Systems Analysis of Personal Transportation Needs and Environmental Implications in New Delhi, India - A Map based narrative

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Outline

• New Delhi – an overview of plans and infrastructure
• Creating a database to understand transportation, land use and air quality management in New Delhi
• Land use and transportation planning in New Delhi
• Air quality issues in New Delhi
Historical images of Delhi - 1

Seven cities of Delhi:
Lalkot,
Siri,
Tughlakabad,
Jahanpanah,
Firuzabad,
Sher Shahi (Purana Quila),
Shahjahanabad

Sources: A. K. Jain, The making of a metropolis
Historical images of Delhi - 2

Historic walled city of Delhi

- Built in 1638 A.D. by Shahjahan
- Fortified with wall of 6 km circumference

Sources: Breese 1966
Historical images of Delhi - 3

- Came into existence in 1911 construction completed in 1931
- Planned on a hexagonal grid system
- Dominated by wide vistas, enormous buildings and large gardens

Sources: A. K. Jain, The making of a metropolis
Modern Delhi

- Became state in 1992
- Key bodies for all municipal services:
  - MCD (Municipal Corporation of Delhi)
  - NDMC (New Delhi Municipal Committee)
  - Delhi Cantonment Board
- Has 70-member legislative assembly and a 7-member council of ministers
Infrastructure issues - Traffic corridors

Source: www.isl.uni-karlsruhe.de/vrl/resp/delhi/respdwww/overpage.html
Traffic problem areas

Source: www.isl.uni-karlsruhe.de/vrl/resp/delhi/respdww/coverpage.html
Traffic accidents

Source: www.isl.uni-karlsruhe.de/vrl/resp/delhi/respdww/c overpage.html
Infrastructure issues – Sewage treatment plants

Source: www.isl.uni-karlsruhe.de/vrl/resp/delhi/respdwww/cove/rpage.html
Infrastructure issues – Sewage problem areas

Source: Urban Environmental Maps, National Institute of Urban affairs, New Delhi 1994
Infrastructure issues – Water treatment plants

Source: www.isl.uni-karlsruhe.de/vrl/resp/delhi/responderpage.html
Infrastructure issues – Water problem areas

Source: Urban Environmental Maps, National Institute of Urban affairs, New Delhi 1994
Infrastructure issues – Landfill sites

Source: www.isl.uni-karlsruhe.de/vrl/resp/delhi/respdwww/coverpage.html
New Delhi - Data

- Land use data derived from IRS for 1962 and 1990
- Major roads, railway lines
- Census 1991 data for wards in New Delhi
- Air quality data from CPCB 7 monitoring stations

Source: IKONOS Satellite picture of Central Delhi 1999
Database development

- Sharing of publicly available data from the local level agencies such as
  - DDA
  - NDMC
- State level agencies such as
  - Government Ministries
  - Town and Country Planning Organization
- Central Government Agencies such as the Central Road Research Institute,
- And other concerned data users and providers (Academic institutions, NGO, TERI)
Land use planning for New Delhi

• Who plans for
  – the City of Delhi?
  – the NCT?
  – the NCR?

• Integrated Land use and transportation planning is vital in cities with the growth rate that we can see in Delhi. Successful cases of such integration include:
  – Curitiba, Brazil
  – Portland, Oregon, USA

• Note that the variety of land uses is high in New Delhi
Land use change in New Delhi
Transportation planning - New Delhi

• Who is responsible for transportation planning?
  – DDA
  – Traffic Police
  – DTC
  – TCPO

• The need for data in the context of traffic management
  – Origin Destination survey
  – Bus route studies to study high density routes
  – Trip generation models to study location of work and non work trips
  – Viability of light or heavy rail in high density locations
Air quality in New Delhi

• A view of changes in SPM over 22 months Jan 1999 - Oct 2000
• Note that SPM values tend to always exceed the NAAQS
• However, SO$_2$ and NO$_x$ values tend to stay below NAAQS
Health and Mortality risks

• High worker, population and children densities in the central wards and in West Delhi

• High mortality and health risks occur in the North (Modeltown, etc) and West Delhi (Gautampuri, etc) due to high concentration of SPM in these locations

• Low SPM related risks in South Delhi
Worker density (Census 1991)

Worker mortality (based on Oct 2000 air quality data)
Density of children below age 6
Source: 1991 Census

Monthly mortality for children
October 2000
Density of population
Source: 1991 Census

Asthma attacks in population
October 2000