Many of the world’s most treasured cities are either unequipped, or under-equipped to prevent or respond to the increasing intensity and frequency of natural disasters. Flood walls, levees, water retention capabilities, and drainage systems worldwide are largely designed with outmoded, historic design criteria, and fail to account for the climate change paradigm yet to come.

The project proposes a global system of levees, serving also as a new brand of urban farms at the city’s edge, preserving local ecologies while protecting cities from emerging dangers.

what are the problems?

**RISING SEA LEVELS**

With the anticipated future climate change, it is estimated that within the next 80 years, the sea level around the world will rise by nearly 1 meter.

Major cities around the world are poised for certain destruction, founded on or near coastal environments and banks of increasingly unpredictable rivers. The increasing threat of damage from tsunamis, and the ever-present risk of seasonal flooding exacerbates the pressure on cities around the world, and demands an intelligent and cost-effective preventative response.

**URBANIZATION / LAND SHORTAGE**

For the first time in history, over half of the world’s population is living in cities. At the same time, over half of the world is living in poverty. With a severe housing shortage threatening the quality of life and sustainability of rapid urban growth, many communities around the world are turning to the only land left available to them, land which is dangerously unfit for development.

Floodplains and oceanic coastlines are prime targets for informal and illegal settlements. Land here is cheap, and largely deregulated because of the very real threat of impending natural disaster.

**FLATTENING ECOSYSTEMS**

In the developing world, the systematization of the agricultural production has resulted in the homogenization of ecosystems and micro-climates, reducing the overall strength of biodiversity and the resilience of staple food crops. Modern crops are primarily monocultured, and not suited to the environment of which they are a part, failing to take advantage of robust local ecologies and their natural systems of irrigation, nutrient cycling, and pest control. This opens the global food supply to vulnerability, making it more susceptible to attack from both existing and yet unknown viruses, fungal infections, and pests.

**PROJECTED FOOD SHORTAGE**

The world’s food supply is in equally dire straits, as a majority of agricultural development exists on level ground, near current sea level, but well below projected or flood-state scenarios. The increasing population has put significant strain on the existing production strains. Food shortages around the world, caused by drought, flooding, and remote or limited access to supply has been a leading cause of conflict in the developing world for the balance of the industrial age.

**EXHAUSTED FARMLAND**

The limited reach of current shallow crop rotation practices are woefully underdeveloped and undersupported, leaving much of the suitable land available currently for agricultural production infertile or in need of remediation in the years to come.

**GEOPOLITICAL POLARIZATION**

As developed countries have significantly reduced the amount of land available for their own supply, they are turning to these already-strained areas to supplement their own supply. The natural, national resources of a majority of the globe are then shipped away for use by foreign populations, further exacerbating the desperation and conflict in the developing world.

In the long run, this agricultural colonialism is harmful to both the populations it serves, and the populations it exploits. While the developed world loses many of its resources, the industrialized world must pay exorbitantly for shipping costs, and crisis management outside of their legal and sovereign territories. As resources around the world become more scarce, this model of business and international relations will quickly become unsustainable.

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The project expands necessary infrastructural and environmental improvements to propose a more productive urban and personal life.
URBAN FUNCTIONS

what is the impact?

01 URBAN RUNOFF INLET
02 RAINFOLL
03 EMERGENCY RESERVOIR
04 RETENTION BLADDER
05 SLOPED PLANTED ROOF
06 PERMEABLE MEMBRANE
Filters runoff and agricultural waste
07 PERMEABLE PATHWAY
Filters runoff through remediating plantlife
08 IRRIGATION + DIRECTIONAL CONTROL
Control gates and valves ensure fresh water reaches zones where it is needed for farming or balancing reserves
09 FRESHWATER RESERVOIR / FISH FARM
Uses filtered runoff
10 SALWATER RESERVOIR / MARSH
Uses filtered freshwater runoff and tidal surges
11 OUTLET TO OCEAN
Filtered water released to sea

01 RECLAIMED LAND
The super-levee project provides an ordered and systematic approach to the reclamation of land and the production of new landfill, appropriating the non-toxic and biodegradable waste of the city to contribute to the city’s longevity.

02 MARINE REMEDIATION
The project introduces new marine ecology and the provision of a series of natural, small-scale harbors, ensuring sustainable development of the waterfront, while allowing for its eventual remediation. Plants at the water’s edge filters tannins and sponsors algal growth, providing new micro-climates for aquatic and amphibious life at the city’s edge.

03 WATER RETENTION SYSTEM
The large surface area of planted roof acts as a natural water retention system for the city, accumulating urban runoff, increased rainfall, and tidal surges within the system. Implemented on a rational or global scale, the network acts as a bladder, holding precious freshwater and mitigating the rise of ocean levels.

04 URBAN FARM + PARKLAND
The hyper-densified global city is able to rekindle a connection with nature, providing productive urban greenspace at its edges. The linear and continuous route along the water’s edge is ideal for recreation and casual transportation, incorporating walking, jogging, and cycling paths, screened from the bustle of the city, and without interruption by auto and rail traffic.

05 HYDROLOGIC MUSEUM
As the system is eventually flooded, samples of ocean water and marine life are automatically encapsulated in each staged level, providing a snapshot of both local and global marine conditions. With the melting polar caps, captured water at the highest levels of the network would be less and less salty, and the transition between the ecologies of the different levels would be highlighted in a hydrologic museum.

06 CYCLICAL FLOOD FARMING
As the network responds to the swells of tidal surges and events, the agricultural plots can take advantage of robust farming practices used throughout the world. By embracing flood farming of rice, grains, and hardy plants growing in sandy and silty soil, the city expands its food production while reducing its ecological impact.

07 EMERGENCY EVACUATION
At the peaks of the network, areas are pre-designated as evacuation and staging areas for response to ecologic, natural, and man-made disasters. With the support of surrounding markets and water filtration systems, these areas come pre-supplied with the means to support temporary and long-term recovery efforts.
Each stage of the levee supports the next. Clippings, compost, and surplus crops from farming levels are used as nutrients and food for a series of fish farms, marshes, and restorative dune ecologies. Waste from marine life and nutrients from algal habitats are then used to fertilize farm levels, making the levee a complete ecology.

PERMEABLE RETAINING WALL
The system of retaining walls is composed of a combination of hardscape elements and permeable membranes, regulating the interchange of ecological by-products and necessities from one level to the next.

01 TIDAL BEACH
Beach areas are well defined, protected by the levee structure. Recreational sunbathing and water sports are encouraged in and around the lowest structures. The armature itself acts as a viable micro-climate and habitat for clinging sea creatures and plant life, responsive to the changing tidal levels.

02 DUNE ECOLOGY REFUGE
At the base of the levee landscape, the structure recreates dune ecologies, with low hardy shrubs and sandy soil providing rigidity to the base of the structure, while sheltering surrounding habitats from erosion and wind. This fragile landscape, often neglected in coastal development, will serve as a much needed refuge for endangered species.

03 SALTWATER MARSH
Taking advantage of intertidal deposits during the day, and flood tidal changes during flood season, the salt marsh is one of the most productive ecosystems on earth. Seasonal cordgrass growth and decay feeds thousands of organisms from bacteria to fish, producing the most naturally nutritional fertilizer for use in agriculture cultivation.

04 URBAN FARM
The terraced levee maximizes land surface suitable for agricultural production. By recycling run-off and rain water, solid waste for composting, and biological waste from a diverse ecosystem, the new superlevée becomes food-generating infrastructure, the cultivated front lawn of the city.

05 FRESHWATER FISH FARM
Carbon-filtered water from the Urban Reservoir is channeled to feed fish ponds. The ponds, fertilized by permeable biodegradable membranes on compacted earth, collect the biological waste produced by its organisms to fertilize agricultural production below.

06 ACCESS + EVACUATION
The uppermost part of the levee structure is used for emergency evacuation in the case of severe urban flooding or the terminal breach of the levee from rising sea levels.

07 SERVICE ROAD
The evacuation area benefits not only from dry points of access and proximity to service roads, but will continue to filter and supply drinking water and surplus farm yields to the population in need during a disaster.

08 CITY MARKET
Inner terraces create space for reservoirs, screen the highway from direct impact with the views, while also serving as smaller community gardens and farmer’s market. Surplus produce and tools can be traded or sold in the market bringing citizens of all backgrounds together in the sharing and distribution of fresh food.

09 URBAN RESERVOIR / WATER BLADDER
On the city side, the infrastructure houses a reservoir for urban-runoff, channelling rainwater into the farm ecologies when water is scarce, and acting as a first line of defense for storm surges and excess spillage from rising sea levels. The reservoir filter water to a grey level suitable for feeding fish and critter ponds.

01 FISH FARM HATCHERY
02 FISH FARM WASTE COLLECTION
03 OVERFLOW AND RUNOFF CHANNEL
Draws oxygenated water back into aquatic farming
04 PERMEABLE PLANTING SURFACE
Filters runoff from rainwater and aquatic farming, planting fertilized by fish waste
05 RAMMED EARTH RETAINING WALL
Retains runoff from levels above
06 LOW MAINTENANCE VERTICAL PLANTING
Prevents additional biodiversity, air purification, and water purification for runoff
07 PERMEABLE WALKWAY
Naturally filters water into irrigation channel below
08 IRRIGATION CHANNEL
09 AGRICULTURAL LAND
10 WORM FARM COMPOSTING
Worm cultures assist in the decomposition and nutrification of agricultural waste
11 ENRICHED SOIL
12 INSECT CULTURE POLLINATION
13 SURPLUS COLLECTION + REDISTRIBUTION
Excess farm yields and gleaned crops are fed to insect larvae, which in turn feed fish.

01 how does it work? ECOLOGIC DOWNCYCLING
Major coastal cities around the world are built primarily at or below current sea level, and new communities are arising everyday in areas prone to an increasing array of sea-borne disasters. The time to act is now.