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**RIVER SAND MINING - BANKE DISTRICT CASE STUDY**

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# Sand mining activities in the district

## District sector master plan

The Banke district has no master plan in place for river sand mining sector. The location of the sand mines and the volume of extractable sand vary each year depending on the sediment load in the rivers and velocity of flow at different river sections.

## Sector budgeting and staffing

There is no specific budget allocated for this sector. The budget for activities related indirectly to sand mining such as river training, watershed management, embankment and river bank erosion protection are kept under the activities of DWIDP Division Office Number 6.

The District Development Committee (DDC) is responsible for monitoring sand mining activities in the district. The Banke’s DDC has not assigned anyone specifically to monitor sand mining activities. A committee is formed annually for awarding sand mining contract; however this committee does not have any responsible for monitoring sand mining activities after the contract has been awarded.

## Location of sand mining activities

The location of the sand mining sites changes annually, depending on the location of sediment deposition. The location of the sand mining sites for the year 2012-13 is shown in the Figure 1; the location is indicated by the red dot.



Figure 1: The location of sand mine sites in Banke district

## Sector trends and issues

The contractors are syndicating the annual DDC sand mining contract process, by refusing to submit the bid, and preventing others from submitting bids, unless the volume of extractable sand-gravel-stone (SGS) volume, as reported in the IEE Report, is reduced to their satisfaction, challenging the accuracy and authenticity of the data in the IEE Report.

The establishment of the Banke National Park in Banke District is hampering the extraction of SGS materials from the river banks and river beds, even when the DDC issues permit to the contractors. This process reduces the annual revenue of the DDC and forces the DDC to spend its own fund to extract the SGS materials to prevent riparian settlements being inundated in the flood season.

The local government units, VDC, and the local clubs are demanding higher share of the sand mining revenue from the DDC, issuing their own permit, and demanding extra tax from the transporters of the SGS materials by citing Article 55(j) of the Local Self Governance Act 1999 , thus reducing the attractiveness of the SGS contract process.

The annual revenue from the SGS contracts in Banke District is increasing at an exponential rate in the last few years. Given the high climate variability, the potential effects of the climate change, and rampant and unmanaged developmental activities in the VDCs, the soil erosion rate is expected to increase, which in turn, will increase the available extractable volume of SGS materials in the rivers of Banke District, at least for some years to come.

The Banke DDC is attempting to manage sand deposition in river beds, and consequent rise in river bed elevation, by implementing various adaptation measures such as (a) embankment construction, (b) river training, (c) bio engineering, (d) watershed management, (e) community forest and (f) sand mining. The adaptation measures are implemented jointly with different line agencies and non-governmental organizations in the district.

## Past extremes in the district

The recent extreme event related to climate variability is the July 2007 flood which had five days of incessant rainfall and inundated major parts of Nepalgunj for more than two weeks. In 2007, five persons died, 7033 families and 44974 persons were directly affected by the flood in Banke district (Shakya, M.R., Disaster Review 2007). The Banke district was the highest ranked district for Total Disaster Factor in the year 2006 (Disaster Review 2006).

Records associated with past extremes in sand mining sector are not available. The data on river bed aggradations rate and the volume of sediment deposit in the river banks has not been recorded. Since sediment deposition in the river bed was not a major concern in the past, people did not notice of any past extremes. The allowable volume of extracting river bed materials in the sand mining contract is determined based on the total volume of extractable materials on each river stated on the Initial Environmental Examination (IEE) report of the district. However since IEE has been introduced recently, the past extremes have not been recorded.

Deforestation and the unmanaged developmental activities in the Chure and Bhabar regions of Banke district in the recent years indicate a potential of rapid increase in sediment load in the rivers. Moreover, the construction of the Laxmanpur Dam in India, in the downstream part of the rivers, south of the Banke district, will reduce the flow velocity of the rivers in Banke district. The combined effect of increase in sediment load and decrease in flow velocity would lead to higher rate in river bed aggradations.

The rate of increase in the sediment deposit on river beds in Banke district can be roughly estimated by the increasing volume rate of extractable SGS materials as reported in the IEE report.

## Linkages to other sectors

Many roads and bridges are planned to build across different rivers and rivulets in Banke district in the near future. Deposition of SGS materials cause the elevation in river bed level, which will impact the high flood level, consequently affecting on primary parameters in the design of bridge, road alignment and weir.

The increased deposition of SGS materials in the river bed can affect the elevation of the intake level designed for water supply schemes.

The plinth level of the houses built in riparian area need to be further elevated since more water can be diverted to the settlement during a flood season due to elevation of river bed resulting from sand deposition. The plinth level of the toilet, hand pumps, and sock pit built in riparian area also need to be on higher ground to avoid flooded in a raining season.

The flood control and river training structures such as embankment, dykes and spurs need to be designed with the potential impact of rise in river bed elevation. The deposition of sediment in one bank of a river can result in diversion of river flow in another bank in the next flood season, unless the deposited sediment is balanced by extraction or natural scouring. In this case, sand mining sector can be interlinked with the river bank protection activities.

# Review of impacts of sand mining in the district

## Affected infrastructure

There is no specific infrastructure/asset in Banke district specifically related to sand mining sector. The private and public buildings and structures built close to the river banks, and in some cases built by encroaching river banks, can be considered as assets, which will be covered in other sectoral studies. For example, the roads and bridges built along and across the rivers will be covered in the road and bridge sector study. The structures associated with irrigation and water supply will be covered in their respective sectoral studies. The built river training structures, like the embankment, spurs, dykes, and gabion walls can be considered as assets associated with sand mining. But again, these specific structures will be covered under the river training and water induced disaster management sectoral study.

Removable properties such as the excavators, shovels, picks, etc which owned and used by the sand mining contractors can be considered as assets. But there is no proper record of such individually owned assets.

The following are some of the priority infrastructures of Banke district that might be indirectly affected by sand mining sector.

1. The head works, main canal and the distribution canals of Sikta Irrigation Project built over (West) Rapti River. (http://www.doi.gov.np/projects/project.php?pid=19)
2. Nepal Cancer Hospital at Sonpur, Khajura
3. Bridge over Rapti River, Man Khola, Duduwa Khola, Jethi Khola, Rohini Khola, Jhijhiri Khola, Muguwa Khola, Kiran Khola, Khairi Khola, Sukhar Khola, Gotheri Khola, Gawar Khola, and Paruwa Khola.
4. Nepalgunj Medical College (Kohalpur and Nepalgunj)
5. Teaching Hospital, Kohalpur
6. Bheri Hospital (Nepalgunj)
7. Phettewal Eye Hospital, Phulteka
8. Regional Police Hospital, Nepalgunj
9. Army Hospital, Nepalgunj
10. I.N.F Clinic (Leprosy)

The following are the photographs of some of the assets of Banke district.

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| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8484.jpg* | *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8473.jpg* |
| ***Bageshwori Temple*** *and* ***Mahadev Temple*** *in Nepalgunj Municipality. These cultural assets are located within the city center of Nepalgunj. This area was inundated in the flood of 2007. These are regularly cleaned, and structurally sound* |
| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8486.jpg* | ***Nepal Cancer Hospital****, Sonpur-4, Khajura - Once completed, this will be a regional hospital. This building could be damaged by flood* |
| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8498.jpg C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8559.jpg C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8568.jpg*  |
| ***Duduwa Bridge*** *- due to unmanaged sand mining in the immediate vicinity of the bridges, the river bed level close to the bridge piers seems to be declining, which can increase the vulnerability of the bridge. Similarly, the river banks in the immediate vicinity of the bridges are degrading quickly, again due to unmanaged sand mining.*  |
| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8502.jpg* ***C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8561.jpg C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8563.jpg****The DDC is attempting to protect the river banks by constructing gabion walls on both banks.* |
| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\Khajura Nala.jpg* | *Bridge under construction at Khajura Nala: Previous bridge at this location was damaged partly due to unmanaged sand mining close to the bridge location* |
| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8581.jpg* | *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8583.jpg* |
| ***Jhijhiri Khola Bridge****: The DDC is spending money to stabilize river banks which were weakened by unmanaged sand mining* |
| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\Man Khola Bridge2.jpg C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\Man Khola Bridge soil erosion.jpg C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8575.jpg* |
| ***Man Khola Bridge*** *at the western boarder of Banke district, on East-West Highway - The river bed in the immediate vicinity of the bridge is declining, and thus increasing the vulnerability of the bridge. The exposed roots of tree near the Man Khola Bridge indicate the level of river bed erosion near the bridge location. Crusher site at Muguwa Khola bridge is located near Sikta Irrigation Project site.* |
| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8514.jpg* *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8508.jpg* | *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8509.jpg**C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8506.jpg* |
| ***Rapti River Bridge*** *- The gabion walls constructed to prevent erosion of embankment have been destroyed to extract stone. The bank protection work at Ripti River Bridge is deteriorating since the local people have broken the net of the gabion wire and taken out the stones of the gabion wall.*  |
| *C:\Users\profhari\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_8585.jpg* | *Aqueduct* ***of Sikta Irrigation Project****: The sand-gravel-stone from this site is used for the irrigation project. Since the project required large volume of the SGS materials, the excavators are used to extract the materials, which is against the existing sand mining regulations.* |

## Past adaptation responses

The Banke DDC has considered sand mining as an adaptation measure against flooding and inundation of riparian and low lying lands in the district. At most of the locations along the rivers, the DDC has been able to maintain river bed elevation by issuing license to mine sand. As such, the success of the adaptation measure is encouraging.

However, due to different anthropogenic activities and natural events, the rate of river bed rise is increasing. The climate change effects can increase the fluvial sedimentation rate and increase rate of river bed aggradation rapidly. Moreover, the additional requirements in sand mining activities by the District Forest Office and in the area within the Banke National Park have hindered smooth operation of sand mining activities in the district.

The river bed sand mining is considered as a part of adaptation against annual rise in river bed elevation, which is partly due to climate change. The success of the adaptation is “partial” in the sense that river bed is rising annually at many locations within Banke district.

# Recommendations for improved management of sand mining

The management aspect, rather than the design aspect, needs to be improved in the sand mining sector. Some preliminary recommendations to improve the management aspects of the sand mining sector are:

1. Capacity development of the DDC to effectively monitor the sand mining activities in the district. If required, the DDC should team up with the security agencies to provide effective monitoring of the sand mining sites.
2. The local community should be made a part of the monitoring team of sand mining activities.
3. Increase coordination, or formation of a joint commission, between the DDC and DFO for minimizing the misunderstanding on the licensing and revenue collection from the sand mining activities in the district.
4. The deadline to submit the IEE study reports related to the sand mining should be around the end of December, which will provide time to study the reports by the concerned official of the MoFALD.
5. There should be provisions of estimating the amount of extractable sand-gravel-stone from the river bed based on a series of cross sections. The cross sections before and after extraction of the sand from the river bed will provide a means of estimating actual volume of sand extracted from the river bed.
6. The details of the locations of each sand mining should be explicitly mentioned in the IEE report. The exact locations of the SGS mine sites , and the extractable SGS volume from each site should be mentioned in the contract document, with coordinate values and maps.
7. There should be provision of contribution by the sand mining contractor for any expenses related to new needs of river training works resulting from over extraction of sand from the river bed.
8. A fixed portion of the revenue from the sand mining should be earmarked for specific local developmental activities, and the amount should be provided to the local governmental units like the VDC, once the sand mining contractor submits the revenue to the DDC. Specific development plans should be prepared to utilize the fund. This provision can minimize the current disputes between the sand mine contractors and the VDC officials.
9. The river training structures should be designed and constructed by incorporating possible impact of rise in flood level due to climate change. A standard design manual for the same should be prepared and followed.
10. The amount spend to remediate the effects of the excesses of the SGS mining activities should be clearly monitored to calculate the net revenue, rather than the current system of ‘gross revenue’
11. The regulation to manage SGS should not create conflict among MoFALD/DDC, MOSTE, MoFSC, MPPW, and MoI

The positive development in this sector is that the MoFALD is serious in better management of the sand mining operations in the country. The existing guidelines are being seriously reviewed currently. The MoFALD has completed the draft of the Resource Booklet on Environment Friendly Infrastructure Development.

Annex A: Completed district office pro forma

The Organizational Structure of Banke District Development Committee is given below.

