

# **Study on the Sand Supply Disruption under Thimphu Thromde**

## **1. Abstract**

Sand is a crucial element in concrete work for construction. Disruptions in its supply can cause delays in construction, increases in costs, and sometimes compromises in the quality of construction. Media reports have highlighted frequent supply disruptions and alluded to possible illegal sand trading during June, July, and August 2022 & 2023.

Understanding the supply chain and why there are disruptions is important to introduce changes for improvements in the supply chain, which will have a positive impact on the economy and protect vulnerable consumers.

Sand supply disruptions occur from May to October. Most procure their sand from NRDCL, and a sizable percentage are known to buy from wherever they can at higher prices when in dire need.

## **2. Background**

Sand is a critical material for modern construction. The Natural Resources Development Corporation Ltd. (NRDCL) has the monopoly to extract sand from public land for sale since it is a valuable natural resource. However, in recent years, there have been reports of shortages in supply, especially during peak construction season, which coincides with the summer months. There are also unconfirmed reports of illicit sand supply in Thimphu Thromde, wherein contractors and house builders purchase sand at inflated prices from 'informal' dealers, while some struggle to get a steady supply of sand at reasonable prices.

The study aims to document the sand supply chain to Thimphu Thromde and determine gaps and challenges in the chain, with the aim of providing recommendations for improvement.

## **3. Methodology**

Information collected from NRDCL, 32 contractors and owners of ongoing construction and 11 truck drivers who regularly ferry sand from Wangdue to Thimphu. Past NRDCL reports and news articles pertaining to sand supply issues were also reviewed.

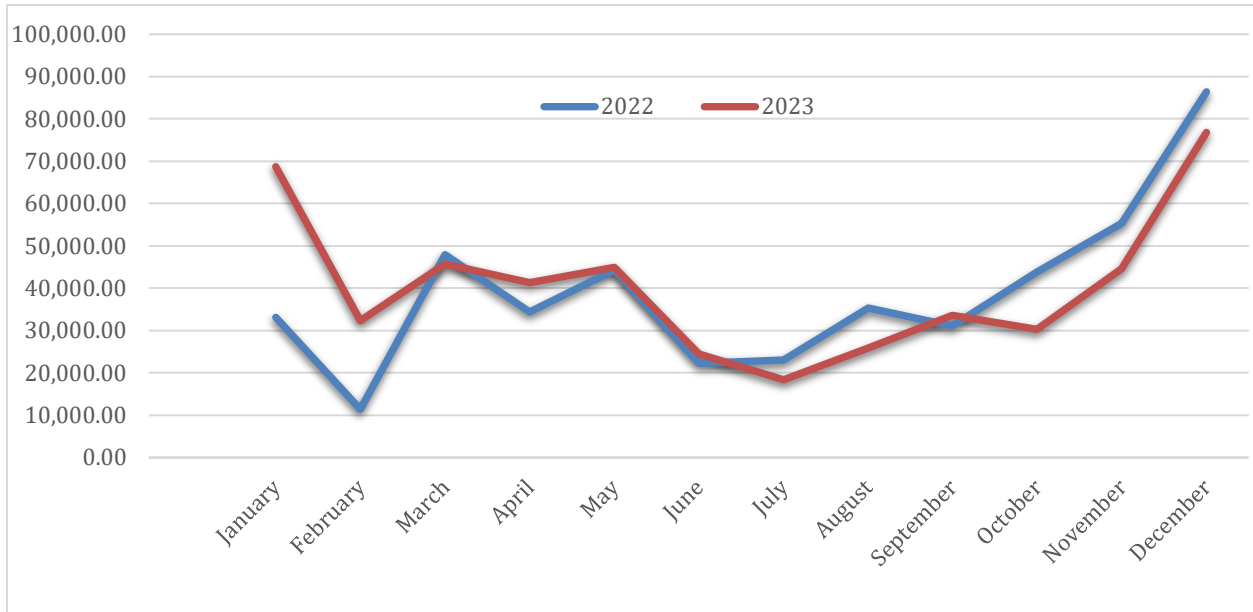
## **4. Findings and Discussion**

The NRDCL, through its six regions (Sha, Rinpung, Jakar, Zhongar, Phuntsholing, and Gelephu), extracts and supplies sand throughout the country. The Sha Region caters to sand requirements in Thimphu, Wangdue, Punakha, Tsirang, Dagana, Paro, Haa, Trongsa, and Chukha Dzongkhag.

There are three types of sand supplied by NRDCL, namely; (i) river sand (the sand is extracted from the river banks), (ii) stock sand (sand stock piled in the stock yard) and (iii) dredged sand (sand extracted from the river bed with dredging boats).

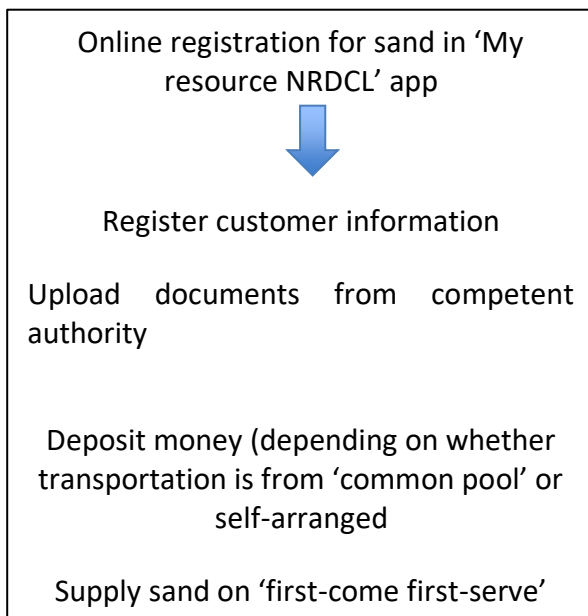
Sand production depends on the season. As is indicative from Fig. I, production is comparatively higher during the winter months than summer months.

**Fig. I: Sand production by month in 2022 and 2023 (source: NRDCL)**



The NRDCL uses an application called ‘My Resources NRDCL’, through which a customer can register and order sand of his choice (Fig. II). Transporters interested in ferrying sands for NRDCL can register using the same application and called upon when required.

**Fig. II: Procedure to order sand through smartphone application**



Upon the release of payment, the consignments are dispatched to the consignee, and upon reaching the consignments, the customers are required to accept ‘delivery confirmation’ through the app itself.

Consumers in need of a small volume of sand can apply for the same application and are eligible for a maximum of five truckloads. Further, customers can opt to lift sand based on their needs in smaller pickup trucks or utility vehicles.

The supply of sand is based on a weekly supply system which depends on the availability of sand at source. A customer can order 10 truckloads of stock sand per week in the winter, while in summer, the supply is limited to 5 truckloads per week. However, if stock volume is low, only a truck load per week is issued. The cost of sand varies among types (Table I & Table II).

**Table 1: Selling rate per m<sup>3</sup> for different types of sand**

Particulars	Stock sand cost per m <sup>3</sup>	Dredged sand-cost per m <sup>3</sup>	River sand-cost per m <sup>3</sup>
Average direct cost	134.12	169	52.87
O & M	70.67	70.67	70.67
10% Profit	20.48	23.97	12.32
Royalty	6.25	6.25	6.25
8% Handlin loss	16.38	19.17	-
Final Price	247.9	289.05	142.14

**Table II: Selling rates of different types of sand, including transportation**

Types of sand	Sand Cost (Nu.)		Transport arranged by NRDCL (Nu.)		Total Cost (Nu.)	
	8 m <sup>3</sup>	10 m <sup>3</sup>	8 m <sup>3</sup>	10 m <sup>3</sup>	8 m <sup>3</sup>	10 m <sup>3</sup>
Stock sand	1,983.20	2,479.00	7,992.32	9,990.40	9,975.52	12,469.40
Dredged Sand	2,312.40	2,890.50	7,992.32	9,990.40	10,304.72	12,880.90
River sand	1137.12	1421.4	7,992.32	9,990.40	9,121.44	11,411.80

During peak construction months from May to October, the builders faced supply disruptions of 72% in July- August, 9.4% in September- October, 12.5% in May- June and 15.5% in March-April and had no issue during the months of November–February. However, the period from May to October is characterized by high river water levels, making dredging difficult, while the construction work is at its peak.

At the time of the supply disruption, 21.9% waited for NRDCL to resume the supply, 46.9% sourced from truckers, 21.9% sourced from other construction sites, and 9.4% from other sources.

However, the majority of construction owners (81%) were able to arrange sand even during the low season (May to October) from NRDCL. 12.5 % of construction owners obtained it directly from truck drivers, while the rest had to arrange it from other construction sites when they faced supply shortages.

Buying sand from sources other than NRDCL is most common during the lean supply season, at the height of construction work. Owners do not seem to mind paying the higher prices since it is costlier to stop work because of a lack of raw materials. The construction owners claim that the amount they were required to pay per truck ranged from Nu. 30,000 to Nu. 45,000, which is an increase of 132.9% to 349% over the regulated price (Nu. 12,880 ) of the dredged sand sourced from the Phuntsholing. The regulated price of stock sand and river sand is Nu. 12,469.40 and Nu.11.411.80 respectively.

With regard to the surveillance, the DGM conducts unannounced inspections at sites at least thrice a week and at the highways. The truckers found ferrying sand are penalized as per the Mines and Minerals Management Act of 1995.

It is not clear how truckers get access to sand, which they can supply directly to customers, or if it is obtained by illegal means. There appear to be no check-posts between source and destination as in the past. Therefore, if any are occurring, illegal movements can be curbed through more intensive monitoring of the routes.

Concerned agencies should explore the economic and technical feasibility of using GPS tracking systems on all truckers to monitor movements so as to prevent any unethical pilferage or siphoning of sands enroute.

As a natural resource, unlike manufactured goods, production cannot be scaled up and down based on market demand forecasts. However, sand is durable and can be stored for a very long time. It is therefore possible to extract as much as is environmentally feasible and stock them for supply during peak demand. The creation of a stocking/ storage facility would not be cost-intensive. It will only need protection from wind and rainfall to prevent being blown or washed away.

To support the infrastructure development of the country and grow the economy, if the current extraction sources are inadequate, more needs to be explored, giving due consideration to the environmental damage it may cause, along with the option of relevant agencies importing sand from India in bulk and distribution to private builders during construction peak season.

Crushed sand, or sand prepared by artificial crushing of boulders, is sometimes used but is generally not preferred by Bhutanese construction owners, because of its apparent inferiority to natural sand. However, there are reports from other countries that crushed sand, also known as M-Sand or manufactured sand, is used in major building construction since it is an economical and eco-friendly alternative to river sand. Relevant government agencies could also study the socio-economic and technical feasibility of using such alternatives in the country.

## **5. Conclusion**

This study indicates some issues with the supply of sand. As the economy grows and more infrastructure is developed, supply side constraints will increase if pilferages are not checked and alternatives are not explored. Apart from increased extraction, other alternatives, such as the use of crushed sand, must also be studied.