

Appraisal Of Water Resources And Soil As Dominant Factor Behind Agrarian Productivity In Medieval Eastern Rajasthan

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Abstract

In the Ain-i-Akbari, Rajasthan represented in the form of Subah of Ajmer. Its area expanse from the Pokhar and dependencies of Amber to Bikaner and Jaisalmer which is approximately 168 kos.¹ The area in breadth from the extreme limits of the Sarkar of Ajmer to Banswara is 150 kos.² Mughal atlas denotes Amber expansion between 26 + to 75+ was the core territory of the chieftdom of the celebrated kachhwaha line.³ However, geographically this south-eastern part of Rajasthan had considerable varied character. It encompasses wide hill ranges, and extended stretches of forest. It traversed by substantial rivers, and numerous parts has wide valleys, fertile tablelands, and prodigious spans of admirable soil.⁴ These factors consider responsible for Agrarian productivity. Here attempted to elaborate and highlights distinctive role of water and soil in agrarian productivity of medieval eastern Rajasthan.

Keywords: climate, soil, water resources, Agrarian productivity, crops.

Date of Submission: 10-08-2023

Date of Acceptance: 20-08-2023

I. Introduction

As contemporary sources, *Arhsatta*, *Taqsim*, *chithis Arzdasht* reveals that the Rajasthan has been an agrarian productivity region since primitive times. Which had been a dominant influence in the economy of Rajasthan. State had made rapid progress in the field of agriculture. Fertility of Soil and water use are reliable derivors of agriculture development. At present land use pattern is not only the result of natural factor but artificial conditions, social, geographical and economic factors also play an important role in determining it. The diverse features like lofty lands and shifting sand dunes at one side and scotching heat and freezing cold makes the region diverse in many ways. Environmental feature of any region reflects in agrarian productivity.

Conversely we have several category of official records relevant to period under study, which are preserved in the Rajasthan State Archive in Bikaner. These sources delimit the main climatic effects to the agrarian society and beside this inferences reveals us glimpse of existing socio-economic scenario of region. It can be supplementary validate with the literary sources obtainable massively. Evidently, Rajasthan is very rich in literally sources. However our prime concern has been to consult the detailed information contained in primary contemporary sources as far as possible. The information from contemporary sources has been supplemented by the examination of near contemporary sources as well as modern works. Main primary contemporary documents are concerned, *Arzdashts* or petitions, an official document available in archive of Rajasthan, sent by the *Amils*, *Fauzdar* or other *pargana* officials to the ruler of Amber. It contained regular reports in regards to significant topics, innumerable revenue and administrative details, nature and amount of crop productivity and primarily denotes condition of rains which is main water source for crop cultivation, in particular *parganas*. *Arhsattas*, provide us detailed information on the crops grown in a *pargana* and this information is available for both cropping seasons. *Chithis*, letters exchanged between officials contains considerable detail in respect of condition of rains, fertility of soil and expanse of agrarian productivity *pargana* wise. These documents enrich about the State's response to various environmental distresses. *Taqsim*, which gives us details regarding soil area under crop cultivation and waste land which was not fit for plough.⁵ However, as environmental topographies vary gradually hence we can supplement our contemporary evidences, by examining the extant information culled from the Gazetteer's, Travelogues, and other regional sources like, *Munhot Nainsi's* account, *Jaisalmer-i-Khyat*, *Vir-Vinod*, *kapad dwara*, *Tawarikh-i-Jaisalmer*, etc., Diwan Munhot Nainsi wrote Marwar Pargana Ri Vigat, of Marwar State provides detailed description of the territory, agricultural types, nature of habitation, soils, other sources of water as well as nature and number of wells.

The work has taken studies of environment directly included Anupam Misra, has made imperative contributions through the works entitled, *Aaj bhi khare hain Talab*⁶ and *Rajasthan ki Rajat Booden*.⁷ Before going

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into details of main topic we need to examine the climate situation of eastern Rajasthan during period under study. As far as region concerned it is semi-arid and dominating due to its peculiarity of desert. The pattern of land use defines the ecological balance in the region and make us understand the ecological status as well. It embraces the management and alteration of natural environment to shape environment to boost agricultural productivity and extent cultivated land. Here we have attempted to understand the soil and water resources as the chief factors led to development in agrarian productivity during medieval times.

II. Climate as integral part of Agriculture

Climate primarily refers to by rainfall and temperature elements, here our concern is to understand and elaborate characteristics of climate of region which reflects in nature and size of agrarian productivity. Geographically, Rajasthan has a great diversity in nature. Main distinct characteristic is Aravalli range of hills. It runs diagonally from southwest to northeast which divides Rajasthan approximately into two natural divisions, the north-western, which is arid, and the south-eastern being the semi-arid. The Aravallis create a central rib in order to separate the two distinct zones in region. The Thar Desert lies on the west and north-west of the Aravalli, where the rainfall does not exceed more than 10 inches per annum and vegetation comprises mainly "stunted and thorny bushes" and open shrubs. Here sand and sand dunes abound. To the south and south-east of the Aravali hills the slopes descent into table lands spanned by river valleys and here the rainfall increases. It is apparent that excepting the south-eastern portion, the rest of Rajasthan plain is an area of inland drainage.⁸ Thus the following physiography zone may be recognised from west to east. River systems also vary to great extent as there are two distinct slopes, one towards south-east and other towards north-east. The Aravalis Mountain ranges forming the watershed between these two slopes. These hills of Rajasthan⁹ are sources of most of water courses, mainly water used to drain towards south east into the Banas. The North-eastern slope has a river-system of importance supported by river Chambal.¹⁰

The region under study, lies to **south-east** area of the Rajasthan. Which contains the more fertile area that stretch inland, as it might be said, behind the coast line, which we have supposed the range fronting north-west to represent. Aravali hill system, which demarcated the climatic pattern of rainfall distribution. The pattern on the eastern flank of the mountain is quite variable and receives much rain when we compare it to western side.¹¹ As far as weather concerned, heat dominates the entire Rajasthan, excluding certain hilly parts.¹² Variation in climate from area to area visible in inferences contained in sources, for instance an *Arzdasht* by Rup Ram dated *Asad Vadi* 1, 1752¹³ informs us about drought, whereas for the same year Purohit Haras Ram inform, in his *Arzdasht* dated *Bhadva Sudi* 6 about the good rainfall.¹⁴ While Babur passing through the area he had realised that north-east Rajasthan is very hot.¹⁵ The reliance on monsoons having an unpredictable nature was extreme and if there was any disturbance in the cycle of monsoons often led to famine. Thus, the peculiar environmental conditions obtaining in Rajasthan as part of a larger manifestation of agrarian productivity and social interaction with these peculiar environmental conditions, come to be the primary modules of this study. It would be appropriate that a rapid analysis of the major published works on Rajasthan is undertaken to help situate the present study.

Rainfall as reflected in dimension of crop productivity

Information comprised in *Arzdasht* and *chithis* give impression that there was varied nature of rains mainly relied upon the course of the monsoon as well as other influences. As T. H. Hendley,¹⁶ observes, the extreme rainfall has shown between July and September. As far as annual rainfall for whole state is concerned it is average, slight lesser than 23 inches, 20 inches are received in the three months, July, August and September.¹⁷ Since, rainfall was unevenly distributed, thus in western parts such as Marwar, Bikaner, and Jaisalmer had annual rainfall scarcely average more than 12 cm. Prior to reaching these plains, the clouds had to travel through extremely hot sand dunes, and they emptied a large portion of their moisture onto the nearby slopes of the Arvalis and high ranges in Katthywar.¹⁸ The southern states receive rains from multiple sources, including the Indian Ocean, which floods the Narmada and Mahi River valleys.

The central area used to receive periodical supply 'of rain, varied in nature, additionally, strong eastern winds cause the Bay of Bengal to provide good rainfall, but the rain is very moderate when the south-west monsoon is in control.¹⁹ The climate of eastern area is warm and healthy, due to the high and sandy soil of country, and climate is pleasant in winter season. Here the maximum heat reaches 106 degree in summer and maximum cold often reaches 38 degree in winter.²⁰ The south of range between Jaipur and Shekhawati water comes out of depth of 30 or 40 feet, and north of same range *shekhawati* is found to be 80 to 100 feet deep.²¹ Since rain is most abundant in the south-east of Rajasthan. In this part if there was delay in south-west rains, It generally acquired south-east rains later in the season, therefore the region was rarely threatened by the harsh droughts of the north-western tract.²² However we have evidences comprised in significant document *Arhzdasht* where frequent detail about condition of rain in *parganas* consisted. *Arhzdasht* by Ramji address to Maharaj Ram Singh, where he informing about the good rainfall in *pargana* resulted production of *kodu* (pumpkin) crop at large extent.²³ Another

significant information consisted in document where it is mentioned that there was great rainfall in almost all *pargana* including *Averi*, and perpetuation of cultivation by peasants.²⁴ There was another information of good condition of rain came from *pargana Bahatri* in the month of *Bhadawa*, vadi 3, V.S 1742.²⁵ Reference of rain in *pargana Amber* and cultivation of crops in *samvat 1745*.²⁶ We can notice occasionally frequency in rainfall, as information from the month *Bhadawa*, *sudi* 14, from same *samvat*, 1742, where detail comprised in respect of news of good rainfall in all villages of *pargana* so far and expressing wish for the good in future as well, which resulted existence of peace in villages.²⁷ Another information from village of *pargana Averi*, *samvat 1743*, description of rainfall and continuance of ploughing.²⁸ Document consisted reference of rain from numerous months of same *samvat*, such as *miti sawan* vadi *amavas* (6 July) *samvat 1746*,²⁹ *miti Bhadawa* vadi 5 (26 July) *samvat 1746*,³⁰ *miti Asoj* vadi 6 (29 August) *samvat 1746*,³¹ description of good rainfall and cultivation of *siyalu* (*kharif*) crop and preparing for cultivation of *Unhalu* (*rabi*) crop, *miti kartik* vadi 9 (27 September) *samvat 1746*,³² reference about reduction in cultivation in many villages due to lack of rain.

We can discern that in *samvat 1746* there was a good rainfall in almost all months but at same time scarcity of rainfall visible there, which denotes variation in nature of rainfall. As far as *samvat 1747* concerns, we have references from the month of *Asarh* vadi 8 (19 June), good rainfall and continuation of cultivation, *Asarh sudi* 2 (28 June), good rainfall led to continue of cultivation and collection of revenue from *rabi* and *kharif* crops, *Asarh sudi* 9 (4 July) mention of rain in *sudi* 1 suitable for cultivation but not sufficient to bring water to the pond but till *sudi* 7 it rains to bring water to ponds, 71 yards in *Sahnda*, 31 yards in *Bandhman* sea, 81 yards in *bhagvatsagar*, and more than 1 yards in *Kundolab*, *Sawan* vadi 5 (16 July) reference of heavy rains from *sudi* 9 to 13 due to which the ploughing could not be done for 4 days, and due to continues light rains from *sudi* 14 to 15 ploughing could be done on third day, *Sawan sudi* 8 (2 August) mention need of good rainfall for cultivation of *kharif* crops.³³ What can be notice in rain condition of *samvat 1747* is constant raining and perpetual cultivation there except in month of *sawan sudi* 2, where scarcity of water has been shown. In *samvat 1749*, we have reference from month *Bhadawa* vadi 3 (21 July), where mention of rain in all *parganas* and ploughing done, and sowing moth and sesame.³⁴ Even document gives impression of excessive water due to heavy rainfall, there was a reference from a *samvat 1744*, comprised of information regarding perpetual raining from *miti Asarh*, *sudi* 2 to *sawan* vadi 1, resulted excess water in low lying village therefore ploughing had to shift to upper ground of village.³⁵ In *samvat 1745*, there was reference of downpour in several *pargans* such as *Amber*, *Amarsar*, *Phagun*, and *chatsu*, which resulted in loss of life and property.³⁶ Even references about flood comprised in documents, for instance detail consisted in document *Arhzasht*, belonging to *samvat 1743*, where description of damage caused by flood of *Banas* river in *pargana Malarna* has been given.³⁷ If there was delay in monsoon it resulted totally damaged of *kharif* crops (as this crop needed more water) and *rabi* crops affected, reduced the agricultural production. Water is essential in an arid region like Rajasthan, beside rainfall this need was fulfilled by *nadi*, *talab*, *nala*, *kua* and *howd*.³⁸ Since there is no perennial river in state the crops are watered by means of well, many of which are very deep, as well as tanks formed by raising embankment (*bunds*) and damming up water across the lower slopes of valley and across the beds of river. Another significant information comprised in document *Arhzasht* belonging to *samvat 1743*, description of farmers get ploughing done in the *pargana*, yield of *Bajra* as rains good for the production of *bajra*.³⁹ Here we get two significant information first about good rainfall in *samvat 1743*, and second considerable information about cultivation of *bajra* crop which required a good amount of water. Additional evidence about the choice of crop yielding, rain condition accordingly, there was description of good *kharif* crop in the *pargana*, and sufficient rainfall for *rabi* crop cultivation, and prompt ploughing.⁴⁰

There was reference of rain in *miti Asarh*, *sudi* 4, *samvat 1744*, and which led to production of millets and sorghum (*jwar*).⁴¹ It appears that the water played a vital role in not only the selection of crops to be sown in an area but also the selection of harvest in which the crop was sown, a perusal of the data available in *pargana Amarsar* where *rabi* crops were preferred as compare to *kharif*,⁴² Even classification of crops mainly depends on water condition of area, since more *rabi* crops had been sown in *pargana Amarsar*, most of these crops are rain fed, which indicates a good quality of rainfall in this area, *jowar* is drought resistant therefore it is an ideal crop for area of low and uncertain areas.⁴³ During periods of delayed and inadequate rainfall, ground is heavily ploughed to soften it before seeds were sown.

Water management

Water as being basic and most essential need in desert area like Rajasthan and it is also significant for agro-economic growth as well. Since water is essential for crop production thus water resources and management as always consider prime concern for the growth of agrarian productivity. There had been made efforts to develop the artificial reservoirs, erection of tanks, maintenance of wells, and manufacture of step-wells, constructing the dams and canals in order to conserve the scanty water which was later used for irrigation as well as for domestic purposes. There has been mentioned of pond in detail comprised in document *Arhzasht*, where detail explanation of distribution of trees above the pond in village *Nindad*.⁴⁴ This requirement was fulfilled by *howd*, pond (*talab*),

rivers, tanks, rivulet (*nala*), and well (*Kuan*).⁴⁵ The sources illustrates numerous water structures erected for conservation of water for instance, Bishan Sagar, Jal Mahal, and Bhagwant Sagar see figure number 2.⁴⁶ Eastern area witnessed that the water is found only a great depth, in north western division it is found from eighty to hundred feet below the surface, and it is brackish in most part, where the soil is highly impregnated with salt, as far as central and eastern division concerned water is fairly near the surface from 30 to 40 feet.⁴⁷ Availability of water in the soil profile obtainable to a particular agro-climatic zone as well as for irrigational purpose is an underlined element for regular cultivation and non-appearance of fallow.⁴⁸

Since water management has been remained primary concern, thus the erection of several canals was carried out under Sawai Jai Singh, from the river of Banganga and Darbhavati. Here can be notice the technique of canal construction of that period. As Canal is hydraulic technique or water channel used to erect for irrigation purpose. However pertinent maps suggest that the survey was carry out of intact route and plans illustrates the depth of water and the height of the pillars as well. Tens canals were constructed under Sawai Jai Singh, the details of these ten canals are mentioned in the text of the map.⁴⁹ Canal of this type bring by sawai jai singh from the river Banganga, details contains in map number 28 ("*Tarah Banganga Ke Nanka Ki*")., the content of the map are particularly substantial, text written in Devnagri script entails dimensions of structure to be constructed in the name of villages and essential milestones on the route are stated. Such as "the gate close to Swami Pemdasa Atala, 17 *gaz* was the height of the pillar, 50 *gaz* of the bank (*ghat*), rivulet (*nalo*) Narpatyawas was 50 *gaz*. The embankment (*kagva*) kalyanpura, khori had height 13 *gaz*, close to Pemdasa Atala and near the village like Shyampura, Charanwas, Manjipuro, A *talab* was constructed in front of Banganga river.⁵⁰ As we are dealing with only hydraulic management thus information has been taken as purposely. A water reservoir lied between Jaipur and Amber known as Mansagar, after name of Raja Man Singh I.⁵¹ for detail see figure number 2 and 3, where information in respect of dams, canals and pond has been mentioned and heavy rainfall reflected in over flow of water in ponds.

Nature and fertility of Soil

According to **Bennet** 'The layer of unorganised material found on earth surface which is made from the part of parent rock and vegetation is called soil'. Since soil is one of the most noteworthy natural factor in agricultural production. It necessitate to understand the nature of soil in order to get acquainted the main process of agricultural production and magnitude of revenue generated by crop production. The soil to the north and west of present-day Jaipur is mainly sandy, but hard clayey soil mixed with gravel is also found. Southwards, the soil is generally rich and productive, with the tract to the farthest south bounded by the bends of the Bana River and consisting of rich alluvium loam being the most fertile area.⁵² However the soil in eastern area was mostly sandy, in certain areas there are tracts of more barren sand, soil is usually a rich firm loam alongside the Banganga valley, in the area of Hindaun it is sandy though not unproductive.⁵³ The soil found rich and fertile around southwards of Eastern area, and the tract to the extreme south, bounded by Banas River bands, was composed of fine alluvial loam and was the most productive part of the state.⁵⁴ In the north of aravali range consisted completely made up of shifting sands and a severe lack of water prevent the growth of any crop besides the October or kharif crop (moth, bajra, and guwar) grown during the rains, henceforth there has been noticed *kharif* crop specifically grains production at large extends.⁵⁵ There are recognised classification of soil texture named as sandy soil, clay soil, sandy loam soil, clay loam soil, and silt loam soil.⁵⁶ There are scarcity of evidences regarding the category of soil prevailed during period under study, the impression can be gather through the analysis of variance of soil as its impact visualise in *dastur* rates of individual crops, for instance the rate of *magro* (hilly land) had lower *dastur* rates as compare to *goriwa*(sandy area).⁵⁷

We may also suggest that the soil in the sixteenth-seventeenth century would have been far more better than in the same area presently.⁵⁸ The soil preferable for the crop is clay loam for better yields. There are several crops which were sown according to soil eminence, for instance *jowar* tolerates saline soil, *makka* or maize best sown on well drained fertile loamy soil and required plenty of moisture during early phase of growth, and therefore moisture retentive soil is suitable for this crop, the soil where cotton is grown fertile though light and best for growing this crop is rich loam directly manured.⁵⁹ During insufficient rainfall soil used to plough extensively to make it soft, statement by *Vakil Ajitdas* and *Manram* that due to drought, even crop moth could not be sown, attesting to the fact that moth was the last crop that could be sown in the occurrence of delayed rain.⁶⁰ As far as soil of Jaipur concerned, it is sandy, nevertheless fluctuates from one place to another. The soil is generally sandy in the west, north and east, of the Jaipur city, however in certain places it is mere barren sand. The richness and fertility in sand can be notice in the west ward region particularly along the Banganga valley. The tract to extreme south, which included Banas River is the most fertile portion of the state and soil is greatly productive.⁶¹ *Taqsim* give references of total measured area and proportion of cultivable area out of measured area. Land was used to be categorize according to percentage of its fertility *polaj* considered more fertile land and many efforts made to bring this under cultivation constantly. *Banjar* or fallow (barren) land was cultivable waste, less fertile land, document shows state used to invite peasants (*Pahi*) from other villages to come and cultivate *banjar* land as more

as possible to which state provided them many facilities.⁶² Banjar land was also known as *kallar* land defined as barren, sterile, brackish, saline land or soil, this land used to produced salt, gypsum and saltpeter.⁶³ We have example from *pargana Udehi*, on the examination of total *raqba*, one can classify the villages into four types, large, medium, small and very small, and percentage distribution of type of village can be 41% as large, 70.2% as medium, 11.2% as small and 14.5% as very small villages.⁶⁴

Analysis of study

Information consisted in document reveals that, as far as geographical profile of Rajasthan concerned, it is found semi-arid or arid desert region. Which prospered sustained itself because of advanced irrigation facilities, water harvesting techniques into agrarian landscape. Crops productivity denotes significance of water facility to grow crops, specifically *kharif* crops. We have frequent mention of rainfall in *Arzdasht* and *chithis* gives impression that abundant rainfall noticed in eastern region of Rajasthan. Even sometimes particular crops for instance *bajra*, was used to carry out in accordance of rainfall. Since we have noticed numerous hydraulic works by rulers for irrigation purpose, which denotes water management as their primary concern. The hostile upshot of climate situation can be notice through the crop production, as we noticed large production of crops which needed lesser water comparison to crops required good amount of water. The natural features of region was advantageous for cultivation of cash crops like sugarcane, cotton, sesame, etc The soil preferable for the crop is clay loam for better yields. There are several crops which were sown according to soil eminence, for instance *jowar* tolerates saline soil, *makka* or maize best sown on well drained fertile loamy soil. Even heavy rainfall evident in references for instance in *sawan vadi 2*, (18 june) 1684, information about excess rainfall in the state and how much water has accumulated in all ponds of the state has been mentioned, see figure 1.

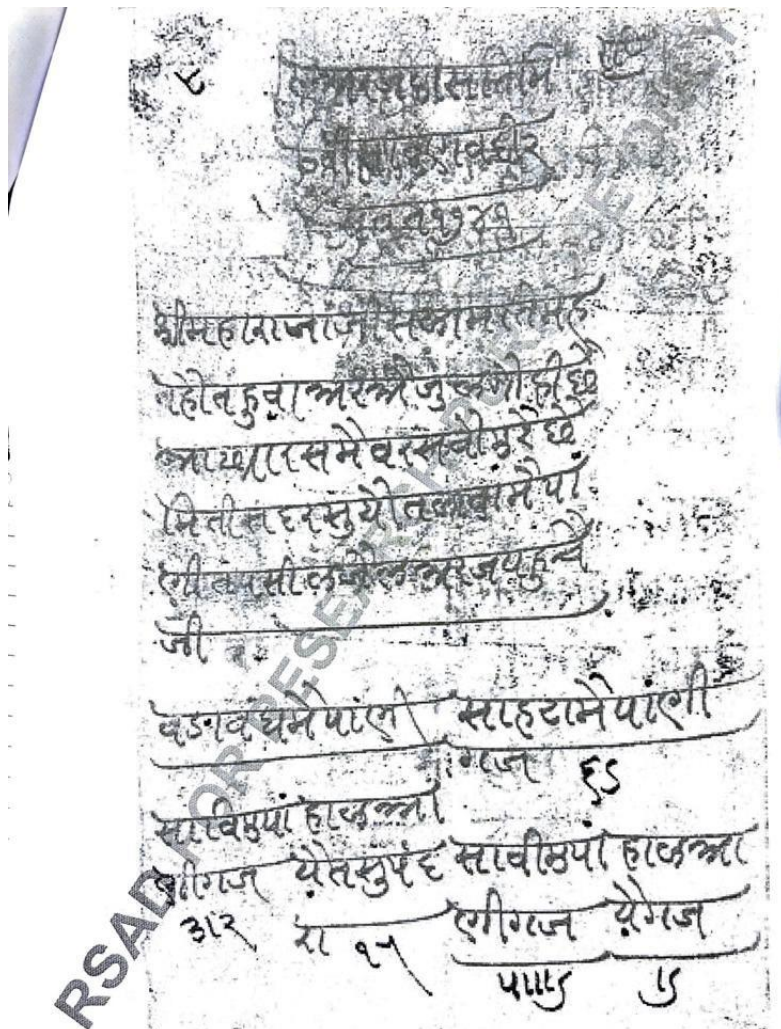


Figure 1 Rain water in pond Sahan 6 yards, and description of water capacity and over flow of water in canals and pond due to heavy rainfall.⁶⁵

ग्राम २

यह तरेसीमा द्रोणी सनपुनी पर प्राथमिक वैठाने
 और श्रीम शराज जी प्रापुनी परताप धे देसमा
 मेइव डेत डु वाजी डु जाद वासु दीज सामवार हो
 श्रय डर दीन सजा पाछे थोला जाद वासु दीज
 तांलो मेइव डेत डु वाजी तला वसगला श्रव डे
 तनर राखी जी

जगवंत सागर मुरी व डे माइटा पर सात सुसात
 जी पाणी वादी यं ठो

और पाणी मावे
 डे

मान सागर वं ध पाणी व डे
 तनर राखी मुर डिगर मी
 ती डु मा डे डे धन्यारी पाणी
 तांलो

Director
 Govt of
 Jampur.

याद ली मे चै मरपाली जा
 तरे पाणी माइ डी गा हो डी जा
 श्री गल पात्र मी वी मा ज के

Figure 2 information regarding the rainfall and full description of water filled in ponds.⁶⁶

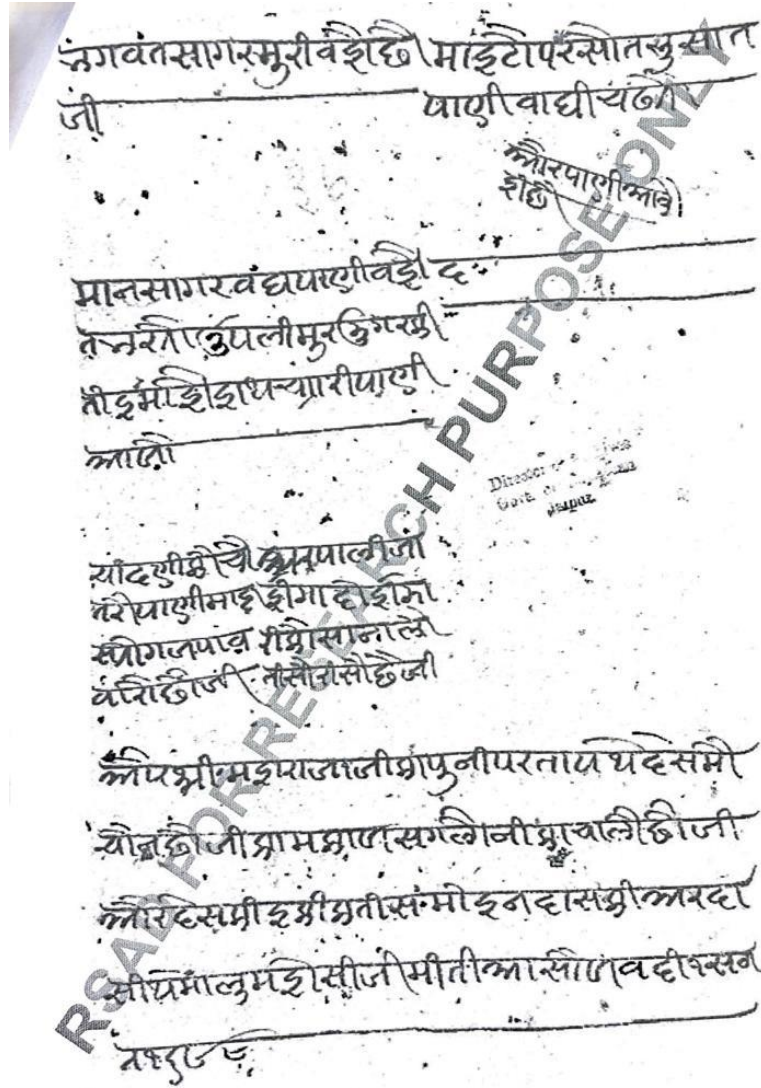


Figure 3 name of few dams mentioned such as Bhagwant Sagar, Maento Sagar, Man Sagar etc.⁶⁷

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