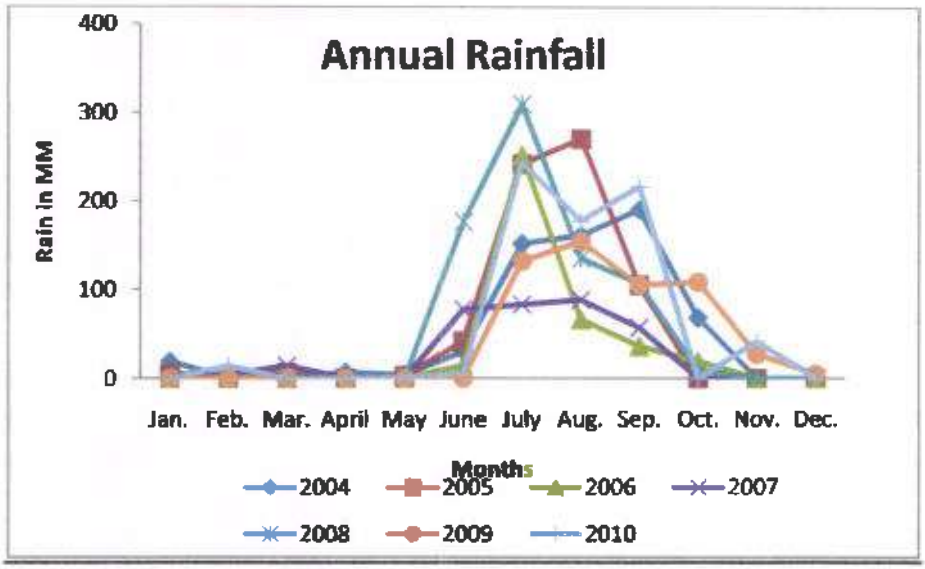
(Source : Met Department)



Overview of mining activity in the district

Detail Of Production Of Sand / Bajri Or Minor Mineral In Last Three Years In Distt.

Sr No.	Year	Production of Minor
1.	2014-2015	2303474
2.	2015-2016	448271
3.	2016-2017	3150

Details Of Royalty Or Revenue Received In Last Three Years

Sr No.	Year	Revenue Receipt(in Rs. Lacs)
1.	2014-2015	1509.16
2.	2015-2016	357.37
3.	2016-2017	12.98

List Of Mining Quarries In The District With Location, Area And Period Of Validity

क्रम सं0	तहसील	नदी का नाम	उपखनिज का नाम	ग्राम	गाटा सं0	खण्ड सं0	रकबा (एकड़ में)	रकबा हे0 में)	खनन की मात्रा(घ0मी0 में)
1	2	3		4	5	6	7	8	9
1	उरई	बेतवा	बालू/मौरम	नन्धा	345ग	1	50.00	20.20	202420
2	उरई	बेतवा	बालू/मौरम	नन्धा	3ग	2	50.00	20.20	202420
3	उरई	बेतवा	बालू/मौरम	नन्धा	3ग	3	21.00	8.48	85020
4	उरई	बेतवा	बालू/मौरम	करथरा	208	1	17.00	6.87	68820
5	उरई	बेतवा	बालू/मौरम	अमरोड	675	1	30.00	12.12	121200
6	उरई	बेतवा	बालू/मौरम	अमरोड	675	2	35.00	14.14	141400
7	उरई	बेतवा	बालू/मौरम	रजापुर	60घ	0	14.33	5.79	57900
8	उरई	बेतवा	बालू/मौरम	खरका	2513,2629	1	50.00	20.20	202420
9	उरई	बेतवा	बालू/मौरम	खरका	2513,2629	2	50.00	20.20	202420
10	उरई	बेतवा	बालू/मौरम	खरका	2628,2629	3	50.00	20.20	202420
11	उरई	बेतवा	बालू/मौरम	खरका	2257	6	29.00	11.72	117200
12	उरई	बेतवा	बालू/मौरम	मुहाना	1782,1783	1	50.00	20.20	202420
13	उरई	बेतवा	बालू/मौरम	मुहाना	1782,1783	2	22.00	8.89	89060
14	उरई	बेतवा	बालू/मौरम	मुहाना	1782,1783	3	22.00	8.89	89060
15	उरई	बेतवा	बालू/मौरम	सिकरीव्यास	1193/916]1191/2	1	50.00	20.20	202420
16	उरई	बेतवा	बालू/मौरम	सिकरीव्यास	1193/916	2	41.20	16.64	166800
17	उरई	बेतवा	बालू/मौरम	सिकरीव्यास	1191/2	3	50.00	20.20	202420
18	उरई	बेतवा	बालू/मौरम	सिकरीव्यास	1191/2	4	50.00	20.20	202420
19	उरई	बेतवा	बालू/मौरम	सिकरीव्यास	1191/2	5	35.39	14.30	143270
20	उरई	बेतवा	बालू/मौरम	सिकरीव्यास	1191/2	6	47.80	19.31	193520
21	उरई	बेतवा	बालू/मौरम	सिकरीव्यास	1191/2	7	32.50	13.13	131570
22	उरई	बेतवा	बालू/मौरम	कुरौना	317मि	1	50.00	20.20	303630
23	उरई	बेतवा	बालू/मौरम	कुरौना	317मि	2	50.00	20.20	303630
24	उरई	बेतवा	बालू/मौरम	कुरौना	317मि	3	50.00	20.20	303630
25	उरई	बेतवा	बालू/मौरम	कुरौना	317मि	4	40.00	16.16	242910
26	उरई	बेतवा	बालू/मौरम	कुरौना	317मि	5	30.00	12.12	182175
27	उरई	बेतवा	बालू/मौरम	ददरी	2093	1	50.00	20.20	202420
28	उरई	बेतवा	बालू/मौरम	बन्धौली	2559,2563	1	50.00	20.20	303630
29	उरई	बेतवा	बालू/मौरम	बन्धौली	2559,2563	2	50.00	20.20	303630
30	उरई	बेतवा	बालू/मौरम	बन्धौली	2558,2559	3	50.00	20.20	303630
31	उरई	बेतवा	बालू/मौरम	बन्धौली	2559,2563	4	40.00	16.16	242910

32	उरई	बेतवा	बालू/मौरम	बन्धौली	2558,2563	5	30.00	12.12	182175
33	उरई	बेतवा	बालू/मौरम	बन्धौली	–	5अ	90.00	36.36	545400
34	उरई	बेतवा	बालू/मौरम	बन्धौली	2558,2563	6	30.00	12.12	181800
35	उरई	बेतवा	बालू/मौरम	सिमिरिया	864/320, 865/320	0	68.00	27.47	412950
36	उरई	बेतवा	बालू/मौरम	सिमिरिया	866/144	0	70.00	28.28	424200
37	उरई	बेतवा	बालू/मौरम	टीकर	1482	1	50.00	20.20	202420
38	उरई	बेतवा	बालू/मौरम	टीकर	1482	2	50.00	20.20	202420
39	कालपी	बेतवा	बालू/मौरम	भेड़ीखुर्द	1396ग	1	50.00	20.20	303630
40	कालपी	बेतवा	बालू/मौरम	भेड़ीखुर्द	1396ग	2	50.00	20.20	303630
41	कालपी	बेतवा	बालू/मौरम	भेड़ीखुर्द	1396ग	3	50.00	20.20	303630
42	कालपी	बेतवा	बालू/मौरम	भेड़ीखुर्द	1396ग	4	50.00	20.20	303630
43	कालपी	बेतवा	बालू/मौरम	भेड़ीखुर्द	1396ग	5	50.00	20.20	303630
44	कालपी	बेतवा	बालू/मौरम	भेड़ीखुर्द	1396ग	6	29.00	11.72	176100
45	कालपी	बेतवा	बालू/मौरम	हिमनपुरा	240	1	50.00	20.20	303630
46	कालपी	बेतवा	बालू/मौरम	हिमनपुरा	240	2	50.00	20.20	303630
47	कालपी	बेतवा	बालू/मौरम	हिमनपुरा	240	3	40.00	16.16	242400
48	कालपी	बेतवा	बालू/मौरम	हिमनपुरा	240	4	40.00	16.16	242910
49	कालपी	बेतवा	बालू/मौरम	हिमनपुरा	240	5	40.00	16.16	242910
50	कालपी	बेतवा	बालू/मौरम	बसरेही	596	1	40.00	16.16	242910
51	कालपी	बेतवा	बालू/मौरम	बसरेही	596	2	40.00	16.16	242910
52	कालपी	बेतवा	बालू/मौरम	चिरपुरा	104	1	35.00	14.14	212100
53	कालपी	बेतवा	बालू/मौरम	चिरपुरा	104	2	35.00	14.14	212100
54	कालपी	बेतवा	बालू/मौरम	क्योटरा	267,268	1	50.00	20.20	202420
55	कालपी	बेतवा	बालू/मौरम	क्योटरा	267,267	2	45.00	18.18	182180
56	कालपी	बेतवा	बालू/मौरम	क्योटरा	267,268	3	40.00	16.16	161940
57	कालपी	बेतवा	बालू/मौरम	पथरेहटा	747	1	40.00	16.16	323880
58	कालपी	बेतवा	बालू/मौरम	पथरेहटा	747	2	40.00	16.16	323880
59	कालपी	बेतवा	बालू/मौरम	पथरेहटा	747	3	40.00	16.16	323880
60	कालपी	बेतवा	बालू/मौरम	पथरेहटा	747	4	40.00	16.16	323880
61	कालपी	बेतवा	बालू/मौरम	पथरेहटा	747	5	40.00	16.16	323880
62	कालपी	बेतवा	बालू/मौरम	पथरेहटा	747	6	25.00	10.10	151820
63	कालपी	बेतवा	बालू/मौरम	कहटाहमीरपुर	1064	1	50.00	20.20	303630
64	कालपी	बेतवा	बालू/मौरम	कहटाहमीरपुर	1064	2	50.00	20.20	303630
65	कालपी	बेतवा	बालू/मौरम	कहटाहमीरपुर	1064	3	40.00	16.16	242910
66	कालपी	बेतवा	बालू/मौरम	कहटाहमीरपुर	1064	4	30.00	12.12	182175
67	कालपी	बेतवा	बालू/मौरम	परासन	738,739,740 ,742,778	1	50.00	20.20	202420
68	कालपी	बेतवा	बालू/मौरम	तरीवुल्दा	36/1	1	50	20.20	202420
69	जालौन	यमुना	बालू/मौरम	शंकरपुर	79/1	0	10--84	4.38	43880
70	जालौन	यमुना	बालू/मौरम	गजरौरा	22/14	0	17.20	6.95	69600
71	जालौन	यमुना	बालू/मौरम	महटौली	2ड़,714ग, 726ख, 727,728	0	63.00	25.45	255000
72	कालपी	यमुना	बालू/मौरम	पथरेहटा	747/16	0	22.00	8.88	220000

DISCUSSION

Ordinary earth and Sand has become very important minerals for our society due to its many uses. Ordinary earth can be used for making brick, filling roads, whereas sand may be used as building sites, brick-making, making glass,

sandpapers, reclamations, and etc. The role of sand is very vital with regards to the protection of the coastal environment. It acts as a buffer against strong tidal waves and storm surges by reducing their impacts as they reach the shoreline. Clean sand is indeed a rare commodity on land, but common in sand dunes and beaches. The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand in inland continental settings and non-tropical coastal settings is silica (silicon dioxide, or SiO_2), usually in the form of quartz which because of its chemical inertness and considerable hardness, is the most common mineral resistant to weathering and it has become a very important mineral for the expansion of society. Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. River sand is one of the world's most plentiful resources (perhaps as much as 20% of the Earth's crust is sand) and has the ability to replenish itself. River sand is vital for human well being & for sustenance of rivers. Sand mining is a sensitive environmental issue which is taken into the consideration by Geology & Mining Department, Govt. of U.P. and Ministry of Environment & Forest, Climate Change. Govt. of India. Geology & Mining Department, Govt. of U.P. had notified in rule no. 41 of Uttar Pradesh Minor Mineral Concession Rules, 1963 and MoEF &CC in **Standard Environmental Condition For Sand Mining, of SSMMG, 2016** has given minimum distance from the mining lease area are compared and maximum distance permissible from the MLA is given in **Table 17**.

Table 17: Environmental Sensitivity Analysis of Site

S. No.	Feature	Max. distance	Reference
1.	School	50 m	UPMMCR,1963
2.	Hospital	50m	UPMMCR,1963

3.	Road(NH)	100 m	SSMMG,2016
4.	Road(SH)	50 m	UPMMCR,1963
5.	MDR	50 m	UPMMCR,1963
6.	Railway Station	100 m	UPMMCR,1963
7.	Chak Road	10 m	UPMMCR,1963
8.	Bridge or embankment	200 m	UPMMCR, 1963
9.	Water supply /Irrigation scheme	200 m	UPMMCR, 1963

As a resource, sand by definition is 'a loose, incoherent mass of mineral materials and is a product of natural processes.' These processes are the disintegration of rocks and corals under the influence of weathering and abrasion. When sand is freshly formed the particles are usually angular and sharply pointed but they grow gradually smaller and more rounded as they become constantly worn down by the wind or water (ISM Envis, Dhanbad)

The "**SUSTAINABLE SAND MINING MANAGEMENT GUIDELINES – 2016**" of MoEF&CC envisages to ensure that sand and gravel mining is done in environmentally sustainable and socially responsible manner; availability of adequate quantity of 21 aggregate in sustainable manner; improve the effectiveness of monitoring of mining and transportation of mined out minerals; conservation of the river equilibrium and its natural environment by protection and restoration of the ecological system; avoid aggradation at the downstream reach especially those with hydraulic structures such as jetties, water intakes, etc.; to ensure the rivers are protected from bank and bed erosion beyond its stable profile; no obstruction to the river flow, water transport and restoring the riparian rights and in-stream habitats; to avoid pollution of river water leading to water quality deterioration; to prevent

depletion of ground water reserves due to excessive draining out of ground water; and streamlining the process for grant of environmental clearance for sustainable mining. The MoEF&CC has also issued notifications SO No. 141(E) dated 15.01.2016 and SO No. 190(E) dated 20.01.2016 under Environment (Protection) Act, 1986 on mining of minor minerals and constitution of District Level Environment Impact Assessment Authority and District Level Environmental Appraisal Committee. These notifications have delegated the power to grant environmental clearance for sand mining to an Authority headed by the District Magistrate. These notifications promote use of satellite imagery to decide the site suitable for mining and quantity of sand which can be mined. The MoEF&CC prescribes following procedures for sand mining;

a) Parts of the river reach that experience deposition or aggradation shall be identified first. The Lease holder/ Environmental Clearance holder may be allowed to extract the sand and gravel deposit in these locations to manage aggradation problem.

b) The distance between sites for sand and gravel mining shall depend on the replenishment rate of the river. Sediment rating curve for the potential sites shall be developed and checked against the extracted volumes of sand and gravel.

c) Sand and gravel may be extracted across the entire active channel during the dry season.

d) Abandoned stream channels on terrace and inactive floodplains be preferred rather than active channels and their deltas and flood plains. Stream should not be diverted to form inactive channel.

e) Layers of sand and gravel which could be removed from the river bed shall depend on the width of the river and replenishment rate of the river.

f) Sand and gravel shall not be allowed to be extracted where erosion may occur, such as at the concave bank.

g) Segments of braided river system should be used preferably falling within the lateral migration area of the river regime that enhances the feasibility of sediment replenishment.

h) Sand and gravel shall not be extracted within 200 to 500 meter from any crucial hydraulic structure such as pumping station, water intakes, and bridges. The exact distance should be ascertained by the local authorities based on local situation. The cross-section survey should cover a minimum distance of 1.0 km upstream and 1.0 km downstream of the potential reach for extraction. The sediment sampling should include the bed material and bed material load before, during and after extraction period. Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross- section. Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume. Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.

i) Sand and gravel could be extracted from the downstream of the sand bar at river bends. Retaining the upstream one to two thirds of the bar and riparian vegetation is accepted as a method to promote channel stability.

j) Flood discharge capacity of the river could be maintained in areas where there are significant flood hazard to existing structures or infrastructure. Sand and gravel mining may be allowed to maintain the natural flow capacity based on surveyed cross- section history.

k) Alternatively, off-channel or floodplain extraction is recommended to allow rivers to replenish the quantity taken out during mining.

l) The Piedmont Zone (Bhabhar area) particularly in the Himalayan foothills, where riverbed material is mined, this sandy-gravelly track constitutes excellent conduits and holds the greater potential for ground water recharge. Mining in such areas should be preferred in locations selected away from the channel bank stretches.

m) Mining depth should be restricted to 3 meter and distance from the bank should be 3 meter or 10 percent of the river width whichever less.

n) The borrow area should preferably be located on the river side of the proposed embankment, because they get silted up in course of time. For low embankment less than 6 m in height, borrow area should not be selected within 25 m from the toe/heel of the embankment. In case of higher embankment the distance should not be less than 50 m. In order to obviate development of flow parallel to embankment, cross bars of width eight times the depth of borrow pits spaced 50 to 60 meters centre-to centre should be left in the borrow pits.

o) Demarcation of mining area with pillars and geo-referencing should be done prior to start of mining.

The above notifications and Guidelines, being notified under the provisions of the Environment (Protection) Act, 1986, have acquired the status of statutory provisions and have to be followed.

GSI Guidelines-Geological Survey of India (GSI) has collated/ formulated considered geo-scientific opinions to address issues pertaining to riverbed gravel/ sand mining. Besides resource extraction, ultimate objectives of riverbed mining should be:-

(i) protection and restoration of the ecological system,

(ii) to prevent damages to the river regime,

(iii) to work out the sediment influx/ replenishment capacity of the river, to restore the riverine configuration (landforms and fluvial geomorphology, such as bank erosion, change of river course gradient, flow regime, etc.),

(iv) to prevent contamination of ground water regime,

(v) to prevent depletion of ground water reserves due to excessive draining out of groundwater, and

(vi) to restore the riparian rights and in-stream habitats.

GSI has identified major hazards caused due to mining of sand/gravel as under:

a) *Instream habitat*: The impact of mining may result in increase in river gradient, suspended load, sediment transport, sediment deposition, turbidity, change in temperature, etc. Excessive sediment deposition for replenishment/ refilling of the pits affect turbidity, prevent the penetration of the light required for photosynthesis of micro and macro flora which in turn reduces food availability for aquatic fauna. Increase in river gradient may cause excessive erosion causing adverse effect on the instream habitats. B

b) *Riparian habitat*: This includes vegetative cover on and adjacent to the river banks, which controls erosion, provide nutrient inputs into the stream and prevents intrusion of pollutant in the stream through runoff. Bank erosion and change of morphology of the river can destroy the riparian vegetative cover.

c) *Degradation of Land:* Mining pits are responsible for river channel shifting as well as degradation of land, causing loss of properties and degradation of landscape.

d) *Lowering of groundwater table in the floodplain area:* Mining may cause lowering of riverbed level as well as river water level resulting in lowering of groundwater table due to excessive extraction and draining out of

groundwater from the adjacent areas. This may cause shortage of water for the vegetation and human settlements in the vicinity.

e) *Depletion of groundwater:* excessive pumping out of groundwater during sand mining especially in abandoned channels generally result in depletion of groundwater resources causing severe scarcity and affecting irrigation and potable water availability. In extreme cases it may also result in creation of ground fissures and land subsidence in adjacent areas.

f) *Polluting groundwater:* In case the river is recharging the groundwater, excessive mining will reduce the thickness of the natural filter materials (sediments), infiltration through which the ground water is recharged. The pollutants due to mining, such as washing of mining materials, wastes disposal, diesel and vehicular oil lubricants and other human activities may pollute the ground water.

g) Choking of filter materials for ingress of ground water from river: Dumping of waste material, compaction of filter zone due to movement heavy machineries and vehicles for mining purposes may reduce the permeability and porosity of the filter material through which the groundwater is recharging, thus resulting in steady decrease of ground water resources.

The GSI has suggested that riverbed mining may be allowed considering minimization of the above mentioned deleterious impacts. The guidelines of National Water Policy of India should also be followed which states that watershed management through extensive soil conservation, catchment area treatment, preservation of forest, increasing of forest cover and construction of check dams should be promoted. Efforts shall be made to conserve the water in the catchments. Following geo-scientific considerations have been suggested to be taken into account for sand/ gravel mining:-

1. Abandoned stream channels on terrace and inactive floodplains may be preferred rather than active channels and their deltas and floodplains. Replenishment of ground water has to be ensured if excessive pumping out of water is required during mining.

2. Stream should not be diverted to form inactive channel.

3. Mining below subterranean water level should be avoided as a safeguard against environmental contamination and over exploitation of resources

4. Large rivers and streams whose periodic sediment replenishment capacity are larger, may be preferred than smaller rivers.

5. Segments of braided river system should be used preferably falling within the lateral migration area of the river regime that enhances the feasibility of sediment replenishment.

6. Mining at the concave side of the river channel should be avoided to prevent bank erosion. Similarly meandering segment of a river should be selected for mining in such a way as to avoid natural eroding banks and to promote mining on naturally building (aggrading) meander components.

7. Scraping of sediment bars above the water flow level in the lean period may be preferred for sustainable mining.

8. It is to be noted that the environmental issues related to mining of minerals including riverbed sand mining should clearly state the size of mine leasehold area, mine lease period, mine plan and mine closure plan, along with mine reclamation and rehabilitation strategies, depth of mining and period of mining operations, particularly in case of river bed mining.

9. The Piedmont Zone (Bhabbar area) particularly in the Himalayan foothills, where riverbed material is mined. This sandy- gravelly track constitutes excellent conduits and holds the greater potential for ground water recharge. Mining in such areas should be preferred in locations selected away from the

channel bank stretches. Areas where channel banks are not well defined, particularly in the braided river system, midstream areas should be selected for mining of riverbed materials for minimizing adverse effects on flow regime and instream habitat.

10. Mining of gravelly sand from the riverbed should be restricted to a maximum depth of 3m from the surface. For surface mining operations beyond this depth of 3m (10 feet), it is imperative to adopt quarrying in a systematic bench- like disposition, which is generally not feasible in riverbed mining. Hence, for safety and sustainability restriction of mining of riverbed material to maximum depth of 3m.is recommended.

11. Mining of riverbed material should also take cognizance of the location of the active channel bank. It should be located sufficiently away, preferably more than 3m away (inwards), from such river banks to minimize effects on river bank erosion and avoid consequent channel migration.

12. Continued riverbed material mining in a given segment of the river will induce seasonal scouring and intensify the erosion activity within the channel. This will have an adverse effect not only within the mining area but also both in upstream and downstream of the river course. Hazardous effects of such scouring and enhanced erosion due to riverbed mining should be evaluated periodically and avoided for sustainable mining activities.

13. Mineral processing in case of riverbed mining of the sandy gravelly material may consist of simple washing to remove clay and silty area. It may involve crushing, grinding and separation of valueless rock fragments from the desirable material. The volume of such waste material may range from 10 to 90%. Therefore, such huge quantities of mine wastes should be dumped into artificially created/ mined - out pits. Where such tailings / waste materials are very fine grained, they may act as a source of dust when dry. Therefore, such

disposal of wastes should be properly stabilized and vegetated to prevent their erosion by winds.

14. Identification of river stretches and their demarcation for mining must be completed prior to mining for sustainable development.

15. The mined out pits should be backfilled where warranted and area should be suitably landscaped to prevent environmental degradation.

16. Mining generally has a huge impact on the irrigation and drinking water resources. These attributes should be clearly evaluated for short-term as well as long-term remediation (MoWR,2017)

SUMMARY

Table 23: Present Status of Mining

Potential area for Mining	**River Betwa**
	485 ha
Mineable mineral Potential (Cum)	**6443060 cum**

The total area of Betwa River is almost 14 Km^2, out of which 15-20% of water channel cannot be excavated. Area of existing / proposed mining lease area is 485 ha, so the rest of the area i.e.915 ha needs to be explored. Additional areas may be further assessed on the basis of various ecological, environmental, social and political considerations. It can be further studied as potential area for mining & revenue generation.

Reference

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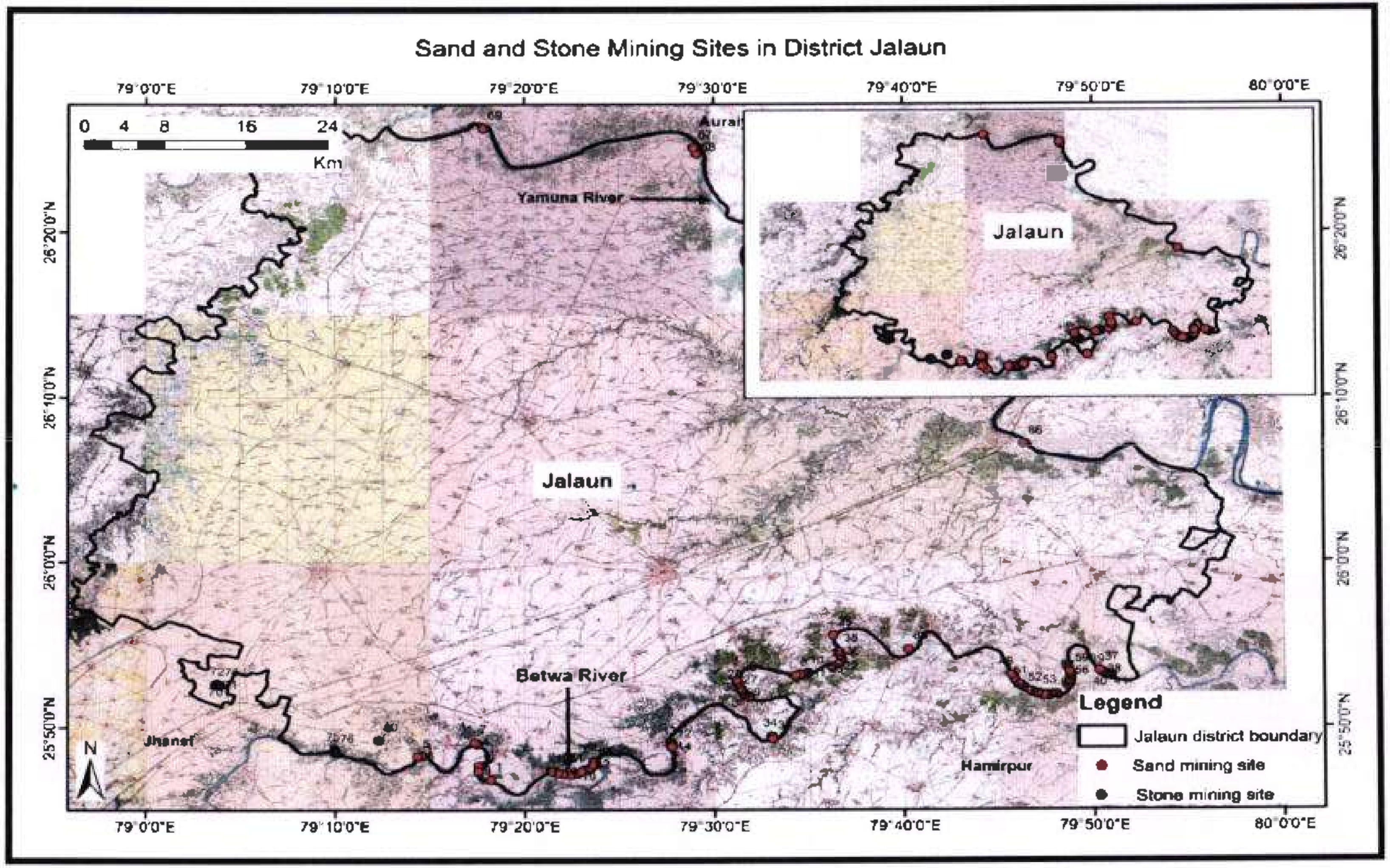
Plate-1



Code	Village	Code	Village
1	Rendha	41	Bheri Khurd
2	Rendha	42	Bheri Khurd
3	Rendha	43	Himanpura
4	Kartharia	44	Himanpura
5	Amrodh	45	Himanpura
6	Amrodh	46	Himanpura
7	Palupur	47	Himanpura
8	Bharka	48	Baratti
9	Bharka	49	Baratti
10	Bharka	50	Chirgaon
11	Bharka	51	Chirgaon
12	Mohana	52	Kathata
13	Mohana	53	Kathata
14	Sikari Vyas	54	Pathrehta
15	Sikari Vyas	55	Pathrehta
16	Sikari Vyas	56	Pathrehta
17	Sikari Vyas	57	Pathrehta
18	Sikari Vyas	58	Pathrehta
19	Sikari Vyas	59	Pathrehta
20	Sikari Vyas	60	Pathrehta
21	Narauna	61	Kalita Hamirpur
22	Narauna	62	Kalita Hamirpur
23	Narauna	63	Kalita Hamirpur
24	Narauna	64	Kalita Hamirpur
25	Dadiri	65	Parsan
26	Bandhauli	66	Tarmapatta
27	Bandhauli	67	Sankarpur
28	Bandhauli	68	Gadraiya
29	Bandhauli	69	Mahtauli
30	Bandhauli	70	Paharganw
31	Bandhauli	71	Paharganw
32	Bandhauli	72	Paharganw
33	Simariya	73	Paharganw
34	Simariya	74	Paharganw
35	Tikar	75	Saila
36	Tikar	76	Saila
37	Bheri Khurd	77	Saila
38	Bheri Khurd	78	Namwa
39	Bheri Khurd	79	Namwa
40	Bheri Khurd	80	Chandrauli

सदस्य-सचिव
डी०ई०ए०सी०
जालौन

सदस्य-सचिव
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