowledge of African pastoralists regarding the cultural landscape (Richards, 1985; Sillitoe, 1998). Other research has, however, revealed the inadequacy and even inaccuracy of local knowledge (Xu et al., 2005). Johnson (1989) examines the limited awareness of native Amazonians about environmental vulnerability to destructive human practices; and Forsyth (1996) points to the spatial limitation of local knowledge. These observations also imply limitations to ethnographic research. This is consistent with studies in quantitative methods that argue for their usefulness in supplementing qualitative research in the identification of broad geographical patterns (Antrop, 1997; McLafferty, 1995; Kwan, 2002; Berkers et al., 2005; Barthel et al., 2009).

The limitation is generated from two factors: time scale and spatial scale. The accumulation of local knowledge occurs over a long period of time. Chandler (1994) compares two groups with different lengths of residency in Southeast China, one 30 and the other 8 generations, and
discovers that the former group has more accurate ecological knowledge and more sustainable land-use practices than the latter. This illustrates the long time frame in which local knowledge accumulates in areas where the landscape does not change much, or only changes slowly. With rapid changes in modern times, however, the natural dynamics of the ecosystem are interrupted. The rapidity of change in the landscape itself is also important, but has not received enough attention in the literature. These rapid changes upset the natural dynamics of the environment (Jiang, 2002). Time has been too short for the local population to accumulate new knowledge. In the meantime, influenced by the scientific and political optimism of the socialist state, local people tend to attribute more capacity to the sandy land than it can offer. As they focus more on the commodity value of the land, their recognition of its natural limitations becomes further obscured.

Spatial scale also contributes to limiting local knowledge on changes at the landscape level. Since the early 1980s, pastureland in Uxin Ju, China has been distributed to households. Each household works its own small parcel of pastureland of about 600–1,000 mu. This does not encourage people to see larger patterns of change at the landscape level that go far beyond the pastureland of individual households. While pastoralists do have knowledge about other households’ pastures, their focus is not on larger spatial patterns. Connectivity at the landscape level is difficult to perceive (Forsyth, 1996); moreover, the privatization of land further encourages segmented views of the landscape. In this sense, unless measures are taken to coordinate efforts across the landscape, land use at the level of individual households will remain incompatible with ecological considerations.

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Summer, Winter, and in between .... The Brokpa Story

Moji Riba

Centre for Cultural Research and Documentation, Itanagar, Arunachal Pradesh

This 15 minutes audio-visual documentary depicts the transhumant lifestyle of Brokpa community in Western Arunachal Pradesh which is becoming increasingly threatened by both the cultural acculturisation of the society into modern way of sedentary life and increasing natural resource scarcity in light of land use/cover changes that are occurring in the region. The traditional transhumant lifestyle which exploits the abundant grazing resources available in the landscape has been mastered by the communities practicing rotational grazing systems across the world has always respected the carrying capacity of the ecosystems in which they resided. The society established institutional mechanisms to protect the ecosystems from overexploitation and used cultural belief systems, taboos and totems to control the access to the resources and inbuilt the heard number management systems and encouraged the community to view the entire landscape or the world as on big unit with cultural activities to be performed before or after use of the specific land parcels. This documentary depicts the transhumant family performing a journey to its summer abode in high elevations, their stay and return journey after exploiting the resources in the alpine regions. It explores the cultural activities that are performed before they proceed and the festivities that they celebrate after their return home. The interviews with representative individuals belonging to older, middle aged and young generations indicate the perceptions of the society at various times and especially the future as visualised by the young generation. The impact of the changing society is clearly visible as the older member supports the views of young generation that they should get education and look for employment and settle down. This audio-visual documentary is part of the series of the documentaries that were produced under MacArthur Foundation supported research programme on Cultural Landscapes: The Basis for Linking Biodiversity Conservation with the Sustainable Development.
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The Socio-cultural and Socio-ecological Dimensions of Demazong Sacred Himalayan Landscape in the Eastern Himalaya

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Introduction

The concept of sacredness over natural spaces is an age-old practice of local and indigenous societies since several millennia. Thus, in many cultures of the world, the sacred natural sites are centre for environmental conservation and have often led to conservation of native biological diversity (Schaff, 2003). The culture and environment prevalent in mountains are the result of long-lasting seclusion and isolation due to restricted accessibility that are primarily characterized by optimal adaptation of indigenous people to their environment finding its expression in a “high mountain cultural landscape” (Jentsch, 1984; Grotzbach and Stadel, 1997). The Convention on Biological Diversity, adopted at the 1992 Rio de Janeiro summit with Agenda 21 has categorically acknowledged the need to protect and encourage customary use of biological resources in accordance with traditional and cultural practices that are compatible with conservation or sustainable use requirements (Article 10). In addition to the economic dimensions, the dynamic but traditionally managed natural resources and systems are chiefly governed by social, cultural, and spiritual dimensions. Thus, traditional societies depend upon the natural resources and biodiversity around them for their sustainable livelihood maintenance (Ramakrishnan, 1992; Ramakrishnan et al., 1994).
The Demazong (Bhutia for “the hidden fruitful valley”) situated in the lap of the Eastern Himalayas, is an example of sacred cultural landscape largely managed and adored by the Lepchas, Bhutias and Nepali communities over several centuries. It is a land abounded by over 84 snow-packed glaciers, two major glacier-fed river systems, around 150 lakes, a number of streams and springs, and a few hot springs. The region is primarily hilly in topography with only a little lowland in the southern part and the variation in its aspect and relief is extreme with agro-climatic variation within short distances. The land rises from an elevation of around 300 m at the sub-tropical zones to temperate zones at and above 2000 m and alpine zone at and above 4000 m. The Mt. Khanchendzonga peaks at 8,598 m which is considered as the abode of deities, bestows enormous natural wealth to the mountain communities downstream.

Despite the similarities of Sikkim Himalayan landscapes and cultural practices among other mountain systems and practices, studies and literature on the socio-economical, socio-political and socio-ecological dimension of Demazong cultural heritage is scanty (Ramakrishnan, 2003, 2008a; Sharma and Liang, 2007). The sacredness of this landscape and the three ethnic communities of Sikkim has been defined and elaborated by several authors (Gowloong, 1998; Arora, 2006, 2006a; Gulia, 2005; Ramakrishnan, 2008; Subba, 2009; Acharya, 2011). This chapter outlines and reviews the spiritual, cultural and socio-ecological dimensions of the Demazong landscape of the Sikkim Himalaya.

**Spiritual/Cultural Dimensions of Demazong Landscape**

The Sikkim Himalayan cultural landscapes is considered as sacred by the indigenous societies inhabiting here. It is described as Beyul (the hidden land) and the Ters (the hidden treasure) in Nysol (holy text of Buddhism) in the Tibetan Buddhist philosophy with clearly defined norms and a well defined boundary for sacredness (Dokhampa, 2003; Ramakrishnan, 2008). The region is an assemblage of sacred landscapes called Demazong or the Shangrila (the hidden paradise on earth). It is believed that Demazong has four religious sites, which are considered to be the four plexuses of the human body. They are (1) Tashiding (symbolizes the head plexus), (2) Yuksam (symbolizes the third eye), (3) Khecheopalri (symbolizes the thorax) and (4) Pemayangtse (the heart plexus) (Jain et al., 2004). All these sites are located in the west district of Sikkim and fall under Khanchendzonga range of mountains. The revered guru of Buddhist followers, Guru Rimpoche, in
the eighth century and Guru Nanak (revered guru of Sikh followers) in the 16th century blessed Demazong as sacred on their way to Tibet. This Himalayan cultural landscape was blessed by Guru Padmasambhava, who personally consecrated many of Sikkim’s sacred landmarks and blessed Drakar Tashiding as the region’s spiritual centre (Dokhampa, 2003). The cultural landscape is worshipped by the Lepcha, Bhutia and Nepalese during several cultural and customary occasions.

Thus, the traditional societies continue to worship the broader Khanchendzonga sacred landscape. These sacred spaces are linked to diversity of natural resources and ecological functions and show strong social integration and cultural harmonization (Sherpa, 2003; Sharma and Liang, 2006; GIAHS, 2007). The Khanchendzonga is a boon to mountain people living below it; its physical presence has made Sikkim a self-contained unit, as it bestows biodiversity, fertile valleys, abundant streams, protected geography and elaborate mythology (Wanchuk and Zulca, 2007). The intrinsic concept of sacred landscape is highly embedded in the primitive tribes, the Lepchas in Dzongu (a Lepcha Tribal Reserve in North Sikkim) who consider Tholung Monastery, Khanchendzonga and the adjoining forests as their symbolic identity (Arora, 2006). The culturally important forests, caves, mountains, rivers and springs (such as Kabi sacred forest in North Sikkim, Mahadevsthan in Lingee South Sikkim) not only represent the symbols of indigenous identity and cultural significance but also house a repository of biodiversity (Das, 2005; Arora, 2006a).

The unique mountainous landscape consists of varied physiographic factors and topography giving rise to microclimatic variations and a range of ecosystem, species and genetic diversity. As stated above, Demazong consist of diverse natural-cultural landscapes and ecosystems that have brought together a network of ingenious cultural societies and management systems into a single regular natural continuum. Here, the biophysical features of landscapes at a shorter distance are conducive for genetic variations and landraces with sustained natural resource management. The traditional societies worship the broader Khanchendzonga sacred landscape, which are linked to diversity of natural resources and ecological functions and show strong social integration and cultural harmonization. This cultural landscape is also described as Ney-Pemathong or Indrakil and worshipped in various traditional, cultural or customary rituals such as Pang-Lhab-Sol (mother deity Khanchendzonga) for protection from calamities, Tendong-Lho-Rum-Faat (worship of the Tendong hills) by
Lepchas and Bhutias for better rain, production and harvest, and Sansari Puja (mother goddess on earth) by Nepalese for better production, rain and good season. Thus, the social-cultural and social-ecological functions are purely traditional and interdependent, amalgamated within the three ethnic communities of Sikkim.

The sacred Khanchendzonga landscape is considered as the abode of deities that houses natural resources critical for human survival. All the water bodies, rivers and lakes are culturally important, sacred and considered as the abode of guardian deities of all faiths. The traditional ways of conservation of water such as local springs (pani-pandhero) is linked to cultural antiquity of the communities. Natural springs, streams and seepages, cliffs and peaks are considered as sacred and are conserved with the application of indigenous ecological knowledge. The Devisthan (place of mother god), Deurali (hills-top, abode of deity), Teesta mai, Rangit mai, Rongli mai, Ramphu mai (mother goddess in rivers), sacred groves and agroforests are the existing examples how people conserve natural resources for human survival and well-being. Indigenous communities have strong belief that the Maharani-Thakurani (queen of goddess who keeps the vigil on them) and her nephew the Bhanjo-Shikari would punish upon disturbing these sacred places in the form of calamities, diseases and illness. Bandevi-Bandevta (god and goddesses of the forests) and Jangali (care taker of the forests) use their super natural powers to conserve forests and biodiversity.

The Demazong cultural landscape is bounded by three mountain ranges, viz., Singalila Range that separates Sikkim from Nepal in the West, Chola Range and the Trans-Himalayan Range separates Sikkim from Chinese Tibetan Autonomous Region and Bhutan in the northeastern part, and Pangolakha Range bifurcates Sikkim from Bhutan in the east, housing the famous Zemu, Rathong, Lhonak, Hidden, Talung, and Tista Khangse glaciers. These Himalayan mountain ranges are unique due to the Khangchendzonga (Ghangchhen-mZod-Nga), Mt. Narsing, Gabar Gangtsen, Pandim Peak, Mt. Simvo, Goecha Peak, Fork Peak, Pao Hungri (Pauhunri), and Mt. Siniolchu all situated between 6000 and 8596 m elevation forming the world’s third highest mountain range. The exceptionally important sacred caves hidden within the Demazong cultural landscape are Shar-chhog-bayphug at Sangmo, Khado-sangphug at Sanganath, South Sikkim, Dechenphug above Nampung, West Sikkim, Lhariny-ingphug via Kongri-Labdan, and Phagmorong and Tragthungrong.
in West Sikkim.

At different point of time, the followers of Buddhism constructed around six famous Chhoedtens in Sikkim that represent five elements (pancha- tattva) such as earth, water, fire, wind, and ether in different layers, representing that all life form (pancha-bhautic) are the physical composition of these principal elements of nature. Norbugang Chhoedten Tashi Hodber at Yuksom was first built by Naljor Chhedshi more than 100 years ago, is a symbol of cultural pride. Similarly, Chhoedten Thongwa Rangdrol at Tashiding is about 100 years old and was built by Gyalwa Lhatsun Chhenpo.

A large number of natural symbols are believed as purely sacred and culturally important, and are found across the mountains and valleys of Sikkim (Table 1). Apart from the tangible benefits such as a variety of ecosystem goods and services these natural spaces bestow to the humans, they are protected for intangible non-use reasons with benefits accruing to them at the spiritual level with psychological implications (Ramakrishnan, 2008).

The concept of Beyul and an approach of Sacred Himalayan Landscape

The concept of Beyul is ancient when the revered Guru Padmasambhava identified several sacred hidden valleys called the Beyuls in the Himalayas. They are mostly isolated, peaceful and abundant in natural resources such as forests and fruits, water and fertile soil. In the Nyingmapa Tradition of Buddhism, Beyul concept has been deeply rooted, and there are about 108 Beyuls found across the Himalayas spread over India, Nepal, Bhutan and China (Sherpa, 2003). This is symbolic to harmonious co-existence of humans and nature and their diverse traditional and customary rituals venerate and protect nature and the environment such as forests (monastery forests, Deuralis, sacred groves), land (rocks, cliffs, caves, hills and mountains), water (rivers, lakes, springs), plants/animals (trees, herbs, cows, serpents, etc.).

The Sacred Himalayan Landscape (SHL) is a landscape approach for mountain conservation and development in the globally important Eastern Himalayan Ecoregion Complex initiated by government, inter-government, non-government, and community based organizations and institutions. The Ministry of Forests and Soil Conservation, Government of Nepal developed a broad strategy document on “Sacred Himalayan
Table 1. Some important sacred lakes, caves, peaks, rocks and hot springs in the Demazong cultural landscape.

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Landscape, Strategic Plan 2006-2016” in 2006. The SHL is a transboundary conservation area covering 39,021 km² area of which about 73.5% falls in Nepal, 24.4% in Sikkim and Darjeeling of India and the remaining 2.1% falls in Bhutan. This strategic planning entails broad objective of developing a potentially strong conservation and management policy and a network of institutional partnerships. Its basic aim is to build landscape approach to planning taking into account the biodiversity conservation, cultural and socio-economic values and sustainability of ecological processes (GoN/MoFSC, 2006).

Mayal-Lyang of the Lepchas

The Lepchas are considered as the aboriginal tribes of Sikkim. They consider the landscape of Sikkim and adjoining areas and Ney-Mayal-Lyang, which means the “holy hidden paradise” They call Khangchendzonga as Kung-chen-chu. Lepchas believe that there is a hidden sacred landscape called Rum-dar-zu-lyang, a place where their deities and the protectors reside. Similarly, adjacent to this Rum-dar-zu-Lyang there is another sacred hidden landscape called Sum-zu-Lyang where their ancestors reside. Besides these two sacred hidden landscapes, they also believe that there is another sacred landscape called Ran-zu-lyang, a holy place where the respected people (after death) live.

Lepchas are ardent worshippers of Forests and Wildlife and organise customary ritual during Punzuk-Rum-Fat (Punzuk-forest and protector god; Rum-Fat- offering of puja) festival. They worship the nature god during Seque-Rum-Fat, for the protection of the cereals, fruits, vegetables, farms and the surroundings for productivity and prosperity. Therefore, they offer their agriculture and wild produces to the deities during the Chi-Rum-Fat ceremony. Lepcha consider the rivers Tista and Rangit as holy rivers and purely sacred. As per the elderly Bungthings (priests), Lepchas were believe to have originated from the Kan-Chen-Chu (Khangchendzonga) which is thus revered as the abode of the origin of the first Lepchas on earth.

The protector spirits (Dewa) of the Lepcha constantly visit and guard their farms, fruits and surrounding environment of a household, disturbance by an outsider to these would punish immediately. Dzongu, as it is culturally called, is pristine, protected, and officially reserved for Lepchas by the Government of Sikkim. The cultural landscape extends towards the north, west, south and east districts of Sikkim forming a continuous cultural corridor. Currently, the identity of indigenous Lepcha tribe is under threat from the
dominant religions and peoples (Foning, 2003), and rapid development actions. This increasing threat has consequently degraded the invaluable wealth of knowledge and the cultural and sacred spaces of Dzongu.

**Su-Khim of the Limbus**

The Limbu tribes or the Yakthumbas are also regarded as aborigines of Sikkim. It is believed that the Limbu, Bhutia and Lepcha had a treaty of blood-brotherhood during the 13th century at a place called Kabi-Lungchok which is located near Mangshila in North Sikkim. Situated on the other side of the Dzongu (bifurcated by River Teesta), Mangshila is culturally important landscape for Limbus. Further, this culturally vibrant Limbu area is a continuous landscape corridor between Bhutia and Lepcha cultural landscapes. The significance of Limbu tribe in the history of Sikkim is such that the name of the state or erstwhile kingdom is from the Limbu word Su-Khim (Su = new, Khim = a house or palace) that was later anglicized as Sikkim. On several cultural, customary and traditional rituals Limbus worship the mother nature.

**Indrakil of the Nepali autochthon**

The Demazong cultural landscape is called the Indrakil (valleys of flowers of the rain god Indra) by the Nepali indigenous communities. The land is also regarded as swarga-ko-phulbari (garden of the heaven) by these communities whose mention is found in various literatures. Across the vertical and horizontal natural spaces in Demazong landscape at large, several traditional cultural practices have undoubtedly played a crucial role in the conservation of sacred groves such as Deuralis, Siddha-sthans, Devi-sthans, Sansari-danda, Mahadevsthans, etc.

Deuralis are natural cultural landscapes presided over by Devi, the protector goddess, forming a complex continuum called Devi-Deurali. The traditional practitioners of local health system and preachers of indigenous rituals, the Dhamis, Jhankris, Bungthings, Phedangbas, Bijuwas chant the elements of sacred spaces and locations such as names of the lakes, water-falls, caves, cliffs, mountain peaks, wild fruits, trees, rocks, springs, Devithans, Siddhethans, etc. and a variety of spirits or demons during customary rituals. Communities of various beliefs and faiths offer flowers and coins while crossing rivers, lakes and all other natural spaces of sacredness.

The springs and their surroundings are considered sacred and are
declared as Devisthan (place of Goddess) by the local priests. Every village of Sikkim is blessed with a number of Devisthans. They are the spiritual and cultural centres of a village and are the reserves of drinking water. They are often socially fenced with oral regulations for keeping the sanctity of the place. Trees of religious and cultural significance like Banyan (*Ficus benghalensis*) and Peepal (*Ficus religiosa*) (considered as the husband and wife pair) are planted in Chautaras (resting place for pedestrians) by the Nepali communities and are found in almost every villages. The idols of god and goddess are placed as a cultural and spiritual expression where the pedestrians offer flowers and leafs (pati) for their protection. Furthermore, Devi Puja and Sansari Puja (Goddess of rain) and Nag Puja (prayer of Cobra snake) are performed at the Devithans and Deuralis on auspicious occasions and also at times of extreme draught during April-May for rain. The advantage of this traditional system is that people fear contaminating/polluting/defecating at and/or in the surroundings of the spring or any sacred site. The springs and the surrounding sacred groves with tall trees are protected in almost every villages of Sikkim. Considering the guardian of springs, the local people offer milk to Naga-Devata (serpent god), offer Dipa-prajjwalan (lightning of lamp) and chant mantras (sacred hymns, etc.). Such activity secures perennial source of water to the villagers as well as protection from natural calamities, diseases, unnatural deaths.

Nepali Hindus also believe that Lord Shiva meditated in Dupukney Cave in the Western Part of Demazong, which is located right above the Khecheopalri Lake. Therefore, the region is considered as the sacred abode and Lord Shiva is worshipped during “Nag Panchmi,” which falls in the month of July-August (nag=Serpent; Panchmi= 5th day of the Shravana Sukla according to Luna calendar), a special month in the Hindu calendar (Jain et al., 2004).

**Biodiversity elements in the Demazong sacred landscape**

The floral and faunal assemblages of the Sikkim, Assam, and other north-eastern states of India appear to be distinct in the Eastern Himalayas. They became a gateway between Southeast Asia and South Asia after the tectonic plate collision some 10–65 million years ago, which resulted in the formation of the Himalayas (Mani, 1974; Gupta, 2001). Several floral and even faunal elements from Myanmar, Thailand, Vietnam, Cambodia, Indonesia, and Malaysia are found in the tropical and subtropical forests of Sikkim. Since the formation of the Himalayas, the Eastern Himalaya
has much more rainfall and is warmer than the Western Himalaya. This has been considered by many as filters and barriers in the effective dispersal of flora and fauna. Therefore, the geological, climatic, and biological events that occur at different times have made Sikkim the important centre of the Eastern Himalaya, which is a global biodiversity hotspot (Myers et al., 2000; Mittermeier et al., 2004).

The Demazong cultural landscape is a cornucopial assemblage of many different ethnic communities (presently, more than a dozen tribes) and this has always remained as a strong feature in regard to biodiversity conservation. These communities are closely associated with nature, have immense knowledge on biodiversity and cognizant of its conservation importance (Acharya et al., 2009). As a combined force (because no one tribe wants to be left out in the race) a large part of the landscape still remains undisturbed despite the onslaught of increasing population. The real process and design of how they help in biodiversity conservation and the underlying reasons have been vaguely understood so far and further insight is needed in this line, especially in the form-factor relevance of inter- and intra-community activities, the total number of people involved in the region, the successful and near-successful stories, inputs and collaterals involved in rituals and impact of the message to the mass, etc., which need a meaningful interpretation. These results, in the end, will turn itself into practical tools for conserving nature in the ethnic way not only in the Demazong landscape but prove beneficial when translated into the entire sway of the Himalayan human settlements and which has a direct bearing on the people living downstream and the Indian plains.

Several studies have emphasized the existence of rich biodiversity in Sikkim (Ganguli, 1998; Rai et al., 2000; Subba, 2002; Anonymous, 2006, 2008; Arawatia and Tambe, 2011). Sikkim has high repository of biodiversity elements representing 4458 species of flowering plants (including 525 species of orchids, 58 primulas and 36 rhododendrons), 506 lichens, 480 pteridophytes, 17 gymnosperms, 689 butterflies, over 1500 moths, 50 fishes, 50 amphibians, 88 reptiles (71 snakes and 17 lizards), 574 birds and 169 species of mammals (Arawatia and Tambe, 2011; Acharya and Sharma, 2012). Apart from its cultural significance of global importance, the Demazong landscape houses 490 widely used medicinal plants which can cater the demand of herbal medicines by domestic and international pharmaceutical companies (Sharma and Sharma, 2010). While Access and Benefit Sharing mechanism should be an
advantage to the traditional communities holding rich traditional knowledge associated to genetic resources (Oli and Sharma, 2010). The scenic beauty, rich biodiversity, friendly people and rich culture is attracting tourists from all over the world. The multi-ethnic groups residing in the area with diverse traditional knowledge blended with culture and religions provide an added attraction to the nature tourists (Sharma et al., 2008).

**Dynamic agrodiversity in the Demazong landscape**

The Sikkim cultural landscapes has wide spectrum of agricultural diversity which has been developed, domesticated, maintained and adapted by human societies since ancient times. It has existing traditional farming systems that encompass variations of agro-ecological zones covering a range of ecosystem diversity extending between 300 and 6000 m. The subtropical zones (below 300 m amsl) mainly constitute terrace rice cultivation systems and farm-based agroforestry. Above this are cardamom-based and farm-based traditional farming system (TFS) in the subtropical to warm temperate zones (600–2500 m), extreme subsistence farming in the cool temperate and lower alpine zones (2500–4000 m), and the Trans-Himalayan nomadic agro-pastoral to pastoral systems in the Tibetan Plateaus (4000–5500 m) (Sharma and Dhakal, 2011). The agricultural biodiversity in any form can only be effectively maintained and adapted with human management systems that have created it, including indigenous knowledge systems and technologies, specific forms of social organizations, customary or formal law and other cultural practices. These agricultural practices over time have led to landscape-scale ecosystem variation, and provided mosaics of micro-habitats that support associated plant and animal communities, which now depend largely on continued management of their viability. The cultural and spiritual association of indigenous communities is found to act as the prime mover in the management of agrobiodiversity.

The indigenous and traditional agriculture systems in the Sikkim Himalayan cultural landscapes have resulted not only in outstanding landscapes developed by multiethnic communities, but more importantly, in perpetuation of globally important agricultural biodiversity (Sikkim Himalayan Agriculture Heritage Systems has been recognized as the candidate sites for Globally Significant Agriculture Heritage Systems program of the FAO), maintenance of resilient ecosystems, and preservation of valuable traditional knowledge and cultural practices. The cultural landscapes with their range of co-evolved systems and locally
managed races, species, varieties and forest and agriculture ecosystems, have outstanding significance within the scope of Article 10 (c) of the Convention on Biological Diversity that requires parties to “protect and encourage customary use of biological resources in accordance with the traditional cultural practices that are compatible with conservation or sustainable use requirements.”

The central to cultural landscapes vis-à-vis conservation of biodiversity involves human-influenced areas, such as socio-ecological production landscapes, that contain customary/traditional sustainable management practices associated with Traditional Ecological Knowledge. Such landscapes are found in other parts of the world under various local names, such as Dehesa in Spain, Muyong in the Philippines, Chitemene in Malawi, and Beyul or Demazong in the Eastern Himalayas (Ramakrishnan, 2003, 2008; Sherpa, 2003; Belair et al., 2010).

The Demazong landscape is an example of Satoyama (Sato=a surrounding village, Yama= mountains, woodlands and grasslands) in the Eastern Himalaya. Satoyama is cultural landscapes in Japan, widely recognized in the world over, cover a wide range of human influenced areas such as villages, farmlands, and adjacent forest areas that are protected and conserved for biodiversity and human well-being.

**Functional attributes and driving forces and management**

The Demazong cultural landscape, with the coexistence of multiethnic and multi-cultural communities, is broadly governed by “formal” and “informal”, and “centralized” and “decentralized” institutions. The formal institutions have a set of Forest and Environment Protection Acts/Rules/ National Policies, Wildlife Protection Act and Biodiversity Act and Rules, and administrative structures articulated in constitutive documents. Informal community-based institutions such as Dzumsa, or village community institutions are essentially based on traditions, oral customary law, symbolic identity, customs, aesthetic or ecological values of the sacred spaces. In most occasions the “management paradigm” of the formal contradicts with informal institutions especially when utilization of resource, ownership and sustainable conservation methodologies come under question (Fig. 1).

Encompassing the Beyul-Demazong cultural landscape, which extends from central Nepal to Sikkim Himalaya in India and end with the western part of Bhutan, there are over 12 Protected Areas (PAs). PA network management policies in the Himalayas have adopted “exclusionary
approaches” to nature conservation where concept of “nature” and human society (their “culture”) are separate entities, thus ignoring the dynamic role of indigenous communities in shaping the globally important and unique ecosystems which are co-evolved through complex processes (Escobar, 1999; Rohling and Galing, 2005; Oudenhoven et al., 2010).

Demazong is “multifunctional and heterogeneous” landscape with different institutional compositions and cultural pluralism. Both “formal” and “informal” institutions are the driving forces of management. Some institutions mainly co-exist for utilization of socio-economic (agro-pastoralism, traditional farming systems, forestry, ecotourism, hydropower, factories) functions of the landscape. Some others are concerned for the conservation and protection of socio-ecological or aesthetic functions of the landscape (nature protection, heritage protection), and those concerned with integration of both aspects or research and planning (Rohling and Galing, 2005). The functional attributes of these institutions differ in several management actions or sometimes coincide depending upon their institutional laws based on literature or those orally interpreted and transferred to generations such as the case for Dzumsa. In the broader prospects and context of economic globalization, the rapidly evolving “formal” and “informal” institutions in the Demazong landscape contradict with “problems of institutional interplay” influenced by the public policies and administrative regulations, thus the generalized functions of the cultural

Fig. 1. Underlying functions of Demazong cultural landscape and their characters of goods and services (modified after Rohling and Galing, 2005).
lenscape has emerged with drivers of threats and challenges (Table 2).

Table 2. Functions, goods and services of the Demazong landscape.

<table>
<thead>
<tr>
<th>Functions</th>
<th>Goods and services</th>
<th>Driving forces and threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-ecological functions</td>
<td>Sacred forests/groves, water resources, ground water recharges, other common property resources</td>
<td>Development activities (hydropower projects, pharmaceuticals, road), land degradation, climate change</td>
</tr>
<tr>
<td>Socio-economical functions</td>
<td>Traditional agriculture production systems, agro-pastoralism in the alpine and trans-Himalayan zones, housing and production activities, forestry, ecotourism, homestays</td>
<td>Declining productivity, reduction of grazing regime of trans-Himalayan zones, illegal collection of wildlife and herbs, unregulated ecotourism and trekking trails, migration</td>
</tr>
<tr>
<td>Aesthetic/spiritual and cultural functions</td>
<td>Scenic beauty, historical and religious sites, outdoor adventure like nature-walk, hiking, trekking and mountain biking, and wildlife-tourism (bird watching)</td>
<td>Ecosystem change, landscape degradation, low level of education of sacred spaces to new generation, lack of appropriate policies, land use change/conversion etc.</td>
</tr>
</tbody>
</table>

**Endangering Cultural Landscape...**

The Demazong, Beyul Demazong, Mayal Lya-ang, Su-khim or the Indrakil is an ancient concept of conservation of natural spaces or landscapes through sacred and spiritual belief system embedded deeply in the culture and religion of indigenous communities. Over the last 20 years, several external forces have endangered the power of this sacred cultural landscape to a greater extent. The continued survival of the globally important agricultural practices and co-management of exceptionally sacred mountain system is threatened by several factors such as loss of customary institutions and traditional form of social organizations that underpin management of these systems. The rapid abandonment of the traditional cultivation and farming systems through modern technologies and developments and dilution of concept and value of traditional varieties by exotic introductions (mostly HYVs), etc. have accelerated the loss of traditional knowledge. The conversion of natural cultural spaces to other
uses such as pharmaceutical company establishments, hydropower generation projects, real estate activities have eroded the sanctity of this socio-culturally rich landscape.

In addition to these, other factors include tourism activities in all the natural cultural spaces, illegal collection and trade of wildlife and non-timber forest products, and marginalization of the indigenous societies over time and space. These threats are leading to the erosion of traditional cultural practices and consequently to a range of impacts on their agricultural biodiversity, associated natural ecosystems, and ecosystems functions. These threats also pose significant risk for the continued viability of unique and globally significant cultural landscape and biodiversity within, and the associated knowledge and management systems that have co-evolved over time and space. The traditional and local stewardship was also weakened by the modern system of management, the Protected Area Management System, initiated by the government through strict regulations over the rights and concession of the indigenous communities. At the wake of globalization, the external forces wield immense impact to the natural landscape concept, for example, modern education system do not integrate the traditional knowledge and wisdom, and thus have influenced the newer generation who has less to do with natural cultural landscape concept. The government development agencies, resource managers, educationist and scientists, and policymakers have overlooked the value of traditional knowledge systems and conservation (Sherpa, 2003). With the due consideration of traditional belief systems, there is immense scope of harnessing the religious sentiments of ethnic communities in the right perspectives of conservation and sustainable management of natural resources in this culturally rich but eco-sensitive Demazong landscape.

Conclusion

The Demazong landscape provides signs of failing structures and conforms to the above story where a once resplendent natural entity is being gradually brought to face denudation and ultimate obliteration in the near future. This particular patch of land, however, has a certain distinctiveness which sets it apart from the entire mountain environment found in the Himalayas and its rich repository of ethnic settlements within a very limited stretch of land. People from different parts of the hills and plains have converged into this place at different times in history and in the process have imparted its individual native socio-cultural touch within the
milieu. Their strong belief in environment conservation, directly or indirectly, has been more than apparent and also instrumental in safeguarding the mountain environment from rapid degradation. A strong basis for this may be the demographic placement of 70% of ethnics residing in the rural environment. So far, only bits and pieces of such efforts have been brought to light and delving deeper into the intrinsic process of their beliefs as well as actions will help us more to understand the native thoughts towards mountain environment conservation. It is in working in this line that a case may be build up to find out what and how of the different processes involved, testing it for its validity and effect, replacement and permutation paradigms of different sets, etc., so that a framework may be constructed which can be applied partially or in a holistic way in the different Himalayan landscapes.

Demazong cultural landscape showcases one example of Satoyama (a cultural landscape in Japan, now recognized by the Convention on Biological Diversity) in the Khanchendzonga Complex of the Eastern Himalaya. With the advent of globalization, this cultural landscape is exposed to rapid landuse change for socio-economic activities and socio-political changes, and in the process steadily losing its value of cultural and spiritual distinctiveness.

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The Traditional Dzumsa System and their role in Resource Management in Cultural Landscape in North Sikkim

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Introduction

Sikkim (27°05’ to 28°08’ N and 88°10’ to 88°55’ E) is a small state of India located in the eastern Himalaya. The state shares three international borders, viz., Nepal in the west, Tibetan Autonomous Region of China in the north and north-east and Bhutan in the east. The Indian state of West Bengal borders Sikkim to its south. Stretched over 112 km from North to South and 64 km from East to West, Sikkim has total geographical area of 7096 km². Sikkim is divided into four administrative districts, viz., east, west, south and north. Among the four districts, north is the largest (4226 km²) and south the smallest (750 km²).

The mountains have a mystical attraction for humankind despite its strenuous and hazardous conditions. It is reported that around one-tenth of the world’s population lives in the mountain regions (Guillet, 1983). It has generally been recognized that the basic characteristic of mountain life is the vertical stratification of resources with altitudinal and seasonal variations. Life sustenance, therefore, is totally dependent on successful adaptation to the mountain environment. The main feature of mountain life thus emerges as adaptation to the constraints of the environment, through time and space, with the application of indigenous ecological knowledge.
Sikkim is a mountainous state and the people here have used their traditional knowledge/or institutionalized administrative system evolved through ages as an adaptive tool to cope up with the prevailing strenuous conditions.

The traditional Dzumsa is a customary administrative system unique to Lachen and Lachung village in North Sikkim. The Dzumsa system is the traditional institution of the indigenous Lachenpa, Lachungpa and the Dokpa (the Tibetan nomadic agro-pastoralists). It is a unique example of indigenous administrative system which was institutionalized to manage the ecology, people and resources of the remote high altitude areas in Sikkim. In this system, a head-man known as the ‘Pipon’ is elected to chair the community. It is a form of local self-governance and was introduced in the beginning of the 19th century (Bourdet-Sabatier, 2004). Sir J.D. Hooker mentions the presence of Pipon in Lachung and Lachen village during his travel to this region (Hooker, 1854). Dzumsa is the traditional political institution inherited from the past which manages the needs and supervises progress and well-being of the local community. The Dzumsa system is recognized by the Government in 1985 (Bourdet-Sabatier, 2004). While Panchayati Raj system was introduced in other parts of the state, Dzumsa system continues to function till today in these two remote high altitude villages of Sikkim.

The institution of Dzumsa is responsible for all major decisions taken for the development and welfare of the community (WWF, 2004). They maintain law and order and dispense justice among the villagers. The Dzumsa supervise all developmental activities of the village concerned, and also settles local disputes over property or familial matters. They are also authorized to collect taxes and determine the prices of locally produced commodities. Dzumsa have their own rules and regulation for regulating the use of natural resources. Since the Lachen and Lachung community practice agro-pastoralism and they move from place to place with their herds of yaks, sheep and goats, Dzumsa play important role in this activity. Dzumsa decides the dates for shifting of herds and movement of grazing animals after building consensus among the owners of the herds. Late or early movers other than specified time period will be fined as per the Dzumsa oral customary law. This ensures equal opportunity for each household to use and extract natural resources and also prevents over-exploitation.

This chapter provides an account of the unique Dzumsa system prevalent in north Sikkim emphasizing ecologically sustainable activities.
such as their role on agro-pastoralism. It is recommended that some principles of the Dzumsa system could be applied to other parts of the Himalaya for sustainable resource use and its management.

**Traditional institutions and natural resource management**

Several traditional institutions, village customary or religious bodies and informal organizations exist in Sikkim. These organizations/institutions play a significant role in decision-making in the effective functioning and management of natural resources, customary and traditional rituals and conflict resolution for all affairs within the village. The ancient *Dzongubegom* (now the Mutan-chi-Lom-al-Schezum) is one example of the traditional institution of indigenous Lepcha community in Dzongu (Lepcha Reserve Area) in North Sikkim. Similarly, Dzumsa in Lachen, Lachung and Muguthang is another example of a functional and a successful traditional institution recognized by the Government of Sikkim. Buddhist monasteries in Sikkim such as Rumtek, Pemayangtse, Pelling, Rhinchenchi (Machong monastery) and several other monasteries have traditional *Duichi committee*, a democratically formed body responsible to look after the monastery affairs, customary rituals, and the natural resources management of the monastic land and woodlands around the monasteries. Similarly, among the Hindu cultural societies, there are several *Dharma-samaj* and *Gaon-samaj* which although exist purely informally are effective in conducting cultural and customary rituals and nature worship. Additionally these institutions are entrusted to settle disputes, manage resources and dispense justice among the villagers. Dharma-samaj is especially institutionalized to monitor and advise the community in cultural and customary rituals. Communities are advised to keep the sanctity of the various sacred groves, water sources and hills (including big rocks) present around the villages (Acharya, 2011). Violating customary laws leads to stringent actions such as fine, social boycott, eviction from the village, etc.

In North-eastern India, traditional institutions and their customary laws are responsible to govern land ownership, natural resource management and traditional system of conservation. In the state of Nagaland, little more than 90%, and in Tripura and Assam more than 30-40% of the forest land is under the customary and traditional management system. *Gaonbura* (the village chief) in Nagaland, *Doloi* in the Jaintia Hills, *Syiem* (or raja) in the Khasi Hills and the *Nokma* or head person among the Garo tribes in Meghalaya are responsible in the management of forest land, sacred groves,
hills and water systems in the villages (Chawii, 2007). In some parts of Manipur, the *Thoubai* is the traditional institution comprising village elders and heads of respective clan families. Similarly, the *Monpas* in Tawang District of Arunachal Pradesh have well-developed traditional institutions based on democratic principles.

**The Cultural landscape of Dzumsa in North Sikkim**

The Dzumsa cultural landscape in the Trans-Himalayan region in North District of Sikkim includes the Lhonak Valley, Lashar Valley and the Yumesamdong-Gurudongmar-Tso Lhamo Plateau. The Lasar Valley, Lhonak Valley and in Tso-Lhamu Plateau all above 4000 m are the homes to the agropastoralist Dokpas for centuries. Dokpas are socio-economically downtrodden in the social hierarchy who practice yak (*Bos grunniens*) and sheep (*Ovis aries*) herding. The total geographical span of Dzumsa cultural landscape is about 1500 km² that comprises Zema watershed, Lhonak watershed and Chombo Chu watershed located in the northern most tip of Sikkim. Although a major portion of the area lies within a region that can be categorized as Trans-Himalaya, its Western and Southern parts occupy an area that can best be described as transition zone between the Greater Himalaya and the Trans-Himalaya. Despite the fact that Tso Lhamo is the only true Trans-Himalayan region in Sikkim, the village of Muguthang which lies west of the Chommoyummo massif in the North and Thangu in the south is also broadly classified as a Trans-Himalayan cold-desert.

Lachen (27°46’ N, 88°35’ E) is a small village located in the north district of Sikkim. It lies at an elevation of 2730 m. Lachen is inhabited by Lachenpa tribe of Tibetan origin. The main occupation of the people is agro-pastoralism but currently they are involved in tourism activities due to rapid development of the tourism industry in Sikkim and the subsequent promotion of tourism in Lachen due to its scenic beauty and enchanting landscape. Nomadic Dokpa argopastoralists reside in the remote Trans-Himalayan region in Muguthang which is located farther away from Lachen village.

Similarly, Lachung (27°41’ N and 88°46’ E) is another small village located in the north district of Sikkim and is closer towards Tibetan border. It has been described as the “most picturesque village of Sikkim” by Hooker (1854). Lachung is at an elevation of around 2650 m and is flanked by the Lachung River, a tributary of the River Teesta. The
word Lachung means “Small Pass”. Before annexation of Tibet in 1950, Lachung was a trading post between Sikkim and Tibet, after which it was closed down. The main inhabitants of Lachung are Lachungpa tribe, also of the Tibetan origin. These tribe shares most of their life styles, culture and ethnicity with the Lachenpa tribe of Lachen.

The organizational structure of Dzumsa

The word ‘Dzumsa’ literally means a gathering place or a meeting point. This system of self-governance was established in the early 19th century in order to manage the communities and the resources located in the remotest part of the then kingdom of Sikkim as central authority (or the capital) was too far and therefore unable to take care of these communities. The Dzumsa proper or the general council of villagers is elected or designated by the villagers to represent them and manage the village affairs. These councils of representatives are referred as *Iheyna* and each *Iheyna* of Dzumsa (Lachen and Lachung) is composed of two Pipons, six Gempos, two Tsipos and two Gyapons. Dzumsa members are elected every year and assume their office for a period of one year. All the households under Lachung, Lachen and Muguthang are the members of the Dzumsa. The same batch of representatives may be reelected or reinstated by the Dzumsa member household heads if they are found progressive, otherwise a new set of people from the respective villages will be elected. The Pipons are the village chiefs, supreme authority in the village and representative of their people to the outside world. The Gempos are the elderly people and assist Pipons in the functioning of Dzumsa. The Tsipos are the accountants who use to collect taxes during the king’s regime but presently have different function after the Sikkim’s integration to Indian Union. They are entrusted to calculate fines and to maintain the record books. The Gyapons are the assistant designated by the Pipons and work as messengers, mainly for developing the relationship of the Dzumsa with the local communities by timely delivering the information to the communities and from them to the Dzumsa.

The Iheyna is formed by the members of Dzumsa. The head of each household is the member of the Dzumsa institution and has right to vote for electing the Iheyna of Dzumsa. Generally, the election takes place at the time of Lhosar (Tibetan New Year) immediately after the monastic dances or sometimes after Sonam Lochhar (the festival of harvest season) that falls during the second week of January (TMI, 2011). Women
members are not eligible to contest for the posts of office-bearers though they have the voting rights and can take part in the process of decision-making if there are no male members in the family (Choudhury, 2006). The office-bearers of the Dzumsa are elected by the system of voting. Elections are conducted by the ad hoc committee designated by the villagers (Bourdet-Sabatier, 2004). Historically they had direct voting system by raising hands but with the evolution of voting system they now use the ballot papers for voting. During voting each member writes the name of their candidate in the ballot paper. Ballots are counted after the completion of voting. The person who gets maximum number of votes is designated as the Pipon I and his immediate contestant will become Pipon II. Similarly, contestants who stand third to eighth position become Gemos and ninth and tenth would be considered as Tsipos. The Gyapons are generally nominated by the Pipons after the elections. Each annual election day commences with certain rituals and monastic dances.

**Annual activities of Dzumsa**

Once the new members are elected, the Dzumsa prepare the annual plan of activities based on Tibetan lunar calendar. They also prepare the code of conduct for their tenure. The declaration of annual plan is done by the Dzumsa office-bearers on a meeting called for the purpose. All the members of the Dzumsa should strictly adhere to these activities and the conducts charted during the meeting. Violation of any kind will be dealt according to oral customary law and imposing heavy fines.

The Dzumsa meetings are held at least once in a month or more frequently if the situation demands. Such meetings are to be attended by at least one member from each family. Failure to attend such meetings is treated as an offence and the offenders are fined and warned by the Dzumsa. In earlier times they used to meet a few times in a year in order to organize religious festivals or fixing up dates for sowing, harvesting and movements of herds. With the introduction of Panchayati Raj Institution in other parts of the state, their functions have increased manifold. Apart from their historical function, Dzumsa also undertake all the responsibilities required to be performed by the Panchayats such as utilization of funds received from government, various developmental activities of the area, etc. Hence, Dzumsa meetings have become frequent activities in recent times.

The Dzumsa under the leadership of Pipons is also responsible for maintaining the law and order in the village and dispensing justice. After the
merger of Sikkim with India, Pipons have become intermediary between the government and the people. Unlike the Panchayati Raj System, Dzumsa has its own revenue collection powers. The revenue generated through taxes, fines and other sources are redistributed among all the households in installments or as a one-time payment at the end of the year (TMI, 2011).

**Agro-pastoralism and resource management**

The Dzumsa carry out a number of economic functions and organize various traditional seasonal activities. Historically, the major economic activity of the Lachungpa and Lachenpa tribe is found to be animal farming supported by minor agricultural practices which includes maize, barley, potato, cabbage, radish, etc. The local communities rear herds such as yaks, sheep, cows and goats. The Dzumsa sets the sowing and harvesting dates for the crops for all growing sites within the valley. This act ensures the coordination among the communities and gives time to fence their cropfields so that it is not damaged by the passing herds. In this way the Dzumsa also sets dates for movement of herds in order to favor the regrowth of the forage or avoid over-grazing in prime locations. The grazing pastures at different altitudes are marked for grazing so that animals are not allowed to enter below certain altitude during summer which can otherwise be used during winter season. Similarly, Dzumsa also allocates the dates for collecting animal fodder, fuelwood and construction timbers, medicinal herbs and other minor forest produce from the adjoining forests and public lands so that each household gets equal share in regard to household upkeeping and winter reserves.

Dzumsa develops the seasonal movement calendar (based on the Tibetan lunar calendar) every year for the movement of their herds from place to place. Once the dates are fixed, all herders are asked to move on the same date. Irregular herding or shifting of livestock from one pasture to another other than the specified dates is an unlawful activity resulting into fines levied by the Dzumsa. Grazing regimes are chosen for the next move depending upon the forage availability, pasture area, number of grazing animals and snowfall events. The route, permissible stopover period at each grazing regime and numbers of grazing animals permitted are predetermined by the Dzumsa.

A summary of the movement of yaks followed by the Lachen Dzumsa members is given in Table 1. The first movement starts from Dambochey and Byamzey where almost all herders assemble mostly during August-September to make a move towards Tso Lhamo. The movements of all
herds at one time would ensure equity; all the animals would get equal opportunity to graze in the new grazing pastures. After the specified grazing days, the dates for the next move would be notified by Dzumsa. Thus, they move until they reach the final destination (Gurudongmar and Tso Lhamo plateau). Such movement is followed for other cattle also such as cows although the cows are never taken above 4000 m. Similar to the Lachen Dzumsa, the Lachung Dzumsa also regulates grazing in their regimes. The herds are moved between Lachung, Yumthang, Domang and the Yumesamdong valleys. Such routine movement of cattle adopted by the local community in Lachen and Lachung valley is the most ecologically sustainable practice. The resources are utilized properly in order to protect their wastage and early exhaustion.

In the Trans Himalayan region, the agropastoralism is a part of the ecosystem functioning. Despite the rapid transformation over the years and changes in the lifestyle, the Dokpa, the Lachenpa and Lachungpa herders are continuing their traditional agropastoral system. But now the new generation has been sent outside for better education and other livelihood options, the herding families are seemingly reducing in number. In order to keep continuity of herding, some households have recruited the paid labourers mostly from other parts of Sikkim or even outside the State. These labourers are initially trained on the yak/sheep herding, grazing in the pasture areas, movement of animals during different periods and production systems, and the Dzumsa rules and regulations.

Table 1. Yak grazing and their movement by Lachen herders at different locations during a calendar year in Tso Lhamo and Lasher valley, North Sikkim.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Location</th>
<th>Grazing start months</th>
<th>Approx. No. of days permitted for grazing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Damboche</td>
<td>August end</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>Byamzay</td>
<td>Mid-September</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Leten</td>
<td>1st week of September</td>
<td>57</td>
</tr>
<tr>
<td>4</td>
<td>Tso Lhamo</td>
<td>November end</td>
<td>76</td>
</tr>
<tr>
<td>5</td>
<td>Yumcho</td>
<td>February end</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>Leten</td>
<td>March end</td>
<td>35</td>
</tr>
<tr>
<td>7</td>
<td>Yakthang, Byamzay &amp; Yangdi</td>
<td>April end</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>Byamzay</td>
<td>May end</td>
<td>30</td>
</tr>
<tr>
<td>9</td>
<td>Damboche</td>
<td>June 3rd week</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>Sebu-Gechang &amp; Phalung</td>
<td>August end</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: TMI (2011)
Applicability of Dzumsa principles in mountain ecosystems

As a whole, 24% of the Earth’s land mass is mountainous and about 10% of people live in mountain regions. Most of the world’s mountains share similarity in climate, topography, lifestyles and, land and resource use pattern irrespective of their geographical location. In a common way the mountain communities experience hardships as cold climatic conditions, difficult terrain features and low land fertility characteristics which leads to scarcity of resources. Hence, judicious use and proper management of these resources is essential for better food security and sustenance of life.

Livestock farming supported by minor agricultural practice is the major economic activity for the people of the high altitude areas in the Himalaya (Sharma et al., 2000). One of the main problems faced by the people in high altitude area is the shortage of animal forage especially during the winter months. The condition of grasslands varies from place to place but the rugged terrain, the cold harsh climate and limited amount of rainfall impose the biophysical constraints in all types of grasslands (Pariyar, 1996) resulting in resource deficiency and subsequent conflict among its users. For example, the migration of large number of Tibetan refugees with their large herds of animals to Nepal in early 1960s disrupted the annual cycle of movement of Nepalese animal herds and deteriorated the conditions of grazing lands due to continuous overgrazing by large number of animals (Singh, 1996). Similarly, overgrazing by large population of Tibetan wild ass (Kiang Equus kiang) is responsible for pasture degradation in Ladakh in Kashmir creating conflict among the nomadic people (Bhatnagar et al., 2006), the reduction in fodder availability (and also poor quality fodder) for sheep and goats in grazing pastures in Uttarakhand during winters have increased mortality rate of animals (Nautiyal et al., 2003), and the developmental activities have reduced the grazing pastures in the Himachal Pradesh (Sharma et al., 2000). It is viewed that development of community managed institutions to these high altitude areas help in management of grazing regimes and sustainable use of local resources. Restrictions on number of herd animals, route and timing of herd movement and extraction of natural resources would resolve the conflicts among the community and ensure continuous availability of forage to the herds. The practice adopted by Dzumsa institution could be applied along the entire Himalayan range to achieve these goals.
Reverence of North Sikkim and Dumsa rituals

It is believed that the Guru Rimpoche and his twenty-five disciples (rje bngas nyer Inga) visited the northern part of Sikkim known as the Beyul-Demozong (sbas yul bras mo ljong) or the hidden valley with the treasures. During their visit they are believed to have tamed the free dwelling malevolent beings and the evil spirits that were disturbing the landscapes. Thus, they blessed the Guru-dung-mar lake at the first site. Then they blessed the entire land of Demazong after which a large number of monasteries and stupas were built at different period of time (Dokhampa, 2003).

During the Drukpa-tse-shi which falls on the 4th day of the 6th month of Tibetan Calendar, the entire mountain ranges, the holy lakes, cliffs, caves, air and water are worshipped at four different places such as Phalung, Jema, Lhonak Valley and Lachen in North Sikkim. This cultural ritual is organized by the Dzumsa that lasts for three days. A purely traditional yak dance is also organized at Phalung. All the members of the Dzumsa assemble to their respective places. The main guardian deity Khang-chen-dzonga is worshipped to please the deity and prayed for blessings for peace, prosperity and protection from natural calamities, diseases and unseemly matters to the people.

There is a holy cave called Thuk-kuk below Thangu at Deothang where Alaxandra David had meditated on her way to Tibet. During Pang-lab-sol, the holy lake Gurudongmar is worshipped. The other peaks Gayokhang and the Chumi-mo are also categorically worshipped. At Lachen, the Dzumsa organize Dup-Che puja at the Lachen monastery for progress, prosperity and peaceful times for the village. They also assemble in the monastery and offer prayer so that the impact of natural calamities such as landslides, earthquakes, etc. can be reduced. The Dzumsa of both Lachung and Lachen are also responsible for conservation of local water sources called Chulumbo or Devithans that affords waterholes to wildlife, aided fish migration, and breeding spaces for less lifeforms (Lachungpa, 2009).

Conclusion

Various ethnic communities around the world use their indigenous traditional knowledge for health care, agriculture, nature conservation and also day-to-day living. Historically, each society used to have their own governance system for the management of communities and their resources, which was developed based on the experience and their applicability to
the environment and lifestyles. But with the advent of technological development and subsequent changes in the governance system, the indigenous systems have been vanishing at a faster rate (Linden, 1991).

Dzumsa system of Lachen and Lachung village of North Sikkim, a traditional self-governance system established in the early 19th century, is one among the few such systems that has survived even today. Based on oral customary law, Dzumsa system displays excellent example of societal management and community harmony. This system is now recognized by the Government of Sikkim and functioning more robustly than before. Documentation, recognition and strengthening of such system around the world, especially in the mountainous region, is extremely essential before they evaporate from the society.

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Cultural Attributes, Economic Valuation and Community Conservation in Holy Khecheopalri Lake of Sikkim in the Eastern Himalaya

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Introduction

Mountains have ecological, aesthetic, and socioeconomic significance, not only for people living in mountain areas, but for those living beyond and occupy 24% of the global land surface area and are home to 12% of the world’s population (Sharma et al., 2010). The mountainous region of Sikkim in the Eastern Himalaya is a sacred landscape and is a centre for cultural and spiritual inspiration for Buddhist and Hindu cultural societies. It is a part of the Beyul (sacred hidden valleys) that exist throughout the Himalayan region mainly sanctified and revered by the Nyingmapa tradition of the Tibetan Buddhism (Sherpa, 2003). The sacred landscapes in the Ganga River System of the Central Himalaya and Dema-Dzong valley of the Eastern Himalaya and the sacred mountains such as Holy Hills of the Dai tribe of Xishuangbanna in Yunnan Province of China (Ramakrishnan, 2000; 2008; 2008a) are all examples of cultural sacred landscapes. Several such landscapes and mountain peaks such as Fuji Mountain in Japan (Iwatsuki, 2003), sacred sites in Tanami Desert in Central Australia (Elias, 2003), Khokiin, Ovoo, Zeegiin etc. in Mongolia (Urtnasan, 2003) and Beyuls in the Eastern Himalayas (Sherpa, 2003) are examples of cultural expressions and preservation of natural environments.

In the world over, the interactions of human culture with nature and ecosystems through several centuries evolved with a symbiotic relationship
to create unique agriculture systems and practices (Sharma et al., 2008). The World Heritage Convention adopted in 1972 is a unique international instrument for conserving cultural and natural heritage of outstanding universal value that provides opportunity for protecting the natural and archaeological sites (Rossler, 2007). The researchers and policy makers together need to identify and validate the cultural values and beliefs of the Beyuls in the Demazong cultural landscape for its recognition under the World Heritage initiative of the United Nations Educational and Cultural Organization. Recently, Food and Agriculture Organizations of United Nations and other partners have launched an initiative called “Globally Important Agricultural Heritage Systems (GIAHS) to identify and safeguard GIAHS and their associated landscapes agricultural biodiversity and knowledge systems. However, there is very limited understanding of how to harness strengths of cultural heritage systems for sustainable development.

The anthropogenic activities in the form of development has induced change of natural and cultural landscapes that are increasingly responsible for affecting the ecosystems at a local to regional levels in the Eastern Himalayas. Protected areas of biodiversity interest provide a variety of benefits and services, which are essential for the economic development of a region and need to be quantified. The economic valuation of natural ecosystem is very limited in developing countries like India, Nepal, and Bhutan. Economic valuation of natural ecosystems is a difficult task, however, such valuation helps to draw attention to their importance, and highlight conservation needs, especially in developing countries.

The Khangchendzonga Landscape is a site of high biodiversity value and one that is facing growing threats from a variety of sources including development, deforestation, grazing, tourism and climate change impacts (Maharana et al., 2000; Tambe and Rawat, 2011; Sharma and Dhakal, 2011; Chettri et al., 2011). Ecotourism should promote conservation of the natural and cultural heritage of an area, and simultaneously improve the living standards of the local inhabitants. There has been a growing interest over the past two decades on ecotourism with emphasis in conservation of biodiversity and cultural heritage, which attracts a majority of tourists. The Japan International Cooperation Agency under “the Sikkim biodiversity and forest management project” has developed Ecotourism Guideline and Policy (Watabe, 2011) for Sikkim to implement ecotourism promotion activities. However, the significance of socio-cultural and socio-
ecological dimensions of the Sikkim Himalayan Beyuls of the indigenous people is yet to find recognition in policy documents.

This chapter deals with mythical, cultural and spiritual significance of the holy lake Khecheopalri of western Sikkim. It highlights the community conservation initiatives, economic valuation of tourism, and protection of cultural heritage in the most popular destination for nature tourism in the eastern Himalayan region.

**Socio-cultural activities of the holy Khecheopalri Lake**

The Khecheopalri Lake is regarded as the part of the wider Demazong Cultural Landscape (Table 1). It is protected under the Provisions of the Places of Worship (Special Provision) Act, 1991 and State Government

<table>
<thead>
<tr>
<th>Site</th>
<th>Location extent</th>
<th>Religious and cultural attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khecheopalri</td>
<td>Lake and religious site around the watershed elevated to the Mt. Khangchendzonga</td>
<td>Khecheo means the flying Yoganis or Taras (goddesses) the female manifestations in Tibet of Avalokiteshvara, the Bodhisatva Compassion, and the palri means a heavenly palace of the gods and goddesses</td>
</tr>
<tr>
<td>Yuksam</td>
<td>Karthok Lake and religious site at Norbugang, at Yuksam</td>
<td>The significance of Yuksam is that it is the third eye, also the meeting place of the three Lamas Latsum Chembo, Sempa Chembo and Rinzing Chembo. Norbugang coronation chorten is historical evidence of the meeting place of three lamas in 1642 and the beginning of monarchy in Sikkim. Rathung-chu valley was blessed by Guru Rimpoche. Yuksam is the centre of religio-cultural centre built in 1701, the oldest Dubdhi monastery in Sikkim is there.</td>
</tr>
<tr>
<td>Tashiding</td>
<td>A religious site</td>
<td>Tashiding symbolizes the head plexus, Tashi means holy sky and Ding means island</td>
</tr>
<tr>
<td>Pemayagstsey</td>
<td>A religious site</td>
<td>Pemayangstsey symbolizes the heart plexus of the body, Pema means lotus, and Yasgstey means the center.</td>
</tr>
</tbody>
</table>
Notification No. 59/Home/98 dated 26.10.1998. The lake (27º 22' 24" and 88º 12' 30" E) is situated at 1700 m in West Sikkim which is estimated to be more than 3500 years old (Jain et al., 2000). The lake represents the original neve region of ancient hanging glaciers, the depression being formed by the scooping action of the glaciers (Raina, 1966). It is surrounded by the densely forested Ramam watershed covering an area of 12 km² and is a repository of biodiversity. It is also the halting place for the Trans Himalayan migratory birds (Jain et al., 2000).

The word Demazong also signifies the “valley of rice”, i.e. the rice produced within the vicinity of the Khecheopalri area is believed to sustain the food security and ensure good productivity to the local indigenous communities. The Guru Rimpoche, Padmasambhava was believed to have visited the Khecheopali area, who subdued the then existing evil spirits, and had blessed the land through his divine power for purity, prosperity and protection. It is also believed that it is the centre of the heavenly abode of the patron saint Padmasambhava, a dwelling place of goddess Tara, Jetsum Dolma, the mother of Lord Buddha. There are a number of spiritual and divine spaces such as the holy cave Dupukney, Yukumney, and Chubukey for the Buddhist monks who take the divine path of reincarnation and blessed with the title of Rimpoches (the reincarnates). Closer to the chorten (stupa) the footprint of Macha Zemu Rimpoche (another revered monk) is available on a stone. The Hindus equally visit the lake and offer prayers throughout the year. They believe that Lord Shiva meditated at one of the caves Dupukney which is located right above the lake, and thus puja offering is organized during Naga-Panchami (Nag=Serpent; Panchmi=5th day of the Shravana Sukla according to Lunar calendar) that falls during July-August, every year.

The Khecheopalri Lake is regarded as holy and wish-fulfilling. Both Buddhist and Hindus perform rituals and place their secret wishes to the prevailing deity. When a family member falls sick, or if a family is aputali (without children), or reeling under poverty, diseases etc. they promise (Bhakal) to visit the lake. Bhakal is to propose for the visit and offering and to rid themselves off their suffering or for desired blessings. People believe that the spiritual power of the deity would reward with divine purity and blessings. Here, one of the festivals purely organized by the Monastery Dwiche Committee is Chho-Tsho. This festival falls in the month of October every year. While another very important festival Bum-chu, which falls on the 14th day of the Losar, the New Year month of the
Tibetan calendar. Chho-Tsho is organized to thank the presiding deity of the lake for protection and bestowing food to the local inhabitants.

The monastery committee organizes Bum-Chu festival for three days. The Monastery monks prepare colourful idols (torma), light butter-lamps (108 to 1008 at a time), and worship the goddess of the lake to prevail peace and harmony throughout the Demazong area. During such occasions, prayer flags (mostly 108) are erected depicting the secret hymns (mantras). Such festivals have been organized in the Khecheopalri Lake since time immemorial. During the Bum-chu, local people organize fete in the open front yard where people sell a large number of holy books, idols and photographs of gods and goddesses, prayer flags, rosaries etc. People from all the districts of Sikkim, Darjeeling district of west Bengal, Bhutan, and Nepal visit Khecheopalri to perform puja offering during Bum-chu. There are several wetlands which are the part of the wider Beyul Demazong in Sikkim (Table 2).

Table 2. Some important wetlands that are considered as a part of the Beyul-Demazong in Sikkim.

<table>
<thead>
<tr>
<th>District</th>
<th>Wetland class</th>
<th>Number of wetlands</th>
<th>Wetland area</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Sikkim</td>
<td>Lakes/Ponds</td>
<td>14</td>
<td>120.75</td>
</tr>
<tr>
<td></td>
<td>&lt;2.25 ha</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>West Sikkim</td>
<td>Lakes/Ponds</td>
<td>11</td>
<td>56.5</td>
</tr>
<tr>
<td>North Sikkim</td>
<td>Lakes/Ponds</td>
<td>135</td>
<td>1807.75</td>
</tr>
<tr>
<td></td>
<td>&lt;2.25ha</td>
<td>64</td>
<td>-</td>
</tr>
<tr>
<td>South Sikkim</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>227</td>
<td>1985</td>
</tr>
</tbody>
</table>


**Origin of Bun-chu**

It is believed that the Bum-chu, a sacred vase was made by Dharampala Damchen (a follower of Guru Rimpoche) with the precious material collected from India. He fashioned it and presented it to Guru Rimpoche, Padmasambhava, to consecrate and bless it with his divine power. Similar to it is still preserved in the Tashiding Monastery in West Sikkim. The Bum-chu and its sacred water was kept under lock and key by the Chogyal (king) of Sikkim and the Lama Committee of Tashiding. Every year the Bum-chu is taken out for public audience and opened with full recitation of the hymns. The sacred water is taken out from it and distributed to the
royal family members of Sikkim, monks of the monasteries and the pilgrims on the 14th day of the first month of the lunar calendar which falls on a full moon day (Dokhampa, 2003).

According to the works of the great terton Chokyi Gyalpo Garwang Ringing Zhigpo Lingpa (1524-1588) while Guru Rinpoche performed the Sadhana of Yidam Chuchig Zhal (yi dam bcu gcig zhal) as a part of the initiation, the Yidam and the entire retinue to deities appeared in the sky and immersed in the water contained in the vase. This caused the sacred water to overflow and spread in all directions in the form of rays. That very moment, as a good omen, there was an earthquake and the four Dharma protectors and gods of thirty-three heavens showered flowers from the sky. This spectacular event was witnessed by the people who were assembled there who were overjoyed, and sacred water from the vase was distributed to all. Yet it was found that the water in the vase never decreased. Inspired by this, the sinful became virtuous, the pious realized lofty divine qualities and all benefited spiritually. Finally, Guru Rinpoche concealed the Bum-chu as a sublime hidden treasure and entrusted it to the protective deities (original script Dokhampa, 2003).

Myths and Legends at Demzong and Khecheopalri

Several myths are associated to Khecheopalri Lake. One fine day a young lady was collecting wild vegetables (Sishnu, *Urtica dioica*) in the dense forest. Suddenly, a white cow appeared before her and informed her divine secret that a holy lake was going to appear nearby. The cow also cautioned that she should not disclose this secret to anybody. On her immediate return to house she explained the story to her parents and thus betrayed the truth. As a result she died the next night. This myth is still pervaded to the Lepcha and other local societies and has restrained them from polluting the lake and the adjoining area.

One day a white holy ox emerged from the lake and started to graze around the lake. It mingled with the herd of cattle that belonged to the Bhutias. When the Bhutia owner noticed the foreign animal in his herd, he tried unsuccessfully to locate its owner. He then slaughtered the animal for its meat and was surprised to notice that a milky discharge oozed out instead of blood. He washed the discharge, cooked the meat, and had a great feast with his friends. After that he began to notice that all his cattle and those belonging to the Bhutia community in the locality
started to vanish one by one due to strange ailments. It is believed that in this way the entire Bhutia community vanished from Khecheopalri village. These days, mostly Lepcha settlements are found around Khecheopalri Lake and only a few Bhutias who married Lepchas are believed to have survived the dreadful curse. The other story holds that the Lepcha girl Nenjo Asha Lham was blessed by the lake goddess and was given a precious gem, which was unfortunately lost by her mother. Even today local people believe that the gem is stored inside the lake and that the lake water can cure many human diseases. This is why the local people keep the lake sacred and do not allow the water to be used for any purpose other than rites and rituals. Strong belief persists with the local and pilgrims visiting the lake (Original Script Jain et al., 2004).

Several legends and mythologies are still oral to the local indigenous people that Khecheopalri is one among many “moving landscapes” within Sikkim (Evershed and Fish, 2006). They believe that impurities in the exceptionally sacred sites would eventually result into shifting of the deities and goddesses to a different place and consequently a “bad time” for the local inhabitants is expected to come. Therefore, the Lepcha, Bhutia and Nepali community and the local institutions frequently participate and organize cultural festivals and the clean up campaigns at different times.

Growing tourism in the Demazong Cultural Landscape

In view of the limited industrial growth in Sikkim, The Government of Sikkim has plans and policies to develop Sikkim as a famous tourism destination both for revenue and employment (Watabe, 2011; Sikkim Tourism Policy draft, 2010). It is a potential source of income generation in the remote hilly areas and employment opportunities to the local community. The number of tourist visiting Sikkim increased significantly in the last 15 years. The real growth of tourist’s number in Sikkim started from 1980 onwards. Until 1980, the state hosted only 10,000 visitors, which dramatically increased to 144,203 domestic and 8,794 international tourists in 1997. In 2007, the total domestic tourists consistently increased to 331,263 and recorded around 43% growth, while the international tourists in 2007 were 17,837 with a consistent growth of 45% in a decade (Fig. 1). Due to limited infrastructure on tourism sector, Sikkim is largely dependent on domestic visitors making up about 95% of the total visitors (Anonymus, 2008).
The high growth rate of tourism recently has caused some serious threats on the natural environment. Most of the tourism activities are either in protected areas or in cultural sites. Sustainable tourism in the mountains has the potential of addressing biodiversity conservation while protecting the rich cultural heritage with defined conservation strategies.

Khechopalri area has become an emerging tourist destination since 1990. During 2000 around 8000 domestic and around 2000 international tourists visited the lake (Jain et al. 2004) while the flow increased dramatically in 2010 with around 25000 tourists visiting annually. Around 12 sacred lakes in Sikkim are occasionally visited by the local people for puja offering. Many trekkers and ecotourists also opt to visit these natural sites (Table 3). The Sikkim Biodiversity and Ecotourism Project of Sikkim implemented by The Mountain Institute India and G. B. Pant Institute of Himalayan Environment and Development in 1996-2000 brought the concept of enterprise-based biodiversity conservation through promotion of home stays and ecotourism in Khecheopalri and Yuksam area.

The Sikkim Himalaya is a region of high biodiversity and cultural heterogeneity with distinctive ethnic groups, mountain peaks, natural beauty, sacred lakes and monasteries making it an attractive destination for tourists. Besides the home stays, several trekking routes have been identified by the Tourism Department of Government of Sikkim for tourism promotion (Table 4).

![Fig. 1. Tourist flow in Sikkim from 1997 (1) to 2007 (11). (Data source: Sikkim: A Statistical Profile 2006-07).](image-url)
Table 3. Sacred lakes: ecotourism destinations in Sikkim.

<table>
<thead>
<tr>
<th>East</th>
<th>West</th>
<th>North</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tsomgo</td>
<td>Khecheopalri</td>
<td>Guru-Dongmar Lake</td>
<td>Tamle Chor Pokhari</td>
</tr>
<tr>
<td>Memencho</td>
<td>Laxmi Pokhari</td>
<td>Tso-Lhamu Lake</td>
<td>Nagi Pokhari</td>
</tr>
<tr>
<td>Bidang cho</td>
<td>Majur Pokhari</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dudh Pokhari</td>
<td>Pokhari, Narkhola</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Important trekking routes approved by the Sikkim Government.

<table>
<thead>
<tr>
<th>Important treks</th>
<th>Places covered</th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monastic trek</td>
<td>Pemayangtse-Sangacholing-</td>
<td>March-May-</td>
</tr>
<tr>
<td></td>
<td>Khecheopalri-Dubdi-Sinon-</td>
<td>October-</td>
</tr>
<tr>
<td></td>
<td>Tashiding-Ralong</td>
<td>December</td>
</tr>
<tr>
<td>Rhododendron trek</td>
<td>Naya Bazar-Soreng/Hilley-</td>
<td>Mid March-</td>
</tr>
<tr>
<td></td>
<td>Barsey-Dentam -Pemayangtse</td>
<td>Mid June</td>
</tr>
<tr>
<td>Khangchendzonga trek</td>
<td>Yuksam-Bakhim-Tsoka-Dzongri-Thangsing-</td>
<td>October-</td>
</tr>
<tr>
<td></td>
<td>Bikhbari-Zemathang-Chaurigang-Goechala-</td>
<td>December</td>
</tr>
<tr>
<td></td>
<td>Rathong-Glacier-and back</td>
<td></td>
</tr>
<tr>
<td>Coronation trek</td>
<td>Rumtek-Sang-Yangang-Rabongla-Tashiding-</td>
<td>October –</td>
</tr>
<tr>
<td></td>
<td>Yuksam</td>
<td>June</td>
</tr>
<tr>
<td>Kasturi Orar trek</td>
<td>Yuksam-Dzongri-Thangsing-Kasturi Odar-</td>
<td>Mid March-</td>
</tr>
<tr>
<td></td>
<td>Labdong-Sinon-Tashiding</td>
<td>Mid June</td>
</tr>
<tr>
<td></td>
<td></td>
<td>October-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>December</td>
</tr>
</tbody>
</table>


The Khangchendzonga complex, the world’s third highest mountain system is a symbolic identity of indigenous people inhabiting below it and is the abode of deities. It houses several Beyuls, the sacred spaces. Within the larger culturally sacred landscape, Khangchendzonga National Park (KNP) was officially designated in August 1977 covering a total area of 850 km². In 1996, it was extended to 1784 km² (25.14 % of the total geographical area of Sikkim) realizing its importance for having diverse habitats, floral and faunal diversity. Many villages such as at Yuksam, Sakyong, Chungthang, Menshithang, Lachen and Monguthang surrounding the park depend on the park’s natural resources for subsistence living. These locations are the fringe villages of the Khanchendzonga Biosphere Reserve covering an area of 2620 km². Most of areas in the buffer zone of the Biosphere Reserve have been identified for ecotourism promotion.
Northern half of the KNP is in the restricted zone, and therefore, this part is not accessible to the visitors. Entry into the park for foreign tourists is allowed only with a valid permit for 15 days.

**Economic evaluation of tourism at sacred Lake Khecheopalri**

An economic evaluation was carried out by Maharana et al. (2000; 2000a) in the Khecheopalri and Yuksam area of West Sikkim during 1996-2000 under the Sikkim Biodiversity and Ecotourism Project. In this study, travel cost (TCM) and contingent valuation methods were used for economic evaluation of recreational/sacredness of natural ecosystems. This model provided an estimate of the benefits individuals received from visiting a site by observing their travel related expenses. The Contingent Valuation Method (CVM) was used for valuation of non-market goods. This method provided acceptable economic measures of social benefits of recreational activities. The CVM is a standardized and widely used method for ascertaining WTP for conservation.

Maharana et al. (2000, 2000a) evaluated the local peoples’ and visitors’ WTP (willingness to pay) in response to the beautiful, unexploited landscape and rich biodiversity of the area. The WTP per trip was much higher for foreign tourists than domestic tourists. Aspects of time, services, or traded goods, contribution by local community, was of no less value than WTP. Therefore, contributions by those who are willing to give time and materials for environmental conservation was a part of WTP. Annual WTP was equal to US$ 8777, which was accounted for the maintenance and preservation of the Khanchendzonga National Park, when extrapolated for total visitors and community households. The WTP amount strongly supported the enterprise-based community involvement in biodiversity and cultural landscape conservation. This result concluded that the concept of ecotourism was percolated to all direct and indirect beneficiaries and stakeholders.

On the other hand a large number of visitors in a short time may lead to the deterioration of the aesthetic, sacredness and biodiversity values. The lake is a cornucopia of sacredness and high biodiversity, and a site of ethnicity to which a large number of visitors are attracted for both pilgrimage and recreation. The TCM model using particularly the local pilgrim’s response accounted the sacredness value at US$ 30186. The CVM estimation for all tourists was US$ 46940 for the maintenance and conservation of the lake. Evaluation for maintenance and protection of the
Lake by the WTP techniques showed high response from all types of visitors including the local community. The WTP for the conservation of the lake was much higher compared to other sites in India (Chopra et al., 1997). Application of the TCM and CVM strongly supports conservation of biodiversity destination and sacred cultural landscape.

Tourism development in India, given its federal character, remains a state’s subject, and therefore, the politics of the state concerned have a greater bearing on the aspects of policy implementation. The national action plan for tourism development has emphasized enhancing of the socio-economic status of the people, increase in employment opportunities, diversification of the tourism products and preservation of cultural heritage and environment. The eastern Himalayan region is unique in the world offering rich biodiversity, multiplicity of ethnic communities, culture, socio-economic traditions, history and lifestyles.

**Community based management of sacred Khecheopalri**

In 2000, the indigenous communities at Khecheopalri formed a local body called the Holy Lake Welfare Committee (HLWC) which was evolved from the traditional Dwichi Committee of the monastery. This was formed to initiate conservation and assist the religious rituals of the local monastery committees. The HLWC underwent several socio-ecological and socio-political changes due to emerging ideologies. Unfortunately, such changes undermined the culture and sacredness and eventually lead into social, environmental and economic challenges.

To link conservation with ecotourism activities while directly involving the local communities, The Mountain Institute India jointly with the Forest Department, Government of Sikkim conceptualized a community based wetland conservation mechanism by the formation of Pokhari Sanrakshan Samiti (PSS). One PSS was initially formed at Tsomgo Lake in 2006, East Sikkim, and registered under the Forest Department of Sikkim. On the basis of successful experience of the Tsomgo, another such committee was formed at Khecheopalri in 2010. The members of the PSS belong to the local and indigenous communities including the Gram Panchayats nominated through a democratic process. TMI India also assisted the Forest Department to frame the policies of PSS. To empower this newly evolved local institution, the Forest Department brought out the notification of the Guidelines of PSS in 2006. The main objective of the PSS is to initiate conservation activities in and around the wetland areas. To establish
as a self sustaining model, the Forest Department has allowed them to collect environment fees from the tourist (Rs 10/person) visiting the lake area. The official notification has established a legal provision of allocating 50% of the fund collected to the PSS for conservation activities and remaining 50% to be deposited to the Forest Department. This initiative has emerged as a successful model in the eastern Himalayas. The Forest Department, WWF India and TMI India are constantly supporting the PSS at Tsomgo and Khecheopalri for building up their capacities on conservation.

Conclusions

Sikkim in the eastern Himalayas has unique cultural and religious history with the introduction of Buddhism by Guru Rimpoche during the 8th century AD. It has a great wealth of social, natural and cultural attractions to bring about the economic prosperity without impacting much on the ecology and environment. The environmental perturbations in the form of hydropower projects in the Beyuls of Sikkim have disregarded the sacredness, cultural identity and power of spiritual spaces. Such rapid development has discouraged the local and indigenous communities on their conservation efforts.

The power of sacred and cultural landscapes is also expressed by the natural environment and predominantly rich biodiversity. The conservation of Khecheopalri and the surrounding landscape is central, and the associated power of the Demazong need to be ascertained in order to formulate policies to respect the power and the indigenous people who protect it. Tourism industry in Sikkim is growing very fast and there is a need to link with environmental awareness amongst the visitors and host community. Cultural traditions, sacred landscapes and the benefits derived from tourism should act as incentives to promote livelihoods, conservation practices, and mitigate environmental degradation.

The economic evaluation of Maharana et al. (2000; 2000a) suggest that the area has economic potential far greater than its realized economic earnings. Therefore, the economic evaluation model is useful for providing relevant information to decision makers on investment and policy development. However, more effort is needed to increase the level of conservation contributions to fulfill the goals as understood in the concept of ecotourism itself. As concern grows over the loss of both natural and cultural heritage in this region, the focus is to create strategies, which seek
to link conservation with economic development and generate incentives to conserve the cultural resources on which economic benefits for local community depend. Therefore, the experience of participatory approaches, taking strongly into account the cultural societies, that link enterprise operation with conservation action could be applied in other biodiversity rich protected areas of the Hindu-Kush Himalayan region as well as other mountain regions of the world.

References
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Cultural Landscapes in the Contemporary Context

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Introduction

Living in a rapidly industrializing world of today, and having destroyed much of the biodiversity all around, one does see the paradox of humans living in a biodiversity-free largely urban concrete jungle and a degraded and/or a drastically altered rural landscape, with isolated pockets of conservation sites as strictly protected nature reserves. In other words, humans are de-linked from nature, and stand out as alien to the given ecosystem/landscape unit of which they should have an integral component. However, arising from a more enlightened viewpoint of human as part of the ecosystem/landscape functions, there is now an increasing concern to involve humans as part of the nature reserve, and therefore bring them as close to nature as possible for a more effective conservation and management of biodiversity. Such an approach towards conservation tends to view biodiversity as critical for meeting with the sustainable livelihood/development concerns of ‘traditional societies’ living within the reserves. This then, at least in theory, is the basis for the now well recognized concept of ‘Biosphere Reserves’ enunciated by UNESCO, which has undergone a series of refinements, and the basic principles now well articulated through the ‘Seville strategy’ document (UNESCO, 1996). This revised approach to conservation is arising from the realization that people living in the area are an integral part of the ecosystem, and without their involvement effective conservation and management of biodiversity is not possible. Yet, we seem to be far away from such an ideal of linking conservation with development, largely arising from a mindset that formal knowledge based industrial technologies offers the ultimate solutions to all the problems humans face in this industrialized world. The ‘ideal’ one is seeking in the area of conservation has to be focused around effective appropriately conserving the ‘cultural landscape/s’ that the traditional societies living within the
reserves tend to value. In other words, linking cultural diversity with biological diversity is the key for effectively conserving biodiversity in the ‘hot-spots’ of biodiversity. This implies the need for community and indeed, stakeholder participation at all levels, an issue that forms the basis for the following discussion on biosphere/nature reserve management in the developing tropics rich in cultural and biological diversity (Ramakrishnan, et al., 2002).

On the other end of the spectrum, with a large area of the landscape already degraded and/or converted into an altered state, both in the developing and the developed world, the move is to protect cultural identity of people living in such areas through a rehabilitation/restoration action plan for ecosystem/landscape management, so that such a /rediscovered cultural landscape could be the best option available to bring these people as close to nature as possible, in the present day context. Such a cultural landscape construct will, for obvious reasons, have to be adjusted to the given socio-ecological situation as it exists now. This is the context in which the following discussion on ‘humans in the biosphere’ has to be seen.

**Socio-ecological systems in the Indian context**

Whether the humans are part of a nature reserve or living beyond its boundaries, what one is seeking to achieve is to manipulate biodiversity at all its scalar dimensions towards getting them as close to nature as possible and thus ensure socio-ecological system integrity, with all the tangible and intangible benefits that contribute to human wellbeing.

In the Indian context, one is dealing with three broad socio-ecological system typologies. Living in biodiversity rich areas of the country, both within nature reserves and outside of it, are about 25% of the country’s human population of over a billion people who may be termed as traditional societies, still living close to the TEK-based cultural landscape with all natural resources still relatively intact. By their very socio-ecological attributes, any conservation linked management plan has to have a larger component of the TEK and this knowledge has to be the starting point for an incremental build-up that leads to conservation of biodiversity linked sustainable development, through a community participatory mode, so that they are able to relate to a value system that they understand.

On the other extreme, are another 25% or so of the urban dwellers who live in a concrete jungle, far removed from nature, and who still seek to
get close to nature. For obvious reasons, there is an emerging concern amongst these urban dwellers to get as close to nature as feasible, through conservation of natural green patches wherever they exist within the urban landscape and planting green cover to the extent feasible.

In between these two extremes come more than half of the humans living in the rural plains of India. Having already lost much of their forest cover (Gadgil, 1992) and the rich traditional water bodies that they had sometimes in the past (Agarwal and Narain, 1997), and with their traditional agriculture on the decline, and even the ‘green revolution’ agriculture being under threat now, these densely populated regions of the country is looking at sustainability concerns both in the area of agriculture (Chadha and Swaminathan, 2006) and tree cover in the rural landscape (Ramakrishnan et al., 2005). For very obvious reasons these people living in the rural plains with some TEK still intact, but often times de-linked from nature and natural resources around, has to follow a mid-path between the traditional societies on one extreme and the urban dwellers on the other – with a good mix of the formal and the traditional knowledge as the basis for a rehabilitated landscape that they look for. For the urban dwellers, the construction of an urban cultural landscape has to be on the basis of text-book based ‘formal’ knowledge alone, for very obvious reasons.

**Humans in biosphere: Biosphere Reserve (BR) Management**

**General issues**

Frustrated with declining global green cover along with the associated biodiversity, when the ‘Man and Biosphere’ (MAB) programme was launched in 1971 by UNESCO, a natural follow up of this scientific initiative was to have clearly demarcated Biosphere Reserves (BRs), as representative samples of biodiversity conservation, with a variety of natural and human-managed ecosystems, as part of the larger eco-cultural landscape complex. The BRs were seen to have the following objectives: (a) conservation role (conservation of biodiversity at all levels from sub-specific to landscape); (b) research and monitoring role as part of a larger international network; (c) development role for meeting with improved quality of life for the local communities living in and around the BRs. The concept of BRs and the issues linked with their management have gone through adaptive evolutionary changes, and are now seen as an important testing ground for linking conservation with sustainable livelihood needs of
local communities in the short-term time frame and sustainable development of the region as part of a long-term strategy. Arising out of these developments, what has now come to be known as the ‘Seville Strategy’ identified clear-cut criteria for BR management, the theoretical framework refined on the basis of experience (UNESCO, 1996). The BR concept became in a sense was one of the significant testing ground for linking conservation with sustainable livelihood needs of local communities in the short-term time frame and sustainable development of the region as part of a long-term strategy.

In any case, the concept of BRs necessitated some degree of zoning, with a core zone that ought to have a higher level of protection as distinct from a buffer zone that as the term indicates is suggested to act as a buffer protecting the core zone. The buffer zone and a transition zone extending to the periphery with all the human population involved is suggested to ideally follow a sustainable developmental pathway with emphasis on conservation of biological resources within these zones, with adequate protection afforded to the core zone itself.

**BR management in the Asian tropics**

In the context of developing countries, human population living within the BRs has always been a matter of conflicting interests and debate; this is so in the context of the south and central Asian countries, where we had an opportunity to look at the emerging issues (Ramakrishnan et al., 2002). Human populations living within the BRs are often widely dispersed, many efforts made to relate to them in the context of conservation linked developmental concerns of these traditional societies has often been a contentious issue for conflict. Perhaps, these considerations were what prompted UNESCO (1996) to move away from the initial perception of three concentric rings of core, buffer and transition zones, to a more flexible way of looking at them, depending upon the local needs and situations. This flexibility and creativity in BR concept has been also helped in integrating ‘National Parks’, ‘World Heritage Sites’, and other nature reserves and cultural entities, into the BR concept, Nanda Devi BR in the Central Himalayan Garhwal region in India is a good example where the Nanda Devi World Heritage site, a distinct and well defined cultural landscape entity (Rego, 2004), stands out as a distinct eco-cultural entity as an integral part of the larger Nada Devi BR itself (Ramakrishnan et al., 2000).
Humans within the BRs of the South and Central Asian region, living close to nature and natural resources around them have derived many of their livelihood requirements from the rich biodiversity around them. Natural ecosystems such as forests have always been the source for a variety of livelihood needs of these traditional societies, through extracted fodder, fuel wood, and non-timber forest products (NTFPs); natural forest system have also sustained traditional agricultural practices through resource flow between these two categories of ecosystems. In short, for these ‘ecosystem people’, the natural and human-managed biodiversity has been the source for sustained food security. All these natural resource linked livelihood activities of the traditional societies of the BRs are largely mediated through the rich TEK that they have. Therefore conservation linked development in BRs have to be largely driven by TEK, bring in formal knowledge only to the minimal extent required.

Management of BRs in the Asian tropics, however, still tend to be largely based on text-book based formal knowledge. Interventions made by BR managers often tend to be patchy, though linking knowledge systems (traditional and formal) are increasingly viewed to be the basis for taking on board societal perceptions and ensure their participation in the management of BRs. What we have seen from the preceding Chapters is that the concept of cultural landscapes could be the most appropriate window which could make conservation efforts most effective, and ensure community participation. For this to happen, the emphasis has to be on TEK, bringing in formal knowledge only to the minimal extent required to generate appropriate technologies relevant to natural resource management linked sustainable livelihood/development of these societies, living within the reserves.. In order to achieve this objective, properly analyzed and validated TEK is a prerequisite. Therefore, there is the need to create a critical mass of scientists who have the ability to take an integrated view of socio-ecological systems, which is what biosphere reserve management is all about.

Even if some good research analysis relevant to BR management is available, the reserve managers often are not aware of this knowledge base. Improving the communication line therefore becomes a major issue where a lot needs to be done, through reach-out efforts (Ramakrishnan, 2008a,b; Ramakrishnan et al., 2005, 2006) To cite an example, there is a large body of information available for the Nanada Devi BR in the central Himalayas (Ramakrishnan et al., 2000); but we do not see any evidence
of this knowledge base being used by the reserve managers, in spite of the availability of policy documents prepared and widely distributed, apart from availability of an audio-visual documentary relevant to this reserve. Obviously, there is an urgent need for the much needed coordination between researchers and BR managers, through institutionalized arrangements for interaction.

In a recent UNESCO-sponsored research initiative, on BR management in the south and central Asian region, this author compared and contrasted the perspectives of a selected group of scientists concerned with participatory BR management, considering ‘knowledge systems’ as an important basis for community participatory conservation linked development of local communities; the ultimate objective was to have a sustainable management strategy for BRs under consideration. One could see a big divide between what possibly could be the ideal approach and the way these reserves are currently managed in the region (Ramakrishnan et al., 2002). What is listed below are some of the more specific issues that cropped up and is therefore are indicative of the kind of management problems that one has to deal with:

Management plans have to be rooted in good research, which often is lacking. To make an illustrative point: Currently there are restrictions on grazing within the ‘Valley of Flowers’ in the Nanda Devi BR, and this management approach seems to have lead to the rapid undesirable spread of a the undesirable weed, Polygonum sp. The question here is as to whether we have adequate information on formal knowledge based grazing regimes that should be imposed to control the spread of this weed? Is managed grazing regimes permissible and if so, what have been the the traditional ways in which people have been interacting within this landscape, and using traditional grazing regimes as a tool to conserve the ‘Valley of Flowers’ as a landscape, ensuring its ecological integrity. Can we combine the two knowledge pathways in a manner so that this valley continues to be a tourist attraction?

Take the case of NTFPs: For many of them, we still have to address location-specific issues - assessment of the resource availability, extraction techniques and sustainable harvest regimes, possibilities for improved quality and productivity of the resource, species-specific plant manipulation
possibilities for better yield, sylvicultural management practices of value for intensive cultivation through agroforestry, home gardens, horticultural systems, etc. these agronomic issues are apart from the possible post-harvest treatments - creation of better storage infrastructure, and processing and value addition.

Coming to the value addition issue itself: Take the case of ‘Kani’ tribe in the Western Ghats who traditionally know about the value of the species ‘Trichopus zeylanicus’ as an antidote against bodily exhaustion. Yet, research based better cultivation practices, and value addition to the end product of this ethno-biologically important medicinal plant species lead to improved quality of life for these people. The extraction of the active principle from medicinal plant species, Trichopus zeylanicus and three other medicinal plants as ingredients used in a community-based patented formulation ‘Jeevani’, was shown to remove fatigue and energize the body, due to the presence of certain glycolipids and non-steroidal compounds with profound adaptogenic and immuno-enhancing properties. This refinement in the TEK based knowledge has contributed towards: (i) enabling the local people in cultivation of the medicinal plant species and (ii) empowered the community for equal sharing of the economic benefits arising from the value added pharmaceutical products sold in the market. These approaches to promoting traditional medicine still remain isolated examples, which need to be replicated in a major way.

Eco-development should also directly attack problems of community participation in forest ecosystem management and/or rehabilitation. A whole range of alternate pathways for traditional agricultural system redevelopment, with appropriate mix of traditional and formal knowledge systems, should be explored for ensuring food security to the people, as part of a short-term strategy. Such a land use development plan should be placed in the context of other natural ecosystems that are present in the landscape (Ramakrishnan, 2008a,b).

In other words, land use management and development has to be made an integral part of the overall cultural landscape.
management plan.

Much of what has been done in the name of eco-development of the BR, though valuable from the point of reducing dependence on the biomass for energy (e.g., by providing energy efficient cooking stoves, cooking gas cylinders, etc.), no doubt contribute towards conservation of natural resource, but these interventions only touch upon the community concerns at a very superficial level only. Issues linked with biodiversity centred eco-developmental efforts through community participation are yet to receive adequate attention. Institutional aspects are important in sustainable management of natural resources with community participation. Major challenges in the institutional aspect are related to policy, legal rights and institutional arrangements, particularly the possible linkages that could be built between the traditional and the modern ways of institution building.

Delivery of appropriately designed technological packages and extension support, a system for providing market information, credit facilities, are other components to be linked through community value based institutional arrangements. Effective coordination between scientists with the relevant knowledge (traditional linked with the formal) and the BR managers is largely missing.

There is an urgent need to bring in all actors involved in BR management, as part of a well coordinated team effort – scientists, NGOs, BR managers and most importantly the local communities, themselves, for effective management of the BRs. There are a few such isolated initiatives in the region; what is critical is to arrive at location-specific consultative arrangements, for a truly participatory decision making process.

At this point, it will be appropriate to say a few words on community participatory forest management, though many of the protected forests are outside the nature reserves. From a forester’s viewpoint, the closest that we have been able to come to for a community participatory forest management approach is through the Joint Forest Management (JFM) initiative that has caught on well in the Indian context. It is well known now
that the success of JFM can at best be termed to be patchy. Gupta (2006), as an insider within the forestry sector of the government has suggested a range of policy interventions to make JFM as a truly community participatory way of managing our forest resources (Box 1). What is suggested for effective JFM in forested areas outside the nature reserves, is also relevant to management of forest based natural resources within the BRs too.

### Box 1. Policy interventions required for making Joint Forest Management (JFM) effective (Gupta, 2006)

<table>
<thead>
<tr>
<th>Tackle intra-community inequity: Village Forest Institutions (VFIs) as they are now often operate on the basis of unequal power relations which tends to ignore the disadvantaged direct dependants on the forests, including the women.</th>
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<tr>
<td>Revamp and restructure avoiding multiplicity of institutions: Often there still exist multiplicity in institutional arrangements such as for the collection and marketing of NTFPs, in spite of JFM arrangements already put in place. VFIs should be vested with prime responsibility for management, of NTFPs, their collection and marketing too.</td>
</tr>
<tr>
<td>Move towards more participatory VFIs by building upon and integrating all the existing arrangements: Make it broad-based involving the Village Panchayats, ensuring that all sections of the society gets representation, with appropriate gender considerations.</td>
</tr>
<tr>
<td>Deal with the new set of exclusions created through JFM: Well conserved forested areas lying outside the nature reserves and nature reserves themselves all should be brought under ambit of JFM.</td>
</tr>
<tr>
<td>JFM for multi-purpose use: To achieve this objective, have a series of micro-planning exercises, according to what the socio-ecological situations may demand, and integrate all these into a larger working plan, so as to build in adaptive flexibility into sylvicultural practices.</td>
</tr>
<tr>
<td>Remove monopolies on sale of JFM timber: Currently forest department alone is empowered to sell timber in the market; this monopoly should be phased out and the VFIs.</td>
</tr>
<tr>
<td>Promote financial support for JFM: Since the spread and success of JFM is often linked to external financial support coming into the area, resources need to be mobilized for regenerative forestry as well as for management of well protected natural forests.</td>
</tr>
<tr>
<td>Move from JFM to CFM: Community Forest Management (CFM) is seen to be the next logical step where in the community is seen to be wholly responsible for the protection, regeneration and management of the forests under its control. With many successful experiences already available in this area, the governmental forest department is seen as technical support system.</td>
</tr>
</tbody>
</table>
Coming from a forester himself, these suggestions on JFM are very significant, and revealing. What is also required is to have a much larger participatory involvement of many of the community based NGOs already working in the forested areas. It is also critical to have a critical mass of disciplined and well organized scientific community to be brought in as stakeholders, with the proviso that they ought to have interdisciplinary inclinations, looking at socio-ecological systems in an integrated manner, rather than merely looking at ecosystems as biophysical entities, an aspect that I have emphasized all along. Also, we have learn appropriate lessons from community participatory success stories, where ever they are available, whether they be within or outside BRs.

**Humans in the biosphere**

Humans living outside the BRs also face many similar problems linked with natural resource management. However, these socio-ecological systems differ from nature reserves in that these landscape systems are often highly depleted of biodiversity. The tree cover and associated biodiversity and natural and managed water bodies once abundantly distributed in the rural landscape, and well managed by the rural communities themselves, are two important resources for sustainable land use management. With depleted water availability, and tree cover along with the associated biodiversity, socio-ecological system sustainability is becoming a major issue, and therefore, the need to have a rehabilitated and/or restored rural landscape. For this to happen, we need to bring in knowledge systems as a trigger, though the proportionality of TEK to be brought in may be much lower compared to the formal knowledge. This apart, water often being a major limiting factor, particularly under a monsoonic climate as prevailing in the Indian context, making this resource available could be seen as another important trigger.

**TEK as a trigger for landscape system management**

In the context of looking at socially valued species as determinants of ecosystem level processes, we discussed the role of TEK, as the basis for a jhum (shifting agriculture) redevelopment plan put in place, in the state of Nagaland. In this context, we considered species such as Nepalese Alder and Bamboo species as illustrative examples that triggered the Nagaland Environmental Protection and Economic Development Development (NEPED) initiative. What was emphasized was that socially valued species
often are ecologically significant keystone species and therefore a participatory approach to species selection would invariably elicit community participation in managing/developing cultural landscapes (Ramakrishnan et al., 1998), also brought out in detail elsewhere too (Ramakrishnan, 2001).

**Water as a trigger for landscape system management:**

Water is a critical resource under a monsoonic climate as prevails in India. Making provision for water through appropriately designed cheap water harvesting systems and reviving the available rich traditional water harvesting technologies that have fallen to disrepute can be seen as a way towards appropriately restoring, conserving and indeed enhancing the rich biodiversity that we have in our culturally diverse rural landscape (Box 2). Where traditional water harvesting systems are not available, cheap rainwater tanks lined with high density polythene that were constructed anew could act the trigger for conservation linked livelihood development of local communities, as we could see right across the Himalayan mountain region (Ramakrishnan et al., 1994).

Using water, along with appropriately integrated knowledge systems as the basis, there have been many attempts to construct community value system based rural landscapes, a few of which are indicated here as illustrative examples (Box 3).

Interestingly enough, a somewhat unrelated outcome from these community based natural resource management initiatives is the increased level of women’s participation in the decision-making process, ensured through appropriate institutional arrangements.

**Urban landscape management**

As a consequence of the great disconnect from nature and natural resources that urban societies face, through a concrete jungle that they have created around them, the emerging human instinct has no moved towards getting as close to nature as possible through what has been conceived as ‘urban cultural landscapes’. Therefore there have been many attempts in India and elsewhere in the developed world, to protect whatever remnants of nature that may still exist in the urban landscape, and/or to ‘green’ through a rehabilitation efforts ‘urban cultural landscapes’.

From time to time, there have been many efforts emerging from the non-governmental organizations in the Indian context, to conserve and
Box 2. India, with its rich variety of traditional water harvesting systems (illustrative examples only), waiting for revival (from Agarwal and Narain, 1997)

The ‘Kuhals’ of Jammu; ‘Kuls’ of Himachal Pradesh; ‘Guls’ of Uttarakhand; ‘Pats’ of Maharashtra; ‘Zings’ of Ladakh; ‘Zabos’ of Nagaland; ‘Eris’ of Tamilnadu; ‘Keres’ of Karnataka; variously known as ‘Tankas’, ‘Kundis’, ‘Bawdis’, ‘Jhalaras’, of Rajasthan are few of the traditional rain harvesting tank/irrigation systems, which existed in India but now, dying a slow death. This traditional practice involves conserving rain-water at the place where it falls. How it is done depends on the local needs and the nature of the land. In this process, groundwater is also recharged. These traditions, especially those that are community based, are strongest in the areas of low rainfall and undulating land surfaces.

The traditional rainwater harvesting system of Gujarat and Rajasthan involves collecting rainwater falling on the terrace of the house, in an underground container called ‘tanka’ or a vertical shaft from which water is drawn and the surrounding subterranean passageways, chambers and steps which provide access to the well called ‘vavs’ or ‘baolis’. Tankas are based on the principle of collection of rainwater as close as possible to the location where it falls. The rainwater falling on the terrace of houses is channelized through a pipe down to an underground tank. The terrace is swept and cleaned before the monsoon by the house owners. A copper pipe carries the rainwater from the terrace to a chamber. This chamber has two outlets, one to the Tanka, and another to the drain outside. The water from the first few showers is allowed to flow to the outside as it could contain some impurities and also as it cleans the pipes. The outlet is then plugged and the water from the following showers go to the Tanka, through the other outlet, which has a copper mesh at its mouth. The Tanka has two manholes, one to access water and other for ventilation. It also has an outlet to drain out excess water.

The vavs or baolis (step-well) is a distinctive form of underground well architecture found all over Gujarat and Rajasthan. Step-wells reflect the development of architectural and sculptural styles in the chronology of temple architecture of the western region. A long stepped corridor leading down five or six storied deep well at the far end is an essential feature of a step-well. Step-wells combine a utilitarian function as a source of water, and a meeting and resting place for men and women while drawing water. Step-well is the primary source of water for domestic and agricultural use. In the arid climate of north Gujarat, where rivers and natural depressions retain water only for a few months after the rainy season, a step-well is often the only source of water, with freshwater being supplied by underground springs throughout the year. Built underground, step-wells were ideal places of social interaction and communication. Step-wells situated outside villages along major trade route were built as resting places for businessmen who carried goods from important ports along the coast of Gujarat to northern India. In addition, stepwells are regarded to be abodes of various spirits with life giving powers. Step-wells are usually located at three different places – close to a temple or they themselves may house a temple, within a village or along the road outside.

Indeed, these traditional water harvesting systems have passed the test of time and are suited to the specific environments for which they have been evolved.
Box 3  Examples of community participatory approaches towards building cultural landscapes (Ramakrishnan et al., 2005; Gera, 1995)

**The Sukhomajri model**

One of the earliest attempts in India to have an integrated land use development linked with water management, with community participation, was the one attempted in the Himalayan foothills of the Shiwaliks, near Chandigarh in north-west India. Using appropriate community participatory institutional arrangements, water conservation measures were initiated through earthen check dams, to cope with erratic rainfall. Combined with appropriate soil conservation measures, such as through planting of trees and grasses all along the watershed, lead to redeveloped agriculture, animal husbandry, horticulture and fisheries practices, with off-farm forestry as an ecological buffer.

**The Johads of Alwar:**

‘Johads’ are traditionally designed dug-out tanks with earthen embankments, now fast disappearing, to store the limited rain water of the monsoon season in this semi-arid, drought-prone Alwar District of Rajasthan in north-west India. A revival programme initiated by a highly committed NGO, ‘Tarun Bharat Sangh’ in the Alwar region now boasts of over 3000 such tanks spread over 650 villages. The increased underground seepage, and the consequent rise in water table, arising out of this massive effort has helped in regenerating 1/2 dozen seasonal rivulets into perennial streams. The direct economic benefits accruing to the local communities are: improved land quality, consequent changes brought about in cropping and other land use patterns, improved animal husbandry and forestry practices, etc. Village Committees (‘Gram Sabhas’), with total community participation are used for joint decision-making about local use of water, towards conflict resolution on resource sharing between neighboring villages, and also resolving location-specific upstream-downstream conflicts.

**Participatory Bamboo-based Plantation Forestry**

At higher elevations in the Kapkot region of Kumaon Himalaya, in the Central Himalayas, a number of bamboo species - *Thamnocalamus spathiflorus*, *T. falconeri*, *T. jaunsarensis* and *Chminobambooosa falcata* (‘Ringal’) - are important economic resource for local communities, though now in short supply due to over-exploitation of natural resources leading to land degradation. Using water as a trigger, both in pure and mixed plantations bamboos were raised along with broad-leaved species like Oak (*Quercus leucotrichophora*), a fodder and fuelwood tree; walnut (*Juglans regia*), with edible dry fruits and of medicinal and natural dye value; horse chestnut (*Aesculus indica*), a fast-growing fuelwood tree that enhances soil fertility, and ash (*Fraxinus micrantha*) used for making agricultural implements and household items, and a number of medicinal plants were raised on private land and village commons, as part of landscape restoration work.
Cultural Landscapes

There has been many efforts to conserve the natural green cover in a city like New Delhi, which happens to have the last remnants of the Aravalli mountain system – a mountain range that extends from arid Rajasthan region and ends up in the Delhi capital region, which is under threat, with some successful and many unsuccessful attempts made to urbanize parts of what has come to be known as ‘the ridge’. This narrow hilly terrain that cuts across the Delhi metropolitan region has not only intangible aesthetic values attached to it, but also known for the tangible benefits as a water conservation area for the Delhi urban landscape region. Such conservation efforts and additional efforts made by environmentalists from time to time, to protect the rich ‘green ways’ along the road network, may be seen as part of the cultural heritage of this capital city. Such examples of emerging environmental activism of this kind in our urban settings are societal attempts to be part of a well conceived urban cultural landscape in the contemporary context, for societal wellbeing with attached intangible values and tangible benefits.

This kind of emerging global environmental activism rapidly taking roots in the industrialized western world too, is to construct ‘urban cultural landscapes’ that has adequate tree cover, water bodies and associated wildlife too, including urban agriculture. These are attempts to address the inevitable social distortions brought about by indiscriminate urbanization of the landscape and consequent degraded environmental quality. Such a reactive social action plan on the part of the urban societies is aimed at a synthesis between environmental and social goals based on democratic principles, and a commitment to sustainable economic development and human wellbeing (Box 4).

### Agriculture-Linked Forestry Plantation in Village Common Lands

In the Banswara village in the Chamoli District of the central Himalayas, water was seen as the key resource for restoration of degraded landscapes, by the locals. Instead of opting for protection of restored areas through costly barbed-wire or stone-wall fencing, the villagers opted for cheaper ‘social fencing’ (recognizing grazing or any other encroachment as an offence), complemented with ‘bio-fencing’ (using alien, fibre-yielding, non-palatable, *Agave americana*). On the whole, community participation ensured successful rehabilitation in a cost-effective way. Multi-purpose tree species were chosen by the community - *Dalbergia sissoo*, *Ficus glomerata*, *Grewia oppositifolia*, *Albizia lebbek* and *Alnus nepalensis*, instead of *Pinus roxburghii* plantations promoted by foresters.
Cultural diversity linked biodiversity contributing to human security

We are dealing with a world that is divided: a north-south geographical divide; a developed-developing-least developed country divide; and a rich-poor societal divide. In a socio-ecological sense, we are talking about a divide existing between traditional societies living closer to the biodiversity-rich nature, a huge rural mass of population who live in biodiversity-depleted environments; and an urban mass where the rich and the marginalized coexist in a concrete mass of buildings and urban slums totally de-linked from nature. One common feature of all humans living under such diverse situations, is an intrinsic desire to be as close to

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Box 4. Urban cultural landscape: Environmental activism in USA (Shutkin, 2000)

Current thinking on an urban cultural landscape, is based upon civic environmentalism, aimed at promoting environmental protection and democratic renewal through a process of community participatory regional planning, environmental justice that are location specific. The concept of corridors of green belt is something that has been adapted to the urban environment as ‘greenways’, a term used often to define a linear space established along the bank of a river, rail track, canal, road or highway, or even within the boundaries of an urban sprawl. Such ‘greenways’ have social functions such as landscape aesthetics, recreation and relaxation that are intangible, with tangible outcomes such as being the ‘lungs’ of the city for improving environmental quality and thus contributing to human ‘well-being’. An activity that is catching up in many cities is urban agroculture, or ‘urbaculture’ is an ancient concept. For centuries food sold in cities were produced locally, which is still being the case in many developing country situations. 90% of the vegetables are locally grown in Chinese cities; many African and Asian cities produce a substantial fraction of this around city centers, which is also the case in a city like Delhi. This concept of city-based gardens have proliferated in American cities, especially over the last few decades, as part of the movement to green the cities, an example of which is the ‘Food Project’ started in 1995, by an environmental education center run by the Massachusetts Auduburn Society, located in the Boston suburb of Lincoln, Massachusetts, selling fresh produce to area residents. Such an approach has to be participatory, based on face-to-face interaction among diverse stakeholders, including all governmental, non-governmental agencies and local communities, a bottom up approach to problem-solving, empowering people to work together, initiate action, experiment and make appropriate adaptations.
nature as possible, a desire that is often articulated and many a times not.

Traditional societies still living close to nature, like the Apatanis of Arunachal Pradesh in north-east India, or the Nanda Devi cultural landscape in the Central Indian Himalayan region of Garhwal are all vigorously working to conserve their cultural heritage, against all odds. On the other side, many mountain societies in the industrialized western world, who still are inclined towards traditionalism, and until recently have been moving in the direction of a homogenized industrialized mountain landscape, now seem to have developed an earnest desire to re-discover their lost cultural landscape, reconstruct the same, and anchor themselves in a location-specific eco-cultural identity of their own, the mountain socio-ecological systems diverse as they are. The same is the dilemma faced by many rural communities living in the developing world, for eg., those living in the rural plains of India. In the ultimate analysis, linking tangible benefits with the intangible values that we all value, is the bottom-line in our journey to discover, and/or rediscover the lost or rapidly losing natural cultural landscape!

**Epilogue**

If one looks at the ecological history of a country like India, right from the colonial period until recent times, the natural resources in the resource-rich mountain regions of the country and elsewhere where traditional societies live, have always been exploited by outsiders, with very little compensatory benefits accruing to these forest dwellers themselves. Having degraded the landscape and adversely impacted upon their land use based livelihood activities, the suggested developmental pathways for these societies have always been alien to their traditional values, because the suggested alternatives were based upon technologies based on text-book based formal knowledge. Such an approach to developmental pathways fits into an agenda of the emerging ‘modernism’, though rejected by traditional societies time and again. This has lead to alienation of traditional societies, their continued marginalization, and thereby posing serious threats for human security at large, which we often witness today.

In this context, we still do see how traditional societies have always identified themselves with a natural cultural landscape that are conserved in one form or another by them, in spite of exploitation of the biodiversity contained there in, by forces external to the region, discussed in detail elsewhere too (Ramakrishnan, 2001). Conservation of this biological
diversity is critical for sustaining their traditional land use systems, since this diversity is the key resource available with them to cope with rapidly emerging environmental uncertainties in the context of ecological ‘global change’ (Mooney et al., 1996). Since economic globalization could contribute to socio-economic uncertainties, these in turn also could bring about socio-ecological distortions.

What we have shown in this volume is that cultural identity is an important attribute unique to humans, and that conserving this identity is critical for conserving biological diversity, thereby ensuring socio-ecological system integrity itself. What this implies is that conserving natural cultural landscape/s that humans value at any given point of time, and restoring those where they no more exist, is the key to bring human societies close to nature, thereby providing them with tangible benefits with concerns for conservation of intangible values that they still cherish (Ramakrishnan, 2003; Ramakrishnan et al., 2005).

With more and more evidences now emerging to suggest that developing countries as compared to the developed ones will be the ones to be more adversely impacted in a socio-ecological sense, in the context of the emerging issues linked with ‘global change’ and ‘globalization’, socio-ecological sustainability concerns become more relevant to people living in the developing world. With the further realization that the poorer sections of the society are likely to be more adversely impacted than the richer sections of the society, even within the developing country context itself (Bondeau et al., 1997), ecological security and sustainability concerns within the developing world gets further complicated.

With increasing human security concerns, across different regions of the world, particularly in the context of the marginalized traditional sections of the human society, one has to look at the emerging opportunities for human dignity linked development and humane governance that Abdus Sabur (2003) talks about for the developing south Asian region, and that Chari and Gupta (2003) link with accelerated degradation of natural resources. The need of the hour is to ensure a dynamic equilibrium of humans linked to nature (Brauch, 2005) In all these efforts, it is becoming more and more evident that knowledge systems have a key role to play, for ensuring socio-ecological systems integrity and human security (Ramakrishnan, 2007) and the linked human wellbeing that formed the basis for the basis for the recently concluded and path-breaking ‘Millennium Ecosystem Assessment’ that recognizes that eco-cultural diversity
(Millennium Ecosystem Assessment, 2005) as an important basis for a sustainable future!

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