Chapter II

THE GEOGRAPHICAL SETTING

Location:

With an area of 163.04 Sq. Km. Sathiaon is one of the seven blocks that constitute the Sadar Tahsil of Azamgarh district and occupies the territory that lies in the north - eastern part of it. Before the formation of Mau district the block was in Mohammadabad Tahsil of Azamgarh but after the formation of Mau as a separate district, Sathiaon and Jahanaganj, the two western Blocks were included in Sadar Tahsil due to its vicinity to Azamgarh town, the headquarters of the district (Fig. No. 1).

Sathiaon Block lies between 25° 59' 30" and 27° 7' 30" north latitudes and 83° 12'45" and 83°22'15"east longitudes. River Tons circumscribes to make its north- western, northern and north - eastern boundary. The river separates it from Sagri Tahsil in the north and from Mau district in the north east. In the east lies the Mohammadabad tahsil of Mau district, in the south Jahanaganj block and in the west Palhani Block of Azamgarh district.

Sathiaon, the block headquarters, is situated on Azamgarh - Mau road 12 kilometer from Azamgarh and 30 kilometer from Mau junction. It is a small railway station on broad guage North - Eastern Railway line that runs between Mau and Shahganj junctions. Sathiaon is 108 Km. from Varanasi and 114 Km. from Gorakhpur via Azamgarh by road. It lies at a distance of 268 Km. from Lucknow, the state capital on Lucknow - Ballia road ( state highway No. 34 ). Mubarakpur the centre of all economic activities, the biggest buying and selling centre of Azamgarh division evaluated in terms of money, the manufacturing centre of Banarasi brocade sarees and a municipal town is situated in the northern part of the Block at 26°6' north latitude and 83°18' east longitude.

The village boundaries of Sathiaon Block are shown in fig. no. 2. It also depicts the urban influence on rural areas. The block has 150 villages grouped in 85 village Pnachayats and 9 Nyay Panchayats. The location of Sample villages selected one from each Nyay Panchayat is also
shown in the map. They are Mustafabad, Dilia, Atardiha, Nibi Buzurg, Baithauli, Kashipur, Muinabad, Asauna and Khemaupur.

**INDEX TO FIG. NO. 2**


STRUCTURE AND GEOLOGY

The Sathiaon Block is situated in middle Gangetic Plain, where the deposition of alluvium commenced after the final upheaval of the Himalayas and it continued all through the Pliocene upto present. It has completely covered the old land surface to the depth of thousands of feet. Thus the solid geology of the area is totally obscured underneath this mantle. In Pliocene period, the most dominant feature after the formation of Himalayas was the formation of a trough or depression, in which sedimentation took place to originate the Ganga-Brahmaputra plain. The geologists like Wadia (1957), Oldham (1917), Burrard (1912) and Krishnan (1956) do not agree regarding the nature of the trough and its formation. E. Swess called it a synclinorium or 'fore deep' while S.B. Burrard 'a rift valley' bounded by parallel faults on either sides.

The depression perhaps began to form in the Upper Eocene and attained its greatest development during the third Himalayan upheaval in Miocene. Most of the present geologists agree that the depression was of moderate depth, which filled up after a simple process of alluviation. These plains have been formed by the deposition of the detritus of the mountains by the numerous rivers, emerged from them. There is also a lot of controversy regarding the depth of the alluvium deposits, Oldham postulates its depth to be about
15,000 feet while Glannie calculated the depth of alluvium to be about 6,500 feet on the basis of gravity results of the different stations in the Gangetic plain. But the results of Glannie (1932)\(^5\) calculation depends on geodetic data and lacks geological support.

In the Sadar Tahsil of Azamgarh some borings were also made to trap the underground water to the depth of 500ft (150 meter). During the drilling process as table no.1 shows the strata contained clay, sand, kankar and small pieces of sandstone. The table also indicates that down to this depth no strata of hard rocks occurred. All that was found was either mixed with clay or sand, giving porous nature to these rocks of the recent origin.

<table>
<thead>
<tr>
<th>Strata No</th>
<th>Nature of Strata</th>
<th>Depth in ft</th>
<th>Strata No</th>
<th>Nature of Strata</th>
<th>Depth in ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Surface Clay</td>
<td>0 - 5</td>
<td>10</td>
<td>Fine Sand, Sandstone</td>
<td>290-311</td>
</tr>
<tr>
<td>2</td>
<td>Soft clay</td>
<td>5 - 29</td>
<td>11</td>
<td>Sand and Sandstone</td>
<td>311-346</td>
</tr>
<tr>
<td>3</td>
<td>Sticky clay &amp; Kankar</td>
<td>29-64</td>
<td>12</td>
<td>Sand, Sandstone &amp; Kankar</td>
<td>346-356</td>
</tr>
<tr>
<td>4</td>
<td>Soft Clay &amp; Kankar</td>
<td>64-80</td>
<td>13</td>
<td>Soft clay &amp; Kankar</td>
<td>356-371</td>
</tr>
<tr>
<td>5</td>
<td>Sandy clay &amp; Kankar</td>
<td>80-115</td>
<td>14</td>
<td>Sandy clay &amp; Kankar</td>
<td>371-385</td>
</tr>
<tr>
<td>6</td>
<td>Soft clay &amp; Kankar</td>
<td>115-130</td>
<td>15</td>
<td>Sand and Sandstone</td>
<td>385-395</td>
</tr>
<tr>
<td>7</td>
<td>Soft clay &amp; Hard Kankar</td>
<td>130-167</td>
<td>16</td>
<td>Sand &amp; Sandstone</td>
<td>395-427</td>
</tr>
<tr>
<td>8</td>
<td>Soft clay &amp; Kankar</td>
<td>167-245</td>
<td>17</td>
<td>Clay &amp; Kankar</td>
<td>427-470</td>
</tr>
<tr>
<td>9</td>
<td>Fine to Medium sand &amp;</td>
<td>245-290</td>
<td>18</td>
<td>Sand &amp; Sandstone</td>
<td></td>
</tr>
<tr>
<td>Sandstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table indicates that clay, sand, kankar and sandstone are the chief deposits. Kankar the conglomerates of lime and characteristics of Bangar county, is a later formation than the sedimentation. Therefore the original material deposited consists of only clay, sand and sandstone. Sandstone mixed with sand and clay occurred at the depth of 126 meter near Chirilakot, 88 meter near Khurhat and 79.5 meters near Azamgarh (Bhaduli). The general height of the study area is 76.5 meters from sea level. Therefore, at the level below this depth, when
sandstone mixed with sand and clay was being deposited, the area must has been under retreating sea water. Ghaghara, which has contributed much in the formation of the plain must have been in matured stage, having more than 100 times greater power of carrying load on account of its increased gradient. This was the time when small stones were brought by the violent stream being deposited in "Indo- Gangetic trough."

Out of the two types of river deposits i.e., older alluvium and newer alluvium, the first dominates the block Sathiaon and second one is confined only to a very narrow strip along river Tons, that makes the northern boundary of the area. The older alluvium (Bangar) is rather darker in colour and generally rich in concretions and nodules of impure calcium carbonate known as Kankar. The Kankar concentrations are of all size and shape from small grains to big lumps. The newer alluvium is light coloured and poor in calcareous matter.

ECONOMIC GEOLOGY:

The mineral products are but few as the geology of Sathiaon exhibits nothing beyond the ordinary Gangetic alluvium, confined to saline earth i.e. 'Reh', brick earth and limestone conglomerate. The alkaline efflorescence of Bangar land is the result of inefficient drainage and presence of a more or less impervious strata underneath, which results into capillary action. The crystallized salts known as "Reh", remain on the ground. The Kankar formations are explained by the fact that the dominant constituent of the old alluvium is clay and sodium clay, rich in kankar nodules, is turned into calcium clay, liberating sodium conglomerates. Kankar deposits found everywhere in the area, either on ground or below the surface on varying depth, were previously used for road metal, concrete and producing lime. Below the surface clay, the yellow soil, deficient in plant food is found. This subsoil is locally used for making bricks and tiles.

RELIEF AND DRAINAGE:

The plain, that forms Sathiaon Block, is a levelled country about 73 to 76 meter above sea level. The topographical sheets (63 N/4 and 63
N/8) of Survey of India do not show any contour lines on it. The whole of the area gently slopes towards north and north east where lies the floodplain of river Tons. The variations in local heights occur simply on account of the river Tons and other small nalas that drain the area into main stream i.e. Tons.

**RIVER TONS:**

The river Tons takes its rise many kilometer beyond the border of Azamgarh in the district of Faizabad. Before reaching Azamgarh town the small tributaries that join it are Majhui, Kunwar, Silani and Suksuiya. They all along with the trunk stream flow through the bangar country in confined channels, which are seldom subjected to change. When these rivers are in flood the water surpasses the edge of the valley and spreads over the vast area to cause heavy damage to the crops. (Fig. No.3).

On the map the river Tons, along the northern boundary of the block looks like the sketch of an anticlinorium with small meanders along a big meander (Fig. No.2). The course of the river is a tortuous one and the river frequently doubling back on itself so as to enclose in the loop a tongue of land or kol which is connected with the main land only by a narrow neck of isthmus. The town of Azamgarh is situated in one of them. This meandering nature of the stream helps enhancing the danger of floods by checking the actual flow of water. The distance that river water has to travel may be estimated from an example that the aerial distance between the two points, where it enters the block and where it leaves it, is only 17 kilometer while the length of the river course is 40 kilometer or 2.35 times greater than the actual distance. Though the river is perennial but during dry months a sluggish current of water flows in the bottom of the river bed.

**UNDER - GROUND WATER:**

In an agricultural over populated country, where rain fall concentrates in a part of the year and canal irrigation is not developed, nothing is so dear to the people than underground water. Thus the study of quantity, quality and conservation of under ground water is of paramount importance
in Sathiaon Block. "Water in the cracks and pores of rocks of the lithosphere below the surface of land is called ground water or underground water".¹⁰ It exists everywhere below the surface but the total amount differs from place to place. No estimate about the quantity of reserved underground water in the district has been made prior to this survey. But it is by itself sufficient, thinking of the constitution of bedrocks and conditions of marine deposits, which brought forth the vast Gangetic plain. The records of the Tube Well Division Azamgarh indicate that in most parts of the district a boring of only 75 meters gives sufficient water for tubewell supply. Most of the private tubewells have borings not more than 24 meters. (Table No.1)

Geologically the district is situated in that part of the Gangetic Plain, where alluvial mantle is the thickest. As the depth increases, the fine clay particles change into coarser one, which add sufficient porosity to their character. The principal factors that develop pore-space pattern in natural alluvial material are variability in shape and size of grains due to setting and compacting alternation of coarse and fine material and of sorted and unsorted material (sedimentary texture and structure)¹¹. The strata table from the tube well boring (Table No.1) shows that the conditions for underground water are ideal in the block and the strata of sand and clay are found in alternate arrangement, which serves as aquifer and aquiclude. Clay, observing 50% of their volume allows no percolation induced by gravity. In these ideal circumstances the underground water reservoir in Sathiaon block may be estimated greater than the average, estimated by Van Hise for the world i.e. 200' to 600' layer over the Globe.¹²

**WATER TABLE :**

Along with the study of quantity and quality of underground water, the study of the level on which it is available for human use i.e. water table, is also important. Talman defines water table "as the contact place between free ground water and capillary fringe and is located by the level at which water stands bore-holes." For all the occurrences of surface water above the water table Meinger's term 'Suspended water' seems to be the best.¹³

The water table varies from place to place, from season to season
and from year to year. Rainfall is the chief source of the underground water; therefore, the water table is decided from the quantity of the annual rainfall, the porosity of the upper rocks and the location of aquicludes. During rainy season water table comes up while in dry season it lowers down. During floods the presence of sand in the soil and subsoil in flood plain of the river Tons gives a free movement to the water and the water in the wells comes up. Table No. 2 shows the seasonal fluctuation in water table in Sample villages.

Table No. 2
Seasonal Fluctuation in Water Table in Sample villages

<table>
<thead>
<tr>
<th>Villages</th>
<th>Water table in meter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>June</td>
</tr>
<tr>
<td>1.MUstafabad</td>
<td>4.0</td>
</tr>
<tr>
<td>2.Dilia</td>
<td>4.0</td>
</tr>
<tr>
<td>3.Atardiha</td>
<td>4.0</td>
</tr>
<tr>
<td>4.Nibi Buzurg</td>
<td>4.0</td>
</tr>
<tr>
<td>5.Baithauli</td>
<td>4.0</td>
</tr>
<tr>
<td>6.Kashipur</td>
<td>4.0</td>
</tr>
<tr>
<td>7.Muinabad</td>
<td>4.0</td>
</tr>
<tr>
<td>8.Asauna</td>
<td>4.0</td>
</tr>
<tr>
<td>9.Khemaupur</td>
<td>4.0</td>
</tr>
</tbody>
</table>

The table shows that in the southern part of the Block where clay dominated in the soil and subsoil the water table remains low all along the year as compared to northern villages, situated near the Tons river due to sandy soil and subsoil and easy horizontal movement of flood water and vertical movement of rain water.

The Geneva Conference of European Scientists concluded that the quantity of the underground water like other minerals is limited and may exhaust as a result of blind consumption\textsuperscript{14}. But unlike other minerals rain water regularly adds to it. The underground water is mainly being used for irrigation and each pumping set has an average area of 10.13 hectares. The excessive pumping of underground water has lowered down the water
level of surface wells and hand pumps, which are the chief source of drinking water. In some localities during drought years the drinking water becomes a problem as surface wells and handpumps get dry in summers. Talman is of opinion that excessive pumping will lower down the water table and it will cause the lowering effect on the moisture condition of the soil and specially on “Natural Sub-Irrigation”\textsuperscript{15}. The growing population will need more food and for agricultural expansion in irrigation is necessary. All this will tell upon the underground water as it exhausts more speedily than it recharges. Therefore the conservation of underground water is necessary. The government must think over the problem and should develop alternate means of irrigation based on surface water before the area suffers from any catastrophe.

CLIMATE:

Climate has played an important role in the socio-economic development of a region. Being an integral part of Middle Indo-Gangetic plain Sathiaon block enjoys the monsoon climate with the rhythm of its three seasons and the reversal of prevailing winds at least twice in a year. Temperature, wind, humidity and precipitation are the elements of the climate and they all vary with a change in the season. With agricultural viewpoint the year falls into three seasons \textsuperscript{16} (Fig. No. 4).

\begin{itemize}
  \item [i] The cold weather season or Rabi season (from November to February).
  \item [ii] The Hot weather season or Zaid season. (from March to Mid of June)
  \item [iii] The season of rains or Kharif season. (from Mid of June to October.)
\end{itemize}

[i] The cold weather Season (Rabi Season):

By middle of October rainfall rarely occurs in Azamgarh and gradual fall in temperature takes place. The low pressure centre caused in the month of May near Peshawar and central Asia stands broken up giving place to a new one between equatorial latitudes. The south western monsoon, being felt from the east, ceases and calm condition prevails in
October before the monsoon begins to retreat from the west. A gradual fall in temperature takes place from October to January and again it begins to rise in February. Fall in temperature results in rise in relative humidity. The 26.65°C temperature of October comes down to 16°C-20°C in January on one hand and 71% of relative humidity of October comes up to 85% in January on the other. Again from the month of February, as the temperature begins to rise, the relative humidity gradually lowers down.

Table No. 3
Distribution of Temperature, Relative Humidity and Rainfall During Cold Weather Season

<table>
<thead>
<tr>
<th>Months</th>
<th>Temperature in °C</th>
<th>Relative Humidity in %</th>
<th>Rainfall in Cms.</th>
<th>No. of Rainy days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. November</td>
<td>20.90</td>
<td>75</td>
<td>1.13</td>
<td>1</td>
</tr>
<tr>
<td>2. December</td>
<td>17.12</td>
<td>82</td>
<td>0.13</td>
<td>2</td>
</tr>
<tr>
<td>3. January</td>
<td>16.20</td>
<td>85</td>
<td>1.48</td>
<td>3</td>
</tr>
<tr>
<td>4. February</td>
<td>19.23</td>
<td>70</td>
<td>0.75</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>-</strong></td>
<td><strong>-</strong></td>
<td><strong>3.49</strong></td>
<td><strong>8</strong></td>
</tr>
</tbody>
</table>

In November, the days are warm and nights are relatively cool. The winds are weak and irregular mostly coming from west. November is the driest month in the district and the average amount of rainfall received during last fifteen years was only 0.25 cms. The sky remains clear and free from clouds. Early in December west winds begin to dominate the system due to increased gradient. Nights are windy and cool, December and January are the coldest months, when temperature ranges between 28°C-27°C and 5.70°C. The low temperature and high percentage of humidity often causes uncertainty in weather resulting in cloudiness, fog, mist, light rainfall and frost. In these months heavy mist and fog often occurs at night and lasts till early and late morning hours. In some years late in December and early in January cold waves overtake whole of the district obscuring the sun for many days. It causes deadly effect upon young plants, man and animal. After fifteenth of January temperature begins to rise and weather remains quite pleasant towards the close of February. But February is colder than November.17
During the month of December, January and February, a few depressions, originating in Mediterranean or Atlantic, coming from west and accompanied by moderate rainfall pass through this area. The annual rainfall during cold weather is 3.49 cms. Before the cyclonic rainfall the temperature rises but as soon as the strong and cold westerly winds pass, they lower down the temperature as a whole. The cloudiness soon disappears after the cyclon moves ahead. Table no.3 indicates that the total amount of rainfall received during cold weather is only 3.49 cms. and none of the months has got more than 3 rainy days. Sometimes, in the later part of the winter season frost and hailstorms happen to take place causing considerable damage to the crops. Sometimes hailstorms are so disastrous that nothing remains in the fields to be harvested. The most important about these hailstorms is that they are never widespread and even in an affected area the damage is not uniform. However the records of widespread hailstorms are not lacking.

The Hot Weather Season (Zaid Crop Season)

Table No. 4
Distribution Of Temperature, Relative Humidity and Rainfall During Hot Weather Season

<table>
<thead>
<tr>
<th>Months</th>
<th>Temperature in °C</th>
<th>Relative Humidity in %</th>
<th>Rainfall in Cms.</th>
<th>No. of Rainy days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. March</td>
<td>25.37</td>
<td>61</td>
<td>0.77</td>
<td>1</td>
</tr>
<tr>
<td>2. April</td>
<td>30.70</td>
<td>58</td>
<td>0.42</td>
<td>1</td>
</tr>
<tr>
<td>3. May</td>
<td>34.55</td>
<td>40</td>
<td>0.90</td>
<td>2</td>
</tr>
<tr>
<td>4. June</td>
<td>34.60</td>
<td>71</td>
<td>9.00</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>11.09</td>
<td>9</td>
</tr>
</tbody>
</table>

The hot weather season, widely known as second half of the dry monsoon period, stretches from March to 15th of June. The mean February temperature of 19.23°C rises to 25.37°C in March and mercury steadily goes up till the end of May. The mean maximum temperature recorded in June is
46.85°C at Azamgarh. In March the range of temperature is the highest. In the first part of the season i.e. March and April, the days are warm but the nights are cool, windy and pleasant and in the second part i.e. May and June the days are scorching and nights warm. Except June the rainfall is negligible and humidity lowest in the year, falling to 40% in May. The sky remains free from clouds and dry air with low humidity blows till second half of the June when monsoon bursts. "The story goes to such an extent that the vegetation mostly dries up and the land surface lies 'parched and bare of verdure under the torrid sun.'"20

The dry west winds are the most important feature of the summer season. They are locally known as 'Loo' and their intensity increases with the increase in temperature until the first week of June. They start to blow at 8 A.M. and reach the highest speed about 3 or 4 P.M. After it they fall very rapidly so that during the evening hours they nearly die out. On the day, when winds are more vigorous, the humidity may be as low as 2 or 3 %. In the Gangetic valley the origin of these hot winds is attributed to the difference between the ground temperature and the temperature a few feet above the ground21. It is very harmful for living beings and lives are reported lost on account of it.

In the evening the hot westerly wind, sometimes, changes into dust-storms. A few seconds, before the storms, the horizon looks clouded with dust and very soon the whole atmosphere gets surcharged with dust and visibility gets reduced. The winds blow with a velocity of seventy to hundred kilometer per hour and are capable of blowing down the trees and roofs of thatched houses. The storms are short lived and often end with light showers of rain. Sometimes hailstorms and thunder storms also occur. This type of rainfall is known as 'mango showers' because it is beneficial for the mango crop. The nature of the summer rainfall is local and in this respect they differ from those in winter season.

The rainfall of the hot weather is helpful in giving a temporary relief from the heat of the day but as they wash away the dust from the atmosphere the unchecked sun-rays make the heat oppressive for the living beings.
Rainy Season (Kharif Season)

The rainy season, sometimes known as period of general rain, begins late in June and lasts till fifteenth of October. It is also known as the Kharif season. Table No.5 indicates that the rainy season is characterized with high temperature, high percentage of relative humidity, heavy rainfall, larger number of rainy days and high percentage of cloud cover in the study area.

In the second or third week of June the moisture laden winds began to blow from the east and weather seems completely changed on account of an immediate fall in temperature. The maximum temperature in the month of June at Azamgarh is 46.85°C while in July it is only 39.7°C. The mean monthly temperature of 34.6°C in June drops to 28.3°C in July. It remains constant in July and August, the rainiest months of the year. The relative humidity rises upto 88% in August due to fall in temperature and presence of moisture in monsoon winds. It is the highest recorded in the year. The high temperature coupled with high humidity makes the condition oppressive for man, like Equatoreal region.

Table No.5
Distribution Of Temperature, Relative Humidity and Rainfall During Raing Season

<table>
<thead>
<tr>
<th>Months</th>
<th>Temperature in °C</th>
<th>Relative Humidity in %</th>
<th>Rainfall in Cms.</th>
<th>No. of Rainy days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. June</td>
<td>34.60</td>
<td>71</td>
<td>9.90</td>
<td>5</td>
</tr>
<tr>
<td>2. Junly</td>
<td>31.00</td>
<td>86</td>
<td>26.95</td>
<td>10</td>
</tr>
<tr>
<td>3. August</td>
<td>29.25</td>
<td>88</td>
<td>28.53</td>
<td>12</td>
</tr>
<tr>
<td>4. September</td>
<td>28.73</td>
<td>87</td>
<td>24.63</td>
<td>10</td>
</tr>
<tr>
<td>5. October</td>
<td>26.65</td>
<td>71</td>
<td>9.53</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>99.47</td>
<td></td>
<td>41</td>
</tr>
</tbody>
</table>

In three months (July, August and September) or 25% of the duration of the year, the region gets 75.9% of total annual rainfall. By second half of September monsoon normally slackens and rainless intervals become longer but temperature and relative humidity remain constant. In October the reversal of monsoon takes place, the sun shines brightly in the cloudless sky and conditions remains unhealthy for human body.
Characteristics of Rainfall and Agriculture:

Azamgarh, the Tahsil and district headquarters receives 105.53 cms. of annual rainfall. The total rainfall divided by number of rainy days gives an average of one cms. a day but it is not uniform. More than 90% of the total amount falls in four months of rainy season. Even in rainy season it consists generally of heavy intermittent falls rather than continuous soaking wet. Frequently the weather clears for some time and the rainy days are replaced by bright one with the light breeze. This is very useful for crops. Incessant rains, when ever they occur, cause the crops to rot.22

The rainfall records show that it varies from year to year. Though the annual average is 105.53 cms. but the annual rainfall in 1979 was 46.1 cms., lowest in fifty years. While in 1953 it was 237.73 cms., the highest in the century.23 This variability often causes flood and drought conditions for the Kharif crops. Due to drought conditions in 1782-83, 1837-38 and 1896-97 people died out of starvation in the district24. The excessive rainfall causes flood and if Tons, the main stream, is flooded. 28 villages get affected and about 23% of the Kharif crops are destroyed.

Based on Gregory's formula25 of standard deviation divided by mean and multiplied by hundred, the variability of rain for Azamgarh is 45.95%. Though it is not very high but the failure of rainfall in such a period when Kharif crops are in the field and means of irrigation are not adequate to protect them, it causes famine conditions. The rainfall varies from its usual course in four ways. Sometimes the monsoon arrives the area late and at other times it retreats before its normal period. It also results in heavy downpour and even in the elongation of dry gaps during the rainy season. All this is due to the failure of monsoons and is equally harmful for plants.

The uniform distribution of rainfall during rainy season and total amount of rainfall are equally important from agricultural viewpoint. A model rainy reason, begins with a good rainfall early in Adra (June 19 to 30) and ends with similar fall in Hast (Oct 24 to Sept. 7th). A famous Hindi saying is as follows.
"Charhat barse Adra utrat Barse Hast,
Kitno Raja Dand le Sukhi Rahi Girhast"

Delay in commencement of rains, by keeping back the sowing lowers
down the yield of the autumn and early Kharif crops, which ripen in
September. The premature close of monsoon is attended with serious
consequences on the transplanted late rice, which is harvested in the third
week of November on the whole. During the season from Adra to Hast,
neither excessive rain nor drought is wished for. Rainfall interspersed
with days of sun shine helps crops to grow better on the one hand and
on the other gives time to the farmers to work in the standing crops and
fallow plots.

The irregularity in the distribution of rainfall during rainy season
causes drought and flood conditions. In 1959 the annual rainfall was 80cms.
but due to failure of rainfall in September, 50% of the Kharif crops were
destroyed. In 1979 too the monsoon failed in August and 75% of the Kharif
crops were destroyed. There is also a reverse condition when within a small
period heavy downpour takes place as in August 1984. The rainfall was
recorded 29 cms. within 20 hours. The result was a flood in the river Tons.
The river Tons often gets flooded in the later part of the rainy season i.e.
after 15th of August. It is because the ground remains saturated and run off
increases whenever heavy downpour takes place in a small period.

Vegetation:

"The word natural vegetation stands for all the wild plants fed
by nature, which covered the land prior the evolution of cultivation or
may cover it being left untouched for a long time in future". It is a key to
know the land capability and fertility and an indication too, for the future
agricultural planning. Vegetation is the best single means of estimating the
value of any region for human use. The natural vegetation affects soil by
adding humus, the most important single element among all it contains. It
enriches the fertility of soil but only fertile soils may have luxuriant growth
of vegetation. The poor soils lack the thick cover of vegetation and thus it
remains devoid of a large number of benefits being derived from the later. Therefore vegetation and soil are inter-related phenomena and both are the products of physiography and climate.

The sub-tropical monsoon climate of Azamgarh, should permit the growth of deciduous forests but poor soil and deforestation on account of increasing population have made the condition such as 'there is no forest in the district and strictly speaking, no jungle worthy of the name'. The deforestation took place before the cession of the area by East India Company in 1801 as all the official reports lack any description of the forests. However, in spite of all these problems one may trace the natural vegetation of the Block on the basis of certain scattered bushes and wild trees, which are found in different parts of it.

The natural vegetation of Sathiaon Block may be classified into three types i.e. trees, shrubs and grasses. Though there is no forest but the planted trees both timber and fruit, are of deciduous nature and shed their leaves in March. The timber trees are sisso (Dalbergia Sisso), Mahua, Neem, Babool, eucalyptus, palas, sisor and akol etc. In absence of sal trees, that dominate Trane Ghaghara plain sisso provides the most valuable wood for building, furniture and other domestic uses. The timber trees may grow even in poor soil, therefore they are found in waste lands of the villages and along road sides. The fruit trees are mango, jamun, jack fruit, Tar and Gular etc. The fruit trees too are planted in village groves and along the roads. Mango is the most dominant tree in fruits. Bargad and Pipal trees are also found in the area but they are only used as fire wood. In shrubs, bamboo, jhau, kas, sarpat, Narkat Jhararia and Khajoor are found in Sathiaon block. Bamboo is the most important among shrubs and is widely planted in the villages due to its multifarious use in daily life. Kas, Sarpat and Narkat serve as thatching material. Jhararia grows in wasteland uselessly. The grasses grow on any piece of land as it goes out of cultivation. It also grows on pond embankments, along road side and in waste lands. These areas serve as grazing grounds. Jhararia (thorny Bush) grows in waste lands.
Afforestation:

The forests play an important role in national economy and maintenance of eco-system. Realizing its importance after Independence the National forest policy was revised in 1952. The Forest Conservation Act, 1980 was revised in 1988. Emphasis was given on afforestation, reforestation and development of wastelands. The optimum forest cover proportional to the geographical area must be 20% in the plains. But in Sathiaon Block it is less than 1.0%. The cultivated area cannot be converted into forest due to high density of population on land. Therefore the area to be forested is the village wastelands, village pond embankments, along roads and railway lines. The Block area is 16,304 hectares and the area under forests must be 3260 hectares. The total land out of cultivation is 3474 hectares. Therefore it is impossible to achieve ideal condition of afforestation. The forest department has occupied 4 hectares of waste land in the south-west of Mubarakpur for plantation. The other major area for plantation is 37 Kms. of road sides and 12 Kms. of railway line sides. The third area for afforestation is village wastelands and Govt. building compounds.

Soil:

The soil of Sathiaon Block (Distt. Azamgarh) have been transported from the sedimentary rocks of the Himalayas and they are nearly all varieties of clay. The scientific data for classification is not available. Thus one has to lay gross reliance on his personal investigation, Gazettiers and settlement reports, which classify the land on the basis of texture, colour, availability of water and level of land. Government has established a soil testing lab at Kotwa, a government farm near Azamgarh city, to guide the farmers for the proper use of fertilizers but have not classified the soil. Soil fertility survey was started in early fifties but data is not available for Azamgarh district.

Soil Classification:

Soil in its formation contains water, grit or sand, silt, clay and
humus. Some soils also contain white chalky specks. The top layer of soil to a depth of about 20cms. is different from the soil lying below, which is called the sub-soil. It is less sticky, easier to dig and darker in colour. It contains more of humus but less clay than the sub-soil. The soil contains giving it fertility, texture and colour, which may be used for soil classification of Sathiaon. Thus the soils of Sathiaon are loam (Domat), clayey loam (Matiyar) clay, (Karail) and Usar. Neither these area of the soils nor their distribution on the map is available because they do not form a compact area and are intermingled with each other.

Loam is the most wide spread soil of the area where drainage is efficient. The clay and sand particles are equally mixed giving it brownish colour. It has lower water retention capacity than other soils and is the best soil in the region.

The clayey loam or grey or yellowish grey coloured matiyar soils have less than 20% of sand. The high percentage of constituent clay makes the soil capable of holding sufficient water for a longer period of time than the Domat. It occurs in patches near tals, which are sometimes too small to be depicted on the Block map.

Clay or Karail is black or dark grey in colour. It is found in low lying areas of tals and village ponds. Ploughing and sowing is difficult in dry clay due to sticky and stiff nature of the soil. Late paddy is the chief crop.

Usar or usar-affected soil is found in most of the villages of the Sathiaon block. The chief character of usar is that it rarely occurs in compact area but lies in patches fragmented in every village. On many spots in the waste tracts, lying on comparatively high level in the region of argillaceous soil, 'reh' afflorescences during the dry months, occurs making the ground in some places white as if covered with snow and in other puffy crust of brownish dust. In many places 'reh' does not coat the surface of the ground, but the soil is evidently infected more or less with it. Even ground on which 'reh' exudes as well as the reh-infected land bears a brownish colour grass is known as 'usarauli' whose acicular leaves may be seen in
the dry months protruding through the efflorescence.

**Reclamation of Usar:**

'The term 'usar' is extremely vague and covers a very wide range of soils. In common parlance, soils only mildly alkaline, soil which show a very pronounced alkalinity or soils with efflorescence of 'reh' on the surface are all expressed as Usar. In actual fact usar is not a type of soil but the dynamic process of sodium soil formation.³³

Some of the most important causes of the usar formation are bad drainage, the rise of permanent water table and the presence of impermeable clay or Kankar layer in the sub soil. As these factors bring the capillary fringe of the under ground water within the influence of surface evaporation and the soils are precipitated as white incrustation on the surface.³⁴

Many experiments for usar reclamation were made in State Usar Reclamation Farms at Rahimabad (Lucknow) and Dhakauni (Hardoi) In U.P. after Independance but the rapid reclamation of usar took place in the study area after 1970 with the use of pyrite and the press mud of sulphitation process of Sathiaon Sugar factory. This new technique out-dated all previously suggested by the government and made the reclamation process easy. The goal was acheived and wide usar tracts in Bamhaur, Shahgarh, Sathiaon, Saminda and Asauna Naya Panchayats came under plough. The development in irrigation process has also helped reclamation. Wide stretches of such land, which were recently reclaimed, may be seen in these Naya Panchayats.

**Crawford's Classification of soils** ³⁵

Among all the soil classifications available, the most extensive is that made by Crawford and his assistant Smith in 1907-8. Though they are not geographical and their objective is revenue assessment but the importance of their study lies in the fact that it evaluates the soil's productivity and fertility for taxable capacity. Mr. Crawford distinguishes the two types of soil in Sathiaon block. The first type covers all the field where
rice thrives better than the other crops and he called it 'rice'. The second is the area, where Ravi crop flourishes better than rice and he calls it 'Rabi'. Again it was divided into eleven sub classes. Regarding his classification Crawford himself has remarked 'The rice land was ceased according to soil and position as regards irrigation and liability to floods, the Rabi land according to its distance from the inhabited sites.' Table No.2.6 gives the distribution of these types in Sathiaon. The boundary of these classes are marked on every village map prepared before consolidation but it is not available on the map, representing more than a village. All the soil types are not necessarily found in every village.

Table No. 2.6
Crawford's classification of soil in Sathiaon
(Area in percentage)

<table>
<thead>
<tr>
<th>Class</th>
<th>Rabi</th>
<th>Rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>3.01</td>
<td>5.03</td>
</tr>
<tr>
<td>(ii)</td>
<td>21.74</td>
<td>31.08</td>
</tr>
<tr>
<td>(iii)</td>
<td>21.91</td>
<td>31.08</td>
</tr>
<tr>
<td>(iv)</td>
<td>22.93</td>
<td>25.36</td>
</tr>
<tr>
<td>(v)</td>
<td>17.83</td>
<td>-</td>
</tr>
<tr>
<td>[vi]</td>
<td>2.58</td>
<td>2.87</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

[3] The Farmer's Classification:

The villages, lying in single soil zone, exhibit different levels of fertility. The chief cause of such a variation is the human approach, which changed the nature and composition of top soil by adding manures, humus and other organic and inorganic contents to make it more fertile. In this approach the best land that surrounds the settlement site is called 'Goind' in local parlance. It is also called 'Good quality of soil'. This area grows most costly crops in every village, requiring utmost care.

As the distance from the settlement site increases there happens
to decrease the human factors i.e. humus. Before reaching the paripjery of the village, where 'Poor quality of soil' locally known as the 'Medium quality of soil' or Majha soil as a transitional belt.

The classification is simple and good from the agricultural viewpoint as it decides the land use pattern in the village. It is popular all over the Eastern Uttar Pradesh. This classification too cannot be shown on a map covering more than a village.

**Soil Conservation:**

Land is the basic asset of any country and its proper utilization is necessary for the general well-being of the people. The maintenance of the productivity of the soil at its optimum level is of utmost importance in plans of soil conservation. Deterioration of soils is brought about by soil erosion and soil exhaustion while soil conservation implies prevention and control of both. The fundamentals of soil conservation are that no land would remain idle, each parcel of land would be put to a use for which it is best suited and the productivity of land would be maintained at a high level. Soil erosion forms the gravest menace to agriculture in Sathiaon block and in some areas soil exhaustion is the result of heavy cropping under faulty system of management and crop rotation, which denudes the soil of its fertility. There are four types of inert land which, in some cases, is a danger to the neighbouring good land.

(a) Eroded gullied and ravine lands along river Tons.
(b) Usar and reh soils.
(c) Water logged areas.
(d) Government waste lands along roads, canals and railway tracks.

Most of the land falling in these categories have been given to the forest department and are being planted with trees. The low lying areas are being connected with Tons to improve drainage, which checks the usar formation of land. The government is providing free soil testing facility to the farmers to check misuse of fertilizers and save the soil chemistry from being unnatural and harmful. The agriculture department is also demonstrating scientific crop rotation and crop combination to check soil
exhaustion and maintain optimum level of fertility. The government has also misused the agricultural land by unthoughtful requisition of it for government buildings, which can be constructed in wastelands.

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