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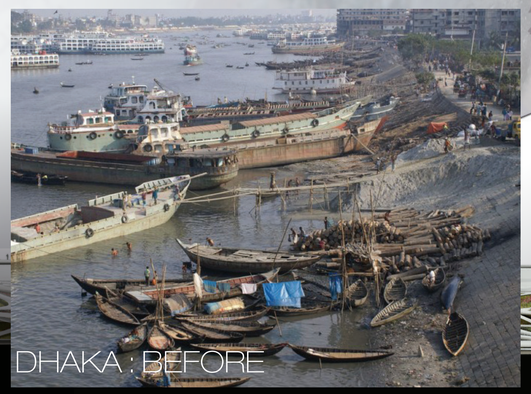
RELIEF

ADAPTABLE STORM-PROOFING

DHAKA, BANGLADESH

ABSTRACT

Although storms perpetually devastate our natural and built environment, they are a necessary component of a larger meteorological system on which we depend. It is this relationship we share with a natural phenomena that prompts us to pursue its inherent advantages. **Storm systems are capable of displacing oceanic plastic gyres**, the primary pollutant threat in our marine ecosystems. This grants us the opportunity, in turn, to collect and recycle plastic as storm-proof infrastructure. Digital fabrication, specifically 3D printing, allows us to deploy this material in the most versitle, and innovative schemes. The notion of adaptive, parametric solutions invites the concept of a worldwide-applicable system . We propose a progressive timeline, one which will protect our cities, and clean our oceans in years to come.


DHAKA : BEFORE

deployable **flood barrier,** present during storms

enjoyable riverfront

Clean River

Levee system designed to **protect** against storm surge

PLASTIC TAKES 500-1000 YEARS TO PHOTODEGRADE (PLASTICDEBRIS.ORG)

10 MILLION TONS OF PLASTIC ARE DISCARDED INTO THE OEANS EACH YEAR (GREENPEACE.ORG)

AVERAGE AMERICAN THROWS AWAY 185 POUNDS OF PLASTIC PER YEAR.
PLASTIC ACCOUNTS FOR 10% OF ALL WASTE BY WEIGHT (ALGALITA.ORG)

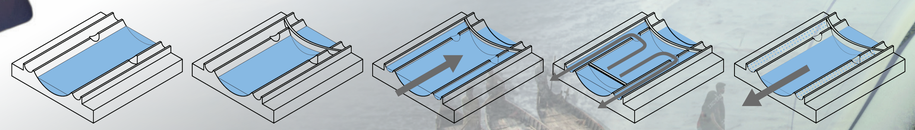
HURRICANE + PLASTIC GYRE = PLASTIC WASHUP

PRINTER BOT + PLASTIC DEBRIS = STORM / FLOOD PROTECTION

water level rise : 40'
illustrated

Plastic Collected in **Catch Basin** and sorted by **"3D Printer Bots"**

FLOOD CONTROL + POLLUTANT COLLECTION



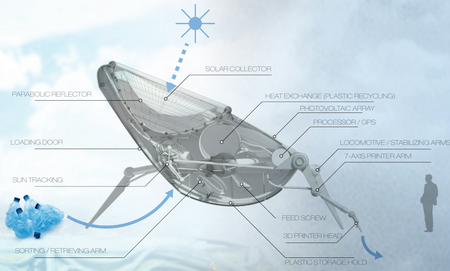
NORMAL
River flows pernormal conditions

PRE-FLOOD
Flood barrier is extended

FLOODING
Storm surge floods river within the levy system

POST-FLOOD I
Control barrier is extended, surface water is drained through peripheral canals, where bouyant pollutants are collected

POST-FLOOD II
Control barrier retracted, remainng water returns to wetlands/oceans; pollutants retained in peripheral canal

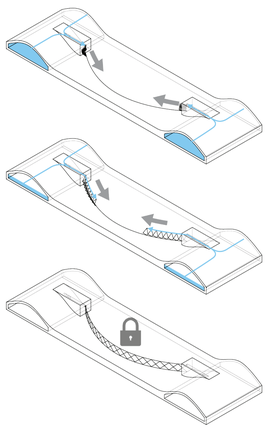


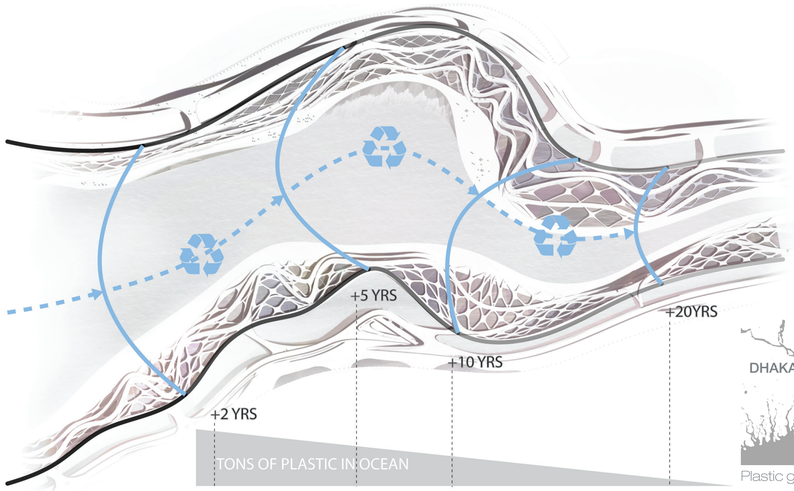
Printer "bots" are entirely self-sufficient machines which can autonomously collect, recycle and print plastic. They are solar powered, focusing the sun's heat to melt plastic into a printable slurry, and using a photovoltaic array to power locomotive, processing, and construction operations. The printer "bot" can asess any site and provide a **3D printed levee system.**

The woven, structural diagrid mimics switchbacks down the face of the levee. Sections of structural members can be printed to replicate ramps or pathways, allowing fantastic circulation over the site and **access to the water.** Plastic is 'stretched' and used to its maximum efficiency by forming thin membrane shells which are infilled with earth, similar to sandbag construction.

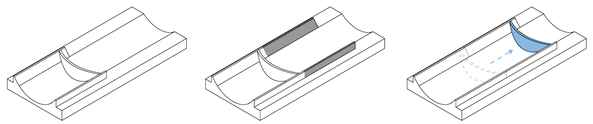
DEPLOYABLE FLOOD BARRIER

Pressurized cysterns (fed from an upstream source or previous flood waters) flood **pneumatic chambers** in the barrier, causing it to expand, and rigidly lock into position.





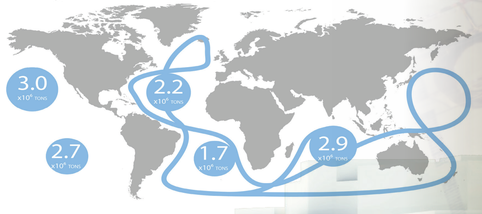
The levee system **advances upstream** as plastic is accumulated, this allows for greater protection and public assets, as well as more area for the system to gather material during surges. Flood barriers are recycled and reprinted as the system expands.



WORLDWIDE-ADAPTABILITY

Printerbots are able to fabricate plastic sails and barges, which can transport them to oceanic gyres, allowing for **worldwide collection** and distribution of plastic waste.

Plastic gyres in the **ocean conveyor belt**



URBAN CONNECTIVITY

Interface with the urban environment **provides storm shelters,** open market arcades, additional pedestrian and bike circulation, and improved recreational waterfront space.