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SHIFTING SANDS

CONCRETE
Sand, gravel, water, cement

CONSUMPTION (2012)
26.9–29.6 Gt

WORLD LAND USE
9 million hectares in 1900, 17.6 million hectares in 1950, 45 million hectares in 2000, 59.5 million hectares in 2016

The production of all images from Vietnam were supported by a grant from the Pulitzer Center for Crisis Reporting.

Sand is fast-becoming one of the most precious commodities of our time. Alongside gravel, sand is an aggregate that has become essential to urbanisation. It is, for instance, used to make concrete—the addition of cement, sand, gravel and water. For the year 2012 alone, the United Nations Environment Programme (UNEP) estimated that the world's use of concrete can be estimated at 26 to 30 Gt. As the UNEP puts it, that is enough to build a wall 27m-high by 27m-wide all along the 40,000km-long Equator. The UNEP produced their March 2014 "alert service" note, "Sands, rarer than one thinks", partly in reaction to the documentary *Sand Wars* (2011) directed by Denis Delestrac. The ecological investigation started exposing the over-exploitation of sand, now the most consumed natural resources after fresh water, according to the UNEP.

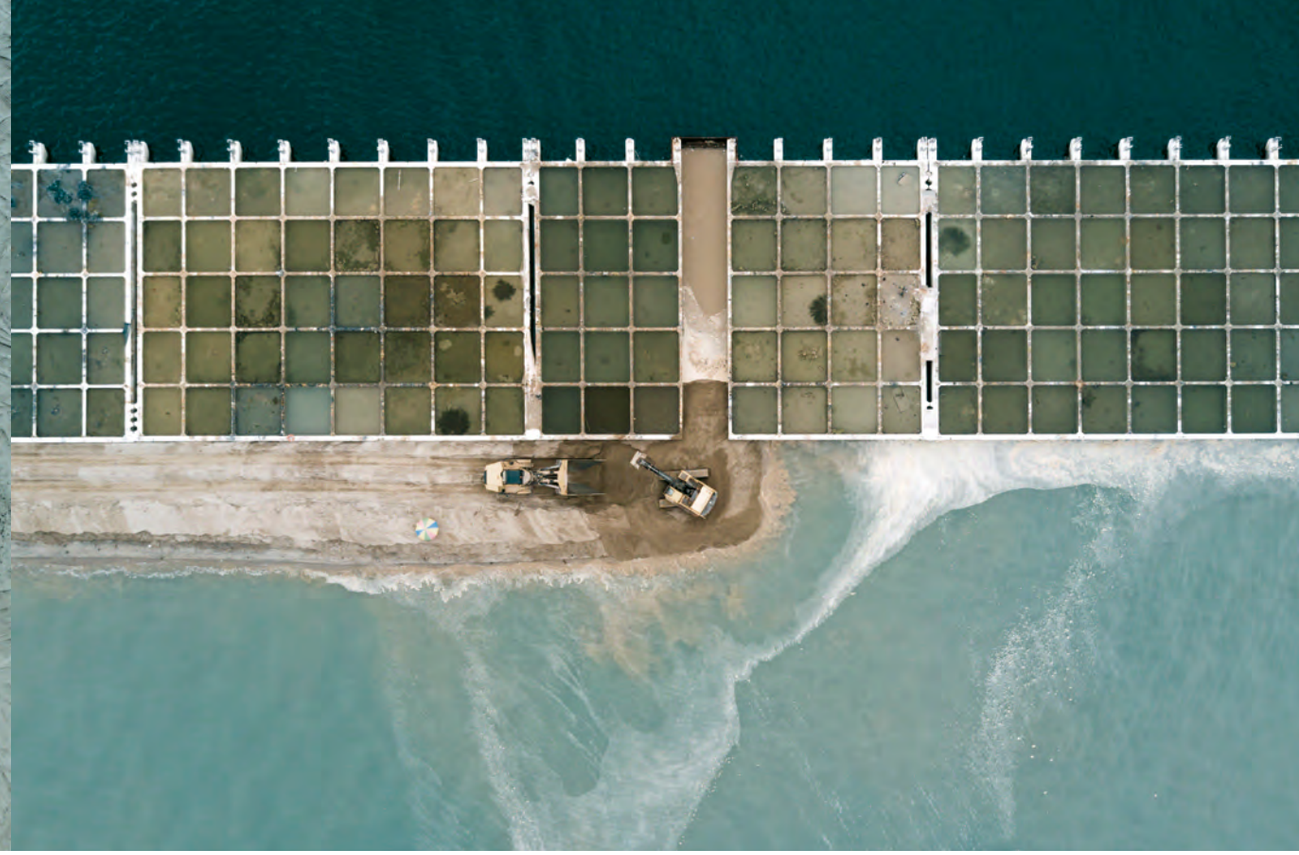
Born in Singapore, now residing in Beijing, China, photographer Sim Chi Yin presents here her ongoing project "Shifting Sands" that she started in 2017. In a recent interview for Magnum, Chi Yin, who joined the legendary cooperative as a nominee in 2018, says about her project "Shifting Sands" that it "started out of the fact I am from Singapore, which by UN figures is the world's largest importer of sand per capita. It came out of an interest in my own country and society." Singapore, a city-state right outside the south border of Malaysia, is limited in its territorial expansion by Malaysia (in the north) and the South China sea (in the south). It has increased its land size by 20 per cent since 1965 by reclaiming land on the sea, heavily relying on sand. After exploiting all the sand available within its own territory, it is now importing aggregate from its neighbouring Asian countries.

Chi Yin investigates visually the complex issue of sand using varied scales and techniques: from drone photography to capture the impact on landscape of building Singapore's new harbour in Tuas, to her human-scale reporting in Chau Ma and Hiep Phuoc, Vietman, where entire ancestral livelihoods are destroyed by the erosion of farmable lands. The former award-winning foreign correspondent for *The Straits Times,* Singapore's English-language most prominent newspaper, illustrates with "Shifting Sands" the depth and versatility of her approach to investigation and photography.

SIM CHI YIN

Tractors plough through piles of sand deposited by sand barges at the Forest City development, to make four artificial islands in Johor, Malaysia. The project has displaced aboriginals, disrupted traditional fishing grounds and local ecosystems.

Four caissons sit off the coast of Tuas, Singapore. They will be used to reclaim a huge piece of land for the country's new container port terminal. Primarily built on reclaimed land, it will become the world's largest container port.



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A drone shot of a bank of sand surcharge used in Tuas, Singapore. Sand, due to its porous nature is used to cover and weigh down on reclamation fill material in order to compact it and remove pressure from water trapped within.

Land reclamation works are on-going in this area of Tuas. Singapore has been short of sand for its sizeable and continual land reclamation and construction work. It has been bringing sand from its neighbouring Southeast Asian countries for decades.

In Hiep Phuoc, Vietman, Nguyen Thj Hong returns to her house destroyed by erosion, a week after the midnight landslide struck (28 June 2017). Caused by damming work and rampant sand dredging upstream, parts of the Mekong Delta are eroding at alarming rates.

Construction material—possibly “manufactured sand” which is crushed granite—comes in on a barge. Singapore, has reclaimed about 20 per cent of its land from the sea since independence in 1965 and is continually short of sand nowadays.

Ships depositing sand expanding Singapore’s westernmost area by making land out of the sea. As a land-strapped coastal city, Singapore tries for solutions to expand its useable land area as its population increases.

A flotilla of sand barges waits to unload their mounds of sand in the straits between Singapore and Malaysia, for the Forest City development—a joint venture between a China developer with the state government and Sultan of Johor.

At high tide, a seemingly endless stream of sand barges sail down the Cho Gao canal en route to Saigon. Rampant sand mining and dredging is going on along the Mekong River in Vietnam, to fuel rapid urbanisation and construction.

On Chau Ma island in the Mekong Delta, farmers harvest and grind amaranth. Some of them are now landless as riverbank erosion has swept away their ancestral farmland. The island which used to have 5,000 inhabitants, has lost about half of its land and people have moved away.

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An entirely new city being carved out of the desert in Gansu, northwest China.

SHIFTING SANDS

A stockpile of sand and gravel in Bedok, Singapore. Ringed by two layers of fencing, this reserve belongs to the country's main building authority, the Housing and Development Board.

A mound of sand protected by a fence on a construction site along the coast in Singapore. The world is running out of sand as Asia's rapid urbanisation is driving up demand like never before.

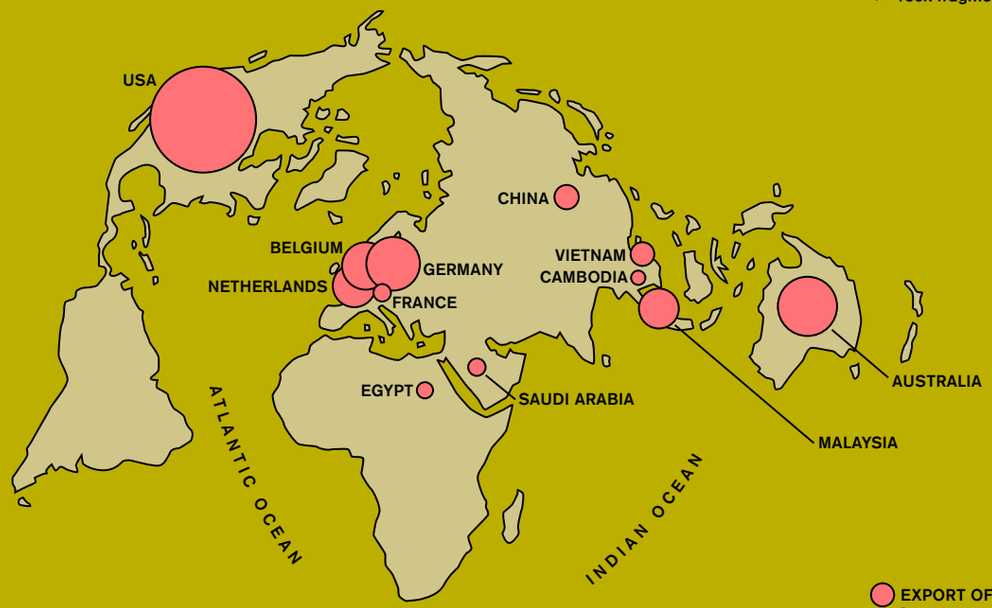
A family takes a walk in southern Malaysia, in an area now covered with giant sand dunes. The Danga Bay area is earmarked for a massive residency and commercial development, with much of the land reclaimed. All images © Sim Chi Yin / Magnum Photos

WHERE DOES SAND COME FROM?

Sand is a natural granular material composed of finely divided rock and mineral particles. These particles range in size from 0.063 to 2 mm (everything bigger is considered gravel, everything smaller is referred to as silt). Every sand grain is the result of the slow erosion of mountains, rocks or biological organisms into increasingly smaller fragments due to the forces of the environment. The most common form of sand is constituted of silica (quartz).

SAND CONTAINS MAINLY

- minerals
- bio-organic grains
- rock fragments



EXPORT OF SAND [IN BILLION $]

USAGE OF SAND

Sand has a major use in the construction industry where every year around 23 Gt are used to create concrete, bricks, cob and mortar. It is also used to make fiber glass insulation, computer screens and man made beaches and islands. For example, Singapore has increased its land area by 20% in the last 40 years, mostly by using aggregates to reclaim land from the sea. Furthermore artificial island and building projects on Dubai exhausted all of the local marine sand resources.

TOP IMPORTERS [%]

1 Singapore [9.7 %]
2 Belgium [8.4 %]
3 Canada [8.2 %]
4 Netherlands [6.9 %]

LAND EXPANSION OF SINGAPORE, 1973–2013

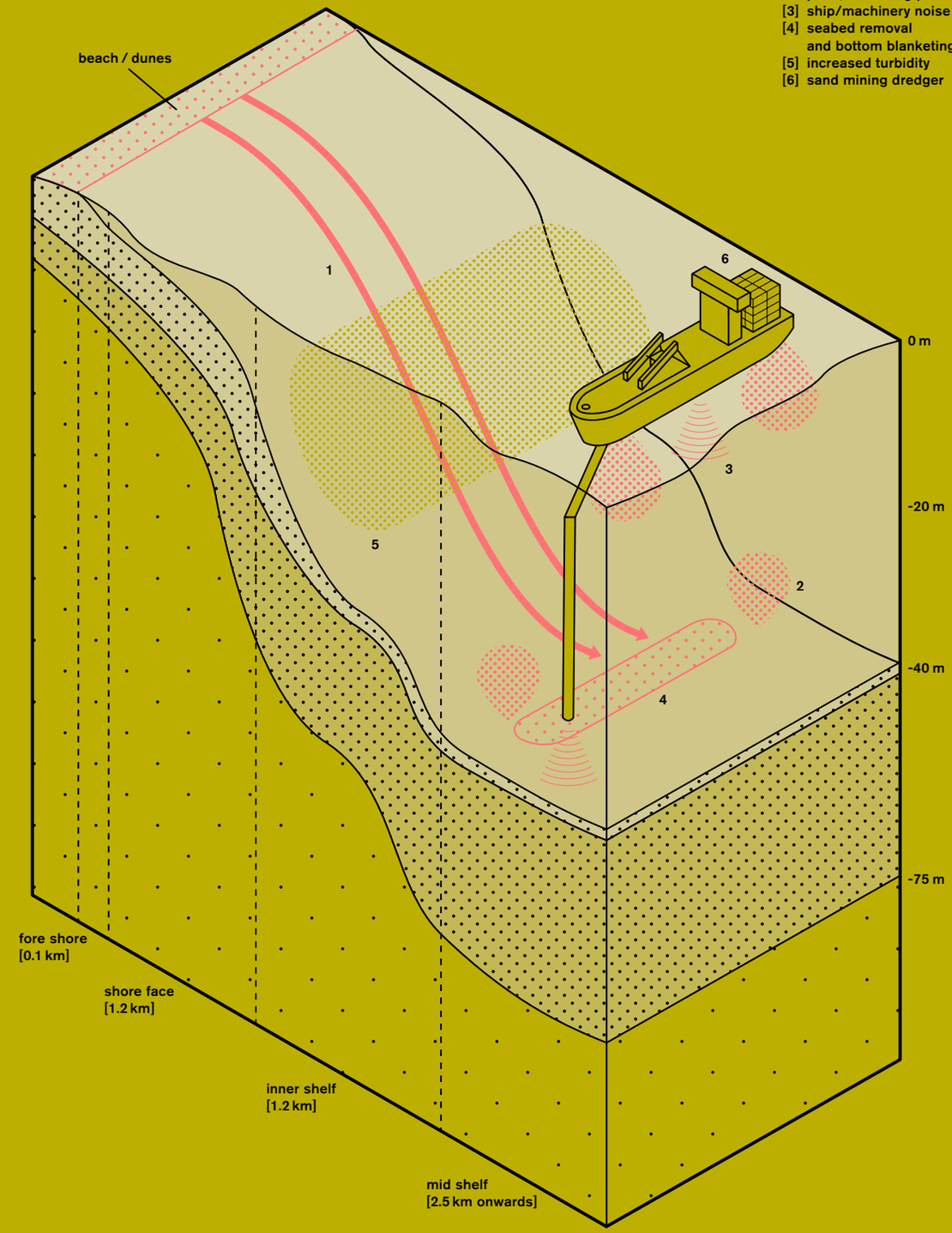
LAND MASS SINGAPORE 1973

MARINE SAND MINING

Sand is mined world-wide and accounts for the largest volume of solid material extracted globally. Until recently, sand was extracted in land quarries and riverbeds; however, a shift to marine aggregates mining has occurred due to the decline of inland resources and an enormous increase in global trade value. Marine sand mining has an impact on seabed flora and fauna. Furthermore coastal erosion occurs largely from direct sand removal from beaches, which is mostly illegal.

DIRECT AND INDIRECT IMPACTS OF SAND MINING

[1] coastal/beach erosion
[2] dust plum, sediment plum, screening plum
[3] ship/machinery noise
[4] seabed removal and bottom blanketing
[5] increased turbidity
[6] sand mining dredger



BEDROCK (SOLID)

PLEISTOCENE SAND (IRON-TAINTED)

HOLOCENE SAND (SHELLY)