Source : www.thehindu.com Date : 2019-05-08

SAND, A GLOBAL SUSTAINABILITY CHALLENGE: UN REPORT

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

The riverbeds of Nagavali and Gostani, in Vizianagaram district, Andhra Pradesh.

The United Nations Environment Programme (UNEP) on Tuesday released a report, *Sand and Sustainability: Finding new solutions for environmental governance of global sand resources*, that highlights a problem that has largely stayed under the radar: sand consumption globally has been increasing and we are extracting it at rates exceeding natural replenishment rates.

Sand and gravel, the report says, are the second largest natural resources extracted and traded by volume after water, but among the least regulated. We must acknowledge that this is “one of the major sustainability challenges of the century,” it says, and we must answer complex questions on how we reduce demand to responsible levels and stop environmentally damaging practices to protect sensitive ecosystems and meet biodiversity conservation goals.

Ecological damage

Sand is created by slow geological processes, and its distribution is not even. Desert sand, available in plenty, is not suited for construction use because it is wind-smoothed, and therefore non-adherent.

While 85% to 90% of global sand demand is met from quarries, and sand and gravel pits, the 10% to 15% extracted from rivers and sea shores is a severe concern due the environmental and social impacts. Their extraction often results in river and coastal erosion and threats to freshwater and marine fisheries and aquatic ecosystems, instability of river banks leading to increased flooding, and lowering of ground water levels. The report notes that China and India head the list of critical hotspots for sand extraction impacts in rivers, lakes and on coastlines.

The dangers of shifting sand

This is in addition to other threats to river systems. “Most large rivers of the world have lost between half and 95% of their natural sand and gravel delivery to ocean,” the report says. “The damming of rivers for hydro-electricity production or irrigation is reducing the amount of sediment flowing downstream. This broken replenishment system exacerbates pressures on beaches already threatened by sea level rise and intensity of storm-waves induced by climate change, as well as coastal developments.”

There are also indirect consequences, like loss of local livelihoods — an ironic example is that construction in tourist destinations can lead to depletion of natural sand in the area, thereby making those very places unattractive — and safety risks for workers where the industry is not regulated.

The construction industry

With current production systems, aggregates (a term for crushed rock, sand and gravels used in construction materials) are necessary for building the infrastructure the world needs, especially developing countries bringing their populations out of poverty.

Quoting studies, the report estimates that 40-50 billion tonnes of crushed rock, sand and gravel is extracted from quarries, pits, rivers, coastlines and the marine environment each year. The construction industry, it says, consumes over half of this, and will consume even more in the future. Going by the U.S. standard of cement and aggregates mixed in 1:10 ratio, and that global cement production is expected to increase to 4.83 billion tonnes per year by 2030, the use of aggregates use will be close to 50 billion tonnes per year in that time. Another study estimates even higher demand: 60 billion tonnes a year by 2030.

According to 2017 figures, China produces close to two-thirds of the world's cement, an estimated 2.4 billion tonnes, with India coming in second at 270 million tonnes (the USA is third, with 86.3 million tonnes). India and China lead in global infrastructure construction, the report says. "China increased its concrete use by 540% in the last 20 years, exceeding the use of all the other countries combined. Even as domestic consumption rates begin to stabilise, China overseas investment in infrastructure development through the Belt and Road Initiative will drive demand for aggregates in approximately 70 countries. Furthermore, domestic demand in India is expected to drive strong future growth in Asia."

What needs to be done

Even basic information about demand and how it will be met, and the real cost of unsustainable consumption, is hard to come by. Another issue is transparency. "Accountability is something that needs to cross boundaries and borders, right down the value chain," the report says. "While we may know how much sand is being extracted from a location, we rarely know where it goes. Similarly, we can estimate how much sand is being consumed but we cannot say where it comes from."

The report suggests better spatial planning and reducing unnecessary construction — including speculative projects or those being done mainly for prestige — thereby making more efficient use of aggregates, investing in in infrastructure maintenance and retrofitting rather than the demolish and rebuild cycle, embracing alternative design and construction methods, even avoiding use of cement and concrete where possible, and using green infrastructure.

Among the studies on recycled and alternative substitute materials the report points to, are several from India, including oil palm shell, waste foundry sand, crushed tiles, granite powder, mine waste, bottom ash, and discarded rubber. It also cites the use in India of non-toxic municipal waste in road-building.

It is critical to raise awareness that what is seen as cheap and freely available is in fact a limited resource. With awareness, the other key issue is governance. At the policy level the way forward, the report suggests, is to strengthen standards and best practices to curb irresponsible extraction; invest in sand production and consumption measurement, monitoring and planning; and establish dialogue based on transparency and accountability.

The report concludes with a call for large-scale multipronged actions from global to local levels, involving public, private and civil society organisations. This will mean building consensus, defining what success would look like, and reconciling policies and standards with sand availability, development imperatives and standards and enforcement realities.

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