The Oceans Are Coming — Part III: Remaining Afloat

Contributed by Keith Farnish and Dmitry Orlov
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[The first two parts of this series drew a surprising amount of vitriol from people who vehemently deny the merits of the case for adapting to rapid climate change and rising sea levels — greater even than the piece ridiculing the Teabaggers. The torrent of comment spam got so bad that I had to shut down comment submission altogether. It was probably fed to some extent by the various interests which were fighting to make the Copenhagen Conference a fiasco.
I really do like giving people the ability to publish thoughtful, reasonable, helpful comments, and so as a compromise I have decided to turn comment submission back on, but only for registered users (including OpenID). Those who wish to dispute the reality of climate change should perhaps go here.]

Had Noah built his ark and the Great Flood never materialized, he would have felt very, very silly indeed! Noah could thank God for such an accurate weather forecast. In the biblical story, once the waters receded, God told Noah that there won't be any more Great Floods, and some of us may still find comfort in this bit of divine dispensation, but rising ocean levels are a fact that more and more of us will be forced to take into account as we redraw our coastal maps. How fast are the ocean levels rising? Well, that's where we have a bit of problem. When making plans, it is helpful to be armed with the most accurate and up-to-date forecasts; laying plans for tomorrow based on yesterday's forecast seems like folly. And yet that is precisely what our incomplete understanding of climate dynamics forces us to do.

In Part I of this series, just a couple of months ago, we cheerfully wrote: "The East Antarctic Ice Sheet (that's the big blob that surrounds the South Pole just off-centre) seems to be quite stable, and should remain that way for the next few centuries." That would have been nice, because the East Antarctic ice sheet holds somewhere around 80% of all the fresh water on the planet; if it were to melt, the sea level would go up by between 20 and 36 metres (75 to 120 feet) and coastal maps would need to be redrawn more or less from scratch. But then shortly after we posted the second part of this series, Nature Geoscience published a study showing that the East Antarctic Ice Sheet was undergoing a decline in thickness:

In agreement with an independent earlier assessment, we estimate a total loss of 190±77 Gt/year, with 132±26 Gt/year coming from West Antarctica. However, in contrast with previous GRACE estimates, our data suggest that East Antarctica is losing mass, mostly in coastal regions, at a rate of 57±52 Gt/year, apparently caused by increased ice loss since the year 2006.

"Accurate quantification of Antarctic ice-sheet mass balance and its contribution to global sea-level rise remains challenging", the authors are quick to caution. Nevertheless, the study concludes that "in contrast to previous estimates... [the new measurements] indicate that as a whole, Antarctica may soon be contributing significantly more to global sea-level rise". In Part I we cited the aforementioned GRACE satellite system as a way of assessing potential ice losses from Greenland, and based on it we assumed — wrongly as it turned out — that East Antarctica would be safe. Taking into account everything that has been discussed earlier in this series, this shouldn't come as a surprise. Typically, we don't know what exactly to expect or when to expect it, but we do know that it will be worse than what we should have been expecting before. Should we wait to act until scientific certainty has been achieved? If we do, will it be too late to prepare or to adapt? Newsflash! It now appears that a couple of big Antarctic glaciers — Pine Island Glacier and Thwaite's Glacier next to it — have passed their tipping points. They have floated off the sea-bed, and will now disintegrate, resulting in as much as a half-metre rise above previously estimated sea level by the end of the century.

We are not in a position to face down the ocean, saying "This far, Ocean, and not a centimetre further!" Our worst-case scenario is that our worst-case scenario is going to continue getting worse and worse. We cannot limit our planning activities to this or that mythical upper bound. When our knowledge fails us, our myths are there to guide us. The success of Noah's mission did not depend on having an accurate estimate of how high the waters would rise, because his ark floated.

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Were the advances all gradual, as are experienced from day to day on the deep ocean island chains of Tuvalu, Mauritius

and The Seychelles (where the governments, perversely, still encourage mass tourism by carbon-spewing jet aircraft) then the threat to the thickly-settled low-lying coastlines of the world could, possibly, be managed in an orderly manner. Managed retreat would certainly be a possibility. The threatened areas could be redesignated as flood-zones, to be used only for low-value farming and aquaculture. Coastal inhabitants would be gradually resettled further inland. As swaths of coastal real estate are knocked down to make room for more sea, abatement procedures would be followed to prevent the coastal waters from being poisoned by toxic chemicals or choked with floating debris. In preparation, new navigation channels could be dug and seawalls and jetties constructed further inland.

But no such opportunities will present themselves in most places where cyclones smash into the coast, inundating mile upon mile of lowland with salt water. Storm surges can suddenly overtop shoreline defences that seemed sufficient the day before, spreading their watery fingers across fenlands and farms. Then the storm sewers back up, breeding typhoid-spreading rats and malaria-spreading mosquitoes wherever the water pools in stagnant reaches. In such cases, emergency evacuation and resettlement remains the only option. But emergency management capabilities are restricted, and will become completely inadequate as the frequency of such emergencies continues to increase.

As we showed in Part II, especially with the story of the Netherlands, you can only hold back the tide for so long before the inevitable happens. What is crazy about the way we occupy the coastal region is not that we do it at all — there is a good living to be made there, as the crofters of North West Scotland found prior to the Clearances, and as the seemingly daredevil occupants of the Sundarbans do today. No, what is crazy about the way we occupy the coastal region is that civilized humans assume that the coastline is fixed. Civilized humans are wont to stand at the water’s edge and not so much dare it, as deny that the sea can take what they feel is so rightly theirs. Yet anyone with a rudimentary understanding of coastal geomorphology knows that many coastal regions are dynamic, their relative stability dependent on the strength of the currents and waves and the resistance of the material from which the coast is built. Shingle and sand move with the dominant current along the shore, depleting one part of the coast and building up another. Where the coast loses its protective skirt, the water can rapidly eat into the land, causing slumps and falls which themselves are carried away by the water. Some places are luckier than others – and it is a matter of luck – to be blessed with mangroves, salt marshes, coral reefs or natural shoals that reduce the impact of the waves and undersea currents. Other places may be more resistant to change: a granite or basalt coastline will withstand the harshest of conditions for eons, even long after all the soil has been scoured off by storms. Most shorelines are continuously moving. When the sea cooperates, it is possible, for a time, to constrain them using embankments or dikes. But the sea always wins in the end. The sea is the ultimate wilderness. We may play its game and sometimes even win, but it will never play by our rules. This much we know and it would be foolish of us to think that it could be otherwise.

Just how foolish? Here is an example from New South Wales, Australia, where the local council have forcefully rejected the do-nothing option:

The “do nothing” option will not be considered by Port Macquarie-Hastings Council as a response to the management of coastal erosion at Lake Cathie, says the council’s coastal and estuaries committee. Local campaigner and Lake Cathie resident Leslie Williams said that local Illaroo Road residents were pleased to see this option removed and that consideration would now focus on alternatives such as beach nourishment, seawalls and planned retreat.

PMHC’s development and environment director Matt Rogers said the “do nothing” option had been dismissed in the report to go before the next council meeting, as the council recognised the impact of that option on residents and was unacceptable. The council will also consider moves to permit residents to make contributions to protection work, while development applications for Illaroo Rd. properties would not be accepted until the erosion issue was resolved.

Notice that last bit? It would appear that development applications will not be accepted until Illaroo Rd. is made safe from the rising oceans. Given the latest ocean rise forecasts, this is a perfectly sensible procedural delay (not to be confused with the "do nothing" option). Illaroo Rd. will be underwater for a short spell — just a few thousand years — but then, with luck, the Earth will enter yet another ice age, glaciers will grow again, the waters will retreat, and, in due course, Illaroo Rd. properties will be developed. This is industrial-strength foolishness, and is surely symptomatic of the megalomania that also makes civilized people believe you can keep burning oil and coal as long as you keep pumping the carbon dioxide underground. The erosion issue will never be “resolved”: something’s got to give... eventually.

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Apart from such "proactive" approaches, those living low-lying coastal areas around the world really have just two choices:

1. Keep denying the reality of climate change and the effects of increased storm energy and sea level rise; or, with similar naïveté, accept that things are changing but assume that their political leaders will somehow be able to deal with it.

2. Face reality, take matters into their own hands, and find ways to adapt. Take to higher ground, or remain near the coast but prepare for a life afloat and on the move.

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If you are thinking of ignoring everything written so far in this series and making your decisions based on the business-as-usual scenario our political leaders love so much, we would urge you to reconsider — while you have the option. Even if sea-level rise does not achieve the catastrophic levels that are becoming more and more likely with each new scientific study, your ability to adapt is going to be constrained by the way you get around. Your speed may vary, but overall it will be inversely proportional to the speed at which the current petroleum-based transport infrastructure falls apart, as the reality of crude oil's terminal decline and resource scarcity begin to hit home. Before too long, you will be on foot — if you are still on dry ground, that is — and, if not, you will need a boat of some sort. Having an internal-combustion engine to push it around is certainly a convenience, but you wouldn't want to be left stranded due to lack of fuel.

One can reasonably imagine that certain internal combustion vehicles will stay in sporadic use longer than others. On the water, smaller motorised craft — dinghies, launches, and tenders — use little fuel, are very energy-effective for the services they render, and so are likely to persist for some time. On land, the pay-off per unit energy is much lower, and so internal-combustion vehicles are likely to be relegated to the realm of pure luxury from whence the "horseless carriage" originally emerged. Limousines for weddings and hearses for funerals will perhaps remain motorised the longest, moving slowly over unpaved roads, since people would still be willing to pay extra for dignity on special occasions. We can also foresee that certain groups, such as governments, mafias, armed gangs and other social predators will be able to secure a supply of fuel the longest. It is difficult to imagine that such a winding-down can transpire uniformly smoothly and peaceably. Inevitably, geography will be the determining factor: remote population centres, to which fuel must be brought overland, will have their supply curtailed long before those that are close to pipelines, railway lines, seaports or shipping channels. In communities that find themselves without access to transport fuels, much of the remaining economic activity will centre around gathering the necessary resources in order to escape, and they will steadily depopulate, leaving behind the old and the sick.

We can foresee that road traffic will be greatly reduced, as paved roads revert to dirt and become eroded and, in places, impassable, as bridges collapse from lack of maintenance, and as predation by both local officials and highwaymen increases both the costs and the dangers. Both pedestrian traffic and caravans of pack animals will try to evade official and unofficial predation, opting for the less popular, more circuitous footpaths instead of the direct and open road. Canals and other navigable waterways will once again play a much larger role in inland transport, with barges pulled by draught animals along towpaths and with sail-boats carrying freight and passengers along the sea-coasts. As the sea-ports that currently serve container ships, bulk carriers and tankers are submerged under the rising seas, the current hub-and-spoke transport networks will collapse, and smaller coastal communities will once again find ample reason to want to build and provision ocean-going vessels, to make seasonal migrations and to trade with faraway lands.

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At the same time, the need for transport will only grow, as millions of environmental refugees diffuse across the world looking for a new place to settle, and, not finding any, remain perpetually on the move. Rapid climate change is putting an end to the last ten thousand years of unusually stable climate. It was this rare episode of climate stability that has allowed agriculture to develop and flourish and previously nomadic tribes to settle down in one place without starving. It even allowed agrarian societies to produce such large food surpluses that cities and towns could become established, eventually growing to millions of inhabitants, all fed using cash crops grown elsewhere. As the climate reverts to its chaotic historical norm, people everywhere will be forced to abandon such sedentery patterns of inhabiting the landscape in favour of the more usual migratory and nomadic existence, minimising the risk of starvation by diversifying food sources across large geographic areas, and making seasonal migrations to avoid extremes of hot and cold.

Even as the rising oceans devastate many coastal areas, the areas far inland will become far less welcoming. Global warming will make extreme weather events, such as the 2003 European heat wave, which resulted in 37,451 deaths, an annual happening. Many inland areas, such as much of the southern United States, which are currently only survivable in the summer thanks to widespread access to air conditioning, will no longer be survivable. Ocean water's moderating effect on climate will make the coasts seem relatively inviting in spite of the erosion and the flooding. However, erecting permanent structures on such an impermanent terrain seems like a foolish thing to do. On the other hand, being able to take to the waves is an insurance policy that might pay you double if you are smart enough. Not only will seas and oceans, coastal waters, waterways inevitably reemerge as the default means of movement, but also as the places where the circumstances will force many people to live. This they should be able to do, provided their dwellings can float and move about without energy from fossil fuels.

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Imagine life on the ocean water, and a community that is connected through its mutual dependence on the wildly dynamic coastal belt. Imagine your home being a boat; moving with the winds, the tides and the currents, rising and settling on the wash of floodwater. This is really not as outlandish as it might sound. Options for post-industrial sailboat-building are described in quite a lot of detail in Dmitry's article "Twenty-First Century Transport", which will appear in Slaying The Hydra, Gillian Fallon and Richard Douthwaite, eds., Green Books, May 2010. The design he proposes has been rather thoroughly thought out and many of its elements rigorously tested.

On board are all the systems needed to make it a self-contained mobile survival capsule. Water for drinking and washing is provided through rainwater collection with a solar still for back-up. Illumination and electricity for communications and navigational equipment and lights comes from a few solar panels and a small wind generator. For sanitation, there is a composting toilet, its proceeds used to fertilize bits of permaculture tucked away on shore. For heating and cooking and getting rid of the inevitable damp, there is a wood stove, the wood generally available in the form of driftwood. What's more, it is very hard to starve because the coastal zone tends to be very productive: Dulse seaweed, clams, oysters, mussels, sea urchins, sea cucumbers, conchs, edible periwinkles and what's left of the fish provide a year-round banquet. A sea breeze provides the air conditioning. A few ratty old sails and a couple of long sculling oars provide the propulsion when the time comes for a change of venue. The same boat that can dry out at low tide on a mud flat or nosed onto a sheltered stretch of beach can be sailed halfway across the world quite safely and comfortably. It wouldn't win any races, but then it doesn't have to be sailed by a professional crew of acrobatic sea-monkeys either.

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The sea exerts a powerful pull on the imagination of the landlubber. Go to any seaside on a warm, sunny day, and you will see quite a few people spread out along the embankment, sitting or standing, staring vacantly over the water. From the water they look like ants. Go ashore and visit any newsstand, even one quite far inland, and you are sure to find some sailing magazines, full of airbrushed photographs of bikini-clad women on top of similarly well-buffed large floating toys. The sea is the ultimate escape fantasy. The landlubbers assume, and rightly sow, that just out of sight of land lies a different world, one which shore-side society will never be able to fully oppress.

The shore-side landscape has been carved up into various types of boxes and rectangles. Architects never tire of putting boxes on top of, next to, or inside of other boxes; this seems to exhaust their range of motions. People inhabit these boxes, starting with the crib and ending with the coffin. In the interim, they use four-wheeled boxes to navigate the maze between house boxes, job boxes and shopping boxes. All of this fixation on rectilinear geometry is supposed to make them safe and comfortable, but it also makes them dream of escape. Escape to sea, of course, is an obvious choice, because any body of water — even a smallish one — is automatically a wilderness, while the ocean is a force of nature par excellence — unconquerable by man, guaranteed to utterly destroy and humiliate any human contrivance designed to keep it in check. The land has been carved up into rectangles and boxes, but the sea-coast (the wet side of it, that is) remains a relative wilderness precisely because it cannot be carved up quite so easily.

Strange though it may seem, the wilderness starts right at the water's edge. If our ocean-gazers turned their gaze to the boats bobbing around at anchor or at moorings, and looked carefully, they would notice that some of these stationary boats are, in fact, inhabited. Here is a dinghy tied up to the stern of one; another has towels drying on the lifelines; a third has a bit of smoke coming from a chimney above the wheelhouse — somebody is cooking lunch. Unbeknownst to most of the box-dwellers on shore, there is rather a large tribe of "live-aboards" — people who live aboard boats. Some keep their boats in posh marinas and emerge from the cabin in the morning wearing a suit and carrying a briefcase. Others live at anchor, setting a few crabpots or fishing off the stern to catch their dinner, and rowing themselves ashore periodically to do an odd job or gather some supplies. Some boats make semi-annual pilgrimages in search of warmer or cooler weather; others have a summer holiday, during which they visit picturesque places along the coast; still others stay put, growing a thick beard of seafood. Living on a boat is in general much more economical than living on land, and it is possible, if one is skilled, to make a living of it without very much monetary input at all. But it is certainly not for everybody. Some people try it and after a while give up, others have been living aboard for decades and are not about to stop.

Many others are about to start living on the water, even though they don't know it yet. The problem is, their houses don't float, don't move, and they aren't particularly habitable without the wires and pipes that hook them to various services. When the water comes, they are submerged and disintegrate. Living on a boat may have its challenges and annoyances, but living in a flooded house is close to impossible. And so, if the landscape you inhabit is in danger of becoming flooded, cut off from the mainland, or generally uninhabitable, why not build a boat instead of a house, or next to the house, and float away when the time comes. It is quite possible for an amateur with limited funds to build a craft that is roomy enough to house a family, relatively immune to wind and waves, happily sits upright on any relatively level bit of ground, rides well to anchor, and contains all the necessities and even a modicum of luxuries, for a perfectly civilized existence.

As a residence, a sailboat offers a unique combination of safety, civilization and freedom. It may be raining cats and dogs and blowing so hard that tree-branches are flying about on shore, but on a boat anchored in a sheltered spot, once you lash down a few things on deck and descend the companionway, you enter a different world. Standing in the cabin, you are up to your chest in water, but the water is outside, while inside it is warm and dry, you have your own source of electricity from the wind generator, fresh rainwater is gurgling down into the water tanks, and, what's more, you do not have to ask anyone's permission or pay anyone for the right to be there. If someone minds you being there, or if the place is uninviting, once the storm passes you hoist sails, pull up anchor, and look for another spot.

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In a world where rising seas are already putting millions of people at risk of losing their homes, their lives, or both, a programme of building large numbers of inexpensive, practical, utilitarian and versatile sailing craft is a direct way to provide flood-proof, earthquake-proof and storm-proof habitation, to build communities, to create local resilience, and to provide hope for a survivable future. It is a way to create connections between different parts of the planet that can survive into the post-industrial age. It offers a way to transport people and goods in a fashion that avoids predation that will be an inevitable element of a disrupted time. It offers us an opportunity to make sure that we remain a seafaring species even as the fossil fuel era recedes into history, and gives us a way to salvage something very useful out of the wreckage of our industrial past.

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See other articles on sail transport, and find Parts I and II of this series, at SailTransportNetwork.com.

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