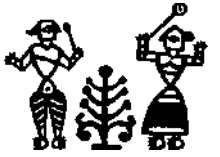
CHAPTER TWO



# *Forest and Fire*

## Geological History

When mammals made their appearance on earth 180 million years ago, the Indian subcontinent had recently broken off from the great southern land mass which earlier included South America, Antarctica and Africa. The land mass which is now India was crossing the equator when the age of dinosaurs came to an end, sixty-five million years ago. Fifty-four million years ago its northern tip bumped into the Asian plate; in another four million years it had established contact along the remaining boundary. The aftermath of this collision has been the Himalaya, rising at a rate of two centimetres a century to produce the tallest mountains in the world (Coward *et al.* 1988; Meher-Homji 1989). This barrier has been continually going up over the last fifty million years, so that most mammals have come to India through passes to the west, and some to the east of this mountain chain. Hominid fossils first appeared on the subcontinent in the Himalayan foothills thirteen million years ago; they continued till seven million years BP (before present) as a part of the mammalian communities of wooded habitats. Then they disappeared, presumably victims of habitat changes

brought about by the continuing upward movement of the Himalaya (Badgeley *et al* 1984).

Much later, members of our own genus, *Homo*, moved onto the subcontinent, probably from their place of origin in the savannas of East and South Africa. Tool-using hominids arose in Africa around two million years ago; by one million years BP they had reached Java. Most likely, they colonized India around this time; but firm evidence of human occupation appears in the form of artefacts such as hand-axes somewhat later, between 700,000 to 400,000 BP (Rendel and Dennell 1985). By this time the lifting up of the Himalaya was done and over, and a seasonal monsoon climate had become established (Rajaguru *et al* 1984).

The hunter-gatherer populations of our own species, *Homo sapiens*, came to cover, in a thin way, much of the country through the remaining part of the late Pleistocene. At this time the climate fluctuated between periods of weak, moderate and strong monsoon. However, the wet and hilly tracts of the Western Ghats, the west coast, and the north-eastern hill regions as well as the Gangetic plain remained unoccupied until the terminal Pleistocene of 20,000 years BP, when the monsoons became distinctly weak at the height of glaciation in the northern latitudes (Rajaguru *et al* 1984; Pant and Maliekel 1987; see table 2.1).

## Prudent Predators

We can only speculate on the ecological-niche relationships of these hunter-gatherer populations. In the productive, stable, tropical environments that they inhabited, most would have been organized in the form of bands with strong bonds to their territories, often in conflict over land- and water-use with neighbouring groups. Each endogamous tribe would have adapted itself culturally to its biological and physical environment, having learnt by trial and error what to eat and what to avoid, how to look for food and how to keep away from predators. Each such tribe may then be thought of as occupying a distinctive, spatially disjunct, niche. As discussed in Chapter 1, such human communities would be expected to develop cultural traditions of sustainable utilization of their resource base (Gadgil 1987).



There is naturally no guarantee that such conservation practices would have led to the long-term persistence of all the elements of their biological environment. But so long as the total demand on resources remained limited, the human populations would tend to reach an equilibrium with their resource base after the elimination of elements that were over-utilized. Even at the hunting-gathering stage, the demand on some resources used as commodities, for instance ivory, could increase without limit and lead to their over-utilization. Drastic environmental changes could also result in a disturbance of the equilibrium that human populations may have reached. Climatic changes attendant on the withdrawal of Pleistocene glaciation 10,000 years ago seem to have resulted in the extinction of many species all over the world; this could in part have been due to the over-extension of human hunting after major changes had taken place in the prey populations. The baboon and hippopotamus became extinct in India at this time, perhaps as a result of such processes (Rajaguru *et al* 1984; Badam 1978).

While more advanced agricultural societies have replaced hunter-gatherer societies over large parts of the moist tropical forest tracts of India, there are, even today, extensive areas where hunter-gathering shifting-cultivator societies persist. These include the humid forest tracts to the north-east of the Brahmaputra valley, and parts of central India where the eastern end of the Vindhya ranges join the north-eastern tracts of the Eastern Ghats. The difficulties of settled cultivation in this hilly terrain, its poor access from major centres of human populations, and low population densities resulting from malaria and inter-tribal wars—all these have contributed to the persistence of hunter-gatherer shifting-cultivator populations in these regions. Some of these populations have converted to Chris-

TABLE 2.1

CLIMATIC HISTORY OF THE INDIAN SUBCONTINENT

| *Geological period* | *Years BP* | *Climate* | *Geomorphic data* | *Human population* |
|---|---|---|---|---|
| Late Holocene | < 4,000 | Moderate monsoons | Saline lakes in western India | Agricultural settlements cover the subcontinent |
| Early Holocene | 10,000-4,000 | Strong monsoons | Fresh-water lakes, entrenched streams, stable dunes | Beginning of agriculture, denser populations |
| Terminal Pleistocene | 20,000-10,000 | Distinctly weak monsoons | Hypersaline lakes, choked rivers, active dunes | Human population spread throughout the subcontinent at low densities |
| Late Pleistocene | 70,000-20,000 | Weak to moderate monsoons | Entrenched streams, stable dunes | Hunter-gatherers in small groups, wetter tracts not colonized |
| Early-Late Pleistocene | 125,000-70,000 | Strong monsoons | Reddish soils (dating doubtful) | Hunter-gatherers in small groups, nomadic |
| Middle Pleistocene | 700,000-125,000 | Monsoonic seasonal climate | — | First evidence of human occupation |
| Lower Pleistocene | 2.0 million-0.7 million | Relatively dry seasonal climate | Volcanic ashes, streams aggrading | Hominids found in both Africa and Java; but no definite evidence of human occupation in India |
| Pliocene | 8 million-2.0 million | Tropical equatorial to strongly monsoonic(?) | Volcanic ashes | — |
| Miocene | 25 million-8 million | Tropical equatorial (?) | — | — |

SOURCE : S.N. Rajaguru (personal communication), R.K. Pant (personal communication)

tianity, drastically changing traditional resource use practices in the process. In the non-Christian tracts, however, we see the persistence of social practices favouring prudent resource use. For example, in Meghalaya, Mizoram and the tribal belts of Orissa, we have evidence of sacred groves and quotas on wood extracted from fuel-woodlots, as well as practices with incidental conservation consequences such as protection given to totemic animals and plants (Fernandes and Menon 1987; Fernandes *et d.* 1988).

## Neolithic Revolution

Historians have argued that climatic change at the time of the withdrawal of glaciers 10,000 years BP led to a creeping back of the forest cover and, in time, to a food crisis. This crisis, very likely, prompted hunter-gatherer societies to domesticate animals and cultivate plants. The crisis was not equally acute everywhere; it was perhaps most serious in the Middle East, where the domestication of animals and the cultivation of plants began to gather momentum some 10,000 years ago (Hutchinson *et al.* 1977). Plants such as wheat, barley and lentils, and animals such as cattle, sheep and goats, were first domesticated here. This process undoubtedly provided the stimulus for the beginnings of agriculture and animal husbandry in the Indian subcontinent. The earliest evidence of this comes from Mehrgarh, in what is now the Pakistani state of Baluchistan, around 8000 years BP (Jarrige and Meadow 1980). There is a disputed claim for the origin of rice cultivation in the Gangetic valley of as early as 7000 BP (Sharma 1980); but it is more likely that rice was domesticated in India some 3000 years later, or diffused here from outside (Chaudhuri 1977). It is, however, certain that a number of pulses like horse gram, hyacinth bean, green gram and black gram were indigenously brought under cultivation in India around 4000 years ago. The humped cattle, zebu, is also likely to have been independently domesticated in the Indian subcontinent. These cattle and pulses give Indian agriculture and animal husbandry its special character (Kajale 1988).



Agricultural-pastoral people spread over the Indian subcontinent in many phases. Without metal tools they could not readily penetrate the moister forests, such as those of the Gangetic plains or the west coast. The habitat most favourable to them for cultivation was along the smaller water courses in the relatively drier tracts of north-western India, the Indus plains, and the Deccan peninsula. This is where agricultural settlements developed over the period 6000 to 1000 BC (Possehl 1982; Dhavalikar 1988; Allchin and Allchin 1968). There was also animal husbandry, including nomadic cattle-herding, and this mode of resource use has left traces—such as the ash mounds of the Deccan. It has been suggested that there was a gradual deforestation in parts of the Deccan over this period, with timber fences slowly giving way to stone walls surrounding pastoral camps (Allchin 1963). In the moister tracts over the rest of the country there would have been some shifting cultivation, but this has left no trace. Hunting-gathering, along with shifting cultivation, might then have continued to dominate all the moister tracts of the subcontinent (Misra 1973).

## River-valley Civilizations

The first urban civilization of the Indian subcontinent embraced a very wide region of the north-west. Archaeological evidence suggests that this culture was familiar with the use of the plough. They had also begun to add indigenous rainy-season crops, such as rice and pulses, to winter-season crops—wheat, barley and lentils—that were of West Asian origin (Mehra and Arora 1985). The agricultural surpluses thus produced permitted the establishment of many towns where the surplus served to promote further processing and exchange of materials—i.e. artisanal and trade activities. Exchange over long distances, as opposed to barter on a small scale, called for the maintenance of records, and the Indus Valley civilization offers

the first evidence of literacy in Indian history (Possehl 1982). The gradual weakening and disappearance of the urban centres of this civilization have been attributed to a variety of possible causes. The explanation with the best documented evidence relates to the shifting of river courses, on account of geological changes associated with the continuing lifting up of the Himalaya. Satellite imagery clearly shows the palaeo-channels of the river Saraswati, which dried up when the Sutlej shifted its course westward to join the Indus, and the Yamuna eastward to join the Ganges (Fig. 2.1) There have also been suggestions of climatic change, as evident from palaeobotany, the flooding of the Indus, and of the salination of agricultural soils on account of irrigation (Agarwal and Sood 1982).

Iron was introduced to India by about 1000 BC, being associated with the Painted Grey Ware pottery culture of the north-west, the Black and Red Ware pottery culture of central India, and the megalithic cultures covering much of the peninsula. Iron, along with fire, made it possible to bring the middle Gangetic plains under intensive agricultural-pastoral colonization, with wet paddy cultivation as a key element (Kosambi 1970).

With the pattern of resource use becoming grounded in a continual march of agriculture and pastoralism over territory held by food gatherers, the belief system of the colonizers would naturally take a form very different from that appropriate to food gatherers, who had a great stake in the conservation of the resource base of their territories. Since the forest, with its wild animal populations, served as a resource base for the enemy, its destruction, rather than its conservation, would now have assumed priority. Supernatural power would now no longer reside in specific trees, groves or ponds, but would be the more abstract forces of nature: earth, fire, wind, water, and sky, whose assistance could be invoked in the task of subordinating hunter-gatherers and colonizing their resource base. Fire to clear the forest, and water to nourish crops in the fields, would be the most valuable of these forces; therefore Agni and



Varuna were the major deities. The main ritual was fire worship, the Yajna, a ritual in which huge quantities of wood and animal fat were consumed.

The burning of the Khandava forest, as depicted in the Mahabharata, beautifully illustrates the operation of this belief system. In this episode Krishna and Arjuna are at a picnic in the great Khandava forest which lies on the banks of the Yamuna, where the city of Delhi stands today. A poor Brahman appears begging for alms. On being granted his desire, the Brahman reveals himself as Agni, the fire god. He then asks that his hunger be satiated by the burning of the Khandava forest, along with every creature within it. Krishna and Arjuna agree to this, whereupon Agni gives them a fine chariot, and bows and arrows, to perform the task The forest is set on fire, and Krishna and Arjuna patrol its perimeter, driving back all the creatures who attempt escape. This includes *nagas* (cobras)—probably the appellation for food-gathering tribes which venerated snakes.

Arjuna evidently wants to clear the Khandava forest to provide land for his agricultural/pastoral clan, and to build their capital city, Indraprashtha. The burning of the forest, and the killing of wild animals and tribal food gatherers is couched in the terminology of a great ritual sacrifice to please Agni. Agni's appearance as a Brahman begging alms is significant, because Brahmans, who presided over fire sacrifices (Yajnas) played an important role in the process of colonization. They served as pioneers, establishing their outposts in forests and initiating rituals which consumed large quantities of wood and animal fat. Thus provoked, the native food gatherers, termed demons or Rakshasas, would attempt to disrupt the holocaust and save their resource base in order to retain control over their territories. Specialist warriors, Kshatriyas, would then rush to the rescue of the Brahmans who had furnished them with appropriate provocation to invade these territories. This process is represented in the Mahabharata, in Dushyanta's visit to the abode of the Brahman sage Kanva. Dushyanta combs the

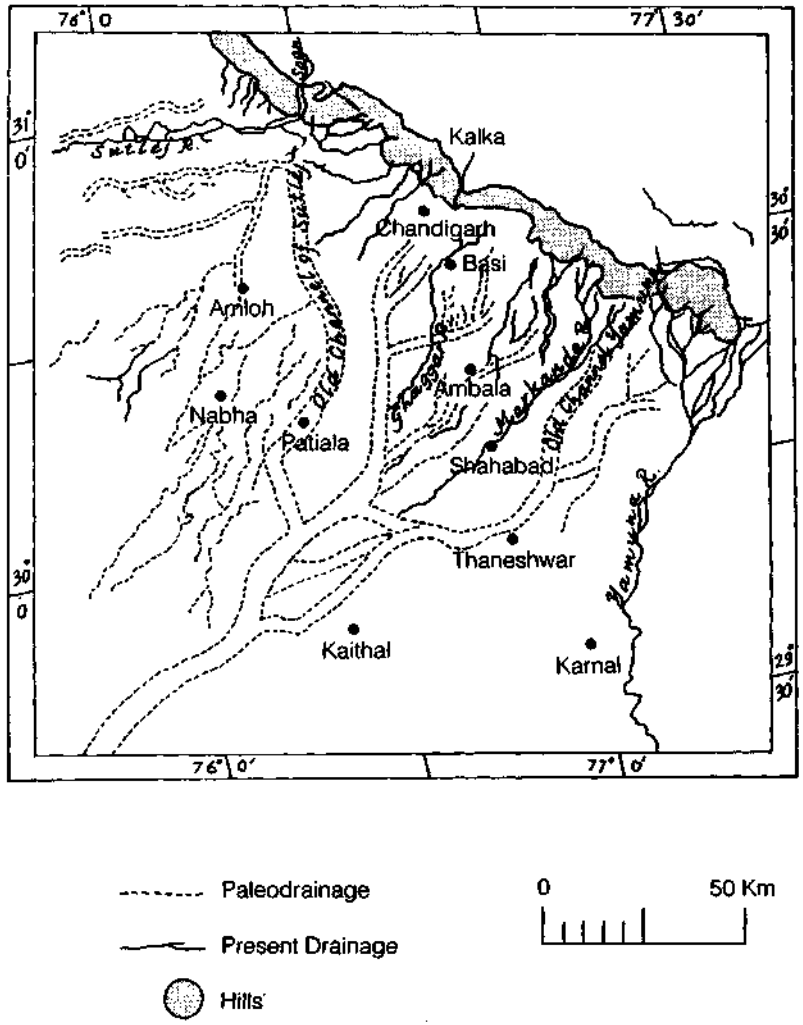



**Figure 2.1**
The Indo-Gangetic divide showing paleo-river channels.

forest with the help of hundreds of assistants, killing wild animals with complete abandon. It appears reasonable to conclude that the purpose of this slaughter was to destroy the resource base of hunting and gathering tribals who livid in the forest (Karve 1974).

The archaeological evidence that becomes available from this period also makes it possible to make more definite statements about human population changes, and to relate these changes to the ecological setting. The land-to-man ratio would have been high in the phase of expansion—the phase analogous to that of r-strategists of ecology. For instance, Lai (1984) suggests a density of 0.75 persons per $km^2$ for Kanpur district in the Ganga-Yamuna divide for the Black and Red Ware period around 1350 BC; this would also have been accompanied by a high livestock-to-man ratio. Meanwhile, more forests would have to be burnt and colonized as older lands were over-used and exhausted. An ethic of exhaustive resource use, with the Yajna as its cornerstone, is likely to have been the ruling belief system in this period. If the human population did indeed quadruple over the next eight centuries of agricultural growth, as Lai (1984) has argued, then much of the fertile land would have come under the plough, resulting in a lower livestock-to-man ratio and a declining availability of forest land for further colonization. Now, with the society moving into a phase analogous to the k-strategists of ecology, people would have required a new belief system, stressing more careful and sustainable patterns of resource use. Such a belief system is likely to have appealed to the agricultural-pastoral component of the population, but to have been opposed by the Brahmans, votaries of the Yajna system. Buddhism and Jainism, sects often described as heterodox, i.e. in opposition to the Brahmanic religion, appear to have been responses to this need Both these religions are known to have protested against the hegemony of Brahmans and the wasteful burning of endless quantities of clarified butter and wood, and the slaughter of animals in sacrificial rituals (Thapar 1984).

As we noted in Chapter 1, the belief system of food gatherers, with its conservation orientation, saw spirits that were respected in trees, groves, ponds, rivers, and mountain peaks. In contrast, in the belief system of food producers conquering new territories, worship focussed on elemental forces such as fire and water, and the great god of war, Indra. As the frontier receded and there were no longer large fertile tracts to move towards, there emerged the belief systems of Buddhism and Jainism, which rejected the supernatural and advocated a rational arrangement of human affairs. These belief systems included an important element of conservation: they advocated that resources should not be used wastefully.

## Social Organization

By the time of Gautam Buddha, some 2500 years BP, settled agriculture and pastoralism had covered wide tracts of the country. These continued into the drier tracts of western India, from where they made their way into the peninsula. The central parts of peninsular India are semi-arid, like much of western India, and here too small-scale cultivation and pastoralism took root along the tributaries of major rivers. The highest concentration of agricultural/pastoral populations were of course along the Gangetic plain. In all these tracts chiefdoms would have sprung up, their scale depending on the scale of cultivation and the extent of expropriable surplus. Food gatherers continued in the hilly tracts of the Himalaya and north-eastern India, on the Central Indian plateau, and on the Eastern and Western Ghats.

In the tracts brought under settled agriculture, the original territorial boundaries of food-gathering tribes would necessarily have broken down in this period. Food producers, whose populations must have undergone substantial expansion, moved into these lands, as might have other food gatherers displaced from their territories. An important question arises here—what would happen to the barriers of endogamy and culture which earlier existed in populations that were now



thrown together within the larger territories of chiefdoms? One possibility is that these barriers of endogamy and cultural differentiation may have broken down, either partially or completely, producing a more or less homogeneous population. However, an agricultural/pastoral society, with its specialized crafts, trade, administration and fighting forces, is far more heterogeneous than a society of food gatherers because it involves a substantial division of labour and differentiation of status. A more likely possibility therefore is that, instead of merging, the different endogamous groups remain distinct and are assigned different tasks and status within the society. While there has undoubtedly been some merging of earlier endogamous groups and some redifferentiation in Indian society, barriers of endogamy among different tribal groups seem to have been largely retained, being converted into barriers of endogamy among caste groups (Karve 1961).

This transition from tribe to caste probably permitted the elites, which were involved in spreading food production and mopping up the surplus, to assign tedious and low-status tasks to various food-gathering tribes. The process itself was rationalized in the *varna* system, which divided the society into Brahmans or priests, Kshatriyas or warriors, Vaishyas or traders, Sudras or peasants and highter-status artisans, and Panchamas (Untouchables) or lower-status artisans and labourers. The conquered food gatherers were then assigned to the Sudra and Panchama categories, both to till the land and to perform lower-status artisanal and service tasks. However, these categories were by no means genetically homogeneous entities, and in any region a very large number of endogamous caste groups made up any one varna. Thus in western Maharashtra today the Sudra varna is made up of many endogamous groups of peasant cultivators such as Kunbis, of artisans such as Kumbhars, of pastorals such as Dhangars, and so on. Further, the potter Kumbhars or pastoral Dhangars are themselves a cluster of many distinct endogamous groups. Among the pastoral Dhangars of western Maharashtra, for example, we find

the Gavli Dhangars who maintain buffaloes in hill forests, the Hatkar Dhangars who maintain sheep in the semi-arid tracts, the Khatik Dhangars who are butchers, the Sangar Dhangars who are weavers of wool, and the Zende Dhangars who used to maintain ponies (Malhotra and Gadgil 1981). It is therefore appropriate to focus on individual endogamous groups as the primary unit of Indian society, and reserve for them the term 'caste' *(jati)* (Karve 1961). A set of castes with similar occupations and with some cultural affinity may then be characterized as a caste cluster. Endogamous castes that make up a caste cluster such as the Dhangars may often be genetically as well as culturally quite varied. Varna itself is a largely artificial construct, with member castes or caste clusters being extremely varied, both genetically and culturally. Even the two higher varnas, Brahman and Kshatriya, who have some cultural affinity among their member castes, have been shown to be genetically quite heterogeneous. For instance, in western Maharashtra the Rigvedic Deshastha Brahmans are genetically closer to the local Shudra Kunbi castes than to the Chitpavan Konkanastha Brahmans (Karve and Malhotra 1968).

This process of forcing the newly-assimilated groups into lower-status tasks was rationalized by the elite in two ways. It was justified first on the grounds that these groups were, at least in some ways, biologically distinctive, and second by attributing birth in lower-status groups to sins committed in a previous birth. A very interesting dialogue of the Buddha addresses this issue. When a questioner equates the different endogamous groups to different species of plants, the Buddha's rejoinder is to point out that the different biological species are separated by barriers to reproduction, with hybrids being either sterile or impossible to produce. Different human groups, on the other hand, are clearly inter-fertile, and, in keeping with his rationalist approach, the Buddha advocates their merger. Buddhism and Jainism, however, did not succeed in destroying the social hierarchy of Indian society.



## The Age of Empires

The eight centuries from 500 BC to AD 300, which followed the colonization of the fertile lands of northern India, seem to have been characterized by the availability of large surpluses of agricultural production for activities outside food production. The river valleys of peninsular India—for example of the Krishna, Godavari, Kaveri, and Vaigai—were also being brought under the plough at this time. The larger the surplus available, the larger the scale controlled by the elite which organized the usurpation of this surplus. Large surpluses would also have promoted large-scale resource exchange—i.e. trade. The chiefdoms of earlier times therefore gave way to larger states—to those of the Mauryas and the Kushanas in the north, and to the Chalukyas and Sangam Cholas in the peninsula (Thapar 1966). These states indulged in a vigorous trade, both internal and overseas.

Sustained by the surplus thus garnered, the primary interest of these states would be to generate ever-larger surpluses within their own territory, and to acquire as much surplus as possible from the territories of other states. The first aim can be achieved through an extension of the area under cultivation, and by enhancing the productivity of agriculture through the provision of irrigation facilities; the latter objective is carried out through external trade and warfare. These preoccupations are reflected in the activities of the Mauryan state, as recorded especially in *Kauiilya'sArthasastra* (Kangle 1969). Based within the large tracts of fertile and cultivated lands in the Gangetic plain, the Mauryan state was keenly interested in pushing the frontiers of cultivated tracts further and further back, for instance by colonizing Kalinga (modern Orissa). This, of course, represented a continuation of the conflict between food gatherers and food producers which accompanied the colonization of the Gangetic plain itself. As observed earlier, that effort was pushed forward by smaller chiefdoms, with Brahmans and their Yajnas serving as forward probes. The continuation of

such expansion under the Mauryan state was a more organized effort in the deliberate colonization of river valleys of the hilly tracts that now bounded the empire. The domesticated elephant probably played a significant role in the invasion of these tracts; a temple frieze in Orissa shows an elephant picking up in its trunk and flinging to death a man with the physical features characteristic of a tribal. At the same time, by providing irrigation works the Mauryan state attempted to boost the productivity of land already under cultivation.

By this time the elephant was established as an important component of the war machine, and Kautilya's *Arthasastra* discusses in some detail the quality of elephants, their capture and care, as well as the conservation of elephant forests. It remarks that every king should attempt to have in the army as large a number of these beasts as possible. Since elephants were never bred in captivity, the *Arthasastra* advocates setting aside, under strict protection, elephant forests on the borders of the state (Trautmann 1982). Such forests were undoubtedly inhabited by food-gathering tribals, and, since the killing of elephants attracted the death penalty, these tribals would be forced to give up the consumption of elephant meat. It is noteworthy that while elephants are hunted for meat in the north-eastern provinces of Mizoram, Nagaland and Arunachal Pradesh—areas that never came under the sway of any Indian state till British times—tribals in the rest of the country do not consume elephant meat. Since these tribals readily consume Gaur, a wild relative of the sacred cow, it is likely that the taboo on elephant meat in peninsular India was a consequence of other taboos enforced by early states such as the Mauryan.

The Mauryan kings also maintained some forested areas as hunting preserves. Parks close to their capitals contained dangerous animals; these seem to have been shorn of their teeth and claws before being released for the hunting pleasures of the nobility. Further away there existed natural forest areas where no one except the nobles was allowed to hunt. This might, in part, have been a strategy to dominate food-gathering tribals by cutting off a major resource. The demarcation of these areas for exclusive use also provided practice in warfare and the pleasures of high life for the warrior classes.



Elephant forests and hunting preserves brought in a new form of territorial control over living resources—control by the state. As noted earlier, to the territorial control exercised by food-gathering tribes, peasants added control of individual fields by families, of forests and pastures by village communities, and of a much larger territorial entity by the chiefdom. Notwithstanding the large claims of the chiefdom, the actual control over cultivated and non-cultivated land vested with villagers. In contrast, elephant forests and hunting preserves were carved out of non-cultivated lands over which the state now claimed direct control, very likely by de-recognizing some of the rights of local food-gathering tribals and/or peasant communities. The latter were perhaps permitted to continue gathering plant material, and to hunt animals which were not explicitly protected. At the same time, the state attempted to regulate the clearing of forests to establish new agricultural settlements.

## Conservation from Above

This radical transformation led on the one hand to a considerable breakdown of local autonomy at the food-gathering stage, and on the other to the organized outflows of agricultural produce as well as commodities such as elephants, musk and sandal. Both processes must have profoundly affected man-nature interactions, chiefly through the breakdown of local traditions of resource conservation and a gradual over-harvesting and erosion of the resource base. As the frontiers closed, and as the resource crunch mounted, there would very likely have been an increasing social awareness of the need for readjustment through the more efficient and conservative use of resources. It was argued earlier that Buddhism and Jainism represented such a response, with the abandonment of Yajnas

being another way of adapting to the changed circumstances. By loosening the hold of Brahmanism, these religions especially attracted the support of traders who flourished in the heyday of high surpluses. Buddhist and Jain monasteries then helped in the opening up of trade routes and the organization of trade, just as the camps of Brahman sages had earlier catalysed the opening up of forests for cultivation (Kosambi 1970).

Buddhism and Jainism then began to play a role in once again designing social conventions which promoted the prudent use of resources. In part, such conservation practices would have been founded on earlier ones, inherited from food-gathering societies. Apart from their appeal to traders, these religions perhaps appealed most to the lower social strata, composed largely out of food gatherers. In fact the leader of the erstwhile Untouchable castes, the late B.R. Ambedkar, believed that the bulk of the Untouchables were adherents of the Buddhist faith in this historical period (Ambedkar 1948). Buddhism and Jainism may thus have played a role for these people by bolstering traditions by which protection was given to various plants, animal species, and various elements of the landscape, such as groves and ponds. In fact the Buddha himself is said to have been born in a sacred grove full of stately sal trees dedicated to the goddess Lumbini.

The best-known ancient state-sponsored conservation campaign was undertaken by the Mauryan emperor Ashoka, following his conversion to Buddhism. The Ashokan edicts advocate both restraint in the killing of animals and the planting and protection of trees. One such edict, from the third century BC, in Dhauli (in present-day Orissa), goes in translation as follows:

> The king with charming appearance, the beloved of the gods, in his conquered territories and in the neighbouring countries, thus enjoins that: medical attendance should be made available to both man and animal; the medicinal herbs, the fruit trees, the roots and tubers, are to be transplanted in those places where they are not presently available, after being collected from those places where they usually grow; wells should be dug and shadowy trees should be planted by the roadside for enjoyment both by man and animal.



In the heyday of Buddhism and Jainism, therefore, there appears to have been a widespread perception of the need to moderate the harvesting of plant and animal resources. But, as pointed out earlier, it is difficult to arrive at precise prescriptions that work in any given local situation, and even more difficult to arrive at prescriptions that work under a variety of conditions. Buddhism and Jainism did not attempt to prescribe practices applicable to each given local situation any more than did the religious beliefs of food-gathering tribes. These religions had perforce to suggest broad principles, such as compassion towards all living creatures, a ban on killing animals, and planting as well as protecting trees. Jainism, especially in its Digambara branch, carried this to its extreme logical conclusion. Digambara Jains are against the killing of any organism, plant or animal. They permit the consumption of biological products only so long as this does not involve 'killing': for instance grain and milk can be consumed, but meat is completely taboo. Digambara Jain monks wear no clothes: these may trap and kill insects and other small living organisms. The monks sweep the ground as they walk, to eliminate stepping on living things that normally escape notice.

This extreme ethic of non-violence has had a pervasive influence on Indian society. It has led towards the complete ban on the slaughter of cattle at ritual sacrifices, and to the taboo against beef by all the upper and most of the lower castes. Protection to cattle has undoubtedly been important in shaping the practices of mixed agriculture and animal husbandry so characteristic of India. A significant proportion of India's caste population has also come to assume vegetarianism. Notably, this proportion is relatively high in the drier, less productive tracts, such as Rajasthan, Gujarat and northern Karnataka, where animal power is more critical to agriculture and where deforestation is likely to have been always ahead of that in

other, wetter regions. This ethic must have been important in the continuation of old, and in the development of new, traditions of protection *vis-a-vis* wild animals and plants. Traditions such as these have played a significant role in influencing the pattern of utilization of biological resources in India over the last several centuries, especially until the arrival of European colonial power.