Centre for Science and Environment
International Conference on Health and Environment

Surveillance of Drinking Water Quality - Safe Water Initiative

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External assessment of the water supply system

- Quite a few managers of urban water supply tend to hold the contentions
  - Their water supply system is unique
  - Problems are also unique
  - No scope to change
  - Affairs must be continued as they are
- Attempt is essential to change this mind set
- Mind set may be changed by external assessment of the water supply system

Urban Water Supply – Problems of Common Nature

Resources Constraints & Demand Pressure

- Rapid pace of urbanization
- Deteriorating environmental conditions
- Dwindling availability of water sources
- Sizeable investment needs
- Community culture of considering water supply as a social virtuous deed

Design and O & M

- Source selection, design and protection
- Treatment plant commensurate with site specific need
- Quality of service
- Adequacy of service coverage
- Reliability of service provision
- Post planning extension of service connections

Management and Revenues

- Consorted decision and long term policy
- Institutional and fiscal reforms
- Appropriate pricing policies
- Private sector participation
- Community involvement
- Motivation of human resources
- Reliable information system and data base

Adverse impact of the problems

- Large urban poor population lacking access to water and sanitation services
- Rest of the population remains dissatisfied with the facilities
- Health risk potential through water supply continues

Surveillance of Drinking Water Quality

SDWQ

AIMS & OBJECTIVES

- **Assessment of the present status of surveillance of drinking water quality programme**
- **Identification of deficiencies, if any, in the existing system and suggest remedial measures**
- **Action plan for improving the surveillance of drinking water quality programme**
- **Preparation of guidelines for initiating suitable measures for surveillance programme, where it is non-existent**
- **Improvement of water supply system**

SDWQ – Basis

- Assessment of
  - water quality from source to consumer end
  - Sanitary conditions
  - Leak detection
  - Infrastructure
  - Performance of manpower
  - Role of the water supply agencies
  - Financial aspects
- Action against health problems
- Remedial actions
- Institutional and organizational reforms
- Community participation
- Support for surveillance
- Legal framework
- Drinking water quality standards

Identified Cities - CPHEEO

Northern Region	**:**	**Allahabad, Bhopal, Chandigarh, Dehradun, Faridabad, Indore, Patiala, Shimla, Srinagar, Udaipur & Varanasi**
Eastern Region	**:**	**Bhubaneshwar, Durgapur, Gangtok, Guwahati, Patna, Puri, Ranchi, Raipur & Shillong**
Southern Region	**:**	**Bangalore, Coimbatore, Kochi & Vishakhapatnam**
Western Region	**:**	**Surat**

Identified Cities – WHO & CPHEEO

Northern Region	:	Agra, Delhi & Jammu
Eastern Region	:	Kolkata
Southern Region	:	Chennai, Hyderabad & Thiruvananthapuram
Western Region	:	Ahmedabad, Jaipur, Mumbai & Nagpur


CPHEEO
WHO & CPHEEO
WHO
Project Cities
N
JAMMU & KASHMIR
Srinagar
Jammu
HIMACHAL PRADESH
Shimla
Chandigarh
PUNJAB
Patiala
UTTARANCHAL
Dehradun
DELHI
HARYANA
PAKISTAN
CHINA (TIBET)
ARUNACHAL PRADESH
SIKKIM
NEPAL
Faridabad
UTTAR PRADESH
Agra
Gangtok
BHUTAN
Guwahati
RAJASTHAN
Jaipur
Allahabad
Lucknow
Varanasi
Patna
BIHAR
ASSAM
Dispur
NAGALAND
Kohima
Shillong
Udaipur
Imphal
MANIPUR
MEGHALAYA
Agartala
Ahmedabad
GUJARAT
Gandhinagar
Bhopal
MADHYA PRADESH
Ranchi
JHARKHAND
Durgapur
WEST BENGAL
TRIPURA
Aizawl
MIZORAM
MYANMAR
Surat
Indore
CHHATTISGARH
Calcutta
Raipur
Nagpur
Puri
DIU
DAMAN
DADAR & NAGAR HAVELI
MAHARASHTRA
Mumbai (Bombay)
ORISSA
Bhubaneshwar
BANGLADESH
Hyderabad
ANDHRA PRADESH
Vishakhapatnam
YANAM (Pondicherry)
ARABIAN SEA
Panaji
GOA
BAY OF BENGAL
KARNATAKA
Bangalore
LAKSHADWEEP
Chennai (Madras)
PONDICHERRY (Puduchchery)
Coimbatore
MAHE (Pondicherry)
TAMILNADU
KARAIKAL (Pondicherry)
Cochin
KERALA
Port Blair
ANDAMAN & NICOBAR ISLANDS
Thiruvananthapuram
Map not to Scale
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METHODOLOGY

Reconnaissance Visit (s) & Interaction with Water Supply Agencies

Secondary Information

Source(s)
- Quality & Quantity

Water Treatment Plant(s)
- Design aspects
- Treatment
- O & M facilities

Distribution System
- No. of distribution zones
- Population served

Municipal Solid & liquid wastes
- Collection & transport facilities
- Treatment & disposal

Health Status
- Prevalence of water borne diseases

Status of SDWQ Programme
- Infrastructural facilities
- Institutional setup with work norms
- Financial resources
- Lab facilities
- Human resources

Primary Data Collection

Planning
- Sampling Locations
- Number of Samples
- Team formation
- Time schedule

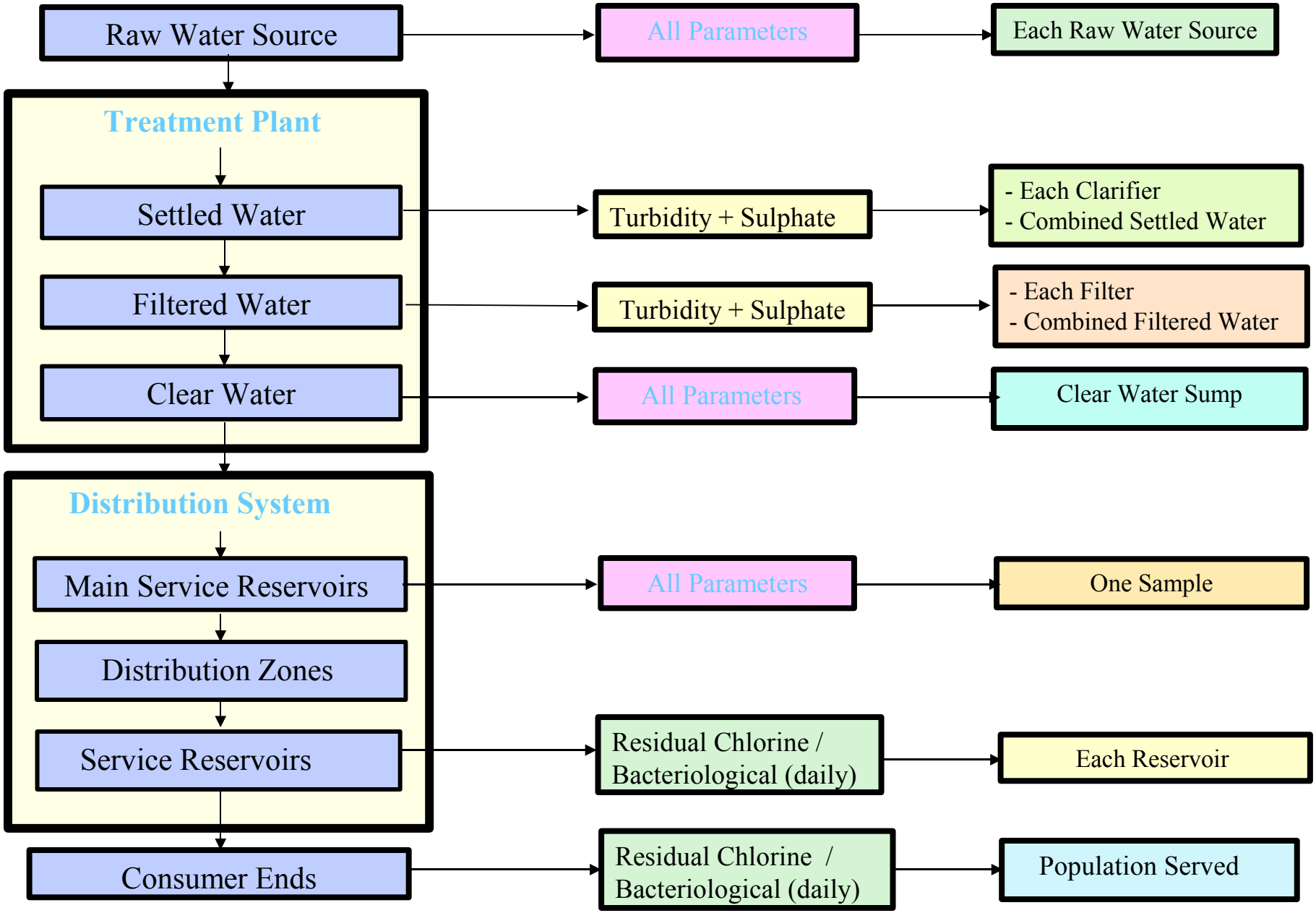
Field Visits
- Sample Collection
- Sample Analysis
- Sanitary and KAP Survey

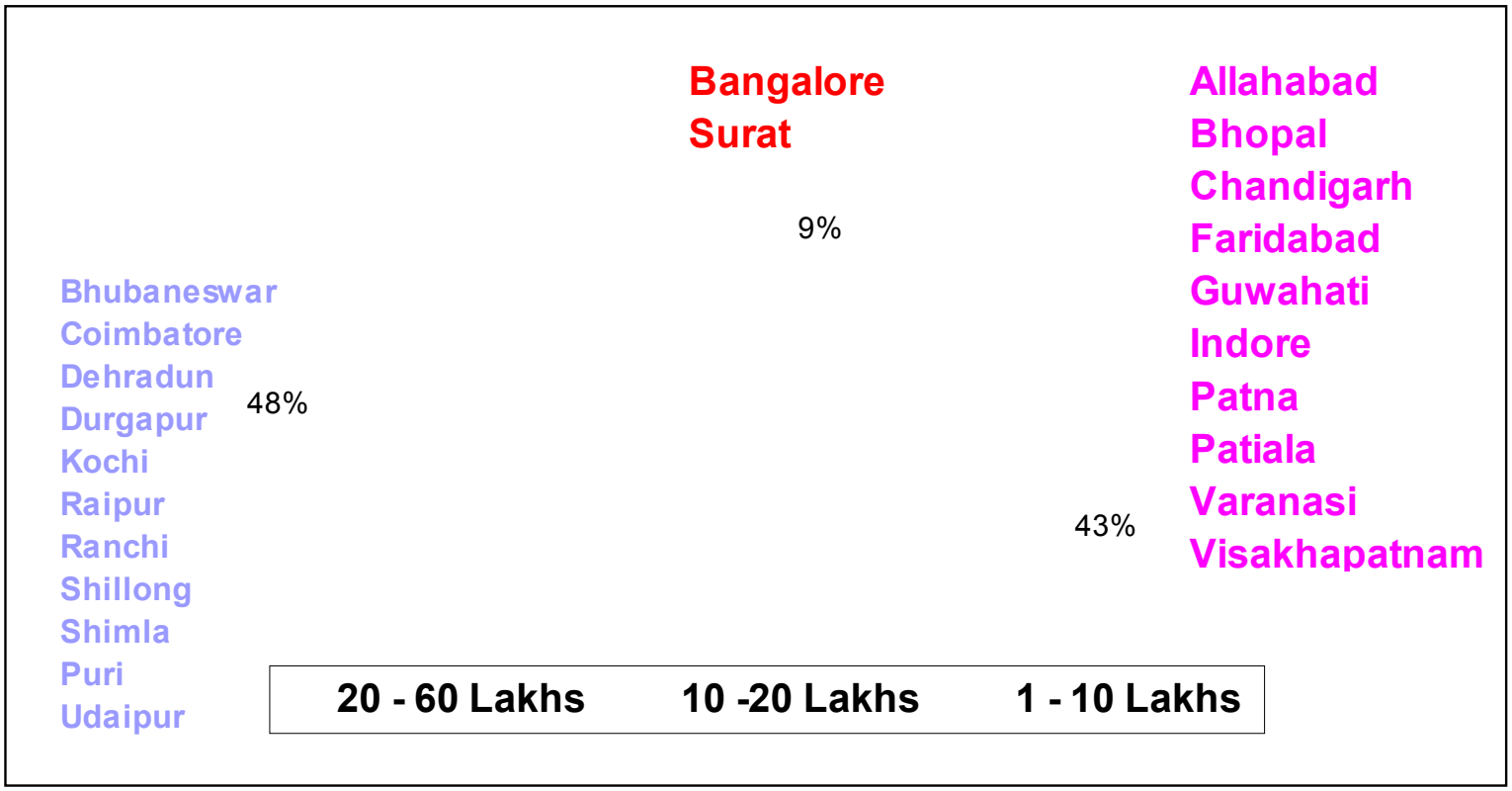
Interpretation of Results and Report Preparation

Physico-chemical and Bacteriological Parameters

Physico-Chemical Parameters	
Temperature (^{o}C)	Turbidity (NTU)
pH	Conductivity (micro mhos/cm)
Total Dissolved Solids (mg/L)	Total Alkalinity (mg/L , $CaCO_3$)
Total Hardness (mg/L , $CaCO_3$)	Calcium (mg/L, Ca)
Magnesium (mg/L, Mg)	Chloride (mg/L, Cl)
Sulphate (mg/L, So_4)	Fluoride (mg/L, F)
Phenolic Compounds (mg/L)	Sodium (mg/L, Na)
Patassium (mg/L, K)	Iron (mg/L, Fe)
Manganese (mg/L, Mn)	Copper (mg/L, Cu)
Zinc (mg/L, Zn)	Cadmium (mg/L, Cd)
Cromium (mg/L, Cr)	Lead (mg/L, Pb)
Arsenic (mg/L, As)	
Bacterilogical Parameters	
Total Coliforms (CFU/100 ml)	Faecal Coliforms (CFU/100 ml)

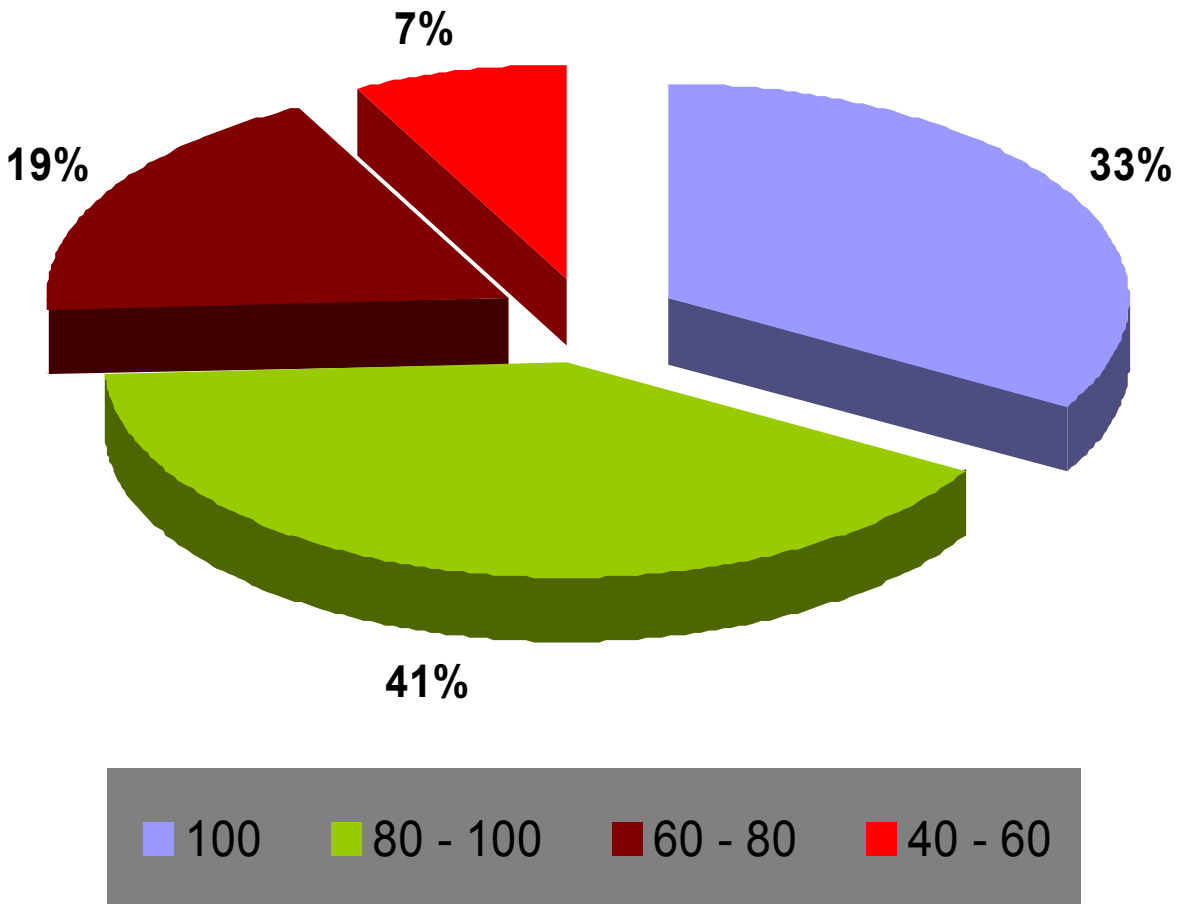
Sampling Locations and Number of Samples



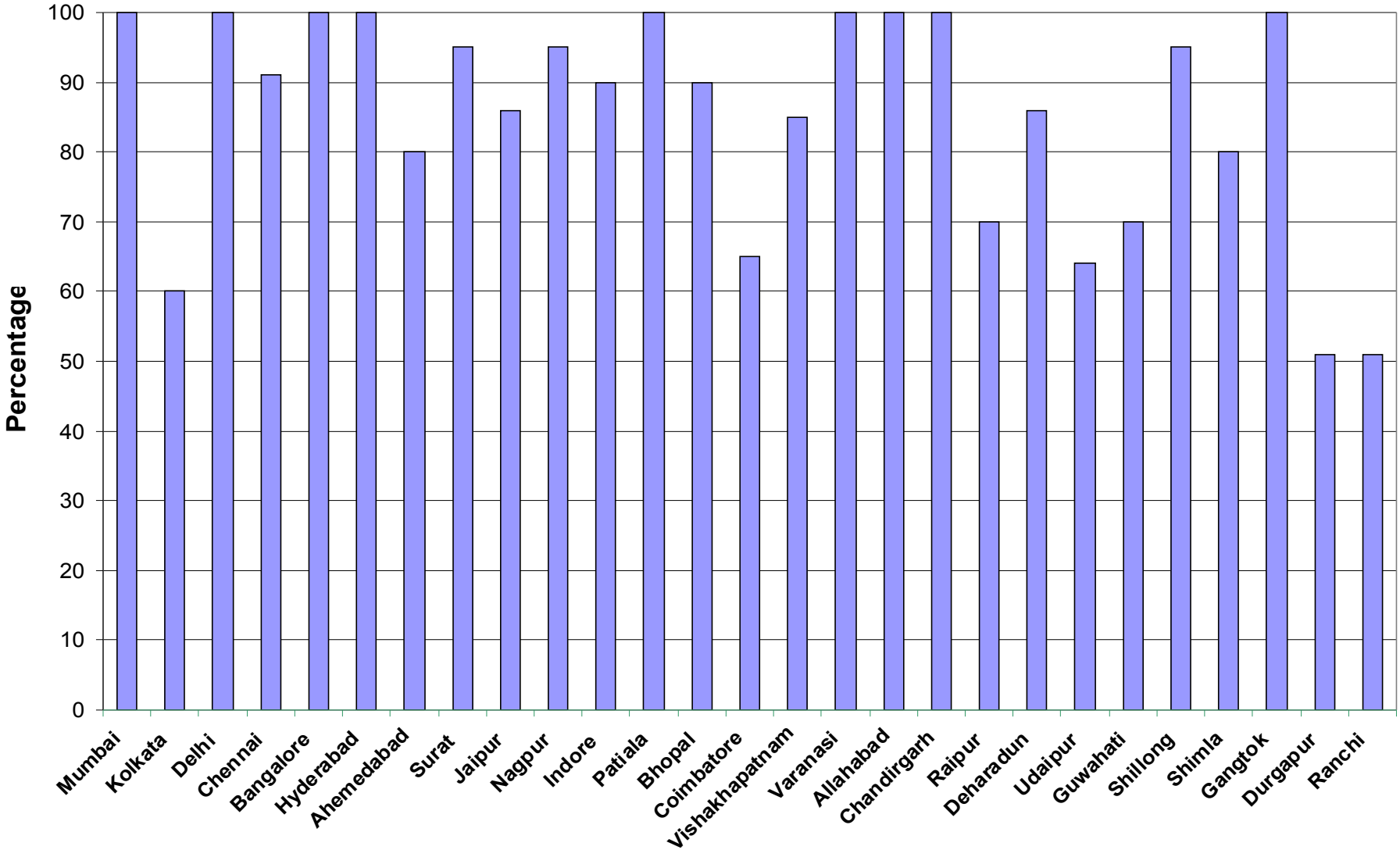


Categorisation of the Cities/Towns Based on Population

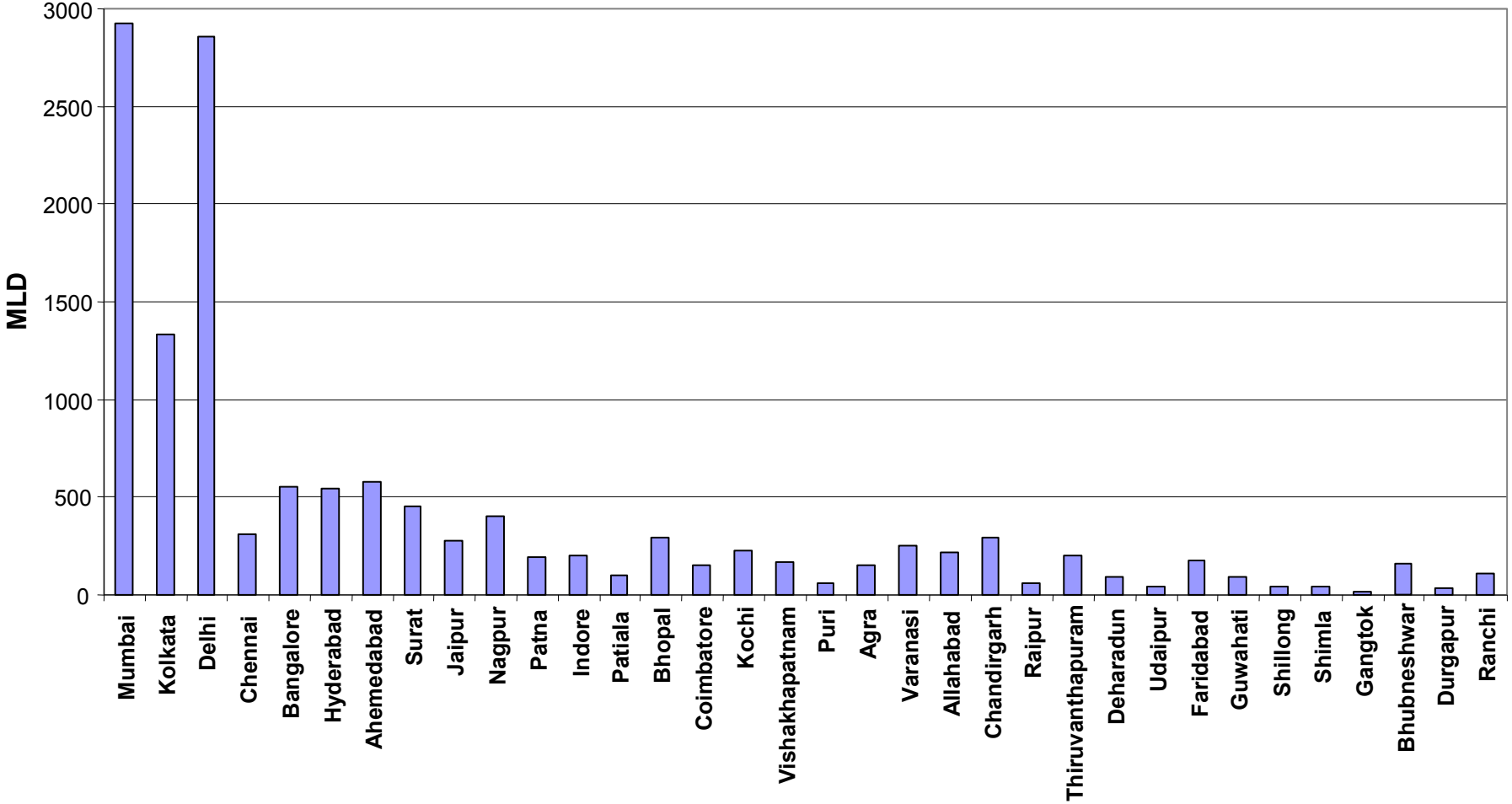
Percentage of Cities with Level of Population Served

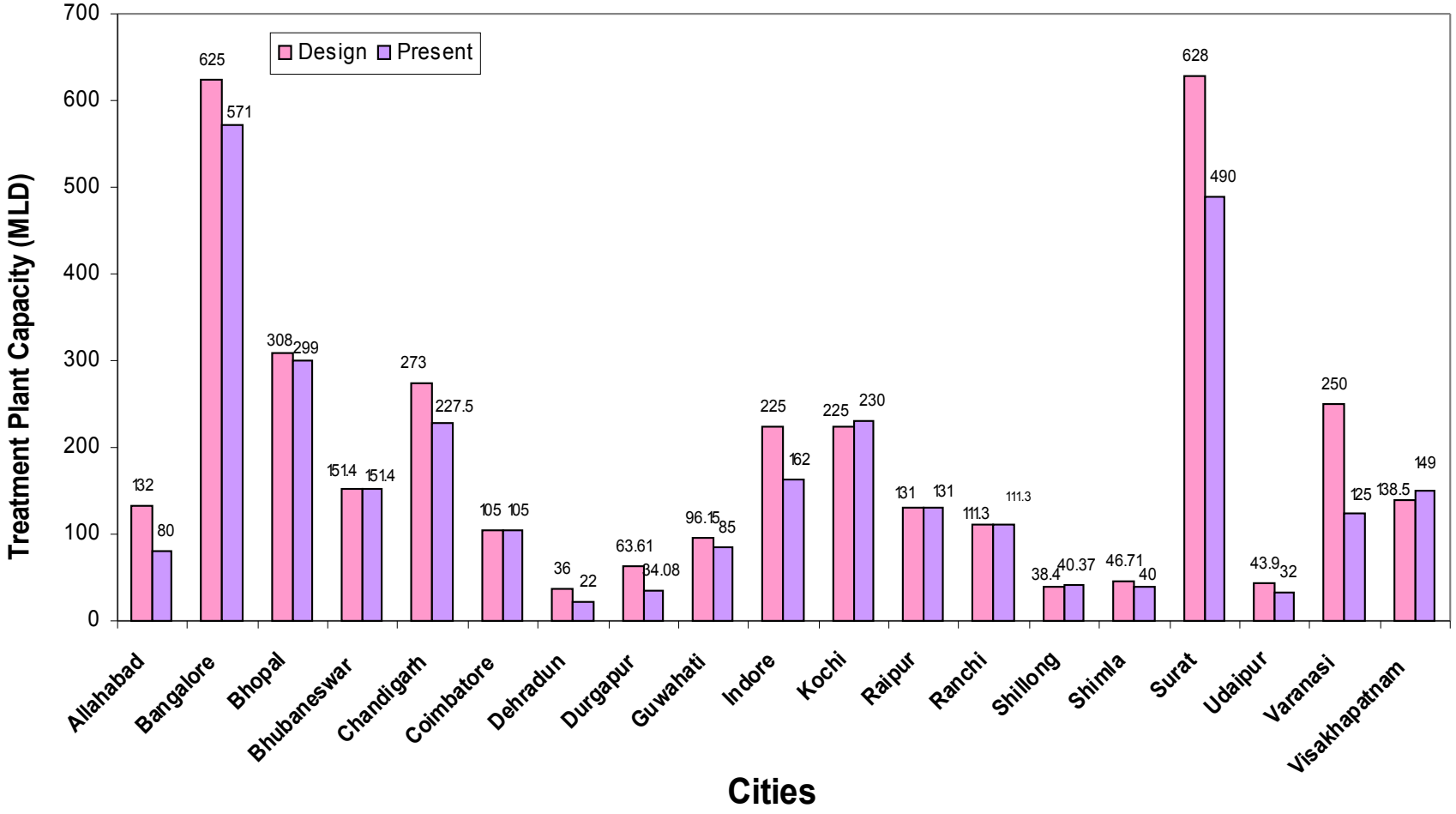


Population Served by Organised Water Supply

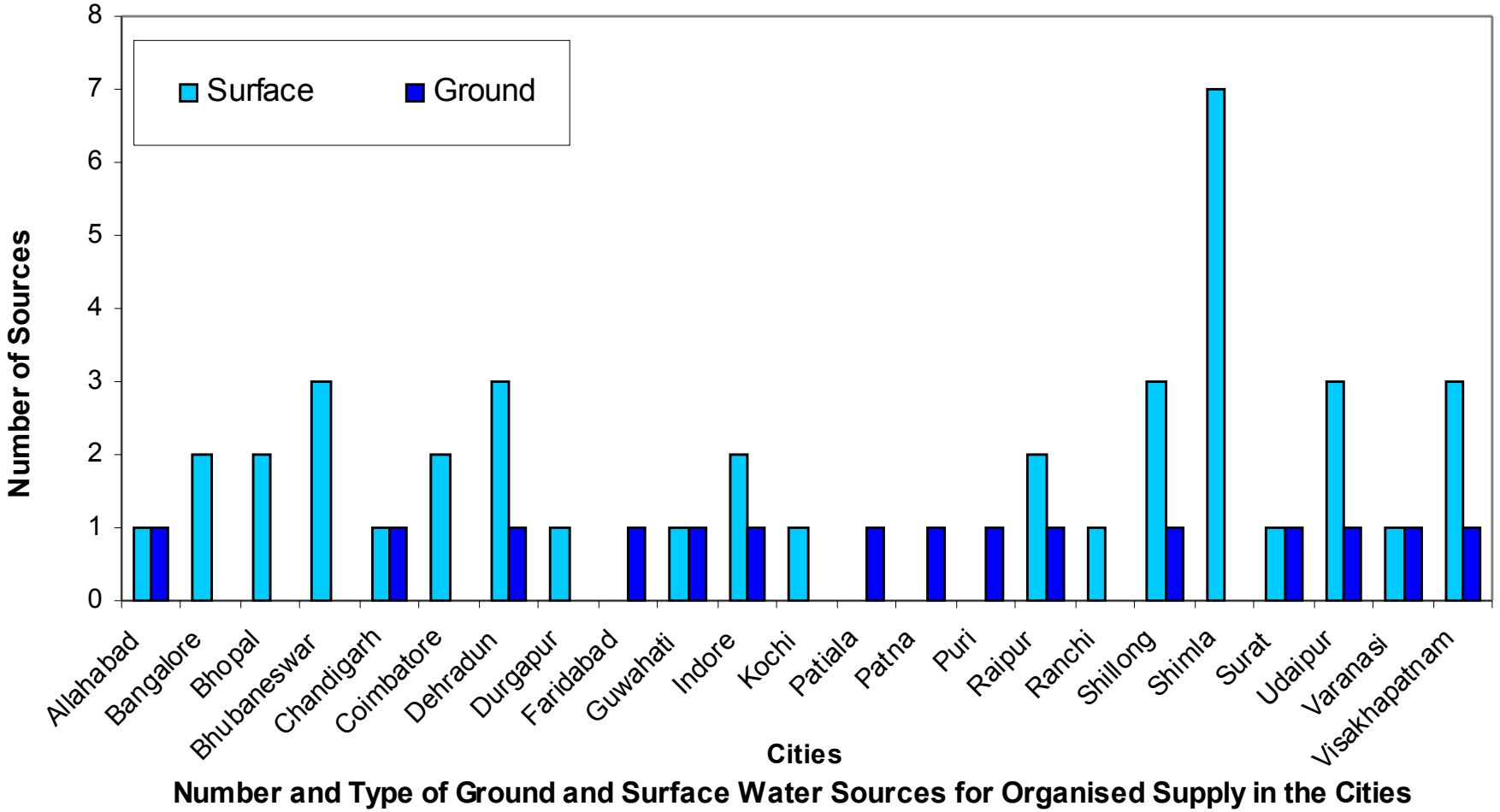


Total Daily Water Supply

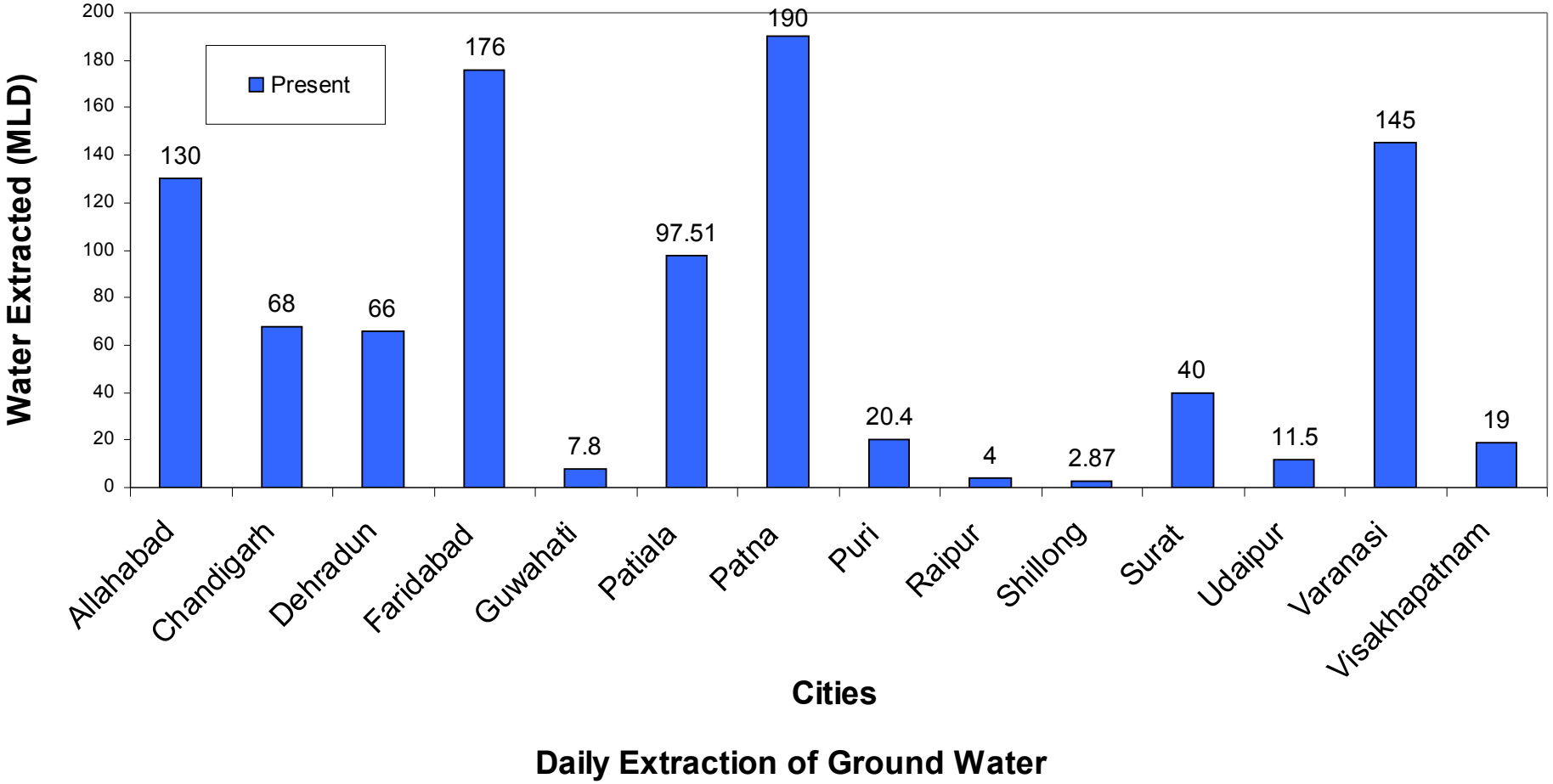




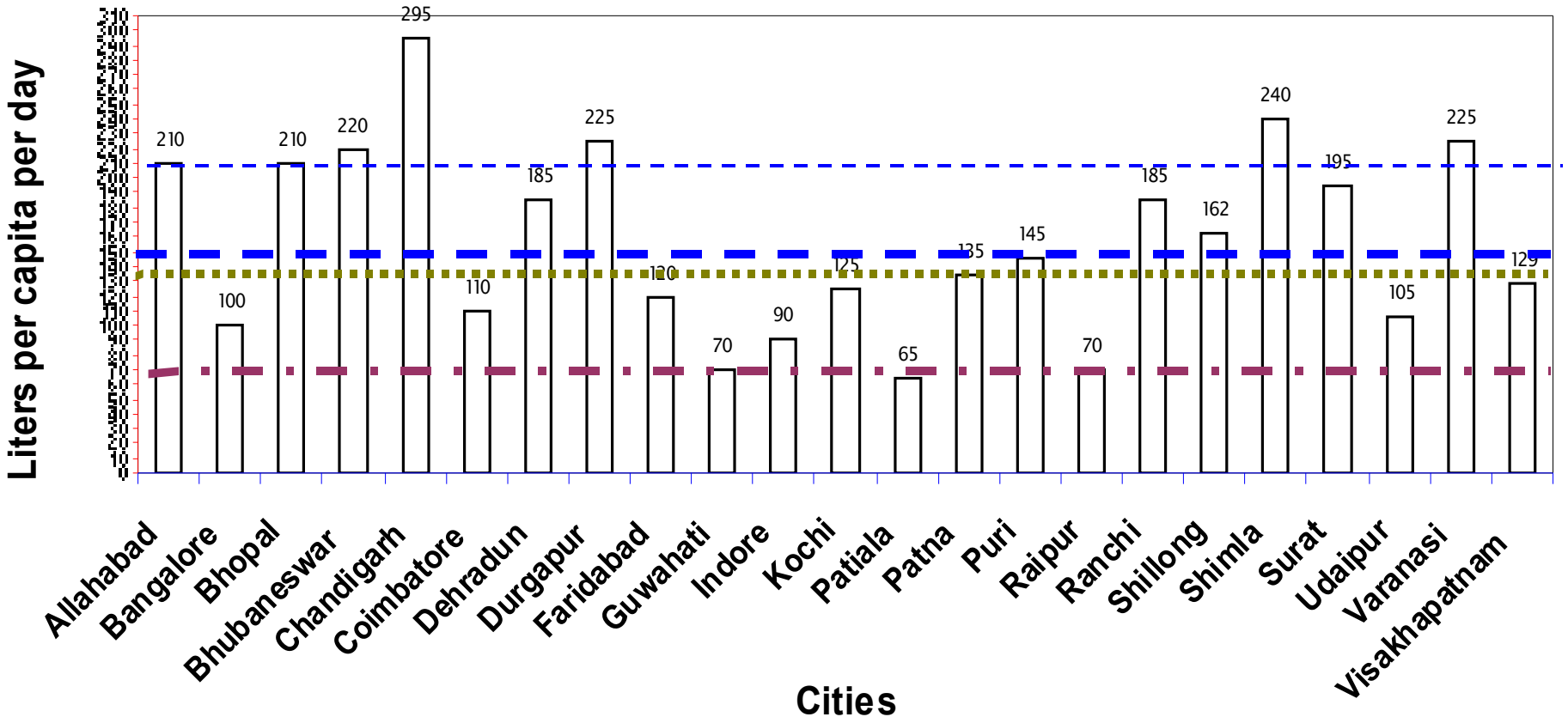
Total Design and Present Capacity of Water Treatment Plants in the Cities



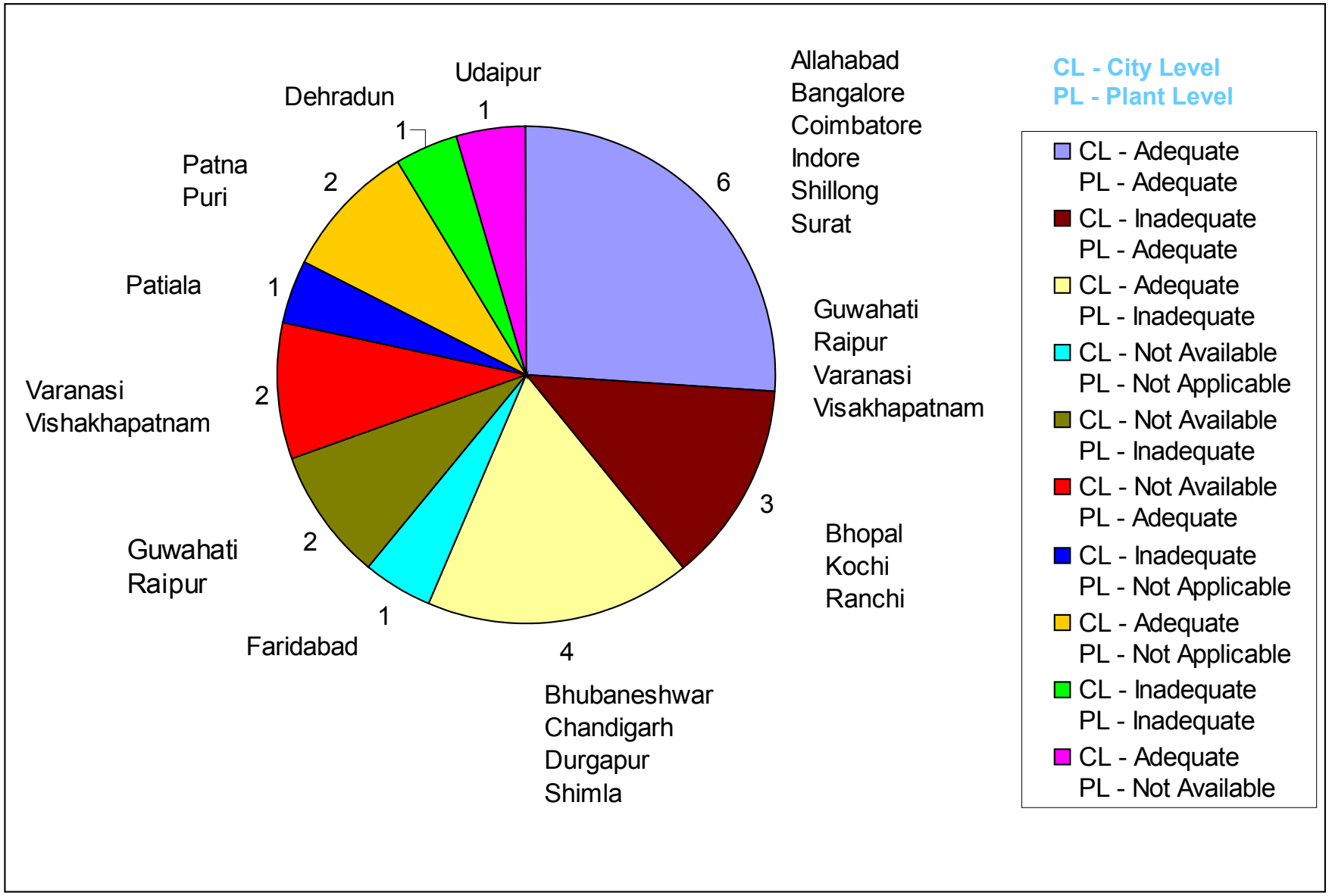
Number and Type of Ground and Surface Water Sources for Organised Supply in the Cities



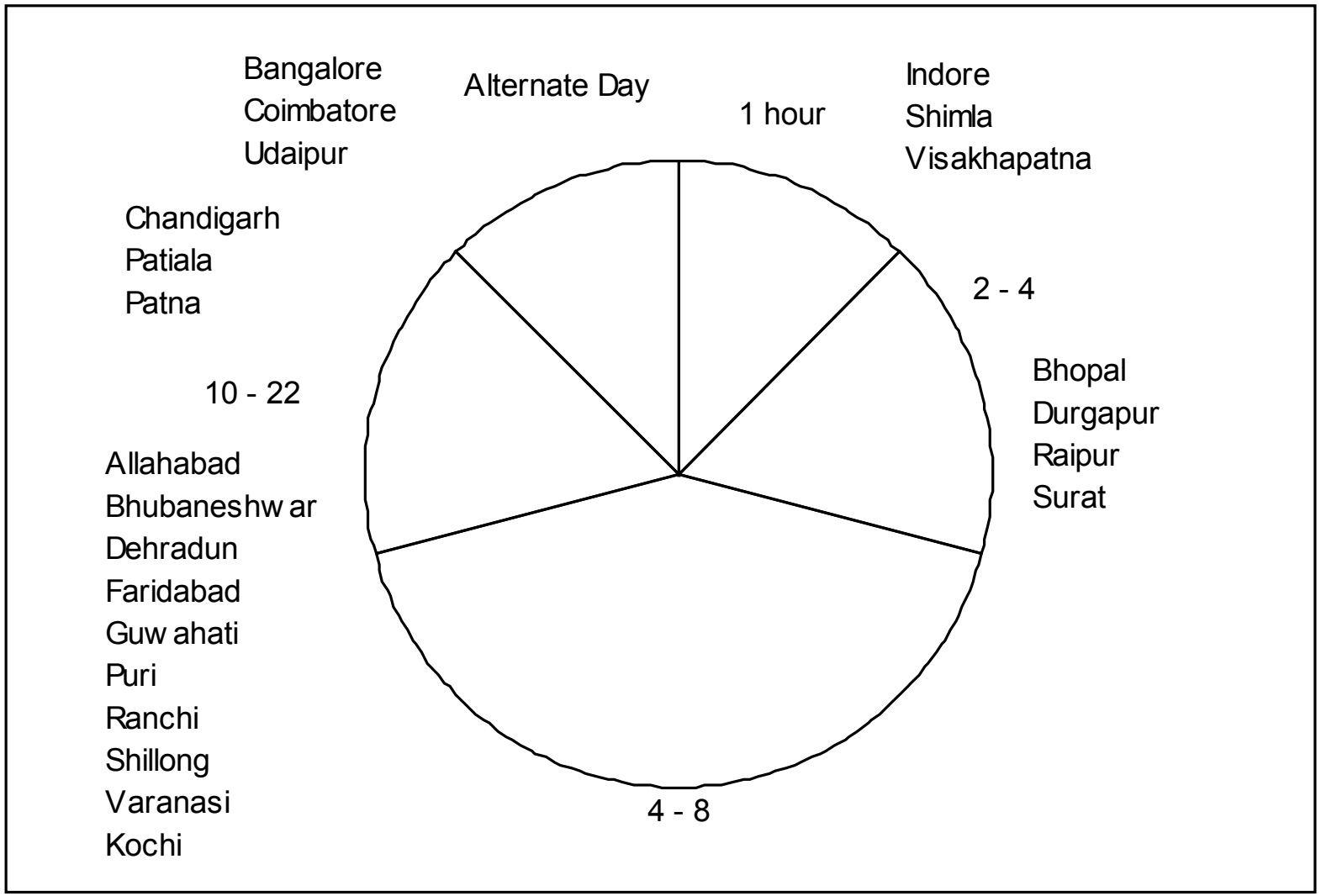
Daily Extraction of Ground Water



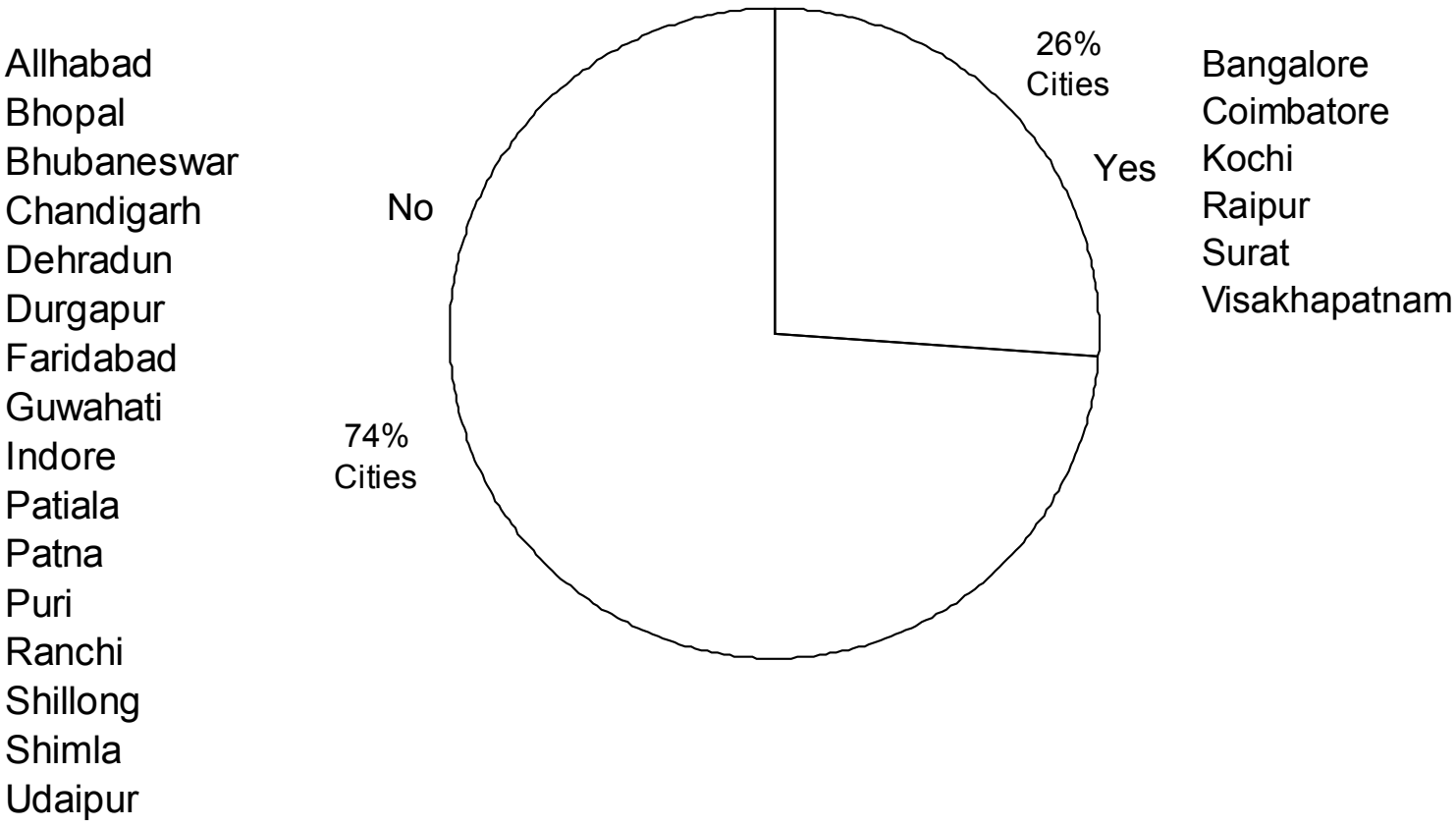
Quantity of Water Supply Based on 100% Population Coverage



Laboratory Facilities Available at Treatment Plant and Central Level in the Cities

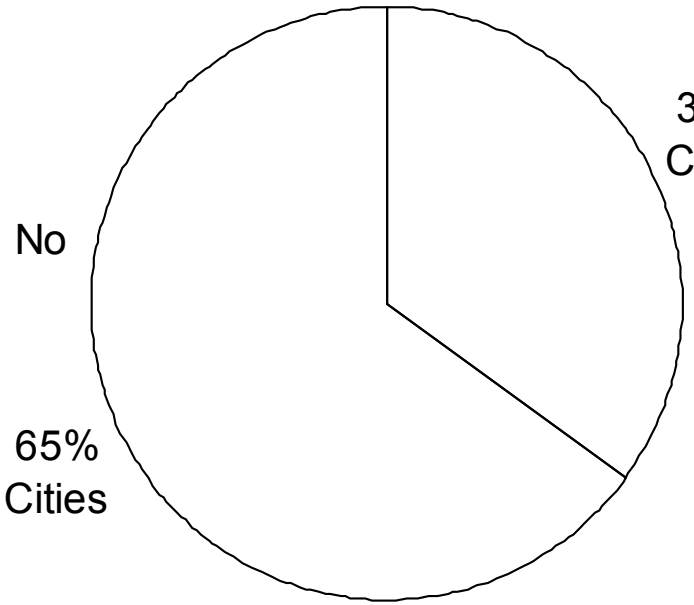


Average Hours of Organised Water Supply Per Day in the Cities



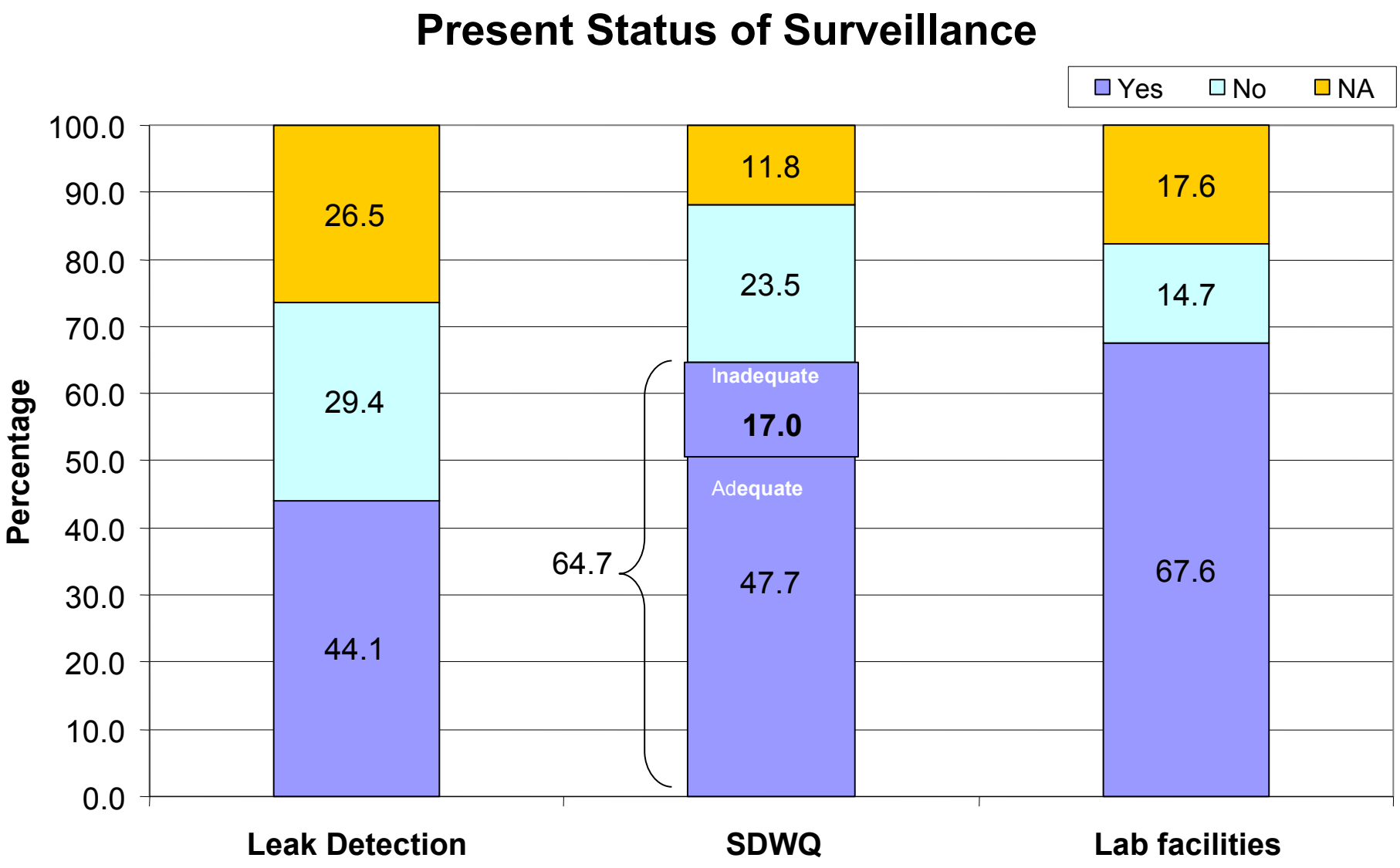
Surveillance of Drinking Water Quality Programme in the Cities

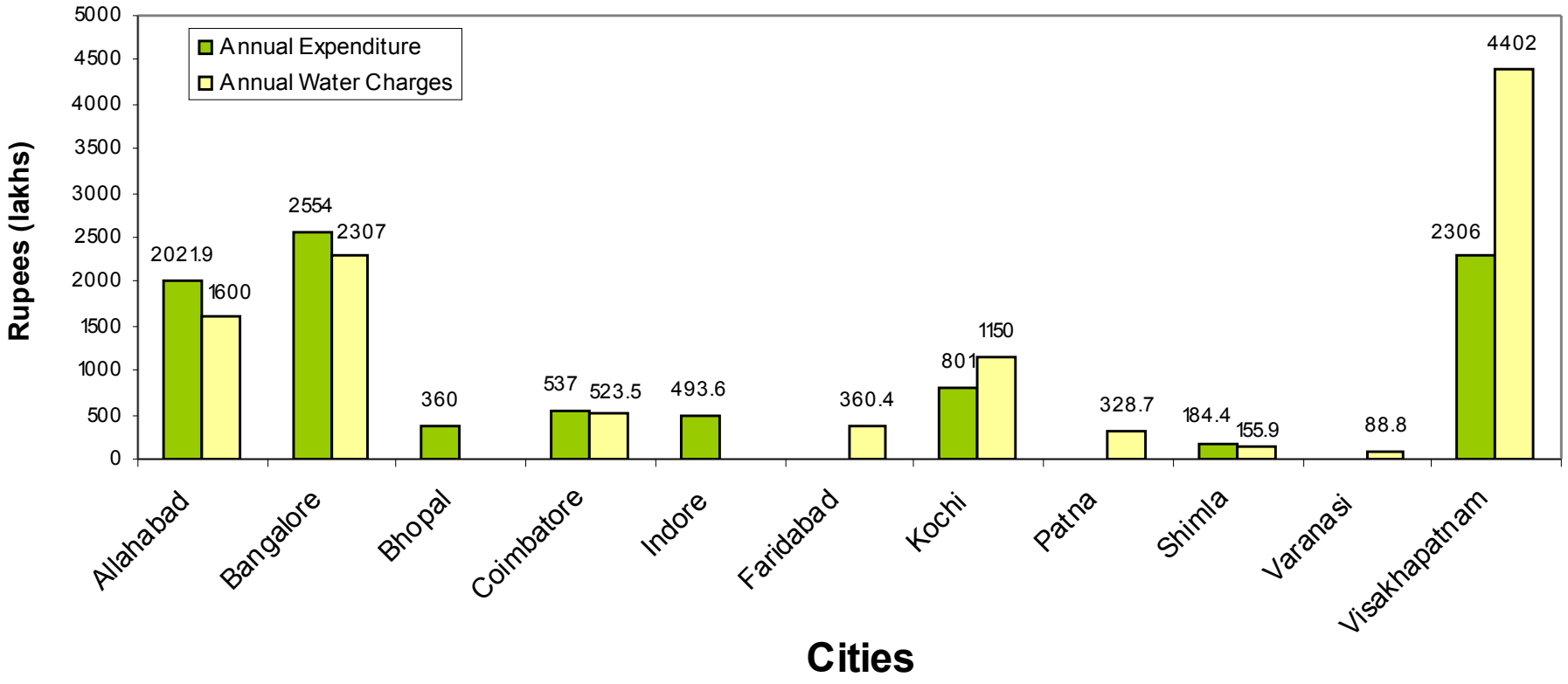
Allhabad
Bangalore
Bhopal
Bhubaneswar
Coimbatore
Durgapur
Faridabad
Guwahati
Patiala
Puri
Raipur
Ranchi
Shimla
Udaipur



Chandigarh
Dehradun
Indore
Kochi
Patna
Shillong
Surat
Varanasi
Visakhapatnam

Leak Detection Programme in the Cities


Present Status of Surveillance
Yes
No
NA
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percentage
26.5
29.4
44.1
11.8
23.5
Inadequate
17.0
Adequate
47.7
64.7
17.6
14.7
67.6
Leak Detection
SDWQ
Lab facilities

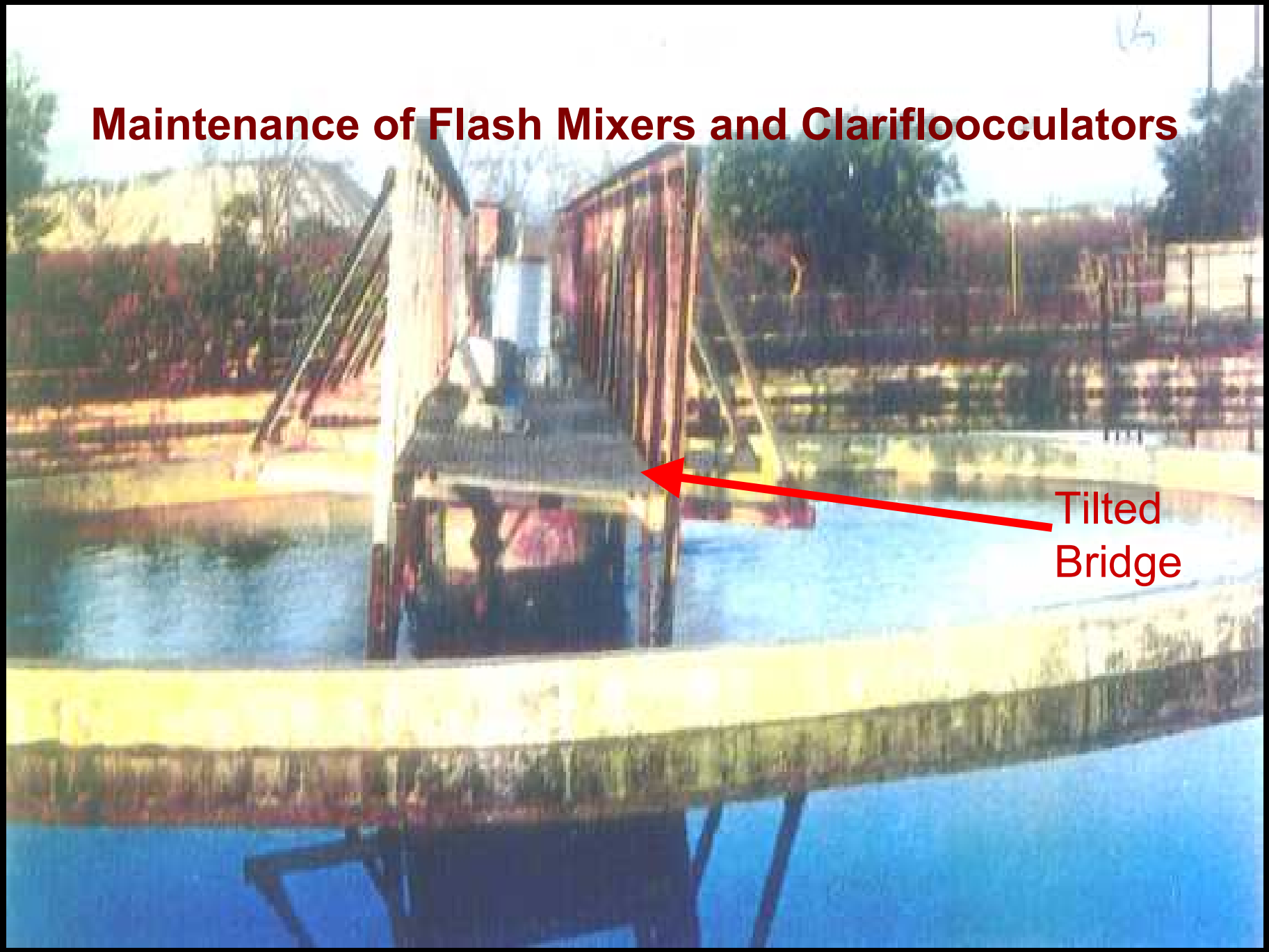


Annual Financial Aspects in the Cities

Single point addition of coagulants
- Not conducive to effective mixing

Chemical dosing through perforated pipe – Simple and effective

Maintenance of Flash Mixers and Clarifloocculators



Clarifier - Flooded due to overloading

A Sand filter without filter sand


Filter bed full of mud balls.

Cracks in filter bed

Silted sedimentation tank & aquatic weed growth


Treated water sump not covered
Hazard of storm water entry

Leakage from Distribution System

Public Stand Posts

The Public Stand Posts (PSPs) in urban and rural water supplies are the potential sources of **recontamination** of drinking water supply. A large number of PSPs are in horrible state.

Hand Pumps

Hand-pumps installation should be carefully supervised to avoid possible contamination of groundwater.

The different installation stations of the Greater Shillong Water supply Scheme at Mawphlang

The different installation stations of the Greater Shillong Water supply Scheme at Mawphlang

Well maintained chemical dosing system

Uniform distribution of backwash water

- Good design and operation

Reliable flow measuring system

- Prerequisite for plant control

Good housekeeping

Well equipped laboratory

– Vital for effective plant control

Recommendations

- Source
- Treatment
- Storage and Reservoir
- Distribution
- Leak Detection
- Quality Control
- Administration and Financial Structure
- Staff
- Public Awareness

Committee for Surveillance of Drinking Water Quality

1	Chairman of city Water Supply and Sewerage Board or Municipal Commissioner or Revenue / Divisional Commissioner (In case of cities / towns not having Water Supply Boards or City Corporation)	Chairman
2	A Nominee of the Mayor, preferably from the corporators	Member
3	Officers of the relevant water supply agency	Members (2)
4	Senior Officer of the Health Department of the city	Member
5	Senior Officer of the Health Department of the State	Member
6	Representative of Chamber of Commerce	Member
7	Representative of the University or Education Department or Education Institute	Member
8	Representative of the Local Chapter of the Indian Medical Association	Member
9	Representative of the Geology Department or Water Resources Department or Pollution Control Board or CGWB	Member
10	Representative of registered NGO in the jurisdiction of the local water supply agency	Member
11	Superintending Analyst of Laboratory for Surveillance of Drinking Water Quality	Member
12	One of the Executive Engineers of the relevant water supply agency	Member

Urgent needs

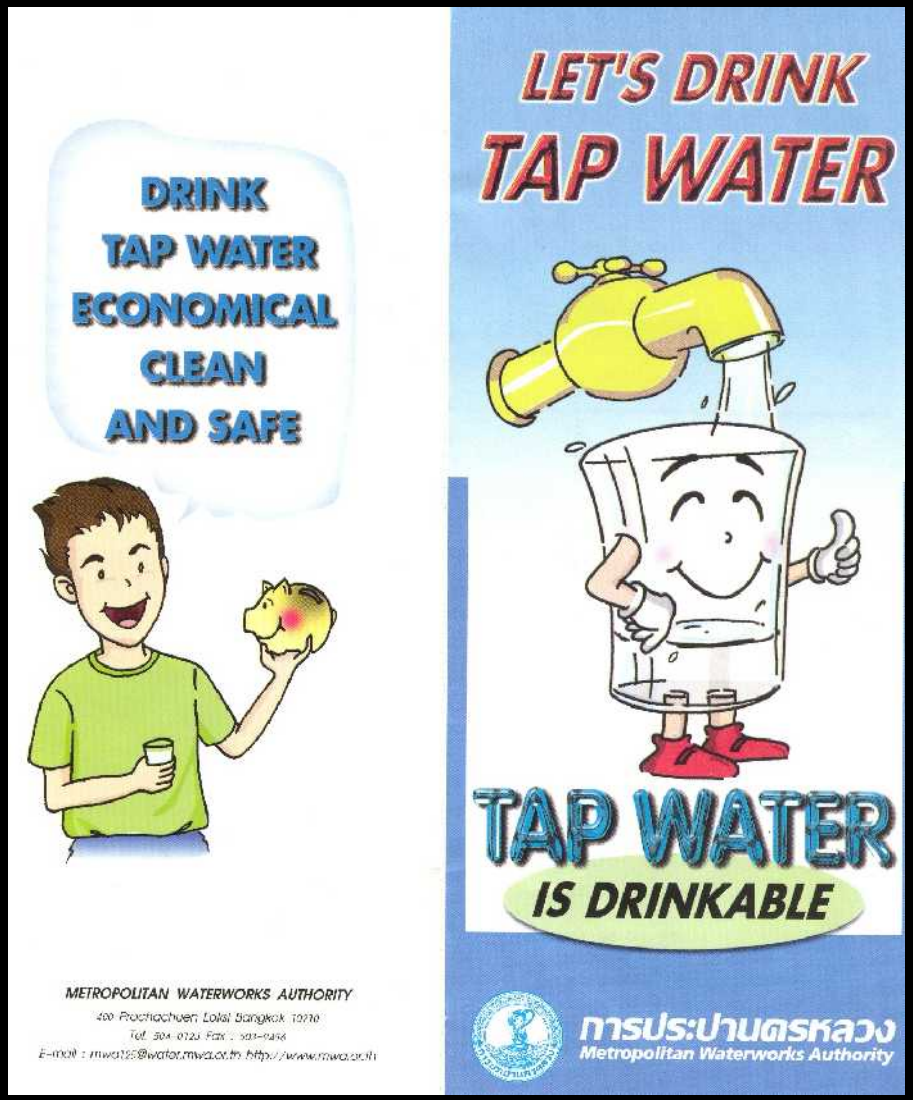
- Consorted decision and long term policy
- Institutional and fiscal reforms
- Appropriate pricing policies
- Private sector participation
- Community involvement
- Motivation of human resources
- Reliable information system and data base

Surveillance of Drinking Water Quality - Expected Results

- Technical Solutions / options
- Monitoring & surveillance of drinking water quality
- Mechanism to implement the SDWQ considering Institutional Capacity Building

Legal frame work & participation

- Enactment implies enforcement
- Participation implies trust and empowerment
- Empowerment does not mean anarchy



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