Urban planning with respect to flood risk

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Outline

Urban Planning Principles for Flood Risk
Development and Land Use Policy
Case Studies:
Carawang
Seoul
Wien-fluss
Urban Planning Approaches

The heart of master planning lies in:

• Identifying the problem
• Opportunities and constraints
• Goals and objectives
• Establishment of policy
• Establishment of standards to measure future development and govern current statuses of protective measures.

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Flood forecasting and flood protection
Urban Planning Approaches

Objectives of Flood Management:
- reducing exposure of people and property to flood hazards
- reducing existing level of flood damages
- minimizing soil erosion and sedimentation problems
- protecting environmental quality and well-being by reducing in-the-catchment pollution
- improving the usefulness of floodplains
- minimizing receiving water pollution

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- Flood management objectives should be implemented into policy.
- Urban Master Planning process involves:
  - Policy, goals, criteria.
- Urban Flood and Pollution Control (UFPC) Master Plan.

To be effective, the policy must recognize the need to treat developed and undeveloped land separately.

This document is becoming an inevitable planning document that directs flood and pollution controlled urbanisation in an undeveloped or underdeveloped area or mitigates adverse consequences of flooding and pollution in the areas that have already experienced flood and pollution problems.
Urban Planning Approaches

Two forms of storm-water master planning:

Preventive:
Preventive would follow a sequence of evaluation of a single stormwater basin.

Remedial:
Remedial would follow a framework less standardised and more site-specific.

Following the UFPC Master Plan approval, when funding is assured, detailed plans and designs are prepared as an advanced step toward implementation.

Preventive master plan for an individual basin includes evaluation of the basin hydrology under existing conditions in order to identify existing drainage problems.

Two approaches are common: to perform cost-benefit analysis where flood damages can be identified, the minimum of which determines the solution to implement, or to comply with the locally adopted storm water drainage criteria based on a pre-determined, commonly accepted, level of risk.
Development and Land Use Policies

- Regulation of floodplain
  - Biodiversity, good groundwater supply, good water quality, natural flood and erosion control.
Urbanisation of a natural floodplain increases the susceptibility of the neighbouring land to floods, generally making it more difficult for drainage planners to plan around.

Urban runoff does not always flow perpendicularly to the contour lines of the natural terrain because of many objects and infrastructure facilities that constitute an urban environment.
Development and Land Use Policies

- Land use and zoning plans:
  - Three foundation floodplain developments:
- preventing development from constricting floodway and allowing the flood fringes to be preserved for agricultural or recreational purpose
- preventing development from constricting floodway and allowing the flood fringes to obtain housing, commercial or industrial purpose as long as results are only insignificant increase in the surface elevation
- restricting the use of the flood plain and leaving it in its original unoccupied state

Land use management employs two principal options: zoning control and development/building control. Zoning control includes designating, by the responsible authority, the type of activity that can be undertaken within the flood-prone area. Most of the physical, social and economic problems associated with flooding, soil erosion and water pollution stormwater are attributable to inappropriate urbanisation of the floodplain, unwise land use within the city, insufficient attention to drainage in urban planning, ineffective updating of existing stormwater control facilities and lack of enforcement of zoning ordinances.

Those types of floodplain development actions are institutionally accompanied by:
- legal measures that enforce zoning, density and pace of development
- taxation measures that may guide development away from hazard areas
- government action that may alter existing land use or require compulsory purchase of the flood-prone land
Development and Land Use Policies

- Land use planning is the tool for creating another significant step, a land use program (type of activities, development pace, population restrictions etc.)

- This is usually supported by: infrastructure relocation, permanent evacuation, open space programs, zoning ordinances for limiting types of land use, and others:
  - regional planning
  - subdivision regulation
  - building codes of practice
  - housing codes of practice
  - sanitary and other utility codes of practice
  - redevelopment policies such as proper design of utilities
  - source pollution control
  - public acquisition
  - flood proofing

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Development and Land Use Policies

Further points:

- Artificial structures should be built in harmony with the rest of the environment.

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This is another example of embankment reinforcements to prevent damage to floodplain developments by means of
Case studies: Carawang

Location: Indonesia
  Western Java
  Carawang City

Catchment Area: 7180 km²
  8 Cities

Flood forecasting and flood protection
Case studies: Carawang

Problems: High level of urbanization in the river basin → conversion of forest areas

Solution: Strict restrictions for the expansion of urban areas

This policy in the short term will impact negatively on the provision of affordable housing but in the long term this policy will be more sustainable.
Case studies: Seoul

River: Cheonggyecheon
- Removal of a 6 Lane Highway
- Building of 22 Bridges
- Recreation of a nearly 6 km river
- Flood control tunnels in the embankment walls
Case studies: Seoul

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Future of Wien-fluss?

Bring the Traffic to Tunnels

A close to natural surface river

A big flood channel

Maybe dual use from the flood channel as traffic space.
Thank you for your attention