

# Challenges and Opportunities in Biodiversity Conservations in National Capital Region of Delhi

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**Abstract**—India is one of the nation which is rich in biodiversity in the world. National Capital Region (NCR) of Delhi is part of it which is rich in semiarid vegetation and various types of fauna. They are the green lungs which keep the area pollution free, support biodiversity, recharge ground water etc. Government has declared them protected areas. Several prohibitions have been made and enforced to conserve their natural conditions. Geo satellite imaging has helped to monitor the green coverage with accuracy and less effort. Unfortunately today the green cover is only limited to 3-4% when desired standard of MoEF is 33 % of the land area. Due to various challenges of rapid urbanization, these areas are being degraded and are losing their rich resources. Delhi has lost 70% of the original forest in the last decade. Efforts are on to restore their native habitations and find new areas which can be added to this green belt. Plans are being unfolded in Regional Plan by National Council of Planning Board from time to time which are included in the master plans of development (MPD) of each year to achieve 33% coverage of green cover in this area, to conserve and rejuvenate them. Various agencies like Army, Environment and Forest Department, Delhi Development Authority (DDA), Delhi University(DU), New Delhi Municipal Corporation (NDMC.), Municipal Corporation of Delhi (MCD) etc are helping in conservation activities. With their efforts the Yamuna and Aravali Biodiversity Park and the Delhi Ridge project are some of the success stories of biodiversity conservation in NCR. The community as a whole including the school and college students are being made aware about the biodiversity resources of NCR. They are also being motivated and initiated to contribute towards the biodiversity conservation by governmental and nongovernmental (NGO) agencies.

**Keywords:** Biodiversity, conservation, NCR, NCT, Challenges, Green cover.

## 1. INTRODUCTION

India is one of the countries in the world which are rich in megadiversity. Indian culture has always been close to the nature. Indians have always respected the mother nature. They have always imparted values to worship and care for fauna and flora like cows, tulsii, pipal and many other members of the ecosystem. Its capital Delhi and the adjoining regions called the National Capital Region (NCR) of Delhi are the

green lungs of that region. In the present-day scenario, Geospatial technology has evolved and generated new tools for managing spatial data. In particular, the evolution of Geographic Information Systems (GIS), the Global positioning System (GPS), and Remote Sensing (RS). Using this technology in it was reported that of the Indian metropolitan cities Delhi has the largest green cover ( report 2006). The green cover area of NCR is comprising of national capital territory (NCT) delhi and regions of Haryana, Uttar Pradesh(UP) and Gurgaon. This comprises of 15 districts spread over the total area of approx 35Km of which Delhi region is 4% (NCT), Haryana 39% Sonapat, Panipat, Jajjar, Mewat, Rohtak, Rewari, Palwal), UP 31% (Merrut , Gautam Budh Nagar, Baghpat, Hapur, Bulandshar, Ghaziabad)) and Rajasthan 25% (Alwar district) [11,13]. Being linked to NCT it has always been under the pressure of urban development. The urbanization has taken a toll on the natural resources. This region which was once part of fertile and prosperous region has changed from the natural hotspots of biodiversity to concrete jungle. There has been tremendous increase in pollution due to anthropogenic activities. The scientist, environmentalists and government have realized the need to preserve the natural resources and take steps for biodiversity conservation to check pollution, climate change, water depletion and preserve the flora and fauna unique to this area.

### 1.1 The Green Heritage of NCR

In the regional plan 2021 the “Green Areas” are defined as nonagricultural which include dense and open forest. The open forests include parks, herbal gardens and highways. According to the 2012 survey the green area covers only 3-4% of the NCR. This is contributed maximally by Rajasthan (42%), second Haryana (33%), third UP(20%) and NCT (5.5%). The water bodies which include rivers, streams, canals, drains, lakes/tanks and ponds constitute 0.68%. Haryana has the highest share (42%), next is UP (38%), third is Rajasthan ( 11%) and NCT (10%) [12,13]. These areas are declared as the natural heritage sites which need to be protected and conserved. They are divided into the four categories. Under

these categories the green cover and the water bodies have been divided into

**1.2 Special protected areas:** This includes national parks, sanctuaries and forests. They are listed as follows:

**A) Sariska national park** of Alwar, Rajasthan. This area was barren lands in 1980s due to the poor monsoon. But in 90s the Johads-water harvesting systems were revived by non governmental Organisation (NGO) which improved the water table and the green cover. Sariska sanctuary is peoples wildlife sanctuary which is protected and maintained by the villagers. It is the Tiger Reserve area which houses neelgai, deer and peacocks.

**B) Sultanpur national park of Gurgaon, Haryana** It is a house for around 250 species of resident and nonresident birds. The winter months see arrival of migratory birds from the cold regions of Siberia, Europe and Central Asia.

**C) Asola, -Bhatti Mine sanctuary:** The area was mainly dominated by sparsed middle storied thorny trees with open patches. It has now been converted to wildlife sanctuary.

**D) Hastinapur sanctuary of Meerut, U.P.** It is present at the bank of river Ganga. It is a grassland which is a house to several, birds and bharasingha [4]

**E) Okhla Bird Sanctuary (OBS):** It was a wetland made by river Yamuna. It was declared a sanctuary in the year 1990. It has 188 species of plants including trees, shrubs, herbs and grasses. It houses 320 species of birds including resident, non resident, migratory and threatened birds. It has 10 species of mammals including nilgai, indian mongoose, blacknaped hare, jackels, 8 species of reptiles and 2 species of amphibians, 30 species of butterflies and numerous insects.

**F) Aravalis (Hilly Area)**The major stretch of the Aravali range in the NCR, lies in Alwar District of the Rajasthan sub region and then it stretches towards the north into Gurgaon, Faridabad and Mewat Districts of the Haryana subregion of NCR. Delhi Ridge is the last leg of the Aravali Range, which traverses south to Delhi from Gurgaon and terminates at Central Delhi. The aravalis have been divided into following three areas in NCR delineating their sensitivity to development : **The Delhi Ridge** - The Ridge in Delhi is actually an extension of the Aravali hills that enter Gurgaon from south and sprawls towards Delhi. The Ridge has been divided into four zones

1 Southern Ridge , Outside the city limits.

2 South Central Ridge Encompasses Mehrauli area

3 Central (or New Delhi Ridg 864 Within the city limits, just north of Dhaula Kuan.

4 Northern (or Old Delhi)Ridge, The smallest section, lies between Civil Lines and the University of Delhi. [16]

**G) Aravalis at Gurgaon and Faridabad, Haryana** – The major portion of forest areas in Aravali section of Gurgaon and Faridabad in Haryana sub-region, mainly passing through agricultural fields or wastelands. **The Mangar Bani** is a sacred grove forest which lies on the gurgoan –faridabad road. It is protecting gurgaon, Faridabad and delhi. The dhau (*Anogeissus pendula*), native to the Delhi ridge, survives here in such profusion that the invasive dhau has created a clonal forest in the Bani,. Mangar Bani is the catchment area of the Damdama lake, the Surajkund lake and the Badhkal lake. This stretch of the Aravali hills acts as a wildlife corridor between the Asola Sanctuary in Delhi and the Sariska National Park in Rajasthan. Dhauj lake was always full of water.

**H) Aravalis at Alwar** - The Aravali makes its appearance in the Alwar district from the northeast in Tijara subdivision and runs southward. The hilly ranges enclose between the fertile valleys and alluvial plains.

**1.3 River systems, wetland and water bodies:**

**Yamuna:** It is one of the major tributaries of river Ganga which flows through Haryana, Delhi and U.P. regions.

**i) Wetland in NCR;** As per the list of Ramsar Convention on Wetlands, a part of site. It is situated in the approximate length of the Narora to Brijghat (U.P. sub-region) stretch is 82 km., covering an area of 26,590 ha. This stretch supports mammalian species like Ganges river dolphins (*Platanista gangetica*) listed in CITES, IUCN Redbook as Endangered, common-otters (*Lutra lutra*), two species of crocodiles i.e. *Gavialis gangeticus* and *Crocodylus palustris*. Under the national legislation, these species are also protected as Schedule I of Wildlife protection Act 1972[12].

**ii) Nazafgarh Jheel, NCT-Delhi and Haryana**-The Najafgarh drain runs into Yamuna. In 2014 it was visited by 5000 birds of 16 species (OBS gets about 1000 birds of 10 species). These include the International Union for Conservation of Nature (IUCN) red-listed Painted Stork, Sarus Crane, Black-Necked Stork, Black-Tailed Godwit and Black-Headed Ibis. This place is rich in Keekar the Upper Ganga river stretch (Naraura to Brijghat) in U.P. sub-region has been designated as a Ramsar wetland plants.

**iii) Bhalsava lake, NCT-Delhi:** One of the tourist spot on GT Karnal road.

**iv) Damdama lake, Gurgaon (Haryana)** It is the rainfed lake of the area. It attracts several tourist as it is used as picnic place.

**v) Sohna lake/Hot water spring, Gurgaon (Haryana):** It is famous for sulfur springs.

**vi) Badkal Lake in Faridabad (Haryana)** :Badkal lake was constructed as irrigation project in 1960 by arresting the flow of water from Aravali hills. It became one of the tourist attractions [5,8]

**vii) The Bil Akbarpur water body in Dadri** The wetland has been home to more than 200 rare bird species, black bucks and deer.

**1.4 Herbal Gardens:** NCT of Delhi has a good variety of medicinal plants. Of 31 plant species, which are in high demand both in domestic and international markets, 11 species are found in Delhi. These are: *Emblica officinalis*, *Saraca asoka*, *Withaniasomnifera*, *Aegle marmelos*, *Phyllanthus amarus*, *Tinospora cordifolia*, *Andrographis paniculata*, *Solanum nigrum*, *Rauwolfia serpentina*, *Asparagus racemosus* and *Ocimum sanctum*.

**1.5 Habitations:** This include urban and rural settlements, biodiversity in large variety of crops that grow in these areas, livestock, green areas and open spaces in the developed areas where biotic resources manifest themselves.

## 2. PROBLEMS IN BIODIVERSITY CONSERVATION AREAS

In 2011 the forest cover in NCR was reported to be 6.2% as against the national average of 21 %. The forest cover has increased by 2% in NCR (all India average 2.4%) during 2001-11 [11,12]. However, in terms of change in forest type, dense forest cover has declined by 28%, while the area under open forest increased by 26%. This has deteriorated to green cover of only 3.02 % in 2012 [6,7]. The total forest cover in NCT is around 20% only as against the expected cover of 33 %. The specific problems in the protected areas are varied. Some of them are enlisted here. **Sariska National Park:** This tiger reserve in which tigers were translocated in 2008 is under threat to tigers. Illegal plying of commercial and noncommercial vehicles on the highway within the critical area ruin the peace, tranquility and safety of the animals. Illegal grazing of grass by the cattle of the residing villagers is spoiling the green cover. The illegal mining inside or legal mining for the marble outside the sanctuary are ripping off the forest cover in this area. **Sultanpur National Park:** The area had become completely dried up few years back. The water restoration was done. This revived the lake but it also had introduced water hyacinths and African catfishes. These catfishes are predators to natural habitats. It is also the house to Neel Gai which make the land infertile. **A sola Bhatti wildlife Sanctuary:** The quartzite (Badarpur) Mining had pulled away the green cover of this area. The area also used to act as a cattle/goat resting and grazing site for herds coming from Rajasthan and nearby areas, severely affecting the vegetation of the region. Moreover the civic agencies were directed to trap the problematic monkeys from their respective jurisdiction and translocate them to Asola Bhatti Wildlife Sanctuary. These monkeys are also responsible for large scale damage to the young saplings of the protected Area. **Hastinapur Sactuary:** It is rich in green heritage but is under the biotic pressures of tree cutting, cattle grazing and fire[4]. **Mangar Bani:** Mangar bani it is close to the dried-up Dhauj lake. All these water bodies now have water only during the

monsoon. The Dhauj lake dried up in 2009. The government killed it by digging two deep borewells to supply water to a stone crusher unit in Pali and by constructing check dams on nullahs draining into the lake. Construction in the catchment area also stopped the flow of monsoon discharge into the lake. **NCT Delhi Ridge:** This area has been evaded by Vilayti Kikar. This plant was planted by the Britishers in 1920s to beautify the wastelands. It adapted itself so well in the area that it became a menace to other native plants. Its roots are deep rooted therefore it depleted the surface water. Moreover it also formed canopy which cut off the sunlight of the herbs and shrubs growing there.

**Yamuna:** It has very less water today in non rainy season and it is very polluted. The NCR is contributing around 3/4<sup>th</sup> of the total pollution to the river. It has high coliform, high Biochemical Oxygen Demand (BOD) and low dissolved oxygen (DO) level. **NCTs water bodies:** Of the 611 water bodies in the capital half have dried and the remaining are in terrible condition due to various reasons. **Nazafgarh Jheel:** This place is not declared as the protected wetland. Ecotourism park is being built here. Delhi Tourism department is setting up a restaurant in the middle of the drain. These developments will chase away the rich biodiversity existing here. **Sohna Lake :** There is a demand by citizens have to consider additional areas around the sohnalake to be declared ecosensitive areas to help in water recharge of the lake as the present protected area is unsustainable for recharge. **Badkal Lake :** The mining activities in the adjoining area of the lake has completely dried up its water since 2006. This has led to complete change in ecology of the lake and recharge capacity of the area and thus the lake has dried up [8,17]. **Bil Akbarpur water body in Dadri Wetlands;** A township is being proposed in this area. The 20 hectare wetland area has been reduced to a mere 6 hectare due to earth filling by the developers, they say. This encroachment has stopped the storm water from the surrounding areas from draining into the lake, affecting the water level and the natural habitat of the migratory birds.

## 3. LAWS ASSISTING BIODIVERSITY CONSERVATION IN NCR

According to the National Forest Policy of 1988 one third of the total area of the country should be under the forest cover [14]. Thus certain laws, prohibitions and enforcements are being used to maintain this much area. Felling of trees is prohibited according to Delhi Preservation of Tree Act 1994 and for every tree cut it is mandatory to plant ten new trees[16]. In MPD 20021 there is special emphasis on conservation of Ridge[10]. National Capital regional planning control board (NCRPB) has outlined certain policies to conserve this biodiversity in the protected heritage sites. These are as follows: 1. The control land use and pollution in the adjoining areas. 2. Afforestation with right type of species of plants. 3. The affect of plantation of crop rotation, all agricultural practices showed be studied well to understand

their impact on soil fertility.4. Activities which cause ecodegradation should be discontinued.5. Conservation Plan should be made from time to time. According to the recent notifications 1. Five km zone around the protected areas are notified as ecosensitive areas which need to be conserved and protected. Areas around the protected area around Asola Bhatti Mines, OBS, sariska sanctuary etc have been declared as ecosensitive zones which should act as buffer zone where no construction activity should go on. 2. Ban in using pits for landfill by municipal waste in the Aravali region.

The campaigns which have promise to save the environment and pollution are i) Anti-Littering and Anti Plastic ii) Waste Minimization & Management iii) Clean City iv) Clean Yamuna Campaign Campaign v) Anti-Fire Crackers Campaign (on the occasion of Diwali, the Indian festival of lights) vi) Playing Holi Naturally Campaign (on the occasion of Holi, the Indian festival of colour, to discourage use of chemically prepared colours) vii) Prohibiting burning of leaves/garbage campaign, 8 Tree plantation drive

The following prohibitions which have been implemented can also help to conserve biodiversity – 1) Ban on cutting of trees without seeking proper permission from the appropriate authority; 2) Ban on installing bore holes/ bore wells without permission from 3) Ban on indiscriminate disposal of electronic waste appropriate authority 4) Ban on burning of leaves in Delhi 5) Ban on indiscriminate feeding of monkeys (birds) 6) Policy for prevention of concretization and choking of trees in Delhi 7) Blanket ban on the use of polythene bags in Delhi (www. delhigreens.com) Recently a fine of Rs 5000/- is imposed on burning of leaves. According to a recent notification the eucalyptus trees on the highways should be replaced with fruit trees

#### 4. INITIATIVES FOR BIODIVERSITY CONSERVATION IN NCR

Some of the initiatives of biodiversity conservation have contributed successfully to rejuvenation of this area are mentioned here. Ministry of (MoEF) has directed the local governments to set up master plans on yearly basis which would include conservation plans. The third phase of the Science Express Biodiversity Special (SEBS) to spread awareness about Biodiversity, environment etc. are launched. Out of the 6 notified Biodiversity Parks (Yamuna, Aravali, Neela Hauz, Kamla Nehru Ridge, Tilpath Valley and River Front), the Yamuna and Aravali Biodiversity Parks are fully functional and have already been attracting the global attention as models for conservation of natural heritage having cultural and educational values in urban centres. Initially it was the army which started the conservation as Eco task Force activity. Now the Delhi Development Authority along with Centre for environmental Management of Degraded Ecosystems, University of Delhi are working tirelessly to restore the biodiversity wealth of Yamuna and Aravali Biodiversity Park.

**Afforestation of River banks** and setting up of Yamuna biodiversity Park was done by creating wetlands which were filled with water, planting natural vegetation which invited several bird. The adjoining bank soil was pH balanced by growing halophytes and then the native varieties of trees were introduced in this area. Once one park was established the adjacent areas were also similarly developed. Corridors are being developed between these parks for smooth inflow and outflow of animals. It has now butterfly conservatory containing 90 species of butterflies. A crocodile conservatory is planned here in phase 2.

**Afforestation activities of Aravali Biodiversity Park** has restored the native and degraded biodiversity in mine denuded barren hill area [3]. This restoration work was started in mid 1990. Now many of the erstwhile flora and fauna are restored here.

**Afforestation of ridge area** is also going on. The vilayti kikar is being uprooted and its place native kikar is being planted. Along with it several trees, shrubs, herbs, climbers are being planted. The pruning is being done in such a way so as to ensure that sunlight reaches the forest floor where native species are being planted. Government has also build up boundary walls in the ridge area to avoid trespassers [9,10,15].

**Restoration of Badkhal Lake:** The studies have shown that the mining pits in catchment and adjoining areas of the lake are filled with water and the ground level of water has also risen up. Thus if proper steps are taken up the badkhal lake can be restored [8]. Presently steps are being taken to revive badkhal lake.

**In the rewari region** The forest cover spread over 0.51% in year 2005-2006 which has increased to 2.04% in the year 2011-2012 in the area. The reason for increase area under forest is forest plantation carried by government on wastelands particularly hilly undulating scrub lands [1]

**Restoration of purity of Yamuna:** Plans are being taken not to dispose off sewage water form NCT in Yamuna but fill the Johads in with sewage water to allow natural cleaning with Sewerage Treatment Plants (STP).

**Revival of all water bodies in NCT:** attempts are on to revive all water bodies in NCT.

**EcoClubs in schools and Colleges:** Are contributing to spread awareness in the young generation who will be the next stakeholders.

**The centres for excellence** have been set up like Centre for Environment Education (CEE) and Conservation Education Centre (CEC). These organizations spread awareness about the environment in schools, colleges and environment.

**National green Tribunal (NGT)** was established in 2010 to solve legal cases relating to environment at the earliest. It is taking action against violaters of green laws. It has asked the

delhi government to remove all the concrete cover from the base of the trees. In another incidence it has asked Hindu College of DU to plant 100 trees if it has cut ten trees on its campus for construction of the hostel.

**Development of New Water bodies:** Seven mines in Bhatti area were chosen to retain rain water for maximum period during a year. All these seven mines were developed into water bodies, which retain water throughout the year. 5 check dams have also been constructed and 6 more are under construction to check rainwater runoff.

**The National Medicinal Plant Board,** Government of India has recommended that medicinal plants be cultivated, as these constitute a bulk of the ingredients used in the preparation of herbal products. The demand of raw material is increasing day by day in local as well as in global markets. Therefore, cultivation of selected species is being promoted in NCR in a big way[2].

## 5. CONCLUSIONS AND RECOMMENDATIONS

Biodiversity deterioration is going on continuously but conservation efforts are also going on. Thus we are still able to improve the green cover. For further improvement we all should help to effectively implement the Regional and master plans of the areas.

## 6. ACKNOWLEDGEMENT

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