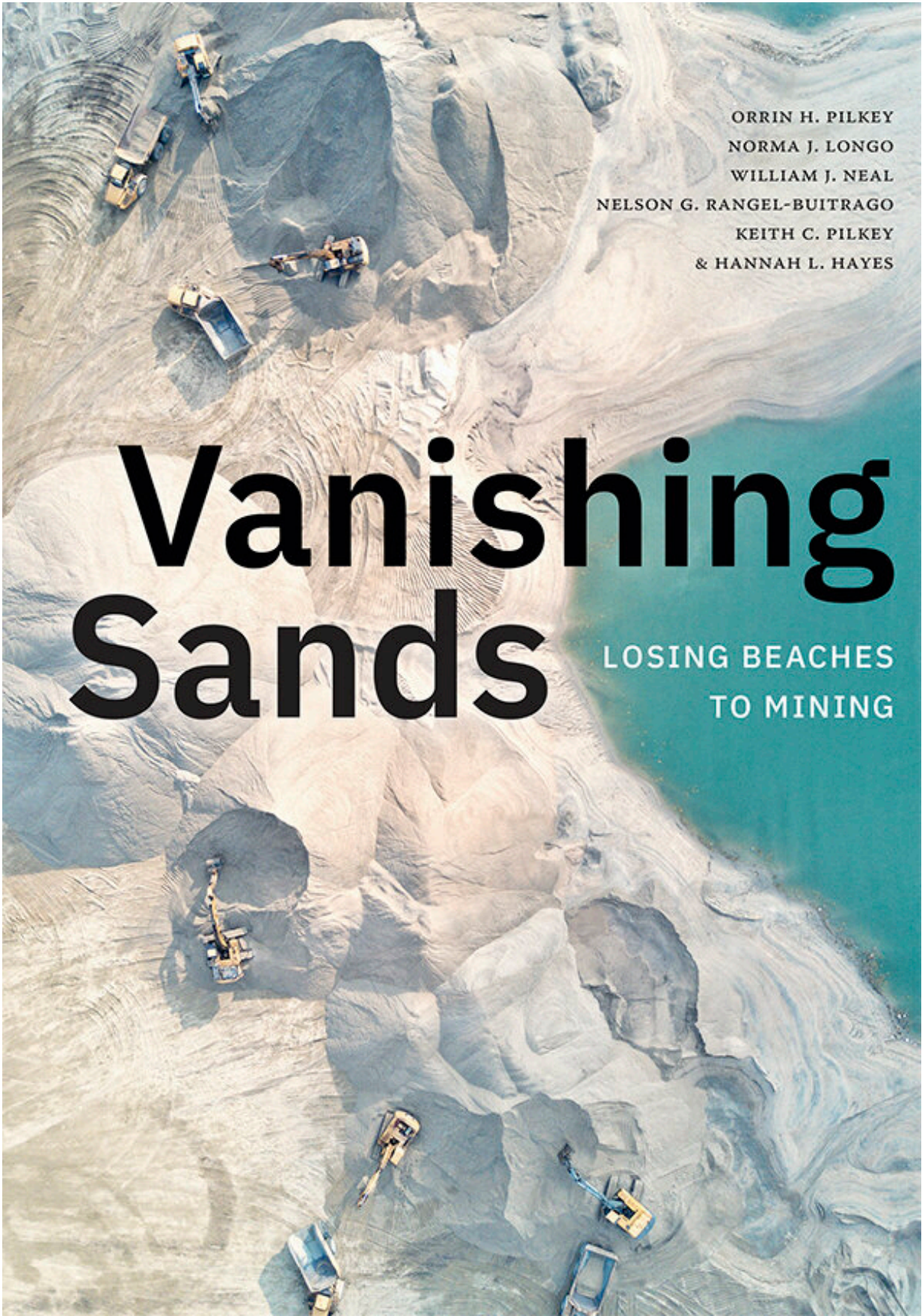


Vanishing sands: How sand mining is stripping away earth's beaches

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Vanishing Sands

LOSING BEACHES
TO MINING

Credit: Duke University Press

In Morocco, up to 60 million tons of sand are bulldozed, scraped or shoveled off beaches each year to be used as aggregate in concrete.

In Singapore, developers have created 65 square miles of reclaimed land using sand mined primarily from [beaches](#) in less affluent neighboring countries.

In Jamaica, 500 truckloads of pristine white sand disappeared from a public [beach](#) on the island's north shore one night in July 2008. Forensic tests later tracked it to two nearby resorts, which had used it to enhance their own skimpy beaches.

Sand mining happens on every inhabited continent and at nearly every conceivable scale. Some of it is legal; much of it is not.

Over the last 20 years, it's devastated beach, dune and estuarine ecosystems from Southeast Asia to the North Atlantic and claimed human casualties as well, as organized crime rings, known as "sand mafia," increasingly use deadly force to protect their illegal mining operations.

A new book from Duke University Press, "[Vanishing Sands: Losing Beaches to Mining](#)," casts light on the shadowy world of sand mining through [case studies](#) that illuminate its disastrous impacts and a concluding chapter that proposes common-sense solutions.

Orrin Pilkey, James B. Duke Professor Emeritus of Geology at Duke

University's Nicholas School of the Environment, is one of the book's six authors.

Because of the tradition of viewing beaches as public land, people have historically thought of beach sand as a free and limitless resource, Pilkey and his co-authors explain in their preface to "Vanishing Sands."

Beaches and [coastal dunes](#) have always supplied sand for local use—stuff like filling sandboxes, improving garden soil and filling sandbags—and until the late 20th century the volume of sand being removed at any given time from any given beach was generally small enough that it could be measured in bucket or wheelbarrow loads.

That changed as the pace and scale of coastal development accelerated. Governments needed sand to extend their land masses. Communities needed sand to renourish their beaches. Contractors needed sand to use as aggregate in the concrete being used to build all the new structures.

As global demand outstripped the supply that could be economically sourced from conventional inland sand pits, beach sand was deemed a suitable substitute, partly because it has angular grains that adhere to each other and, theoretically at least, improve the durability of any material or matrix they're mixed into, and partly because it could be sourced from nearby dunes and beaches at practically no cost.

Excavators, bulldozers and dump trucks soon replaced buckets and wheelbarrows.

By 2020, entire beaches and dune systems in Africa, Asia, Europe, the Caribbean, South America and the eastern United States had been stripped bare. Some now have pits the size of soccer stadiums in them. Others have been reduced to mud flats that provide nearby communities with scant protection from flooding and storm surges at a time of rising

seas and stronger storms due to climate change.

In addition to documenting large-scale sand mining's adverse impacts in nine vividly written chapters, "Vanishing Sands" provides a list of science-based recommendations—Pilkey and his co-authors call them "truths and solutions"—for ending the damage.

"Coastal sand exploitation is rapidly spreading in this time of sea-level rise and intensifying storms. Such mining is slowly destroying the protective nature and touristic value of beaches on a global scale," they write. "Ultimately, the solutions must (include)an inexpensive substitute for sand to be used in concrete...an end to coastal [sand](#) mining, and a systematic move landward as the sea rises. Here's hoping that some wisdom will prevail."

Co-authors of the new book are Norma Longo, a geologist, photographer and longtime colleague of Pilkey's at the Nicholas School; William Neal, emeritus professor of geology at Grand Valley State University; Nelson Rangel-Buitrago, professor of geology, geophysics and [marine research](#) at the Universidad del Atlantico in Colombia; Keith Pilkey, an attorney concerned with issues of coastal development; and Hannah Hayes, a scholar of land rights, disaster capitalism and risk management.

"Vanishing Sands" is the 24th book Orrin Pilkey has written or co-written. In addition to his books, Pilkey has published more than 250 peer-reviewed studies on coastal geology.

Provided by Duke University

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