

## Storm Surge: An Interview With Climate Change Expert Klaus Jacob On NYC's Post-Sandy Future

by {ga=screan1}

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NEW YORK — Geophysicist Klaus Jacob has been warning about how vulnerable New York City is to violent weather for years and, more importantly in his view, how climate change and rising sea levels will transform the shape and character of the metropolis.

Weeks before Superstorm Sandy shocked the city and upended the public discussion about preparing for future extreme weather, The New York Times published an interview with Jacob in

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which he said that the storm surge from Hurricane Irene came only a foot from paralyzing transportation in and out of Manhattan.

“We’ve been extremely lucky,” Jacob told the Times. “I’m disappointed that the political process hasn’t recognized that we’re playing Russian roulette.”

Now, in a sit-down interview with the Gotham Gazette, Jacob describes his struggles to get Washington and Albany, as well as the city, to pay attention to the peril of rising sea levels; how some proposed solutions like flood gates would likely cause more trouble than they are worth; and how he thinks the city's shrinking footprint will lead to more densely populated neighborhoods on higher ground and the loss of coastline.

Jacob became interested in New York City issues in the late 1980s when he successfully prodded local leaders to adopt a seismic building code. Since the late 1990s, he has worked largely on climate change, focusing his attention on how the rise in the sea level and storm surges will affect New York and other global cities. Mayor Michael Bloomberg appointed him to the New York City Panel on Climate Change, which was convened in 2008. Jacob has served in an advisory capacity to city and state agencies on issues related to climate change.

Jacob’s own home, next to a tidal stream and marsh close to the Hudson River, was flooded during Superstorm Sandy’s historic storm surge.

He was interviewed at his office at the Columbia University **Lamont-Doherty Earth Observatory** in Palisades, N.Y., in late December.

*This is part one of a two-part interview. The second part [will be published next week.](#)*

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GG: What are some of the lessons that you think can be derived from Sandy? What are you focused on as you’re moving ahead in your work?

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KJ: There is clearly already visible action that [the Federal Emergency Management Administration] has taken. FEMA is in the process of putting out so-called Advisory Base Flood Elevation maps ... the 1 percent per year probability flood insurance rate maps. That is a much needed revision — since the last time those maps came out — that every new or modified building will have to conform to ... raise it to higher elevations or other measures.

Now after Sandy it became clear that the old FEMA maps were outdated ... In many publications, we have said that this is one of the most fundamental things that has to change. ... It was long overdue.

A little side story to that, four to five years ago I was chairing a session in a meeting of the National Institute of Building Sciences in Washington, D.C., on reducing risks from natural hazards. I spotted the FEMA guy in the room responsible for national flood insurance rate maps. I said, "Would the gentleman from FEMA please tell us when they are including sea level rise in their coastal flood mapping program?" He said, "As soon as Congress mandates it." Which means never, given our Congressional situation where some still argue about the existence of climate change. Sandy did what Congress didn't do.

It shows the kind of difficulties when we rely on national initiatives. As long as we can do homegrown initiatives, meaning New York City, New York State, or counties, I think we are much better off in getting things done. States can negotiate with FEMA for local solutions, so Congress doesn't have to mandate it nationwide.

GG: Do the new flood maps use data based on projected sea level rise from climate change? How did Sandy trump Congress?

KJ: There is nothing stated about sea level rise on those new maps. It's simply an emergency update based on Sandy data. They don't have to say anything about sea level rise. Now we have confirmation — here is the new data. Officially, climate change doesn't enter in. That's how politics works in this country.

GG: Where is the connection between international negotiations on climate change and local

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planning here? How does the link ever get made?

KJ: That link is 20 years away. We better act on our own behalf. I am acting on my own behalf in my own house (by raising it). It doesn't come top down—it goes the other way. The pressure will come from the communities. You see this already in certain areas of Staten Island; I have heard that some have voiced great interest in being bought out by FEMA. That's the kind of grassroots experience that translates into politics. The new FEMA maps will affect from now on what happens in this area. I'm sure there are some people that won't like it. It costs money to live up to future FEMA regulations.

GG: Are people aware of the costs that are coming? How is the city of New York approaching this question?

KJ: We haven't seen the new elevations for NYC. The city is holding back on their wording until that info is either informally available to them or released publicly. It's a touch-and-go situation, everyone is in limbo, and is scratching their heads as to what to do while all of this rebuilding action is going on. A small thing: I raised my outlets to a higher level in my house. I have my furnace in the attic. These are simple measures that you can do. The city really should insist on doing that everywhere too ...

GG: These maps will require that people have to elevate?

KJ: Not necessarily for existing structures ... If it's just normal repairs. They are grandfathered in. Right now, with Sandy repairs, it's not clear where it falls. I believe it's at the discretion of the city what they want to insist on.

GG: But some areas will no longer be insurable? That may push some of this?

KJ: That's exactly the concern. I don't have flood insurance. I am just as much affected as the Battery is. So is the entire Hudson Valley, all the way to Troy, to the Federal Dam just upstream from Albany. Because it's all tidal.

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GG: You're still sitting on the New York City Panel on Climate Change?

KJ: We haven't met since Sandy, but NPCC is an ongoing effort that will survive the mayoral change. It has been adopted into city law. The NPCC is an ongoing institution that will periodically advise the city on climate change issues ... There is another body — the Climate Change Task Force — both have been written into the city charter. It's at the behest of the city when it will call for input, and that has not yet happened since Sandy. Also the International Panel on Climate Change will come out with a new report — the last one was in 2007 — that will provide a new baseline. The NPCC has to look at it and say, "that's the international consensus. How does that trickle down to us?"

GG: Beyond the FEMA data, are there any other key results from Sandy, particularly at the city and state level?

KJ: That whole discussion about the barriers has taken front seat. The mayor and the governor are not necessarily seeing it in the same way. My impression is that the mayor is much more circumspect and realistic about it ... He has advice from the panel and task force. There are serious concerns about the barriers. They are very appealing as a quick fix. It's a simplistic approach. But life is not that simple.

Many of us advised the Mayor's Office of Long Term Planning and Sustainability. I'm also a technical advisor to the Department of City Planning. They are going about it in a much more holistic way. Barriers are an option in a portfolio of measures. The advisory panels were established before Sandy and they are continuing with their efforts. Sandy has provided very important data to verify certain notions that already existed from the NPCC and other studies. There were forecasts as to where the water would go and how high. We have seen it can go higher ...

The governor jumped on the idea of barriers immediately. Congressman Jerry Nadler wrote a letter three or four months before Sandy to the Mayor's Office of Long-Term Planning to produce a study of barriers. There were other politically motivated voices pushing in that direction. There is another barrier lobby — Dutch engineering firms. They smell a big job. Ever since Katrina, they have been roaming around the city with the help of the Dutch consulate general. I'm a little bit of a barrier skeptic and a thorn in their skin. [He laughed at this.]

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GG: You have said publicly that you don't see storm barriers as a long-term solution.

KJ: I do not deny that they have a medium term benefit that's very attractive. Storm surge barriers are very good at keeping out the high water during storms, combined with high tides, because they have a certain height. Assume we have 5, 6, 8, 10 ft sea level rise. You could build barriers against that if you have enough money ... Let's take \$30 to 40 billion. Make them high enough, you could keep storms out for 100 years.

That's very good news ... Not only in New York City, the whole Hudson Valley and the MTA, with all its assets that are on the protected side. But not any assets out on Long Island. Just outside the barriers it gets a little worse, during storms, when the barriers are closed, the water piles up on the outside of the barriers. Connecticut will not like it. Long Islanders will not like it. New Jersey outside the barriers will not like it ... The communities south of Sandy Hook.

Or, if the big barrier from Sandy Hook to Rockaway is not built ... Then it may be three smaller ones near the Verrazano and Whitestone bridges, and across Arthur Kill. Then, the people in the outer harbor might not like it. Because that's where you get an extra 1 to 2 feet storm surge rise. These are local difficulties. But barring those — that's not my issue. Also barriers will become a political playball that will delay their building. There will be lawsuits ... A West Way dejas vus.

My real concern has to do with long-term sea level rise. The barriers are mostly open — the sea level will get in and out of those barriers. Once sea level rise reaches about 6 to 10 feet ... You can't keep the sea level out (using the barriers) ... Because the Hudson brings its water down. You have to get the Hudson water out into the ocean, otherwise the barriers are working the opposite way, they would fill up from behind ... It's not just the Hudson. It's the Passaic, the Hackensack, the Raritan. All this inland water has to get out into the ocean.

You have two options: Either you open the gates and let the ocean in and equalize, or you have to pump out this river water and keep the ocean out all the time. We would become essentially like New Orleans, which has levies and dikes around it. They are below sea level and rely on huge pumping systems to keep out the water from the higher Mississippi and the ocean. They pump it out all the time. 24-7/365. Those systems have to work all the time. To do such a pumping system for New York — that would produce a lot of greenhouse gases. It's another

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reason why this is unsustainable.

GG: What does such a pumping system do to the natural ecosystem?

KJ: We don't know. We haven't done any studies. That's why I think the Mayor is smart. He understands the issues. He realizes that solving all of these problems, and others still coming out for barriers and their environmental impacts that will be unacceptable, will take 10 to 20 years. He wants to do something that's doable now, and that's doable on the nickel of the city. Rather than wait for federal money raining down and hoping for the best ... and having NYS, NJ, CT and almost 300 jurisdictions agree to a big plan for a delta works ...

GG: So you're saying that the barriers don't address the core issue?

KJ: The ocean will rise to the point where it will encroach certainly on the neighborhoods out in Breezy Point, Newtown Creek, parts of Manhattan, Jersey City... Current discussions on barriers miss the boat: sea level rise. I don't know why that's not under discussion.

That's what your article has to point out: Folks, you're missing the big picture. You're fiddling around on the edges — the scary edges of stormy days... The barriers will be effective only for the scary edges ...

But my concern doesn't become effective until sea level rise reaches 4, 5, 6 feet or more. And it will effect gradually first the lowest-lying areas, and then gradually go up .... That's where all those regulations — the ABFEs — come in. There's a lot at stake right now: how the city wants to shortcut the red paper for rebuilding quickly now, while on the other hand look to the future and insist on rebuilding at higher elevations (and other protective measures).

GG: What does the latest data say about sea level rise relative to New York City?

KJ: The NPCC came out with two forecasts. One was based on IPCC data, which essentially

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had 2 feet of sea level rise by the end of the century. But with a footnote. It leaves out the ice melt in Greenland and West Antarctica. Knowing that shortcoming of IPCC, the NPCC came out with a second model that did the best we could in taking into account historic geological sea level rise rates that have occurred at the end of glaciation times, and took other projections from satellite measurements for this second scenario. That is called Rapid Ice Melt Scenario — RIMS. It has 2 feet of sea level rise by the mid-50s; 4 feet by the mid-80s; and if you project to 2100, it's essentially 5 feet, plus/minus 1 foot by the end of the century.

If you take the 6 feet from the RIMS, which I personally think is the more likely value, that's when the barriers become dysfunctional. Once you have 6 feet, you start to inundate a lot of areas, particularly if you have weather on top of that. The new BFEs will have to be updated twice between now and the end of the century to keep up with sea level rise.

GG: Of all the impacts of climate change discussed in the NYS Climate report — severe weather, heat waves, etc. — is sea level rise the core issue?

KJ: Yes. Sea level rise is the ultimate fate of the city. The heavy precipitation, heat waves don't challenge the existence of the city. Sea level rise gets at the jugular. It truly threatens the livelihood of the city as we have it now — unless it adapts. It can adapt. It can be a totally lively city without barriers. We are lucky. We have high ground within our boundaries. Neither New Orleans nor Amsterdam nor Venice have that luxury. We have that luxury. We just have to move together on higher ground.

Unfortunately, Jane Jacobs may not like it. We may have to modify some of our low-rise neighborhoods and make them higher-rise neighborhoods. At least we have that option. We better do it in the form of a planned, managed retreat, rather than chaotic reactions to the Sandy's of the future. That's where urban planning comes in.

That hasn't sunk in yet, even with the forward looking folks in the Mayor's Office of Long-Term Planning and the Department of City Planning. They still think in decades, instead of a century or longer.

GG: Where is the city in terms of thinking about the rest of the 21st century?



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KJ: I'm kicking them left and right. It's like moving mountains.

GG: Will all Zone A areas eventually have to be evacuated?

KJ: Not wholesale. Many of them will be evacuated and transformed into a nice waterfront, green parks, more than we ever had asked for. There's a wonderful future to be seen. It's an incredible opportunity for NYC. Those structures and buildings that we want to keep there — there are several options ... The Customs House (in Lower Manhattan) could be lifted up. Or, cheaper, you just give all this basement stuff up. Waterproof it, etc., and take out all the electric control systems from the basement of that building ... put them up on the roof, or the 10th floor ... that's a small price to pay.

GG: What about all of the buildings that are owned and operated by the NYC Housing Authority in these areas?

KJ: Let's take the public housing in Red Hook, which is in bad shape after Sandy. They still have boiler trucks outside ... I guess theoretically you could lift them up, but I think it would be cheaper to build new ones if you insist on having structures like them at such locations. It would be much better to find a place within the five boroughs to create new public housing that's safe. All the houses that were built out on Coney Island and the Rockaways, it's so unsustainable.

All that stuff that was built north and south of Newtown Creek, the waterfront of the East River ... These were all plans that have been in the works for 10 to 20 years. At that time, nobody had any idea that sea level rise and climate change would play into it. Same thing with Willets Point, Hunters Point and all these development projects ... Look at the Westside Yards.

Our institutional inertia is 10 to 20 years out of pace with our climate knowledge. Unless we make changes — that's in the hands of the mayor. He can whip those plans into shape. He's treading too slowly on incorporating those changes, I think.

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GG: Where is the mayor's inertia coming from? Is it intellectual? Is it pressure from the real estate industry?

KJ: It's everything. They all work in the wrong direction. We are all in risk denial. I am sometimes in risk denial. It starts with the individual, then come the institutions, and then come short-term interests like the real estate industry ... Developers hold onto risk only for the time it's in development, and then they sell it to whoever buys it. The risk is transferred to the new owner ... There's no law that tells the developer to tell the new owner what the risk is, or — more consequential — (that he or she is) liable for it.

GG: You have stated that the thrust of PlaNYC was not to prepare for climate change, but, rather, to plan for a projected one million new residents by 2030.

KJ: Everything else was an afterthought, which was pushed by the scientific community ... (Climate change) was patched on to it. It wasn't the original motivation for it ... The updated plaNYC that came out three years later faced climate change much more upfront, but still only in a short term way. If you read the language, you see it was not written by scientists. Why should it be? For instance, there are sentences in there that say we have a fixed amount of land and we have to make better use of the land. We don't have a fixed amount of land. It's being reduced (by sea level rise). That wording is wrong. The thought is wrong. Intellectually it hasn't sunk in.

GG: Are you saying that the operating premise for PlaNYC has to be different? For instance, how do we plan for a potential 6 foot sea level rise at the end of the century?

KJ: And it doesn't stop at 6 feet at the end of the century. It will accelerate for at least 200 years. Maybe in 500 years, it will start to level off if we get a Kyoto-like protocol. Which we still don't have. So this city will have to live with an ever smaller footprint. And we can tell roughly where it's going.

Maybe future generations will come up with some smart way of carbon sequestration ... But it won't affect sea level rise for another 500 years ... Because we have front-loaded so much CO<sub>2</sub> into the atmosphere ... By all likelihood, we are locked into sea level rise for a long time.

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The density patterns of the city will have to be changed. We will have to move together on the high ground we have, and hand the filled-in lands at the edge of the city back to the sea. Yes, we are a waterfront city — but with the luxury of high ground. There will be losers. There will be winners.

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*Photo of Sandy from NASA.*