Infrastructure

Mapping the World's Maritime Chokepoints

How global trade still funnels through a handful of narrow passages, and what happens when they come under pressure.

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About eighty percent of world trade by volume moves across water[1], and a surprising share of it is forced through passages narrow enough to see across. The Strait of Hormuz (https://www.eia.gov/international/analysis/special-topics/World_Oil_Transit_Chokepoints)[2], the Strait of Malacca (https://en.wikipedia.org/wiki/Strait_of_Malacca), the Suez and Panama canals, the Bab-el-Mandeb (https://en.wikipedia.org/wiki/Bab-el-Mandeb)[3]: each is a place where dozens of independent routes pull toward a single line on the chart, pass through it one ship at a time, and fan back out toward a hundred destinations on the far side.

We tend to think about trade as a web, diffuse and redundant, routing around any single failure. At the scale of the whole ocean that is roughly true. But zoom into the places where the water pinches and the redundancy disappears. A chokepoint is exactly the part of the network where the alternatives run out, where everything is briefly forced through the same eye of the needle, and where a single closure propagates outward as a shock to systems that never appeared connected at all.

The geometry of a chokepoint

A chokepoint has measurable properties: a throughput, a cost, and a failure mode. Hormuz carries roughly a fifth of global oil consumption through a shipping lane two miles wide in each direction. Malacca handles around a quarter of traded goods. When too much arrives at once, the passage does not gracefully absorb it; it queues, it distorts, and in the worst case it stops, as the world was reminded when a single container ship wedged sideways in the Suez Canal and held up an estimated nine billion dollars of trade per day.

What makes these passages strategically interesting is precisely that they are not substitutable on any useful timescale. Capital can reroute in seconds; a supertanker cannot. The detour around the Cape of Good Hope[4] adds thousands of miles and weeks of sailing to a voyage that Suez would have measured in days. So the chokepoint behaves less like a road and more like a hard constraint that the entire system is organized around, invisible until the moment it is the only thing that matters.

Five passages that hold up the world

Five passages do a disproportionate share of the work, and what unites them is not size but irreplaceability. The Strait of Hormuz carries roughly a fifth of the world's oil and a third of its seaborne crude through a channel barely two miles wide in each direction. The Strait of Malacca threads almost a quarter of all traded goods between the Indian and Pacific Oceans, funnelling the better part of China's and Japan's energy imports past a single Indonesian shoal.

Where Hormuz and Malacca are accidents of geology, the two great canals are deliberate edits to the map. The Suez Canal collapses the sea route between Europe and Asia from weeks to days; the Panama Canal does the same for the Atlantic and the Pacific. Both substitute a few engineered miles for thousands of natural ones, and both inherit the vulnerability of anything built narrow on purpose. At the mouth of the Red Sea sits the Bab-el-Mandeb, the strait every Suez-bound ship must clear first: closing it closes Suez by proxy, no matter that the canal itself lies open a thousand miles to the north.

When the node fails

The instructive cases are the failures, because each exposes a different way the same geometry can break. In March 2021 the Ever Given, a container ship a quarter of a mile long[5], turned sideways in a sandstorm and wedged across the Suez Canal. For six days nothing moved; several hundred ships queued at both ends, an estimated nine billion dollars of trade stalled each day, and the shock travelled to factories in Europe waiting on parts that were suddenly parked in the Egyptian desert.

Other failures arrive slowly. A multi-year drought lowered the freshwater lakes that feed the Panama Canal's locks[6], forcing the authority to cut the number of daily transits and the maximum draft of each ship. And in the Red Sea a campaign of drone and missile attacks did what no sandbar could[7], persuading much of the world's container fleet to abandon the Bab-el-Mandeb and Suez entirely and sail the long way around Africa. In each case the failure mode was specific to the node, but the propagation was generic: the system broke three steps downstream, in places that had never thought of themselves as exposed to a strait, a lake, or a contested stretch of coast.

Who holds the keys

A chokepoint is never purely a fact of geography; it is also a fact of power. The open-water consensus that any flagged vessel may transit an international strait is a convention, not a law of nature, and in practice it is underwritten by the navies willing to enforce it.[8] When that presence thins, the passage does not close so much as become negotiable, its use suddenly contingent on the goodwill of whoever is nearest and best armed.

Where a strait is a shared commons, a canal is owned property, and ownership is leverage. The authorities that run Suez and Panama set the tolls, meter the traffic, and decide in a drought which ships sail and which wait at anchor. That power is mostly exercised quietly and commercially, but it is power all the same: a single administration, answering to a single government, sitting astride a meaningful slice of world trade.

The disruptions still ahead

Two pressures stand out because they alter the geometry itself rather than merely testing it. A warming planet edits the chart in both directions at once: drought lowers the freshwater lakes that feed canal locks and shrinks the tonnage each transit can carry, while melting ice opens northern routes that were closed for the whole of recorded trade. Each change relocates the chokepoints rather than abolishing them.

The newer vulnerability is not physical at all. Modern ports and ships run on software: the scheduling systems, the navigation, the cranes that load and unload. A passage can now be closed by corrupting the code that coordinates it, with no sandbar or blockade required, and the attack surface of a chokepoint has quietly grown to include every networked system that keeps the traffic moving.

A standing inventory

None of this is an argument for despair, only for honest accounting. Redundancy helps, a second canal or a bypass pipeline or a stockpile, but each is expensive and none escapes the underlying geometry: a bypass pipeline is itself a chokepoint with a smaller diameter, and a strategic reserve postpones a shock rather than absorbing it. The honest goal is not to abolish chokepoints, which the shape of the planet will not allow, but to know exactly where they are, how much they carry, and how the rest of the system reorganizes when one of them closes.

So the work returns to where it started: the patient drawing of the picture. An honest inventory of every node that matters, what it carries, who controls it, and how the rest of the system reorganizes when it closes, is no guarantee against the next shock. It is merely the difference between being surprised and being ready, and on the day a passage closes, that is the only difference that counts. ■

Footnotes

1. By volume. Measured by value the share is lower, since ships carry bulk cargo like oil, grain, and ore while aircraft handle lighter, costlier freight. The eighty percent figure is the standard UNCTAD estimate for seaborne trade. ↩

2. Hormuz lies between Iran and Oman. Its two shipping lanes are each about two miles wide with a two mile buffer between them, so a single incident near the strait can put the whole passage at risk. ↩

3. The name means Gate of Grief, a nod to its currents and reefs. The strait connects the Red Sea to the Gulf of Aden and narrows to about sixteen miles, which is why closing it effectively closes the route to Suez. ↩

4. Routing from Asia to Europe around the southern tip of Africa instead of through Suez adds roughly 3,500 nautical miles and about ten days to the voyage, along with the extra fuel that distance burns. ↩

5. The Ever Given is around 400 metres long, close to the height of the Empire State Building laid on its side. Freeing it took a fleet of tugs and dredgers and a spring high tide. ↩

6. The locks are filled with fresh water from Gatún Lake, and every ship that passes sends tens of millions of gallons out to sea. A severe drought in 2023 forced the authority to cut daily crossings well below the normal rate. ↩

7. The strikes, launched by Houthi forces in Yemen from late 2023, pushed much of the container fleet onto the Cape route. Traffic through the Suez Canal fell by more than half in the months that followed. ↩

8. In the Gulf that role falls mainly to the United States Fifth Fleet, based in Bahrain. The right of ships to pass through international straits is set out in the UN Convention on the Law of the Sea, a treaty the United States follows in practice but has never ratified. ↩
