CONCLUSIONS

Based on the observations and discussion presented in the thesis, the following conclusions are drawn:

1. The human activities such as grazing, lopping, agriculture, road construction, and dumping of waste and human habitation contributed to disturbance gradient across the landscape of Nahargarh Wildlife Sanctuary where intensity of disturbance (measured in terms of relative impact factor) decreases with the increase in distance of human settlement from the forest border. Three habitats (regions) - the least disturbed Nahargarh Biological Park (NBP), the moderately disturbed Jal Mahal Forest (JMF) and highly disturbed Kukas Forest (KF) – are recognized across the gradient of the landscape. There is no edaphic gradient across the landscape and the soils are nutritionally rich with high percent organic matter and NPK levels across the habitats. In other words the disturbance does not impact the nutrient status of soils, although the vegetation composition and structure and species diversity varied across the disturbance gradient. The observed patterns of variations in plant community composition, structure and species diversity are not influenced by edaphic factors. The lack of edaphic gradient across the disturbance gradient of the landscape suggests that disturbance leads to homogenization of habitat leading to reduction in ecological diversity in the Sanctuary through free movement of grazing animals and other human mediated activities such as lopping and fragmentation.
2. The vegetation of three habitats belongs to tropical thorn forest with *Anogeissus pendula* as the dominant tree. The taxonomic diversity of plants in the three habitats is high, with 175 species distributed among 57 families, and most of the families are represented by 1 to 2 percent of the total species. The plant communities in terms of species composition, structure and species richness and diversity are ecologically differentiated across the disturbance gradient. In other words anthropogenic mediated activities led to the changes in composition, structure and species richness and diversity leading to evolution of communities and degradation from tropical thorn forest ecosystem to scrub. If the present anthropogenic mediated activities are continued at the present rate, the native communities will be replaced by monoculture of invasive species such as *Prosopis juliflora*.

3. The bird taxonomic diversity of the habitat is high, with 104 species distributed among 42 families, most of which were represented by 1 to 2 percent of the bird species. The bird communities are ecologically differentiated across the disturbance gradient, with 75 to 80 percent of residents, 12 to 18 percent migrants and 6 to 9 percent endemic to Indian subcontinent. The bird communities in terms of composition, species diversity and richness showed marked decline with the increase in disturbance. This is exemplified by the fact that both the critically endangered vulture species are locally extinct in highly disturbed Kukas Forest’s habitat and only one vulture species was sighted in moderately disturbed Jal Mahal Forest and both were rare in the least disturbed
Nahargarh Biological Park. If the human activities continue to operate at the present rate in the Sanctuary, there will be large scale local extinctions of species. There is a need to relocate the villages located close to the forest.

4. The seasonal and annual variations in number of bird species among three regions are highly pronounced. This might be due to changes in the phenology of vegetation brought by seasonal climatic factors such as precipitation, temperature and relative humidity, which in turn influence the food base and microniche for bird species. The annual variations in weather patterns such as precipitation and temperature also contribute to the annual variations in number of bird species sighted across the habitats.

5. The variations in the number of guilds (ranging from 11 to 15) and their sizes across the disturbance gradient of the landscape suggest: (i) that the food web size and specialist bird guild sizes such as insectivore, insectivore-nectarivore and frugivore feeding guilds decreased with the increase in disturbance, and (ii) the generalist birds such as omnivores increases with increase in disturbance. The avian community dynamics is also influenced by food web size and trophic structure which in turn are influenced by vegetation and disturbance.

6. The plant community composition and structure and species richness and diversity are altered across the disturbance gradient of the landscape and
the plant communities evolved in response to disturbance gradient has contributed to observed avian community dynamics across the disturbance gradient. In other words avian community dynamics is regulated by vegetation and indirectly by disturbance and climate via vegetation.

7. The patterns of variations observed in plant and bird communities across the disturbance gradient of the landscape also suggest ecological sorting of species across the disturbance gradient of the landscape leading to evolution of biotic communities.

8. The loss of vegetation cover, the decline in tree density, the fragmentation of habitat and increase in the number of small patches of forest in the landscape lead to enhanced nest predation resulting in marked reduction in bird species richness and diversity which ultimately lead to local extinctions of bird species. Consequently avian community serves as bioindicator of the biodiversity status in the landscape.

9. The facts that: (i) the breakdown in correlations between bird diversity and richness with plant diversity and richness, and foliage height diversity and tree density in highly disturbed Kukas Forest in contrast to the strong linkage between the variables of plant and bird communities in relatively undisturbed Nahargarh Biological Park and moderately disturbed Jal Mahal Forest; and (ii) the severity of nest predation within 50 m of edge and low nest predation in the interior of the forest strongly suggest that biotic integrity is critical for maintenance and sustainance of biodiversity of
the area and disturbance (anthropogenic activities) disrupts integrity resulting in loss of biodiversity and changes in biotic communities which ultimately lead to extinction of ecosystem. The only way to preserve the biotic integrity is to impart resilience to the degraded ecosystem through restoration ecology.