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## BGS MINERALS

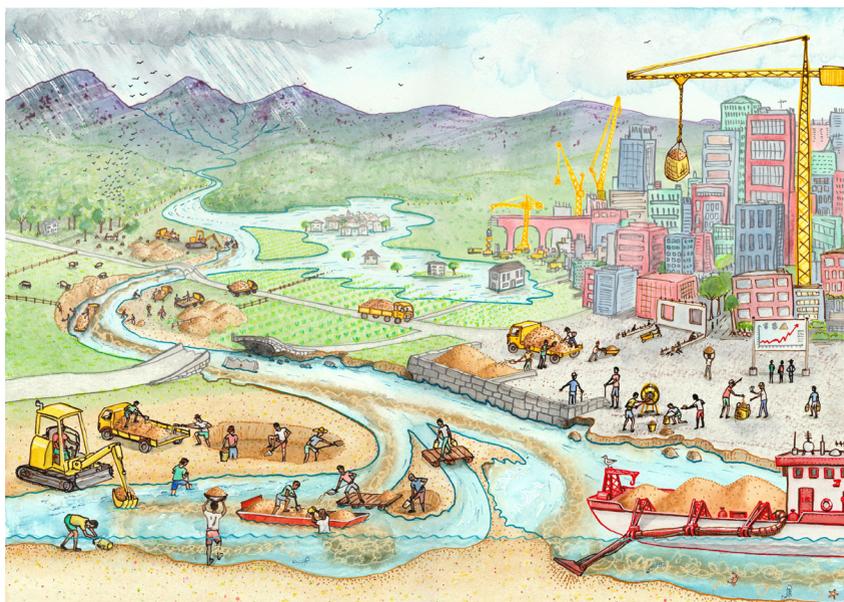
# Illustrative good practice guide for sand mining

Rapidly increasing demand for sand in many countries, combined with little or no governance, has resulted in sand mining causing wide-ranging, negative environmental, social and economic impacts. This demand is the result of rapid urban growth in many parts of the world and the need for good-quality housing and infrastructure. Such development consumes huge quantities of sand, which is used in concrete. The BGS International Geoscience Research and Development project 'Sand and sustainability' is working to address some of these issues with geoscience-led solutions.

This illustrative guide is designed to enable stakeholders that are affected by or have an interest in the extraction of sand to understand how geoscience data and information can be used for the monitoring and management of sand resources.

## GOOD PRACTICE GUIDE FOR SAND MINING

### The current situation



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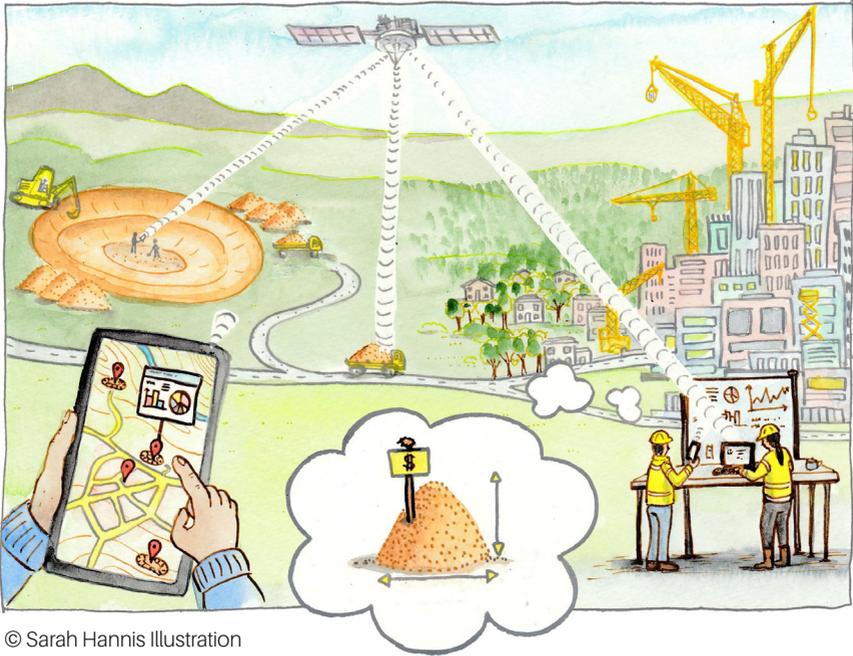
In many countries, large-scale extraction from rivers and the nearshore environment causes:

- erosion of banks
- damage to infrastructure
- harm to water quality, farmland and biodiversity
- increased risk of flooding

Sand supply is often inadequate to meet future needs, causing price fluctuations and stockpiling. There is little or no consideration by the consumer with regards to where this essential building raw material comes from, no transparency in the supply chain, and no linkages between urban planning and those with responsibility for managing sand resources. This is a supply system that is either breaking down or has effectively already broken down in many places.

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## Monitoring



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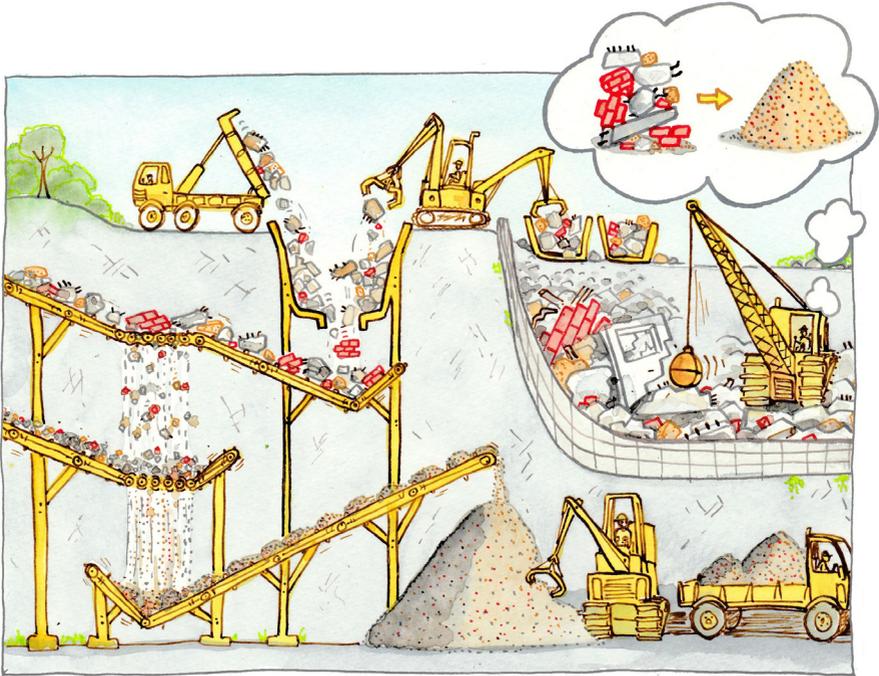
The first steps in managing the extraction and increasing the supply of sand from more sustainable sources, including recycling and re-use when feasible, include understanding how much sand we have, how much is being produced, from where it is produced and where it is used. Traditionally, surveys of the sand industry by regulatory authorities were a key source of such data, but these surveys are expensive, time consuming and require a strong regulatory regime. Instead of surveying, the sand team at the BGS has been using remote sensing as a more accessible, alternative, and cheaper way to monitor the activities of the sand industry<sup>1</sup>.

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<sup>1</sup> Bide, T, Novellino, A, Petavratzi, E, Watson, C.S. 2023. A bottom-up building stock quantification methodology for construction minerals using Earth Observation. The case of Hanoi. *Cleaner Environmental Systems*, Vol. 8. <https://doi.org/10.1016/j.cesys.2023.100109>.

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### Recycling

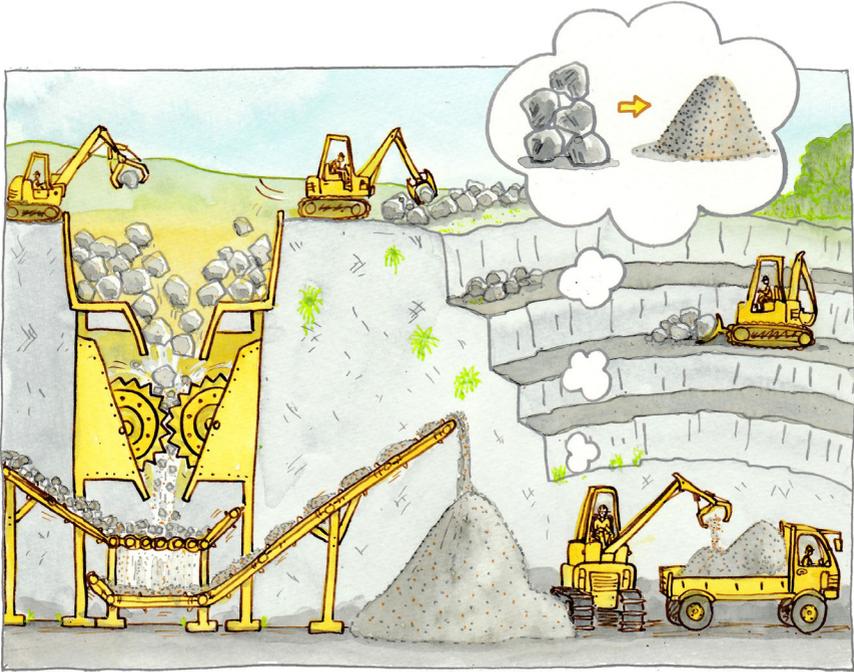


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Moving towards a circular economy is a key part of any solution to reduce the environmental impact of natural resource consumption. Enabling a circular economy requires a clear understanding of the material supply chain as well as collaboration between planners, consumers and producers. Utilising of construction, excavation and demolition waste (often referred to as 'CDEW') may be a viable alternative to natural sand, as may recycling of other products, such as crushed glass. Re-use of modular building material may also help reduce the demand for natural sand.

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### Use of alternative primary materials



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One of the main alternatives to natural sand is 'manufactured sand', which is produced from the crushing of hard rocks. This can be a primary product or a by-product from mine (sometimes known as ore sand) and quarry waste. Manufactured sand has similar physical and chemical properties to natural sand. It is easier to manage the environmental effects from quarry sites, which are often located far from the sensitive environments where river and beach sand is found. However, consideration needs to be given to the increased energy often required to produce manufactured sand.

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### Sourcing of natural sands



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Mining of natural sand should be targeted at 'fossil' or geological deposits formed from the sediments of ancient river systems or offshore environments. These are located well away from the more active water courses, beaches and marine environments. Extraction needs to be carefully regulated; one way of achieving this is to implement tax or royalties, to ensure local administrations take an active interest and the sand resources are valued.

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## Reduction of use



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Reducing demand for, and therefore consumption of, sand will help to alleviate the pressure on sensitive environments. There are many ways to reduce the use of concrete (and therefore sand). In some applications, use of timber may be a sustainable alternative; increased use of steel and glass in construction may also reduce demand for concrete. Reduction can also be achieved by smarter design — for instance, reducing the size of floor spans or constructing smaller buildings thereby helping to reduce material consumption.

# More information

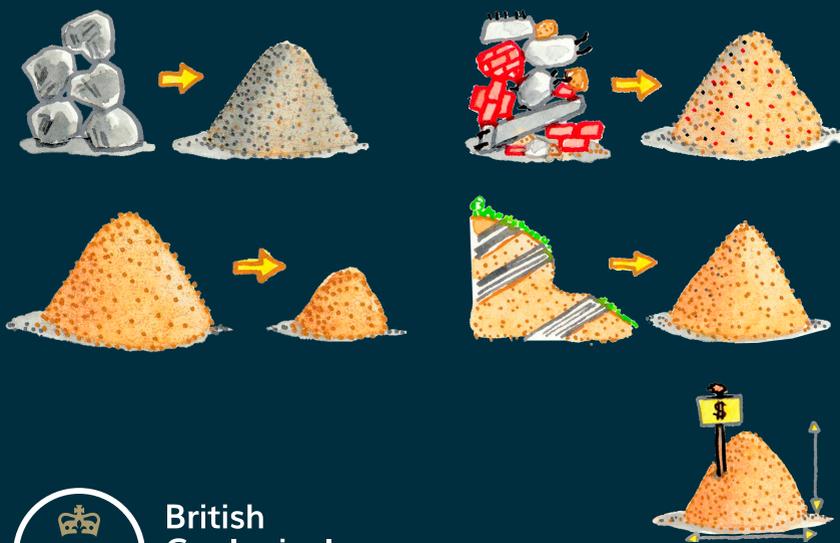
High-resolution images

The use of remote sensing to monitor sand resources

UNEP report Sand and Sustainability: 10 Strategic Recommendations to Avert a Crisis

For more information about the project

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