

## **Quarrying of Minor Minerals and Sociated Economic Prospects: A Case Study of Balason River**

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### **Abstract**

Balason river which is the most important right bank tributary of Mahananda river, having its origin from Lepchajagat on Ghum-simana ridge at an altitude of 2361m is amongst the most affected river of the sub-Himalaya due to the human induced activities of quarrying minor minerals from the river bed mostly used for construction purposes. In this paper Lakpa and Bishal attempt to assess the extent of quarrying activities of minor minerals from the Balason river bed, the exploitation of water resources and also the economic prospects of such activities.

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**Keywords:** Quarrying, Minor Minerals, Construction Purpose, and Quality and Transport Costs.

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### **Introduction**

Minor minerals, according to clause (e) of section 3 of the mines and minerals (Development and Regulation) Act, 1957, means "building stones, gravels, ordinary clay, and ordinary sand other than sand used for prescribed purposes, and other minerals which the central Government may, by notification in the Official Gazette, declare to be minor minerals." Mostly floodplains and terraces are the sites of sediment storage in stream systems and can contain large quantities of boulders, gravels and sands that can be mined economically. Such sediments ranging from medium to large sized boulders, gravels, crushed stones and sands also called "Aggregate" in the mining industry have uses in nearly all commercial, industrial, and residential construction. The skyscrapers, subways, and streets of our cities; the foundations of our houses, driveways, sidewalks, sewer systems, municipal buildings, schools, houses of worship, and shopping centers of the suburbs and towns; the highways, bridges, overpasses, power plants, dams, and water supply systems of the infrastructure serving and connecting our cities suburbs, and towns; all these activities require the use of large volumes of natural aggregate. An average 6-room house requires about 82 metric tons of aggregate; an average size school requires about 14,000 metric tons of aggregate; and one kilometer of 4-lane interstate highway requires nearly 50,000 metric tons of aggregate.

### **Effects of Quarrying Activities**

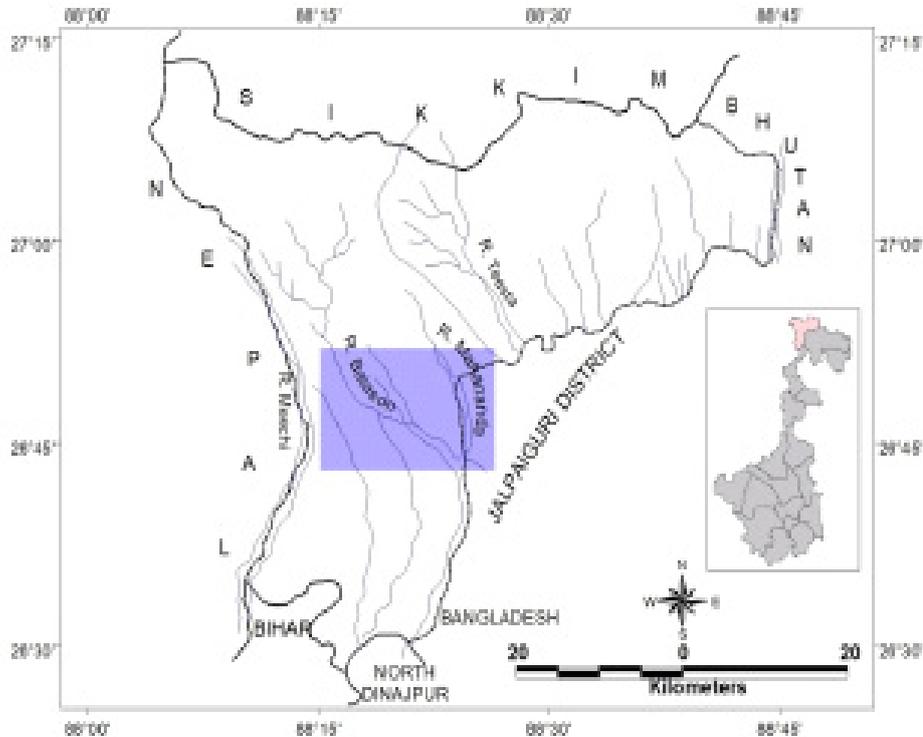
In-stream and floodplain extraction of sediments can result in increased likelihood of avulsions due to the physical alterations to the channel and floodplain that occur during mining operations.<sup>1</sup> Impacts from in-stream, floodplain, and channel migration zone (CMZ) extractions can be viewed as both positive and negative. Impacts generally viewed as negative include: 1) bed lowering (incision or degradation) upstream and downstream of the extraction site and related scour adjacent to bridge supports, pipelines, or other structures; 2) changes to channel bed morphology and exposure of bedrock; 3) lowering of the water table and loss of riparian vegetation; 4) reduction of floodplain sedimentation; 5) increase in lateral erosion of river banks; and 6) flooding of ponds resulting in stranding of indigenous migratory fish species and/or release of non-native species into the river. Impacts typically viewed as positive include: 1) reduction in flood height for a given discharge due to bed lowering; 2) increase in side channel refuge and habitat for juvenile salmonids; 3) introduction of sediment and large wood through lateral erosion; and 4) increase in overall edge habitat and channel complexity.

### **Study Area**

For the analysis of quarrying of minor minerals of different grade and size, ranging from fine grained sand to gravels, pebbles to medium to large sized boulders for construction purposes from the river bed, the lower course of Balason river (fig 1) has been chosen which originates at LepchaJagat, located on the Ghum-Simana ridge at an altitude of 2361 m and at Latitudinal extension of 27°3'55" N and longitudinal extension of 88°14'12" E. It is the major right bank tributary of the Mahanada River covering an area of over 254.59 sq. km. The river Balason being a perennial river has a total length of 48.40km of which 24.27 km is in the hills and remaining 24.13 km in the plains, till its confluence with river Mahanada near Siliguri town (latitude 26°48'37"N and longitude 88°18'30"E).

1 B.Collins & T. Dunne, "Fluvial geomorphology and river-gravel mining; a guide for planners, case studies included", Special Publication - California Division of Mines and Geology, Sacramento, California Division of Mines and Geology, 1990, p. 29.

Fig 1: Location of the Study area.



### Quarrying Activities at Balason river

Within the Balason River bed, the extraction of minor minerals begins from its piedmont zones i.e. from Dudhia till its confluence with river Mahananda. Within this extent there are 4 important sites where extraction is done on greater amount. The first site under consideration is located in and around the piedmont zone (near Dudhiabazar), where mostly larger sized boulders ranging up to 0.5 m predominates. Here, such boulders are broken with the help of human muscles in different sizes according to the demand of the market. The second site is located 5 km downstream from Dudhia, near a place named Nayabusty (Tarabari). Due to gradual decrease in sediment size as the river proceeds downstream, this site extracts boulders ranging from 300 to 50 mm diameter. The third and the largest site are located upstream and downstream of Matigara Bridge. In this site huge amount of medium to small sized gravels along with coarser to finer grained sands are extracted. Due to the accessibility of NH 31 and other local connected roads, this site has the largest number of workers engaged in extraction activities and also huge number of trucks loaded with different grades of sediments could be seen along the river bed and the last extraction site is located near the confluence where mostly smaller sized gravel and sands are extracted.

On the extraction sites, the bed materials are extracted up to 2 to 2.5 feet within the river bed during the dry season and the larger boulders are collected at some selected places which are broken into smaller sizes ranging between 75 to 90 mm. Other grades of bed materials prepared are 5/5th, 3/4th, 1/4th, Accurate, Metal, Bajri and chips

from large boulders and from sand mostly coarse and fine sands are supplied. During the rainy season, due to increase in river's velocity as well discharge, larger boulders and gravels are mostly extracted near the banks and the extraction of finer sediments gradually decreases.<sup>2</sup> The minor minerals thus extracted from or beneath the river bed are kept at some specific places for further processing. These places are located sometimes within the river bed and in sites like near Tarabari (Rangia) the collected materials are brought to a nearby place where they are broken into pieces of smaller sizes. From such sites, these ready materials are transported by trucks with different capacities ranging between 125 cu.ft to 800 cu.ft.

**Table 1: Rate of Royalty on Minor Minerals**

Name of Minor Minerals	Rate (Rs/cu.m)
Boulders/Pebbles/Stones/Sand Stone/Gravel	₹ 22.00
Granite (Black)	₹ 650.00
Granite (Gray)	₹ 400.00
Granite (coloured)	₹ 525.00
Impure Quartz, Kankar & Morrums	₹ 15.00
Laterite	₹ 15.00
Ordinary Clay/Fuller's earth/ Brick Earth	₹ 12.00
Marble	₹ 600.00
Marble	₹ 600.00
Ordinary Sand	₹ 22.00
Other Minor Minerals	₹ 15.00

Source: Schedule I, rule 20 (1) of the West Bengal Minor Minerals Rules, 2002.

Extraction of minor minerals from the Balason river bed varies greatly with respect to its demand in the construction material industry. These extraction sites are taken on lease by private sand and stone supplier agencies and the concerned authorities are paid royalty at rates prescribed by the Government (table 1). As per the records of District Land and Land Reform Office, Darjeeling, there are total of 37 Quarry Permit Holders and among these, 21 such permit holders are operational at Balason river bed stretched over the Kurseong and Siliguri sub-division of Darjeeling district.

### **Economic Prospects of Quarrying Activities**

With the gradual development of Siliguri town after independence, the aggregate Industries along the Balason River began to flourish. The construction of well connected transportation networks (fig 2) connecting the rapidly developing trade centre as Siliguri, also arouse the demand for construction materials and due to the nearness and availability of minor minerals, Balason became the major source for supply of such materials. During this process, the development of quarrying activities also

<sup>2</sup> L.Tamang, "Boulder lifting activities on Lower Balason River, West Bengal, India," in Geographical Thoughts, Vol. 6, 2008. 75-80.

attracted huge influx of labourer from different parts of north Bengal, south Bengal, Bihar, Assam, Rajasthan, Uttar Pradesh, and Bangladesh. Most of them migrated from Bangladesh during the partition of India and Pakistan in 1947 and at time of independence of Bangladesh in 1971.<sup>3</sup> These undocumented migrants are settled along the river banks in temporary built huts and every family member including small children are engaged in quarrying activities. The earning of such labours depends on the volume of materials extracted or the total volume of stones crushed into smaller sizes, as such, extracting 100 cu.ft of Accurate (gravel sized) fetch Rs. 350/- and 100 cu. Ft. of Bajri gives ` 700/-.

**Table 2: Costs of minor minerals of different sizes produced at Kasari.**

Sieved size of minor minerals (in mm)	Sold at (Rs./cu.ft)
40 mm	₹ 12.50
20 mm	₹ 15.00
10 mm	₹ 13.00
06 mm	₹ 6.00
0.75 mm (grit)	₹ 8.00
Dust (fine sand)	₹ 5.00

Source: Based on the survey by the authors.

Along the lower course of Balason River at least 3 processing centers (locally called kasari) could be found where the extracted materials are brought from the river bed with the help of trucks at the rate of ` 120/- per ton and these materials are processed mechanically with the help of sieve of various sizes fitted at the top and the sieved materials are kept separately according to its sizes.<sup>4</sup> At one such centre located at Basbari (Khaprail), sieves of 40mm, 20mm, 10mm, 6mm and 0.75 mm are fitted and according to the workers engaged in this privately operated centre, the obtained product also costs in respect of its size( table 2). The unskilled worker of such centers gets wages of ₹ 90/- per day while the skilled worker gets ₹ 166/- per day. After the finished products are ready, they are loaded in trucks of different capacities. Usually smaller to medium sized trucks (125-250 cu.ft) are loaded with the demands of surrounding areas, majority of which are supplied to Siliguri, Jalpaiguri and hill Sub-divisions. The far distance supply are carried by larger trucks (800-1600 cu.ft), the maximum being parts of South Bengal, Bihar, Assam, Jharkhand, etc. Thus, the final prices of such minor minerals extracted from Balason River are dependent on the distance traveled to reach the customer in need. Beside this, the accessibility of the extraction site also determines the price of the material required. For example, a full truck of 250 cu.ft gravel costs around ₹ 350-500/-, whereas, the same quantity of gravel in Darjeeling

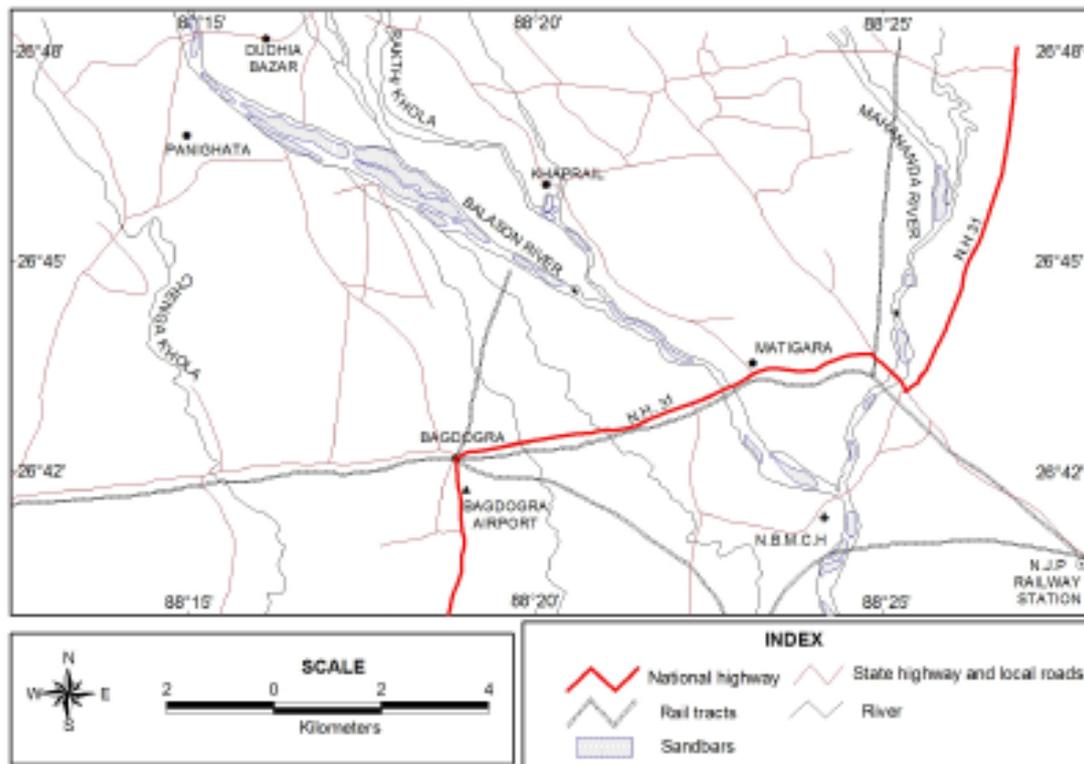
3 B. Gan, "Child Workers in the Stone Crushing Family", *North Bengal Anthropologists*, Vol. 1, 2008. p. 66.

4 L. Tamang, Effects of sand and gravel extraction activities, proceedings of Seminar on Flood Forecasting Activities on North Bengal Rivers and other water resources development issues, Lower Brahmaputra Division, Central Water commission, 2009, pp. 16-19.

costs not less than ₹ 2500-4000/- Hence, the price of minor minerals extracted from Balason river, varies with size, grade and distance traveled from source of production.

**Fig 2: Network connectivity in and around the lower Balason River.**

### Prohibition for Controlling the Illegal Quarrying



In order to put control over the increasing rate of illegal quarrying, the Govt. of West Bengal in *The West Bengal Minor Minerals Rules, 2002, Schedule V* has formulated certain prohibitions for quarrying permit or extraction:

- No quarrying of minerals shall be allowed within 200 m of both sides of any river bridge or culvert over any waterway or from any embankment and structural works of the irrigation and waterways Department.
- No quarrying operation shall be allowed within a distance of 200 m from any hydraulic structure, reservoir, bridge, canal, road and other public works or buildings.
- No quarrying operation shall be done within a distance of 5 km of a barrage axis or dam of a river. The distance is to be reckoned across an imaginary line parallel to the barrage or dam axis as the case may be.

- In the districts of Darjeeling and Jalpaiguri, the quarrying of boulders and sand shall only be made from the central one-third of the river-bed; provided that where the width of the river is 30 m or less, the extraction of the said minerals shall not be made except with the permission in writing from the Irrigation and Waterways Department.
- No tree shall be felled and removed and no public easement shall be interfered with except with the written consent of the Issuing Authority in this respect and he may attach such conditions to his consent as he thinks fit, and the conditions shall be binding on the permit-holders.<sup>5</sup>

## Conclusion

With rapid development of Siliguri as major urban centre of the region, the quarrying of minor minerals from Balason river bed is also becoming an important industry providing livelihood to large number of population mostly migrated from adjoining places. These people who have migrated from their native places in search for better livelihood and to escape the clutches of poverty find themselves no better off than they were before. The people dependent upon such activities are not concerned about the ultimate result and with more demand from local markets; the illegal mining is a common practice. Although the State Government has formulated different provisions under The West Bengal Minor Minerals rules, 2002 and The West Bengal Minerals (Prevention of Illegal Mining, transportation and Storage) Rules, 2002, along with the Mines and Minerals (Development and Regulation) Act, 1957, but the workers engaged in direct extraction activities are mostly deprived since they are hapless as they cannot bargain for the better wages. The implementation of the above mentioned Rules have not taken place due to callousness of the concerned authority and the role played by the middle man. Hence, the quarrying activities are largely hampering the fluvial environment of the region and also the huge influx of migrants is resulting into additional burden over the available resources. The concerned authorities are responsible to aware the long term effects of extraction and they should also formulate policies for proper and scientific utilization of such resources. Also, an integrated watershed development programme for the highland-lowland interactive system is the need of the hour, and a constant vigil is necessary to maintain the geo-ecological stability of the strategically important part of the country.

5 A. N. Banerjee, *The West Bengal Minor Minerals Rules, 2002*; Cfr the Mines and Minerals (Development and Regulation) Act, 1957 (as amended up-to-date), Tax 'N Law, Kolkata, 2007, pp. 3-29.