CHAPTER 2

STUDY AREA
2.1 Aligarh District

Aligarh comprises the northern most part of the Agra division in the upper Ganga – Yamuna doab (the area between two rivers) region. It extends from 27° 29’ N latitude to 28° 11’ N latitude and 77° 29’ E longitude to 78° 38’ E longitude. To the north the boundary is purely conventional and touches the district of Bulandshahar; on the northeast the Ganges separates it from the district Badaun, on the east and southeast lies the district of Etah, on the southwest lies the district of Mathura, and on the west it is separated from Haryana by the river Yamuna. It is stretched over an area of 5000 sq km approximately and its length and breadth are 120 km and 72 km respectively. Aligarh is at a distance of 120 km from the National capital Delhi and well connected by road and rail network (Figure 2.1a).

A survey of the district was done for egret populations and it was found that all four species of egrets under the scope of this study were found utilizing the Sheikha Lake round the year as a natural habitat. Considering its ecological compatibility, easy approachability and atmosphere conducive to fieldwork Sheikha Lake was selected as the intensive study area for this work.

2.2 Sheikha Lake

Situated at a distance of 17 km from Aligarh the Sheikha Lake is a perennial lake spread over 250 hectares which is also home to a large number of waterfowls both migratory and resident. The Upper Ganga Canal (UGC) divides the area in two parts. For the convenience of the study we termed them as Sheikha ‘A’ and ‘B’. However, the main lake is Shiekha ‘A’ on the western side of the canal. Sheikha ‘B’ becomes patchy in the dry season and segregates into several small pools. The metal road and the canal form
two of the boundaries of the lake while on other two sides it is surrounded by a tree line separating it from the agricultural fields (Figure 2.1b).

### 2.2.1 Historical Background

The district of Aligarh has been an example of imperfect drainage of rain and floodwater since yore. Owing to these drainage defects there were several small and temporary marshes and lakes, which are mainly rainwater reservoirs confined to some natural depressions. Such wetlands were common around Sikandra Rao and Koil tehsils (administrative sub-divisions). There were fair sized lakes at Gopi, Ikri, Bhawan Garhi, Nagla Sheikha and Gursikaran and seasonal lakes such as Adhawan and Sengar. With the advent of the UGC in 1852 many of the drainage defects of the Aligarh district were rectified and hence the smaller marshes leveled up. The remaining wetlands were confined to the depressions in the higher levels of the country and through which the UGC passes.

Details of the history and formation of Sheikha Lake are not found in any reliable government documents. For example only an occasional mention of a Jheel can be seen in some of the district gazetteers. However, survey of the region and inquiries from the locals suggest that prior to the construction of the (UGC) the area would have been a wasteland and converted into a marsh due to water logging from seepage of the canal. Further depression created by digging out mud for building the canal and accumulation of rainwater would have resulted in a Lake. Today it exists as a perennial wetland fed by rainwater as well as canal seepage. It is also speculated that several kilometer long belt of marsh had existed on both side of the canal but later reclaimed for agriculture under land reforms. Constant draining of water also affected these marshes and today they exist as
barren land. Only a few scattered patches of marshes have survived and Sheikha Lake is one of them.

2.2.2 Physical features

2.2.2.1 Location and approach

Sheikha Lake falls between the latitude 27° 51’ 21” North and longitude 78° 13’ 05” East, in the upper Gangetic Plain of northern India. A part of the saline alkaline belt of western Uttar Pradesh, the Sheikha Lake lies in the southeastern region of the District in the Koil Tehseel of Dhanipur Block. It is located at a distance of 22 km from the Aligarh Muslim University campus on the Panaithi – Charra road that goes left from the Grand Trunk road towards Kanpur. The main villages in the vicinity of the lake are Bhavankheda, Changeri and Sheikha. The nearest small town with a bus station is Jalali, which is at a distance of 3 km from the Lake.

2.2.2.2 Topography

The general surface of Aligarh district is a plain of remarkable fertility and the level is extremely regular. The configuration of the soil is characteristic to that of the doab and it slopes gently from north to southeast. The level rising sharply to the high sandy upland gradually descending inland to a depression drained by several rivulets. The Sheikha Lake lies in this central depression. Apart from a few sandy ridges alternated by shallow depressions, the land is uniform. The surface is varied by several depressions formed by the river valleys and natural drainage lines while the elevations consist merely of slight ridges of sand. The height of the ground surface where the UGC enters the district is 193.24 m above sea level and towards south the level drops to an altitude of 160 m above sea level.
2.2.2.3 Soil

The principal physiographic alluvial fillings and the major soil types of Aligarh district are influenced by the depositions of the two rivers Ganga and Yamuna. The main constituents of the alluvium are of clay, silts, sands and *kankar* (limestone conglomerate that results into a type of rocky earth) in several horizontal layers piled up in varying proportions and varying thickness. There are also a few tracts of infertile barren soil locally called *usar*. These tracts are filled with white slippery sand very fine in texture on which even grass refuses to grow. The local washer men use this soil for washing clothes and its vernacular name is *reh*. A type of inferior sand called *bhur* gives an arid appearance to some parts. The Sheikha Lake is a part of the fertile loamy belt formed by the low land *khadar* of the Kali river which gradually sinks into the broad central depression. Clay soil, imperfect natural drainage and numerous lakelets in which the surface water collects without finding an outlet characterize this tract. In consequence of the resultant saturation the tract is marred by frequent stretches of barren *usar* and the exudation of salt in the form of *reh*.

2.2.2.4 Rivers

Any major river does not traverse the District, the Ganga merely touches it in the northeast while separating it from Bulandshahar and the Yamuna flows for a short distance along its western boundary separating it from the State of Haryana. The other streams running through the district are the Kali and the Isan (tributaries of the Ganga) the Nim (tributary of the Kali) and the Rind, Sengar, Karawan and Patawaha (tributaries of the Yamuna). However, by all means the most vital water body of the district and the
Sheikha Lake as is the UGC, which was commenced in 1842 and opened 12 years later (Atkinson 1875).

### 2.2.2.5 Ground Water

Sand belts provide the main inlet for ground water. The depth of water from the ground level varies from place to place, ranging from 6 m to 9 m in the northern half of the district and 15 to 19 m in the southern half. The water table near the Sheikha Lake is comparatively higher than the dry portions of the city and remains up to 19m. The general chemical composition of the water of the district is suitable for irrigation (Bahadur 1976).

### 2.2.2.6 Other wetlands

There were broad tracts of lowland specially in tehseel Koil and Sikandara Rao. In this part of the district natural depressions were numerous but now there are no permanent big lakes. However, various water bodies of small or big sizes existed earlier. The major ones were at tehseel Koil in Gursikaran, Ikri and Adhawan, the last was the source of Sengar river. In Akrabad the large wetlands were at Ladhawa, Sahadi and Gopi. There was an extensive group of depressions in Sikandara Rao as well as a large complex of the broad lakes of Hasayan, Bakayan, Nagla Sheikha and Jao, besides several detached ponds at Bhisi and Jau. In the central depression of Khair also there were the large water-bodies named Ogar and Morehna. In addition to these there were several shallow depressions at Atrauli and a large lake at Dadon (Nevill 1909). Many of these lakelets have given way to siltation, draining and agricultural reclamation.
2.2.3. Climate

The climate of Aligarh is typical of tropical monsoon type. Extreme variation in temperature and humidity are its characteristic features (Yahya et al. 1990). The region is characterized by three distinct seasons namely winter, summer and monsoon. Bright days, cold nights and low humidity are the features of winter season from mid November to mid March. Rains also occur for a short duration in January. Summer continues from mid March to mid June. May and June are the hottest months of the year. Hot and dusty wind called lou is prevalent in the region during summers. December and January are the coldest months of the year when the cold wave casts its spell for over a fortnight and the days are foggy with low temperature. This cycle of the major seasons is interspersed by spring season in March and the autumn break around October each year. Apart from monsoon during the rest of the parts of the years the sky remains generally clear or lightly clouded. However, for short spells of a day or two during the cold season the skies become cloudy and light showers may occur.

2.2.3.1 Temperature

The region experiences extreme conditions of temperatures that rise to a maximum of 44° to 47°C during summers, and dips to even 0°C during winters. However, the average minimum temperature for winters ranges around 4°C to 5°C. There is an approximate difference of 10°C between the minimum and maximum temperatures of a day. More or less the same pattern was recorded by temperature rise and fall during the three years of study period (Figures 2.2a, 2.3a, 2.4a). Although the maximum temperature recorded in the study period was not more than 45° C even during extreme summers, the minimum temperature did drop to 0°C in the peek winters. This extreme
variation of temperature also accounts for the diversity of bird species in the region. The water temperature in the lake varies between 12°C and 30°C.

2.2.3.2 Rainfall

Monsoon breaks usually during the first week of July and continues till the last week of August. Moderate rainfall, amounting to an aggregate of 644 mm annually is received during these months. However, the average annual rainfall received by the region on the whole amounts to 760 mm (Anon. 1976). About 87% of the annual rainfall is received during the south-west monsoon months from June to September, July and August being the two heaviest rainfall months. In the monsoon season the skies are generally heavily clouded and overcast on some days. The weather conditions and seasonal rhythms round the year make Sheikha Lake a perennial wetland suitable to act as a waterfowl refuge during winters. A picture of the average monthly rainfall during the study period is given in Figures 2.2b, 2.3b and 2.4b. The pH varies from 7 to 7.8 and the content of dissolved oxygen fluctuates between 4.4 and 8.1 mg/litre at Sheikha Lake (Khan 1990)

2.2.3.3 Humidity

Except during the southwest monsoon seasons (June to September) when the relative humidity is high - more than 85% usually - the air is generally dry over the district. The driest part of the year is during the summer season when relative humidity is less than 25% in the afternoon (Singh 1987).

2.2.3.4 Wind

Winds in the District are generally light with a slight increase in summer and the early part of the monsoon season. During the period from October to April the Winds
blow mostly from north and west. South-easterlies appear in May. During the monsoon season winds are predominantly from the south-east and east. The mean wind speed is 5 km/hour (Singh 1987).

2.2.3.5. Special weather phenomena

During the monsoon season the depressions originating in the Bay of Bengal, which move in a westerly or a northwesterly direction across the central part of the country, affect the weather of the District causing widespread heavy rains. During the cold season passing western disturbances affect the weather and a few showers occur. In the summer months the District often experiences dust storms. Thunderstorms also occur during the monsoon season some times accompanied with hail and squally showers. Fog occurs for a short period of two to three weeks during the cold wave with extreme cold conditions in winters.

2.2.4 Flora and Fauna

Perennial water lodging, diverse weather conditions, shelter belt plantation and the adjoining canal favours a broad spectrum of living conditions for diverse life forms. The effect of the edges and ecotones phenomenon at Sheikha Lake supports rich avian diversity too.

2.2.4.1 Flora

The terrestrial plant community around Sheikha Lake comes under the dry deciduous forest type as classified by Champion and Seth (1968). The most abundant tree species planted at the periphery of the lake are that of Terminalia arjuna and Schyzgium cumunii. Other trees with stunted growth are Accacia leucocephala, Accacia nilotica, Holoptelia integrifolia, Ficus religiosa, Dalbergia sissoo and Azadirachta indica. At the
border of the Jheel there is thick growth of *Prosopis juliflora*. The major weeds are *Lantana camara*, *Sida* spp. *Parthenium hysterophorus* and *Cassia tora*. Plantations of *Psidium guajava* and *Terminalia arjuna* are present on one side of the jheel. The shrub species are *Ipomea aquatica*, *Muraya koenigi* and *Lausonia enermis*. The dominant grass species are *Ischeatium* sp., *Saccharum spontaneum*, *Imperata cylindrica*, *Saccharum munja*, *Vetiveria zizanoides*, *Dichanthium annulatum* and *Setaria glauca*. The submerged vegetation consists of *Hydrilla*, *Ceratophyllum demersum*, *Vallisneria spiralis*, *Potamogoton crispus* and *Naja* spp. Free floating vegetation consists of *Salvinia* and *Azolla* sp. and in some places *Eichhornia crassipes*. Rooted floating vegetation includes *Nymphoides cristata* and *Nymphoides indica* (Saxena 1999). Details of the floral diversity are given in Appendix I.

2.2.4.2 Fauna

Compared to a large variety of birds only a few mammalian species are found in this area. In addition to blue bulls *Boselaphus tragocamellus* and jackal *Canis aureus*, are Indian Mongoose *Herpestes auropunctatus*, Five-striped Squirrel *Funambulus pennanti*, Porcupine *Hystrix indica*, Black-naped Hare *Lepus nigricolis*, and Rhesus Monkey *Macaca mulatta* are reported as identified with the help of Prater (1971). Several species of rats are also found.

Amongst reptiles several species of snakes and fresh water turtles such as *Lessymes punctata* and the *Geochlamys hamiltonii* are found here. An occasional Monitor Lizard can also be seen in the terrestrial habitat. Sheikha is also rich in ichthyofauna and several species of amphibians also occur here. Insect diversity in Sheikha is also quite
abundant. Due to limitations of this study it was not possible to commence a comprehensive biodiversity assessment of the area.

**Avifauna** - The main attraction of the Sheikha Lake are the waterfowl that inhabit the Lake in different combinations in different times of the year. A one square km perennial wetland surrounded on all four sides by thick plantations and a leading trail of forest on the adjacent canal banks is a sort of haven for the resident as well as migratory birds. They use the wetland for feeding and general activities, the adjoining crop fields supplement their feeding and the nearby thickets provide breeding and roosting sites. During drought years this wetland becomes more strategic for migrants and many waterfowl detour here even from Bharatpur as pilot bird banding by Yhaya *et al.* (1990) has shown.

Rahmani and Sharma (1997) have reported 161 species from Sheikha while in another study Yahya *et al.* (1990) described 188 species of birds from the environs of Aligarh. Though a threatened species the Sarus Crane *Grus antigone* are found in good numbers (largest flock of 28 seen during the study period). Black-necked Storks *Ephippiorhynchus asiaticus* and Black-headed ibis *Threskiornis aethiopica* – both near-threatened species (BirdLife International 2000) are found in some numbers. The lake is seen teaming with migratory waterfowl during the winters – Bar-headed Geese *Anser indicus*, the Grey lag Geese *Anser anser*, Ruddy shelduck *Tadorna furruginea*, Red-crested Pochard *Netta ferina*, Shoveller *Anas clypeata* and many others. Waders and herons also contribute to the waterfowl diversity of the lake. In addition to this it is home to many forest birds such as kites and eagles, doves and pigeons, warblers, cuckoos, parakeets and numerous passerines.
Although agriculture and livestock breeding is the main livelihood for the inhabitants around the Lake, it has never been subjected to unsustainable anthropocentric pressures for land or water. The area around the Lake is used for cattle grazing which is in the interest of the ecosystem health since it helps in pulling back ecological succession and maintaining the wetland in a seral stage, which would otherwise change into a climax terrestrial ecosystem. Apart from this a small amount of fishing, fuel wood and fodder extraction and utilization of the Sheikha ‘B’ pools for cultivation of water chestnut *Trapa bispinosa* is also done.

Earlier the legal status of the Sheikha Lake was that of a Village Commons Land under the ownership of the *Gram Samaj* (village level local governing body). The Forest Department had done plantations around the Lake under the Social Forestry program a few years ago. At the time of the formation of the Upper Ganga Canal the Irrigation Department had also planted trees along the canal bank. Later these were also taken over by the Forest Department and now they exist as Protected Forests. The FD exercised its right of prohibiting hunting of the Scheduled species under the Indian Wildlife Protection Act 1972 amended in 1991. Later Rahmani and Sharma (1996) suggested that it should be developed as a ‘Multiple-Use Protected Area’ with prohibitions on major habitat alterations, land acquisition and tree plantation. Presently Sheikha Lake is a Closed Area and a forest guard is to check poaching.
Sheikha Lake has got some conservation attention by authorities and scientists. It was first brought on the world ornithological and conservation map by Yahya *et al.* (1990) when a pilot project on bird ringing was initiated in the Lake and several waders with Russian rings and ducks ringed by BNHS elsewhere were recovered. Considering the support of the local community in the protection and upkeep of the Lake it was recommended to be included in the National Directory of Community Conserved Areas (Khan & Abbasi 2000). Recently it has been listed as an IBA site due to the large congregations of birds that it harbors. The Indian Bird Conservation Network (IBCN) at the Bombay Natural History Society (BNHS), Mumbai has listed it as an IBA (Important Bird Area) Site due to the large congregations of birds that it harbors (Abbasi and Yahya 2003, Islam and Rahmani 2004). It has also been listed as an important wetland of Uttar Pradesh by (SACON) 2004.
Figure 2.1b: Map of intensive study area - Sheikha Lake (Indicative)
Figure 2.2 a: Max and Min temperatures and b: average monthly rainfall in Aligarh in 2001.
Figure 2.3 a Max and Min Temperatures and, b: average monthly rainfall in Aligarh in 2002
Figure 2.4 a: Max and Min Temperature and b: average monthly rainfall in Aligarh in 2003.

Source: Meteorological Station, Physics Department, AMU, Aligarh.