BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

EA No. 16 of 2019
IN
OA No. 153/2014

IN THE MATTER OF:

Indian National Trust for Art and Cultural Heritage

Applicant

Versus

Govt. of NCT of Delhi & Ors.

Respondents

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Place: Panchkula
Dated: 09.01.2025

Dr. Virender Kumar Dahiya
Member Secretary,
State Wetland Authority, Haryana

Through

Rahul Khurana, Advocate
17, Central Lane, Babar Road,
Bengali Market, New Delhi

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Reply of Dr. Virender Kumar Dahiya, Member Secretary, State Wetland Authority, Haryana to the objections dated 28.08.2024

PRELIMINARY SUBMISSIONS: -

MOST RESPECTFULLY SHOWETH:

1. That historically, the Najafgarh Jheel was located far below Chhawla in Delhi (District Gazetteer Delhi: 1883-84 and 1912). There is no evidence of Jheel in Gurgaon District in the historical literature i.e. Gazetteer published during British period 1883-84 and 1912. The original Jheel used to get its water from Sahibi river which was a tributary of river Yamuna. The amount of water from hills of Gurgaon was petty as mentioned in the literature. The relevant paras of the District Gazetteers are given below:
   a. **Reporting of Najafgarh Jheel in Delhi Gazetteer of 1883 (page-8):** *The western lines, as has been already said, converge on the Jhil below Najafgarh. There are two main passages into this: one to the north of Jharaudah (now Jhrodha Kalan) and east of Dichaon comes into the low lands at Nawadah Hashtal; the other and larger body of drainage comes in between Mandelah Khurd and Bakargarh running south-east to Pindwala Kalan and meeting, jhil below Chhaolah. The main jhil lies to the south-west and west of this, and is fed, as already noted, by the Sahibi drainage from Gurgaon and the flow of hill water on the west side of the Delhi hills. This last comes down in several places; the most distinct lines perhaps are those lying about Dabari and Palam. A more particular account of Najafgarh Jhil considered in its revenue and irrigation aspects will be found in Mr. Maconachie's Settlement report. It is sufficient to note here that the area drained by it is 3072 sq miles, and its water surface with a depth of 12 feet in the water gauge at Nanak Heri is 56,657 acres or about 88.5 sq miles. In 1833, its area was estimated at 52.5 sq miles, but the time of the year this refers to does not appear. Its outlet is a drain passing with a muddy sluggish flow to the north-east by Kakraula, Nilanthi and Basei across the Rohtak road about three miles east of Delhi and emptying itself into the Jamuna just above the village of Wazirabad.*
   b. **Reporting of Najafgarh Jheel in Gurgaon District Gazetteer of 1883 (page-3):** Another marked physical characteristic of the District (Gurgaon) is found in its jhils or lakes. The most important of these is

the Najafgarh jhil on the northern border of the district; but this is mainly situated in the Delhi district. Into the Sahibi, swollen by Indori, and the Badshahpur stream pour their waters.

c. **Reporting of Najafgarh Jheel in Delhi Gazetteer of 1912 (page-7):** *Thus we are brought by natural steps to describe the Najafgarh basin into which falls not only the drainage of the district on the west of the canal but also two other streams of importance: : the one is the depression by which the drainage of the part of the Rohtak district joins this district at Mundela Kalan and passing Ujwah and Pindwala joins the main Jhil at Chhaola: the other is the Sahibi Nala which passes through the Gurgaon district having its head waters far off from in Alwar. The main Jhil receives too, a few petty streams from the local hills. The area which drains into this Najafgargh Jhil is estimated at some 3000 square miles: in years gone by an area of more than 80 square miles has been known to be submerged by the floods,* ***but for various reasons such extensive flooding no longer takes places.*** *As may be imagined the volume of water was more than the soil could absorb and cause of much sickness and fever; so it was determined to cut a channel, now known as the Jhil Drain, to run the surplus water into Jamna. This work was carried out in 1888 under the direction of Captain (afterwards Sir Hennery) David. This drain begins about Chhaola where it is little more than a petty ditch and passes via Kakraula, Hasttsal and Basai, by a deep cut through the high lying Bangar into the Jamna at Wazirabad. The result of this work is that the water is drawn off too quickly fixed in the channel, it is possible to flood an area of twenty square miles and to draw off the water in time for cultivation.*

The relevant pages of District Gazetteers are placed as **Annexure-R/1.**

2. That the Najafgarh drain was dug and a bank was constructed on Delhi side during mid-1960s to check flooding in Delhi side and to divert water to Yamuna. No bundh was constructed in a length of about 5 km on Haryana side during that period. After construction of check dams in Rajasthan portion on Sahibi river and construction of Masani Barrage in district Rewari of Haryana during 1970s, no water came from Sahibi river to reach Najafgarh Jheel area/Yamuna river. The present submergence along Najafgarh Drain is due to city waste water of Gurugram.

3. That as there is no bundh on Haryana side along Najafgarh Drain and there is siltation in the Najafgarh drain in the down flow, the city waste water has spread in large area in farmers' fields. The land of farmers has been submerged. The water used to take time in draining out from farmers' fields through Najafgarh drain as the flow is slow due to siltation in Najafgarh drain in Delhi portion. Aquatic birds started visiting the area due to its proximity to Sultanpur National Park.

4. That concerning the matter of farmers land, a Committee of senior officers was further constituted under the Chairmanship of Sh. Devender Singh, IAS (the then ACS. Irrigation & Water Resources), Sh. Sudhir Rajpal IAS (the then CEO, GMDA) and Dr. Yash Garg IAS (the then DC, Gurugram). The

Committee of Senior Officers prepared a detailed report after analysis of historical literature, satellite images and hearing all the stakeholders including the representative of the Applicant and the farmers. The major findings and the recommendations of the Committee are given under:

- *It is established fact from historical literature (Delhi Gazetteer 1883-84 and 1912; Gurgaon Gazetteer 1883) that the Najafgarh Jheel was located in the State of Delhi. Very small area of submergence was in District Gurgaon. The Jheel used to be in village Chhawala which in Delhi.*
- *It is also fact that Jheel used to get major portion of water from Sahibi river in sheet flow which was a tributary of river Yamuna and no water is coming the Sahibi river after late 1970s as check dams have been constructed at the source in Rajasthan state. The quantum of water from local hills through Badshahpur nala has been reported as petty.*
- *To check flooding in Delhi portion, a drain was dug in mid 1960s to channelize Sahibi River water to the river Yamuna and a bank was constructed on Delhi side to check flooding in Delhi side. This led to spread water in Haryana side as the drain in the area in question is at the borders of Haryana and Delhi.*
- *No water came in Sahibi river in Haryana and Delhi portion after construction of check dams in the State of Rajasthan and construction of Masani Barrage on Sahibi River in district Rewari of Haryana State during late 1970s.*
- *It is also established from toposheets of Survey of India (1976) that there is depression in the area but there is no mention of any Jheel in the toposheet but there is mention of Drain No. 8 (Najafgarh drain) meaning thereby during late 1970s, there was drain and depressions and no evidence of jheel existence.*
- *There is no mention of Jheel in revenue records of said villages (Dualtabad, Dhankot, Khedki Majra, Bhudera, Dharampur) in District Gurugram where submergence is there at present as reported by DC, Gurugram as per directions of Hon'ble NGT.*
- *It is also established from historical google earth images that there was water spread in the panchayat land area of 80 acres only in the year 2005 (20.02.2005) and in the year 2009 (13.03.2009), it was only 47 acres.*
- *It is also established fact from google earth images that there is no submergence in the area in question in the year 1990 and the spread of urbanized area of Gurgaon city was only 25 Sq Km approx. which has extended upto 350 km in the year 2021. Due to expansion of urbanised area after the year 2010, the discharge of water through Leg-2 and Leg-3 (Badshahpur drain) increased and the water started to spread beyond the panchayat area. The submerged area used to increase during monsoon months and after monsoon, the water used to recede in later months.*
- *It is also reported that the Leg-2 and Leg-3 are not connected to the Najafgarh Drain due to which water spreads in the large area and there is need to connect the Leg-2 and Leg-3 to Najafgarh Drain by installation of pumping stations and gates.*

- *It is also proposed to construct bank on Haryana side of the Najafgarh Drain so that the water can straight way flow upto Yamuna and does not spread in the large area. As some of the water also comes from Drain No. 8 during rainy season and spreads in the area in question which further adds to spread of submerged area. Therefore, it is recommended that bank on Haryana side of Najafgarh drain may be constructed to check spread of water in large area and also to channelize water in Najafgarh drain upto Yamuna.*
- *It is also observed that after connection of Leg-2 and Leg-3 in the Najafgarh Drain and construction of bank on Haryana side along Najafgarh drain, the area of submergence will also automatically decrease. The water will be channelized to Yamuna by gravity or pumping so that land of private owners may be saved from submergence. The storm water during rainy season may be allowed to spread in the adjoining area through openings in Leg-2 and Leg-3 when there is lack of space in the Najafgarh drain which will be utilized by the private land owners for raising kharif crops. The excess water after rains will be pumped into drain and the lands will be available to farmers for sowing rabi crops.*
- *As per plan submitted by GMDA and Irrigation & Water Resources Department, no treated water will go to the Najafgarh drain as plans for utilization of treated waste water for agriculture, greenspaces and industries are in pipeline as described above. Once the treated waste water will be utilized, there will not be any flow of water in the submerged area except during rainy season. After completion of the project of enhancing the capacity of TWW Channel from 188 MLD to 550 MLD in two years, TWW which is being discharged through Leg-2 and Leg-3 in the submergence area/Najafgarh drain will be diverted to Channel completely and will be utilized for irrigation purposes and the submergence area will reduce considerably. Very small area will submerge only during rainy season.*
- *The concern of private land owners is genuine that their private land submerged with city waste water cannot be declared as waterbody as the city authorities are not able to channelize the storm and treated water into Najafgarh drain. They have argued that no water should be allowed to be discharged in their private lands.*

In view of facts mentioned above, following recommendations were made:

a) *The so called Jheel did not exist in Haryana side, historically it was in Delhi and the area which is now under submergence is due to discharge of rain water and treated waste water of Gurugram city flowing through city drains viz. Leg-2 and Leg-3 (Badshahpur Drain) and the area of submergence increases due to addition of more water by Drain No. 8 during monsoon coming from Jhajjar District.*
b) *There is no water in Delhi side infront of area of submergence in Haryana side as a bank has been constructed on Delhi side of Najafgarh Drain. There is need to construct bank on Haryana side on Najafgarh*

Drain to avoid spreading of water in large area on the same lines as constructed on Delhi side.

c) *The Leg-2 and Leg-3 (city drains) are required to be connected to Najafgarh Drain directly by fixing gates and pumping stations to channelize the water in Najafgarh drain and finally to Yamuna.*

d) *The water flows slowly in the Najafgarh drain as it is silted in Delhi portion and the matter is required to be taken up with Delhi Government to carry out desilting of Najafgarh drain regularly.*

e) *Since it is a transboundary issue related to water disposal of Delhi and Haryana states in river Yamuna, therefore, the matter needs to be taken with Ministry of Water Resources, Govt. of India for desilting of Najafgarh Drain in Delhi portion so that the water can flow fast into river Yamuna and the submergence area in Haryana side can be minimized.*

f) *Since the Country & Town Planning Department has issues licenses in the area, therefore, a view needs to be taken by the Government in consultation with Country & Town Planning Department regarding restriction on construction activities in this area considering the requirement of land for water accumulation during rainy season.*

g) *The land of private owners has also submerged due to spread of water and declaring land of private people as wetland is not justified.*

***Conclusion:* It is misnomer that Jheel existed in Haryana side and the land of private owners cannot be declared as Wetland.**

5. That after this report of Senior Officers Committee, the matter of Najafgarh Jheel was re-examined as no body critically examined this matter before. With the findings of the Senior Officers Committee Report, Haryana Government pursued the matter with Ministry of Environment, Forest & Climate Change, GoI as the ministry was entrusted for implementation of Joint Environment Management Plan of Delhi and Haryana. An Inter-Ministerial Expert Group was constituted by MOEF & CC, GoI with following members:

i. Dr. Pravin Kumar, Director (Technical), National Mission for Clean Ganga (NMCG), Ministry of Jal Shakti (MoJS), Government of India (GoI)

ii. Sh. O. P. Srivastava, Chief Engineer, Irrigation & Flood Control, Department, Delhi

iii. Sh. Birender Singh, Engineer-in-Chief, Irrigation & Water Resources Department, Haryana

iv. Sh. J. Chandra Babu, Scientist E, CPCB, MoEF&CC, GOI – Member Convener

Terms of Reference of the Inter-Ministerial Expert Committee:

a) To identify the factors relating to unwanted submergence of land areas

b) To undertake a study so as to identify various factors/issues embodying the flow of water through Najafgarh Drain including connectivity of the drains up to river Yamuna, de-silting of such drains etc.

c) To draw up Standard Operating Procedure (SOP) for de-silting of the Najafgarh drain so as to facilitate uninterrupted flow of water into river Yamuna

d) SOP also to include periodicity and extent of de-silting of drains, estimation of the cost involved and such other factors as may be considered relevant.

e) The Committee was asked to submit its report within three months from the date of issue of letter dated 16.02.2022.

6. That the Inter-Ministerial Expert Group heard all the stakeholders and visited the site also. The Expert Group submitted its report in June 2022 which has already been annexed in previous report. The representatives from Haryana Government submitted its Action Plan before the Expert Group and the action plan was well recorded in the Report. The relevant para of the report is given below:

Main factors relating to unwanted submergence of land area are detailed below:

- *The built-up area in Gurugram has grown almost two-times from 189.67 km² in 2007 to 358.90 km² in 2017. If this urban growth trend continues, it is expected that the built-up area will be increased to 518.86 km² by 2025. Accordingly, Increase in volume of treated waste water due to considerable expansion of urbanised area of Gurugram-Manesar Urban Complex since 2010.*

- *Increase in volume of runoff water during rains due to increase in urbanized area and decrease in unpaved area for water percolation, reduction in water holding catchment area.*

- *The drains of Haryana namely Drain No. 8 contributes little run off during monsoon from Jhajjar district, Badshapur Drain (L3) (Capacity 3700 cusec), Dharmpura Drain (L2) (Cap.1500 cusec) and catchment runoff due to rainfall contribute to the unwanted submergence in the Jheel area under reference. During the summer season mainly Badshapur Drain (L3) and Dharmpura drain (L2) plays major role in unwanted submergence and these drains also carry silt, sewerage and floating materials.*

- *It appears that the presence submergence is mainly due to city waste water of Gurugram (Gurgaon) and surface run off during rainy season disposing water through Badshahpur Nalla (Leg-3 Drain) and Leg-2 Drain.*

- *Spread of submergence area on Haryana side as there exists a bund /bank along Najafgarh Drain on Delhi side and the water is accumulated on Haryana side. The bund also does not exist Haryana side in Rawat village of Delhi. Due to which the land of farmers has been sub-merged in village Rawat of Delhi and some villages of Haryana viz. Daultabad, Khedki Majra, Dhankot, Dharampur, Chandu etc.*

- *Accumulation of silt in Najafgarh depression as well as in Najafgarh drain in Delhi jurisdiction resulting into reduction of storage capacity and slow flow of water through Najafgarh Drain to river Yamuna.*

- *Back flow of water during monsoon season from Najafgarh drain due to silt in the Najafgarh drain*

- *Designed bed slope of Najafgarh drain in the submergence areas is 1:25000, which is hindrance to fast movement of water through drain.*

- *The area which is under submergence or which fall under various contour levels belong to private land owners and gram sabha land has low ground level. The design bed level of Najafgarh Drain is 207.5 m (HFL level of Najafgarh drain 211.2 m) and thus even considering 1 m natural draft in Najafgarh drain, there shall be submergence in the counter level of 208.5 m.*

The Action Plan submitted by Haryana State for control of submergence in future (Annexure VIII) is also taken on record. As per Action Plan submitted by State of Haryana, following interventions have been proposed for resolving the problem of submergence:

Enhancement of capacity of STP Agricultural Channel from 188 MLD to 550 MLD for Jhajjar district for utilization of treated waste water. Work has already been started. After completion of the project of enhancing the capacity of treated waste water (TWW) Channel from 188 MLD to 550 MLD within in two years, TWW which is being discharged through Leg-2 and Leg-3 at present in the submergence area/Najafgarh drain will be diverted to Channel completely and will be utilized for irrigation purposes and the submergence area including farm land (private land) is expected to reduce considerably.

Thus, the Committee is also of the opinion that actual submergence due to rain water or actual Jheel area can be determined after completion of above project after 2 years to take adequate remedial measures if required.

7. That the State Government started working on the Action Plan submitted before the Expert Group. Meanwhile, the concerned departments of the State Government submitted their proposals to manage the city waste water and save the farmers land from submergence as mentioned under:
   1. *Enhancement of capacity of STP Agricultural Channel from 188 MLD to 550 MLD for Jhajjar district for utilization of treated waste water.*
   2. *Construction of bundh on the bank of Najafgarh Drain on Haryana side in a length of about 5 km to channelize the water in the drain instead of spreading in farmers' fields.*
   3. *Connection of Leg-2 & Leg-3 to Najafgarh Drain and installation of pumping stations.*

8. That in view of facts and circumstances presented above, ***the actual area of submergence can be determined after completion of above said projects as mentioned under:***

Sr. No.	Action	Executing Department	Timeline
1.	Enhancement of capacity of STP Agricultural Channel from 188 MLD to 550 MLD for Jhajjar district for utilization of treated waste water for agricultural purposes.	Irrigation & Water Resources Department, Haryana	90% work is complete, work will be completed by 31.01.2025
2.	Construction of bundh on the bank of Najafgarh Drain on Haryana side in a length of about 5 km to channelize the water in the drain instead of spreading in farmers' fields.	-do-	The work will be completed within one year after providing land by District Administration.
3.	Connection of Leg-2 & Leg-3 to Najafgarh Drain and installation of pumping stations.	Gurugram Metropolitan Development Authority (GMDA)	The work of connecting Leg-2 is in progress, will be completed by 06.09.2025. The work of connecting Leg-3 will be completed within next three years after providing additional land by District Administration by 31.03.2027.

9. That the State Government has taken a decision to identify an area of 75 acres as Wetland and after completion of project of STP Channel of 550 MLD for agricultural purposes to Jhajjar District, the matter of submergence of farmers land will be resolved and if any water is coming through Leg-2 and Leg-3 drains will be directly put in the Najafgarh Drain which will be in drain form after construction of bundh on Haryana side also.

10. That after completion of action of Haryana state, 60 m. in Haryana side width of water in a length of about 5000 m will act as wetland. The total area will be around 75 acres.

11. That Wetland (Conservation & Management) Rules 2017, defines **wetlands** as 'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, **with water that is static or flowing**, fresh, brackish or salt, including areas of marine water the depth of which, at low tides, does not exceed six meters'. In addition, to protect coherent sites, Article 2.1 of the Convention provides that 'wetlands may include riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands.'

12. That there is no restriction of area of wetland as per Wetlands (Conservation & Management) Rules 2017. It is mentioned in these guidelines that all wetlands, irrespective of their location, size, ownership, biodiversity, or ecosystem services values, can be notified under the Wetlands Rules.

13. That a Civil Appeal bearing Diary No. 17182/2024 in the matter of Rao Satvir Singh & Another Vs Union of India & Ors. in the Hon'ble Supreme Court is also pending in the same matter.

PARAWISE REPLY ON MERIT:

1. That it is time and again reiterated that the original Najafgarh Jheel was in Chhawla in Delhi and main source of water was Sahibi river. No water of Sahibi River has come to this point since 1978 after construction of dams in Rajasthan and construction of Masani Barrage in District Rewari. The area of submergence is not a lake and was not a lake. The land belongs to farmers/private owners and the present submergence is due to non-management of city waste water. The claim of applicant that land under submerge is Najafgarh Jheel is strongly denied. The present submerge area is due to city waste water and the underground water of this area is brackish and due to waterlogging the ground water is not drinkable and this water has no role in re-charge of ground water so claimed by the applicant. The issues of urban flooding will also be resolved once the bundh is constructed along Najafgarh drain and Leg-2 and Leg-3 drains bringing city water are connected straight to Najafgarh drain. Hence, the contents of the para 1 are denied.

2. That the objections filed by the applicant in para 2 are baseless and devoid of any merit without having any knowledge of the area and without having the knowledge of problem that the farmers are facing due to submergence of their lands due to non-management of city waste water. Delhi Government managed their farmers land from submergence by construction of bund along Najafgarh drain on their side but a stretch of about 5 km was left open on Haryana side. The contents of preliminary submissions are being reiterated.

3. That it is once again submitted that submerge land in question at Gurugram is not a Jheel as claimed by the applicant. It is area of submergence of farmers land due to non-management of city waste water. Had the city waste water been not there, there had not been any submergence in this area. It is also submitted that the ground water in this area is brackish and no extraction is being carried out in this area. Hence, the contents of the para 3 are denied.

4. That it is further submitted that the land required for bundh is different that the land kept reserved for water course. The total width of land along Najafgarh drain that will be acquired will be 100 m, out of 100 m, 60 m will be kept for water course and 40 m for bundh. Similarly, in Delhi side also 50 m has been kept as water course and 50 m for bundh which has already been constructed. The applicant is trying to create confusion. Hence, the contents of Para 4 are denied.

5. That the contents of para 5 are wrong and denied. It is submitted that there is stagnated water on farmers land and the farmers are demanding to government authorities to manage their city waste water instead of allowing to spread in their area as they are not able cultivate crops which they used to cultivate since 2010 which is clearly visible from Satellite images. It is noteworthy that the provision referred by applicant is applicable to the wetlands notified under the Rules, 2017.

6. That contents of para no.6 of objections are wrong and denied. The applicant is equating the stagnated city waste water with the High Flood Level. The proposition is illogical and liable to be rejected. It is specifically denied that land in question submerged in city waste water is not a lake as claimed by the applicant time and again. The state authorities are bound to manage their city waste water by way of treating it and utilizing for agricultural purposes and save the farmers land from submergence. The actions planned by state authorities are in consonance with the interest of saving farmers land and bringing back to the level of cultivation by managing the city water and Channelizing through Leg-2 and Leg-3 drains to Najafgarh Drain and finally to river Yamuna. Once the action plan is completed, there will not any issue of submergence and also the water will also be channelized to resolve flooding issues. There will also be scope to divert the water to Jhajjar district for reutilization including agricultural purposes. It is relevant to mention here that there is another rich habitat for birds nearby called Sultanpur National Park and the state Government has preserved this habitat by connecting the waterbody with canal water. The birds which are seen in this submerged area come from Sultanpur National Park. This area of submergence was never a Jheel. Hence, the contents of the para 6 are denied.

7. That the provision referred by applicant is applicable to the wetlands notified under the Rules, 2017. It is humbly submitted that here is no recharge in the area of submergence as the ground water is brackish and due to water logging of city waste water, the first layer of drinkable water

has also been converted into brackish. The applicant has no ground knowledge of the area.

8. That the provision referred by applicant is applicable to the wetlands notified under the Rules, 2017. However, land in question sought to be notified is merely submerged due to unchanneled city waste water and not the wetland. The contents of preliminary submissions are being reiterated.

9. That contents of para no.9 are wrong, denied and irrelevant. No such data as alleged in para under reply is in record of answering respondent. It is humbly submitted that said data referring to I&FC, Delhi may pertain to NCT of Delhi only. It is further submitted that stagnated city waste water due to absence of proper channel system cannot be termed as High Flood Level Contour. It is further submitted that the water has spread in larger area as there was siltation in Najafgarh drain and the Leg-2 and Leg-3 were not connected to Najafgrah Drain. Delhi has constructed bundh along Najafgarh drain due to which water has spread in Haryana side otherwise, it would have spread in Delhi side.

10. That the contents of para 10 are denied as the water submergence is due to city waste water, not due to rain water. Once the city waste water will be managed by city/government authorities, there will not be any submergence. It is further submitted that reference of the 'Land Revenue Settlement of the Gurgaon District , 1882 is illogical in support to claim the land of villages mentioned as Jheel. Even said document says about inundation from the jheel but not the actual jheel area. The applicant has tried to mislead this Hon'ble Tribunal by not citing the exact lines of said Settlement which mention the suffering of people of villages mentioned.

11. That the contents of para 11 are irrelevant as the present submergence has no role in water security for the city as the ground water beneath land in question is brackish and nobody is extracting for any use in the adjoining area. Rather, the drinkable water has been converted to brackish due to water logging and merging of lower layers in the upper good water layers. There is no merit on the claims of the petitioner. The persons who are facing problem in this area and who had the knowledge of local conditions can better understand and know the issues. The contents of preliminary submissions are being reiterated.

12. That the Satellite images produced in the senior officer's report clearly shows that there was no submergence in the area till 2010 and the water was confined to about 50 acres in Panchayat land of village Daultabad before merging to Najafgarh drain. Later due to increasing discharge, the water started spreading in farmers' fields. Hence, the contents of para 12 of objections are irrelevant and misconceived. The contents of preliminary submissions are being reiterated.

13. That the contents of para 13 are denied and the submergence will considerably decline once the action plan prepared by the State

Government is completed. The contents of preliminary submissions are being reiterated.

14. That in reply to para no.14 of objections, the contents of preliminary submissions are being reiterated. The State Government has taken a view to identify the water course as 75 acre till the action plan is completed. Once the action plan is completed and the matter may further be reviewed any time.
15. That in reply to para 15 of the objections, State Government after identification of the 75 acres has submitted brief document to the Ministry and the Ministry will prepare joint EMP based on the documents of both the States. The State Government was in process of studying the matter as the matter was related to farmers land and various committees were constituted to study the matter and report. Finally, the State Government also requested intervention of Central Government once the matter was examined thoroughly and reported by Committee of senior officers.

16. The contents of para 16 are denied and not agreed upon as the area of submergence will reduce considerably once the action plan of state government is completed. The contents of preliminary submissions are being reiterated.

PRAYER:

In view of the preliminary objections and Para-wise reply stated herein-above, it is most respectfully prayed to accept the action plan of the State Government vide which area of 75 acres has been identified as wetland in the interest of justice.

Place: Panchkula
Dated: 09.01.2025

Dr. Virender Kumar Dahiya
Member Secretary
State Wetland Authority, Haryana

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AFFIDAVIT

I, Dr. Virender Kumar Dahiya, Member Secretary, State Wetland Authority, Haryana, aged about 58 years do hereby solemnly affirm and declare as under:

1. That I am well conversant with the facts and circumstances of the case in my aforesaid official capacity, therefore, I am competent to swear this affidavit.

2. That I have read the contents of accompanying reply to objections which has been drafted under my instructions.

OATH COMMISSIONER PANCHKULA 9/1/25

DEPONENT

VERIFICATION

Verified at Panchkula on 9th day of January, 2025 that the contents of above affidavit are true and correct to my knowledge and on the basis of information derived from the Official record which I believe to be true and no material fact has been concealed therein.

ATTESTED

(INDERJEET CHAUDHARY)
OATH COMMISSIONER
PANCHYKULA (HRY.)

DEPONENT

9 JAN 2025

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I identify the deponents He/She has signed in my presence

Certified that the aforesaid statement has been made before me on 9/1/25 at Panchkula

Mahender Kumar, Assistant
O/o State Wetland Authority, Haryana.

OATH COMMISSIONER PANCHKULA (HRY.)

ANNEXURE - R/1

CHAPTER I.

THE DISTRICT.

SECTION A.—DESCRIPTIVE.

Chapter I, A.

Descriptive.

General description.

The Gurgáon district is the southernmost of the three districts of the Delhí division, and lies between north latitude 27° 39′ and 28° 31′, and east longitude 76° 21′ and 77° 35′ forming the extreme south-east corner of the Province. Its shape is exceedingly irregular. It is bounded on the north-east by the Delhí district; on the east by the Jamuá which separates it from the districts of Bulandshahr and Alígarh of the North-West Provinces; on the south by the Mathrá District of the North-West Provinces and by the state of Bhartpur; on the west by the Alwar state; on the south-west (that is south of the Rewárí *tahsìl*, by the Jaipur *parganah* of Kotkásim, by the Báwal *parganah* of Nábha, and by Alwar; on the north-west by the Kánti *parganah* of Nábha; and on the north by Dujáná, the British district of Rohtak, and the little state of Pátaudí which it almost embraces in its clasp.

It is divided into five *tahsìls*, of which that of Fírozpur embraces the southern, that of Palwal the east-central, that of Núh the west-central, that of Gurgáon the northern, and that of Rewárí the outlying north-western portion of the district. Some leading statistics regarding the district and the several *tahsìls* into which it is divided are given in Table No. I on the opposite page. The district contains two towns of more than 10,000 souls, as follows :—

Rewárí	23,972
Palwal	10,635

The administrative head-quarters are situated at Gurgáon, on the Rájpútáná State Railway, 22 miles from Delhí in the extreme north-eastern corner of the district. Gurgáon stands 25th in order of area and 13th in order of population among the 32 districts of the Province, comprising 1·82 per cent. of the total area, 3·41 per cent. of the total population, and 2·96 per cent. of the urban population of British territory. The latitude, longitude, and height in feet above the sea, of the principal places in the district are shown in the margin.

Town.	N. Latitude.	E. Longitude.	Feet above sea level.
Gurgaon ..	28° 28′	77° 4′	800 *
Firozpur (Jhirka),	27° 47′	77° 0′	680 *
Nuh ..	28° 7′	77° 2′	700 *
Palwal ..	28° 9′	77° 22′	690 *
Rewari ..	28° 12′	76° 40′	700 *

* Approximate.

The Hills.

The hill ranges of the district form a marked feature in its physical characteristics: they are connected with the great Aravalí chain, of which they are among the most northern spurs, and like that range their general direction is from S. S.-W. to N. N.-E. One chain forms the western border of the district from the south-western corner of the Fírozpur *tahsìl* to a point about opposite the town of Núh. There the district boundary line turns off to the west, while

Chapter I, A. Descriptive.

The Hills.

the range runs on in the same course, and then sweeping off in a curve to the west, ends in three short spurs, two thrown out to the north and one to the west. Another range on the east of this one runs almost parallel to, but gradually diverging from it. After a course of 25 miles northwards from the southern border of the district, it becomes more and more broken, and for 20 miles its existence can only be traced by a line of detached rocky hillocks of various sizes, appearing here and there above the surface of the ground. Then it once more re-appears as a range, and, forming the north-eastern boundary of the district, runs with gradually lessening height past the northern boundary of the district into Delhí. These are the only chains of any unbroken length; but short broken ranges and detached hills are numerous in the south and west of Rewárí, whence they just cross the border into Rohtak and are also found to the north-east of Rewárí, the north-west of Núh, and in the eastern portion of the Fírozpur *tahsíl*, formerly known as the *parganah* of Púnáháná. The total hill area of the district is shown by the professional survey as 99·397 square miles. Iron, inferior plumbago, and mica are found in these hills, and what are alleged to be traces of copper. The hills are generally of inconsiderable height, generally lessening as you proceed northwards, of the same general character as the well-known ridge at Delhí, and frequently of considerable breadth at the summit; the range between Delhí and Gurgáon is in places more than three miles broad. The ordinary height of the ranges above the plain is from 500 to 750 feet: the hill above Meolí is marked on the map as 1,347 feet above the sea, the elevation of the plain below being about 625 feet. The isolated hill of Tánkrí is the highest in the district, and must reach quite 2,000 feet above the sea.

Rivers and streams.

The Jamná.

The Sáhibí.

Except the Jamná the deep stream of which forms the eastern boundary of the district and the province, within which it is therefore partly contained, there is no river of permanent flow in the district; but the Sáhibí, which rises in Jaipur, passes through the east of Rewárí, where its sandy bed is in places more than half-a-mile broad, into Pátaudí and the Rohtak district, one branch passing also through the north-west of Gurgáon. After heavy rain in Jaipur, this stream sometimes comes down with great force, and it has twice, within the last generation, flooded the town of Rewárí, in 1845 and on the 15th August 1873. On both occasions the water came from the south by Lálpur and Dawáná, having left the proper bed, which must gradually have been raised by the deposits of sand in the Alwar state. In August 1873, the water came at mid-night, and was some three feet deep in the city; it flowed away to the northwards in some three or four hours, but caused considerable damage in the city, and outside, it utterly destroyed the railway bungalow and swept away large portions of the line.

The Kansáotí.

The Kansáotí or Kasáwatí, another stream rising in Jaipur, runs through the north-west of Rewárí and passes into Dujáná: formerly, according to the old maps, it joined the Sáhibí in Rohtak, but its waters now never reach so far. Like the Sáhibí and most of the other streams, it brings down a great deal of sand. Two

The Indorí.

different streams go by the name of Indorí, so called from Indor in the Alwar hills not far from Núh, near which they both rise, or

rather commence their course; for like all the other streams of occasional flow, they are merely torrents running for a few hours after rain. One of these streams enters the district at Nandrámpurbás and falls into the Sáhibí opposite Jarthal: the other flows northward into the country round Táorú, and after being joined by a number of other small *nullábs*, bringing down the drainage of the surrounding hills, spreads its waters over the low country south of Bahorá, and eventually joins the Sáhibí. Thus the Sáhibí, while it only comes down in full force after heavy rain in the north of Jaipur, flows with a smaller stream after merely local rain, carrying off the discharge of the Indorí.

The Indorí.

The Bádsháhpur *nullah* brings down the drainage of part of the Ballabgarh *tahsíl* of Delhí, through a gorge in the range, dividing Delhí and Gurgáon: it formerly flowed southwards through the Bhúndsí valley, but more than a century-and-a-half ago it was diverted by the construction of a *band* by Bahádur Singh of Ghásera into its present course, falling into the Najafgarh *jhíl*. In the heavy floods of 1875, part of its stream found out its old channel and swept down past Bhúndsí. Another important stream is the Landohá, which is formed by the union of two streams in Alwar, one flowing south from the direction of Tijáráh and the other joining it nearly at right angles from the west. After pursuing its southward course to a point nearly directly west of the southern end of the Fírozpur *tahsíl*, it sweeps round in a curve, and, crossing the border, flows northwards up the Fírozpur valley, and if left to itself would finally fall into the Kotla *jhíl*. Formerly a far more importants tream, the Manasne or (Mánasle, *i. e.*, man taker), now generally known as the Rúpáreil, entered the district from Alwar and passed up the Fírozpur valley along the Landohá channel. Bábar in his Autobiography mentions that it then fell into the Kotla lake, but later, it either was artificially diverted or naturally found out its present course into Bhartpur. The tradition as recorded by Mr. C. Gubbins is, that some Meos violated and then murdered some women in the bed of the river, then dry in the hot winds, and that a *fakír* who lived near by left it with the curse, that the streams should never again enter the polluted bed. Besides these more important streams, there are numerous torrents of short course, which, after rain, rush down with the water drained from the hill-sides, and spread their floods over the lower levels. There are also a few petty brooks fed by springs, the most important of which is the Jhir of Fírozpur.

The Bádsháhpur *Nullah*.

The Landohá.

The Manasne.

Other streams.

Another marked physical characteristic of the district is found in its *jhíls* or lakes. The most important of these is the Najafgarh *jhíl* on the northern border of the district; but this is mainly situated in the Delhí district. Into it the Sáhibí, swollen by the Indorí, and the Bádsháhpur stream pour their waters. Another *jhíl*, but of very much smaller size, is that known as the Sarmathlá *jhíl* in the south-east of the Gurgáon *tahsíl* near the Delhí border. The other *jhíls* of the district are found in the tract of Núh, lying under the first range of hills mentioned above. This is a low-lying strip of country, the natural receptacle of the drainage of the Fírozpur valley and parts of Alwar to the south; of the higher land to the east; of the hills

The *Jhils*.

The Najafgarh *Jhil*.

The Sarmathla *Jhil*.

The Núh system of *Jhils*.

Chapter I, A.

Descriptive.

The Núh system of *Jhíls.*

that lie on both sides the Bhúndsí valley to the north; and of the eastern slopes of the bounding range to the west. From all these four quarters, but principally from the north and south, come during the rainy season the surplus drainage waters of the surrounding country. Omitting, for the present, mention of the works which will hereafter be described, the natural course of these flood-waters is

The Khalílpur *Jhíl.*

from the north part into the Khalílpur *jhíl*. This receives the overflow of the Sarmathlá *jhíl*, which passes to the south through a sort of escape channel, the drainage of the eastern slope of the southern part of the range dividing Delhí and Gurgáon, and part of the drainage of the Bhúndsí valley. The Khalílpur *jhíl* again has a natural escape channel which conducts the surplus waters into the

The Chandaini *Jhíl.*
The Kotlá *Jhíl.*

Chandaini *jhíl*, which also receives directly the other part of the drainage of the Bhúndsí valley. The only natural outlet for the waters of the Chandaini *jhíl* is towards the Kotlá *jhíl*, lying further south immediately under the Fírozpur-Alwar hills and on the borders of the Núh and Fírozpur *tahsíls*. This *jhíl* also forms the natural receptacle of the drainage of the Fírozpur valley, including the Landohá, and in former days the Mánasne. It is the largest of the Gurgáon lakes, and is some three miles long from north to south, by 2½ miles broad. Although a great part of the water, which would naturally pour into it, is diverted by artificial works, the *jhíl* remained filled during 1874-5-6, and before these works were constructed can hardly ever have been free from water. The other *jhíls* are usually quite dry in the hot weather, and unless the rains have been somewhat heavy, their whole area is generally cultivated, either with the usual spring crops or the later sown melons, and spring *júár* used for fodder. But after heavy rain the greater part of this low tract of Núh is flooded, and one continuous sheet of water sometimes exists for nearly 20 miles.

Brief account of the general aspect of the district.

More detailed accounts of the country will be found in the description of the assessment circles (Chapter V, Section B). It will be sufficient here to say that although the Gurgáon and Rewárí *tahsíls*, forming the northern and western parts of the district, are generally sandy,—the lands near the hills are very inferior and often cut up into a perfect net-work of ravines,—further from the hills, in some tracts, the soil is better, approaching a light loam in its character; in other places it is of very loose consistency, and some parts present a desolate appearance with high hillocks of sand. To the south-east and south-west of Gurgáon, the low-lying lands of a better character are found, which are benefited by natural irrigation; and on the north border of Gurgáon is the low basis of the Najafgarh *jhíl*. The banks of the Jamná are generally high; but in the north-east corner of the Palwal *tahsíl* there is a small tract between the main and a small branch channel of the river, low-lying and liable to inundation. From the Jamná and this tract westwards there is a stretch of country some 30 to 35 miles from north to south, and some 15 to 20 miles from east to west, of a level good loam, rising gradually from the Jamná and then sloping to the east and south, and extending over most of the Palwal *tahsíl* and the eastern portions of the Núh and Fírozpur *taksils*. Between this plain and the range of hills mentioned as dividing Gurgáon and Alwar, there is in Núh the low-lying country before mentioned. There the prevailing soil is clay, but immediately

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Descriptive.

Brief account of the general aspect of the district.

under the hill and to the north-east of Núh and in the north-west of Palwal, the country is very sandy. The part of Núh which lies above the hills is a high-lying table-land of a consistent but sandy loam, inferior near the hills, but sloping down towards the somewhat better lands in its central and western parts; while the part of Firozpur not contained in the plain above mentioned consists of a valley between two ranges of hills, the lands of which are generally good, but are partly damaged by sand deposits; the soils near the hills are generally inferior, and the valley merges on the north in the Núh tract of depression.

Character of well water sweet, brackish, and salt.

A marked peculiarity of the Gurgáon district is the saltness or brackishness of the water supply in many parts; in some tracts, such as Chak Chiknot of Firozpur, the water is invariably salt, in others it is everywhere sweet, and in others again it is impossible to tell beforehand whether a well will be sweet or salt; and sometimes there are two strata of water, one salt and the other sweet, so that the well when first worked is sweet, and after being worked some little time, yields salt water. It may be said that the wells are especially liable to be salt (1), when the depth to water is considerable and the soil of a clayey character (as a rule, in sandy villages the water is sweet); (2), in tracts which are low-lying and receive and retain the drainage of higher lands; the salt producing tracts near Farrukhnagar and near Núh both fall under this heading. The wells are classed in the Settlement papers as sweet, brackish, or salt; the effect of the character of the water on the produce depends partly on the nature of the soil; where this is sandy, a certain amount of saltness in the water is a positive benefit, and where the water is very salt, very fine crops can be grown if the seed is once sprouted by rain water; on the other hand, on a clay soil saltness in the water is very prejudicial. For vegetables and tobacco, sweet or only slightly brackish water is ordinarily necessary. Besides the above three descriptions of water, there is a kind of water found in some wells in Rewárí, known as *matwálá*, or hard, the crops on which are generally good; and there are also a few wells in which the water is sweet *kallar;* on sweet *kallar* wells and on very salt wells on clayey soils, it is often necessary to let the land, which has been watered one year, lie fallow or be cultivated with rain crops the next year, in order to prevent its becoming unculturable. In some parts of the district the only drinking water which the people can get is procured from wells sunk close to the village tank or pond, and is in fact, the pond water roughly filtered. If the pond goes dry in the hot weather, water has to be fetched sometimes from a distance of two or three miles. Another point which may be noticed is, that the water-supply in the wells situated in that part of the district which lies east of a line drawn along the range of hills on the Alwar border, and thence prolonged northwards, is, as a rule, comparatively scanty, while west of that line it is abundant; the cause of this is probably connected with the fact shown by the course of the Sáhibí, that this western part of the district is lower than the Rájpútáná country to the south.

Difference as to amount of water-supply in the east and in the west of the district.

Other irrigation works.

In former times, under native rule, much irrigation was carried on by throwing dams across the hill streams, and thus causing the water to flood an expanse of country. Many of these works were

Chapter I, A. Descriptive.

Other irrigation works.

allowed to fall into disrepair while under the management of the irrigation department on account of the small direct revenue derived from them; but since the District Fund Committee took charge in 1879, the system has been extended by repairing old embankments and constructing new ones. The old works now in operation are :—

Dams at Gwálpahárí (lately repaired by the Delhí Committee) Jhúnd *sarai*, Bárgújar, Jhársá, Harsarú, and Raisina in the Gurgáon *tahsíl*; at Dahínā and Nandrámpurbás in Rewárí; drainage canals Aláwalpur and Sangel in Núh; dams at Banársí, Kanmeida, Madapur, Máhaulí and Naglí in Fírozpur; and the connected chain of works consisting of the Kotla embankment and Gubbins' Cut, designed to drain the Chandainí *jhíl*, and utilize the surplus water, and to divert the drainage of the Fírozpur valley away from the Kotla *jhíl*. A description of these latter works will be found in Chapter V, Section B, and the arrangements made for their maintenance will be noticed in the same Section.

A new embankment with irrigation channels and masonry head works and sluices, has lately been constructed across the outlet of a hill torrent at Sohna, at a cost of Rs. 10,000, and capable of irrigating a thousand acres of land; also a dam across the Bádsháhpur stream near Ghátá, costing with a masonry sluice and irrigation channels, Rs. 7,500; and a new embankment at Bhúnd near Fírozpur, costing Rs. 6,500. A supplementary embankment at Bárgújar, and a new dam at Kásan, both in the Gurgáon *tahsíl*, are in course of construction, and projects are being prepared for similar works at Damdamá, Dhuláwat, Harchandpur, and several other suitable sites, in various parts of the district, with a view to utilizing the large volume of drainage water which now runs to waste. A small portion of the canal, constructed for conveying the surplus water of the Najafgarh *jhíl* into the Jamná, lies within this district.

The Agra canal.

Year.	*Kharíf.*	*Rabi.*	Total.
1874-75 ..	..	9,405	9,405
1875-76 ..	2,167	7,387	9,554
1876-77 ..	4,848	10,265	15,113
1877-78 ..	16,789	31,837	48,626
1878-79 ..	11,828	29,447	41,275
1879-80 ..	10,452	29,447	39,899
1880-81 ..	9,814	31,054	40,868
1881-82 ..	14,875	28,106	42,981
1882 83 ..	16,212	34,704	50,916

The Agra canal, which is under the control of the Government of the North-Western Provinces, was nominally opened on the 5th March 1874, and irrigation commenced from the *rabi* of 1875. The areas irrigated in the Gurgáon district each year have been as shown in the margin.

In 1882-83, the number of villages which took water in the *kharíf* was 161, of which 102 were in Palwal, 44 in Núh, and 15 in Fírozpur; and the number which took it in the *rabi*, was 133, of which 99 were in Palwal, 24 in Núh and 10 in Fírozpur. Of the total irrigation of 50,916 acres in 1882-83 about one-fifteenth was by lift and the rest by flow. More than 40 miles of new channels are now under construction, and the area of irrigation next year will be proportionately increased.

During the year 1883 several new distributory channels have been opened, and irrigation from the Agra canal in the Gurgáon district has been greatly developed.

As yet the irrigated area under *kharíf* crops is small, sugarcane cultivation being strange to the people, and the main crops grown being

The Agra canal.

wheat and barley. However, the Canal Officers have grown and distributed among the people young sugar plants, for which there was a demand, but the unprecedentedly low price of sugar during the last two years has restricted the cultivation. It is, however, certain to increase ultimately. That of indigo has been introduced lately and is already becoming popular. In a few places there seems to be some danger of water-logging, producing the same disastrous effects as on the Western Jamná Canal.

Droughts.

The district has from time to time suffered severely from the effects of drought; beginning with the well-known *Chálísá*, the effects of which were so terrible in all this part of India. The years of drought still remembered in the district are the following :—

A. D.	Sambat.		
1783-84	1840	...	Severe famine.
1803-4	1860	...	Scarcity.
1812-13	1869	...	Scarcity.
1817-18	1874	...	Scarcity.
1824-25	1881	...	Scarcity.
1833-34	1890	...	Severe famine.
1837-38	1894	...	Severe famine.
1843-44	1900	...	Scarcity.
1850-51	1907	...	Scarcity.
1860-61	1917	...	Famine.
1868-69	1925	...	Scarcity.

To these must now be added the famine of 1877-78. The effects of the droughts of 1860-61 and 1868-69 were greatly mitigated by the relief afforded by Government, and the liberality with which the people were treated in the matter of collecting the revenue. The people generally compare very unfavourably with the treatment they then received the action taken in what was the worse famine of 1877-78.

Rain-fall, temperature, and climate.

Table No. III shows in tenths of an inch the total rainfall registered at each of the rain-gauge stations in the district for each year, from 1866-67 to 1882-83. The fall at head-quarters for the four preceding years is shown in the margin. The distribution of the rainfall throughout the year is shown in Tables Nos. IIIA and IIIB.

Year.	Tenths of an Inch.
1862-63 ..	532
1863-64 ..	373
1864-65 ..	219
1865-66 ..	288

The average rain-fall of the district may be taken at about 25 inches.

Gurgáon	...	...	...	26.6
Rewárí	...	...	...	22·4
Núh	...	...	...	24·0
Palwal	...	...	...	25·5
Firozpur	...	...	...	22·3

An analysis of the rain-fall returns given with the Revenue Report for the sixteen years 1863 to 1878, both inclusive, gives the following results :—

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Rain-fall, temperature, and climate.

Month.	Total rain-fall of 16 years.	Annual average.	Number of years in which no rain fell in the month in question.	Maximum rain-fall.
	Inches.	Inches.		Inches.
January	11·9	0·7	4	3·4
February	7·5	0·5	7	1·5
March	10·9	0·7	5	2·1
April	3·3	0·2	9	0·9
May	19·5	1.2	4	2·7
June	40·0	2·5	3	7·6
July	160·8	10·0	...	24·9
August	103·3	6·5	1	16·7
September	89·3	5·6	1	28·2
October	10·9	0·7	9	3·5
November	0·3	...	15	0·3
December	6·9	0·4	8	3·5

But the accuracy of these figures, which gives an average of 29 inches, a maximum of 46·1 inches in 1873, and a minimum of 11·3 inches in 1868, is exceedingly doubtful; and the following statistics collected by Mr. Wilson, are more trustworthy.

Annual Rain-fall at each Tahsíl (in inches).

Year.	Gurgáon.	Ferozpur.	Palwal.	Núh.	Ferozpur.
1865-66 ...	29·2	26·9	18·5	16·1	16·0
1866-67 ...	33·0	38·1	28·8	17·0	41·7
1867-68 ...	30·6	25·1	28·6	34·9	16·0
1868-69 ...	11·5	20·1	19·3	15·8	12·9
1869-70 ...	22·9	21·4	22·5	17·9	13·5
1870-71 ...	15·8	19·1	17·4	12·9	17·4
1871-72 ...	27·8	12·6	8·5	20·1	12·9
1872-73 ...	30·4	20·4	31·4	25·8	21·5
1873-74 ...	45·1	34·0	40·5	37·9	37·9
1874-75 ...	31·3	16·8	25·2	29.1	22·2
1875-76 ...	47·0	23·5	42·3	42·6	31·0
1876-77 ...	32·2	15·8	29·6	19·7	19·1
1877-78 ...	18·0	13·6	16·9	17·6	9·9
1878-79 ...	26·6	13·4	17·8	18·6	16·2
1879-80 ...	24·2	34·1	35·7	34·6	36·6
1880-81 ...	17·1	21·0	21·5	21·9	22·8
1881-82 ...	20·7	28·2	27·7	22·8	22·1
1882-83 ...	15·4	19·3	26·3	26·6	32·2
Average of 18 years ...	26·6	22·4	25·5	24·0	22·3

On these figures Mr. Wilson remarks—

"But while these figures represent the average of a series of years, the most marked feature of the return is the variableness of the rainfall; thus at Gurgáon it varied from 11·5 inches in 1868-69 to 47·0 in 1875-76, and in the same year (1871-72) it was 8·5 inches at Palwal and 27·8 inches at Gurgáon, only some 30 miles off. Moreover, the success or failure of the crops depends more on the distribution than on the mere amount of the annual fall; and while the figures showing the total rain-fall are well worth discussion, they are only a very rough index to the nature of the seasons as favourable or otherwise to the crops."

Rain-fall, temperature, and climate.

The climate generally is more temperate than that of the Panjáb proper, the cold in winter and the heat in summer being both less extreme. Near the hill ranges, however, and in the Fírozpur valley, bounded as it is by hills on either side, the heat is very great; and in some villages which lie immediately under the hills, the people are accustomed to go out in the fields to sleep at night, so as to escape the heat radiated from the glowing masses of rocks.

The health of the district.

The flooded tracts near Núh are terribly fever-stricken in years of abundant rain-fall, and few men can stand a lengthened residence at Núh without injury to their constitution. The higher parts of the district, and notably the Táorú table-land, and the high plain of Palwal and the east of Núh and Fírozpur, used to be very healthy; but fever has come with the Agra canal into the villages along its course in the high plain; and in 1878-79 the east of the district, and in 1879-80 the whole district was, like the neighbouring tracts, devastated by fever. The town of Rewárí has been unhealthy ever since the incursion of the Sáhibí in 1873. The most unhealthy months are September, October, and November, while in February deaths are at their minimum point. Fever is the chief cause of mortality, but cholera visitations are not rare, and are sometimes very severe: while the district is the worst in the Panjáb for small-pox. Tables Nos. XI, XIA, XIB, and XLIV give annual and monthly statistics of births and deaths for the district and for its towns during the last five years; while the birth and death rates since 1868, so far as available, will be found in Chapter III, Section A, for the general population, and in Chapter VI, under the heads of he several large towns of the district. Table No. XII shows the number of insane, blind, deaf-mutes, and lepers as ascertained at the census of 1881; while Table No. XXXVIII shows the working of the dispensaries since 1877.

Among the general agricultural population, there can hardly be said to be any practice of medicine. For fever, which is the most prevalent form of illness, a mixture of butter-milk with flour and water is drunk; or sometimes the more rigorous course of a hard turn at the plough, so as to induce perspiration, is followed. For a scorpion sting you may choose among the following prescriptions; rub the place with the root of a certain onion-like plant; apply the ashes of the scorpion or the dirt from a cow's ear or hare dropping; or cook the scorpion in *ghí* and rub it on the sting. There are somewhat similar recipes for bites from a snake or a mad dog; but the above will suffice to show the character of the ordinary remedies applied in the villages. In the towns *hakims* are met with, who generally practise the *Yunání* system of medicine.

SECTION B.—GEOLOGY, FAUNA AND FLORA.

Geology.

Our knowledge of Indian geology is as yet so general in its nature, and so little has been done in the Panjáb in the way of detailed geological investigation, that it is impossible to discuss the local geology of seperate districts. But a sketch of the geology of the Province as a whole has been most kindly furnished by Mr. Medlicott, Superintendent of the Geological Survey of India, and

Chapter I, B.

Geology, Fauna and Flora.

Sultánpur salt sources.

is published *in extenso* in the Provincial volume of the Gazetteer series, and also as a separate pamphlet.

There are ten clusters of villages south-west of Delhí, situated partly in the Gurgáon and partly in the Rohtak district, where manufacture of salt by the evaporation of brine raised from wells has been carried on from a period long antecedent to British supremacy. They are known as the Sultánpur Mahal, are spread over an area of about 20 square miles, and comprise the villages of Sultánpur, Saídpur, Mahmúdpur, Sadhrána, Káliáwás, Ikbálpur, Mobárikpur, Basírpur, Zahídpur and Sailana. Three of these tracts have been British Territory since 1836, having been included in the Jhársa *parganah*, which lapsed in that year on the death of Begam Sumroo. The others only came to us after the mutiny, five having till then belonged to the Nawáb of Jhajjar and two to the Nawáb of Farrukhnagar. The salt is called Sultánpuri, and is of good quality, containing about 90 to 95 per cent. of sodium chloride. The subjoined table gives full details as to the size of the saline tracts, and the number of wells as they stood in 1870. Since then the number of wells has decreased to 322, but the number of pans has risen to 4,487.

Name of Sar, or Saline tract.	Approximate area of saline tract in acres.	No. of Wells.			Average depth to water.	Average depth of water.	No. of sets of pans now in use.	No. of pans.
		In use.	Disused.	Total.				
Sultánpur	350	39	12	5	14	17½	70	435
Sadhrána	30	21	5	26	8	20	23	284
Saidpur	15	6	6	12	7	17	8	60
Mahmúdpur	16	15	10	25	10	19½	14	138
Mobárikpúr	550	72	18	90	18	20	120	1,308
Basírpur	550	49	26	67	16	17	60	530
Ikbálpur	20	16	1	17	17	19	18	243
Káliáwás	4	3	...	3	10	16	4	35
Zahídpur	20	15	5	20	16	21	58	602
Sailána	10	10	1	11	19	20	15	164
					Average.			
Total ...	1,565	246	84	330	13·5	18·7	390	3,799

Process of manufacture.

The manufacture of the salt is exclusively from natural brine derived from wells. The brine seems inexhaustible, as some of the works have been in operation apparently for the last 200 years, and no deterioration is observable. The brine is evaporated by solar heat in shallow *chunam*-lined pans, which vary in extent from 200 feet by 60 feet to only 60 feet by 40 feet, and in depth from 10 to 12 inches. To each well is attached one or more sets of pans, each set consisting on an average of about 9 pans so arranged that there is a slight fall from each pan into the one next beyond it. When after

Process of manufacture.

the annual repairs, which take place about February, the pans are all in order, the highest is filled with brine from the well, and the brine is allowed to stand there for one, two or more days according to the season and the weather, the period being shorter in the hot and longer in the cold weather. After thus standing, the brine is run into the second pan, the first being refilled, and then from the second to the third pan and so on, until the brine reaches the last pan but one, and there it is allowed to remain, receiving perhaps one or two accessions, from the higher pans, until a commencement of crystallization is observed, when it is at once turned into the last pan and crystallization allowed to proceed. This is the most delicate part of the process; if the best salt is to be made, and at the same time none wasted, the progress of the deposit (for the crystals form on the floor of the pans) must be closely watched. Up to a certain period nothing but edible salt is deposited; after that other allied salts begin to drop, and the edible salt must then be at once removed, and the mother liquor, of which no further use is made, run off: otherwise, especially at some works, the gross products of evaporation, taken as a whole, are bitter and uneatable. Not more than 8 inches depth of brine at most is run into the first pan, and it is reduced to half that quantity or even less before it reaches the last but one pan. When the brine has sufficiently concentrated to be transferred to the crystallizing pan, the manufacturer skims the surface of it (taking care not to disturb the sediment) with some flat curved instrument, usually a cow's rib bone, with which he succeeds in removing all the lighter impurities together with leaves, straw, and the like, that may have settled on the brine. In the cold weather the salt rarely crystallizes under a month from the date the brine is drawn, but in the hot weather a period of 10 or 12 days suffices.

The process of manufacture varies much in details. In some factories the water is not detained, as indicated above, in the last pan but one, but allowed to run on, at once, into the last. The former course, however, is more usual. At times, it is said that in some works the whole liquid is allowed to evaporate, and the gross deposit taken as salt. This may account for the inferior quality of some of the salt, but this process is only possible where the brine is exceptionally pure; in most factories it would spoil the salt altogether. The quality of the brine varies surprisingly in different wells, and in the same wells at different seasons. During the rainy season, and for a month or so after, the water is barely brackish in wells, which in warm weather (and then all the wells are at their best) yield excellent brine. The proportion of salt in the water varies from one *chitták* in the maund, or about 0·16 per cent., the lowest workable rate, to as high, in the hot weather, as one *chitták* in 2½ seers or 3 per cent.* The average depth of water below the surface, in March, varies in different *sars* from 7 to 19 feet.

The salt, when removed from the pans, is stacked in conical heaps, and, when fresh, is stamped with the Government seal all over. A few days hardens the exterior into a crust, which is not only sufficient to

* This is according to the statement of the salt-workers. The Commissioner of Customs, who visited the spot in the winter months of 1866 67, records that he could find none of this strength.

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Geology, Fauna and Flora.

Process of manufacture.

prevent any salt being removed without detection, but also to protect the heap against all ordinary rains. The salt fetches a better price when fresh, and is never pitted if the owner can help it, until the rainy season, when, perforce, any stock remaining unsold has to be pitted. Although the process of manufacture is essentially the same as a rule everywhere, and although the salt has even locally but one name, its qualities differ vastly according, chiefly, to the *sars* in which it is made. A *palla* (a local measure. = 3 maunds 30 seers standard) of Basírpur salt, for instance, sold in January 1868, for Rs. 2-3, while the same quantity of Zahídpur salt was selling at 11 annas and 6 pie. The real cost of production cannot be ascertained, as the mass of the workers are agriculturists during the rains and the better portion of the cold weather, and only turn to their salt pans when their fields no longer need their labour. The cattle that till their lands draw the brine, and the labour they employ is mostly that of their own household. They work on capital borrowed at exorbitant rates.

The prospects of the trade are good and the salt maintains its position in the market.

Salumbhá salt sources.

There were other clusters of villages in the Gurgáon district, consisting of the Salumbhá, Núh, and eight other tracts or *sars*, and situated at the foot of the Mewát hills to the north of Sohná, and commonly called the Núh Mahál, the salt of which was known as Salumbhá, where manufacture used to be carried on in the same way and under the same preventive arrangements as in the Sultánpur Mahál; but the salt was of very inferior quality and very dear, and the demand for it diminished year by year after the opening of Railway communication with the Sultánpur Salt Works and the Sámbhar Lake, until in 1882-83 manufacture and sales almost entirely ceased. The works were closed in April 1883. The process of manufacture here differed in many respects from that adopted at the Sultánpuri works. In both, the salt was made by solar evaporation, in *chunam*-lined pans; but whereas at Sultánpur these pans are but a few inches deep, at Núh they were from 30 to 40 inches deep. Again, the crystallization of the salt at Núh was aided, by the introduction into the concentrated brine of large bunches of thorny twigs and shrubs, the salt not being allowed to form of itself at the bottom of the pan. The pans of a set were much fewer in number, and the brine, when it had reached a certain state of concentration in one pan, was commonly transferred to the formation pan by means of the *lenrì*, or lifting basket so commonly used for irrigation, where the difference of levels is slight. Lastly, the great depth of the pans introduced a great difference in the time in which results are obtained. At Sultánpur, in a good season ten or twelve successive "crops" may be obtained, while at Núh one was the average; and although two were sometimes taken, it happened quite as frequently that the brine had been drawn more than a year from the wells before the salt was extracted. Long before the crystallization was complete, the brine had assumed a deep brownish red hue, was dirty to a degree, and smelled most unpleasantly. The salt was extracted from the vats (for this seems a more appropriate designation than pans) before the evaporation was complete; but even with this precaution, a certain

quantity of other salts of soda, magnesia, and lime, were deposited at the same time as the chloride, and the fresh produce was so bitter as to be unsaleable. Salumbhá salt was therefore always pitted as soon as possible, and in most of the factories was not reckoned marketable until it had been a year buried. The salt varied a good deal in quality. None of it was good, but that of some of the saline tracts was so bad, as to be barely saleable, when plenty of Bhartpur or Sultánpuri salt was in the market.

Salumbhá salt sources.

The number of manufacturers employed in 1882-83 was 298, the number of wells worked was 322, and the number of pans 4,487. The annual yield averages some 6½ *lákhs* of maunds (see figures given in Chapter V). The produce belongs to the manufacturer who sells it at the current price of the period, unless, as generally happens, it has been hypothecated, in which case the creditor takes possession. After paying the Government dues, the salt is exported to the south-eastern districts of the Panjáb and into the North-Western Provinces and Oudh. The Rájpútáná-Málwa Railway from Delhí passes close to some of the salt works, and there is a branch line from the Gurhi station with sidings to the works. The price of the salt at the works ranges from 9 annas to 2½ annas per maund, according to quality, the average being about 5¾ annas per maund. In the markets which it enters after paying the duty and *Hákimí* cess, it sells according to distance and amount of freight at from Rs. 3-2-6 to Rs. 2-10-0 per maund. The preventive system in force is described in Chapter V.

Produce of the manufacture.

Iron ore exists in the hill range near Fírozpur and at Patau Udepurí, a few miles south of Fírozpur; in the time of the Nawábs of Fírozpur the trees on the hills were rigorously preserved, and the ore was worked and smelted at Fírozpur, there being 22 furnaces at work, each of which could turn out two maunds of iron in 18 hours. But on annexing the country the hills were abandoned to the village communities, and the consequent decrease in the supply of fuel soon rendered the manufacture unprofitable, and it has long been abandoned. Traces of copper exist in the range east of Fírozpur, on the road to Rewárí. Mica is found near Bhúndsí, and is occasionally extracted. In 1861 the late Dr. Thomson, Civil Surgeon of Gurgáon, reported the find of a deposit of plumbago near Sohná, and an account of his discovery was published in the *Panjáb Gazette* of 4th January 1862. Some pencils were manufactured out of the plumbago found there, and at first there was good hope of the mine being really valuable, but eventually the substance was pronounced extremely poor and commercially valueless. More recently the locality has been visited by Mr. Hacket, Geological Surveyor; the following extracts from his notes describe the result of his examination:—

Iron.

Copper.
Mica.

Plumbago.

"At the back of the town of Sohná, in the Gurgáon district, a thin irregular band of schist, possibly belonging to the Raiolo group, occurs in the quartzites. From these schists some specimens of plumbago have been taken. There are no traces of any excavations having been made, except a very small pit, which could not have been many feet deep. Anything that I could see was exceedingly poor and hardly deserved the name of plumbago, and I doubt if anything much richer was ever taken from this locality. The specimen sent to me by the Deputy Commissioner was as poor as those I picked up.

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Gold.

"When examining these schists, the Sohná *lambardár* told me that after every rain, small quantities of gold were discovered in the sand, mud, &c., of the little water-courses at the bottom of the hill. I had up, and examined, *mehtars* of the town, who told me that it was true that they made a few rupees every year in this way, and that the heavier the rains the larger the amount of gold. Last year, for instance, as the rains were so slight, they did not get any, or did not think it worth while looking for. The only rocks exposed in this gully are the Alwar quartzites, and these schists. As I cannot imagine that the gold could be washed out of the hard quartzites, I presume it must come from these schists."

Slates.

Slates are quarried from the detached knot of hills near Khol, Májra-Bhálkí, and some twelve miles west of Rewárí; the chief quarry has been for some years worked by the Kángra Valley Slate Co., who employ about 250 labourers on their branch in this district. During the four years, 1876 to 1879, the quarries supplied about 300,000 square feet of roofing slates, and about 34,000 square feet of slabs; while in 1883, some 600,000 superficial feet of slate was excavated. The slate in question corresponds with what is known as the Granwacke slate, which is laminated claystone, containing sand, mica, &c., and is inferior to clay slate. The cleavage does not appear as clean or as good as in slates from the hill districts, nor is the colour uniform or the grain fine. In Granwacke slates the laminæ of deposition on all the vertical planes are parallel to the plane of stratification, and so far differ from clay slates whose laminæ cross the plane. But the slates, although not of first class quality, are good and serviceable and will suit most buildings. Slates from these hills have been very largely used in roofing and flooring the stations of the Rájpútáná and Rewárí State Railways, as well as in buildings generally along both lines.

Sulphur springs at Sohna.

The town of Sohná has long been celebrated for the hot sulphurous spring, possessing no mean medical qualities, which issues from the foot of the Mewát hills, against the eastern side of which the town is built. The water at the present time wells up into a substantial reservoir, covered in with a dome-shaped roof. Round this well-house is a courtyard containing the bathing tanks, and closed in by well constructed native buildings. The largest tank measures 36 feet long by 24 broad, and 5 deep, and is supplied with water from the main reservoir. The virtue of the spring was first tested for Europeans in 1863, when a party of invalids was sent out from Dehlí to try the water as a cure for the well-known Delhí ulcers. The report of the medical officer in charge was most satisfactory. The water was found to be at a temperature varying from 115° Fahr. to 125°. This was in the month of October. In 1872 a medical man, Dr. Charles Smith, was sent to report upon the springs as a cure in cases of rheumatism. The following is extracted from his report:—

"By reference to my note-book on the 9th February, I find that the temperature of the water was low, in consequence of a cold wind having been blowing for three or four days successively; on this occasion the temperature was 92°, while four days previously it had been 110° 5′ Fahrenheit. On the above date, at 12 A.M., I found forty-five people of both sexes and all ages bathing in this very limited space, and I am informed that at certain times (during a *melá* or native fair) as many as two hundred and fifty may be seen bathing at the same time. When the water is comparatively cold, as it was on the 9th February, the bathers remain in the water ten or twenty minutes; when the temperature is

Sulphur springs at Sohná.

higher, they remain as long as one and even two hours, and come out, as one may easily imagine, sick and faint. I found men bathing, washing their dirty clothes, and drinking the same water, and was not surprised to hear that diarrhœa and dysentery occasionally prevailed in the neighbourhood.

"On the same date (9th February) I examined the main spring which is uncontaminated by bathers. I found the temperature of the water 110° Fahr., or 18·5, warmer than the outside tank which was exposed to the wind. On looking into the well, which is about 21 feet deep, the water was found to be fairly clear and of a greenish colour; there was a vapour of steam on the suface, and bubbles of probably sulphurous acid gas were rapidly rising, and there was a strong smell of sulphur perceptible; my face exposed to this vapour rapidly broke out into beads of perspiration. This tank is of faulty construction, insomuch that the drain leads off only the surface water, whereas, as is obvious, much greater cleanliness would result by having it let off from the bottom by a syphon drain. That the tanks should be more frequently cleansed is evident, as natives suffering from open sores, itch, and all sorts of cutaneous diseases, bathe, and actually, as I saw, drink the same water. A capital bath has been built for the use of Europeans, but this is also faultily constructed. When I first arrived I found the bath empty. It is placed in a house, about fifteen yards from the main spring, from which an iron pipe leads the hot water to the bath: this iron pipe is only two inches in diameter, and has been considerably narrowed by the incrustation caused by the chemical action of the sulphurous acid on the iron of the pipe. The dimensions of the European bath are as follows:—18′ × 16′ × 5¾′. I used this bath daily after it was again filled, and enjoyed it much; the temperature never rose above 82° Fahr., in consequence of the faulty construction of the leading pipe above alluded to. This might be easily remedied by having a glazed tiled drain substituted for the iron pipe. The bath is now useless for all medicinal purposes, but is a very pleasant one for ordinary use.

"I must add that the population appear healthy, and I have noticed no skin diseases amongst them, or ulcers, or boils. Many people have consulted me, suffering from chronic forms of ophthalmia, and other surgical cases have come to my notice; but no medical ones. The sanitary state of the city is decidedly bad, the streets are narrow and undrained, sewage from the houses is allowed to soak into the ground, and accumulations of filth are to be found in every corner. The water which flows out of the baths is a source of nuisance, for the outside drain is so badly constructed that in many places a fermenting pool of filth is the result, from other refuse being thrown into it. The Civil Surgeon at Gurgáon visits Sohná once a month, and sends any cases requiring attention to his hospital at Gurgáon. There is a very comfortable *dák* bungalow at Sohná, now rarely frequented, in which Europeans might make themselves quite at home, bringing their own servants and bedding. Invalids suffering from rheumatism, or Delhí boils, or cutaneous diseases, might give this place a trial. Those who might be too helpless to go to the bath could have the water brought to them to the bungalow in *chatties* or *mussaks*, and have it raised to any temperature by boiling and then putting it into their own baths. The country round Sohná is very pretty and fertile, and the rocky ridge which surrounds the place affords a nice change to those accustomed to the uniformity of the plain scenery. Small game abound in the fields and neighbouring jungle; vegetables are procurable, and the drinking water is pure and soft. The water of the hot spring possesses bleaching properties of no mean order. I have now, in conclusion, to state that I have no hesitation in asserting that all the men whom

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I brought out from Delhí have derived great benefit from the use of the hot sulphur-spring baths, assisted by the change of air, warmer temperature, and comfort of the hospital marquées; and I would venture to recommend that on another occasion further experiments be tried in similar cases, also for Delhí boils and cutaneous diseases. I would also beg to suggest that improvements be made to the tank, that a house be built over it to exclude the cold air and afford greater comfort by keeping up the temperature of the waters; again, that the sanitary state of the town be looked to, as it would be unadvisable to establish a sanitarium at this place before some action is taken in this respect."

Vegitation of the district.

The district is not well wooded, and some portions of it, such as the low-lying tract in Núh, are peculiarly bare of trees. In Rewárí the *farásh (Tamarix Orientalis)* is especially prevalent, and here the *farásh* trees in waste lands and along the village roads often form the subject of an ownership, distinct from the ownership of the soil. The *kíkar (Acacia Arabica)* is found all over the district; it grows in large numbers in some villages a few miles south-west of Gurgáon, and in the Palwal *tahsíl* may be found instances of *kíkar* plantations carefully preserved by the village communities. The *káblí kíkar (Acacia Farnesiana)* is also common. The *ním (Azadirachta Indica)* is generally found growing in and around the village sites, where also the *pípal (Ficus religiosa)* and the *bar (Ficus Indica)* are of frequent occurrence. In some parts of the district, particularly in low-lying flooded tracts, in which the soil is naturally sandy, as at Sultánpur in the Gurgáon *tahsíl*, and near Sailání, the *khíjúr* or date-palm (*Phœnix sylvestris*) grows abundantly; but the fruit is very inferior. In the east and south of the district there are a few scattered specimens of the *tarí* or palmyra (*Borassus flabelliformis*). The Palwal *tahsíl* is by far the best wooded; there most Ját villages preserve a certain portion of their area sacred from the plough, and regard in a semi-sacrilegious light the cutting down of the trees growing there. The greater part of the vegetation ordinarily found in such *banís* or *rikhíás*, as they are called, consists of the *karíl (Capparis aphylla)*, the *híns* or *jhokar (Capparis horrida)*, the *jál* or *dongar (Salvadora oleoides*, the *raunjh (Prosopis spicigera)*, and the *khair (Acacia catechu)*; but there are also found the *dhák (Butea frondosa)*, the *gular (Ficus glomerata)*, the *papri (Pongamia glabra)*, and the *lasaura (Cordia latifolia)*, as well as some of the other trees already mentioned. The *kadam (Nanclea cardifolia)* is fairly common towards Palwal and Hodal; the *barwa (Crancvra religiosa)* and the *imli (Tamarindus Indica)* are met with, but are not common. The *am (Mangifera Indica)* is extremely rare. The *bakáin (Melia sempervirens)* is of ordinary occurrence, and the *amaltás (Catharto-carpus fistula)* is not very infrequent. The *ber (Zizyphus jujuba)* is planted in orchards for the sake of its fruit especially near large towns, and is also found elsewhere. The *shisham, (Dalbergia sissu)* and the *siras (Acacia sirissa)* are confined to the sides of the roads, where they have been planted by the District Officers; near Gurgáon a very successful experiment has been made in planting an avenue with the *Bignonia Millingtonia*, locally known as *wiláyatí bakáin*, a handsome quick-growing tree with a beautiful white flower. The special tree of the hill ranges is the *dhauk (Anogeissus latifolia ? or pendula ?)*; at one time the hills are said

Vegetation of the district.

to have been very fairly covered with *dhauk* trees, but now, except in a few places where the villages preserve the trees, until they reach a size which fits them for sale, every sapling is at once cut down or grazed down by goats. On the Tánkrí hill there are some *gúgal* or balsam trees.

One of the most characteristic plants of the district is the *zizyphus nummularia*, ordinarily called *pálá* or *jhar-berí*. This is common all over the district, except in low-lying inundated tracts; but it especially favours high-lying and sandy lands, such as are found near Táorú and in parts of Rewárí; there in September and October the fields are often so thickly covered with this prickly shrub that it is not easy either to walk or ride over them. It is invaluable to the people: the leaves are threshed out and given as fodder to the cattle, the fruit is eaten or taken for sale to the towns, the thorny branches are used for hedges or fuel, and the root for dyeing leather. Hardly less useful is the *múnj* grass (*Saccharum sara*), which is found all over the district, and seems to flourish both in high sandy lands, as near Bolní in Rewárí, and in low flooded tracts, as near Palwal on the east. Its uses are too well known to require description here. Among the numerous other plants found in the district, the following deserve notice:—

The *jháú* (*tamarix dioica*) covers the low alluvial lands along the banks of the Jamná; its twigs are used in basket-making and in the construction of temporary well-cylinders. The *bánsá* (*tephrosia purpurea*) grows abundantly near the hills; the cylinders of temporary wells are ordinarily made by weaving together its branches. *Kíhp* (*orthanthera viminea*) grows on salt lands, and used to be used in the Núh salt-pans to quicken the crystallization of the salt. *Bathuá* (*chenopodium album*) and *chaulái* (*Amaranthus?*) are common pot herbs: the former grows chiefly in irrigated lands. The seeds of the *sánwak* (*panicum colonum*) are also eaten by the poor. The *náli* (*ipomœa reptans*), which grows in submerged lands, is also used as a pot herb: and among the wild gourds the *kachrí* (*cucumis pubescens*) and the *bankarelá* (*momordica charantia*) are eaten by the people. In poor soils near the hills there often grow the *kans* grass (*saccharum spontaneum*) and the *bhurt* (*cenchrus echinatus*) with its troublesome and prickly burs; and in the flooded lands of some villages in the north of Fírozpur (especially in Gohánáand Bahádrí) is found the *narsal* (*arundo karka*), a most tenacious aquatic plant, which it is almost impossible to eradicate, and which had to be considered in fixing the assessment of those estates. Pipe stems are made of its reeds. The only other plant which it seems necessary to mention is the *nág-phaní* (*cactus Indicus*), which forms a thick hedge round many villages in Rewárí.

Wild Animals: Sport.

The days when tigers abounded in Gurgáon on the then woody banks of the Jamná, are now long since gone by. The panther (*taindwa*) is now the largest representative of the feline family. They occasionally appear in the hills, wandering in from the adjacent hilly tracts of Alwar. A large wild cat (*banbilla*) is also commonly found in the jungles near the hills. Hyenas have a representative in the striped hyena (*jarag*), not common, and found only in the neighbourhood of the hills. The canine group is well represented,

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Wild Animals: Sport.

and wolves (*bheria*), foxes (*lomri*) and jackals (*gídar*) are common in all parts of the district. The mongoose (*niolá*) is common. A larger animal of the same species is found in the hills. It is about twice the size of the ordinary mongoose, and instead of brown, has a dark grey fur. Hares are very plentiful in all parts of the district, and the porcupine is common, generally found in the neighbourhood of the hills. Rats and mice are very common, and the bandicoot infests some of the towns. Dormice are found in all parts, but chiefly in sandy and saline tracts burrowing in the ground and living in large communities, and frequently causing damage to extensive patches of cultivation. In gardens and groves, the striped squirrel is always to be found. Musk rats are common, and so also is the little hedge-hog. Flying foxes are chiefly seen about Gurgáon, where they infest some of the gardens. The common bat inhabits old ruins and *khángahs* in great numbers. The sacred monkey is to be found in great numbers about Hodal, and there are also a few in Rewárí and Gurgáon. At Sohná, a solitary blackfaced monkey lives in the hills above the town, and frequently visits it. The wild boar inhabits the low hills near Bhúndsí and Sohná, and the Khádar lands of the Jamná.

Ruminants are represented by the black buck and the ravine deer, both of which are fairly plentiful. The former in the hilly and sandy parts, the latter in the low lands. The *nílgái* is also found in the southern parts of the Rewárí *tahsíl*, bordering on the foreign states. Hogdeer are occasionally met with in the Khádar lands of the Jamná. During the past five years rewards amounting to Rs. 1,152 were paid for the destruction of 25 leopards, 229 wolves, and 5,624 snakes. The species of snakes found are given below.

Birds.

The *jhíls* of this district attract great numbers and varieties of water fowl. During the cold months, wild geese, the grey and the barred, come in great numbers, arriving about the beginning of October. Also ducks of the mallard, pintail, and painted bill varieties; and pochards, sheldrakes, shovellers, red-heads, wigeons and teal swarm in all the marshes. With them also come a host of cranes, the common and the demoiselles; pelicans, spoon-bills, flamingos, grey curlew, snipe, crakes, rails, and sand-pipers. All these winter visitants disappear about the end of March. The *sáras*, the largest of the cranes, is a permanent resident, and breeds in the rains. They are usually seen in pairs in the lowlands about Núh, and the neighbouring villages. The comb duck, or *nakta*, comes in the rains to breed, and builds its nest generally in old ruins. The painted bill-duck is also a permanent resident of these parts and breeds in the rains. Adjutants and several other cranes come in great numbers during the rains. The ibis visits these parts in the rains in great numbers. Peafowl are considered sacred generally throughout the district. They are very common, and are chiefly seen about villages. The wild or blue pigeon is very common, living in great numbers in ruins and deserted wells. The wood pigeon, or stock dove, comes in great flocks during the cold season, and are chiefly to be seen near Bhadas in the Firozpur *tahsíl*, and Jatauli between Gurgáon and Rewárí. Grey doves, ring doves, and turtle doves are plentiful. There are four kinds of sand-grouse

Birds.

to be found in this district. The Imperial or black-breasted is a winter visitant and abounds in parts of this district, from November to the end of February. They are chiefly to be seen in the neighbourhood of Gurgáon and Farrukhnagar. The common, the pintail, and the painted, are residents of the district. The painted are only to be found on the rocky hills, and are nocturnal in their habits. Grey partridge abound in every part of the district. The black is also plentiful in some parts. Bushquail, both jungle and rock, are common, and when the wheat is about to ripen in March, the common quail appears in great numbers. The *ubara* is occasionally seen. The *lik* or painted florican comes here to breed in the rains in the sandy parts of the district. The Indian Roller, or blue jay is common, and king fishers of the blue and the spotted kind are plentiful near *jhíls*.

Tortoises.

Tortoises are found in the Jamná, and a small kind in some tanks and wells. The small tortoise is sometimes brought from long distances and put into wells and tanks to keep the water pure.

Reptiles

Snakes appear only in the hot and rainy season, the commonest are the cobra and the *krait* known here as the *Bissanda*. The *daboia* and the *afae* are also found. *Dhawan, domuhi kalgandaith, padam*, Chamelia, *azdahá* (python) are occasionally seen.

The largest of the Lizards is the Goa, a smaller kind is the *biskabra*, supposed to be very poisonous. There are also, the house lizards, the sand lizards, the *sanda* or edible lizards, the tree lizard or Chamelion, and the beautiful *bamni* lizard.

Fish.

Besides the Jamná and the Agrá canal, there are few localities where fish are to be found. The Jhir stream in the hill pass above Firozpur has a few species of small fish, and here and there some of the large tanks have fish of the ophiscipali (*saol*) and macrones (*tengra*) species peculiar to muddy and stagnant waters. There is a large tank at Hodal that contains some of the smaller kinds of river fish. This tank is fed from the Agrá canal. Of the *jhíls* in the interior of the district; the Najafgarh lake is the only one where there are fish, and this is due to this lake being connected with the Jamná by the drainage canal. In the lake all the better kinds of fish can be caught, but fish, as food, are scarcely known in this district. A few are occasionally brought from the Najafgarh *jhíl* into the market at Gurgáon. The following better kinds of fish are known:—*rohu* (labes rohita) *kalbas* (labes kalleas) *mahasee* (barbastor). *Bhur, narani, bamcha, bam* (eel), *qwalli, singhi, moh, phapta*, are the local names of the commoner kinds.

HARYANA DISTRICT GAZETTEERS

REPRINT OF
DELHI DISTRICT GAZETTEER, 1883-84

GAZETTEERS ORGANISATION
REVENUE DEPARTMENT
HARYANA
CHANDIGARH (INDIA)

1999

GAZETTEER

OF THE

DELHI DISTRICT.

1883-4.

Compiled and published under the authority of the
PUNJAB GOVERNMENT.

PREFACE.

THE period fixed by the Punjab Government for the compilation of the *Gazetteer* of the Province being limited to twelve months, the Editor has not been able to prepare any original matter for the present work; and his duties have been confined to throwing the already existing material into shape, supplementing it as far as possible by contributions obtained from district officers, passing the draft through the press, circulating it for revision, altering it in accordance with the corrections and suggestions of revising officers, and printing and issuing the final edition.

The material available in print for the *Gazetteer* of this district consisted of the Settlement Reports, and a draft *Gazetteer*, compiled between 1870 and 1874 by Mr. F. Cunningham, Barrister-at-Law. Notes on certain points have been supplied by district officers; while the report on the Census of 1881 has been utilised. Of the present volume, Section A of Chap. V (General Administration), and the whole of Chap. VI (Towns) have been for the most part supplied by the Deputy Commissioner; Section A of Chap. III (Statistics of Population) has been taken from the Census Report; Mr. Carr Stephen's work has been largely drawn upon for the Archæology of Delhi and its suburbs; while here and there passages have been extracted from Mr. Cunningham's compilation already referred to. But, with these exceptions, the great mass of the text has been taken almost if not quite verbally from Mr. Maconachie's Settlement Report of the district.

The draft edition of this *Gazetteer* has been revised by Messrs. T. W. Smyth, G. Smyth, Maconachie, Carr Stephen, Parker, and Delmerick, and by the Irrigation Department so far as regards the canals of the district. The Deputy Commissioner is responsible for the spelling of vernacular names, which has been fixed throughout by him in accordance with the prescribed system of transliteration.

THE EDITOR.

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DELHI.

CHAPTER I.

THE DISTRICT.

SECTION A.—DESCRIPTIVE.

General description.

The Delhi district, is the central of the three districts of the Delhi division, and lies between north latitude 28° 12′ and 29° 13′, and east longitude 76° 51′ and 77° 35′. It consists of a long narrow strip of country running along the right bank of the Jamná. Its greatest length north and south is 76 miles; its average breadth is 18 miles, the broadest place being opposite the city of Delhi, where it measures nearly 26 miles. It is bounded on the north by the Pánipat *tahsíl* of the Karnál district; on the east by the river Jamná, which separates it from the Mirath and Bulandshahr districts of the North-West Provinces; on the south by the Palwal *tahsíl* of the Gurgáon district; and on the west by the Sámplah, Gohánah, and Jhajjar *tahsíls* of Rohtak and the Sadr *tahsíl* of Gurgáon. It is divided into three *tahsíls*, of which that of Ballabgarh lies to the south, that of Delhi in the centre, and that of Sunípat to the north.

Some leading statistics regarding the district, and the several *tahsíls* into which it is divided, are given in Table No. I on the opposite page. The district contains two towns of more than 10,000 souls, namely:—

Delhi	...	...	...	173,393
Sunípat	...	...	...	13,077

The administrative head-quarters are at Delhi, which is situated about the centre of the eastern border of the district, on the right bank of the Jamná, and on the Sindh, Panjáb and Delhi Railway. Delhi stands 31st in order of area and 12th in order of population among the 32 districts of the province, comprising 1·01 per cent. of the total area, 3·41 per cent. of the total population, and 8·35 per cent. of the urban population of British territory.

Town.	N. Latitude.	E. Longitude.	Feet above sea-level.
Delhi	28° 39′	77° 17′	707
Sunípat	28° 59′	77° 4′	720*
Ballabgarh	28° 20′	77° 22′	700*

The latitude, longitude, and height in feet above the sea of the principal places in the district are shown in the margin.

The hills and the river.

The tract thus limited, though exhibiting none of the beauties of mountainous districts, possesses a considerable diversity of physical feature, and in parts is not wanting in picturesqueness. This it owes

* Approximate.

Chapter I, A.

Descriptive.

The hills and the river.

to the hills and to the river. The former, which at the southern end join on to the hills of Mewát and so meet with the Aravalís, at the other start from the river at Wazírábád, four miles north of Delhi, and skirting the present city on the north-west and west, stretch away nearly due south to Mahraulí. Before reaching this place, however, they branch out into two halves, one going full south, the other sweeping round in a curve to the south-east to Arangpur, whence again it turns south-west, and uniting with the other branch below Bhátí, holds on southward to Kot, and so out of the district into Gurgáon. But though the main direction may thus be described, there are here and there irregularly shaped spurs which break the continuity of the range, and at the same time greatly extend its area. The irregular oval enclosed by the branching halves above spoken of is really a plateau of a light, sandy soil, lying high and dry, but with a very useful general slope to the south-east. Here in different places are earth work dams aggregating several miles in length, made to catch the drainage. Of these more will be said further on.

The hills of Delhi, though not attractive in themselves, give a pleasant view across the Jamná, and in clear weather allow, it is said, even a glimpse of the Himálayas. Their surface is generally bare, supporting little or no vegetation save a stunted *kíkar* (*Acacia Arabica*), or *karíl* (*Capparis aphylla*), or the small bush of the *bérí* (*Zizyphus nummularia*) which, with its prickly thorn, is so inhospitable to the foot traveller. The surface of the ground is sprinkled with thin lamina of mica, which shine in the sunlight like gold. The stone, which juts up from the ground here and there, is hard and often sharp-edged. Water of course lies very deep, and irrigation by well almost everywhere impracticable. A moderate pasture is obtained by flocks of sheep and goats herded by Gújar boys. This tribe has appropriated almost entirely the hill villages, as they suit their pastoral traditions, and pastoral traditions are less repugnant than a settled husbandry to thieving, a habit universally attributed to the Gújar. The highest point of the range probably is near Bhátí—1,045 feet above the sea and 360* above the Jamná railway bridge at Delhi. The breadth varies greatly. At Arangpur it is not less than ten miles, while towards the northern end the hills dwindle into a mere rocky ridge, only a few yards broad. That 'Ridge,' however, since the memorable hot weather of 1857, is a name not likely to be forgotten by Englishmen. The hills divide the district into two parts. The northern, which is the larger, is also the more fertile and more populous. Without going minutely into details, it may be said that this larger half of the district consists of three parts, the Khádar or riverain of the Jamná, the Bángar or level mainland, and the Dábar or lowland subject to floods. The Khádar lies rather low, has a light sandy soil, and easy irrigation from wells.

The Khádar and Bángar.

The Bángar is higher, and by nature, drier. The Western Jamná Canal, however, traverses its whole length and affords too copious

* Making the bridge itself 685 feet above the level of the sea. The highest recorded flood of the river at this point was 673·7 feet. The sun-dial in the Fort at Delhi gives 825 feet, but this is somewhat too high.

The Khádar and Bángar.

irrigation, which has produced a sad effect on the appearance of the country. The most casual observation during a ride across the Bángar would show hundreds of acres whitened or half whitened by the destructive *reh* or *shor*. The soil is naturally more fertile and productive than that of the Khádar, being of a firmer consistency. The country is cut up in every direction by water-courses. Nearly on the boundary of the Khádar and the Bángar the Great Trunk Road runs almost due north up to the end of the district.

The Dábar.

The Dábar lies to the west of the hills, and consists of the low ground or basin scooped out by their westward drainage, and the floods of the Sáhibi *naddí*, which comes down through Gurgáon from Alwar. In the rainy season the country is under water for many miles round Chháolah and the villages near it: as the rains subside and the cold weather comes on, the greater part of the floods is carried off into the Jamná by the Najafgarh *jhíl* escape, but the *jhíl* itself, except in years of drought, covers a great many acres with the residuum, which lies in a hollow south of the villages of Báhlolpur, Dahrí, and Zainpur.

The Jamná.

If, as seems probable, the drainage of the hills hollowed out the Najafgarh *jhíl*, so too the division of the Khádar and Bángar was doubtless caused by the erratic wandering of the Jamná from its ancient bed. The river enters the district at a height of some 710 feet, and leaves it at about 630 feet above the level of the sea, with a course within the Delhi limits of rather over 90 miles, and an average fall of between 10 and 11 inches to the mile. The general direction is nearly due south. In the floods of the rainy season the river has a considerable breadth, swelling in places to several miles, with a maximum depth of some 25 feet. In the cold weather its normal depth is said to be four feet only; the stream is only sufficient to supply the three canals which draw from it (the Eastern and the Western Jamná, and the Agra Canal) and is then fordable in many places. The banks of the river are generally low, and the bed sandy, but there is said to be "a bed of firm rock" under the site of the Agra Canal weir at Okhlah. Religious reverence is due to the Jamná from the Hindú, though in a less degree than to the Ganges. It passes close under the Fort at Delhi, and it must always have rounded the eastern point of the rocky 'Ridge' at Wazírábád. But in the northern part of the district it appears formerly to have had a course much to the west of that which it holds at present. The drainage channel, called the Budhi *nalá*, which comes down under the very doors of Sunípat, would seem by the conformation of the country to have been the old bed of the Jamná, and this is supported by strong and general tradition. The course of the Budhi marks off the division of the country into Khádar and Bángar. The Khádar which, as might be supposed, lies low, may be defined as the soil which at some time or other lay either under the river or to the east of it.* The Bángar in old times lay immediately to the west of the

* An interesting evidence of this is the elongated slip-like shapes of most of the eastern Bángar villages. They evidently abutted on the river, and part of their area is made up of the Khádar land deserted by it. But east of this again the land is slightly higher, also favouring the theory of a sudden change to the east.

Chapter I, A. Descriptive.

The Jamná.

stream, and the ascent of the old bank is in most places plainly visible. How or when the river changed its course is not known; but there seems some probability that the change was violent rather than a gradual one. The physical conformation above alluded to favours this; while some countenance is also given to it by the fact that the shapes of the village areas in the Khádar do not at all suggest a gradually elongating boundary, as would probably be the case had the river gradually receded. Nor is the latter supposition rendered likely by the circumstances, so far as known, of the origin of those villages. It may at any rate be considered certain that the river once flowed beneath the walls of Sunípat, and down south by Narelah, to somewhere near Azádpur on the Grand Trunk Road near Delhi, where, beginning to feel the influence of the hills, it must have turned sharply to the east. Below Delhi its course seems to have been in the same way immediately east of the Bángar bank. This, in the immediate vicinity of the city, abuts almost directly on the stream where it now runs; the soil is hard, high, and in many places rocky. The Khádar, after reappearing in the fertile lowlands of Indarpat and Ghayáspur, is again cut off at Okhlah, where the Bángar bank juts boldly forward, giving an advantageous site for the head of the Agra Canal. For some few miles below this the ground continues the same, but then the old river would seem to have taken again a more westerly course than the present—to have passed close by the ancient village of Tilpat: then turning again south-east along a *nalá* still visible, to have rounded closely the high bank on which the Khádar-Bángar villages in this part mostly stand. From Gharorah to Chánsah this line is very conspicuous. The Khádar south of Delhi is thus a very narrow slip of country, often only a single village in breadth.

South division of the District.

The country immediately south of Delhi as far as Mahrauli, Toghlakábád, and Molarband, is rocky and undulating. This and the picturesque ruins abounding almost everywhere give the scene an interest not often found in the plains of India. Beyond this again to the south, the country lying between the hills to the west and the Khádar already described on the east becomes more flat and open, and so fit for the passage down the eastern side of its length of the Agra Canal, which keeps an almost perfectly straight course at a low level down into the Palwal *tahsíl*. Parallel with it, roughly speaking, is the metalled road to Agra which passes through Ballabgarh, at a distance of 22 miles from Delhi. The soil of this part is mostly a light, sandy loam, which, under good hands, is very fairly productive. The country between the Agra Road and the hills to the west begins to get level a few miles below Badarpur; it is mostly sandy, bearing the detritus from the hill slopes, and in the rainy months is marshy and in places flooded—the passage of the water is toward the south, where it debouches at the top of the Palwal *tahsíl*.

Southern drainage lines.

The drainage of the Delhi district, as may be easily seen from the map, is divided completely by the hills, and may be separately considered in these two portions. The drainage of the southern part is simple. There are three main outlets for the north Ballabgarh drainage, in its rush down eastward from the hills to the river—the

Bárahpulah, Tekhand, and Burhiyá *naddís*. The general flow of these water-courses, which is too violent in flood to be of much use in irrigation, is to the east; but here and there, owing to local peculiarities of soil, their course is changed, and they go sometimes east, sometimes south. The Bárahpulah drains the slopes of the hilly villages north-east of Mahrauli, and crossing the Agra Road under a fine bridge (from the number of arches of which it takes its name), runs into the Khádar just south of Humáyún's tomb. The Tekhand *naddí* drains the lands west of Máhraulí, crosses the road about four miles below the Bárahpulah, runs over the canal by a superpassage 2½ miles below Okhlah, and then runs southward into the river. The Burhiyá *naddí* drains the whole of the hills lying in the vicinity of Arangpur to its south-west and south. It is larger than the Tekhand *nalá*, and in flood it is sometimes violent enough to stop the passage of travellers at the point where it crosses the Mathrah Road, which is unbridged. The south Ballabgarh drainage runs more decisively south-east. The torrents and drainage channels on this part beginning from the north are as follows:—

(1.) There is a small channel issuing from the hills, south of the village Meolah Mahárájpur, which comes down on to the low ground of Fatehpur Chandilah.

(2.) A much larger stream, called the Parsaun, comes down from the Badhkhal hill on the same low ground in Fatehpur Chandilah, a little to the south of the other. It crosses the Agra Road under a bridge, and fills the tank at Faridábád. Thenceforward it divides; one branch of the watercourse goes down the old imperial road toward the Majesar lands, and then turns eastward on to Sihi. The second goes more directly to Sihi, passing by the *ábádí* of that village, and so on near Súrat Ram's garden to Ballabgarh. Thence it crosses the main road again on to the low ground of Ranherah. Before the Agra Canal was dug, the water used to spread over the fields of Majheri and Chandaoli.

(3.) A third channel descends from the hills south of Badhkhal through the Daulatábád land, and round to the south through Ajraunda into the limits of Majesar village. There it splits up into two streams; the main one, passing between the two *ábádís* of Majesar, passes through the west lands of Ballabgarh on to Ranherah *jhíl*; the other passes north of Majesar into Sáran; some water too from this *nalá* comes down on the south lands of Daulatábád, through Minárú to Sáran, and meets the last named stream in the *dahar* of Gaunchhí village.

(4.) Another stream comes down from the hills on the confines of Bhánkrí and Pálí on to the Dabuá lowlands, then through Ghazípur and Naglah Gújarán, touching the south-west corner of Sáran, and falls into Gaunchhí *dahar*. When in heavy flood it does not stop there, but passes on to Shamápur.

(5.) There is a stream locally known as Bhandwánbáj which comes down south of the last named on to Kherí Gújar.

(6.) The sixth torrent comes out of the Pálí hill. Passing by the south of the *ábádí* of that village, it goes to Kherí like the other.

Chapter I, A.

Descriptive.

Southern drainage lines.

(7.) Another *nalá* comes down from the hills near Kothrah Muhabatábád. It passes to the north of Pákal, and touches the north of the Nekpur lands joining with Nos. 5 and 6 in Kherí Gújarán. Thence running on through the south-west corner, of Naglah, and the north of Koreishípur, it goes through Sarúrpur and Mádalpur, and joins No. 3 and 4 in Shamápur. Thence, moistening the lands of Jhársetlí, Kandhálí, and Kailgáon, it passes through Naglah, Jogián, Harphalah, Maholah and Kabúlpur Bángar out of the district.

(8.) This *nalá* comes out of the hills under Mángar; it is injuriously violent, and when in flood brings down a large body of water. Its line lies close by Dhauj, Tíkrí Kalán, Fírozpur Kalán, Ladhispur into the *jhíl* of Kabúlpur Bángar.

(9.) The last *naddí* is the one issuing from under Kot. This is nearly as bad as Mángar *nalá* when in flood, and damages the lands of the villages through which it flows when it comes down in heavy rains; it passes through Alampur, Sarohi, Khoi-Jamálpur, Bijupur into the marsh at Sarmatla in Palwal and thence on to the *jhíl* of Khalílpur.

Of all of these the most violent are No. 8, the Mángar one, No. 3 from Badhkhal and No. 9 from Kot in the order named. There is no perennial stream, however; and except in the rainy season the effects are seen only in the undulating character of the ground, here and there cut into more clearly marked channels, the permanent moisture of the lower lands, and in a few villages, a pool of standing water which, though in dry seasons it disappears altogether, in wet ones swells into a *jhíl* or marsh of considerable size. Thus in the cold weather the road is sometimes unpleasantly flooded between Sarmatla on the border of Palwal, and Ballabgarh; and duck can be generally shot on the ponds near Gaunchhi throughout the winter months. As instanced above, the Agra Canal has materially altered the drainage of the east half of the Ballabgarh *tahsíl*. There is now no room for any considerable length of drainage flow on that side. There is an escape dug from the canal south of Tilpat opposite the place where the water of the Burhiyá *naddí* comes in, and this meanders on in a slimy *shor*-mixed stream through the low Khádar north of Bhopání on toward Bhaskaula, where it gets a doubtful exit into the river. The want of drainage here is shown in the prevalence of *shor*, which more or less affects all the land lying in this neighbourhood.

Drainage north of the hills.

Turning to the drainage north of the hills, and beginning at the further end of the district, the first drainage line that draws notice is the channel of the Budhi *nalá* mentioned above, which runs down almost due south, on the east side of the Bángar *chak*. This comes down to within a few miles of Delhi, but in the latter part of its course it becomes very serpentine, and hence is called there the Nág *nalá*. It has no clear outlet, but is partly intercepted by the Gangá Toli escape, dug from the canal 13 miles above Delhi. The large sheet of water near Bhalswah Jahángírpur marks the continuation of this channel, which sooner or later it is hoped will be cleared out again. There are outlets for the drainage from the west dug *into* this channel near Jagdíspur and Ládpur below Sunípat; but no outlet exists for the water when it comes there, except a very

Drainage north of the hills.

irregular passage down by Pitampura, which does not do its work at all properly. Besides this *nalá* the Khádar has a depression, well defined in some parts, blocked up by cultivation in others, running down from Kherí Tagá, with a fork on one side through Pipli Kherá, and another through Rámnagar. Between Dhatúri and Malikpur the channel is well defined, but in Murthal it grows doubtful, appearing again in a perfect net-work of hollows and sinuous depressions in Kunashpur, Dipálpur, and Kheorsh. Hence it takes a turn rather more south-east, and joins a *nalá* of the river at Jakhauli. From the large pond in Pipli Khera, a small trench (it can hardly be called a ditch) has been dug for a considerable distance to the south-east to carry off the rain water, but it has not been vigorously followed up or kept in repair, and so is of little practical use. It may be asked what is the need of drainage channels in the Khádar, where the water-supply is never too abundant; but this remark supposes a greater power of absorption in the soil than actually exists. As a matter of fact the Khádar does need drainage, though in comparison with the Bángar not so much. There are not a few places in the Khádar where *reh* or *shor* is apparent, especially under the lee of the Grand Trunk Road. This work forms in some places a *band* several feet above the level of the adjacent country, and necessarily impedes the passage of the rain drainage toward the river. It is true there are scientific bridges at different places, but the breadth of water-way was, it would seem, intended to be enough to protect the road, rather than specially to allow free unimpeded passage of the drainage.

Drainage of the canal tract.

But the damage done in this way by the Grand Trunk Road is a mere trifle, compared with the grievous injury that has been for many years going on in the Bángar, by reason of the bad alignment of the Western Jamná Canal, and want of proper provision for drainage of the rain water and surplus moisture from irrigation.

The alignment of the canal, as it has stood for some fifty years since its reconstruction, is throughout a great part of its course in this district in a *valley;* and in order to allow of irrigation on the higher grounds receding from its side, its bed has been raised so as to be not seldom higher than the adjacent fields. Percolation has been of course immense. Then the distributaries have hitherto been constructed on the same principle, without any thought of economy of land or water. The water-courses often intersect each other and often run parallel side by side for long distances. It is not wonderful therefore that the damage done by water-logging is immense, and in places all but irretrievable. With the best system of drainage possible, and the best care and attention in watching over and enforcing that system, it will be a long time before the Bángar recovers itself. One branch of the drainage of the Delhi Bángar runs down to the west of Bali Kutabpur, then south south-west to Pugthallah on through the two Bajánás, and so into Rohtak to meet with the other lines at the Najafgarh *jhíl*. Another depression systematised into a drainage cut starts from Júán, and goes south south-west by Salemsar Májra and Mahipur, and so like the other out of the district. A third runs due south from Bhatgáon through Nirthán; a fourth crosses the line of the Canal at Bhadanah

Chapter I, A.

Descriptive.

Drainage of the canal tract.

and Jharauti with, as may be imagined, a terrible effect; while a fifth, a very important line, runs due south from the two Thánahs by Nizámpur Khurd, Kutabgarh, and passes between the two large villages Ládpur and Kanjháolah with a course to the south-west into Rohtak. A sixth lies south-east of Púth Khurd and goes through Sáhibábád, Daulatpur, Rithálah (a large part of whose lands is simply marsh) and Magholpur Khurd, crossing the Rohtak road about a mile east of Nánglai Jat, and falling into the Najafgarh *jhíl* in the limits of Nánglai Saiyad. These drainage lines are not mere depressions scientifically determined to be such: they are patent to an ordinary observer riding over the ground if he carefully watches the lie of the land, and two things that always are affected by this, the character of the cultivation and condition of the soil. Except the last line the lower part of the channels lies in Rohtak, where they come in at the top of the Najafgarh *jhíl*.

On the other side of the canal the directions of the drainage flow are perhaps not so clear, but still they may for the most part be made out. One small line goes down between Ahulánah and Atael; another larger one runs south-east from Khúbru through Shekhpurah and Aghwánpur; a third from Dabarpur in the same direction through Máhrá in the Khádar below Shahzádpur. The outlet of those three is clear, or might be made so, into the Budhi *nalá* mentioned above. But below this there is more difficulty. There is a flow south-east from Jhán, but it gets obstructed somewhere about the road where it passes through Barwásní, and but little water passes on to Mailanah, though that seems the natural direction. About Rohat there is almost a basin, and the escape dug nearly due east to Nasírpur Bángar at present does but little good. It appears to be used to take off superfluous canal water rather than for relieving the neighbourhood by drainage. Further down there is a sinuous depression below Katlupur, passing through the north-east lands of Bowánah round by Sanauth into the Gangah Toli escape. This escape was dug possibly to take off the surplus water of the canal, and not for drainage purposes, though its direction is shaped so as partly to serve them. It carries off some water from Sanauth and Razápur Kalán, and then running sharp to the south turns again to the east at the Grand Trunk Road, which it crosses a mile south of Alipur, and thence on in the same direction to Garhí Khusru and the *nalá* running past Burári.

The Najafgarh *jhíl*.

The western lines, as has been already said, converge on the *jhíl* below Najafgarh. There are two main passages into this: one to the north of Jharaudah and east of Dichaon comes into the lowlands at Nawádah Hashtsal; the other and larger body of drainage comes in between Mandelah Khurd and Bákargarh, running south-east to Pindwála Kalán, and meeting the large *jhíl* below Chháolah. The main *jhíl* lies to the south-west and west of this, and is fed, as already noted, by the Sáhibi drainage from Gurgáon and the flow of hill water on the west side of the Delhi hills. This last comes down in several places; the most distinct lines perhaps are those lying about Dábri and Pálam.

A more particular account of the Najafgarh *jhíl* considered in its revenue and irrigation aspects will be found in Mr. Maconachie's Settlement Report. It is sufficient to note here that the ar

drained by it is estimated at 3,072 square miles, and its water surface with a depth of 12 feet in the water gauge at Nának Hori is 56,657 acres or about 88½ square miles.* In 1833 its area was estimated at 52½ square miles, but the time of the year this refers to does not appear. Its outlet is a drain passing with a muddy sluggish flow to the north-east by Kakraula, Nilanthi, and Basei across the Rohtak road about three miles west of Delhi, and emptying itself into the Jamná just above the village of Wazírábád.

The Western Jamná Canal.

The Western Jamná Canal has for many years been a factor of enormous power in determining the condition of the *zamíndár* in a large and densely populated portion of the district. It appears that the Dehli Canal is a work of considerable antiquity, certainly some centuries old; and the tradition of the country-side says that after copious and long continued irrigation, the Bángar *chak* of the district became ruined with *reh*, that the canal was given up, and people took to wells, or to dependence on the rainfall to nourish their crops. About the year 1815 the canal water was re-introduced. In an official document of the time it was noted that several persons were ready to contract to do the excavation and clearing work necessary for this purpose, but a "work so dignified, so popular, and so beneficial, should not fall to the share of any but the Government." It was estimated that one lakh yearly for three years would cover the expenses of the scheme, the result of which it was hoped would be to bring under cultivation "vast tracts now deserted." Lieutenant Blaine, the officer in charge of the work, was called away to the field by the Goorkha war; but operations must have been pushed on without great delay, for in 1819 the canal was running. After this no information is available before 1838, when a systematic clearance was made, and once again before the Mutiny. At the Regular Settlement in 1842 little damage from water-logging seems to have been noticed or even apprehended. But in 1856, remissions for *shor* began, and others were made in 1858, and since then the subject has been one of constant anxiety to all officers acquainted with the state of the case. Moderate irrigation and good drainage are all that are wanted to restore the Bángar of Delhi to the beautiful fertility described by John Lawrence about forty years ago, as allowing one "to ride for miles as through a highly cultivated garden." But every year's delay in bringing these measures into operation makes the remedy hoped for more difficult.

Reh.

The existence of the evil of *reh* and its extensive impoverishment of the soil are too well known now to require to be dwelt on at length.† It is really impossible to tell in places how far the damage has spread. Here and there ruin unmistakeable, bare and perhaps complete, is apparent. Whole tracts of land, formerly most productive, are lying barren; white with the saline efflorescence when dry, or when wet, foul with a stagnant and sickening vapour that, once perceived, is characteristically distinguishable, and is at

* In 1856-57 this gauge showed 15′ 11″, which would give a much larger area; but the capacity of the *jhíl* has been ascertained only up to 12 feet on the gauge.

† For the last conclusions arrived at by experts on the subject of *reh*, reference should be made to the "Report on the deterioration of land by *reh* in the Aligarh District, North-Western Provinces," by a Committee held in 1878.

Chapter I, A. Descriptive. *Rek.*

times so strong in its odour as to give the sense of being eaten like food. At this point there is no doubt of the damage. But there is a second stage, reached before the final ruin, wherein the corners of fields look unhealthy; perhaps they have a few stunted stalks on them, perhaps they are quite bare. The middle of the field which has a crop, has also here and there small patches of white or barren soil, telling too clearly of the diminished yield. But the effect of several of these patches, irregular in shape, and scattered in diverse quarters, is to make any estimate of the produce of the field very uncertain. There is, however, even before the second stage an inceptive one, where the devastation has only just begun. Here no *shor* is apparent on the surface of the soil, but the unhealthy look of the crop, or it may be (as in wheat), a kind of withered precociousness in the ears, shows that things are not as they should be. The fields, to a casual glance, bear their usual variegated burden of yellow and white and green; but the *samíndár* knows to his cost that the curse has come upon him.

Rainfall, temperature, and climate.

Table No. III shows in tenths of an inch the total rainfall registered at each of the rain-gauge stations in the district for each year, from 1866-67 to 1882-83. The fall at head-quarters for the four preceding years is shown in the margin. The distribution of the rainfall throughout the year is shown in Tables Nos. IIIA and IIIB, while Table No. IV gives details of temperature for each of the last 14 years, as registered at head-quarters. The average rainfall for the whole district during the 12 years 1869—1879, is 23·1 inches. This is the result of carefully abstracting the monthly returns published in the *Punjab Gazette*, but it is curious when compared with the larger rainfall in Pánipat, and the larger rainfall on the other side in Gurgáon, which certainly has the reputation of being a thirsty tract as compared with this district. The *tahsíl* averages do not help in the matter, as Delhi has a larger figure than the others; thus, Sunipat gives 22·7, Delhi 25·5, Ballabgarh 21·3 inches. At pages 12 to 14 will be found an analysis of the annual rainfall for the above 12 years, arranged according as it affects the autumn or the spring harvest, or both. The climate of the district is what might be anticipated from its position, as lying between the plains of the Punjab and those of the more tropical parts of Bengal. The cold weather is much like that of the Punjab, and there is a bleak north-west wind which makes the temperature seem lower than it actually is. On the other hand, the hot weather begins sooner by a good fortnight, though the nominal dates for commencing and leaving off *punkhás* are the same as those of Lahore. Tents become unpleasant after April 1, when, if the season is a normal and favourable one, the hot wind *luh* begins. During the succeeding months, down to the middle or end of June, the west wind should blow moderately and equally. A violent west wind is hurtful to the crops, while an east* wind is unhealthy for

Year.	Tenths of an inch.
1882-83 ...	532
1883-84 ...	365
1884-85 ...	294
1885-86 ...	396

* "If the east wind blow in *Jeth*, that is bad. If a Ját (mount and) make a horse to dance, that is bad. If a Brahmin take to wearing a knife, that is bad."

men. The four months, *Phúgan*, *Chait*, *Baisákh*, and *Jeth* make up the the *Kharsa* season—the dry months. Then comes the *Chaumásva*—the four rainy months—*Asarh*, *Sáwan*, *Bhádon*, *Asoj*. In this period plentiful rain is expected and wished for, especially in *Bhádon*.* In *Asoj*, however, it is getting too late for cotton and *til*.† The air then, if the west wind blows, is fresh and healthy; the east wind is very debilitating and is said to produce boils and fever. *Asoj* brings us on to October when the nights are beginning to get cool. Then comes the feverish season, which is always bad in Delhi, but during the last few years has been so fatal as in some parts to materially diminish the population. The canal villages, which might be thought most likely to suffer, have not been distinguished lately in this way. Towards the end of November or the beginning of December matters begin to improve, for the *jára* or cold season has well begun. The four months—*Kátik*, *Mangsir*, *Poh*, *Mágh*—bring us round again to the *Kharsa*. Rain is almost unknown in November, but is thought good for husbandry in December,‡ as if there is no rain, there will be heavy work for the oxen in watering the young *rabí* crops,§ and in *Poh*, though late, it is better than nothing.‖

Disease.

Tables Nos. XI, XIA, XIB, and XLIV give annual and monthly statistics of births and deaths for the district and for its towns during the last five years, while the birth and death-rates since 1868, so far as available, will be found in Chapter III for the general population, and in Chapter VI under the heads of the several large towns of the district. Table No. XII shows the number of insane, blind, deaf-mutes, and lepers as ascertained at the Census of 1881; while Table No. XXXVIII shows the working of the dispensaries since 1877. In the district Census Report for 1881, the Deputy Commissioner wrote as follows:—

"The sanitary condition of most of the villages is as bad as it can possibly be. Each village is surrounded by dung-hills, and by one or more stagnant pools. In most houses the families and the cattle sleep in the same quarters, and the water of the wells is frequently brackish, or largely impregnated with organic matter. The district has seldom been visited by cholera, and the mortality from this disease has never been very high, but the villages and smaller towns suffer greatly from periodic epidemics of fever, which cause great mortality."

Delhi Boil.

The only peculiarity in the way of disease in the district is the Delhi boil. The causes of this sore are as yet not known,

* There are many sayings in the popular vocabulary exemplifying this: "If it rains in *Har*, it will make (the country) prosperous." "The showers of *Sáwan* are filled with pearls." "(In) the showers of *Sáwan*, dry and moist (soil) all becomes green." "If it rains in *Bhádon*, then both harvests will be (good):" while heat for *Jeth* and rain for *Bhádon* are pithily indicated as desirable in the forcible lines:—"Talk as a rule is good, but not too much; silence is good, but not too much. Rain is good, but not too much; sunshine is good, but not too much. But the more we get the better of rain in *Bhádon*, or sun in *Jeth*, or talk in our story-tellers, or silence in our wives."

† "If it rains in *Asoj*, the *til* won't give (good) oil, nor cotton trees (good) pods."

‡ "With rain in *Mangsir*, the wheat will be of good colour."

§ "If watering is not given in *Mangsir*, surely a thief has carried off the oxen."

‖ "If it rains in *Poh*, there will still be something of a crop, full or thin."

Statement of Rainfall in the Delhi District from 1867 *to* 1879.

Name of Tahsil.	Month.	Years.												
		1867-68	1868-69	1869-70	1870-71	1871-72	1872-73	1873-74	1874-75	1875-76	1876-77	1877-78	1878-79	Monthly average.
Delhi.	April	0·7	0·9	...	1·5	0·4	0·3	...	...	...	...	0·2	1·6	0·6
	May	0·7	0·1	...	...	3·3	1·1	2·4	...	0·5	2·6	0·2	0·5	1·0
	June	0·9	2·3	0·2	6·2	4·2	...	0·2	2·9	0·4	4·5	3·7	0·5	2·4
	July	13·7	1·3	6·5	2·8	8·3	11·1	19·8	2·2	3·4	4·6	1·3	11·7	7·9
	August 1st half	1·2	0·3	0·1	7·0	5·1	4·2	4·5	0·6	5·0	0·4	0·1	0·2	2·4
	Total ...	17·7	4·7	7·8	17·5	21·3	16·7	26·9	15·4	9·	10·1	5·5	14·4	13·8
	August 2nd half	5·5	...	1·2	4·6	2·9	6·4	...	3·2	0·2	0·2	...	16·8	3·4
	September	0·2	0·1	8·3	0·6	0·7	6·1	8·5	3·1	27·4	5·3	0·5	0·5	5·1
	Total ...	5·7	0·1	9·5	5·0	2·9	12·5	8·5	6·3	27·6	5·5	0·5	17·3	8·5
	October	...	...	1·7	...	...	...	1·2	...	0·1	1·2	3·3	...	0·9
	November	...	...	...	...	...	...	...	...	...	...	...	...	0·4
	December	1·7	...	...	0·1	...	0·5	0·5	...	...	...	2·4	...	0·6
	January	0·5	0·6	...	0·5	2·0	0·4	0·2	0·1	...	2·3	...	...	0·6
	February	1·2	1·2	...	0·6	0·7	...	...	1·2	0·1	2·1	1·2	...	0·8
	March	0·5	3·2	1·0	...	0·1	...	1·0	...	1·3	0·2	0·1	0·2	0·6
	Total ...	4·6	5·0	2·7	1·2	2·8	0·9	3·6	1·3	1·5	6·5	9·0	0·2	3·3
	Annual total of Delhi Tahsil ...	28·0	9·8	19·7	22·7	27·0	30·1	39·0	21·0	38·4	22·1	15·0	31·9	25·5

Statement of Rainfall in the Delhi District from 1867 *to* 1879.—(Continued.)

Name of Tahsil.	Month.	Years.												
		1867-68	1868-69	1869-70	1870-71	1871-72	1872-73	1873-74	1874-75	1875-76	1876-77	1877-78	1878-79	Average fifteen Years.
Ballabgarh	April	0·2	0·3	...	1·3	0·5	...	...	...	...	...	0·5	0·3	0·3
	May	0·5	0·3	...	...	2·1	0·9	1·5	...	1·6	0·6	0·1	1·3	0·7
	June	0·4	4·1	0·5	3·3	5·4	...	1·6	4·1	...	0·3	1·0	0·3	1·8
	July	12·5	0·3	9·7	5·1	9·4	7·3	14·0	11·8	0·9	8·3	3·2	5·5	7·3
	August 1st half	2·8	...	0·7	2·2	5·4	6·1	5·5	1·3	3·5	1·2	...	1·3	2·5
	Total ...	16·4	5·0	10·9	11·9	23·8	14·3	22·5	17·2	6·0	10·4	5·7	8·7	12·7
	August 2nd half	3·9	...	3·3	3·2	0·9	3·3	...	4·0	0·7	...	0·3	2·9	2·4
	September	1·6	...	7·1	0·4	0·6	8·0	4·4	1·6	23·0	1·8	0·5	2·1	3·9
	Total ...	5·5	...	9·4	3·6	1·5	6·3	4·4	5·6	24·8	1·8	0·7	13·0	6·3
	October	0·4	...	0·7	...	...	...	1·8	...	0·8	0·5	4·1	...	0·7
	November	...	...	...	...	...	...	...	...	...	...	0·1	...	0·0
	December	0·5	...	...	0·3	...	0·4	0·1	...	...	...	3·2	...	0·4
	January	0·7	1·4	...	...	0·5	...	...	0·2	...	1·6	...	...	0·4
	February	1·3	0·7	...	1·2	0·4	...	...	0·7	0·1	2·3	0·4	...	0·5
	March	0·2	1·9	0·5	...	0·1	...	0·4	...	0·5	0·6	...	...	0·4
	Total ...	3·1	4·0	1·2	1·5	1·3	0·4	2·3	0·9	1·4	5·0	7·8	...	2·4
	Annual total of Ballabgarh Tahsil ...	25·0	9·0	21·5	17·0	25·6	21·0	29·2	23·7	32·0	17·3	14·2	20·7	21·3

Statement of Rainfall in the Delhi District from 1867 *to* 1879.—(Concluded)

Name of Tahsil.	Month.	Years.												
		1867-68	1868-69	1869-70	1870-71	1871-72	1872-73	1873-74	1874-75	1875-76	1876-77	1877-78	1878-79	Monthly average.
Sonipat.	April	1·2	0·2	...	0·4	0·3	0·8	...	...	...	...	1·3	1·7	0·6
	May	1·1	...	...	...	1·3	0·6	1·9	...	0·8	1·1	3·1	1·8	1·0
	June	1·9	2·0	...	13·4	5·7	...	0·2	5·4	...	1·6	1·4	0·6	2·8
	July	7·8	...	18·4	10·3	4·6	6·0	14·6	8·7	8·3	12·7	...	2·1	8·3
	August 1st half	4·2	...	1·7	3·6	2·5	7·4	4·3	1·6	5·1	0·5	...	0·7	2·7
	Total ...	16·2	2·2	15·1	27·6	14·6	14·9	23·0	14·7	8·7	16·1	6·1	6·9	17
	August 2nd half	4·9	...	...	3·0	0·4	0·5	...	0·6	0·6	2·0	...	10·3	1·8
	September	1·4	0·3	2·5	2·4	1·1	5·3	2·1	2·3	24·5	3·3	1·8	1·8	4·1
	Total ...	6·3	0·3	2·5	5·4	1·5	5·8	2·1	2·9	25·1	5·3	1·8	12·1	5·9
	October	...	...	1·6	...	...	...	1·2	...	...	1·7	3·2	...	0·6
	November	...	...	...	...	...	...	...	...	...	...	0·1	...	0·0
	December	0·8	...	0·1	...	...	1·9	0·2	...	...	...	3·1	...	0·5
	January	0·4	0·2	...	0·5	0·4	0·6	...	0·1	...	0·5	...	0·1	0·3
	February	1·4	0·6	...	0·9	7·9	0·3	0·8	0·8	...	1·2	0·3	...	1·2
	March	0·4	2·6	1·2	...	1·3	...	...	...	0·4	1·0	0·8	...	0·7
	Total ...	3·0	3·4	2·9	1·5	9·6	1·8	4·0	0·8	0·4	4·4	7·5	0·1	3·2
	Annual total of Sonipat Tahsil ...	25·5	5·9	20·5	33·5	24·7	22·5	27·0	18·4	34·3	25·8	15·2	19·3	23·7
	Annual total for the District ...	36·2	8·2	20·6	24·7	25·8	24·5	31·7	21·0	34·9	31·7	13·5	21·0	23·1

but the best local opinions point to a scorbutic origin. Some years ago in the *Indian Medical Gazette* there appeared a memorandum by Lord Mark Kerr, sounding a paean over the supposed fact that "at the end of eight years" (after his Lordship's return home from India in 1864) "the disorder has almost entirely disappeared from Delhi." Inquiry was instituted by the Sanitary Commissioner with the Government of India, but the reply received did not show any evidence either one way or another. There had been no doubt a decided temporary decrease, but it was not as yet certain to be permanent, and conclusions were considered premature.* At the City Dispensary in Delhi the annual average of cases treated for this disease for five years (1875—79) was 37.

Health of canal villages.

In the villages irrigated by the Western Jamná Canal the standard of health and vitality is materially lower than elsewhere, (see further Chapter III, Section A). This fact attracted the attention of Government as long ago as 1847, when a Committee was appointed to inquire into the sanitary state of irrigated districts. The Medical Officer, Dr. Dempster, in his memorandum forming part of the report, showed that in many villages of this part, 75 per cent. of the people had disease of the spleen, and that the average proportion of the persons thus diseased to the total population of the villages examined during the inquiry, was nearly 50 per cent. In 1867 another inquiry was instituted by the Government of India, and the results reported by Dr. A. Taylor, Civil Surgeon of Delhi. This report has been printed (Selections from the Records of the Government of the Punjab and its Dependencies, New Series, No. VI). Dr. Taylor showed clearly the presence of an unusual amount of spleen disease, and its close connection with the degrees of swampiness and want of drainage found in various parts. The villages "enjoying the greatest advantages" of irrigation were almost invaria-

* The Punjab Sanitary Commissioner, when called on for opinion and facts, said that there was great doubt as to the latter, consequently an opinion induced from them would be premature. He evidently inclined to the opinion, however, that the disease could be said only to be in abeyance. The cases in the Dispensary, though less than half in 1870 and 1871 as compared with the five years before, had in the earlier months of 1872 again mounted up to nearly their former numbers.

The following medical description of the sore has been furnished by Lálá Rám Kishendás, Assistant Surgeon in charge of the City Dispensary at Delhi :—

"This disease is similar in its nature to Biskra Button, Aleppo evil, Lahore sore, Moultan sore, &c. ; it would be better, therefore, to call all of these by a common name ; and the designation 'Oriental sore,' proposed by some writers, is the most appropriate. It attacks persons of all ages and positions in life and both sexes indiscriminately, but children between the ages of five and ten seem most liable to it. Depraved nutrition from climatic influences is believed to be the cause of its production, but the exact nature of these influences is unknown.

"It attacks generally the most exposed parts of the body, *e.g.*, the face, forearms, hands, legs, and feet, but has been seen on the chest, abdomen, and other parts generally covered as well. It commences as a papular eruption, attended with itching, soon followed by a crushed pustule and ultimately by irregular ulceration, which may last any length of time, but which, so far as I have seen, never destroys the deeper tissues. There is no certain cure for it : strong caustics sometimes eradicate it by destroying the nucleated cells contained in the meshes of the tissues attacked. There are several stimulating and astringent native remedies in vogue as specifics for the sore, but I have never seen any material benefit arising from them. Change to a better climate has appeared beneficial to troops suffering from it. Its pathology is under dispute ; some observers of authority say it is of a parasitic origin, while others of equally high reputation deny this altogether."

Chapter I, B.

Geology, Fauna and Flora.

bly those where the debilitating disease assumed its most prominent form. While drawing a sad picture of the state of the people, he alludes to the improved drainage of the Najafgarh tract, and shows that, while in 1845 the splenic enlargements were 43 per cent., in 1867 they were only 5·37. The flood level had sunk three feet, and the aspect of the people was healthy and robust.

Alleged evil effects of canal water.

Besides fever, the *zamíndárs* of the canal villages complain that copious irrigation of the land brings with it, though they do not know how, impotence in the men. On this point information is of course very doubtful: the earliest report on the matter, that of Mr. Sherer (Selections from the Records of the Government of India in the Public Works Department No. XLII) expressed the same opinion. "The unfruitfulness of women in canal villages is a subject of "common remark, and the consequent difficulty of inducing other Ját "families to give their daughters to the men of Páoipat, and the "environs of the canals generally, is very great." Dr. Taylor heard that sexual incapacity existed greatly among men, but that women were not barren in the same proportion. The local belief is the same; and it is said in addition that the women are generally more healthy than the men. Two reasons are given—the women come from other villages—often villages not irrigating from the canal, and so have a healthier stock to begin with. Secondly, they work more than the men. This sounds strange, and is only half true; but there is no doubt that the women in the canal villages look less lazy and demoralized than the men, who are indeed a very degenerate race.

SECTION B.—GEOLOGY, FAUNA, AND FLORA.

Geology.

Our knowledge of Indian geology is as yet so general in its nature, and so little has been done in the Punjab in the way of detailed geological investigation, that it is impossible to discuss the local geology of separate districts. But a sketch of the geology of the province as a whole has been most kindly furnished by Mr. Medlicott, Superintendent of the Geological Survey of India, and is published *in extenso* in the provincial volume of the *Gazetteer* series, and also as a separate pamphlet.

Mines and minerals.

The mines of the district are thus returned in the Administration Report:—Chalk mines at Kasúmpur and Arangpur, the former leased by the villagers for Rs. 300 a year, the latter not worked at present; 24 *kankar* mines in various villages, yielding 933,000 maunds annually, worth some Rs. 8,000; *bajri* mines at Bánskauli and Raisínah, yielding annually 1,000 maunds, worth Rs. 250; nine stone mines yielding 4,950 maunds, worth Rs. 1,265; a crystal mine at Arangpur, not worked at present. The quantities here stated are probably unreliable. The noticeable minerals therefore of the district, so far as known, are stone, crystal, *kankar* and chalk; though it is said the quartz-like formation of the hills* renders the existence of

* Their scientific description is given as follows:—

"A core of quartzite with more or less vertical bedding, and the associated rocks as far as they are exposed on the flanks of the ridges, indicate advanced metamorphism."