The single most potent force that affects nature is the numerical and intellectual strength of human beings. In pre-historic times fire in the hands of human beings became the single most potent force which transformed the natural world. Closed canopy forests were burnt, effectively changing the character of flora and fauna from shade and humidity-tolerant species to those of sunny, open and wind-dominated landscapes. This change continues even today, with ever-receding forests and ever-expanding open, barren areas and human settlements. Change in the vegetational composition of a forest may be slow, subtle and selective or may be rapid, all-pervasive and indiscriminate.

At Bhimashankar, 125 kms NW of Pune, I have seen the effects of both, subtle, low-intensity change in forest associations brought about by local tribals and rapid, high-intensity change brought about by commercial exploitation.

In landscapes not favoured by high rainfall, the transformation brought about by human beings is relatively quicker in changing associations than is the case in high rainfall areas. A moist deciduous forest with a dominant community of Erythrina-Bombax-Lagerstroemia and with a leavening of Adina and Garuga was seen to change to an association of Erythrina-Cassia-Oedina-Boswellia as a result of moderate intensity of grazing and cutting by cattle and man. If grazing and cutting continue and probably increase in intensity, trees may be replaced by shrubby growth and an association of Butea-Grewia-Anogeissus-Acacia may come into existence.

In semi-arid tracts the presence and absence of water is critical in establishing associations. Where a trickle of water is present except for 2 or 3 driest months, Ficus religiosa, Pongamia, Syzygium and Diospyros montana can be found in sparse populations. Where drought conditions prevail over a longer period, Azadirachta, Acacia, Zizyphus and Balanites will constitute a community while in still more arid climate, Zizyphus, Capparis, Euphorbia and Opuntia may be found scattered over extensive areas.

A part of the Bhimashankar forest is protected both as the reserved forest and also as a sacred grove from where people do not normally remove any kind of biomass for religious sentiments. Thus a grove is left inviolate for a considerable period. The earlier studies in Bhimashankar carried out in the fifties of the last century and later studies done in 1990s show very little qualitative variation in the community structure of this part (sacred grove) of the forest. The dominant community continues to be Mangifera-Syzygium-Olea-Ficus. Members of these species dominate the canopy level of this forest. The next level shows the dominance of Olea-Syzygium-Mangifera-Memecylon-Garcinia-Mallotus. The next lower storey is represented by Dimorphocalyx-Garcinia-Maytenus-Lea; and the ground flora by Dimorphocalyx-Garcinia-Maytenus-Lea and Actinodaphne. Karvea and Thelepaphaele can be seen at the edge and along the tracks. However, a quantitative and qualitative change, in the proportion in which different species and sizes of species were represented in the forest, must have occurred. This subtle change due to the removal of biomass from the grove in recent years also brought about a qualitative change in the fauna represented by birds. Species such as woodpeckers and hornbills were totally eliminated as their food available in old and mature, large-sized and partly decaying trees became hard to get. Fairy bluebird, a species rare in this part of Western Ghats, has ceased to occur also. Disappear-
ance of such species cannot be explained or connected to the disappearance or rarity of a single or even a group of plant species. Only a subtle change in the forest composition or in the proportion in which different species are represented in the forest, can perhaps explain this change. A change in vegetational composition has changed animal associations!

In dense forest one many times comes across hunting parties of birds in which different species are associated and move in tandem. The hunting party one usually encounters in this grove today, consists of Bulbuls, Flycatchers, Babblers and Thrushes. Before 1990 it is possible that Woodpeckers and a greater variety of flycatchers were in place instead of bulbuls and babblers. As subtle changes in forest composition continue, an avifaunal association consisting not only bulbuls-flycatchers-babblers and thrushes but also Barbets and Drongos has resulted.

As rainfall decreases from west to east, on the Bhimashankar plateau, the plant associations change from a dominance of evergreen species to the dominance of semi-evergreen and moist deciduous species. The semi-evergreen middle height forest shows a dominance of Actinodaphne, Syzygium, Mangifera, Symplocos and Heterophragma. Birds found to be associated with this forest included Nilgiri wood pigeon, Rufous turtle dove, Small green barbet, Grey drongo, Red-whiskered bulbul, Black bulbul, Quaker and Scimitar babbler, Verditer and Paradise flycatchers, Phylloscopus warblers, Blackbird, and Small sunbird.

The moist deciduous forest was mainly found below the plateau of Bhimashankar on the western and southern sides of the escarpment. The dominant species of this forest are Terminalia, Dalbergia, Sterculia, Bombax, Bridelia and Madhuca. Birds associated with this forest included Grey-fronted green pigeon, Blue-winged parakeet, Jungle owlet, Malabar grey hornbill, Golden-backed, Black-backed and Pygmy woodpeckers, White-bellied and Hair-crested (Spangled) drongos, Tree pie, Gold-fronted leaf bird, Tickell’s blue and Grey-headed flycatchers, Loten’s sunbird and Prinias.

Short-height semi-evergreen forest with good canopy cover was found to be dominated by Mallotus, Xantholus, Memecylon, Actinodaphne, Terminalia and Caryota. Birds associated with these included Grey jungle fowl, Collared scops owl, Long-tailed nightjar, Small green barbet, Yellow-browed bulbul, Scarlet minivet, Shama, Blue-headed rock thrush, Ground thrush and Common rosefinch.

Secondary evergreen forests were found to be dominated by Memecylon, Xantholus, Atlantea, Bridelia and Heterophragma. Birds associated with these forests included Grey jungle fowl, Peafowl, Rufous turtle dove, Crow pheasant, Grey drongo, Gold-fronted leafbird, Red-whiskered bulbul, Quaker babbler, Red-breasted flycatcher, Phylloscopus warblers, Blackbird, Flowerpeckers, Small sunbird and Common rosefinch.

Roadside secondary forests showed dominance of Actinodaphne, Xantholus, Macaranga, Erythrina, Ficus, Randia and Zizyphus. Birds associated with these included Black-shouldered kite, Shikra, Kestrel, Red-wattled lapwing, Spotted dove, Plumbeous parakeet, Palm swift, Coppersmith, Tree pie, Small minivet, Iora, Red-vented bulbul, Jungle babbler, Jungle prinia, Tree pipit, Plain-coloured flowerpecker, Purple sunbird etc.

Short-height trackside evergreen forest with broken canopy was characterised by Memecylon, Atlantea, Callicarpa, Maytenus, Allophylus and Eleotria. Birds found to be associated with these were Blue rock pigeon, Laughing dove, Rose-ringed parakeet, Sirkeer cuckoo, House swift, White-breasted kingfisher, Green bee-eater, Indian roller, Baybacked shrike, Jungle crow, Red-vented bulbul, Chiffchafl, Plain prinia, Magpie robin, thick-billed flowerpecker and Purple-rumped sunbird.

Scrubland on the plateau exists both in the vicinity of the forest and away from it. It is characterised by coppiced tree species interspersed with shrubs. Dominant community consists of Memecylon, Randia, Lasiosiphon, Maytenus, Bridelia and Ficus. Birds associated with this scrub included Imperial pigeon, Rosy pastor, Black, Red-whiskered and Red-vented bulbuls, Paddyfield pipit, Crested (Malabar)lark, Blyth’s reed and Booted warblers, Brown rock pipit and Jungle myna.

It is evident that with the opening of the forest canopy, shade-tolerant bird species are gradually replaced by species from more open habitats. In the different forest types described above, a gradual disappearance of members of different plant species had become evident. Sacred groves typify perhaps the least disturbed forest plant communities. As disturbance sets in, members of the species such as Garcinia, Mallotus and Litsea are removed in preference to Mangifera, Syzygium and Ficus. Memecylon, Actinodaphne and Xantholus gradually take the places of trees that were removed. An under-storey of Thelephasae and Karvea starts emerging along with Maytenus and Lea. Further disturbance involves loss of some members of Mangifera, Syzygium, Olea and ficus and their replacement by Memecylon, Actinodaphne and Xantholus. Memecylon takes over...
in later stages of degradation and comes to dominate forests in high rainfall areas near the crestline.

As rainfall decreases towards the east, evergreens such as Garcinia, Mallotus and Litsea are replaced by Terminalias, Bridelia and Diospyros. Disturbance in this region (rainfall <6000 mm) brings in Callicarpa, Heterophragma and Caryota with Allophylus, Sterculia, Albizia and Macaranga. With such changes in vegetation, parallel changes in the composition of bird communities can also be noticed. I have already referred to the loss of hornbills and woodpeckers. Further opening of the forest witnesses a gradual loss of larger owls and rare birds such as Bazas and Trogons. If disturbance continues Shama, Yellow-browed bulbul, White-bellied blue flycatcher disappear followed by successive loss of Blue-headed rock thrush, Black-naped flycatcher, Indian scimitar babbler and Nilgiri wood pigeon. Typical forest species are therefore, lost. In very high rainfall areas (>6000 mm) they are not replaced, as in regions very near the crestline of Western Ghats. In slightly low-rainfall regime they tend to be replaced by others as we have already seen. In medium and low rainfall areas succession of change occurs from Red spurfowl to Grey jungle and Peafowl; Nilgiri wood pigeon to Rufous turtle dove to Spotted and Laughing dove; Blue-winged parakeet to Plum-headed and Rose-ringed parakeet; Jungle nightjar to crow-pheasant; Brown wood owl to Great horned owl to Jungle owlet; Small green barbet to Coppersmith to Green bee-eater; Golden-backed and Black-backed woodpeckers to Pygmy and Mahatta woodpeckers; Spangled drongo and Drongo-cuckoo to White-bellied drongo and Black drongo; Jungle myna to common myna and Rosy pastor; Tree pie to Black-headed cuckoo shrike and Little minivet; Black bulbulf to Red-whiskered to Red-vented bulbul; Puff-throated and Tawny-bellied babbler to Jungle and Large grey babbler; Verditer and Tickell’s blue flycatcher to Fantail flycatchers; Yellow-cheeked tit to Grey tit; Crimson and Crimson-backed sunbird to Purple-rumped and Purple sunbird; Spotted munia to Indian silverbill; Chestnut-shouldered petronia to House sparrow and Rosyfinch to Crested bunting. This change is apparent as forests are replaced by dwarf vegetation. Among vegetation and bird life in Western Ghats and adjacent areas such regressions can be witnessed everywhere in Maharashtra.

References