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Tokyo Is Preparing for Floods ‘Beyond Anything We’ve Seen’

By Hiroko Tabuchi
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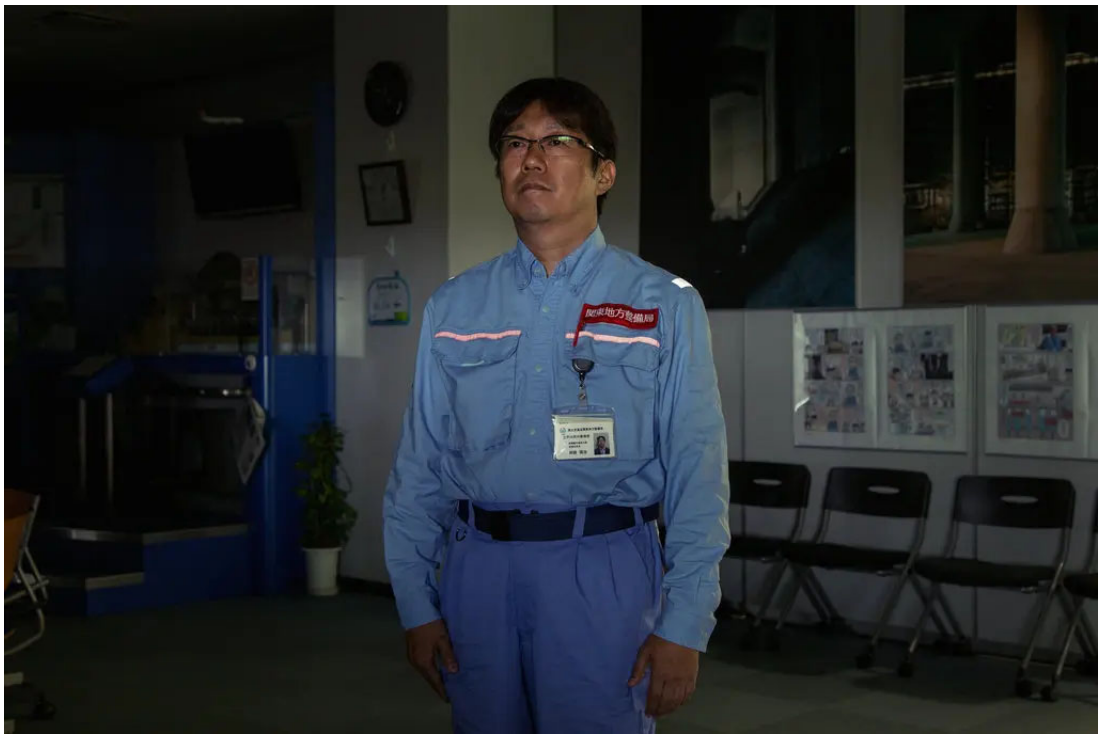
KASUKABE, Japan — The cavernous underground cisterns here north of Tokyo could hold the Statue of Liberty, a scale that underscores the site’s immense task: protecting the world’s most populous metropolis from flooding.

Linked by tunnels that divert water away from the region’s most vulnerable floodplains, the $2 billion underground anti-flood system, completed in 2006, is an extraordinary example of the defenses that global cities are readying as they face an era of extreme weather brought on by climate change.

In the United States, towns and cities battered by a string of devastating hurricanes are just starting to come to terms with what it could take to bolster their storm protections. Houston city officials have pleaded for state and federal funds to help build a new $400 million reservoir that could keep storm water from inundating downstream neighborhoods.

“We’re preparing for flooding beyond anything we’ve seen,” said Kuniharu Abe, who heads up the underground site. “Until now, at least, we’ve been successful.”



Kuniharu Abe, head of the underground system designed to protect Tokyo from flooding, in Kasukabe. Kentaro Takahashi for The New York Times

But even in Tokyo, the onset of more frequent and intense storms has forced officials to question whether the region’s protections are strong enough, a concern that has become more urgent as the city prepares to host the 2020 Olympic Games.

Across Japan, rainfall measuring more than two inches an hour has increased by 30 percent over the past three decades, the Japan Meteorological Agency estimates. The frequency of rainfall of over three inches an hour has jumped 70 percent. The agency attributes the increase of these intense rains to global warming, heralding a new era in a country that is already among the world’s wettest, with a language that has dozens of words for rain.

Rising oceans also make the Tokyo metropolitan region, home to 38 million people, vulnerable to storm surges, even as major redevelopment projects open up the previously industrial waterfront to new residences and businesses. And years of pumping groundwater has led some parts of the city to sink by almost 15 feet over the past century. Wide areas of Tokyo now sit below sea level, protected by aging dikes.

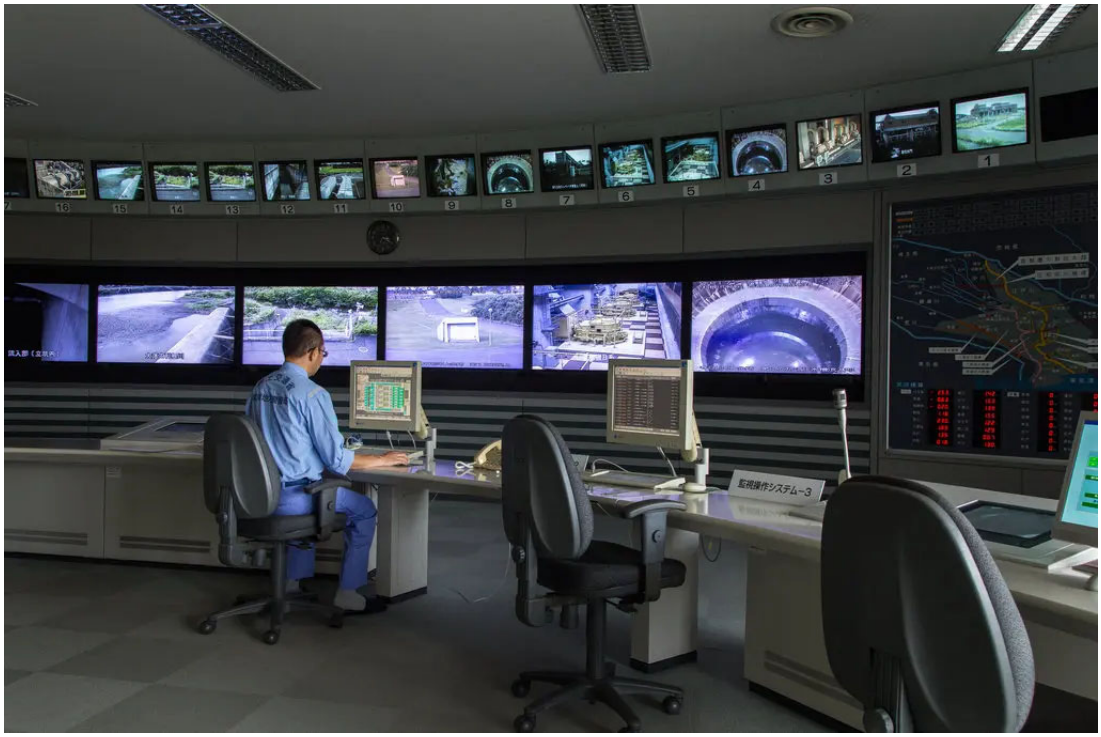
A section of the underground system. Extreme rainfall, along with the potential for earthquakes and tsunamis, make Tokyo and neighboring Yokohama the riskiest metropolitan area in the world, according to a 2014 study. Kentaro Takahashi for The New York Times

Extreme rainfall, along with the potential for destructive earthquakes and tsunamis, make Tokyo and the neighboring port city of Yokohama the riskiest metropolitan area in the world, according to a 2014 study of natural disaster risks by the Swiss Re reinsurance firm.

In late 2015, heavy typhoon rains wreaked havoc across greater Tokyo, forcing a record 670 million cubic feet of water into the underground facility, known as the Metropolitan Area Outer Underground Discharge Channel. It took four days for the site’s four large pumps — powered by engines similar to those used in a Boeing 737 jet — to clear the deluge.

“Tokyo faces dangers on all sides,” said Nobuyuki Tsuchiya, an anti-flooding expert and the former head of civil engineering for Tokyo’s flood-prone Edogawa ward. “It’s difficult to say that it’s doing enough.”

A big challenge lies in Japan’s deteriorating government finances.



Yasuyuki Osa, Mr. Abe’s deputy, in the tunnel system’s control room. Kentaro Takahashi for The New York Times

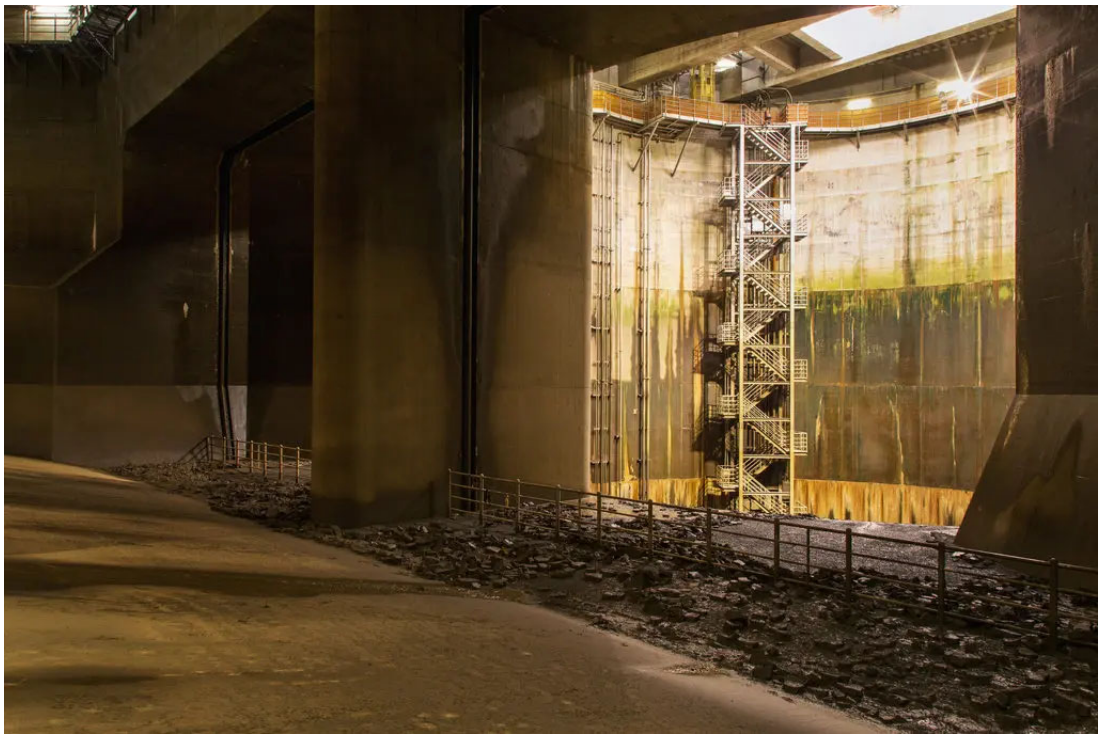
In late 2015, typhoon rains forced a record 670 million cubic feet of water into the underground tunnels. It took four days for the site’s four large pumps to clear the deluge. Kentaro Takahashi for The New York Times

Work began on the facility here in Kasukabe in the early 1990s, at a time when Japan was pouring funds, and concrete, into huge public works projects. But now, with a government debt more than twice the size of its economy and spiraling costs of caring for an aging population, the country is less able to muster the resources to fund such ambitious projects.

Even Mr. Abe, who runs the Kasukabe site, acknowledges that the sprawling operation may have been a one-time feat. And the visitors he gets from developing countries interested in learning about the site, he said, often raise their eyebrows when they learn of the construction costs.

“I’m not sure Japan can build something like this again,” Mr. Abe said.

Experts have also questioned the wisdom of erecting more concrete defenses in a country that has already dammed most of its major river systems and fortified entire shorelines with breakwaters and concrete blocks. Some of these protections, they say, only encourage development in regions that could still be vulnerable to future flooding.



Some wonder if flood defenses create a false sense of security and encourage development in regions that may remain vulnerable. “There’s a limit to what you can do with hardware,” one expert said. Kentaro Takahashi for The New York Times

In eastern Saitama, where the Kasukabe facility has done the most to reduce floods, local industry has flourished; the region has successfully attracted several large e-commerce distribution centers and a new shopping mall.

“There’s a limit to what you can do with hardware, and it leads to a false sense of security,” said Toshitaka Katada, a professor in disaster prevention at the University of Tokyo. Investment in infrastructure needed to be paired with more public education in disaster survival skills, like familiarity with local flood hazard maps or evacuation protocols, he said.

(Here, Prof. Katada has a convincing track record. A program he led in the coastal city of Kamaishi that drilled schoolchildren to run to higher ground in the event of a tsunami is credited with saving some 3,000 lives when 50-foot tsunami waves struck the city in 2011.)

Visitors can tour the system, which cost $2 billion and was completed in 2006. Kentaro Takahashi for The New York Times

Still, the Kasukabe operation remains a critical part of Tokyo’s defenses, say officials at Japan’s Land Ministry, which runs the site. Five vertical, underground cisterns, almost 250 feet deep, take in storm water from four rivers north of Tokyo.

A series of tunnels connect the cisterns to a vast tank, larger than a soccer field, with ceilings held up by 60-foot pillars that give the space a temple-like feel. From that tank, industrial pumps discharge the floodwater at a controlled pace into the Edo river, a larger river system that flushes the water into Tokyo Bay.

Between floods, site managers run tours of the facility, inviting members of the public to walk on the floor of the vast tank and to peer into the murky cisterns.

“This is another important role,” said Mr. Abe’s deputy, Yasuyuki Osa, after a recent tour, “to get people to think about the danger of floods, and how we can adapt.”

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