

DOUGLAS HILL Eng.Sc.D, PE  
1925-2019  
A Personal Tribute



**Dr. Douglas Hill** passed away peacefully in his home in Huntington, Long Island on October 16th at the age of 94. He was born in the Bronx NY, growing up in New York City and Long Island. He lost his beloved wife Ruth of 69 years some years ago. Doug received a B.Aero.Eng. degree at Rensselaer Polytechnic Institute, a M.S. in Industrial and Management Engineering and then a Doctor of Engineering Science degree from Columbia University, New York City. He was a licensed professional engineer in the State of New York and a founding member of the Infrastructure Policy Group, Metropolitan Section,

American Society of Civil Engineers (ASCE). For his service to the nation, Dr. Hill was appointed as a Fellow of the ASCE,

For many years, Doug was Director of Environmental Programs at Grumman Ecosystems Corporation, where he supervised a staff with skills in systems analysis, mathematical modeling, marine sciences, terrestrial and aquatic ecology, geology, hydrology, forestry, landscape architecture and environmental planning. In an earlier life, he was a structural designer and operations analyst at Grumman Aircraft Engineering Corporation and a young naval aviator during WWII, stationed at Okinawa.

His career continued at Brookhaven National Laboratory in the late 1970s, where he was associated with the Energy Technology Systems Analysis Programme of the International Energy Agency, first as U.S. representative, then project head, and finally as a consultant. This project developed the MARKAL energy planning model <sup>1</sup>, now widely used around the world.

His other clients as a consulting engineer included the Regional Plan Association, Environment Canada (Corporate Planning Group), Korea Institute of Energy Research, and the Netherlands Energy Research Foundation. For many years Doug was an Adjunct Lecturer at the School of Marine & Atmospheric Sciences at Stony Brook University providing critical leadership and advice to the Storm Surge Research Group.

With the sponsorship of the Infrastructure Group of the Metropolitan Section of the ASCE he chaired two of its earliest conferences. The first was ***The East River Tidal Barrage: a Symposium on a Multipurpose Addition to New York City's Infrastructure***, held in 1993 at Columbia University. This meeting was co-sponsored by Columbia University, the New York Sea Grant, and Stony Brook's Marine Sciences Research Center (now School of Marine & Atmospheric Sciences). The proceedings were published by the New York Academy of Sciences <sup>2</sup>.

Delegates examined the merits of a marine engineering solution to improving the region's water quality by installing a tidal gate rectifier in the East River tidal strait. The proposal was to modify and harness the daily tidal currents streaming back and forth throughout the East River. The turbulent flow provides strong stirring and mixing and then dispersal of large amounts of treated and partially treated sewage effluent from four major treatment facilities in both directions, into both New York Harbor and western Long Island Sound (LIS) in approximately equal proportions. This characteristic of the East River tidal strait has confounded sustained efforts over many decades to eliminate or significantly reduce excess nitrogen concentrations and to improve bottom dissolved oxygen concentrations in the waterways surrounding New York City.

---

<sup>1</sup> <https://en.wikipedia.org/wiki/MARKAL>

<sup>2</sup> "The East River Tidal Barrage: A Symposium on a Multipurpose Addition to New York City's Infrastructure", D. Hill (ed.), *Annal. NY Acad. Sci.* Vol 742, pp. 193, 1994.

The rectifier, similar in principle and operation to the historic Shinnecock Canal<sup>3</sup> tidal gates and locks cutting across the south fork of eastern Long Island, would be a system of swinging gates built across the upper East River lying in relatively shallow water between the Whitestone and Throgs Neck Bridges. Operated by the natural rising and falling of the tides, the gates would close to block the eastward flow of river water into LIS during the rising tide. Six hours later, on the falling tide, the gates would swing open without the need of mechanical assistance to pump much cleaner LIS water westward through the East and Harlem Rivers, into the Harbor and out to the coastal Atlantic Ocean. This would vastly reduce nitrogen concentrations beyond what is possible using conventional methods of further upgrading sewage treatment plants and the 770 combined sewer outfalls located around the Harbor

The only other method to reduce or even eliminate the treated wastes of New York City, northern New Jersey and other communities lining the lower Hudson River and its tributaries would be to construct an immense plumbing system, collecting sewage from dozens of treatment plants and thousands of combined sewer outfalls. This waste would be collected and pumped miles out to sea (as do for example, the cities of Boston and Los Angeles). Doug realized that would be an impossible task in today's political climate, with the nation struggling to address other major infrastructure deficiencies totaling several trillion dollars. According to the ASCE's 2017 Infrastructure Report Card, the United States racks up a lowly grade of D+ <sup>4</sup>!

While working with the Stony Brook Storm Surge Research Group, Doug co-authored the technical report *East River Tide Gates: Operational Feasibility and Trade-Offs* <sup>5</sup>. This analysis indicated that pollution-control swinging gates rectifying the River's co-oscillating tidal flows would not be a hindrance to the busy shipping traffic. In fact it would actually facilitate safe navigation of the river, especially through the hazardous Hell Gate narrows. It would necessitate new traffic control measures for lengthy and slow-moving tugs and barges, many of which carry volatile oil and gasoline cargoes, bound for New England destinations.

The East River Tidal Barrage conference was followed shortly thereafter in 1994 when Doug organized a second major event: *The Baked Apple? Metropolitan New York in the Greenhouse* <sup>6</sup>. Held at the former downtown World Trade Center, this was probably the first conference in the U.S. to examine climate change mitigation and adaptation measures for a major urban area. It was co-sponsored by the Port Authority of NY & NJ, the NY Academy of Sciences, the NY Sea Grant, the Institute for Coastal and Marine Sciences at Rutgers University, and Stony Brook's MSRC (now School of Marine & Atmospheric Sciences).

The theme and questions to be debated were "*What are the likely scenarios of the impacts on New York City of climate change?*" Since nobody knew exactly how climate change would unfold in the years ahead, the delegates were split into groups and asked to determine to the best of their abilities the fate of the City and what could and should be done about protecting its citizenry and infrastructure, projecting 25 years into the future.

The three chosen scenarios were zero (*little green apples*), medium (*apple fritters*) and accelerated climate change (*apple crisp*) defined by prescribed rises in air temperature and sea level. The brilliance of the scenario method is that it avoids endless debates about climate change and how it might or might not evolve.

---

<sup>3</sup> [https://en.wikipedia.org/wiki/Shinnecock\\_Canal](https://en.wikipedia.org/wiki/Shinnecock_Canal)

<sup>4</sup> <https://www.infrastructurereportcard.org/>

<sup>5</sup> Hill, D., R.E. Wilson & M.J. Bowman, "*East River Tide Gates: Operational Feasibility and Trade-Offs*". Final Report to Greeley and Hansen on Contract CODE R909 ID: WP283 for Facilities Planning for the Upgrading of the Newtown Creek Water Pollution Control Plant. MSRC Technical Report, 2004.

<sup>6</sup> "*The Baked Apple? Metropolitan New York in the Greenhouse*", D. Hill (ed.), *Annal. NY Acad. Sci.* Vol 790, pp. 221, 1996.

Each discussion group was given one scenario – sent away and instructed to investigate the issues that the City needed to address, adapt and mitigate over the next 25 years *taking those climate changes as a given*. No judgment was made as to who was right and who was wrong about whether and how severe climate change might become.

***But in retrospect, it's worth noting that now, 25 years later, it seems that both the region and the planet are racing along the trajectory of the worst case scenario*** <sup>7</sup>.

The workshop participants also suggested the need for consideration of regional storm surge barriers that would transcend geographical and political boundaries to protect the region from coastal flooding and accelerated sea level rise as the intensity and perhaps frequency of storms increased in the quarter centennial lying ahead.

Doug continued to develop these ideas and participated in fundraising and publishing for many years as an active member of the Storm Surge Research Group. He also worked tirelessly to advance the concept of regional storm barriers or sea gates within the Metropolitan region's engineering community.

In 2009 a third conference "***Storm Surge Barriers to Protect New York City: Against the Deluge***" was organized by Douglas and held at the Tandon School of Engineering of New York University, then known informally as Brooklyn PolyTech. Sponsored by the *Coasts, Oceans and Rivers Institute of the ASCE*, it was organized with one major objective in mind: to assemble a group of leading coastal scientists, engineers, planners and government officials to investigate various alternatives for protecting NYC against the twin threats of future extreme weather events and related coastal flooding that could destroy many thousands of homes, wreak havoc to commercial and industrial property and cripple the Metropolitan infrastructure.

Major US, UK and Dutch engineering firms responded to assignments given to them by the conveners with a prescribed mission to investigate various geographic barrier locations and conceptual barrier designs. The delegate list turned out to be a *Who's Who* of international experts on storm surge barriers.

As fate would have it, the proceedings<sup>8</sup> were delayed for three years owing to technical editing and copyright issues. Doug had little patience for such bureaucratic interruptions but we persevered. The proceedings finally were announced in October 2012. This was an amazing coincidence as Superstorm Sandy tore apart Metropolitan New York that same month!

Dr. Hill was also concerned with energy policy. In 2001, he was responsible for the energy sector analysis in "***Climate Change and a Global City: Metro East Coast***", a report prepared by NASA Goddard Institute of Space Studies and Columbia Earth Institute for the U.S. Global Change Research Program <sup>9</sup>.

In 1991, he was the principal author of "***Long Island Energy Plan***", prepared for the Long Island Regional Planning Board, which anticipated the present pressing need for additional natural gas supply to this region.

At the North American Heat Island Summit in Toronto in 2002, he presented a paper, "***Castaways on the Urban Heat Island***". Another outgrowth of the Baked Apple conference, this argued that the longer and more severe

---

<sup>7</sup> ["IPCC Climate Change conference \(COP 25\)"](#), Madrid, Dec 2-13, 2019.

<sup>8</sup> "***Storm Surge Barriers to Protect New York City: Against the Deluge***", D. Hill, M.J. Bowman and J.S. Khinda (eds.), Amer. Soc. Civil Eng., pp. 259, 2013.

<sup>9</sup> "***Climate Change and a Global City: The Potential Consequences of Climate Variability and Change - Metro East Coast***", U.S. Global Climate Change Impacts in the United States.

heat waves due to global warming would particularly threaten the aged and sick populations in rundown urban housing. He proposed that the national weatherization program to repair such buildings be expanded to provide protection from summer heat as well as be made more energy efficient in winter. A small step in this direction has been taken in New York State.

In 2013, Doug organized and presented a graduate course in risk management at SoMAS, technical in nature which helped put into perspective the challenges facing Metropolitan New York, New Jersey and Long Island.

By then, Douglas was a constant presence at SoMAS, always needling our storm surge research group to press ahead with exploring the mysteries of storm surge science, including associated environmental issues, and particularly urging us to investigate the possibility of designing and implementing regional storm barriers to protect the region for a hundred years or more.

Douglas Hill was more than just a pioneer leading the way. He was a prophet. In 2009 he penned an unpublished manuscript *"Waiting for Katrina: Will Storm Surge Barriers Save New York City?"* There he methodically analyzed the European and US storm surge barrier systems and analyzed their effectiveness. He certainly rang the alarm bells as he concluded his treatise with this paragraph:

*"What do California, Cedar Rapids, Galveston – and now New Orleans – have in common? Somebody has taken charge of protecting the places from flooding. In New York City, nobody wants the problem. A grassroots effort to promote the idea of storm surge barriers was the March 2009 conference sponsored by the local professional societies. More than one hundred engineers and scientists attended the two-day event, including representatives from the New York District of the Army Corp of Engineers. Conspicuously absent, however, were invited representatives of the local entities that are needed to initiate steps to protect the city, including the Mayor's Office of Long-Term Planning, the New York City Department of Environmental Protection, the Port Authority of New York and New Jersey, and members of Congress representing some of the places that would be flooded".*

Finally he chided: *"A somnolent New York City awaits its own Katrina"*.

Well he was right and Superstorm Sandy came to pass just three years after he made his dire predictions. Now seven years after Sandy, we await the recommendations of the US Army Corps of Engineers with their *Harbor and Tributaries Study (HATS)*<sup>10</sup> where they are investigating a variety of regional storm surge barriers and perimeter structures for reducing the risks of flooding in the region, largely based on Hill's recommendations.

The Army Corps now holds the destiny of Metropolitan New York and northern New Jersey in its hands.

Thank you Douglas.

Malcolm Bowman  
Stony Brook University NY  
December 2019.

---

<sup>10</sup> <https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/>