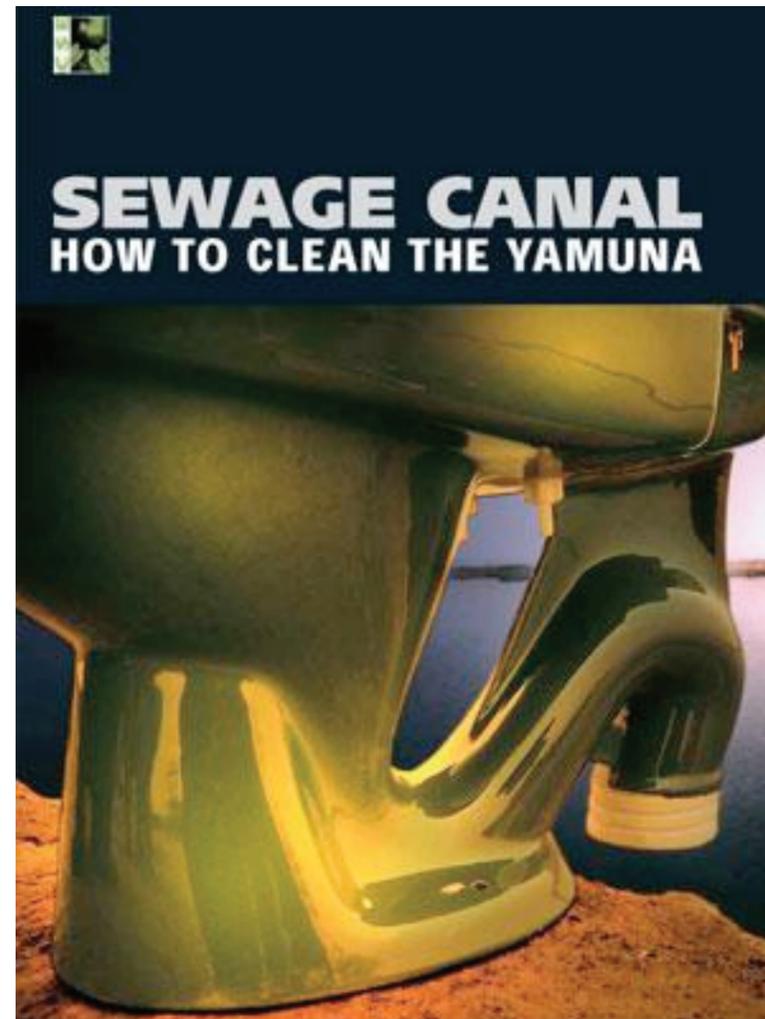
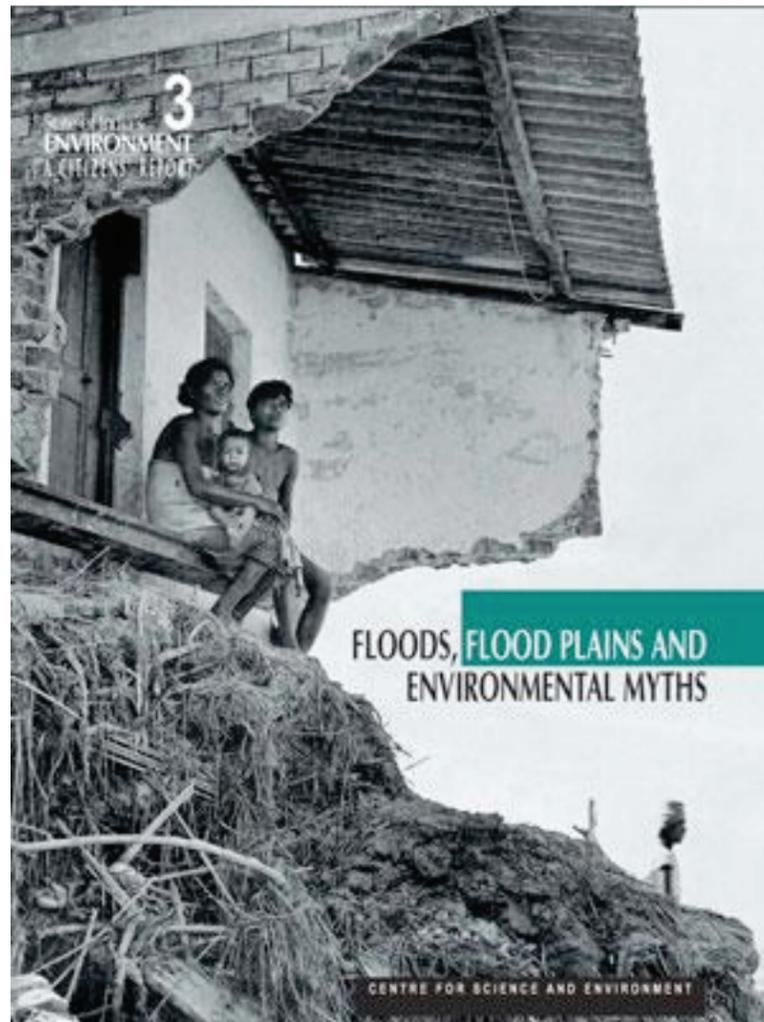


Evolving paradigms for flood and wastewater management: FROM TRADITION TO SUSTAINABILITY ... AND BEYOND



Problem:
How to understand your
current paradigm,
where it comes from
and how to
break out of it

by Tyler Corson-Rikert

4.214 Water, Landscape
and Urban Design, Fall 2010

SOUTH ASIAN PRECEDENTS

Flood and wastewater management

Conceptual evolution

TRADITION

- Simple, inexpensive technology
- Little knowledge of physical, chemical processes
- Lower density of settlement, and so lower impact
- Healthy respect for the power and logic of natural forces

MODERNITY

- Belief that technology offers solutions
- Grounded in Western thought and engineering
- Bold investment plans requiring continuing spending on operations and maintenance
- Both catastrophic and chronic failures

SUSTAINABILITY

- Acknowledging limitations of engineering
- Recognition of ecosystem services
- Incremental improvements through more intelligent and adaptive use of technology
- Beginning to rethink the range of possible solutions

BEYOND SUSTAINABILITY

- Disruptive innovation in the means of production, consumption, habitation, and environmental protection
- Mobilization of natural, human, and technological forces for change
- Dynamic, adaptive solutions to complex problems

Flood protection INDIA

TRADITION

MODERNITY

SUSTAINABILITY

Population and development on floodplains

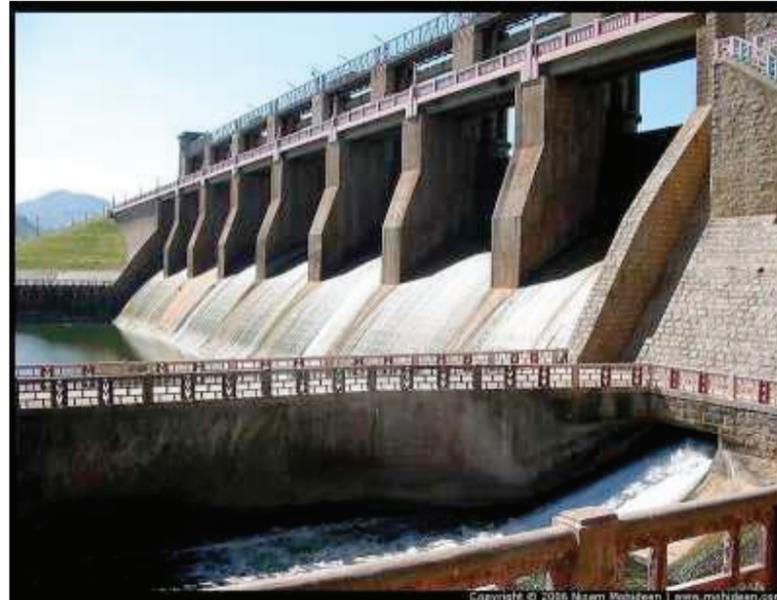
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PRE-INDEPENDENCE:
living with floods

INDEPENDENCE:
modernity through engineering

CONTEMPORARY:
the limits of engineering

FUTURE:
accomodating flooding



Flood protection USA

TRADITION

MODERNITY

SUSTAINABILITY

PRE-FLOOD
CONTROL
INFRASTRUCTURE:
periodic flooding & loss



Source: <http://4christe.tripod.com>

RELIANCE ON LEVEES:
free to build,
safe until a point



Source: <http://www.nytimes.com>



NEW STRATEGIES:
green
infrastructure,
wetlands,
and flood plain
controls



River pollution INDIA

TRADITION

MODERNITY

SUSTAINABILITY

Population and development of urban areas

??

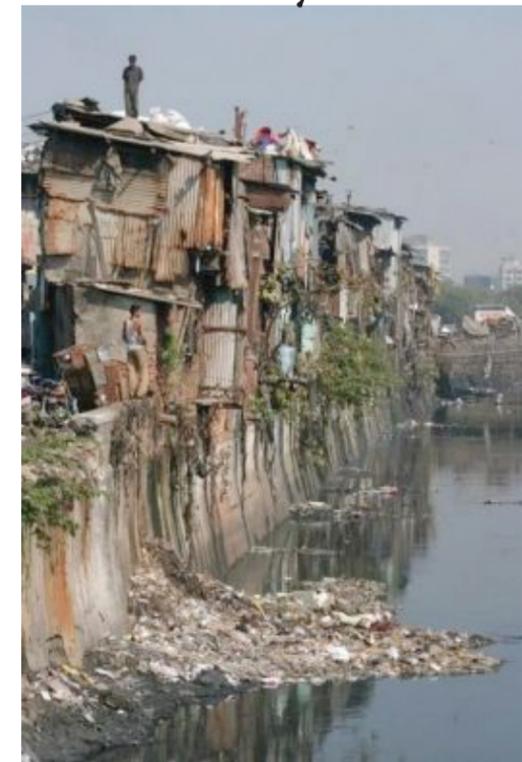
THROUGH TODAY:
sewage ditches to
polluted waterways



FAILED SOLUTION:
sewage treatment plants
& still-polluted waterways



NEEDED:
affordable
& scalable
systems



River pollution USA

MODERNITY

SUSTAINABILITY

TRADITION

GRAY INFRASTRUCTURE:

capital investments,
operations & maintenance
to meet regulatory standards

GREEN INFRASTRUCTURE:

stormwater
retention,
infiltration,
distributed
treatment

SOLUTION IS
DILUTION:

assimilation of
untreated or
minimally
treated waste



TRADITION

- Naturally shifting and flashy rivers
- Less dense settlement of floodplains
- Reliance on agriculture, but also arts and crafts
- Reliance on flooding for soil fertility.
- Clear inability to control

- Sewage disposal through open ditches
- Reliance on assimilation of waste in larger freshwater flow of rivers
- Little or no treatment beyond settling, natural biological and chemical processes
- No concern about “modern” toxic chemicals and metals
- Disease and pollution issues varying with settlement density?
- Limited understanding of river ecology and pollutant loading

MODERNITY

- With Independence, vision of modernity through engineering
- Massive investment in embankments and dams - control at great cost
- Costs in money spent, loss of fertility, water logging, catastrophic breaks, corruption
- Realization that this cannot be sustained

- National plans to clean up rivers
- Focus on construction of sewage treatment plants to meet specific water quality standards
- Inattention to operations and maintenance, sewage collection systems, treatment standards, and maintaining sufficient flow in rivers
- Existing infrastructure need financially impossible to meet, with waste load valways growing

SUSTAINABILITY

- Another future is possible through acceptance of natural forces, no longer scapegoating upstream neighbors, land reforms, modified agricultural practices, ground water development for irrigation, rainwater harvesting, flood-proofing housing, policy makers admitting they were wrong

- Need for affordable infrastructure to match the scale of the pollution problem
- New focus on water conservation and wastewater reuse to leave fresh water in rivers, attention to wastewater collection, treatment and reuse throughout the system, appropriate interventions in a range of ‘irregular’ areas like slums and urban villages, and monitoring and progressive standard setting

BEYOND SUSTAINABILITY

- Re-programming of floodplains for non-flood-vulnerable economic uses
- Floodable or elevated or floating structures
- Sophisticated flood prediction and response systems

- Leapfrogging Western technologies and strategies
- Pollution prevention / reduction of wastewater generation
- Separate residential from industrial waste at the urban scale to facilitate reuse
- At the residential scale, separate gray water from brown water flows, also to facilitate reuse

Philadelphia
is going
SUSTAINABLE
right now:

What would it
look like to go
BEYOND
SUSTAINABILITY
in Philadelphia?



Full cost
pricing



Bring
back a
buried
creek

Source: www.wplp.net

Stormwater BMPs

Harnessing of
ecosystem services

Green waterfronts
and corridors

Triple bottom line

Community mobilization

Integrated strategies

Environmental education

Economic incentives



New
habitats

Aggressive
water reuse



No pavement



Let's do
a green
economy



Why *are* there
pollutants on
the ground?



Make nature
a city thing