

The world needs to get serious about managing sand, U.N. report says

With sand demand rising, extraction posing growing environmental threats

10 MAY 2019 • BY RACHEL FRITTS



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Our reliance on sand is staggering—by volume, the amount we use is second only to water. As a key component of cement, asphalt, and glass, sand is integral to every aspect of our lives. It is in our phones, our schools, our hospitals, and our roads. Globally, humans consume up to 50 billion metric tons of sand and gravel every year, amounting to 18 kilograms per person per day.

But our insatiable demand for sand now poses "one of the major sustainability challenges of the 21st century," and meeting it will require "improved governance of global sand resources," concludes [a United Nations report released this week](#). In particular, the report recommends encouraging ways of reducing demand for new sand and strengthening policies aimed at discouraging the harmful environmental impacts of sand mining. It also recommends developing a more traceable sand supply chain through better monitoring and international information sharing.

The U.N. recommendations are "very timely," says geologist Minik Rosing of the University of Copenhagen, because sand "is a natural resource that transcends national borders, and ... extraction frequently has consequences beyond national borders."

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The report represents the first global effort to recommend solutions to sand-related problems, says environmental scientist Pascal Peduzzi, an author of the report and director of GRID-Geneva, a part of the United Nations's Science Division based in Châtelaine, Switzerland. He became aware of the issue after a trip to investigate beach erosion in Jamaica, he says. "We went to a small fishing village, and the villagers told us that one night some people came with trucks, armed with guns, and they stole their beach away," Peduzzi recalls. "I was shocked that just for sand, people were ready to kill."

In 2014, Peduzzi wrote a U.N. report titled *Sand: rarer than one thinks* that focused on sand extraction's environmental impact. "But at the time, I had limited solutions to offer," he says. Then, in October 2018, the United Nations organized a roundtable discussion in Geneva, Switzerland, at which researchers, policy experts, and industry representatives discussed both the scope of the problem and potential solutions.

Demand for sand is rising, the report notes. In Asia and Africa, a construction boom has increased demand threefold over the past 2 decades. Globally, extraction of sand and gravel is projected to rise to 82 billion metric tons by 2060. Abundant desert sand, however, is too smooth to use for building materials, so most sand is sourced from quarries. Increasingly, it is also mined from coastal beaches and dredged from fragile river and marine ecosystems, causing harm to aquifers, fisheries and protected areas. And rising prices have prompted "sand mafias" that illegally exploit sand resources to appear in countries such as India and Morocco.

Extraction—both legal and illegal—"comes at the expense of other economic sectors, local livelihoods, and biodiversity," according to the report. And "growth in the extraction and use of these minerals is putting strain on the resource base and will likely lead to a 'tragedy of the sand commons' unless a more responsible appropriation of these resources is promoted," says Aurora Torres, an ecologist at the German Centre for Integrative Biodiversity Research in Leipzig.

To avoid that tragedy, the world should focus on "reducing natural sand extraction and its impacts in the near term," the report states. One recommendation is to eliminate unnecessary building projects and speculative building. When building new structures is necessary, recycling old materials is a good option, particularly for developed countries that already have a lot of infrastructure, the report says. Germany, for instance, recycles 87% of its waste aggregate materials. Recycled ash from burned solid waste can also replace sand.

When new sand is needed, it should come from stable quarries, if possible, and not aquatic ecosystems. And to ensure that users know their sand is coming from less damaging sources, governments and businesses should create supply chains and regulatory structures that trace sand from its source to the final buyer.

Such recommendations are a good start, Torres says. But the issue is still "understudied" and "rarely" comes up in scientific circles, she says. "Hopefully this report will contribute to paving the way for more dialogue, interaction, and collaboration between all the sectors and actors connected by sand flows. It is time to treat sand like a resource, on a par with clean air, biodiversity, and other natural endowments that nations seek to manage for the future."

The report, which was circulated to policymakers at the United Nations Environment Assembly in Nairobi in March, has already resulted in a new U.N. resolution that calls for sustainable sand management practices.

Meanwhile, some nations are eyeing the potential to exploit new sand resources. In Greenland, melting ice is expected to deposit piles of sand on the coast, where it could be exported. Greenland could be a promising source, Rosing says, because "the environmental consequences are likely to be low, governance standards are high, and there will be likely co-benefits for indigenous people."

doi: 10.1126/science.aay0017

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