Indian Forester, 141 (10) : 1110-1113, 2015
http://www.indianforester.co.in

ISSN No. 0019-4816 (Print)
ISSN No. 2321-094X (Online)

VIEWS AND EXPRESSION

TIME IS RIPE TO REVIEW THE WILDLIFE HABITAT MANAGEMENT IN PROTECTED AREAS IN CLIMAX

Ecological succession of vegetation in climax is the culmination stage in plant succession for a given environment. The climax stage of any deciduous vegetation is a stage of gray with no ability to regenerate / develop; it has to naturally perish and give way for the new vegetation. The ecological succession at 'climatic climax' in any 'Tropical Deciduous Forests' is a threat for the carrying capacity of the habitat; and the wildlife management has to review the habitat management strategies practiced since from the inception Project Tiger, 1973 and work out all possible remedial measures to rejuvenate the grey habitats with scientific plans to rejuvenate the vegetation. Time is ripe for review of 'habitat management' in the 'Protected Areas' facing ecological succession at climax in deciduous forest regions in the best interest of the wildlife, since the habitats in different stages of succession only can meet the diverse requirements of diverse wild animal.

The vegetation in part of Bandipur Tiger Reserve (TR) in Karnataka has attained the ecological succession stage of Climatic Climax- a rare case for analysis in the interest of maintaining sustainable carrying capacity of the Protected Areas (PAs) in India.

Bandipur, is a famous name in the field of wildlife conservation in India and a pride of Karnataka in wildlife tourism map of the world. It is one of the 9 TRs initially established in India with the launch of 'Project Tiger, 1973' for the conservation of our 'National Animal-Tiger', the representative of all living organisms of our country's ecosystems as it occupies the crown of the biological pyramid-biotope. Bandipur TR is a National Park by status, spreading over 880 km^2 and it is contiguous to PAs like Mudumalai (Tamil Nadu) to South, Wynad (Kerala) to SW and Nagarahole (Karnataka) to West. It lies mid-way (80 km) between the famous tourist destinations- Mysore and Ooty.

Bandipur TR has a long history of wildlife conservation, as it was started as a 'game sanctuary' in 1931 over 90 km^2 by the then Maharaja of erstwhile Mysore State exclusively for his hunting. It was extended over 800 km^2 in 1941 and named as 'Venugopala Wildlife Park' with a 'sanctum sanctorum' over 60 km^2, in which, all the forestry operations were prohibited and left to nature, to provide undisturbed habitat to wild animals. This sanctum sanctorum of the erstwhile park was continued as 'tourism zone' with the establishment of TR in 1973. Thus, the present tourism zone of Bandipur TR has a long history of wildlife conservation for more than 8 decades, since 1931 and it was left to nature without any forestry operations ie; left undisturbed for more than 7 decades, since 1941. This is an area fit for analysis on ecological succession of vegetation.

Analysis of Vegetation in the tourism zone: It is in the foot hills of Niligiris, with tropical climate, where the average annual rainfall is about 625 mm from both the monsoons and the mean annual temperature ranges from 22 - 27 degree Celsius. The vegetation in the tourist zone which is limited to Bandipur RF was said to be - open forests of dwarf trees with meadows and swamps with plenty of fodder resources, as one of the most suitable habitats for herbivores like elephant, bison, sambar, chital, four horned antelope, barking deer and wild boars that supported predators like tiger, leopard, wild dog and hyena and a host of other animals like sloth bear, reptiles, amphibians, fishes and birds as per the status report on the Bandipur sanctuary by the then Head of the Forest Department, YML Sharma in 1970s. The gregarious flowering of bamboo was said to be happened in 1960 and the dead bamboo was harvested by Mysore Paper Mills, Bhadravati. Natural regeneration of bamboo was good in the tourism zone and the author himself has witnessed it since 1978 and again it has flowered in 2010s.

The vegetation in the tourism zone improved with the passage of time. This Dry Deciduous Forests had abundant fodder wealth for the herbivores (*Ref: First Management Plan of Bandipur TR, 1973 by S G Neginhal).* The herds of herbivores could be seen for nearly a km from the roads by the tourists till 1980s in this tourism zone. The visibility of animals was good for tourists with

Fig. 1 : Open deciduous forest without weeds in tourist zone-1970s; Photo by D. G. Wesley

ample opportunity for photography because of the openness and the light. The only obstruction was elephant grass and nothing else.

By 1980s, the vegetation was showing all-round improvement in growth, regeneration with sufficient fodder grasses. *Lantana camara* started occupying fringe forests, banks of streams/ water holes and plantations of teak/ Eucalyptus. *Eupatorium odorata* and *Parthenium hysterophorus* were showing their heads here and there. The TR management did not initiate any action to check these exotic and invasive weeds. The species *Lantana* was considered to be beneficial to animals as its fruits were liked by birds, deer and bear and also considered as a good cover for small animals/ predators, as the fodder wealth was abundant. The exotic weeds were treated as part of succession along with *in-situ* weed species like *Desmodiums, Indigoferas, Ixora, Lea chinensis, Termerics* etc.

By 1990s, the ecological succession of vegetation further improved exhibiting different storeys of vegetation most liked by diverse animals in the area. The regeneration of tree species, with lot of *Kydia calycina* was liked by elephants; bamboo and grass growths were very conducive to rate Bandipur as one of the best habitats for wildlife. The improvement in the water regimes of the area was remarkable. The local weeds were looking dangerous and the *Lantana* was picking up fast.... and the *Eupatorium* started establishing in patches with *Parthenium*. Even then, no plan was initiated to check the exotic weeds. (Ref: The 20 years Review Report of Bandipur TR, 1993 by the Author & Sri BS Ramaiah).

By Y2K; The dawn of 21st century, the succession of vegetation started showing the sign of its 'climatic climax'- the stage of aged trees, lack of regeneration of tree species, absence of tree spp in the under storey became conspicuous. The exotic weeds (*Lantana, Eupatorium & Parthenium*) became rampant and started occupying the forest floor giving no scope for the grasses- the light demanders- to flourish.

The wild animals' population especially bison, sambar, chital, wild boar, elephant, leopard and tiger increased in numbers with demand for better resources for food, water, shelter and space for spreading their genes. They started going out of PA more frequently in search of food/water during pinch periods, creating more man-animals conflicts. The success rate of animals' sighting increased for the visitors along with the succession of vegetation and increase in the population of wild animals.

By 2010s the vegetation in the tourism zone attained 'ecological succession to the stage of climatic climax'-culmination stage of succession or end of further improvement or a stage of gray- absence of different stages of vegetation, absence of regeneration, more fuel wood load inviting fire with more number of dead trees as it is a deciduous forest; and the presence of flowered and dead bamboo and thick mat of *Lantana, Eupatorium* and *Parthenium* under growths are also not allowing the grasses to come up- a non-conducive or dangerous conditions for the survival of herbivorous animals. The local weeds disappeared from the competition. The grasses degenerated and could be seen only in some opens and in some patches and the elephant grass- *Imperata arundinacea* that was most common in this habitat found to be degenerated due to closure of the canopy of the vegetation / exotic weeds. But, the rate of success of tiger sighting improved in the tourism zone- since the tiger population considerably went up and tigers started moving in the safari roads and the view lines as they could not move in the forests infested with thick mat of weeds.

Tigers cannot dream of crossing the present vegetation where even the elephant paths have been

Fig. 2 : Thick mat of *Lantana* & *Eupatorium* in the tourism zone, Photo: 2008.

Fig. 3 : Tiger moving on the road in spite of the visitors following it in vehicles for nearly 2 km in tourism zone, because it could not sneak in to the thick mat of Lantana growth on either side of the road.(July, 2014).

covered by prickly Lantana and other weeds. It is the case with other animals also, since the mat of exotic weeds are so crowded and allows no animals to cross or no vegetation below them. Only wild boar is happy to hide and move below these weeds. With this condition the prey animals- herbivores are forced to forage in view lines or meadows and predators find it easy to find prey animals in their roaming tracks and are lucky to have high success rate of predation with in their home range. Hence, there is more sighting of tigers in Bandipur TR compared to previous years.

This sighting of tigers is most spectacular for the tourists, profitable for the tour operators and a boost to the tourism. The tourists think that the forests in Bandipur TR are dense, green, animals are in plenty and wildlife management is good. In reality, this stage of climatic climax of vegetation is with full of fuel wood load prone for fire hazards; and it is most disliked by the wild animals as it cannot meet the diverse food requirements of diverse animals.

Fig. 4 : Elephants in a view line as they could not sneak in to forest in spite of the visitor's vehicles approaching very close to them at 5-6 m due to thick mat of Lantana in the forest.(July, 2014)

The Management Practices: The Bandipur TR authorities remained and continue to remain silent with the projection that the TR management is committed to total protection against fire / disturbances and non-interference with the vegetation. But, no research data is available to substantiate the belief that 'the wildlife habitats have to be left to nature without interference or forestry operations. However, there are proved theories to show that the habitats should possess different storeys of vegetation or different stages of succession to meet the diverse food and cover requirements of diverse animals to consider them as ideal habitats. But, it is possible to make a habitat to provide different stages of vegetation with scientific manipulation to the diverse requirements of diverse animals. Now, Bandipur tourism zone is in climatic climax and in the stage of gray, not fit to

Fig. 5 : Flowered and dead bamboo in the tourism zone,(Nov, 2013)- Fuel load of the habitat can be visualized. It was burnt in the incendiary fire of 2014 summer.

sustain diverse animals' requirements. It is bound to face the following situations.

Prevailing conditions

1. There is no hope of natural regeneration in this condition of vegetation to start its new succession as there is no potential tree species and open forest floor to induce the germination of seeds of trees or grasses for natural regeneration.
2. The habitat will continue to deteriorate in terms of 'carrying capacity'- the ability to sustain animals with the passage of time and will force the diverse animals to migrate to viable areas or to perish.
3. It will be a volcano (with dead bamboo clumps and dead trees) waiting for ignition in summers to burn into ashes in addition to causing damage to the existing live vegetation, animals and pollution by emitting enormous CO_2 to atmosphere- a cause for global warming.
4. Fire is the only solution to clear gray or dead stock

Fig. 6 : The part of the tourism zone burnt in the accidental fire occurred in March, 2014. No measures planned to rejuvenate this burnt area except sowing of some seeds of bamboo & grasses on the burnt ashes of the fuel wood load of the forest in climatic climax. Parthenium is fast... in occupation of this open area- (July, 2014).

of vegetation for further succession, since the vegetation is of hard woods and takes decades for weathering to allow space for natural succession.

5. Even after fire, natural regeneration of trees will be a dream in the midst of weeds. The exotic weed, *Parthenium* will occupy the forest floor immediately after the fire, followed by *Eupatorium* since they are *Asteraceae* family species with air borne seed-dispersal mechanism and high germination potentials. *Lantana* will not be an immediate threat as it takes time to invade; some grasses may come in between weeds. No trees regeneration can be expected without artificial introduction into the burnt area or cleared area.

Possible Solutions: The remedy for the areas under climatic climax is a challenge to the wildlife management. It can be resolved only through silvicultural practices and afforestation and not by allowing it to 'nature' as there is no hope for natural succession in this era of exotic weeds in tropical deciduous forests of India.

The considerable remedies are :-

1. The burnt areas should be guarded against exotic weeds and taken up for afforestation in blocks with miscellaneous species that are not browsed by animals and bear fruits liked by animals; eg. *Terminalia belerica, Eugenia jambulana, Simaruba glaucum, Anona squamosa, Anacardium occidentale,, Bauhinias spp, Emblica officianalis, and* with special protection, spp like *Melea dubia, Ficuses, Kydia calycina* in addition to sowing of seeds of grasses like-Bamboos, *Cymbopogon martini, Cymbopogon flexosus, Digitariaspp, Heteropogon contortus, Imperata arundinacea, Themeda* spp. etc with protection/ nursing for 5 years.

Fig. 7 : Gray forest area burnt in 2014 fires. How long the dead hard trees will take for weathering? How can this area rejuvenate without supplementing? Will it not be a fertile site for exotic weeds to invade? are the questions.... (July,2014)

2. The worst grey areas need to be taken up for clear felling and block planting of trees and sowing of grasses with solar fencing without waiting for it to be burnt in near future for initiation of any action.
3. If the clear felled area shows sufficient root stock for natural regeneration; such area be tended for natural regeneration by controlling weeds by adopting silvicultural coppice system.
4. The action needs to be initiated to introduce biological controlling measures against *Eupatorium* and *Parthenium* in addition to physical removal of *Lantana* to keep them under check.

Vision: We have learnt about the climatic climax conditions of the vegetation in the tourism zone- 60 km^2 in Bandipur TR -which was left untouched for 7 decades. Rest of the area in Bandipur TR especially core zone is in succession which was left to nature for the past 4 decades. It is also showing the succession signs of pre-climatic climax and may reach climatic climax, being aggravated by the presence of exotic weeds and declining rainfall due to global warming by another 2 or 3 decades. Then, the carrying capacity of the BTR will definitely collapse as it happened in the tourism zone (2014) and the situation may force the animals to flee from the area or perish. Then what will be the remedy to rejuvenate the habitats?.... This will also happen even in the adjoining PAs like Mudumalai, Wynaad and Nagarahole TR. Then, where will the diverse animals migrate to meet their bonafide requirement- food & shelter?

The wildlife management in Bandipur TR, as well as in other PAs in India needs to take note of the ecological succession at 'climatic climax' prevailing in the 'Tropical Deciduous Forests' in the tourism zone of Bandipur TR, which is under wildlife management for more than 8 decades and maintained undisturbed for more than 7 decades. It's a threat for the carrying capacity of the habitat; and the management has to work out all possible remedial measures to rejuvenate the grey habitats by drawing a scientific plan for the Bandipur TR and also for other PAs in India that are going to face the 'climatic climax' of the vegetation in near future in tropical deciduous regions. Time has come for review of 'habitat management' in the 'Protected Areas' in climatic climax in the best interest of the wildlife.

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