

PLANNING AND CLIMATE CHANGE: MEGACITIES' WATER AND SANITATION IN DEVELOPING COUNTRIES

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OUTLINE

- City and crisis thinking
- Growth of urban phenomenon
- Diagrams
- Circumstances shaping megacity growth and decline
- Water and the city
- Coping with Day Zero phenomenon in 21st Century
- Critical issues of urban water
- Population and water
- Asian plans for mitigation by 2050
- Disconcerting trends
- Controlling urbanisation
- Conclusion

CITY AND CRISIS THINKING

- Oswald Spengler *Decline of the West* (1923) city civilization lost – humans scavenging for cultural remnants: Post WW1 and Spanish flu (1918-22)
- 2022: Global reality of megacity: Climate Change/‘Anthropocene’, Ukraine crisis and COVID-19

GROWTH OF URBAN PHENOMENON

- Emergence of urban mindset ~6000yBP Holocene Epoch ~11 600yBP favourable moist conditions.
- Forager/hunter lifestyle adaptations in Fertile Crescent.
- Farming communities – industry - trade – culture – religion - city state
- Imperial city (Rome) *Cloaca Maxima* (Etruscan origins) 375CE
- Similar trends: Africa, Asia (Han Dynasty), Europe, South America and North America
- Since 1800 **industrial city** London (1m) - Industrial Revolution
- 1900 **imperial cities** of London and Paris and **metropolitan city** – colonial order
- 1940s **megalopolis** (onset of Great Acceleration) (Boston-Washington)
- First **megacities**? Tokyo and New York 1950:10m
- 1970s-80s awareness of Megacity (1970s MIT report to Club of Rome). Emergence of China as of 1980s
- 1990s post-Cold War: Globalisation and exponential rate of megacity growth. By 2000s megacity concept absorbed.
- **Water-energy-food (WEF) nexus** manifests – 1950s: emergence of critical thresholds in urban areas
- Formalised in water sector thinking: 2005-11)

World Population Distribution: 2021 MEGACITIES, OTHER URBAN AREAS & RURAL

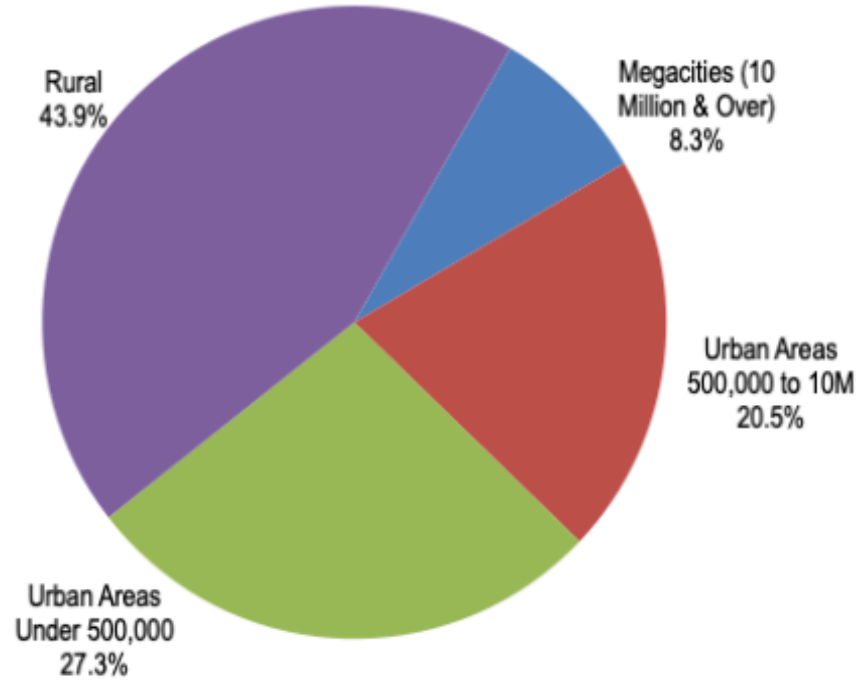
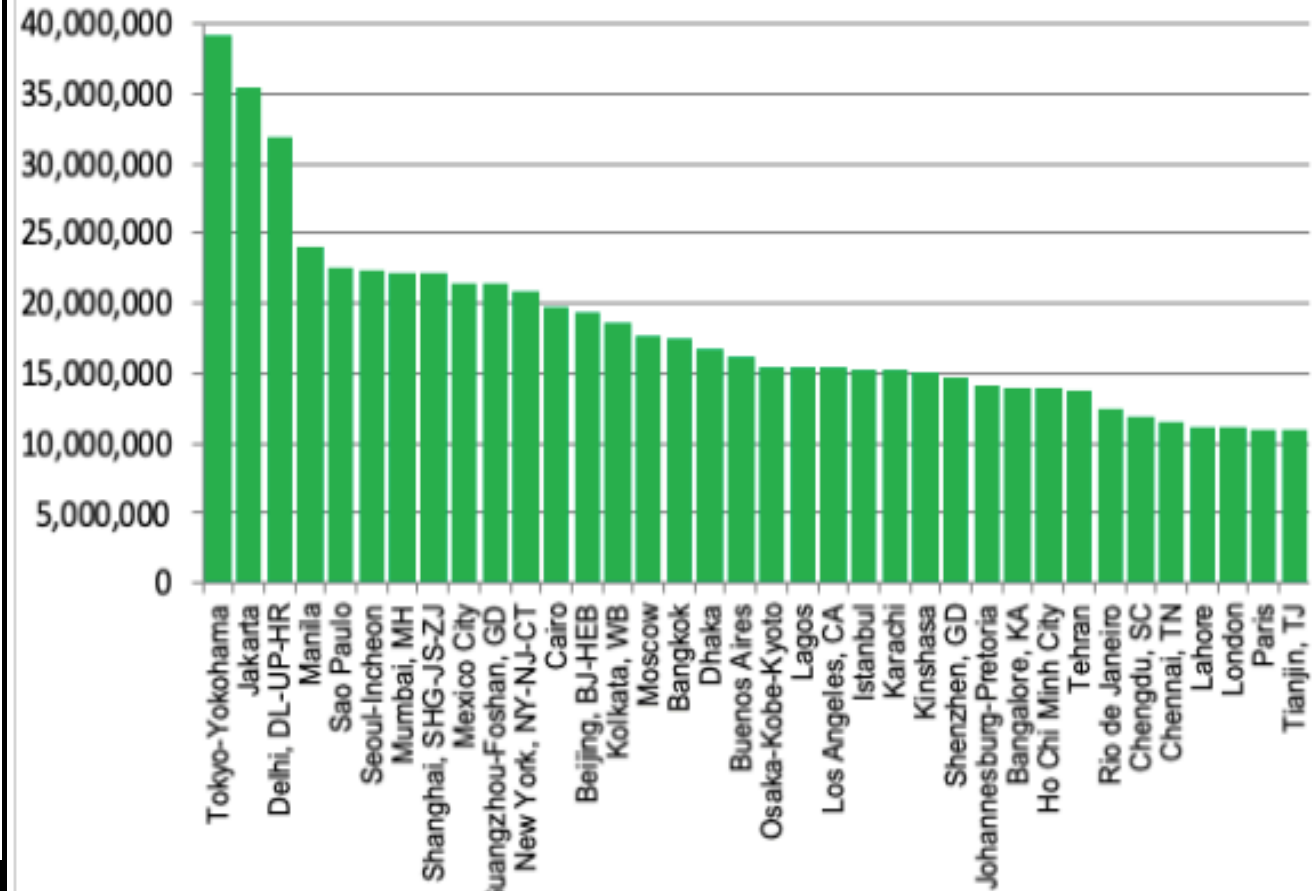


Figure 1

World Megacities: 2021 Population BUILT-UP URBAN AREAS OVER 10,000,000 (36)



Demographia World Urban Areas: 2021

Figure 2

(Cox, 2021)

CIRCUMSTANCES SHAPING MEGACITY GROWTH AND DECLINE

- **Growth:** Natural increase of population; migration; industrialization; commerce; transport and communication connectedness; education; governance.
- **Decline:** Political decisions; outmigration; housing quality decline; lack of urban planning; loss of industries; mass of low-income communities; race and lack of ethnic integration
- **Environmental factors:** Floods, droughts, cyclones/typhoons major disasters, water resources decline, decline of health conditions
- **Climate change: Ongoing contingent factor** Driver of lapses in WEF-nexus system.
- **Contingency:** No longer merely “if” and “then”. Complexity, awareness of agency in outlier developments on periphery of streams of consciousness. Requires resilience

WATER AND CITY

- Water key to development in urban areas: Fertile Crescent; India; Egypt (Nile); East Asia; South America.
- Cities synonymous with water infrastructure: irrigation; canals; aqueducts; wastewater; qanats; wells and storage systems; Archimedes screw, windmills and water.
- Population growth; industry, trade and manufacture; urban domestic culture
- Pollution -> diseases; hygiene
- Dissemination of ideas global spread.

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COPING WITH DAY ZERO PHENOMENON IN 21ST CENTURY

- DZP before the 21st century.
- Global thinking in 21st century trending: Barcelona (2008); São Paulo (2015); Cape Town (2017).
- Subsequently Bangalore, Beijing, Cairo, Indonesia's Jakarta, Moscow, Istanbul, Mexico City, London, Tokyo and Miami.
- Potential strategies to avert Day Zero:
 - Provide for multiple systems of water distribution: sub-municipal systems; private sector; individual provider
 - Greater water consciousness (Adaptation to droughts and floods)
 - Water reuse and home rainwater storage facilities

CRITICAL ISSUES OF URBAN WATER

- Environmental refugees in cities (from rural areas)
- Outbreaks of diseases: cholera, typhoid, diarrhoea
- Use of exogenous plant-life to clean wastewater
- Infrastructure unable to cope (min. 18h p/d). Energy supply
- Problems introducing, maintaining and upgrading existing infrastructure.
- Cities sinking underground because of groundwater extraction.
- Changing use of space on urban periphery farming and suburban growth (informal settlements)
- Urban infrastructure changing natural aquatic river ecosystems; pollution of seawater; larger storage dams; hydropower.
- More impervious surface areas (ISAs) unable to suck up flooding stormwater
- Asia and SS Africa: urban growth
 - loss of history and heritage;
 - different W&S systems in one city;
 - Transformations in urban planning (size of city: some the size of European states).

POPULATION AND WATER

- By 2000s 63% of global megacity people no longer in catchments (Varis, 2006).
- Most megacities in the world in the past decade emerged in Asia and Africa (Belhassan, 2021).
- 2016 33% of world's population, primarily in India and China, experienced severe water shortages (Mekonnen and Hoekstra, 2016).
- Jakarta groundwater extraction - city sinks – starting new capital (Kooy and Bakker, 2015; Wildsmith, 2020).
- By 2050 68% of the world's population living in urban areas (Alves et al., 2021; Smil, 2019). Urban areas notorious for water supply shortfalls.

ASIAN PLANS FOR MITIGATION BY 2050

- Estimates Asian cities by 2050: 193-284 large cities; 10-20 megacities
- water use efficiency;
- control urbanization in water-scarce areas;
- mitigate water availability due to climate change;
- maintain integrated sustainability analyses;
- seek local solutions for addressing water scarcity; and
- promote sustainable development

DISCONCERTING TRENDS

- City centre most rapid area of population growth in poorest countries.
- Management issues and lapses in efficient W&S management programmes (Lundqvist et al., 2005).
- Higher greenhouse gas temperatures
- More prone to severe flooding (World Bank Group, 2021) .
- Groundwater resources prone to potential contamination, because of ongoing demand for more
- Lack of adequate storage facilities (Belhassan, 2021).

CONTROLLING URBANISATION

- In recent times:
- Govts prevent urbanisation of poor to cities
- Incentives
- Provide rural infrastructure and services
- Inclusive agricultural growth
- Access to land
- Reduce population growth?
- Transitional trajectory China -> India -> Africa

CONCLUSION

- Climate change, megacities and W&S planning require attention
- Think beyond disciplinary boundaries
- Currently real-time monitoring systems
- Algorithms define water quality and quantity 24/7. Significant breakthroughs
- Nowotny:
 - We ... run the risk of a return to a deterministic world with a predetermined future that will take care of us. It will also be controlled – but not by us (Nowotny, 2020: p. 17).
- Examples of historical considerations of Mexico City, Dehi and selected cities in China explore historical dimensions of megacity origins, governance and climate change)
- Science fiction may also be necessary to understand the Gigacity (50m) of the future.
- Kim Stanley Robinson's *Ministry of the future* (2020)

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