JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
NATIONAL RIVER CONSERVATION DIRECTORATE (NRCD)
MINISTRY OF ENVIRONMENT AND FORESTS

THE STUDY
ON
WATER QUALITY MANAGEMENT PLAN
FOR
GANGA RIVER
IN
THE REPUBLIC OF INDIA

FINAL REPORT

VOLUME III MASTER PLAN FOR PROJECT CITIES

VOLUME III-8 GIS DATA MANAGEMENT

JULY 2005

TOKYO ENGINEERING CONSULTANTS CO., LTD.
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FINAL REPORT
ON
WATER QUALITY MANAGEMENT PLAN FOR GANGA RIVER
JULY 2005

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PURPOSE AND INTENT

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CHAPTER 1 PURPOSE AND INTENT

The Study on Water Quality Management for the Ganga River Basin covers a vast geographic extent. The study area is encompassed between the latitudes of 21.5 deg. North and 31.5 deg North, and the longitudes of 73 deg. East to 89 deg. East. Within this expanse, the defined Ganga River Basin for the study measures approximately 857,650 sq. km[1].

With the help of the GIS and the accompanying database application, it is intended to assimilate project relevant information into a uniform format, enabling systematic data extraction, analysis and mapping to support the different aspects of the study. Of primary focus within the entire work is the assimilation, mapping, and analytical support for the water quality assessment, modeling, and decision support for management plan formulation.

The GIS and Database support efforts were directed at two scales:

1. The River Basin
2. The most polluted section of the Ganga river covering the cities of Lucknow, Kanpur, Allahabad, and Varanasi.

1.1 RIVER BASIN STUDY

At the river basin level, the efforts were directed towards collecting broad scale data for the entire basin. These efforts were complicated by the inclusion of border/ restricted areas as a result of which the acquisition and use of Survey of India (SOI) maps was not readily feasible. Available SOI[2] maps in addition to maps from Central Pollution Control Board (CPCB) and National Thematic Mapping Organisation[3] (NATMO) were used as the initial data source to develop an understanding of the region and formulate a seamless GIS database for the project study.

1.1.1 Base Maps for River Basin

The water resources map provided the first river basin wide data source for the project team, supplementing the drainage (river and major tributaries) maps from CPCB. Land use coverage for the river basin data is based on information derived from interpretation of WiFS (188 m pixel resolution) satellite data.

Basic information for the project team on demographic data in association with administrative boundaries to the district level and locations of urban areas within the basin were used to prepare analyses of proximity and relative importance for pollution loading into the river. A detailed distance based calculation was generated for all 238 large urban centres identified in the study area of the Ganga river basin.

Through an iterative process of mapping monitoring locations of water quality and water flow, from documented sources, information provided by CPCB and CWC, and through repeated interactions with experts from these agencies, the maps representing these locations were accurately established.

Based on the detailed mapping of the river systems through the entire basin, and based on the modelling efforts planned for the project, the 26 sub-basins defined by CPCB were re-delineated as 38

1. Area derived from GIS based mapping and measured from basin boundary revised as per drainage feature data available at approximately 1:250,000 scale.
2. Maps at 1:1 million scale for the states were used as reference source for the entire basin. Where available, unrestricted 1:250,000 scale maps were also used for the study
3. Water Resource, Agricultural Resource, and Forest Resource atlases

sub-basin. On the basis of these sub-basins, the entire GIS information was analysed and computed for the modeling support. This information, in conjunction with basin wide water quality data[4] and water flow information[5] was used to develop the requisite data and analysis framework for the study.

1.1.2 Creating Project Sub-Basins

Ganga river sub-basin mapping has gone through many phases, from initial mapping of 15 major basins to the 38 final sub basins.

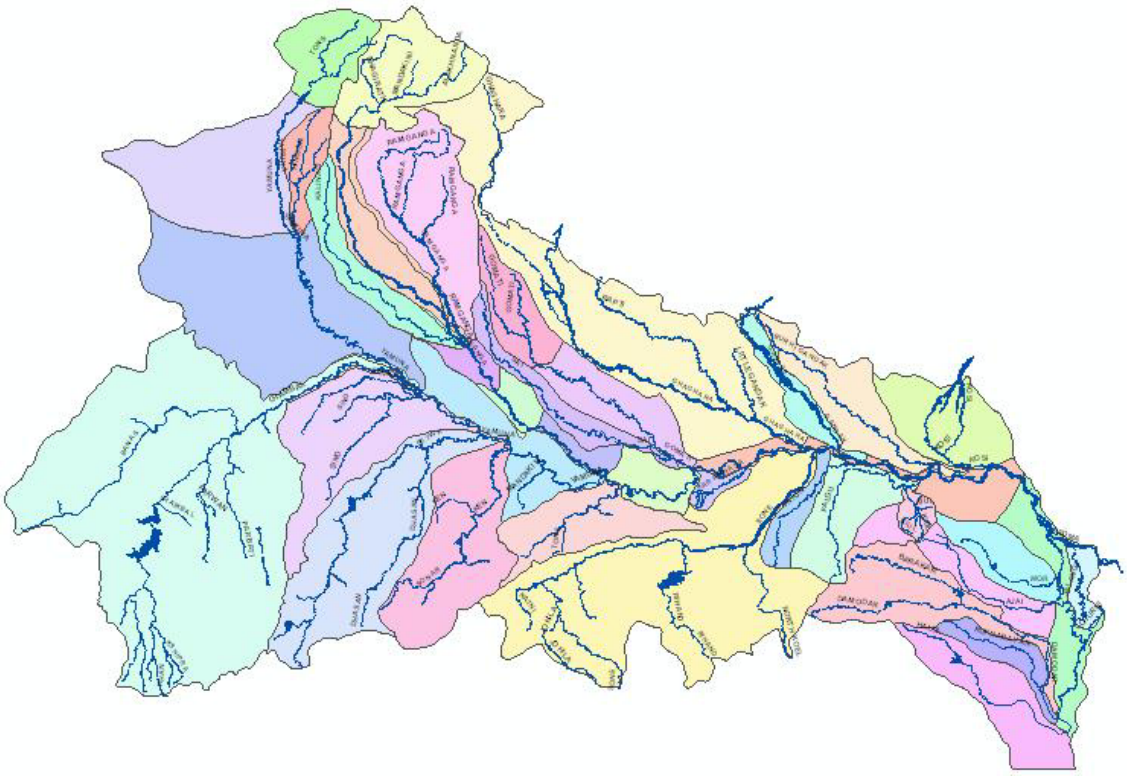

Figure 1.1 Sub-Basins in Ganga River Basin

Phase 1:
Initially *15 major Ganga sub basins* were digitized from a Ganga Basin Water Quality map provided from Central Pollution Control Board on a scale of 1:2.5 million .Basic drainage pattern was also derived and attributed from the same map. Rivers to be considered were decided upon by the CPCB data and other annual report reports.

Phase 2:
Sub-basin of river Kshipra, Khan, Mandakini, Kali (west), Hindon etc. were added to the map on the basis of water quality data provided by CPCB. Location of few rivers which were not on the map but had water quality data were confirmed during subsequent meetings with the CPCB officials and thereby adding their sub basin to the original map.

Phase 3:
These sub basin boundaries again went through number of changes made by the JICA study team. No tributary of second order was included. So the sub basins like Kshipra, Khan, Rihand etc. were merged into the major basins of the first order rivers. Some new basins like Kosi, Sind, Falgu, Punpun, Ken

4. Data was obtained from CPCB. Although the request was for data from 1983 to 2002, data for the years 1983, 1984, 1985, 2002 has not been made available. Some years also have partial data gaps that CPCB has not been able to address.
5. Data provided by CWC under use restrictions. This data is being used internally within the team for modeling purposes. No GIS based mapping except locational information is being presented.

were added. These rivers were earlier not considered as no data of water quality about them was present.

Phase 4:
Lower Ganga II basin was further sub divided into 8 sub basins; they are Haldi, Rupnarayan, Damodar, Barakar, Ajai, Mor, Jalangi and Lower Ganga II. Bigger basin like Yamuna, Gomti and Ganga were further broken into Upper, Middle and Lower reaches by the JICA team making the total numbers of sub basins 36.

Phase 5:
Apart from creation and deletion of sub basins, their boundaries also, have been shifting from time to time, with respect to the

- position of monitoring locations (their latitude and longitude provided by the CPCB)
- Inclusion of IInd order drainage.

With the availability of drainage system on the scale of 1:250,000 the boundaries were subsequently modified.

Phase 6:
River Kiul and Karamnasa were identified by overlaying the toposheets of 1:50,000 scale of that area on the drainage system map of 1:250,000 scale. The sub basins of the subsequently identified river were created thereby making the total number of basins to 38.

All these changes were incorporated into the GIS database from time to time and all spatial and aspatial data were brought on the GIS platform.

1.1.3 Data Available for Ganga Study

In addition to the spatial mapping of the river basin features, extensive information on water quality, water flow, demography, livestock, industrial pollution, and metrological information was sought to be assimilated into the database and linked to the spatial features.

The data availability of this information is given below:

(1) Water Quality Data

The water quality data has basically been received from the CPCB, NRCD, and UP PCB. Details of this information, assimilated into the project database are:

Central Pollution Control Board, Delhi

The Data received includes MINARS Water Quality Monitoring data. The data was requested for the years 1983 – 2002 but it was received for years 1986 – 2001.

The data was received overall for 211 monitoring stations of which 120 were river monitoring stations.

For finalising of monitoring stations location, the data received as well as CPCB Ganga River Basin Map from Water Quality Atlas was used.

Though the data also included the latitudes and longitudes of respective monitoring locations, but initially there were considerable problems in their setting with respect to the river and their given locations. Other major problems encountered included exact location of small rivers, and confusion in their names. A number of meetings were held for collection of the data, confirmation of missing data

as well as positioning of Monitoring stations and authorities were very co-operative in their efforts to help us.

Initially 101 Monitoring stations were classified as existing and 26 river basins were decided upon based on CPCB annual report. These river basins formed the base for deciding upon the project river basins. Besides these 18 monitoring stations were classified as additional (which were not in the CPCB annual reports). These mostly included those stations that were new i.e. established in 2001. Also 3 stations were found on the Ganga River Basin Map, which were not present in the data, and now are closed.

There are 30 water quality parameters, which are being monitored under the MINARS schemes, and these were initially listed by the GEMS. However, these include parameters like Total Platelet Count, Entero Cocci, Strepto Cocci, which are usually not monitored at all in most locations. Also the range of parameters being monitored is very much limited by the budget of respective State Pollution Control Boards.

National River Conservation Directorate, Delhi

The data received include the following:

- Water Quality Monitoring data for the years 2001 of Yamuna, Hindon, Gomati, Western Yamuna Canal and Ganga River in Uttar Pradesh and Bihar.
- Water Quality Monitoring data for the years 2002 of Yamuna, Hindon, Gomati, Western Yamuna Canal and Ganga River in Uttar Pradesh, Bihar and West Bengal.

The data received from here has parameters Temp, pH, DO, BOD, COD and Coliform count (Total/Faecal). However, the data is not available for all the months of the year.

Uttar Pradesh Pollution Control Board, Lucknow

This was received during the visit to their office in the Last week of March, 2003.
This includes:

- Data on Water Quality Status of river Gomti at 9 points (6 in Lucknow) showing annual average of BOD, DO and Total Coliform for the years 2000 – 2002.
- Status of current water Quality of various rivers in Uttar Pradesh. This file has average water quality monitoring data at 29 monitoring locations in Uttar Pradesh for the year 2002.
- Status of wastewater generation, collection treatment and disposal in river basin towns in Uttar Pradesh.
- Water Quality Monitoring data in Allahabad for river Ganga and Yamuna during the period April 2002 – February 2003.

On the whole, the data from Central Pollution Control Board forms the major part of our Water Quality Data.

(2) Water Flow Data

The water flow data has been procured from Central Water Commission for 25 river flow monitoring locations in the Ganga River Basin.

The site locations were received in terms of latitudes and longitudes and most of the sites were sitting on the correct location. However, there was a problem in a few locations which was resolved in later meeting where latitudes and longitudes were verified from their reference books. Some sites had to be shifted a bit in order to position them at their exact given location and for shifting their latitude was kept the same whereas their longitudes were changed.
The data was in the form of monthly average, maximum and minimum discharge and cross section.

Besides this, data has also been made available from TEC, which was provided to them during the YAP Project. This is again in the form of monthly average, maximum and minimum discharge for the years 1995-2000 for river Yamuna and its tributaries. Again this data is not complete, i.e. the data is not available for all the years at most sites.

(3) Livestock Data

The livestock data for the year 2001, considered in this study, has been estimated by the projection of data of livestock from 14th Livestock Census (1987). Growth rate for each type of livestock has been considered using 10-year Cumulative Annual Growth Rate, CAGR (1987-1997) of the data on national level.

The problems encountered include too much variation in 5 years CAGR and no census of livestock in the states of Bihar and Jharkhand in the year 1987. The data in Data Viewing Application is provided district wise and is further subdivided into total, urban and rural.

(4) Population Data

The source of the population data is Census Info India 2001 (Census of India). The cities have been categorized into Class I and Class II towns, as well as small towns. The Data for Data Viewing Application includes district wise data for 1971, 1981, 1991 and 2001 census as well as Class I, Class II Cities based on 2001 census. The population has further been subdivided into Total, Urban and Rural categories. Also sub-basin wise population has been calculated for 2001 and projections have been made for 2011 based on trend obtained from the populations of 1971, 1981, 1991 and 2001.

(5) Meteorological Data

The meteorological data has been requested from National Data Centre, Indian Meteorological Department. The data has been requested for capital or any representative meteorological station of following states located in the Ganga Basin –

Himachal Pradesh (Shimla), Haryana (Chandigarh), Uttaranchal (Dehradun), Delhi (Delhi), Uttar Pradesh (Lucknow), Madhya Pradesh (Bhopal), Rajasthan (Jaipur), Bihar (Patna), Jharkhand (Ranchi), West Bengal (Calcutta), and Chhatisgarh (Raipur).

The mean data (for the last 30 years) requested includes Mean daily air temperature, Maximum and Minimum (°C), Mean Monthly Rainfall (mm), Mean Monthly Evaporation (mm), Mean daily humidity (%) for each month.

1.1.4 Information Analysis for Ganga Study

The GIS functionalities were used to develop secondary data for the project using information collected. Three main sets of secondary data were generated:

1. River Basin Topography
2. Relative Distance from Ganga of Point Loading Sources of Pollution
3. GRID maps for spatial analysis and modelling support

River Basin Topography

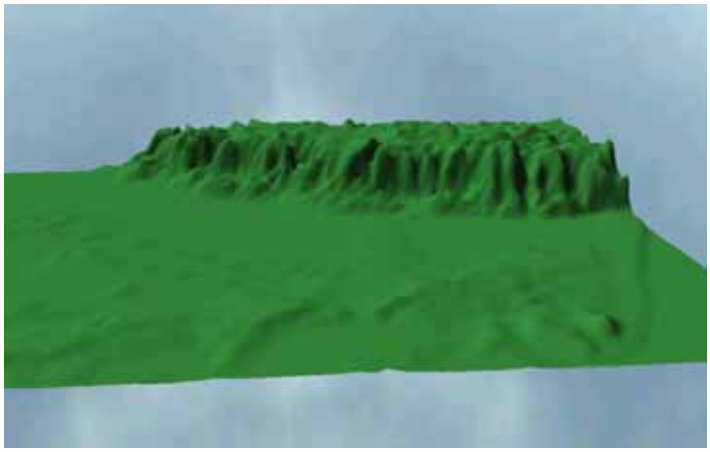

Figure 1.2 DEM of River Basin: Central and North Extent

Using the available contour information derived from 1:200,000 scale data sources for the entire river basin, a preliminary Digital Elevation Model (DEM) was developed. Since the relative elevation along the Ganga and its major tributaries is relatively flat, considerable modelling and editing of the DEM was required. This was achieved through an integrated use of ArcView Spatial Analyst and ArcView 3D Analyst. Iteratively revising the DEM helped generate a more representative 3-D model of the river basin from which a topographic map was developed. This same dataset can be used to further drape existing map layers such as Land Use to have a better understanding of the morphology of the river basin.

Relative Distance Analysis

To estimate the effect of point sources of pollution on the water quality in the Ganga River Basin, the project team required estimation of relative distance of these pollution generators from existing major drainage features. This information was developed using a selection of 238 major urban centers and computing their distance from closest drainage feature.

Developing the cumulative distance from the Ganga river for each of these features was achieved through extensive re-segmenting the drainage features to the closest point of intersection between a straight line drawn from each of these urban centers to the proximal drainage feature.

These distance measures have been integrated into the water quality modelling for the river basin. A similar approach was used for estimating the distance of district headquarters and district centroids for computation of non-point pollution load on the river basin.

GRID maps for Spatial Analysis

Grid / raster maps were required to be generated for the representation and analysis of modelling results for the river basin. These Grid maps are used in Spatial Analyst to develop a River Segment Water Quality map by interpolation of the estimated and projected water quality along river segments. This cartographic modelling exercise provides spatial representation for the river basin water quality model developed by the project team, giving a better spatial understanding of the existing and projected river water quality based on the study.

1.1.5 River Basin Water Quality Modelling

Information from water quality modelling outputs from the project team was made available to the

GIS as estimated values for selected water quality parameters, for existing conditions, projected conditions in 2010 and 2030, and projected conditions in 2010 and 2030 with project interventions. These estimates were provided for sub-basins of the entire river basin, however due to the limited flow data available (till Varanasi only) the estimated value of the selected parameters could only be computed for monitoring stations along the Ganga main stem upto Varanasi.

This information was spatially represented by linking to the geographies of the river sub-basins and to the relevant monitoring locations along the Ganga main stem upto Varanasi. Using thematic and graphed representations, this information has been documented for the project.

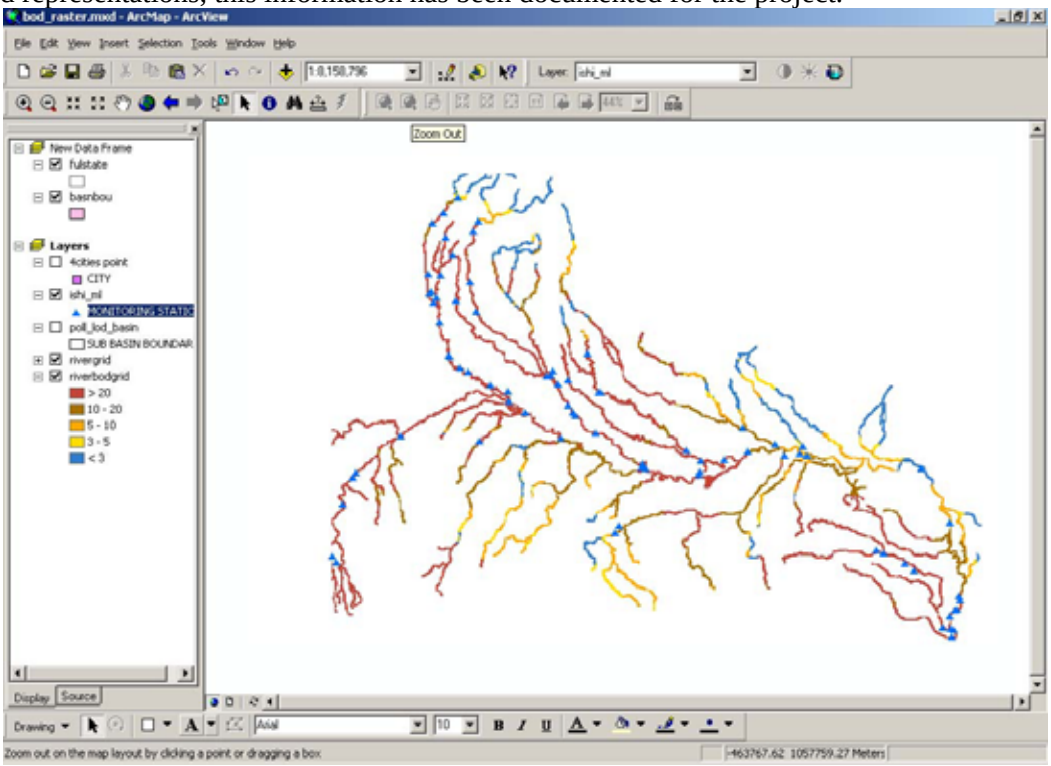

Figure 1.3 Spatial Analyst based Interpolation of River Segment Water Quality

Using the Grid Maps as described above a river segment water quality map was developed representing existing and projected conditions. By integrating Spatial Analyst and 3D Analyst driven cartographic functions, the estimated value of a selected parameter, BOD, was interpolated between the monitoring locations. While the spatial analysis generated presents maps of the entire drainage for existing conditions, the projected conditions can only be modelled and estimated along the Ganga main stem up to Varanasi.

1.2 FOCUS ON CITY LEVEL STUDY

The four cities in this study are Lucknow, Kanpur, Allahabad, and Varanasi. Information for these four cities was developed from Satellite Imagery (LISS and PAN data was blended together to provide multi-spectral 5.8 metre resolution imagery) acquired for National Remote Sensing Agency interpreted with the help of available 1:50,000 and 1:25,000 scale Survey of India Topographic Maps. The maps were enhanced by and attributed using the help of the SOI maps, Tourist Maps, and third-party digital data. This information was verified against Survey of India Maps and through field observations of the team, where possible.

While the satellite imagery base maps and GIS data cover a vast extent, detailed mapping of the major roads and existing sewerage facilities was conducted for the urbanized extents of each city. This detailed mapping covered approximately 200 sq. km. each for Lucknow and Varanasi, 300 sq. km for

Allahabad, and 400 sq.km. for Kanpur.

Careful mapping of the information on sewerage systems, nalas, and associated information of capacity, flow, and water quality was created from information provided to the project team from UP Jal Nigam and UP Nagar Nigam offices from each of the cities. The information was supplemented from field observations of the project team and was consolidated into the correctly geo-referenced based maps developed. This information provided the basis for establishing spatially accurate information analysis for the four city region as well as developing the water quality modelling efforts at this scale.

1.2.1 Preparation of Base Maps

Efforts were made to develop accurate, geo-spatially referenced base maps for the project team for all the four cities. To achieve this goal, Survey of India Maps at 1:50,000 and 1:250,000 were studied to define the extents of urbanization. Efforts were made to identify and obtain these maps from the offices of SOI in New Delhi and in Dehradun. While some maps were acquired, complete coverage for the four cities was not readily available from SOI. The maps that were available were considerably out of date, not reflecting the growth of the cities being considered in the study.

For this reason, it was considered relevant to acquire recent satellite imagery for the study areas of Lucknow, Kanpur, Allahabad, and Varanasi. To ensure that we had good overage of the urbanization radiating outwards from the original city areas, regional extents were covered using LISS imagery and more detail for the core areas was addressed through PAN imagery. Geo-referencing and blending the two products provided a detailed, multi-spectral colour base map for each city, giving an updated and accurate picture of the urban and regional setting for the project.

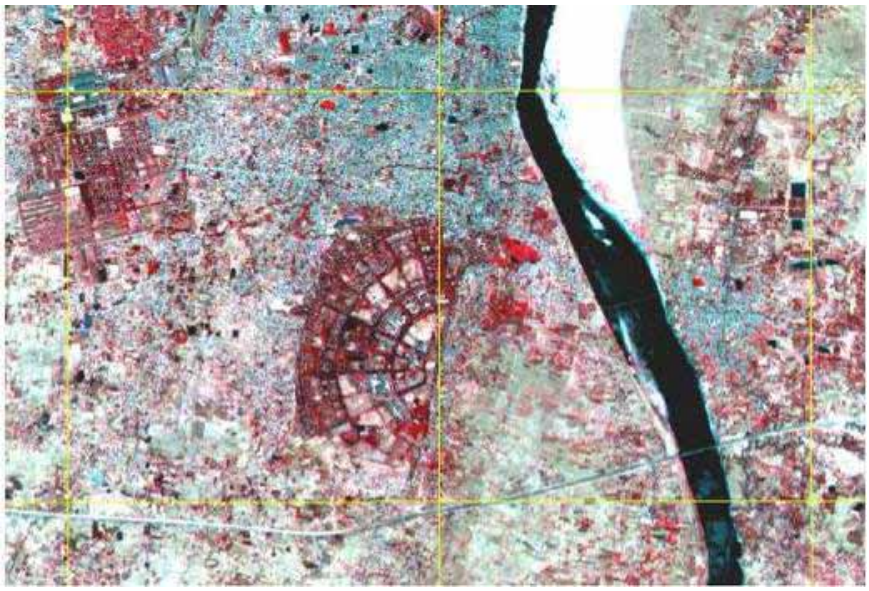

Figure 1.4 Example of Satellite Imagery based Mapping for City Base Maps

Although requests were made to each City for obtaining existing digital data, if available, it was found to be more expedient to generate the information required on major roads, railroads, localities, and drainage features from the satellite imagery and by supplementing it from data acquired from other third-party data sources.

Using the satellite imagery as a backdrop and the mapped information on major roads and reference features, base maps were provided to the project team for the study and master plan development.

1.2.2 Sewerage System and Nalas

As part of the project works, information on sewerage systems provided by UP Jal Nigam and the Project Team Experts was assimilated onto the prepared base maps of each city. While some of the information was made available in CAD format, most of the relevant data was provided in the form of paper maps by UP Jal Nigam.

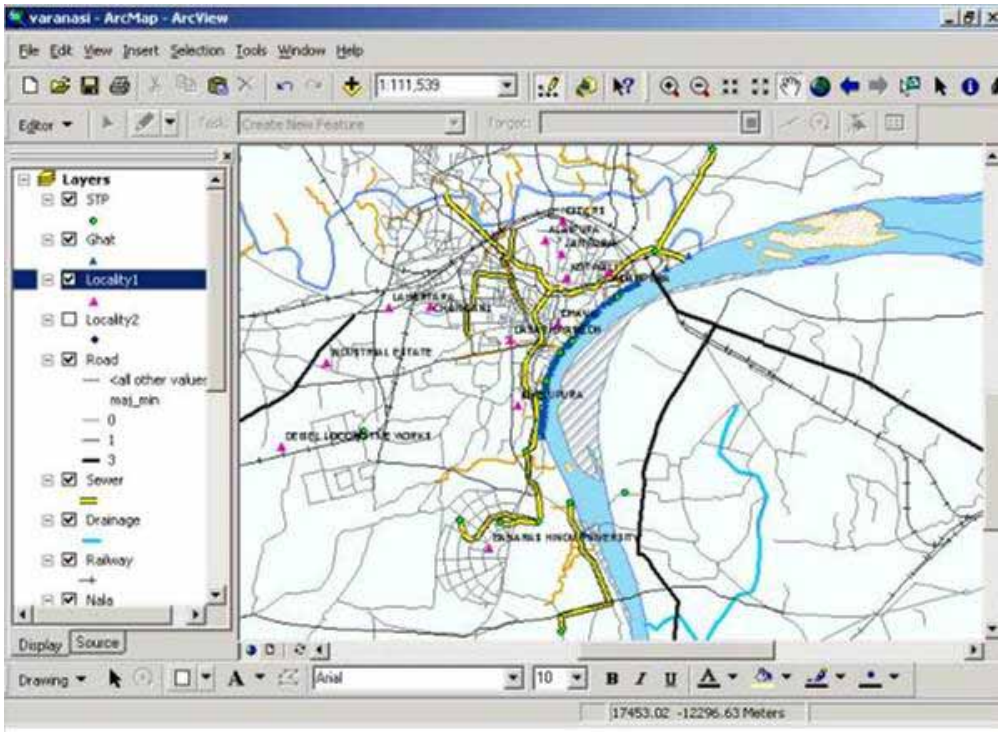

Figure 1.5 Examples of GIS for City Mapping with Sewerage and Nala Information

With the assistance of project staff, all the informations comprising of spatial and aspatial data of Allahabad, Kanpur, Lucknow and Varanasi Sewerage Systems was incorporated into the GIS database. The spatial information includes location of Point facilities like the pumping stations, treatment plants, Line facilities like the sewer trunks and polygon features like Sewage Districts, Project Area boundary. Attribute information on size, capacity, and known length of sewer lines was entered into the associated database.

Information on the Nalas in each city were assimilated from CAD maps provided by the Project Team Members. The spatial location, extent, and relationship to the river was updated using the satellite imagery to better understand the drainage patterns through each of the cities. Attribute information on the flow and discharge quality were assimilated into the associated database.

1.2.3 Water Quality Modeling Support

The City Water Quality modelling efforts are using QUAL2E in which output from the model generates estimated values of parameters such as BOD, at pre-defined intervals along the water channel. Using intervals of 50 meters along the waterfront within the city area and using larger intervals of 500 meters or 1000 meters beyond the city extent.

To spatially represent the outputs of the modelling efforts, locational nodes were generated in ArcView 8.3 using the linear segmentation functionality to provide spatial positions correlating with the QUAL2E output. The estimated numeric value of the selected parameter, BOD, was then joined with the appropriate spatial location, using which a thematic map provided graphic output of the simulated

water quality conditions.

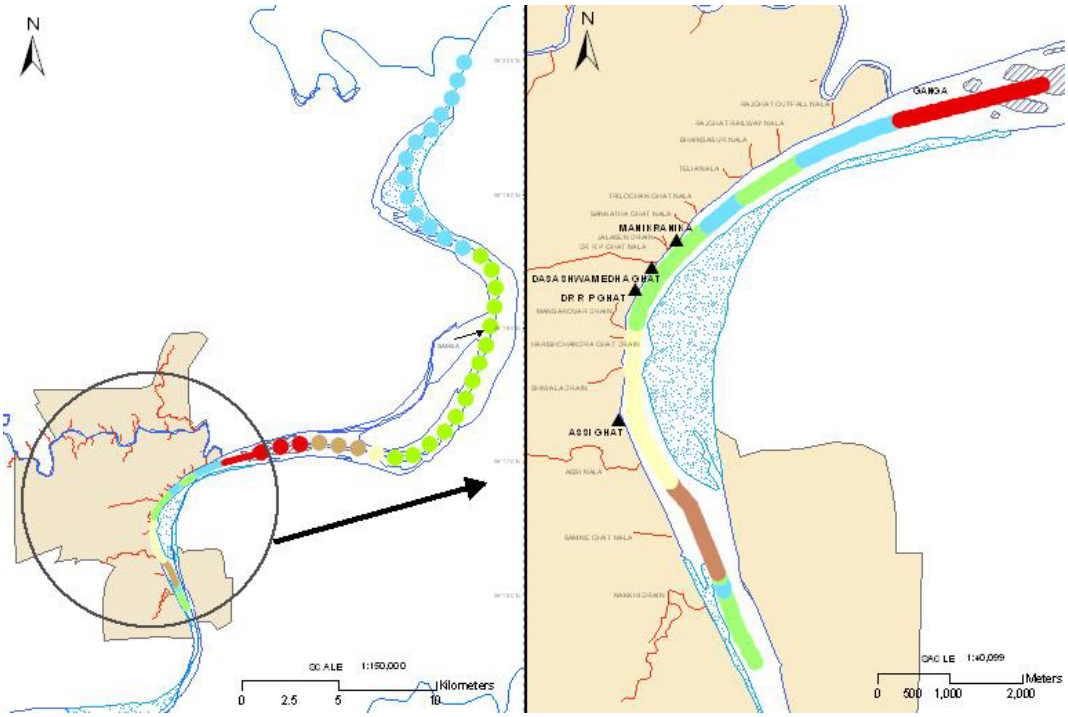

Figure 1.6 Water Quality Modeling Results at City Level

This exercise was conducted for five scenarios; existing conditions in 2003, projected conditions in 2010 and 2030, and projected conditions with project interventions in 2010 and 2030

1.3 CITY LEVEL MAPPING AND SEWERAGE SUPPORT

The GIS database developed under the earlier stage of this project phase was relocated and deployed at the Lucknow office setup by the team. During this stage of the work a greater emphasis was placed on two parallel activities:

- Population Analysis and Development Distribution
- Sewerage System Master Plan Development

1.3.1 Population Analysis and Distribution

The city level analysis of the existing demographic distribution and projections for futre population growth and distribution were supported by the use of GIS. The ward maps of each city were obtained from the respective Nagar Nigam offices, digitized, and associated with the census data made available from the Census Department office in Lucknow. These municipal extents were overlaid on the satellite imagery to assess the relationship between the demographic distribution and the urban landscape. Corrections were made where evident mismatches were found by superimposing ward boundaries on the satellite imagery.

The satellite imagery was processed for differentiating open spaces, water bodies, vegetation, and built areas. This helped determine the developed/ developable areas within the municipal limits and the urbanized extent beyond. Using a secondary classification technique of combining spectral analysis with visual interpretation, development density patterns were identified and classified into 5 categories to reflect very high density to very sparse density development.

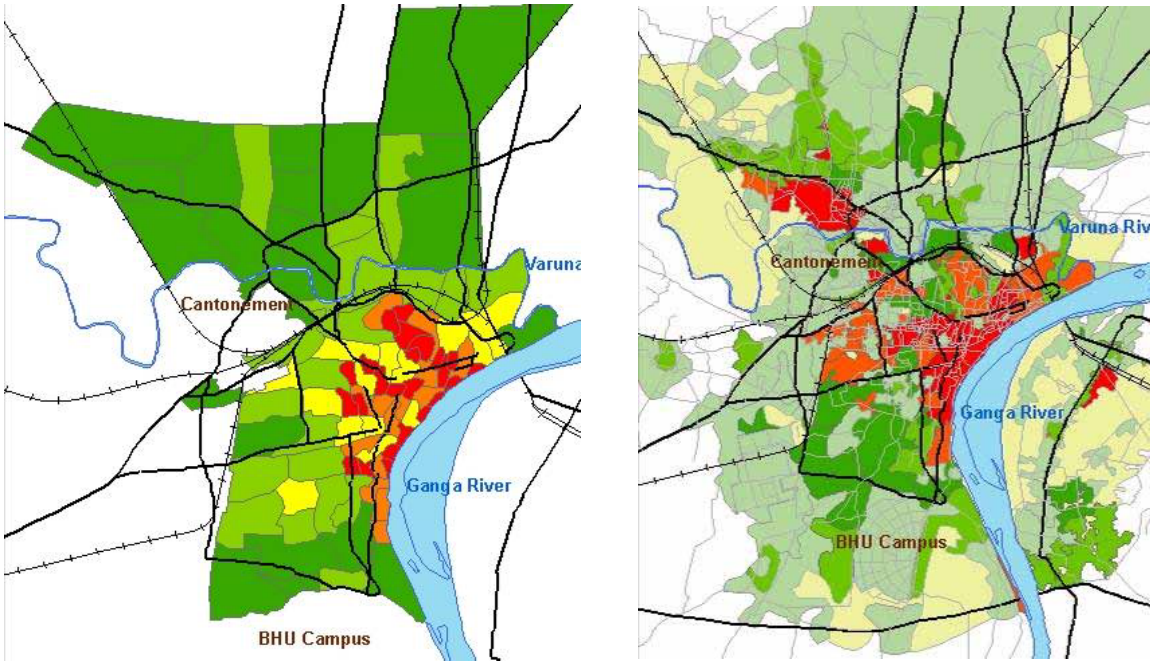

Figure 1.7 Ward-Wise Population Density using Census Data (Left side)
Figure 1.8 Satellite Imagery Interpretation of Development Density (Right side)

Using the satellite imagery and the visual interpretation maps, growth directions beyond the city were analyzed and per-urban areas of growth were demarcated which have been included in the study area for each city.

These spatial datasets of the municipal extents with existing demographics, the satellite imagery based development density maps, and the peri-urban growth areas, were collectively used for the growth projections and population distribution. The resultant demographic trends were re-allocated back to the municipal wards and the peri-urban areas to generate spatial representations of changing development densities.

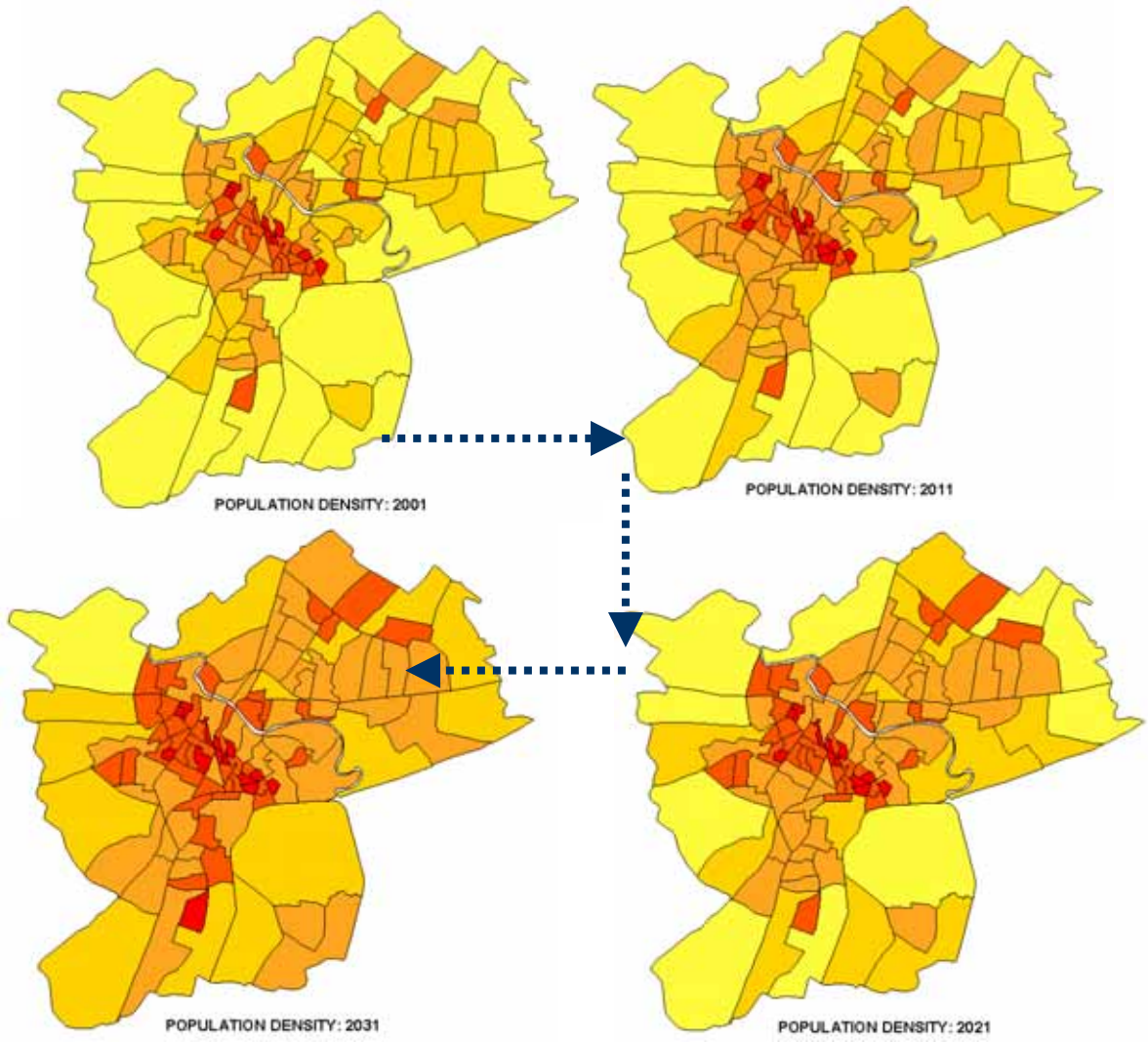

Figure 1.9 Study of Decadal Change in Growth Density of Lucknow

1.3.2 Sewerage master Plan Development

The GIS base maps were updated with existing sewerage facilities and drainage features to establish more accurate base maps for the sewerage master-plan development efforts. Using the limited topographical information and field observations, catchment and sub-catchment maps were also developed for each city.

The master-planning efforts used these maps in combination with demographic analysis and growth distribution to plan and locate the major features of treatment facilities and trunk sewers. Iterative re-design of the master plan and analysis using GIS was carried out for each city and the intermediate and final plans documented using GIS.

During the design process, CAD services were also used to document and create schematics, cross-sections, and facility details as required for the planning process. The base GIS data was also transformed into CAD for use by the feasibility study team for their detailed field exercises.

1.4 DATA AND DATA SOURCES

While the primary reference data source for spatial information are the Survey of India Maps, the map data was acquired from CPCB, NATMO, TTK Tourist Maps, National Remote Sensing Agency, and Indian Institute of Remote Sensing. Some digital data was also made available from third party sources providing 1:200,000 for the river basin extents and detailed base-mapping from the 4 city area.

Satellite imagery was obtained from NRSA for the entire project. WiFS data with 188 m pixel resolution was used to develop an understanding of the river basin and river morphology. LISS and PAN data was blended together to provide multi-spectral 5.8 metre resolution imagery for the four cities.

Mapped information on Sewerage Systems and City Drainage was collected by the project team from the Uttar Pradesh Jal Nigams and appropriate Nagar Nigams. This information was consolidated into the GIS Database.

1.5 OUTPUTS GENERATED

The map prepared for the project are:
1. River Basin Maps of Project Information
    - CPCB Basin and Sub-Basin Boundaries
    - Project Team Basin and Sub-Basin Boundaries
    - Major Rivers and Tributaries
    - Water Quality Monitoring Locations
    - Water Flow Monitoring Locations
    - Administrative Boundaries (State and District)
    - Major Urban Areas in River Basin
    - Population by District for River Basin
    - Water Resources of River Basin (raster geo-referenced map)
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2. River Basin Maps of Information Analysis
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    - River Segment Grid Map with Monitoring Stations
    - River Basin Grid Map by Sub-Basin

3. River Basin Maps of Water Quality Modelling
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    - Pollution Runoff Density of BOD by Sub-Basin (Simulated Condition 2010 with and without Project)
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    - Comparison of Pollution Runoff Density of BOD by Sub-Basin (Existing Condition, Simulated Condition 2030 with and without Project)
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1.6 GIS CAPACITY BUILDING

The creation of the extensive database under this project, and its use through almost every aspect of this study has demonstrated the benefit of the use of GIS for such project activities. It has also been observed that the different agencies with whom interactions have happened during the project period, especially the UP Jal Nigam, Nagar Nigam, and Pollution Control Agencies (CPCB Water Quality Division and UPPCB) would benefit from the more structured use of this technology.

It is suggested that some consideration be given to developing and imparting GIS-centric knowledge by the project team, with approval and support of JICA, to enhance the decision making and operative capacity of these organisations with a view to support the water quality improvement programmes.

CHAPTER 2

WEB SITE DEVELOPMENT

CHAPTER 2 WEB SITE DEVELOPMENT

The project web site has been developed for this study. This provides basic information about the project to the public. The website has now been hosted on a privately procured web space and is accessible at www.gangajicastudy.com. Through this web-site, general project related information and report content is being made available.

Figure 2.1 Update Home Page of Web Site

The section on "What's New" provides links that can be updated with new project information, workshops, events, etc.

As currently established, the contents of the project web-site are:

1. Introduction

This page provides a general introduction to the study.

2. Study Approach
   - Scope of Study
   - Overall Study Schedule
   - Study Organisation

3. Study in Progress
   - Phase I Study
   - Phase II Study
   - River Pollution Management Plan
   - Sewerage Master Plan – General, Lucknow, Kanpur, Allahabad, Varanasi
   - Institution and Organisation for Sewerage System
   - Non-sewerage Scheme Plan for Project Cities
   - Social Consideration and Hygiene Education Plan
   - Pilot Project for Sanitary Improvement of Manikarnika Ghat

4. Study Area Profile
    - Ganga River Basin
    - Study Four Cities
    - Pollution Source

5. Contact Us

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
NATIONAL RIVER CONSERVATION DIRECTORATE (NRCD)
MINISTRY OF ENVIRONMENT AND FORESTS

THE STUDY
ON
WATER QUALITY MANAGEMENT PLAN
FOR
GANGA RIVER
IN
THE REPUBLIC OF INDIA

FINAL REPORT

VOLUME III MASTER PLAN FOR PROJECT CITIES

VOLUME III-9 INSTITUTIONAL DEVELOPMENT PROGRAMME

JULY 2005

TOKYO ENGINEERING CONSULTANTS CO., LTD.
CTI ENGINEERING INTERNATIONAL CO., LTD.

FINAL REPORT

ON

WATER QUALITY MANAGEMENT PLAN FOR GANGA RIVER

JULY 2005

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THE INSTITUTIONAL DEVELOPMENT PROGRAMME

INSTITUTIONAL DEVELOPMENT PROGRAMME

CHAPTER 1 FRAMEWORK OF THE INSTITUTIONAL DEVELOPMENT PROGRAMME

1.1 INSTITUTIONAL DEVELOPMENT PROGRAMME

The present study is expected to formulate a Master Plan for the Water Quality Management for the Ganga River and undertake Feasibility Studies on the priority projects identified to be implemented urgently. To ensure successful and effective implementation, operation and maintenance of the project, capacity of the related organisations and suitability of legal framework will be reviewed and any improvement thereof, if necessary, will be sought.

Institutional alignment, in its broad sense, includes cultural, socioeconomic and legal frameworks, organisations and their operational, financial and human resources. An institutional development programme will cover these issues of the study and will be intended to present a comprehensive guidance to pursue a sustainable undertaking of the project.

1.2 REQUIREMENTS FOR THE FACILITY PLANNING

The Master Plan will envisage sewerage facilities such as sewage treatment plants, pumping stations and sewer networks, and non sewerage measures, that is low cost sanitation like public toilet, etc. They are intended to improve quality of water flowing into the Ganga River. In this Master Plan study, on the basis of an agreement between the National River Conservation Directorate of the Indian Government and Japan International Cooperation Agency from the Japanese Government, four cities are selected as target cities. They are Kanpur, Lucknow, Varanasi and Allahabad. It is a three-staged Master Plan. The first phase will include detailed programmes to be implemented by the year 2010. The second phase will be undertaken by the target year of 2015. The entire Master Plan will address the sewerage and non-sewerage facilities to be brought about by the ultimate target year of 2030. Therefore, the Master Plan is targeted to address the Water Quality Management Plan to be realized in almost 30 years.

Both Indian and Japanese governments wish that facilities installed under the Master Plan shall be operated and maintained properly, and shall benefit the people through the stable and sustainable supply of water and wastewater services. Institutional Development Programme (IDP) is therefore required to propose and engineer institutional alignments to ensure proper operation and maintenance of the installed facilities and to support the sustainable or long-lasting water supply and wastewater services. IDP needs to create and structure legal frameworks and organisations with suitable operational, financial and human resources.

This is one perception of the point at issue.

1.3 REQUIREMENTS FOR THE NATURE OF THE PUBLIC INFRASTRUCTURE SERVICES

Another perception is that the operation and maintenance of the wastewater facilities are not merely mechanical and technical operation and collection of tariff to recover the costs, but entail the business operation of the public infrastructure services. As such a public service, water supply and wastewater services need to be operated on a set of the objective, principles and guidelines that is common among successful service providers.

These common conditions and characteristics of the sound public services are other requirements to the wastewater service. They will be discussed in the later process of the programme formulation.

1.4 CONTENTS OF THE PROGRAMME

The institutional development programme outlined here is prepared in the following sequence and contents. At first, the existing institutional alignment is reviewed. Hierarchy of organisations related to the National River Conservation Plan is presented and national, state and city level organisations are briefed.

Secondly, constraints and bottlenecks are discussed. As operation of the sewerage and sanitation facilities are responsibility of the cities, city level organisations are observed and their constraints or limitations are pointed out. Thirdly, in view to the nature of the sewerage service, the objective, the principles and the guidelines of the public infrastructure services are reminded, and a proposal is presented to structure a sewerage service provider in accordance with such principles.

Fourthly in the light of the national decentralization policy, area of institutional resources required to enable the provider is drafted to indicate the diverse extent of issues. Due to significance and complexity of the issues, an Institutional Development Programme (IDP) and establishment of a permanent IDP Unit in the UP Department of Urban Development are proposed to formulate and implement a long-lasting administrative reform. It is suggested in the final section of this report that the reform to create and capacitate the sound public service providers may be assisted by the IDP consultant and a project type technical cooperation, both to be funded by a bilateral donor.

CHAPTER 2

EXISTING INSTITUTIONAL ALIGNMENT

CHAPTER 2 EXISTING INSTITUTIONAL ALIGNMENT

2.1 NATIONAL RIVER CONSERVATION AND URBAN DEVELOPMENT

The hierarchy of the major administrative units that are closely related to the study is shown in Figure 2.1. It shows hierarchic tiers of the national, the state and the municipal levels of organisations. Right to central wing of the figure includes line of organisations for the urban development. Left wing illustrates line of the environmental conservation and pollution control. Two lines are administratively separated. Liaison and coordination for implementation of the National River Conservation Plan is the only linkage connecting the two.

Line of urban development

Traditionally, this line has been on the urban development and development of urban infrastructure including roads, surface drains, water supply and sanitation, buildings, parks, streetlights, etc. *Jal Nigam* is responsible for planning and implementation of water supply and sewerage schemes. State and District Urban Development Agency is planning and implementing small schemes targeted to the urban poor. Lucknow (and other city) Development Authority prepares the land use plan. It also developed new areas for urbanization and installed infrastructures such as roads, electricity service, sewerage, drainage, solid waste removal system, and even buildings within the newly developed areas. UP Housing and Development Board has been also developing independently new urban areas with infrastructure. Unlike the pure market economy, it is noted that the public sector constructs urban buildings in India.

Line of environmental conservation and pollution control

This line has the standard-setting and monitoring functions. UP Pollution Control Board has regional offices in all four of the target cities. It is responsible for the quality monitoring of the river water and hence shall check polluted wastewaters from flowing into the river. National River Conservation Directorate (NRCD) is an organ for abatement of river pollution at the central government level. It helps state governments plan and implement projects for National River Conservation Plan and National Lake Conservation Plan.

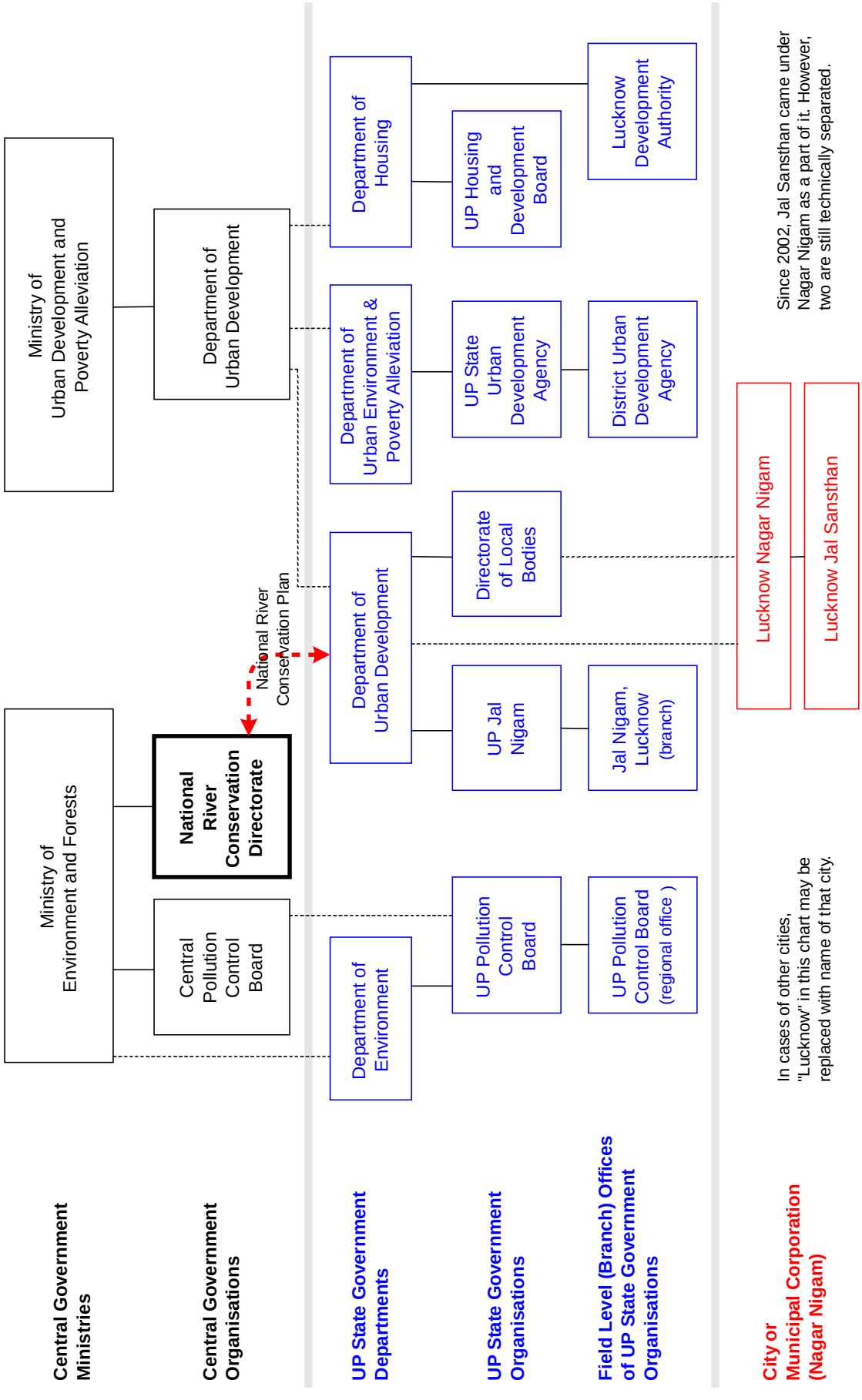


Figure 2.1 Hierarchy of Institutions – Case of Lucknow

2.2 NATIONAL LEVEL ORGANISATIONS

The present Master Plan study is administratively related with National River Conservation Directorate, Ministry of Environment and Forests; and Department of Urban Development, Ministry of Urban Development and Poverty Alleviation at the central government level.

National River Conservation Directorate (NRCD) was created in 1985 as a wing of the Ministry of Environment and Forests. It provides fund for and oversees implementation of National River Conservation Plan (NRCP) and National Lake Conservation Plan (NLCP) in all states of India. Until 2003, Rs. 47,000 million (US$ 1,070 million) has been invested in 31 rivers and 157 cities/towns in 18 states under NRCP, among which 59 cities/towns fall into Ganga Action Plan. Appendix A shows scale of NRCP broken- down to individual rivers, and cities/ towns.

As shown in the investment scale in Table 2.1, most of the NRCD activity is related with NRCP.

Table 2.1 Budget of National River Conservation

Unit: million Rs.

Year	National River Conservation Plan		National Lake Conservation Plan		Establishment, Research & Development		Total
2003-2004	2,352.2	82.2%	450.0	15.7%	60.0	2.1%	2,862.2
2002-2003	2,782.6	94.3%	121.9	4.1%	47.7	1.6%	2,952.2
2001-2002	2,832.8	95.3%	100.0	3.4%	40.8	1.4%	2,973.6
2000-2001	1,175.4	96.7%	2.0	0.2%	38.5	3.2%	1,215.9
1999-2000	1,524.3	96.9%	12.0	0.8%	36.7	2.3%	1,573.0

Source: NRCD

Compared with the internal funds from the national and state governments, external finance from multilateral and bilateral donor agencies is small. Donors' contribution to NRCP is shown in Table 2.2.

Table 2.2 Donors for National River Conservation Plan

Unit: million Rs.

Plan	Donor	Amount	Remarks
Ganga Action Plan I	World Bank	330.4	
	Netherlands	473.2	Kanpur & Mirzapur
Ganga Action Plan II	Netherlands	500.0	Kanpur
Gomti Action Plan	UK	58.9	Lucknow
Yamuna Action Plan I	Japan (JBIC)	5,240.0	
Yamuna Action Plan II	Japan (JBIC)	5,304.0	Earmarked

Yamuna Action Plan (YAP I and II) is related with three states in the catchment area, namely, Haryana, Delhi and Uttar Pradesh. NRCD provides fund to the implementation agencies in these states that is Public Health Engineering Department in Haryana sate, Delhi Jal Board and Municipal Corporation of Delhi in Delhi, and UP Jal Nigam in Uttar Pradesh.

Ganga Action Plan (GAP) has been and is being implemented in 59 cities/towns in 5 states. Implementation agencies in each state are as follows:

State	Implementing Agency
Uttaranchal	Uttaranchal Peyjal Nigam
Uttar Pradesh	Uttar Pradesh Jal Nigam
Bihar	Bihar Rajya Jal Parishad
Jharkhand	Mining Area Development Authority
West Bengal	Public Health Engineering Department
	Kolkata Metropolitan Development Authority
	Kolkata Metropolitan Water Supply & Sanitation Authority

Under Ganga Action Plan I, Rs. 4,517 million (US$ 103 million) investment was completed in 25 cities/ towns besides other projects still going on.

Completed Project under GAP I

Million Rs.

State	Cities/towns	Amount
Uttar Pradesh	6	1,901.2
Bihar	4	535.5
West Bangal	11	1,856.0
Others	4	224.3
Total	25	4,517.0

NRCD has staff of only approximately 100 persons, which consists of some 80 supporting personnel and 22 qualified personnel. The latter are: 15 technical officers at various levels, 1 project director, 1 joint secretary, 1 accounting, 2 financial and 2 other staff. This small staff is overseeing investment projects in some 150 cities / towns with the total annual budget of approximately 27 to 64 million US Dollars. Despite apparent need to increase number of staff, NRCD is not allowed to do so due to the general ban against increase of civil servants.

Being aware of the shortage of staff to monitor performance of number of projects, NRCD has started devising the Project Management Unit in every river-wise or state-wise river conservation plan. The Unit is expected to monitor and evaluate the implementation of NRCP so that the investment will be effectively undertaken.

2.3 STATE LEVEL ORGANISATIONS

At the Uttar Pradesh State government level, there are Ministry of Housing, Urban Development and Urban Poverty Alleviation; and Ministry of Environment. In Ministry of Environment, UP Pollution Control Board is placed as a wing of Department of Environment. Under the Ministry of Housing, Urban Development and Urban Poverty Alleviation, there are three related departments, i.e., Department of Urban Development (DUD), Department of Urban Environment and Poverty Alleviation (DUEPA), and Department of Housing (DOH).

Under DUD, there are Directorate of Local Bodies and Jal Nigam. Directorate of Local Bodies is overseeing, advising and transferring the state subsidy to local bodies that are cities and towns. Jal Nigam (Water Corporation) is planning and constructing water supply and wastewater facilities for all the local bodies. Constructed facilities are transferred to the local bodies for their operation and maintenance.

Under DUEPA, there are State and District Urban Development Agencies. They plan and develop plots of land in and around the local bodies, particularly larger cities. In these land development projects, they develop roads, drainage and sewers, and even buildings for sale to the individuals and private sector. Some drains and sewers, it is reported, are not connected to the existing facilities properly to discharge runoff water and wastewater. Also, many complain that projects are not necessarily well coordinated with the future plans that cities and other agencies envisage.

Under DOH, there are State Housing and Development Board, and City (District) Development

Authority. Both develop new colonies on their own plans. They are also responsible for installation of sewers and drains within their colonies. Once these colonies are sold, maintenance of sewers and drains as well as solid waste disposal comes under the city's responsibility.

UP Jal Nigam has constructed the sewerage facilities such as interceptor sewers, force mains and sewage treatment plants in the 4 target cities under Ganga Action Plan I. It was expected to transfer the facilities to the cities. However, Jal Nigam is still operating most of facilities in 4 cities. Tables 2.3 and 2.4 show number of staff and costs of operation and maintenance in 4 cities.

Table 2.3 Number of Permanent Staff of UP Jal Nigam Deployed on the GAP Works (Construction & O&M) in the 4 Target Cities

Category of Staff	Average Monthly Salary (Rs)	Kanpur	Allahabad	Varanasi	Lucknow
1. General Manager	28,000	1	1	1	2
2. Project Manager	25,000	4	2	3	5
3. Project Engineer	22,000	9	7	10	18
4. Assistant Project Engineer	18,000	20	12	37	63
5. Office Support Staff	9,000	60	36	88	137
6. Field Staff	4,000	104	72	135	167
Total		198	130	274	392

Table 2.4 Expenditure of Jal Nigam on the Operation & Maintenance of GAP facilities

(Rs. in Lakh)

City	Year	Expenditure on			
		Personnel	Repair & Maintenance	Electricity Charges	Total
1. Kanpur	2000 /01	160.58	137.2	342.29	640.07
	2001 /02	162.80	276.9	223.88	663.58
	2002 /03	168.30	183.02	262.77	614.09
2. Allahabad	2000 /01	103.8	172.67	184.9	461.37
	2001 /02	110.45	63.32	222.67	396.44
	2002 /03	118.37	32.76	225.21	376.34
3. Varanasi	2000 /01	131.56	187.36	199.19	518.11
	2001 /02	164.68	124.51	277.60	566.79
	2002 /03	140.12	83.08	272.56	495.76
4. Lucknow	2002/03 (3 months only)	23.73	4.64	73.00	101.37

Table 2.5 compares the costs for operation and maintenance actually spent by Jal Nigam in 4 cities against the costs that the Government of India assumes minimal requirement. It is notable that only a half the standard is met.

Table 2.5 Operation & Maintenance of Ganga Action Plan Assets by UP Jal Nigam

(Rs. in Lakh)

City	Requirement of O&M Funds According to GOI Standards				Amount Actually Spent on O&M		
	Personnel	Electricity	Repair & Maintenance	Total	2000/01	2001/02	2002/03
1. Kanpur	219.45	505.34	575.74	1,300.53	640.07	663.58	614.09
2. Allahabad	128.59	348.06	232.51	709.16	461.37	396.44	376.34
3. Varanasi	198.67	295.11	337.37	831.15	518.11	566.79	495.76
4. Lucknow	93.26	148.82	149.38	391.46	-	-	101.37

1. Because of paucity of funds, the UPJN has not been able to spend the amount on O&M commensurate with the prescribed standard requirement and has been attending to only the most essential works of operation and maintenance.

2. The figures of Kanpur include the O&M of Combined Effluent Treatment Plant (CETP) also.

3. The O&M of the Lucknow STP and Pumping Stations are presently being done by the construction contractors themselves under the agreement for Capital works. The expenditure figures represent only the amount spent for 3 months on watch and ward, that on nala cleaning and electricity charges which are borne by the UP Jal Nigam. The STP and other works are operational since December 2002 only.

2.4 MUNICIPAL LEVEL ORGANISATIONS

Municipal corporations (*Nagar Nigams*), municipalities (*Nagar Palika Parishads*) and *Nagar Panchayats* are administrative units of the same category, but different in scale. Municipal Corporation is large urban center with population of half a million or more. Municipality is middle sized urban center with population of a few tens of thousands to hundreds of thousands. *Nagar Panchayat* is less populated urban center. Definite numbers of population dividing these three names are not clearly defined. They may correspond to city, small city and town, which are the smallest units of local urban administration and legislation.

Nagar Nigams

A *Nagar Nigam* is the office of the municipal corporations. It consists of elected councilors, an elected mayor and a *Nagar Nigam* office. The executive officer of *Nagar Nigam* is a municipal commissioner, who is appointed from the state government in the case of the four target cities. A *Nagar Nigam* office is responsible for register of birth and death; and various services for urban community and maintenance of urban infrastructure including solid waste management. Profiles of four *Nagar Nigams* are given in the Appendix B.

The mandates of the Municipalities have been listed in the twelfth Schedule of the 74th Constitution Amendment Act 1992 as follows:

1) Urban planning including town planning
2) Regulation of land use and construction of building
3) Planning of economic and social development
4) Roads and bridges
5) Water supply for domestic commercial and industrial purpose
6) Public health, sanitation, conservancy and solid waste management
7) Fire services
8) Urban forestry, protection of environment and promotion of ecological aspects
9) Safeguarding the interest of the weaker section of society, including the handicapped

and mentally retarded
10) Slum improvement and upgradation
11) Urban poverty alleviation
12) Provision for urban amenities and facilities such as parks, gardens and playgrounds.
13) Promotion of cultural, educational and aesthetic aspects.
14) Burials and burial grounds, cremations, cremation grounds and electric crematoriums
15) Cattle pounds, prevention of cruelty to animals
16) Vital statistics including registration of births and deaths.
17) Public amenities including street lighting, parking lots, bus stops and public conveniences
18) Regulation of slaughterhouse and tanneries.

Mandates mentioned above have been divided into five broad categories and their classification is as under:

a. Essential Municipal Function: Functions that municipal bodies must perform and include item nos.2, 4, 5, 6, 12, 14, 15, 16, 17 and 18 from the above list.
b. Environment Management Function: Function item no.8 of the list
c. Planning Function: Function nos. 1, 3, 9, 10 and 11
d. Agency Type: Function item nos. 7 and 13
e. Function relating to Governance: Function item nos. 1, 2, 3 and 7

Water supply and sewerage services are provided by *Jal Sansthans* that are independent from *Nagar Nigams* in the 4 target cities, while they are provided by the municipal offices in smaller municipalities.

Ordinary revenue of *Nagar Nigam* is mainly from the state transfer or grants, property tax and other taxes on parking, theatre, vehicles, advertisement, etc. Property tax stands for more than 70 percent of the total tax revenue, whereas the state transfer accounts for approximately 70 percent of the total current revenue. Property tax is levied on the percentage (10 to 15 %) of annual rental value of property (land and building) of residents. Lawful method to assess the annual rental value is complex and not transparently defined. Reassessment at 5 year interval is not always implemented. As a result, complaints against the existing valuation of the annual rental value are everywhere and many lawsuits are in the courts. It is also reported that in many municipalities newly urbanized and built-up areas are not always counted for in the tax register.

Looking at the financial statements obtained so far from some *Nagar Nigams*, which are calculated and recorded by hands, figures don't match at many places. They are counted by single entry on the cash basis. One thing is clear that the city's own income does not cover expense. Some seventy percent of total expense is covered by the state transfer payment. It is also clear that capacity of accounting and financial management is very limited. More noticeable and important is that proper audit is not practiced. To find a bird's-eye view of *Nagar Nigams* in 4 cities, Table 2-6 shows their financial scales.

Table 2.6 Scale of Finance: Nagar Nigams Based on current income and expenditure

Unit: Rs. Million

		Lucknow	Kanpur	Varanasi	Allahabad	4 Cities
1989/90 with Octroi tax	Income	252		137		
	Expense			111		
1998/99	Income	809	302	284		
	Expense	769	470	308		
1999/2000	Income	763	866	356		
	Expense	746	895	322		
2000/01	Income	908	966	515	474	2,863
	Expense	912	960	466	436	2,774
2001/02	Income	1,018	1,072	440	362	2,892
	Expense	930	1,035	440	377	2,782
2002/03	Income	1,370	1,112	413	375	3,270
	Expense	1,461	977	395	354	3,187

Jal Sansthans

Jal Sansthan is responsible for operation and maintenance of water supply and sewerage system. Since 2002 in Uttar Pradesh, it is placed under the *Nagar Nigam* legally, and assumed to be a part of the latter. For some reason, however, it still maintains separate organisation, financial account and revenue collecting unit from those of *Nagar Nigam*. There are 6 *Jal Sansthans* in large cities in UP state. In the smaller cities and towns, engineering divisions or water divisions of the city (municipal) office are operating water supply and sewerage services.

Legal mandates of *Jal Sansthans*, most of which are duplication of those of *Nagar Nigam*, are set forth in UP Water Supply and Sewerage Act 1975 as follows:

- To plan, promote and execute schemes of and operate an efficient system of water supply
- Where feasible, to plan promote and execute schemes of, and operate sewerage, sewerage treatment and disposal and treatment of trade effluents
- To manage all its affairs so as to provide the people of the area within its jurisdiction with wholesome water and where feasible, efficient sewerage service
- To take such other measures, as may be necessary, to ensure water supply in times of any emergency
- Such other functions as may be entrusted to it by the state government by notification in the gazette.

Water and sewerage tax /charges are sources of *Jal Sansthan's* income. In the absence of water metering, both tax are assessed on percentages (12.5% for water and 3% for sewerage) of the annual rental value of residents' property. According to Varanasi *Jal Sansthan*, water tax is collected from all the house connections, whereas sewerage tax is levied from all the residents. As stated earlier, weak grounds of the annual rental value are at issue. Further, register of property with the assessed annual rental value is prepared by *Nagar Nigam* and not regularly circulated to *Jal Sansthan*. According to Lucknow *Jal Sansthan*, approximately 75 percent of the total bill is collected in recent years. Despite every effort, it is very difficult to collect the remaining 25 percent, as poor people simply do not have money, and people receiving intermittent supply or no supply tend to refuse to pay. Even if the entire bill is collected, it is not sufficient for the operation and maintenance of the water supply and sewer facilities installed and transferred to it by UP *Jal Nigam* and other state level organisations like District Urban Development Agency. As most of activity of *Jal Sansthans* is addressed to water supply services, they are not able to work sufficiently on maintenance of the already existing sewer networks alone. While they are aware that they are expected to operate the newly installed sewerage facilities under Ganga Action Plan I (GAP I), which comprise interceptor sewers, force mains and sewage treatment plants, their limited revenue without the government subsidy in significant scale never

allows proper operation and maintenance of such new facilities. It is also reported that they do not have suitable skills for operation of sewage treatment plants, which are newly introduced technology in India and being accumulated among engineers and technicians of Jal Nigam. Most of *Jal Sansthans* say that around or less than 20 percent of their expenditure would be spent for maintenance of the existing sewer networks. Financial scales of *Jal Sansthans* are shown in Table 2-7.

Table 2.7 Scale of Finance: Jal Sansthans Based on current income and expenditure

Unit: Rs. Million

		Lucknow	Kanpur	Varanasi	Allahabad	4 Cities
1996/97	Income	155			66	
	Expense	245			98	
1997/98	Income	198		60	71	
	Expense	282		134	97	
1998/99	Income	342		82	71	
	Expense	319		158	114	
1999/2000	Income	753	142	89	95	1,079
	Expense	367	151	182	112	812
2000/01	Income	328	195	98		
	Expense	435	185	216		
2001/02	Income		226	142		
	Expense		209	133		
2002/03	Income		236	209		
	Expense		222	182		
Assumed Scale (1)		500	250	220	180	1,150
25% of the Above (2)		125	63	55	45	288

Note (1): Approximation of annual financial scale in, say, 2005/06
Note (2): Assumed maximum expense for operation & maintenance of sewers

In *Jal Sansthans*, financial recording by double entry and accrual basis is legally implemented. However, most of the observations seen in *nagar Nigams'* financial records are found also in their records. Absence of proper audit may be an important cause of incorrect financial records. Profiles of 4 *Jal Sansthans* are shown in Appendix B.

Organisation of city office

Most of organisation charts obtained from 4 *Nagar Nigams* and 4 *Jal Sansthans* are observed to be along the lines and nodes of persons, or ranks of positions such as executive engineer, assistant engineer, and junior engineer. Functional organisation charts with divisions or units of organisation, each of which a specific function or duty is attributed to, are not shown. This type of perception of institutional organisation may invite a suspicion whether there are functional units and cells of independent functioning, or a crowd of persons without specified jobs.

In Varanasi *Nagar Nigam* that has approximately 3,800 employees; 102 are categorized as Centralized Services, who are appointed and assigned by the state government and shuffled from one municipality to another frequently; 325 are of Cadre 'C' Services requiring qualifications to a certain extent; and 3,388 are of Cadre 'D' Services, of which 2,344 are sweepers engaged in the solid waste management. Similarly, in Lucknow *Nagar Nigam*, 5,000 among 9,000 permanent employees are sweepers engaged in the solid waste management. As city is directly involved in the solid waste disposal services, the majority of the permanent employees are simple laborers. In the case of *Jal Sansthans*, 40 to 50 percent of the permanent employees are simple laborers. In contrast, senior officers of *Nagar Nigams* are shuffled frequently by the state. Senior officers in *Jal Sansthans* are also shuffled among with other *Jal Sansthans* in the UP.

History of city office

Both *Nagar Nigam* and *Jal Sansthan* are relatively young organisations that have evolved only after independence. *Nagar Nigams* were created in 1960's. Creation of *Jal Sansthans* or reorganisation from

respective municipal department in charge of water supply and sewerage was enacted in 1975, when UP Jal Nigam was reorganised from the previous Local Self Government Engineering Department of the UP state. Creation or reorganisation of *Jal Sansthan* was delayed and completed only in 1979. Both *Nagar Nigams* and *Jal Sansthans* are young, immature and evolving, and heavily depending on fiscal and human resources from the state government.

CHAPTER 3

CONSTRAINTS AND BOTTLENECKS

CHAPTER 3 CONSTRAINTS AND BOTTLENECKS

At the city level, *Nagar Nigam* and *Jal Sansthan* are rendering water supply and sewerage services, and solid waste disposal and other services. Both are part of the "City Office." How are these services operated and provided? Some may say they are fairly well operated. But, at the same time, there are many problems, like intermittent water supply or no supply in some areas of cities, water leakages in many places and clogged nalas (drainage canals) and sewers where sewage and wastewater don't run. Even the UP Jal Nigam, which is still operating the GAP I sewerage facilities, does not run pumps and sewage treatment plants during frequent power failure, since it has no sufficient fuel and funds to run the standby generators.

Jal Sansthans point out many important issues. They cannot supply water to some areas, as the production capacity is not enough. The distribution pipes are old and many leakages occur. Due to insufficient revenue, major replacement of pipes is difficult. Sewerage facilities that Jal Nigam constructed do not always generate the additional revenue, as branch sewers are not connected to trunk sewer. Jal Nigam doesn't lay sewer networks. They cannot operate sewerage facilities, as they don't have enough revenues. In these statements, *Jal Sansthans* claim that they are doing what they can do. But, due to the constraints and limitations that confine them, they cannot provide water and wastewater services readily satisfactorily to the people. They are not allowed, they state, to recruit any new employee or create any single post. These limitations are imposed by the state authorities on the one hand, and by municipal council on the other.

City offices don't have enough revenue to run the water supply and sewerage services, and solid waste disposal services and so on. Their employees are not sufficiently disciplined or skilled. This is particularly true in the sewerage sector, as sewage treatment is comparatively young practices in India. These constraints have to be overcome. Besides, sewerage facilities are installed by the state organisations and aimed for transfer to the city offices for their operation. Coordination and demarcation of multiple organisations are not apparently seen by citizens or even among the related parties, since legal mandates of Jal Nigam, *Nagar Nigams* and *Jal Sansthans* are duplicated. As a result, no one in the city office can explain clearly who is responsible for and what is the reason to derive the improper service level. Thus, city offices face many complaints from citizens and cannot resolve them easily. Many think, therefore, city office has to be enabled, enhanced and capacitated to provide services to the citizens satisfactorily.

Not only the national and state governments of India, but also many multilateral and bilateral donors have been putting emphasis on capacity building in city offices. Many trials and attempts have been and are being made in many cities such as Bangalore, Chennai, Ludhiana, Mirzapur, Agra and so on. Some success stories are simply not replicable in the other cities and some others do not appear sustainable in the long run. Reports on success stories say that the revenue on the property tax, water and sewer tax could be doubled by improving the tax net by introducing the Information Technology, Geographic Information System and giving necessary training on the use of them. If assessment of annual rental value of the properties could be rationalized through varied spectra of measures, then the tax would be doubled again. Eventually, the stories tend to say, the city's revenue would be tripled.

The trials and attempts have been made to address the operational resources, i.e., computerized tax registrar, etc., the financial resources, i.e., the revenues or tax, and human resources, i.e., the employees and their management. They could not triple the city's revenue, as they were not sustainable for more than a few years, some were not implemented due to political interventions. Tax increases are always sensitive issue. Even if these attempts were implemented, incremental revenue could not be in a range of doubled or tripled scale in the target cities such as Lucknow, Kanpur, Allahabad and Varanasi. It is clear that these exercises shall be pursued to its limit, since there is possibility to raise revenue and capacities with their own efforts in cities. However, they cannot raise the revenues to the extent required to operate the public infrastructure services to the citizens' satisfaction. Thus, the constraints will not totally be removed by the simple capacity building within

the city.

Maintenance of sewers is made by *Jal Sansthans*, while some part of it is made by *Nagar Nigam* in the case of Varanasi. They are maintaining the existing sewer networks alone. The existing downstream of sewers such as interceptor sewers, force mains and treatment plants were installed under GAP I of National River Conservation Plan. They are operated and maintained by Jal Nigam. In the present Master Plan, most of the proposed sewerage system will be the downstream facilities. As they will be installed under GAP II, significant amount of operation and maintenance costs shall be generated. To see the combined operation and maintenance costs, a simple estimation is given in Table 3-1 by adding costs of the Master Plan facilities and the existing GAP I facilities, and the possible maximum costs for the upstream sewers.

Table 3.1 Combined Operation and Maintenance Costs

Unit: Rs. Million

	Lucknow	Kanpur	Varanasi	Allahabad	4 Cities
O&M Costs for the Master plan Projects (mostly Downstream)					
2005	118	0	237	231	2,360
2010	128	900	354	289	3,392
2015	544	900	393	421	3,852
2020	690	1,402	430	444	4,542
2025	714	1,402	438	481	4,579
2030	714	1,402	438	487	4,584
O&M Costs for the GAP I Downstream Facilities (GoI Standard)					
	39	130	83	71	252
O&M Costs for the Upstream by Jal Sansthans (assumed maximum)					
	125	63	55	45	288

Combined Operation and Maintenance Costs with Rate of Growth from the Above										
2005	282	2	193	3	375	7	347	8	2,900	10
2010	292	2	1,093	17	492	9	405	9	3,932	14
2015	708	6	1,093	17	531	10	537	12	4,392	15
2020	854	7	1,595	26	568	10	560	12	5,082	18
2025	878	7	1,595	26	576	10	597	13	5,119	18
2030	878	7	1,595	26	576	10	603	13	5,124	18

Incremental O&M costs in 2010 will be much more than the combined financial scales of 4 *Nagar Nigams* (Table 2-6). They will be 15 times in 2015 and increase by18 times in 2020 as compared to now possibly being spent by 4 *Jal Sansthans*. New revenue source shall inevitably be explored.

To learn some sustainable success stories for possible revenue mobilization, visits were paid to Ahmedabad and Surat, Gujarat State and Indore, Madhya Pradesh State. Lessons so far learnt from these cities don't show much of replicable exercises. Rather, they show difference of economic and institutional frameworks from those in UP state. Such difference includes scale of city's economy, scale and nature of revenue of municipal corporation, concentration of matured public due to high literacy rate, level of qualification of municipal commissioner (IAS), etc.

CHAPTER 4

REQUIREMENT – PERCEPTION
OF
PUBLIC INFRASTRUCTURE SERVICES

CHAPTER 4 REQUIREMENT - PERCEPTION OF PUBLIC INFRASTRUCTURE SERVICES

4.1 THE PUBLIC INFRASTRUCTURE SERVICES

Examples of the public infrastructure services are:

- Water supply and wastewater services,
- Solid waste disposal services,
- Provision of facility like crematorium or even fire fighting services,
- Fuel gas supply,
- Electric power supply,
- Telephone service, and so forth.

They have the common characteristics and natures. All or most of them are natural monopolies without the market competition. Therefore they have to be regulated, and monitored by the authority or by the public. Some are operated by municipality. Some are provided by the nation-wide entity. Some are concessioned to the private sector. The global trends are to decentralize, fragment or fracture into multiple entities, or even privatize them to simulate the market competition. These services have the common objective, principles and guidelines.

4.2 THE OBJECTIVE OF THE PUBLIC INFRASTRUCTURE SERVICES

The public infrastructure services shall be provided in pursuit of the apparently self-explanatory objective. That is,

> The services shall be provided in quantity and with quality demanded with least costs and hence for the lowest prices.

They shall be provided as demanded, as they are the very basic necessity of the residents. Since the services are natural monopoly with no market competition in an area covered, the monopoly should be regulated and monitored by the public or users. The services shall be provided for the lowest price possible. To ensure the lowest price, practical principles of the public services have been established all over the World.

4.3 THE PRINCIPLES OF THE PUBLIC INFRASTRUCTURE SERVICES

To achieve this objective, the service provider has to be operated on the following basic principles:

- Single management - One integrated and responsible entity shall operate every line of the water supply and wastewater services. If planning, implementation and operation are made by separate entities without effective coordination, who shall be primarily responsible and accountable to the service recipients or the public? Without single entity, responsibility or accountability is not there. Accountability and single management are two sides of a coin.

- Least cost through the efficient operation and the high technical standards - The service in demanded quantity and quality should be provided with expense of the least operation costs and for the lowest price possible. The provider needs to render the services very efficiently and therefore to operate with the high technical levels.

- Transparent cost - To ensure the least cost operation, the cost control shall be rigorously and ruthlessly exercised. For this purpose alone, experienced and matured accountant and engineer must be in place. The detailed costs that are verified by the audited financial reports shall be made available to the public.

- Cost recovery from the users, or the user pay principle shall be pursued as far as practicable. It is desired to recover costs of the water supply and wastewater services from the service recipients as much as practicable or to the level of their affordability or willingness to pay. In many municipalities all over the world, costs of water supply are recovered from the users, but costs of wastewater disposal are not - by 100 percent. Recoverable proportion to the total costs will grow as the economy grows and, the living standards and the affordability-to-pay improve. With Indian economy booming in this inertia, it will be possible to recover them significantly in the not too distant future.

4.4 THE GUIDELINES OF THE PUBLIC INFRASTRUCTURE SERVICES

To design and structure the most suitable service provider, international best practices may serve as guidelines. Successful water supply and wastewater service providers worldwide operate under a common set of enabling conditions and share a number of common characteristics. They tend to have:

- Autonomy in all aspects of managing the service provider and operation of water and wastewater systems, including the planning, financing and implementation of investments as the provider has to evolve as demands evolve;

- A clearly defined regulatory framework, which hold the provider to high standards of efficiency, while insulating professional management from undue political interference;

- Financial self-sufficiency from the collection of tariffs sufficient to meet all financial needs - operational, maintenance, investment, and debt service, minimum intervention from the subsidy giver even if subsidy is required;

- A strong sense of public service and consumer orientation to render service of the best quality for the minimal cost. It has to be responsive to the demands and complaints by the users.

- The smaller, the better be the provider scaled, as the economic scale allows, to be more sensitive and responsive to the evolving demands;

- Access to credit for financing investments; and

- Reliance on a strong, competitive private sector to provide the quality support service. Once the single responsible entity is established, it can contract-out or sell to the concessionaires any parts of the services.

Thus, the essential principle of the public infrastructure service provider is found to be the single entity with single management. How shall it be organised? (1) As a division under the city or municipality? Or, (2) a statewide single provider? Or, (3) One in each municipality, but independent from the city? In most of Euro-American, African and Asian countries, responsibility for management of the water supply and wastewater service belongs to the municipality.

If one statewide service provider is organised in the UP, it will need employees of several tens of thousands. In Israel and the Palestinian territories, that have land of desert only, one nation-wide or territory-wide public company is providing the bulk supply of treated drinking water to every municipality for a wholesale price. Every municipality owns its water division, which distributes water to every house for a retail price.

If the independent service provider is to be organised in each city, the question will be who and how will it be regulated and supervised. There are options on how the single provider shall be established.

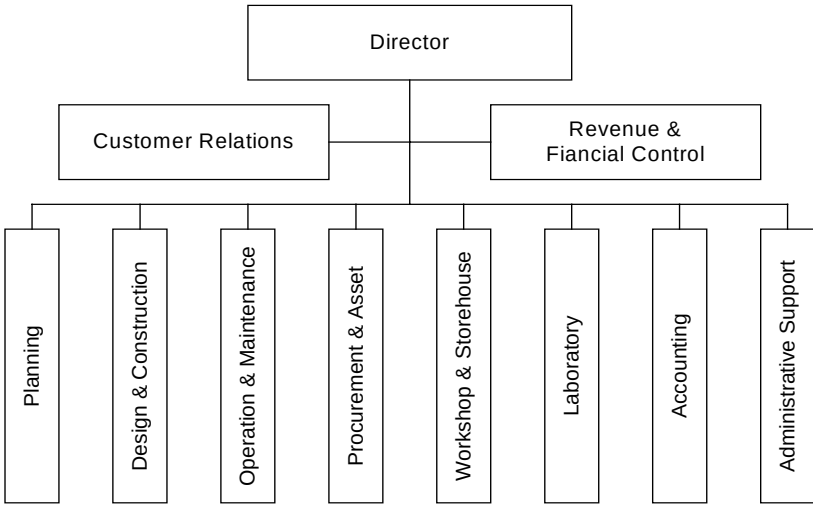
Here, option (1) is proposed, as it is most widely practiced. But, it does not mean to exclude the other options.

Water supply and wastewater service provider is proposed to be under the single management, and it will better be placed under the city office, but financially and technically autonomous, and highly professional, consumer oriented provider.

4.5 BASIC FUNCTIONS OF WATER AND WASTEWATER DIVISION

City's Water Supply and Wastewater Division shall be managed with business-oriented manner, and shall have the basic functions or units as follows:

- Customer relations, marketing, billing & collection – This will be most important business unit.
- Revenue, financial/ business/ cost control – Cost control shall be pursued to ensure least cost operation.
- Planning - business and facility – Business plan and facility development plan are different, but both shall be planned in pursuit of the objective of the services.
- Design and construction
- Technical operation and maintenance
- Procurement, asset management & control
- Workshop, storehouse, vehicle & machine
- Laboratory to monitor quality of water
- Administrative support, personnel



CHAPTER 5

RESOURCES REQUIRED

CHAPTER 5 RESOURCES REQUIRED

As discussed earlier, attempts toward capacity building in the present city offices (*Nagar Nigam* and *Jal Sansthan*) may raise the revenues and the capacities to a certain level, but not to the level required. In the institutional terms, these attempts were addressed to operational, human and financial resources of the present organisation under the present institutional framework. The present framework as far as practiced is that the solid waste disposal service may be planned and implemented by the city office; but water and wastewater services are not planned and implemented by the city office; and their operation and maintenance alone are entrusted to the city. This is against the single management principle.

To make the water and wastewater division of the city office such a single entity, a clear regulatory framework shall be established. To enable the division to provide the proper public services, all the operational, human and financial resources shall be transferred from the state to the cities.

5.1 NATIONAL DECENTRALIZATION POLICY

The constitutional amendments 74 and 75 suggest decentralization, delegation and devolution from the state to the local bodies. If it means the institutional reform, all three of the institutional resources should be transferred to the local bodies. The institutional resources are:

- Operational resources, i.e., jurisdiction, responsibility, facilities and equipment, and technology for the services;
- Human resources, i.e., qualified engineers, planners and problem-solvers; and
- Financial resources, i.e., revenue sources.

They shall be transferred to the larger cities in the beginning, and to the smaller towns and villages in the later stage.

5.2 THE CITY

Are cities willing to assume the responsibility, if the state is ready to transfer all of them? In the case of development and operation of water supply service, cities may say, yes, we are willing to assume the responsibility, because water is basic human need – and one of economic essentials, and water business has more chances to pay, as water tariff collection will be easier.

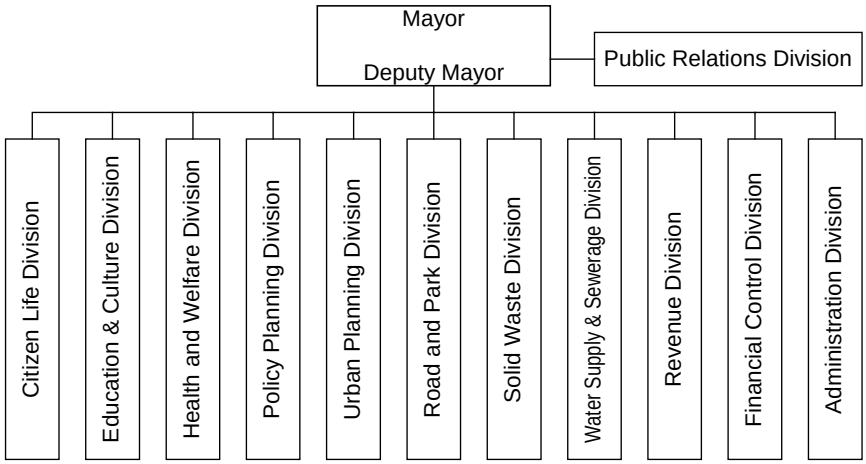
In reality, however, citizens' affordability to pay is still low, and full cost recovery may be difficult for some time. Therefore some financial aid, that is subsidy or tax transfer will be needed.

For the reference purpose, brief information on a full-fledged city office in Japan is shown in the Appendix C. It is noted that the business account of the city, which is on water supply and sewerage service alone, is slightly on the deficit side. Composition of city tax as well as national transfer and subsidy, details of the general account, contents of the special account and business account are shown. At the end, organisational structure broken down to division, section and unit, with roles and functions of each section with number of staff are shown.

In the case of development and operation of the wastewater disposal service, cities may not be so happy to answer. The development as well as operation of this service is very costly. As it is a young service, people are not accustomed to pay the service charge. It will be difficult to collect the charge to recover the significant proportion of costs. However, to conserve quality of the river water, it is important to enforce the wastewater treatment. To enforce such regulations and control, financial assistance to the cities is much more needed.

The basic city office, if the sewerage and other proper services are to be provided by city, needs to

have the essential divisions as shown below:



5.3 THE STATE ORGANISATION

Such regulatory enforcement and financial assistance may be sought from the state organisation, which shall have the following functions:

- Drafting regulations and ordinances,
- Setting standards, criteria, guidelines of the public infrastructures,
- Evaluating and approving projects that municipality proposes for the state subsidies, and
- Monitoring performance & quality of municipality's projects and service operation, and advising the cities when necessary.

Also, the state organisation shall provide technical supports to the municipalities. Such support may include:

- Training of city engineers and administrators,
- Release and transfer of the qualified engineers and specialists to cities,
- Provision of specialist services to cities through contracting,
- Maintaining and upgrading levels and quality of engineering and technology through research and development, etc.

To reform the present state-city relationship into the new relation outlined as above, it is proposed to formulate and implement an Institutional Development Programme that is primarily intended to create and capacitate the water and wastewater service providers while the Master Plan projects being implemented.

CHAPTER 6

INSTITUTIONAL DEVELOPMENT PROGRAMME

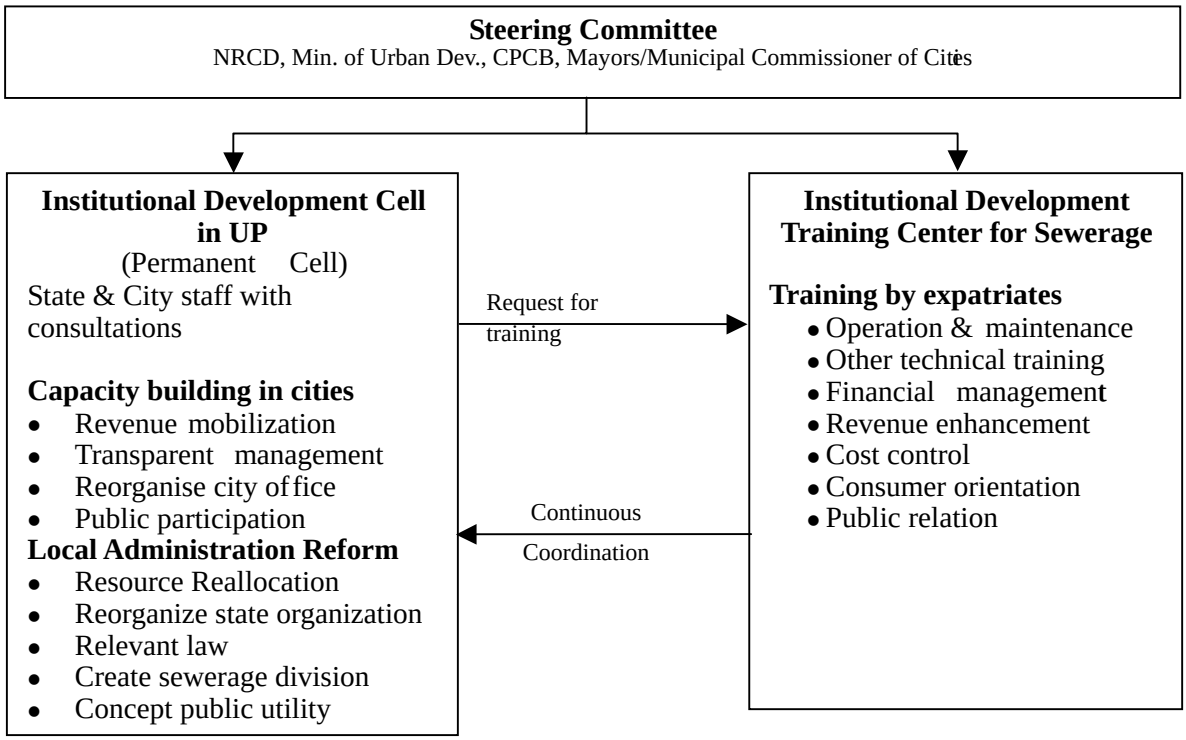
CHAPTER 6 INSTITUTIONAL DEVELOPMENT PROGRAMME

Accordingly, the Institutional Development Programme (IDP) is expected to implement institution engineering aimed to:

- Strengthen city offices so that they can implement succeeding phases of the Master Plan projects, and

- Build and strengthen water supply and wastewater divisions in the city offices so that they can provide the public infrastructure services in accordance with the objective, principles and guidelines.

Organisations of Institutional Development Programme may be envisaged as shown below:



Note: Staff shall be selected among from the state govts. and city office (Nagar Nigam and Jal Sansthan)

6.1 INSTITUTIONAL DEVELOPMENT PROGRAMME UNIT

It is proposed that an independent programme unit be created in the UP Department of Urban Development during the course of the implementation of the first phase of Varanasi sewerage project. The IDP unit shall report directly to the Principal Secretary and shall be staffed with experts of engineering, law, finance and local administration selected among from the relevant departments of the UP state and 4 cities. The steering committee of the ID Programme shall be convened by NRCD with members from the National Department of Urban Development, Central Pollution Control Board, the UP State Government and the Mayors of 4 cities. A consultant team shall be employed by NRCD and attached to the IDP unit for the guidance and collaboration.

The IDP unit in collaboration with the consultant shall undertake the two-tier municipal reform programme. The first tier, involving coordination among taxpayers, cities' population and personnel of

city office, is a painstaking and time-consuming attempt to attain consensus of all levels on the desirable city office and its providing public infrastructure services.

A. Capacity building in the cities by replicating lessons learned in the Agra Municipal Reform Project (see Appendix D for its terms of reference) and other municipal reform projects, including, but not limited to:

- Structuring appropriate systems for effective revenue mobilization from city tax (property tax, water/ sewerage tax, etc.)
- Structuring appropriate systems for financial management and public relations
- Structuring appropriate systems for service delivery of the municipal services including particularly wastewater services, taking into account possible private sector participation
- Implementing a large scale public awareness and participation programme in 4 cities

The second tier of the programme, being purely administrative and hence involving only administrators, is comparatively simple attempt. It will include only some amendment of local administrative law and shuffling of some personnel. It may be implemented in the shorter period of time, if consensus among the top-level decision makers is attained.

B. Formulation and implementation of the local administrative reform to bring about decentralization, delegation and devolution of the operational, human and financial resources from state to cities, by the following order:

- Identifying the resources needed by cities in providing public infrastructure (municipal) services
- Identifying and selecting the resources of the state government, which are needed by cities and can be transferred from state to cities
- Identifying and selecting the regulatory functions and the engineering & specialist functions of the state organisations including Jal Nigam so that the desired regulation and control as well as the level of technical standards and quality can be enforced and maintained
- Reviewing and drafting the relevant laws and regulations including those for the public servant's cadre so that the transfer of the above resources may be brought about. In any case, duplication or unclear definition of responsibility and jurisdiction shall be eliminated, so that every relevant organisation may clearly perceive its judicial and operational arena, its boundary and linkages to those of the others.
- Taking measure to convert and rectify the perception from the O&M of public facilities [bureaucrats' view] to the provision of the sustainable public infrastructure (municipal) services [citizens' view] by involving all levels of civil servants and citizens
- Structuring in the cities' water and wastewater division appropriate systems to pursue the objective, principles and guidelines of the pubic infrastructure services
- Formulating and implementing any other means to enhance the public service provider

6.2 CONSULTANT FOR INSTITUTIONAL DEVELOPMENT PROGRAMME

This consultant team attached to the IDP Unit may be called as IDP consultant, which shall be employed separately from the consultant for the detailed design and supervision of construction for the Varanasi sewerage project. The IDP consultant in collaboration with the IDP Unit is expected to concentrate on the institution engineering to mobilize and reform the institutional framework, i.e., regulatory framework of the State and Cities. It shall, also, focus on the institution engineering to reshape the operational, human and financial resources of cities, particularly those of the water and wastewater divisions. It will identify and formulate actions and measures to be taken up step-by-step to evolve the present city offices to the full-fledged city offices. These actions and measures include introduction of new management systems, shift of the regulatory frameworks and perceptions or

working environments, in which the stakeholders will play their roles. Training of personnel at many levels will become necessary to quickly adjust themselves to the new roles and environments. Such training programmes may be formulated by the IDP Unit with its consultant. Implementation of these trainings, however, shall be made by a separately proposed "Public Service Training Center."

6.3 PUBLIC SERVICE TRAINING CENTER

Public Service Training Center shall be established separately under NRCD and the National Department of Urban Development with possible bi or multilateral assistance programme. In cooperation and collaboration with the IDP Unit, it will develop and provide necessary trainings of personnel relevant to the IDP during and after the period of the Programme.

Appendix A

Appendix A: Riverwise National River Conservation Plan

(Rs. million)

No.	River / City-Town	State No.	State	Approved Cost	Sanctioned Cost (Till 01/2004)	Expenditure By State (Till 12/2003)
I	**Adyar**					
II	**Cooum**	1	Tamil Nadu			
1	Chennai			4,915.2	2,553.9	1,574.0
	Subtotal			**4,915.2**	**2,553.9**	**1,574.0**
III	**Betwa**					
2	Bhopal	2	Madhya Pradesh	23.5	15.1	11.7
3	Mandideep		Madhya Pradesh	16.5	3.6	3.6
4	Vidisha		Madhya Pradesh	46.4	43.5	35.5
	Subtotal			**86.4**	**62.3**	**50.8**
IV	**Bhadra**					
5	Bhadravati	3	Karnataka	46.0	31.6	24.6
	Subtotal			**46.0**	**31.6**	**24.6**
V	**Brahamini**					
6	Chandbali	4	Orissa	9.7	0.0	0.0
7	Dharamshala		Orissa	22.0	0.0	0.0
8	Talcher		Orissa	67.7	0.0	0.0
9	Puri (Coastal Area)		Orissa	482.9	482.9	13.0
	Subtotal			**582.3**	**482.9**	**13.0**
VI	**Cauvery**					
10	Bhawani		Tamil Nadu	35.0	12.8	8.3
11	Erore		Tamil Nadu	148.9	113.7	105.4
12	K.R. Nagar		Karnataka	8.0	4.2	6.7
13	Kollegal		Karnataka	7.1	10.9	4.4
14	Kumarapalayam		Tamil Nadu	59.4	23.2	31.9
15	Nanjagud		Karnataka	17.5	12.7	11.4
16	Palli Palayam		Tamil Nadu	54.1	18.5	6.2
17	Karur		Tamil Nadu	385.0	276.4	3.8
18	Kumbakonam		Tamil Nadu	506.0	345.9	14.5
19	Myladuthurai		Tamil Nadu	462.0	396.3	3.0
20	Tiruchirappalli		Tamil Nadu	1,320.0	1,166.7	8.6
21	Sri Rangapatna		Karnataka	18.4	14.4	13.5
22	Trichy		Tamil Nadu	65.5	38.3	40.0
	Subtotal			**3,086.8**	**2,434.0**	**257.6**
VII	**Chambal**					
23	Keshoraipatta	5	Rajasthan	7.6	5.3	1.4
24	Kota		Rajasthan	124.5	6.4	4.1
25	Nagda		Madhya Pradesh	37.2	27.0	26.9
	Subtotal			**169.3**	**38.6**	**32.4**
VIII	**Damodar**					
26	Andal	6	West Bengal	14.1	1.8	2.0
27	Asansol		West Bengal	76.1	1.8	1.7
28	Bokaro-Kangali	7	Jharkhand	11.6	1.0	0.7
29	Chicunda		Jharkhand	17.2	0.0	0.0
30	Dugdha		Jharkhand	12.4	0.0	0.0
31	Durgapur		West Bengal	16.2	2.1	1.9
32	Jharia		Jharkhand	19.3	0.0	0.0
33	Ramgarh		Jharkhand	29.5	1.6	0.9
34	Raniganj		West Bengal	15.5	1.9	1.9
35	Sindri		Jharkhand	0.1	0.0	0.0
36	Sudamdih		Jharkhand	10.0	1.0	0.4
37	Telumochu	9	Bihar	2.1	0.6	0.2
	Subtotal			**224.1**	**11.7**	**9.6**

IX	**Ganga**					
38	Allahabad		Uttar Pradesh	327.2	315.6	60.9
39	Anupshaher		Uttar Pradesh	54.9	45.0	22.9
40	Arrah		Bihar	25.5	3.4	2.8
41	Badreshwar & Champdani & Kanchanpara		West Bengal	337.9	53.2	10.8
42	Badrinath	10	Uttaranchal	6.8	2.0	1.5
43	Baidyabati		West Bengal	129.1	49.8	0.0
44	Bansberia		West Bengal	268.1	24.2	8.3
45	Barahya		Bihar	4.1	4.1	3.8
46	Barh		Bihar	6.9	1.9	1.5
47	Barrackpore		West Bengal	239.5	114.5	21.1
48	Bhagalpur		Bihar	51.7	2.0	2.1
49	Bijnor		Uttar Pradesh	71.8	4.3	3.7
50	Budge-Budge		West Bengal	98.5	12.4	8.9
51	Buxar		Bihar	7.6	0.8	0.5
52	Chakdah		West Bengal	23.5	0.0	0.0
53	Chapra		Bihar	16.8	0.0	0.0
54	Chunar		Uttar Pradesh	46.8	4.0	2.7
55	Circular Canal		West Bengal	90.2	59.5	28.1
56	Deo Prayag		Uttaranchal	38.1	5.8	2.5
57	Dhulian		West Bengal	37.1	2.7	0.9
58	Diamond Harbour		West Bengal	34.3	0.0	0.0
59	Farrukkabad		Uttar Pradesh	5.1	0.0	0.1
60	Fatwah		Bihar	6.7	1.8	1.4
61	Garmukteshwar		Uttar Pradesh	15.4	3.5	2.6
62	Garulia		West Bengal	103.6	41.1	12.3
63	Gazipur		Uttar Pradesh	77.2	5.6	4.9
64	Gopeshwar		Uttaranchal	9.7	1.5	1.6
65	Goyespur, Halilshar		West Bengal	259.2	123.6	49.1
66	Haridwar & Rishikesh		Uttaranchal	64.8	27.5	26.7
67	Hazipur		Bihar	29.3	0.0	0.0
68	Jangipur		West Bengal	33.5	2.7	1.6
69	Jijganj Azimganj		West Bengal	55.7	2.5	1.9
70	Joshimath		Uttaranchal	4.4	1.7	1.3
71	Kahelgaon		Bihar	20.7	0.0	0.0
72	Kanpur		Uttar Pradesh	857.4	526.3	510.2
73	Karna Parag		Uttaranchal	2.9	0.8	0.4
74	Katwa		West Bengal	35.8	2.6	1.9
75	Kharda (Extended)		West Bengal	98.6	53.3	11.9
76	Konnagar		West Bengal	148.7	135.1	10.2
77	Maheshtala		West Bengal	127.6	86.4	37.1
78	Mirzapur		Uttar Pradesh	37.0	26.2	9.5
79	Mokamah		Bihar	17.7	0.0	0.0
80	Mugal Sarai		Uttar Pradesh	40.9	14.8	2.4
81	Munger		Bihar	11.6	4.0	3.4
82	Murshidabad		West Bengal	48.9	2.7	0.6
83	Naihati		West Bengal	232.2	12.7	0.6
84	North Barrackpore		West Bengal	192.2	141.6	0.0
85	Patna		Bihar	116.4	17.8	8.8
86	Ranipur		Uttaranchal	74.6	39.3	12.6
87	Rishra		West Bengal	119.1	44.0	7.8
88	Rudra Prayag		Uttaranchal	20.9	1.5	1.3
89	Sahebganj		Bihar	4.8	2.1	1.1
90	Saidpur		Uttar Pradesh	6.2	0.0	0.2
91	Srinagar		Uttaranchal	70.8	42.1	18.0
92	Sultanganj		Bihar	9.4	3.7	3.1
93	Tolly's Nallah		West Bengal	354.5	238.3	138.7
94	Uttar Kashi		Uttaranchal	91.8	63.4	25.0
95	Uttarpara Kotrunj		West Bengal	107.0	92.6	5.0
96	Varanasi		Uttar Pradesh	450.6	416.1	100.5
	Subtotal			**5,878.9**	**2,883.7**	**1,196.7**

X	**Godavari**					
97	Bhadrachalam	11	Andhra Pradesh	29.4	20.1	11.6
98	Mancharial		Andhra Pradesh	45.7	23.1	18.6
99	Nanded	12	Maharashtra	145.0	129.3	97.9
100	Nashik		Maharashtra	688.9	620.2	445.5
101	Rajamundry		Andhra Pradesh	239.1	217.9	88.7
102	Trimbakeshwar		Maharashtra	116.4	116.4	44.6
103	Ramagundam		Andhra Pradesh	196.1	57.5	22.8
	Subtotal			**1,460.6**	**1,184.4**	**729.6**
XI	**Gomati**					
104	Jaunpur		Uttar Pradesh	56.6	37.7	37.2
105	Lucknow		Uttar Pradesh	3,110.1	3,106.7	313.4
106	Sultanpur		Uttar Pradesh	47.0	43.5	43.6
	Subtotal			**3,213.7**	**3,187.9**	**394.2**
XII	**Khan**					
107	Indore		Madhya Pradesh	421.9	401.9	196.5
	Subtotal			**421.9**	**401.9**	**196.5**
XIII	**Krishna**					
108	Karad		Maharashtra	133.1	31.9	20.7
109	Sangli		Maharashtra	148.4	244.0	0.0
	Subtotal			**281.4**	**275.8**	**20.7**
XIV	**Kshipra**					
110	Ujjain		Madhya Pradesh	249.2	180.5	154.4
	Subtotal			**249.2**	**180.5**	**154.4**
XV	**Mahanadi**					
111	Cuttack		Orissa	140.4	68.4	27.3
	Subtotal			**140.4**	**68.4**	**27.3**
XVI	**Mandovi**					
112	Panaji	13	Goa	141.0	141.0	0.0
	Subtotal			**141.0**	**141.0**	**0.0**
XVII	**Narmada**					
113	Jabalpur		Madhya Pradesh	138.1	13.4	11.5
	Subtotal			**138.1**	**13.4**	**11.5**
XVIII	**Pamba**					
114	Pamba (Sabarimala)	14	Kerala	184.5	184.5	0.0
	Subtotal			**184.5**	**184.5**	**0.0**
XIX	**Pennar**					
115	Bangalore		Karnataka	462.7	462.7	91.3
	Subtotal			**462.7**	**462.7**	**91.3**
XX	**Sabarmati**					
116	Ahemadabad	15	Gujarat	938.3	1,019.6	753.4
	Subtotal			**938.3**	**1,019.6**	**753.4**
XXI	**Satluj**					
117	Jalandhar	16	Punjab	545.5	521.1	234.9
118	Ludhiana		Punjab	1,571.6	1,330.0	978.0
119	Phagwara		Punjab	71.6	77.3	60.2
120	Phillaur		Punjab	7.5	11.1	12.1
121	Kapurthala		Punjab	125.6	125.6	50.3
122	Sultanpur Lodhi		Punjab	24.1	24.1	16.8
	Subtotal			**2,345.8**	**2,089.2**	**1,352.2**
XXII	**Subrnarekha**					
123	Ghatshila		Jharkhand	19.7	6.8	2.4
124	Jameshedpur		Jharkhand	170.5	17.5	3.8
125	Ranchi		Jharkhand	116.2	13.3	3.6
	Subtotal			**306.4**	**37.6**	**9.8**
XXIII	**Tapti**					
126	Burhanpur		Madhya Pradesh	52.6	48.4	18.1
	Subtotal			**52.6**	**48.4**	**18.1**
XXIV	**Tunga**					
127	Shimoga		Karnataka	70.9	38.0	12.9
	Subtotal			**70.9**	**38.0**	**12.9**

XXV	**Tungabhadra**					
128	Davanagere		Karnataka	64.5	40.4	28.8
129	Harihara		Karnataka	25.0	25.0	20.1
	Subtotal			**89.4**	**65.4**	**48.9**
XXVI	**Tamrabarani**					
130	Tirunelveli		Tamil Nadu	660.0	520.1	4.3
	Subtotal			**660.0**	**520.1**	**4.3**
XXVII	**Vennar**					
131	Thanjavur		Tamil Nadu	770.0	565.6	5.0
	Subtotal			**770.0**	**565.6**	**5.0**
XXVIII	**Vaigai**					
132	Madurai		Tamil Nadu	1,650.0	1,127.8	360.9
	Subtotal			**1,650.0**	**1,127.8**	**360.9**
XXIX	**Wainganga**					
133	Chapara		Madhya Pradesh	5.9	4.0	3.7
134	Keolari		Madhya Pradesh	7.8	3.6	3.2
135	Seoni		Madhya Pradesh	12.9	2.5	2.4
	Subtotal			**26.6**	**10.1**	**9.3**
XXX	**Yamuna**					
136	Agra		Uttar Pradesh	746.3	844.0	778.0
137	Chhchhrauli	17	Haryana	10.3	10.5	8.5
138	Delhi	18	Delhi	1,865.6	1,806.4	1,607.0
139	Etawah		Uttar Pradesh	94.3	56.0	62.0
140	Faridabad		Haryana	780.4	785.0	740.6
141	Gharaunda		Haryana	17.3	14.1	24.9
142	Ghaziabad		Uttar Pradesh	917.2	946.9	932.8
143	Gohana		Haryana	33.6	34.8	38.2
144	Gurgaon		Haryana	268.2	276.5	265.8
145	Indri		Haryana	12.8	13.7	16.0
146	Karnal		Haryana	273.0	249.4	259.6
147	Mathura		Uttar Pradesh	279.9	248.6	241.8
148	Muzaffarnagar		Uttar Pradesh	128.3	128.6	125.9
149	Noida		Uttar Pradesh	281.5	271.6	266.8
150	Palwal		Haryana	105.6	105.4	110.6
151	Panipat		Haryana	439.3	435.1	436.7
152	Radaur		Haryana	18.1	10.9	7.1
153	Saharanpur		Uttar Pradesh	255.2	248.7	238.3
154	Sonepat		Haryana	240.4	226.3	226.2
155	Vrindavan		Uttar Pradesh	96.2	89.7	85.4
156	Yamunanagar		Haryana	286.7	288.0	283.3
	YAP-II			5,738.0		
	Subtotal			**12,888.1**	**7,090.1**	**6,755.5**
XXXI	**Musi**					
157	Hyderabad		Andhra Pradesh	3,440.8	0.0	0.0
	Subtotal			**3,440.8**	**0.0**	**0.0**
	Grand Total (31 Rivers)			**44,921.5**	**27,211.0**	**14,114.5**

Appendix B

Appendix B : Profiles of State and City Organizations

1. UTTAR PRADESH JAL NIGAM

The Uttar Pradesh Jal Nigam (UPJN) is an autonomous corporation of the Uttar Pradesh State Government, under the Department of Urban Development. It was established on June 18, 1975 under the Uttar Pradesh Water Supply and sewerage Act, 1975. As a result, the Local Self Government Engineering Department (LSGED), a government department, was converted into an autonomous organization called UPJN, which took over all the assets and liabilities of the erstwhile LSGED.

UP Jal Nigam is the apex body for urban and rural water supply, sewerage and sewage disposal in the state. It is required to establish state standards for water supply and sewerage services and is empowered to inspect all water supply and sewerage facilities in the state regardless of who operates the services. The main functions of UPJN for water supply, sewerage and drainage may be classified under the following three broad categories:

1. Planning for the state – to prepare State plans for water supply, sewerage and drainage on the directions of the State Government;

2. The actual preparation, execution, promotion and financing of schemes, i.e., design and construction of capital works, as well as operation and maintenance in areas where there are no *Jal Sansthans* or where they are directed to do so by the state government. The O & M of rural water supply is the responsibility of the UP Jal Nigam.

3. Controlling authority for local bodies, such as water works, *Jal Sansthans* etc. in the state. It is required to review and advise on tariff, taxes and charges of water supply in the areas of the *Jal Sansthans* and local bodies and also provide them with loans.

1.1 FUNCTIONS CURRENTLY BEING PERFORMED

The Jal Nigam's role in planning is primarily limited to planning water supply and sewerage schemes in the state. The controlling function is limited to participation in the Boards of the *Jal Sansthans* and recommending increase in tariffs/approving their budgets. The *Jal Sansthans*, after approval by their boards, approach the state government directly for tariff increases. The Jal Nigam does not exercise any real control over the local bodies and also does not find time to inspect water supply and sewerage schemes being managed by *Jal Sansthans*.

It's primary role, therefore, is the planning and execution of water supply schemes across the state. UP Jal Nigam executes the capital works and then hands them over to the *Jal Sansthans*, in the case of urban areas, for operations and maintenance. In rural areas, the operations and maintenance of the water supply schemes remains with and is being carried out by the Jal Nigam. Even in the execution of capital works, UP Jal Nigam merely designs the works and then supervises the construction for a fee (*centage*); the actual construction work being subcontracted to outside parties.

Over the past few years, no budgetary allocation has been made to the Jal Nigam by the state government for sewerage, other than special schemes. This is despite the fact that out of the 623 towns (*Nagar Nigams* – 11, *Nagar Palika Parishads* - 195 and *Nagar Panchayats* - 417) only 55 towns have sewerage systems, and that too partially. Some sewage treatment plants have been set up under the Ganga Action Plan and some sewer lines are being laid out under the Revolving Fund. Under the Ganga Action Plan, the UP Jal Nigam, together with the *Nagar Nigams* and *Jal Sansthans*, is the main executing agency for Uttar Pradesh.

The Jal Nigam has a commercial wing called "Construction and Design Services" which carries out developmental works for different state departments who do not have the technical capacity for such

works. They undertake contract works both in the state for these departments as well as contract works in other states. They also offer advisory services in water supply and sewerage works in other states of the country.

In the fiscal year 2002-2003, the Jal Nigam had received Rs.6,509.51 million for various works undertaken by them. In 2003-2004, as against a budget of Rs.5,338 million, the state government approved Rs.2,003.61 million of which the Jal Nigam had received only Rs.1,106.23 million up to December, 2003. Almost all the works were for water supply with a skew to rural water supply. The Jal Nigam's budget for works to be undertaken in 2004-2005 is Rs.5,813.7 million. Of the funds allocated by the state government, the entire amount is for water supply.

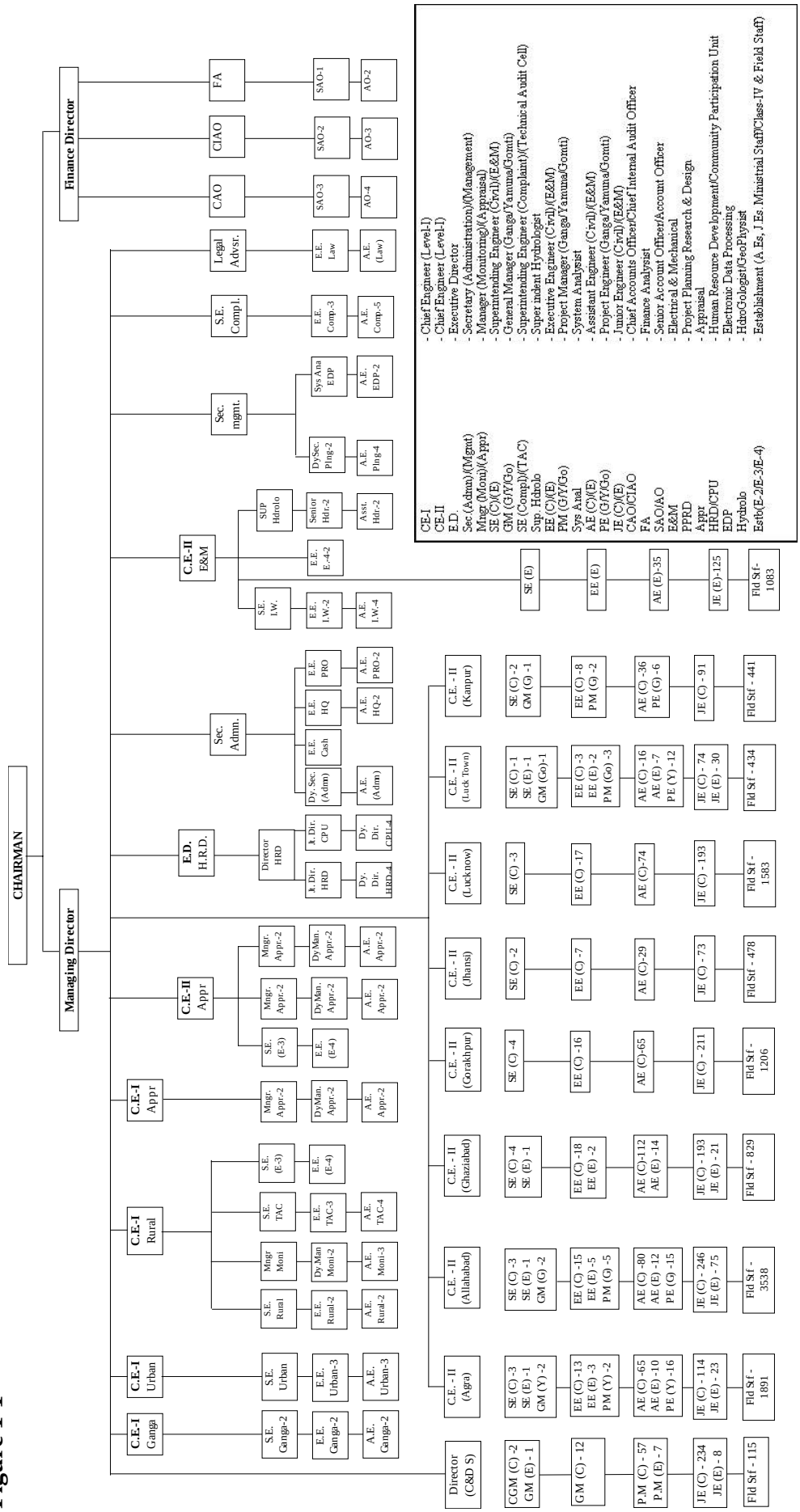
1.2 ORGANISATION STRUCTURE

The Uttar Pradesh Jal Nigam is headed by the Chairman, who is generally a senior Indian Administrative Service (IAS) officer of the rank of Secretary, nominated by the state government. Presently, however, the state has nominated the Minister for Urban Development as Chairman of the Jal Nigam. The Chairman is supported by the Managing Director, also appointed by the state government, and who is a qualified engineer from the Jal Nigam, with experience in water supply and sewerage. The other nominated appointee is the Finance Director, who is from the State Finance and accounts Service. The organization structure of UP Jal Nigam is provided in Figure 1-1. Administratively, the Jal Nigam is divided into 9 zones; Agra, Ghaziabad, Allahabad, Lucknow, Lucknow Town, Kanpur, Jhansi, Gorakhpur and a zone controlling electrical and mechanical works. These are subdivided into 37 circles, which are further subdivided into 139 divisions. The break-up, by function, is as under:

Function	Circles	Divisions
Construction	30	111
Project	1	1
Electrical & Mechanical	6	27
Total	**37**	**139**

Both the project as well as construction divisions carry out both project designing and execution. The electrical and mechanical divisions design and execute piped water schemes (pumping stations), tube wells and maintain flood-pumping stations etc. Each zone is headed by a chief engineer, a circle is headed by a superintending engineer and the head of a division is an executive engineer.

Figure 1-1


CHAIRMAN
Managing Director
Finance Director
C.E.-I Ganga
C.E.-I Urban
C.E.-I Rural
C.E.-I Appr
C.E.-II Appr
E.D. H.R.D.
Sec. Admn.
C.E.-II E&M
Sec. mgmt.
S.E. Compl.
Legal Advsr.
CAO
ClAO
FA
- Chief Engineer (Level-I)
- Chief Engineer (Level-I)
- Executive Director
- Secretary (Administration)/(Management)
- Manager (Monitoring)/(Appraisal)
- Superintending Engineer (Civil)/(E&M)
- General Manager (Ganga/Yamuna/Gomti)
- Superintending Engineer (Complaint)/(Technical Audit Cell)
- Super indent Hydrologist
- Executive Engineer (Civil)/(E&M)
- Project Manager (Ganga/Yamuna/Gomti)
- System Analysist
- Assistant Engineer (Civil)/(E&M)
- Project Engineer (Ganga/Yamuna/Gomti)
- Junior Engineer (Civil)/(E&M)
- Chief Accounts Officer/Chief Internal Audit Officer
- Finance Analysist
- Senior Account Officer/Account Officer
- Electrical & Mechanical
- Project Planning Research & Design
- Appraisal
- Human Resource Development/Community Participation Unit
- Electronic Data Processing
- HidroGologist/GeoPhysist
- Establishment (A. Es, J. Es. Ministrial Staff/Class-IV & Field Staff)
CE-I
CE-II
E.D.
Sec (Admn)/(Mgmt)
Mngr (Moni)/(Appr)
SE (C)/(E)
GM (G/Y/Go)
SE (Compl)/(TAC)
Sup. Hdrolo
EE (C)/(E)
PM (G/Y/Go)
Sys Anal
AE (C)/(E)
PE (G/Y/Go)
JE (C)/(E)
CAO/CIAO
FA
SAO/AO
E&M
PPRD
Appr
HRD/CPU
EDP
Hydrolo
Estb(E-2/E-3/E-4)
Director (C&D S)
CGM (C) -2
GM (E) - 1
GM (C) - 12
P.M (C) - 57
P.M (E) - 7
JE (C) - 234
JE (E) - 8
Fld Stf - 115
C.E. - II (Agra)
SE (C) -3
SE (E) -1
GM (Y) -2
EE (C) -13
EE (E) -3
P.M (Y) -2
AE (C) -65
AE (E) -10
P.E (Y) -16
JE (C) - 114
JE (E) - 23
Fld Stf - 1891
C.E. - II (Allahabad)
SE (C) -3
SE (E) -1
GM (G) -2
EE (C) -15
EE (E) -5
P.M (G) -5
AE (C) -80
AE (E) -12
P.E (G) -15
JE (C) - 246
JE (E) - 75
Fld Stf - 3538
C.E. - II (Ghaziabad)
SE (C) -4
SE (E) -1
EE (C) -18
EE (E) -2
AE (C)-112
AE (E) - 14
JE (C) - 193
JE (E) - 21
Fld Stf - 829
C.E. - II (Gorakhpur)
SE (C) -4
EE (C) -16
AE (C)-65
JE (C) - 211
Fld Stf - 1206
C.E. - II (Jhansi)
SE (C) -2
EE (C) -7
AE (C)-29
JE (C) - 73
Fld Stf - 478
C.E. - II (Lucknow)
SE (C) -3
EE (C) -17
AE (C)-74
JE (C) - 193
Fld Stf - 1583
C.E. - II (Luck Town)
SE (C) -1
SE (E) - 1
GM (Go)-1
EE (C) -3
EE (E) -2
P.M (Go) -3
AE (C) -16
AE (E) -7
P.E (Y) -12
JE (C) - 74
JE (E) - 30
Fld Stf - 434
C.E. - II (Kanpur)
SE (C) -2
GM (G) -1
EE (C) -8
P.M (G) -2
AE (C) -36
P.E (G) -6
JE (C) - 91
Fld Stf - 441
Dy. Dir. HRD-4
Jr. Dir. HRD
Director HRD
Dy. Dir. CPU-4
Jr. Dir. CPU
Dy. Sec. (Adm)
E.E. Cash
E.E. HQ
E.E. PRO
A.E. (Adm)
A.E. HQ-2
A.E. PRO-2
S.E. (E-3)
E.E. (E-4)
Mngr. Appr.-2
DyMan. Appr.-2
A.E. Appr.-2
S.E. TAC
E.E. TAC-3
A.E. TAC-4
S.E. Rural
E.E. Rural-2
A.E. Rural-2
Mngr Moni
Dy.Man Moni-2
A.E. Moni-3
S.E. Urban
E.E. Urban-3
A.E. Urban-3
S.E. Ganga-2
E.E. Ganga-2
A.E. Ganga-2
S.E. I.W.
E.E. I.W.-2
A.E. I.W.-4
SUP Hdrolo
Senior Hdr.-2
Asst. Hdr.-2
E.E. E.-4-2
Dy.Sec. Plng-2
A.E. Plng-4
Sys Ana EDP
A.E. EDP-2
S.E. Compl.
E.E. Comp.-3
A.E. Comp.-5
Legal Advsr.
E.E. Law
A.E. (Law)
CAO
SAO-3
AO-4
ClAO
SAO-2
AO-3
FA
SAO-1
AO-2
SE (E)
EE (E)
AE (E)-35
JE (E)-125
Fld Stf- 1083

Manpower Strength

The total staff strength is given in Table 1-1. As may be seen, the UP Jal Nigam has the following strength:

S.No.	Category	Nos.
1.	Technical staff	3,289
2.	Non Technical staff	4,410
	Sub – total	7,699
3.	Work charged (Regular)	8,172
4	Work charged and Muster Roll (Daily wages)	3,426
	Sub - total	11,598
	Gross Total	**19,297**

With a ban on new recruitments, Jal Nigam has been carrying the same work force with additions only in the work charged staff, a sizeable number of whom have been regularized. Apart from major expansion in its early years, the Jal Nigam's work has substantially reduced, even though there is still a lot to be done in the sewerage works for the state. However, these works require policy decisions and substantial funding.

The Jal Nigam has a very strong force of qualified engineers, mainly for civil works. However, since its functions are all technical with construction being contracted out, the very high percentage (57%) of non-technical staff does not appear to be justified. Furthermore, with a reduction in the quantum of work being handled, the number of divisions appears to be in excess of requirement.

The UP Jal Nigam was one of the few government institutions, which provide regular training to its staff, even though the training was mainly for engineers. They have a training center set up in Lucknow for this purpose. However, due mainly to a shortage of funds, in-house training is no longer being carried out by the Jal Nigam and some engineers are sent for training in various programmes conducted by the central government.

Table 1-1: Total Manpower Strength as on 1.7.2004

S.No.	Position	No. of personnel
1.	Chairman	1
2.	Managing Director	1
3.	Finance Director	1
4.	Chief Engineer (Level 1)	3
5.	Chief Engineer (Level 2)	7
6.	Superintending Engineer	51
7.	Executive Engineers	196
8.	Assistant Engineer	748
9.	Junior Engineer	1,925
10.	Hydrogeologist/Geophysicist	3
11.	Draughtsman	371
12.	E.D.P. Cell/Computer personnel	81
13.	Chief Accounts Officer	1
14.	Chief Internal Audit Officer	1
15.	Legal Officer	1
16.	Senior Accounts Officer (Class I)	6
17.	Accounts Officer (Class II)	6
18.	Accounts Officer (Class III)	187
19.	Field staff (Class III)	2,594
20.	Head Office staff (Class III)	351
21.	Class IV staff	1,164
Sub-Total		7,699
Work charged staff (Field)		
22.	Regular	8,172
23.	Daily wage/Muster Roll	3,426
Sub-Total		11,598
Grand Total		**19,297**

Operations and Maintenance of Ganga Action Plan, Phase I facilities

UP Jal Nigam has constructed sewerage facilities such as sewage treatment plants, sewers and pumping stations in the 4 target cities of Lucknow, Allahabad, Varanasi and Kanpur under Ganga Action Plan, Phase I. It was expected that the maintenance of the facilities would be taken over by the local bodies. However, Jal Nigam continues to operate most of the facilities created. Tables 1-2 and 1-3 show number of staff and costs of operation and maintenance in the 4 cities:

Table 1-2: Number of Permanent Staff of UP Jal Nigam deployed on the GAP works (Construction and O & M) in the 4 cities

Category of Staff	Average monthly salary (Rs.)	Numbers of Staff			
		Kanpur	Allahabad	Varanasi	Lucknow
1. General Manager	28,000	1	1	1	1
2. Project Manager	25,000	4	2	3	5
3. Project Engineer	22,000	9	7	10	18
4. Assistant Project Engineer	18,000	20	12	37	63
5. Office Support Staff	9,000	60	36	88	137
6. Field Staff	4,000	104	72	135	167
Total		198	130	274	392

Table 1-3: Expenditure of UP Jal Nigam on the Operation & Maintenance of GAP facilities

(Unit: million rupees)

City	Year	Expenditure on			
		Personnel	Repair & Maintenance	Electricity Charges	Total
1. Kanpur	2000/01	16.06	13.72	34.23	64.01
	2001/02	16.28	27.69	22.39	66.36
	2002/03	16.83	18.30	26.28	61.41
2. Allahabad	2000/01	10.38	17.27	18.49	46.14
	2001/02	11.04	6.33	22.27	39.64
	2002/03	11.84	3.28	22.52	37.63
3. Varanasi	2000/01	13.16	18.74	19.92	51.81
	2001/02	16.47	12.45	27.76	56.68
	2002/03	14.01	8.31	27.26	49.58
4. Lucknow	2002/03 (3 months only)	2.37	0.46	7.30	10.14

Table 1-4: compares the required costs for operation and maintenance as per Government of India standards with the costs actually spent in the 4 cities. It is noted that only half of the standard is spent.

Table 1-4: Operation and Maintenance of Ganga Action Plan Assets by UP Jal Nigam

(Unit: million rupees)

City	Requirement of O&M funds according to GOI standards				Amount actually spent on O&M		
	Personnel	Electricity	Repair & Maintenance	Total	2000/01	2001/02	2002/03
1. Kanpur	21.95	50.53	57.57	130.05	64.01	66.36	61.41
2. Allahabad	12.86	34.81	23.25	70.92	46.14	39.64	37.63
3. Varanasi	19.87	29.51	33.74	83.12	51.81	56.68	49.58
4. Lucknow	9.33	14.88	14.94	39.15	-	-	10.14

1. Because of paucity of funds, the UP Jal Nigam has not been able to spend the amount on O&M commensurate with the prescribed standard requirement and has been attending to only the most essential works of operation and maintenance.
2. The figures for Kanpur include the O&M of Combined Effluent Treatment Plant (CETP).
3. The O&M of the Lucknow STP and Pumping Stations are presently being done by the construction contractors themselves under the agreement for capital works. The expenditure figures represent only the amount spent for 3 months on watch and ward, on cleaning of drains and electricity charges which were borne by the Jal Nigam. The STP and other works are operational since December, 2002 only.

1.3 FINANCIAL MANAGEMENT

UP Jal Nigam compiles its accounts on commercial principles. However, some of the divisions follow a cash system with conversion to commercial at the end of the period for reporting to head office. In most of the cases, income and expenditure relating to establishment are accounted for on accrual basis, however, expenditure on work and income thereon are accounted for on cash basis. Even though accounts are computerized at head office, they are being maintained manually. In 2005-06, it is proposed to computerize the entire accounts, even at the unit level.

The income and expenditure accounts for the last 5 years have been provided in Table 1-5. As may be seen, the Jal Nigam has been registering net deficits every year, which increased from Rs.11 million in 1997-98 to Rs.381 million in 1998-99 and has now come down to controllable limits at Rs.20 million in 2001-02. The increase in net deficit in 1998-99 was mainly on account of an increase in salaries and wages, which jumped from 44% (Rs.795 million) of total expenditure in 1997-98 to 61% (Rs.1,187 million) in 1998-99. This increase was not on account of additional manpower but on account of increase in salaries due to the 5th Pay Commission recommendations. The Jal Nigam's income has grown marginally over the 5 year period 1997-98 to 2001-02, from Rs.1,806 million in 1997-98 to 2,309 million in 2001-02. This increase, however, has been largely due to an increase in earnings from other interest, which has grown from Rs.158 million (9% of total income) in 1997-98 to Rs.542 million (23% of total income) in 2001-02. Centage and income from survey and project fee was Rs.719 million (40% of total income) in 1997-98 as compared to Rs.762 million (33% of total income) in 2001-02. As compared to the marginal increase in income from centage and survey and project fee, salaries have increased from Rs.795 million in 1997-98 to Rs.1,384 million in 2001-02. In 1997-98, whereas centage and income from survey and project fee covered 90% of salaries, in 2001-02, it is now covering only 55%. This percentage is obviously an indicator of the organisation's overstaffing.

Table 1-5: Uttar Pradesh Jal Nigam Income and Expenditure Accounts

(Unit: million rupees)

	YEAR TO MARCH 31									
	1998		**1999**		**2000**		**2001**		**2002**	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
INCOME										
Centage	565	31	641	41	594	37	566	30	703	30
Survey and Project Fee	154	9	93	6	54	3	43	2	59	3
Interest on Loan	55	3	56	4	52	4	48	3	54	2
Interest on capital during construction	-		-		-		-		-	
Other interest	158	9	177	11	217	13	403	22	542	23
UP government maintenance grant	327	18	78	5	240	15	368	20	414	18
UP government grant – others	37	2	37	2	46	3	38	2	11	0
Income from maintenance schemes	88	5	109	7	123	8	148	8	164	7
Miscellaneous income	422	23	378	24	282	17	255	14	364	16
Total Income	**1,806**		**1,570**		**1,618**		**1,869**		**2,309**	
EXPENDITURE										
Salaries, wages, pension and gratuity	795	44	1,187	61	1,167	64	1,330	65	1,384	59
Traveling and daily allowances	19	1	22	1	23	1	26	1	29	1
Maintenance schemes	665	37	237	12	203	11	259	13	465	20
Other expenses	128	7	138	7	155	8	147	7	183	8
Interest charges	207	11	361	19	283	15	264	13	259	11
Depreciation	4	0	6	0	5	0	5	0	8	0
Total Expenditure	**1,817**		**1,951**		**1,835**		**2.032**		**2,330**	
NET SURPLUS/DEFICIT (-)	**-11**		**-381**		**-217**		**-163**		**-20**	
APPROXIMATE ACTIVITY RESULTS	**Amount**									
Centage and survey/project fee less salaries and wages	-77		-453		-518		-720		-623	
Maintenance income less expenditure on maintenance schemes	-576		-128		-80		-111		-301	
Income less expenditure on maintenance schemes including maintenance grant	-250		-50		160		257		113	
Interest earned less interest paid	-152		-305		-221		-216		-206	
RATIOS	**%**									
Centage and survey/project fee to salaries and wages	90		62		56		46		55	
Maintenance schemes income to maintenance schemes expenditure	13		46		61		57		35	
Maintenance schemes income and grant to expenditure	62		79		179		199		124	

Source: Uttar Pradesh Jal Nigam Balance Sheets for the years 1998/99 to 2001/02

Expenditure on maintenance schemes net of income decreased from Rs.576 million in 1997-98 to Rs.301 million in 2001-02. This deficit is adequately covered by the maintenance grant being provided by the state government. Interest charges, which comprise the third largest component of expenditure have remained a steady percentage of total expenditure. However, the deficit on account of interest earned less interest paid has increased from Rs. 152 million in 1997-98 to Rs.206 million in 2001-02. This suggests that the Jal Nigam should pay more attention to its investments and the nature of such investments, subject to the state government's regulations governing such investments.

As is evident, the main sources of income are centage, interest income and UP government maintenance grant. Income is further bolstered by miscellaneous income. However, with the rising interest costs not balanced out with interest earned on investments, and the UP Jal Nigam's inability to

collect interest owed to it from loans given to local bodies further aggravated by a high salary cost, has resulted in losses year after year. The cash losses are being funded by the state government's grant and loans. The loans are repayable and UP Jal Nigam has to pay interest on these. As there is no share capital of the state government in the equity of the Jal Nigam, these loans cannot be converted into equity, which essentially means that the Jal Nigam ends up paying unduly high interest.

Balance sheets for the period 1997-98 to 2001-02 have been summarized in Table 1-6. Fixed assets accounted for 10,013 million in 2002, of which over 90% are hand pumps. Net current assets were Rs.18,485 million in 1998, which increased to Rs.34,007 million in 2002. Inter divisional transactions are very high at Rs.2,515 million in 2002. These represent the net amount of unreconciled transactions between divisions. Normally this balance should not exist on consolidation if there is due diligence in accounting. However, unreconciled balances have always existed in the Jal Nigam and reflect the problems of efficiency of accounting and on internal controls on interdivisional transactions.

The fund flow analysis has been provided in Table 1-7. This shows a fairly steady increase in fixed assets, but what is alarming is the sharp decrease in investments. Project costs have also increased steadily. However, the net increase in project costs is not explained by growth in centage income from projects. Overall, the statement shows that the increased consumption of funds by the Jal Nigam is not justified by the comparatively marginal increase in business.

The above analysis clearly shows that the organization is overstaffed and underworked. As such, in order to sustain its operations it requires additional work and needs to develop and attract business through marketing itself to parties other than the state government or its departments. With the infrastructure already in place, it should also step up its activities of getting business from other states of the country.

Table 1-6: Uttar Pradesh Jal Nigam Balance Sheets

(Unit: million rupees)

ASSETS	AS OF MARCH 31				
	1998	**1999**	**2000**	**2001**	**2002**
SOURCE OF FUNDS					
Loan – Government of Uttar Pradesh	2,677	2,959	3,086	3,201	3,293
Grants – Government of Uttar Pradesh	24,959	32,077	35,273	40,135	44,763
Loans – LIC and HUDCO	193	173	154	142	137
Divisional Surplus	-1,581	-810	-1,191	-1,409	-1,571
Surplus/Deficit for the year	-11	-381	-217	-163	-20
Centage on materials unconsumed	291	291	294	277	310
Depreciation Reserve	50	61	66	71	78
Pension and Gratuity Reserve	60	60	60	60	60
TOTAL SOURCES	**26,637**	**34,429**	**37,524**	**42,314**	**47,049**
APPLICATION OF FUNDS					
Fixed Assets	**5,913**	**7,814**	**8,319**	**9,242**	**10,013**
Investments	**2,239**	**2,887**	**2,867**	**2,783**	**3,029**
Current Assets, loans and advances					
Project Cost	22,864	26,937	30,944	34,676	39,735
Current Assets	2,931	3,269	2,272	4,367	5,116
Inter Fund Current Account	562	302	539	294	359
Inter Divisional Transactions	1,284	1,048	1,873	1,947	2,515
Loans and Advances	1,413	1,467	1,521	1,574	1,627
	29,055	33,023	37,149	42,859	49,352
Less: Current Liabilities and Provisions					
Current Liabilities	1,582	2,203	2,434	2,814	3,037
Deposits for projects	8,988	7,092	8,376	9,756	12,308
	10,570	9,295	10,811	12,569	15,345
Net Current Assets	**18,485**	**23,728**	**26,338**	**30,289**	**34,007**
NET ASSETS	**26,637**	**34,429**	**37,524**	**42,314**	**47,049**

Source: Uttar Pradesh Jal Nigam Balance Sheets for the years 1998/99 to 2001/02

Table 1-7: Uttar Pradesh Jal Nigam Funds Flow statement

(Unit: million rupees)

	YEAR TO MARCH 31			
	1999	**2000**	**2001**	**2002**
SOURCE OF FUNDS				
Loan – Government of Uttar Pradesh	282	127	115	92
Grants – Government of Uttar Pradesh	7,118	3,196	4,862	4,628
Loans – LIC and HUDCO	-20	-19	-12	-5
Divisional Surplus	771	-381	-218	-162
Surplus/Deficit for the year	-370	164	54	143
Centage on materials unconsumed	0	3	-17	33
Depreciation Reserve	11	5	5	7
Pension and Gratuity Reserve	0	0	0	0
TOTAL INFLOW FROM SOURCES	**7,792**	**3,095**	**4,789**	**4,736**
APPLICATION OF FUNDS				
Fixed Assets	**1,901**	**505**	**923**	**771**
Investments	**648**	**-20**	**-84**	**246**
Current Assets, loans and advances				
Project Cost	4,073	4,007	3,732	5,059
Current Assets	338	-997	2,095	749
Inter Fund Current Account	-260	237	-245	65
Inter Divisional Transactions	-236	825	74	568
Loans and Advances	54	54	53	53
Increase in Current Assets	**3,969**	**4,126**	**5,709**	**6,494**
Less: Current Liabilities and Provisions				
Current Liabilities	621	231	380	223
Deposits for projects	-1,896	1,284	1,380	2,552
Increase in Current Liabilities and Provisions	**-1,275**	**1,515**	**1,760**	**2,775**
Increase in Net Current Assets	**5,224**	**2,611**	**3,949**	**3,719**
TOTAL APPLICATION OF FUNDS	**7,792**	**3,095**	**4,789**	**4,736**

Source: Uttar Pradesh Jal Nigam Balance Sheets for the years 1998/99 to 2001/02

2. URBAN DEVELOPMENT DEPARTMENT, GOVERNMENT OF UTTAR PRADESH

The Urban Development Department (UDD), Government of Uttar Pradesh, provides policy directions and administrative support to all efforts directed at providing urban basic services, including infrastructure development, in the state. The department is headed by the Minister for Urban Development, Water Supply, Urban Employment and Poverty Alleviation and all administrative functions are under the Principal Secretary, UDD who is supported by the Special Secretary in the department. An organization chart of the department is provided in Figure 2-1.

The department apart from policy directions, allocates funds to and monitors the activities of the following agencies which are administratively responsible to the department:

1. Directorate of Local Bodies, headed by a Director,

2. Uttar Pradesh Jal Nigam, an autonomous body corporate headed by a Chairman with a Managing Director for day to day activities, and

3. State Urban Development Agency, headed by a Director.

The Directorate of Local Bodies coordinates the activities of the Nagar Nigams, Nagar Palika Parishads and Nagar Panchayats. The numbers of such agencies, area of their operations and population covered by them are presented in Table 2-1.

Table 2-1: Types and numbers of local bodies, urban area of their control and population covered

			As per 2001 Census	
Local Body	Definition	Nos.	Municipal Area (sq. km.)	Population (million)
Nagar Nigam	Urban area with more than 5 lakhs population	11	1,380.24	12.767
Nagar Palika Parishad	Urban area with more than 1 lakh but less than 5 lakhs population	195	2,017.65	13.782
Nagar Panchayat	30,000 up to 1 lakh population	417	1,741.40	6.020
Total		623	5,139.29	32.569

The local bodies provide the following services:

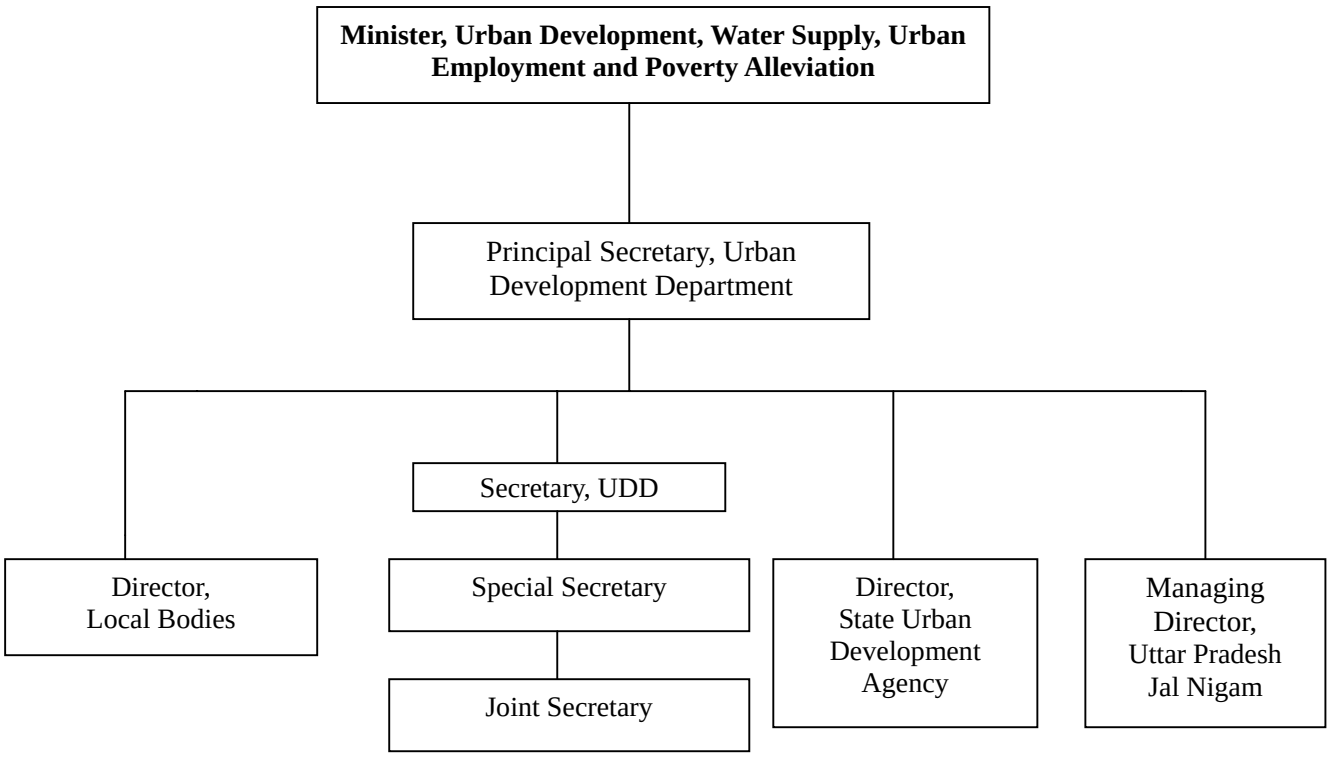
a. Operations and maintenance of water supply and sewerage systems,
b. Repairs and maintenance of roads,
c. Lighting,
d. Sanitation,
e. Maintenance of public buildings and facilities,
f. Schools run by local bodies,
g. Government hospitals, only in *Nagar Nigams*.

The State Urban Development Agency (SUDA) supervises and monitors all Urban Poverty Alleviation programmes, including the Urban Basic Services for the Poor (UBSP) and the *Jawahar Rozgar Yojna*, a centrally sponsored urban employment scheme. SUDA allocates funds to the District Urban Development Agencies (DUDA), which in turn transfers the funds to the respective urban local body.

UDD coordinates its efforts in the urban areas with the Housing and Urban Planning Department, which is located under a separate Ministry. This department controls all the Local Development

Authorities (LDA). The LDAs construct housing colonies, including all infrastructure facilities such as roads, water supply and sewerage, lighting etc. and hand over the facilities constructed in those colonies that are located in the municipal areas to *Nagar Nigams* and *Jal Sansthans* for operation and maintenance. The LDAs, apart from the Jal Nigam, are the only other agency in the state, which is permitted to construct water supply and sewerage facilities.

There are, however, problems in coordination in overall urban planning and implementation of facilities. The Housing and Urban Planning Department is responsible for urban planning and the Urban Development Department responsible for provision of basic services. As these two departments are located in two different ministries, often urban planning remains uncoordinated. Also branch sewers constructed by the LDAs are not connected to trunk sewers, which makes the job of operation and maintenance quite difficult.



Note: The post of Secretary, Urban Development Department has been lying vacant for some time.

Figure 2-1: Organisation Chart of the Urban development Department, Government of Uttar Pradesh

3. Kanpur City

Nagar Nigam

PROFILE

Kanpur Nagar Nigam was formed in 1959 under the Nagar Mahapalika Act with the objective of providing all necessary basic civic amenities to the residents and visitors to Kanpur city. The municipal area is spread over 300 sq. km of which the Kanpur Nagar Nigam covers 240 sq. km and 60 sq. km is covered by the Cantonment Board. 50% of the total area is residential, about 17% industrial and the rest is park and open spaces, agriculture, forest and vacant land. Kanpur has a fair number of large and small industries and several educational institutions. The city has a population of 2.77 million (as per 2001 census), 16.9% of whom reside in slums.

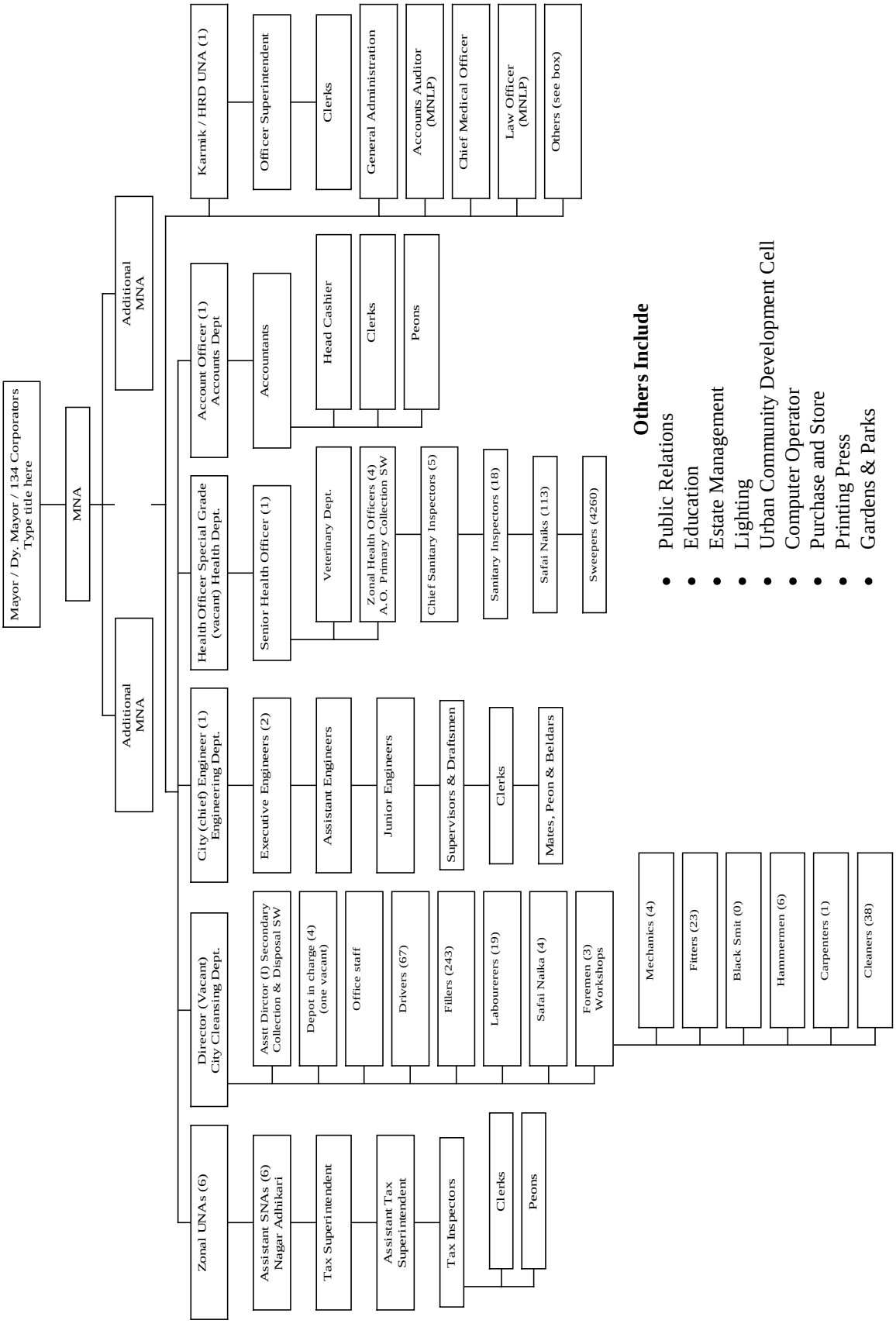
STRUCTURE OF KANPUR NAGAR NIGAM

Kanpur Nagar Nigam is headed by an elected Mayor, who is supported by the Municipal Commissioner, who is from the State Civil Service. The Municipal Commissioner is the executive head of the Nigam and is in turn supported by two Additional Municipal Commissioners, one of whom is from the State Civil Service and the other from the Palika (Municipal) Administrative Service. The functional heads, i.e. Chief Engineer (Engineering Department), Director (City Cleansing Department), Health Officer Special Grade (Health and Sanitation), Chief Accounts Officer, Chief Auditor, Chief Medical Officer (for Hospital Administration, food quality and diseases control) and heads of General Administration and HRD are subject specialists and report to the Municipal Commissioner.

Figure 3-1 presents an Organisation Chart of Kanpur Nagar Nigam.

Administratively, Kanpur Nagar Nigam is divided into 6 zones and 112 wards. Each ward is represented by an elected *Sabhasad* or ward corporator. The *Sabhasads* are grouped into committees at various levels, which are the policy-making bodies.

Organogram of KNN



FUNCTIONS

Services provided by Kanpur Nagar Nigam are within the municipal area and include the construction and maintenance of storm water drains, collection of garbage and solid waste and lifting it to dumping sites, repair and maintenance of city roads, maintenance of parks, public buildings and public area and street lighting. Other services provided relate to registration of births and deaths, hospital administration, enforcement of Prevention of Food Adulteration Act, prevention and checking spread of contagious, infectious and dangerous diseases and education.

Whereas the maintenance of roads, street lighting and cleaning of drains above 3 ft. diameter (large drains) is the responsibility of the Engineering Department, solid waste management and cleaning of drains below 3 ft. diameter (small drains) is taken care of by the Municipal Health Department. The Health Department is responsible for primary solid waste collection and dumping up to intermediate rubbish depot and secondary collection of garbage is the responsibility of the Director, City Cleansing.

Maintenance of Drains
Large Drains
The Engineering Department prepares a drain cleaning plan based on the budget available and requirement and implements it before the onset of monsoons. Other cleaning works are based on complaints. Cleaning machines are used for cleaning of large drains.

City cleaning, including small drains
During working hours, scavengers clean footpaths, roads and drains in their respective beats. The garbage is collected in wheelbarrows and deposited in various intermediate rubbish depots/bins from where it is collected by loaders/dumpers and dumped at Panki landfill.

Human Resources Management

Manpower Strength

The Kanpur Nagar Nigam has staff strength of 3,950 on their rolls. This includes 400 staff in centralized posts of the Nigam, 875 non-centralized staff and 2,675 grade D employees.

The following details the manpower of only those departments relevant to the programme for sewerage services in Uttar Pradesh:

The Engineering Department has 6 Zonal Engineers of the rank of Executive Engineer and one Traffic Wing for maintenance of roads, also headed by an Executive Engineer. There are 2 Assistant Engineers for each Executive Engineer and 6 Junior Engineers reporting to each of the Assistant Engineers, making a total strength of 105 engineering staff who are a mix of civil, electrical and mechanical engineers. They also handle street lighting. There are also lighting inspectors and supervisors and park supervisors. This department also looks after the workshop.

The Health Department has 1 Senior (City) Health Officer, 1 Health Officer, 5 Additional Health Officers, 4 Area Health Officers, 15 Chief Sanitary Inspectors, 42 Sanitary Inspectors, 184 sanitary supervisors and 4,650 scavengers, who are a mix of regular and work-charged staff. The position of Health Officer Special Grade has been lying vacant for the last four years.

The City Cleansing Department, apart from the Director, has 1 Assistant Director, 4 Sanitary Inspectors, 11 Sanitary Supervisors, 75 drivers for mechanized loaders/dumpers and 349 fillers/beldars.

Response to Public Needs

Grievance Redressal
Complaints are routed through various levels:

- from ward corporators or residents telephonically or verbally in the Zonal Offices or at the Headquarters
- from residents through applications sent to Zonal Offices or the Headquarters
- Departmental observations

The complaints may be logged with:
- the Municipal Commissioner
- the Additional Municipal Commissioners
- the Chief Engineer
- the Zonal Engineers

This happens as there is no formal system for logging complaints. When complaints are received at Headquarters, the CE sends the complaints through *dak* (post) to the concerned ZE. If expenditure is required, then estimates are drawn up and put up for sanction. If the complaint can be attended to with existing departmental labour and machinery, it is done. After complaints are attended to, reports are sent to the persons who initiated the complaint. There is no formal system of tracking status of complaints attended. Complaints are put on file and indexed for follow up. These are monitored by the CE every 7 days.

Financial Management

Accounting systems
The accounts of Kanpur Nagar Nigam are computerized and they use Tally 6.3, an off the shelf accounting software. Even the accounts are maintained on commercial principles, they are finalized and presented in the single entry form. From 1999 onwards, through support and funding provided by the Netherlands Government sponsored ICDP project, Kanpur Nagar Nigam started the process of computerization and currently all accounts other than health, registration of births and deaths and education are computerized, including payroll.

The Accounting department is staffed with 1 Chief Accounts Officer, 9 Accountants, 2 Assistant Accountants, 8 Departmental Accountants and 43 Accounts clerks. The Audit Department under a Chief Auditor has 10 Auditors and 17 Assistant Auditors.

Section 99 to 103 of the UP Municipalities Act, 1916 lay down the method of preparation of Budget and the manner the expenditure is to be made. The Kanpur Nagar Nigam prepares monthly and annual budget.

Revenue Sources and Analysis
Property Tax is the main item of revenue for Kanpur Nagar Nigam, which is 10% of the assessed Annual Rental Value. Kanpur Nagar Nigam introduced the Self Assessment Scheme w.e.f. Fiscal year 2002-03. Out of a total of 280,000 properties estimated in the Municipal area, 205,000 have been assessed and of which 25,000 opted for Self Assessment in 2002-03. The revenue generated from property tax in the financial year ended March 31, 2003 was Rs.160.57 million, which was 50% of the total revenue (excluding grants) and 93% of total tax collected for that year. It is believed that this will go up as more and more assessees come under the tax net. Currently, collection of property tax of non-residential properties is in the range of 40-50%. It is felt that if the government of UP sets up a grievance redressal committee and a tribunal for settling disputes, income from this source will go up by about 1.5 times. In addition to property tax, other sources of tax income are advertisement and other taxes. Tax comprises 54% of the total revenue of the Nigam, the balance 46% coming from rentals, sales of assets and other properties, road cutting charges etc.

Table 3-1 shows the amount of revenue generated by the Nigam through taxes from 1998-1999 to 2002-2003.

Table 3-1: Income from Tax revenue from 1999-2000 to 2002-2003

(Unit: million rupees)

Description	1999-2000	2000-2001	2001-2002	2002-2003
Total Tax	135.89	124.31	177.95	171.92
Property Tax	122.6	112.74	169.00	160.57
Property Tax % Total Tax	90.2 %	90.7 %	95.0 %	93.4 %
% increase / decrease (-) in property tax over previous year		(8.0)%	49.9%	(5.0)%

The income generated by Kanpur Nagar Nigam is not sufficient to meet its operating costs, hence every year the Central and State Governments transfer funds to the Nigam to meet the deficit. The transfers are in lieu of Octroi Tax, which was abolished in 1990. Table 3-2 shows the Income and Expenditure of Kanpur Nagar Nigam, including for the year 1989-90 which was the last year in which Octroi was received for the full year.

Table 3-2: Income and Expenditure Account of Kanpur Nagar Nigam

(Unit: million rupees)

Current Account Income										
Description	**1989-1990**		**1999-2000**		**2000-2001**		**2001-2002**		**2002-2003**	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1. Tax Revenue	200.39	66.2	135.89	15.7	124.31	12.9	177.95	16.6	171.92	15.5
a. Property Tax	35.23		122.60		112.74		169.00		160.57	
b. Other Taxes	3.26		13.29		11.57		8.95		11.35	
c. Octroi Tax	161.90		-		-		-		-	
2. Other Revenue	25.32	8.4	113.71	12.8	78.41	8.1	168.24	15.7	145.80	13.1
3. Transfers	76.78	25.4	616.62	71.5	763.68	79.0	725.56	67.7	794.41	71.4
Total Revenue	**302.49**		**866.22**		**966.40**		**1,071.75**		**1,112.13**	
Current Account Expenditure										
1. Salary	318.38	67.7	656.87	73.4	626.82	65.3	736.58	71.2	646.58	66.2
a. Tax staff	19.89		32.73		32.88		36.71		37.67	
b. Sweepers	98.72		287.73		281.88		309.68		308.40	
c. Other	186.14		216.07		218.80		242.31		238.04	
d. Pension	13.63		120.34		93.26		147.88		62.47	
2. Maintenance	112.04	23.8	226.67	25.3	327.97	34.1	271.72		288.57	29.5
3. Others	39.65	8.5	11.25	1.3	5.57	0.6	26.40	2.6	42.21	4.3
Total Expenditure	**470.07**		**894.79**		**960.36**		**1,034.70**		**977.36**	

Source: Budget Statements of Kanpur Nagar Nigam for the years 1999-1990 and 1999 to 2003

Octroi collected in 1989-1990 was Rs.161.90 million, almost 81% of the total tax revenue for that year which was Rs.200.39 million. It would appear that the Nagar Nigam is yet to get over the abolishment of this tax as even after 13 years the total tax revenue was only Rs.171.92 million in 2002-2003 and the *Nagar Nigam* is becoming more and more dependent upon the state government for budgetary support.

The salary of sweepers is perhaps the single largest component of expenditure. In 2002-2003, it accounted for almost 48% of total salaries and about 31% of total expenditure. Expenditure on maintenance of drains over the 4 year period, 1999-2000 to 2002-2003, is provided in Table 3-3 below:

Table 3-3: Expenditure incurred on maintenance of drains by Kanpur Nagar Nigam during the years 1999-2000 to 2002-2003

(Unit: million rupees)

	1999-2000	2000-2001	2001-2002	2002-2003
Expenditure on maintenance of drains	Nil	Nil	Nil	8.20

Source: Budget Statements of Kanpur Nagar Nigam for the years 1999 to 2003

It is very clear from the above that Kanpur Nagar Nigam has not paid much attention to maintenance of drains. This may either be on account of paucity of funds or the drains being in very good condition, which perhaps is doubtful.

Tax collection system

Tax and non-tax collections are organised under one of the two Additional Municipal Commissioners. Under him there are 6 Assistant City Commissioners, 9 Tax Superintendents, 7 Assistant Tax Superintendents, 90 Revenue Inspectors and 155 Revenue Inspectors, Grade –II.

Nagar Nigam has computerized all assessment ledgers and demand collection records. It has a computerized tax billing system with the help of which it can now print 1.5 lakh bills per month. Kanpur Nagar Nigam considers itself the pioneer in the introduction of GIS in Uttar Pradesh. Bills are raised by the billing department at head office and sent to the zones for collection. Revenue inspectors distribute the bills and collect payments. Tax collected in cash is deposited into the bank and cheques are sent to the head office the next day where a daily collection report is prepared and submitted to the Municipal Commissioner daily.

Collection Efficiency

In 2003-04, the Nagar Nigam had a collection of Rs.419.93 million comprising Rs.261.37 million tax collections and Rs.158.57 million non-taxes. This was 92.57% of the target set for the year, and 29.6% higher than the collections for 2002-03.

Property Tax
Annual Rental Value under the Self Assessment Scheme

It is necessary to understand the meaning and the importance of Annual Rental Value. Annual Rental Value is the amount at which the property can be let out. The second term used here is Self Assessment Scheme. Under the Self Assessment Scheme, Nagar Nigams have shifted the onus of determining the Annual Rental Value of the property on to the owner of the property. While determining the Annual Rental Value of any property under the self assessment scheme, there are several factors such as location of the house, the size of the road in front of the house or building, the type of construction, carpet area of the building and size of plot on which the building is constructed. Each of these factors has a value attached to it. While arriving at the value, exemptions and discounts are given for areas like, toilets, portico, balcony, kitchen, garage and common areas. After applying these exemptions and discounts, the total area is arrived at by multiplying length and width of the house and applying a factor of 80% to the resultant to arrive at the Annual Rental Value.

Kanpur Nagar Nigam has a transparent Self Assessment form which sets out important information for the assessee including exemptions/discounts. It has also worked out ward-wise rates for each of the 110 wards under different conditions, a copy of which is also made available to the assessee. For owners of self occupied properties, the discounts are as follows:

- 25% for houses less than ten years
- 32.5% for houses which are 10 to 20 years old, and
- 40% for houses older than 20 years.

For residential properties, the house owner will make a declaration of the area of the house every fourth year. Kanpur Nagar Nigam carries out a 10% sample checking of the self assessed properties. The Property Tax is presently 10% of the Annual Rental Value.

An incentive of 10% of the amount of bill plus arrears, if any, is given if the payment of tax is made within the due date. In cases of delay, a 10% penalty on the entire amount of bill is charged. Where properties have not been self-assessed, there is a provision of penalty of Rs.500/- per day of delay in self assessment and payment, subject to twice the bill amount. However, Kanpur Nagar Nigam has found this penalty difficult to recover. Payments of property tax are either collected by the revenue inspectors or may be deposited by the residents into a bank designated for this purpose.

The main problem faced by KNN is with respect to non-residential properties. The value of such properties are arrived at through the formula:

Value = Cost of land + cost of construction – depreciation

70% of this value is the Annual Rental Value and property tax is 15% of the value so arrived at. However, in the absence of detailed Rules on how the Act is to be administered, there are several instances of disputes leading to judicial cases. It is felt that if the GoUP (as has been done in Delhi) makes provisions for:

1. Hardship and Anomaly Committee for grievance redressal, and
2. A Tribunal to settle disputes

The number of complaints/disputes and judicial cases will be reduced or be settled early, leading to increased collections on this account.

Jal Sansthan

Structure of Kanpur Jal Sansthan

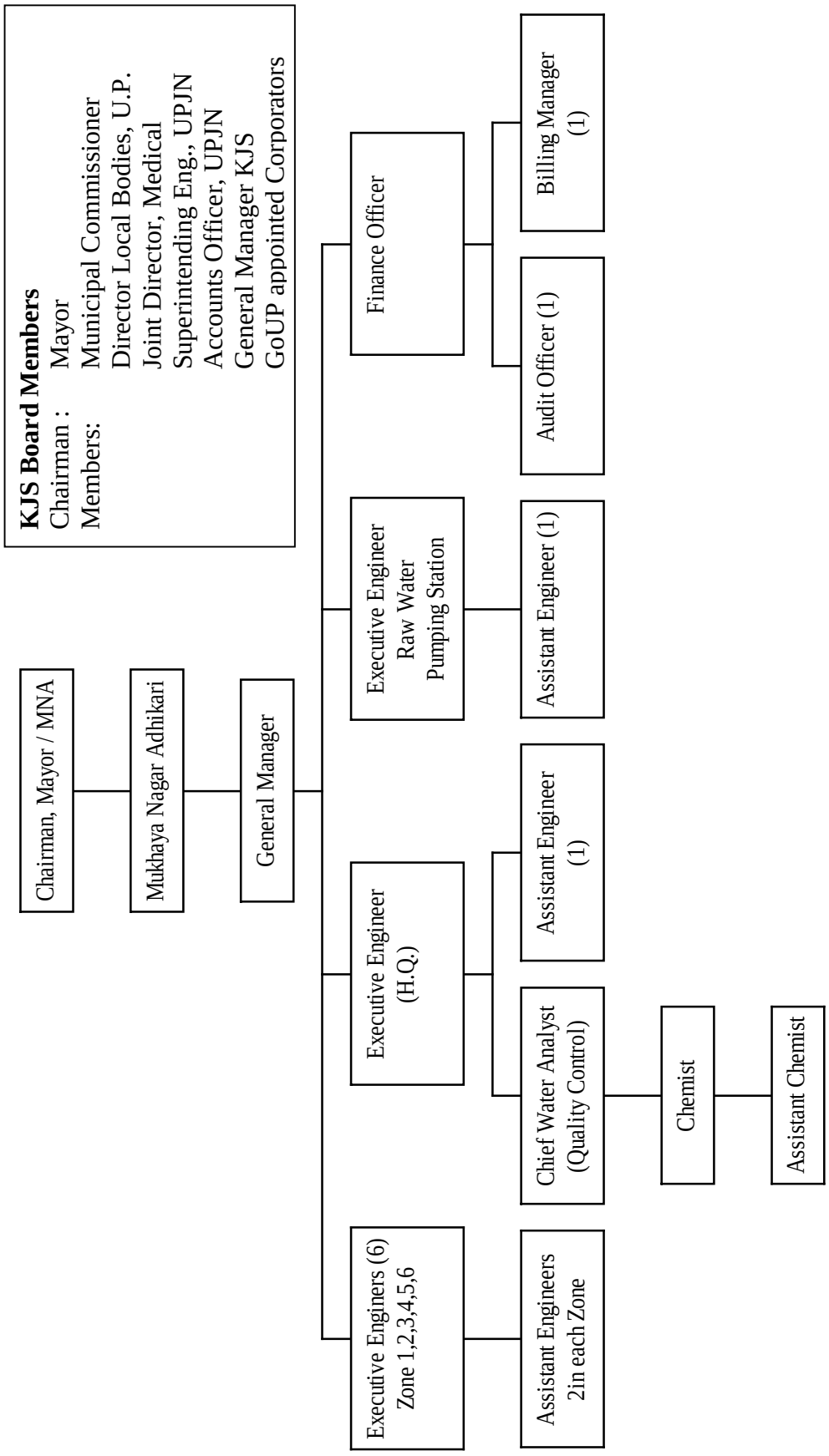
The Kanpur Jal Sansthan is an autonomous body with a governing Board and receives policy guidance from the Uttar Pradesh Jal Nigam and administrative support from the Director (Local Bodies) under the Urban Development Department, Government of Uttar Pradesh. The Board comprises of the following persons:

1. *Nagar Pramukh* or Mayor – Chairman
2. *Mukhya Nagar Adhikari* or Municipal Commissioner – Member
3. Director Local Bodies, Government of Uttar Pradesh – Member
4. Joint Director, Medical – Member
5. Superintending Engineer, Uttar Pradesh Jal Nigam – Member
6. Accounts Officer, Uttar Pradesh Jal Nigam – Member
7. General Manager, Kanpur *Jal Sansthan* – Member

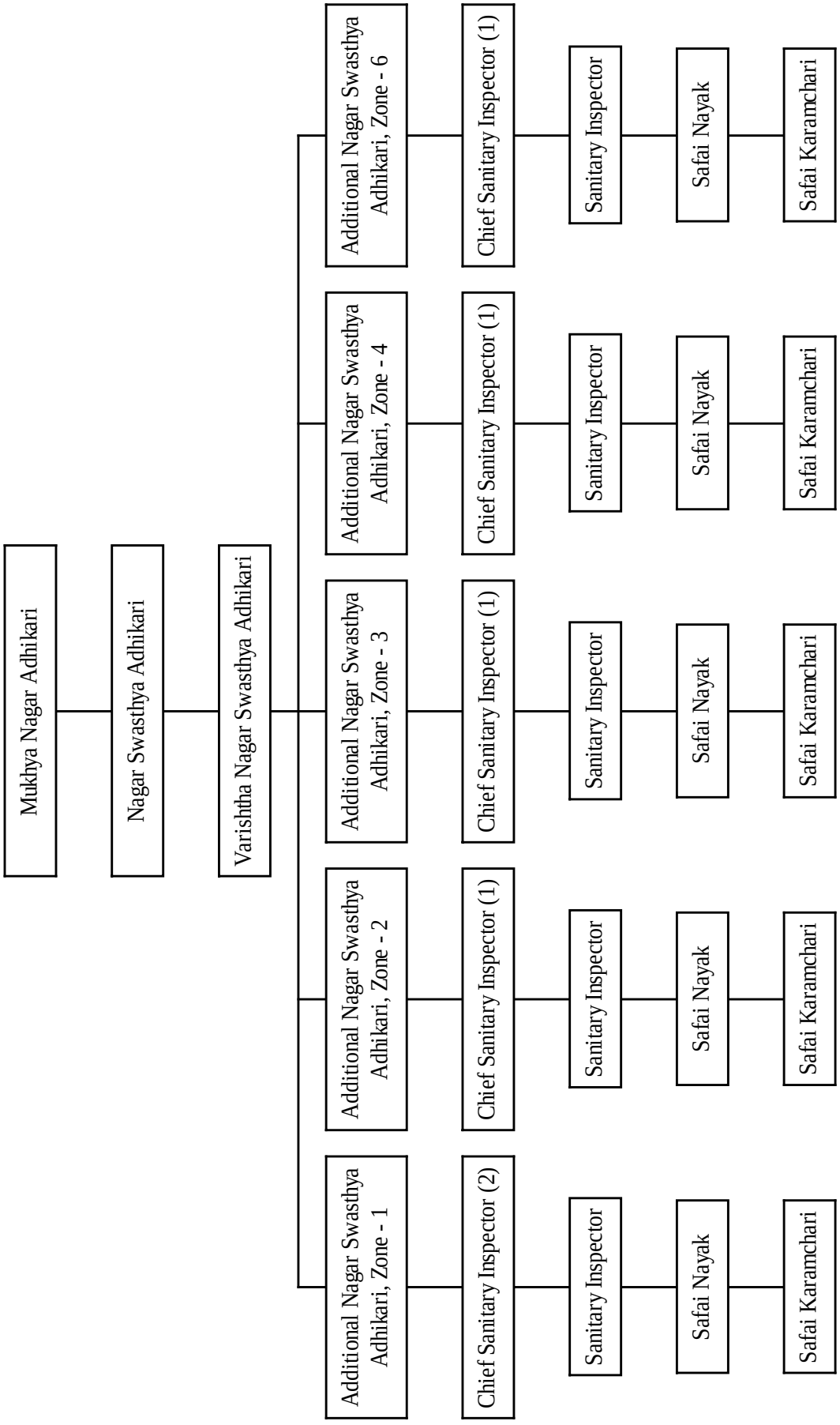
The General Manager is responsible for the day-to-day operations of the Sansthan. It is divided into six operational Zones, each headed by an Executive Engineer. In addition there is a Water Quality Monitoring division, headed by the Executive Engineer (Head Quarters) and Raw Water Pumping division also headed by an Executive Engineer. Support at Head Quarters is provided by the Secretary, who looks after Administration, and the Accounts Department. The heads of the different zones/divisions/departments report to the General Manager.

The organization structure of Kanpur Jal Sansthan is provided in Figure 3-2.

Organisation Structure of Kanpur Jal Sansthan



Organisation Structure of Health Department for Primary Collection of Solid Waste



Functions

Services provided by Kanpur *Jal Sansthan* are within the municipal area and include the operations and maintenance of the water supply and sewerage systems. Data on the water supply and sewerage system is as follows:

Water Supply:

Coverage - 80% of Municipal area

Water Production:

- Quantity: Average production - 395 ML per day

- Source: Ganges River - 200 ML per day
  Lower Ganges canal - 60 ML per day
  Tube wells - 125 ML per day

- Length of water pipeline - 1,341 km
- No. of water pumping stations - 26
- Tube wells - 130
- No. of Hand pumps (India Mark II)- 9,220 of which 750 are rebores

Of the total water supply, 30% is accounted for by leakage and wastage, 10% is supplied through stand posts and a further 10% is provided as public utility service. The saleable water, therefore, is only 50% of what is produced and this is supplied as to 95% domestic supply and 5% non-domestic supply.

Sewerage:

- Coverage - 60% of Municipal area
- Length of sewer line - 957 km; 100 km Trunk sewer and 857 km Branch sewers
- No. of sewage pumping stations - 13
- Size/Diameter of sewers - Trunk sewers: up to 48 “
  Branch sewers: 9” to 12”

The sewerage system in Kanpur is very old; over 100 years and over the last 10 years, due to shortage of funds, no repairs or improvements have been carried out. This has resulted in an increase in the number of complaints. It has been mentioned that maintenance of sewers is done on a daily basis, even though the Jal Sansthan spends most of its time attending to complaints. Not only does the sewerage system need to be reorganised, there is also a need for cleaning machines.

Within the budgets available, the General Manager of Kanpur Jal Sansthan has all powers for operations and maintenance.

Human Resources Management

Kanpur Jal Sansthan has a total of 1,755 employees of which 606 are technical staff and 1,149 are non-technical staff. The staff are further categorized by class as follows:

	Technical	Non Technical	Total
Class – I	9	1	10
Class – II	15	4	19
Class – III	102	150	252
Class – IV	480	994	1,474
	606	1,149	1,755

The technical staff consists of engineers, diploma holders (non engineering) and technically skilled staff. Apart from the General Manager, who is of the rank of a superintending engineer, there are 8 executive engineers; one each heading up the six zones plus one each at headquarters and the raw water pumping zone, 14 assistant engineers and 34 junior engineers, making a total of 57 engineers. They belong to the Government of Uttar Pradesh centralized services (UP *Nagar Vikas* services) and can be posted anywhere in the state according to rank and availability of post. They are usually posted to the KAVAL (Kanpur, Agra, Varanasi, Allahabad and Lucknow) towns and to the regional *Jal Sansthans*. Whereas their transfers and promotions are centralized and controlled by the Urban Development Department, Government of Uttar Pradesh, their salary and increments are controlled by the *Jal Sansthan*. Kanpur *Jal Sansthan* has had 3 General Managers over the past 3 years.

All other staff are non centralized and belong to the *Jal Sansthan* cadre. This includes other technical (non engineers) and non-technical staff. The non technical staff at the head office includes a Finance Officer, an Accounts Officer, an Audit Officer, Chief Water Analyst and Secretary (Administration) with their support staff. The Class – IV staff are mainly skilled and unskilled workers.

The Kanpur *Jal Sansthan* usually sends its staff, mainly engineers, for training programmes conducted by the Government of India for different levels of engineers in urban water supply and sewerage. However, those selected for training are mainly on the basis of availability, as there is a shortage of staff, after a discussion on training needs.

Financial Management

Revenue Sources and Analysis

The accounts of the Jal Sansthan were computerized under the Indo-Dutch ICDP project and are being compiled on commercial principles. However, accounts are still being maintained manually and only entered into the computer. It is expected that by end of fiscal 2004-2005, the accounts would be completely computerized. It was mentioned that the accounts are audited by the Accountant General, Government of Uttar Pradesh, Allahabad and concurrent audit is performed by the audit department of the Kanpur *Nagar Nigam*. The accounts last audited were for the year 1997-1998 by an external firm of chartered accountants. The *Jal Sansthan* has obtained sanction for audit up to 2010 and it is expected that by the end of the fiscal year 2004-2005, the accounts up to the year ended 2002 will be audited.

Water charge, water tax and sewer tax are the main source of revenue. The water tax was reduced from 14% of Annual Rental value of property to 12.5% with effect from April 1, 2003. Water charges are levied at the rate of Rs.3.90 per kilolitre (KL) for domestic supply and at Rs.7.56 per KL for non-domestic supply. Minimum sewer tax is 4 % of annual Rental Value or 25% of the respective water charge or Rs.390/- per seat per year, whichever is higher. Kanpur *Jal Sansthan* has been empowered to increase tariffs by 7.5% every year. Water tax and charges comprise about 85% of total revenue and the revenue from sewer tax has gone up from Rs.11.83 million in 1999-2000 (8.3% of total revenue) to Rs.28.99 million in 2003-2004 (11.5% of total revenue). Table 3-4 presents a revenue analysis of Kanpur *Jal Sansthan*.

Table 3-4: Revenue Analysis of Kanpur Jal Sansthan

(Unit: million rupees)

Description	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Total revenue	142.47	194.87	226.06	235.62	253.04
Water Tax and water charge	127.86	169.00	190.61	196.68	213.94
Water Tax % of Total revenue	89.7%	86.7%	84.3%	83.5%	84.5%
Sewer Tax	11.83	21.63	27.09	30.13	28.99
Sewer Tax % of Total revenue	8.3%	11.1%	12.0%	12.8%	11.5%

Source: Statement provided by Kanpur Jal Sansthan vide their letter of 3/9/2004

Table 3-5 provides the income and expenditure account of Kanpur Jal Sansthan for the 5 year period 1999-2000 to 2003-2004.

Table 3-5: Income and Expenditure Account of Kanpur *Jal Sansthan*

(Unit: million rupees)

Current Account Income										
	1999-2000		2000-2001		2001-2002		2002-2003		2003-2004	
Description	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1. Water Tax	52.20	36.6	58.55	30.0	69.72	30.8	74.43	31.6	89.88	35.5
2. Water Charge	75.66	53.1	110.45	56.7	120.90	53.5	122.25	51.9	124.06	49.0
3. Sewer Tax	11.83	8.3	21.63	11.1	27.09	12.0	30.12	12.8	28.99	11.5
4. Other Income	2.78	2.0	4.24	2.2	8.35	3.7	8.82	3.7	10.11	4.0
Total	142.47		194.87		226.06		235.62		253.04	
Current Account Expenditure										
1. Establishment	132.63	87.7	161.18	87.0	170.94	81.6	182.22	82.0	175.73	79.0
2. Electricity	3.47	2.3	3.77	2.0	15.08	7.2	15.77	7.1	8.12	3.6
3. Consumables	6.35	4.2	12.04	6.5	11.89	5.7	11.94	5.4	14.58	6.5
4. Maintenance	7.63	5.0	6.85	3.7	9.89	4.7	10.64	4.8	22.36	10.0
5. Others	1.09	0.8	1.53	0.8	1.58	0.8	1.66	0.7	1.76	0.9
Total	151.17		185.37		209.38		222.23		222.55	

Source: Statement provided by Kanpur Jal Sansthan vide their letter of 3/9/2004

Establishment expenses, which include salaries and wages, comprise almost 80% of total expenses with expenditure on maintenance being a paltry 5%. Only in 2003-2004, a sum of Rs.22.36 million or 10% of total expenditure was incurred on maintenance. This was actually desperate measures to keep afloat the over aged water supply and sewerage systems of the Nigam. Of the salaries and wages budgeted for the year 2004-2005, the salaries of sweepers is budgeted at Rs.59.19 million (Kanpur Jal Sansthan Budget document for 2004-2005).

Table 3-6 provides a statement of expenditure incurred on sewerage services by Kanpur Jal Sansthan. It may be seen that of the total establishment expenses incurred in 2003-2004, about 26% was accounted for by sewerage maintenance staff and 24% of expenditure on maintenance was spent on maintenance of sewers. Expenditure on account of sewerage services for that year was about 26% of total expenditure. However, as against this expenditure, the revenue from sewer tax just about covers 50% of the expenditure.

Table 3-6: Expenditure incurred on Sewerage Services by Kanpur *Jal Sansthan*

(Unit: million rupees)

Description	1999-2000		2000-2001		2001-2002		2002-2003		2003-2004	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1. Establishment	41.68	86.7	45.69	86.0	48.25	85.7	46.93	82.3	46.17	78.9
2. Electricity	2.41	5.0	3.28	6.2	3.58	6.4	4.08	7.2	4.49	7.7
3. Maintenance	3.05	6.3	2.74	5.2	3.29	5.8	3.88	6.8	5.38	9.2
4. Consumables	0.41	0.8	0.63	1.2	0.54	1.0	1.29	2.3	1.56	2.7
5. Others	0.55	1.2	0.76	1.4	0.63	1.1	0.83	1.4	0,88	1.5
Total	48.10		53.10		56.29		57.01		58.48	

Source: Statement provided by Kanpur Jal Sansthan vide their letter of 3/9/2004

As has been mentioned earlier, no capital expenditure has been incurred on improvement of the sewerage system in the recent past.

Tax collection system

Kanpur *Jal Sansthan* has 30 people for tax billing and 170 people for tax collections. Billing is computerized at head office from where bills are prepared and sent to respective zonal offices for collections. Zone-wise targets have been set for tax collections. Within zones, targets for collections are further set area-wise and tax collector-wise. An incentive of 0.25% is given if collection targets are met or exceeded and departmental enquiry is started against tax collectors who fail to meet their targets. Tax collectors or assistants (Class IV staff) personally present the bills to the residents and collect the tax that is deposited directly into the bank. Daily collection reports are sent by the zonal office to the head office. In the event that residents fail to pay their taxes, a recovery charge by way of 10% penalty is levied and sent through the District Magistrate, which is served on the residents by the *Tehsildar*.

Collection Efficiency

Actual tax collections in 2003-2004 against the budget is presented in Table 3-7 given below:

Table 3-7: 2003-2004 – Actual Tax collected against Budget

(Unit: million rupees)

	Budget	Actual collections	Actual as % of Budget
Water Tax	100.79	89.88	89.2 %
Water Charges	125.98	124.06	98.5 %
Sewer Tax	27.58	28.99	105.1 %

Prima facie, *Jal Sansthan* appears to be quite efficient in tax collections. However, what is important to note is whether all those who should be paying taxes are actually assessed for taxes. All the 3 taxes are based on the list of properties for which annual rental value is assessed with the *Nagar Nigam*. Very often, Jal Sansthan does not have the updated list of properties assessed and have to make several trips to the *Nagar Nigam* before they can obtain the updated list or additions. It is difficult to assess, therefore, as to from what percentage of total residents taxes are actually being collected and whether there is scope for increase in tax collections and, if so, to what extent. The *Jal Sansthan* also faces problems on account of a shortage of collection staff given the large municipal area.

Response to Public Needs

Kanpur *Jal Sansthan* has a system of recording complaints at the head office, zonal offices and at the junior engineer maintenance units. At the head office a control room works round the clock and receives complaints both personally as well as through telephone. The complaint is recorded in a register and passed on the same day/next day if the complaint is received at night, to the concerned zone through a job card sent to the executive engineer. On complaints being attended, the job card is sent back to the control room. The control room is monitored by the executive engineer (Headquarters).

A similar system is maintained at the zonal offices where the zonal engineer monitors the status of complaints. At the maintenance units, a public register is maintained for complaints and is monitored by the junior engineer. Unless the complaint is major in nature, it is attended to within 24 hours of receipt of complaint. Daily reports are sent from zonal offices to head office stating complaints received, nature of complaint and status.

Management Information Systems

Management Information Systems (MIS) are maintained manually. Daily MIS reports are submitted by the zonal offices to the General Manager reporting on:

- Water supply pipeline leakages and action taken thereon.
- Repairs to hand pumps,
- Routine cleaning of sewers,
- Position of pumping stations,
- Complaints received and status of rectification thereof,
- Revenue collection

Monthly reports are submitted to the General Manager copied to the UP Jal Nigam and Director (Local bodies) on production of water, operations and maintenance of water supply and sewerage, revenue collections and any other important issue.

4. LUCKNOW CITY

Nagar Nigam

Lucknow is the Capital of Uttar Pradesh; one of the largest states in India. Lucknow *Nagar Nigam* was formed with the objective of providing all the necessary urban basic services to the residents and visitors to the city.

Structure of Lucknow Nagar Nigam

Lucknow *Nagar Nigam* is headed by an elected Mayor, who is supported by the Municipal Commissioner, who is from the State Civil Service. The Municipal Commissioner is the executive head of the *Nigam* and is in turn supported by Additional Municipal Commissioners and Assistant City Commissioners. The functional heads, i.e. Chief Engineer (Engineering Department), Health Officer (Health and Sanitation), Chief Accounts Officer, Chief Auditor, Chief Medical Officer (for Hospital Administration, food quality and diseases control) and heads of General Administration and HRD are subject specialists and report to the Municipal Commissioner. An organisation chart provided by Lucknow *Nagar Nigam* describes a hierarchy and is based on posts rather than on functions. The Nagar Nigam has divided the city into 6 zones for administrative and management purposes.

Functions

Services provided by Lucknow *Nagar Nigam* are within the municipal area and include the construction and maintenance of storm water drains, maintenance of branch sewers, repair and maintenance of city roads, maintenance of parks, public buildings and public area and street lighting. Other services provided relate to registration of births and deaths, hospital administration, enforcement of Prevention of Food Adulteration Act, prevention and checking spread of contagious, infectious and dangerous diseases and education. The Sanitation aspect of the city is taken care by the Health and Sanitation Department.
It is essential to note here that the branch sewers and open drains are being maintained by Lucknow *Nagar Nigam* and the main and trunk sewers are being maintained by Lucknow *Jal Sansthan*.

Manpower

The Lucknow *Nagar Nigam* has a staff strength of 6,250 which includes the C and D Grade employees, comprising of chemists, draftsman, cashiers, clerks, compounders, sweepers, peons, etc. The *Nagar Nigam* employs around 3, 448 sweepers and other cleaning staff.

The Engineering Department has 6 Zonal Engineers of the rank of Executive Engineer and there are 2 Assistant Engineers for each Executive Engineer and 6 Junior Engineers reporting to each of the Assistant Engineers, making a total strength of 90 engineering staff who are a mix of civil, electrical and mechanical engineers. They also handle street lighting There are also lighting inspectors and supervisors and park supervisors. This department also looks after the workshop.

The maintenance of sewers is the responsibility of the Health and Sanitation Department of the Lucknow *Nagar Nigam*. Presently this department has 1 City Health Officer, 1 additional health Officer, 3 Chief Sanitary Inspectors, 15 Sanitary Inspector and 3,448 Sweepers. In addition to this there are around 1,735 contracted and daily wage sweepers. The maintenance of sewers and drains is entrusted to these people. These persons were recruited by the Lucknow *Nagar Nigam* and over the years, they have gathered experience by self-learning and through knowledge imparted by their seniors.

The current maintenance staff strength at the moment is inadequate when it comes to the maintenance of the sewers. Hence, around 1,700 persons are employed on contract basis to carry out routine

maintenance.

In financial terms, the expenditure on salary is nearly 62% of the total annual expenditure of Lucknow Nagar Nigam and is constantly rising despite a ban on new recruitment. The salary of C & D Grade employees, i.e. sweepers, clerks, peon compounders etc, accounts for nearly 46% of the total annual expenditure on salary. The total revenue for the year 2002-2003 was Rs.691.45 million including state transfers, out of which Rs.407.65 million was spent on employee salaries. This means that 59% of the entire revenue (including transfers from State Government) of the Lucknow Nagar Nigam is allocated to manpower.

Revenue Sources and Analysis

The Lucknow *Nagar Nigam* works in watertight compartments. The information does not flow freely and smoothly within departments. There is also lack of data sharing with other organisations (such as Annual Rental Value of properties, number of properties assessed, etc.) This is mainly due to lack of use of computerised systems. Accounts of Lucknow *Nagar Nigam* are maintained on a single entry system.

The Accounts and Audit department has a total sanctioned staff strength of 26 and the Tax department has 150 both at junior and senior levels. The actual number of persons working in all the three departments are 115 including 97 in the tax department.
Section 99 to 103 of the UP Municipalities Act 1916 lay down the method of preparation of Budget and the manner the expenditure is to be made. The Property tax is the main item of revenue for Lucknow *Nagar Nigam*, which is around 45% to 50% of the total own revenue. The property tax is charged at the rate of 15 percent of the assessed Annual Rental Value. The per Capita spending towards property tax during 2001 was around Rs.51.44.

Nagar Nigam has nearly 329,000 properties as per the latest figures available for 2004 under the tax net. The estimated revenue of property tax will be around Rs.270 million for the financial year ending 31st March 2005. It is believed that this growth in the revenue is mainly due to the implementation of the self-assessment scheme. In addition to property tax, the other sources of revenue are Advertisement Tax, Vehicle Tax, rental income from properties of the Nigam, fines, registration fee, and transfers from Lucknow Development Authority for maintenance of facilities for the newly developed colonies.
Table 4-1 shows the growth in the Tax Revenue of the *Nagar Nigam* since 1998-1999 to 2002-2003

Table 4-1: Growth in the Tax revenue since 1998-99 to 2002-03

(unit million Rs.)

Description	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003
Property Tax	111.17	102.25	100.12	107.17	109.59
% Growth over Previous Year		-8.02%	-2.03%	7.04%	2.25%

The above table is prepared on cash basis, i.e., the amount received actually during the year is reflected in the statement. Hence, there is a drop in the percentage property tax revenue.

The income generated by Lucknow *Nagar Nigam* is not sufficient to meet its operating cost, hence every year the Central and State Government transfers fund to meet the deficit. The provisions of the 11th Finance Commission recommended measures to augment the consolidated funds of the State in order to supplement the resources of the Municipalities during 2000 to 2005 in terms of the 73rd and 74th Amendment of the Constitution. The State transfers funds to the local bodies out of the revenues of the state collected in the form of duties, taxes, tolls, fees etc. based on the recommendations of the State Finance Commission.

Table 4-2 shows the Income and Expenditure of *Nagar Nigam* Lucknow and also the income prior to

the abolishing of the Octroi Tax and the compensation now received from the State Government. The year 1989-1990 is the last year when Octroi was received for the full year.

Table 4-2: Income & Expenditure Account of Lucknow *Nagar Nigam*

(Unit million Rs.)

Current Account Income										
Description	**1989-1990**		**1999-2000**		**2000-2002**		**2001-2002**		**2002-2003**	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1. Tax Revenue										
a. Property Tax	33.36	13%	102.25	14%	100.12	11%	107.17	10%	109.59	8%
b. Other Taxes	4.59	2%	10.95	1%	67.32	8%	34.71	3%	61.29	4%
c. Octroi Tax	76.05	30%								
2.Other Revenue	42.70	17%	59.76	8%	63.70	7%	86.61	8%	66.21	5%
3 State transfer Maint.			455.21	59%	502.40	55%	561.70	55%	616.41	45%
4. State Transfers Capital	95.60	38%	134.72	18%	173.97	19%	227.61	24%	516.01	38%
Total Revenue	**252.30**		**762.89**		**907.51**		**1017.80**		**1369.51**	
Current Account Expenditure										
1. Salary										
a. Tax Staff	20.82		36.63	5%	38.16	4%	39.91	4%	39.83	3%
b. Sweepers	68.08		214.23	29%	245.06	27%	240.22	26%	246.17	17%
c. Other			139.78	19%	148.05	17%	157.87	17%	161.87	11%
d. Pension	6.30		44.42	6%	66.92	7%	72.43	8%	78.00	5%
2. O & M			180.12	24%	195.54	21%	170.11	18%	242.46	16%
3. Capital Expense	0		119.24	16%	205.25	22%	226.88	25%	490.06	34%
4. Others			11.30	1%	13.33	2%	22.28	2%	202.45	14%
Total Expenditure			**745.72**		**912.31**		**930.14**		**1460.84**	

Source : Budget Statement of Lucknow Nagar Nigam for 1989-90, 1999 to 2003

Lucknow *Nagar Nigam* has treated the Grants received from Central Government through State Government and Rolling fund as capital receipts and expenses against them have also been shown separately.

The above statement shows that the Octroi Tax was a major component of revenue for the Lucknow Nagar Nigam as per the Income and Expenditure statement of 1989-1990. It was nearly 30% of the total revenue or 67% of the tax revenue. However, it is interesting to note that the expenditure staff employed for Tax purposes has been 18% which has now grown to 23% of the tax revenue. Which means that in order to collect tax revenue of Re.1 in the year 1989-1990 the Lucknow Nagar Nigam had to spend Rs. 0.18 however that has now grown to Rs. 0.23.

On the expenditure side it is important to note here that the percentage of salary to the total revenue expenditure has remained more or less constant, however there is a constant drop in the percentage of expenses on maintenance. The salary has remained at a level of 60% to 65% however the maintenance expenses have dropped from 28% in 1999-2000 to 23% in 2003-2004. This means that there is no control over expenditure on manpower cost vis-a-vis maintenance.

Annual Rental Value under the Self Assessment Scheme

It is necessary to understand the meaning and the importance of Annual Rental Value. Annual Rental Value is the amount at which the property can be let out. The second term used here is Self Assessment Scheme. Under the Self Assessment Scheme *Nagar Nigams* have shifted the onus of determining the Annual rental Value of the property to the owner of the property. While determining the Annual Rental Value of any property under the self assessment scheme there are several factors such as the location of the house, the size of road in front of the house or the building, the type of construction, carpet area of the building, size of plot on which the building is constructed. Each of these factors has a value attached to it. While arriving at the value exclusions and discounts are given for the areas like kitchen, balconies and common area.

Discount of 32.5% is given to the owner in case the property is self-occupied and is older than 20 years. In case the property is less than 20 years old and is self occupied then the discount offered is 25%. In case of new self occupied properties the discount is only 7.5%.

The Property Tax in Lucknow is 10% of the value so derived using the above method. Incentive of 10% of the amount due is given if the payment of tax is made within the due date. In case of delay, a penalty of 10% is charged on the entire bill value.

Complaint Redressal

Breakdown maintenance record is generally noted in a register. However, no separate files are maintained to record this. The records of routine maintenance, which takes place only once a year before monsoons, are recorded manually. Although a complaint register is kept in the office, the files are not maintained regularly.

A sanitary inspector is responsible for taking down the complaints from the respective wards. The site people come to the "*chouki*" and take note of the complaints. Lucknow *Nagar Nigam* claims that all complaints are addressed within 24 hours. However, if a complaint is registered in the evening or the work is tedious, attending to complaints can take more than 24 hours.

Jal Sansthan

Profile

Till 1975, the Municipal Corporation (Now Nagar Nigam) was a single organization that looked after all the operation and maintenance of the infrastructure including water supply and sewerage and the Local Self Government, Engineering Department of the U.P. Govt. undertook the planning and construction of the capital works. However, with the arrival of the International Monetary Fund, it was decided that two separate entities will be required. One will be responsible for construction and execution while the other one will be mainly into operation and maintenance of these structures. Accordingly, under the water supply and sewage Act, 1975 Jal Nigam was established for capital works and Jal Sansthans were created for operation and maintenance. Allahabad Jal Sansthan came into existence in 1976 under the U.P. Water and Sewerage Act 1975. It was entrusted with the work of cleaning and maintaining the trunk and main sewers. The production and distribution of clean potable drinking water is also looked after by the Jal Sansthan.

Structure of Lucknow Jal Sansthan

The Lucknow *Jal Sansthan* is an autonomous body with a governing Board and receives policy guidance from the Uttar Pradesh Jal Nigam and administrative support from the Directorate (Local Bodies) under the Urban Development Department, Government of Uttar Pradesh. The Board comprises of the following persons:

1. *Nagar Pramukh* or Mayor – Chairman
2. *Mukhya Nagar Adhikari* or Municipal Commissioner – Member
3. Director Local Bodies, Government of Uttar Pradesh – Member
4. Joint Director, Medical – Member
5. Superintending Engineer, Uttar Pradesh Jal Nigam – Member
6. Accounts Officer, Uttar Pradesh Jal Nigam – Member
7. General Manager, Lucknow *Jal Sansthan* – Member

The General Manager is responsible for the day-to-day operations of the *Sansthan*. It is divided into six operational Zones, each headed by an Executive Engineer. Support at Head Quarters is provided by the Secretary, who looks after Administration, and the Accounts Department. The heads of the different zones/divisions/departments report to the General Manager.

Functions

It is the responsibility of Lucknow *Jal Sansthan* to provide potable water or clean drinking water, maintain the entire water supply system (including pipes, pumps, storage tanks and water filtration plant). In addition, Lucknow *Jal Sansthan* is also responsible for maintaining trunk and main sewers. In turn, Lucknow *Jal Sansthan* collects water tax, water charge, sewer tax and sewer charge as their revenue, and maintains their independent book of accounts.

Manpower

The entire operations of the Lucknow *Jal Sansthan* have been divided into six zones and each zone is headed by a Zonal Officer, he is assisted by an Assistant Engineer and a team of operating Staff.

Jal Sansthan has total staff strength of around 2,004 permanent employees. The water department employs 1,610 persons and the sewerage department has 394 employees. The water department has 527 pump operators and 608 gang men. However, the sewerage department has 391 persons employed in the maintenance of sewers. *Jal Sansthan* has nearly 362 persons on daily wages. The approximate expenditure on daily wagers is around Rs.22.29 million. The total manpower cost is around 40% of the

total expenditure excluding depreciation. However, 75 percentage of *Jal Sansthan's* own revenue is spent on staff salaries. Hence they are left with very little money to spend on items like electricity and maintenance. *Jal Sansthan* receives grant from the state to meet its obligation for electricity.

Revenue Sources and Analysis

Jal Sansthan is in the process of computerisation. As a first step, they have installed stand alone computers mainly for revenue collection. However, there are plans to purchase computers and transfer most of the accounting load on the computers.

Lucknow *Jal Sansthan* maintains its accounts on a double entry system of accounting and gets its accounts audited by an external firm of Chartered Accountants.

Water Charge, Water Tax and Sewer Tax and Sewer Charge are the main heads of revenue. The Water Tax is 12.5% of the Annual Rental Value of the property (as calculated by the *Nagar Nigam*) and Sewer tax is 3% of the Annual Rental Value or 25% of the water Charge where annual rental value is not available. Water Charge is calculated on the basis of a tariff chart. The *Jal Sansthan* calculates both the water tax and water charge and bill is raised for the higher. On an analysis of the Income and Expenditure statement of Lucknow *Jal Sansthan*, the water and Sewer tax amounts to approx 75%. Water charge is another 15%. The revenue from taxes and water charge is sufficient enough to take care of the operating cost of the Sansthan, which include salary, maintenance etc. Expenditure on Electricity is directly met by a grant received from the UP State Government

Table 4-3 shows the growth in the Tax revenue of *Jal Sansthan.*

Table 4-3 : Growth of Revenue of Lucknow Jal Sansthan

(unit million Rs.)

Description	**1997-1998**	**1998-1999**	**1999-2000**	**2000-2001**
Total Revenue	136.59	217.72	264.78	209.96
Growth in revenue		59.3%	21.6%	-30%
Water Tax and Charge	128.01	188.11	178.87	182.67
Water Tax % of Total revenue	94%	87%	67%	87%
Sewer Tax	8.57	29.61	25.91	27.29
Sewer Tax % of Total Revenue	6%	13%	33%	13%

Source: Audited Balance sheet for the years 1998,1999,2000,2001

There is a drop in the total revenue for 2000-2001 after a growth up to 1999-2000. The figures do not show the actual amount due towards water tax, water charge, sewerage tax, as the accounts are maintained on receipt basis.

Table 4-4 shows the Income and Expenditure of Lucknow *Jal Sansthan* for the past 4 years.

Table 4-4: Income & Expenditure Account of Lucknow Jal Sansthan

(Unit million Rs.)

Current Account Income								
Description	**1997-1998**		**1998-1999**		**1999-2000**		**2000-2001**	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
1.Water Tax	98.67	49.8%	142.99	42%	132.65	18%	147.72	45%
2. Sewer Tax	8.57	4.3%	29.61	8.6%	25.91	3.4%	27.29	8.3%
3. Water Charge	29.34	14.8%	45.12	13.2%	46.22	6.1%	34.95	10.6%
4. Other Income	10.78	5.4%	21.04	6.2%	19.00	2.5%	21.60	6.5%
5 Grants	50.52	25.7%	103.17	30%	529.35	70%	96.94	29.6%
Total	197.89		341.94		753.13		328.49	
Current Account Expenditure								
1. Salary	113.07	40.1%	131.95	41.5%	154.31	42.0%	174.60	40.2%
2.Consumables	14.95	5.3%	16.75	5.3%	15.35	4.2%	14.12	3.2%
3. Electricity	95.35	33.9%	111.04	35.0%	138.03	37.6%	183.96	42.3%
4. Interest	36.79	13.0%	35.49	11.1%	35.49	9.7%	35.49	8.2%
4. Others	21.38	7.7%	22.93	7.1%	24.03	6.5%	26.58	6.1%
Total	281.55		318.16		367.22		434.74	

Source: Audited Balance sheet for the years 1998,1999,2000,2001

There is a steady growth of 18% to 20% in the salary and pension payouts each year. However, the growth in revenue does not even match the growth in the employee cost. The *Jal Sansthan* has a constant interest expense of Rs.35.49 million which is nearly 10% of the total outlay. It is interesting to note that the electricity grant from the State Government is not received regularly and on time. It is arbitrarily decided without any justification for the amount given in a particular year. The electricity cost book for the period under study, i.e., 1997 to 2001is Rs.528.38 million, however, the amount received during the same period is Rs.779.98 million. It is not possible to clearly say if the amount received is in excess of current demand or whether it is payment for old dues. It can be inferred that it is an advance as in the year 1997-1998 the cost of electricity booked was Rs.95.35 million and the amount received as grant was Rs.50.52 million only. But at the same time there is no justification for the advance payment.

5. ALLAHABAD CITY

Nagar Nigam

Allahabad city is situated in the southeastern region of the state of Uttar Pradesh between the two rivers Ganga and Yamuna. This city has religious importance because of the confluence of the two rivers Ganga and Yamuna along with a third mythological invisible river Saraswati. Millions of pilgrims come to this city every year to take a dip in the river during the famous occasions of *Kumbh* and *Ardh Kumbh*.

Accounting Systems and Financial Analysis

The Allahabad *Nagar Nigam* follows single entry accounting system.
Property tax is still the main item of tax revenue for Allahabad *Nagar Nigam* even though the share of this tax in total tax has reduced from 86% in 200-2001 to 57% in 2002-2003. During 2001-2002 and 2002-2003, tax from stamp and registration fee increased substantially. The property tax is charged at the rate of 15 percent of the assessed Annual Rental Value.

In addition to property tax, the other sources of revenue from tax are advertisement tax, vehicle tax which is now included in other tax, stamp and registration fee and non-tax revenues are rental income from properties of the *Nigam*, fines, registration fee, transfers from Allahabad Development Authority for maintenance of facilities for the newly developed colonies.
Table 5-1 shows the growth in the tax revenue of Allahabad *Nagar Nigam* for the period 2000-2001 to 2002-2003

Table 5-1: Growth in the Tax revenue 2000-2001 to 2002-03

(unit million Rs.)

Description	2000-2001	2001-2002	2002-2003
Total Tax	42.38	60.91	81.44
Property Tax	36.53	41.05	46.52
Property Tax % of Total Tax	86.2	67.4	57.1
% Growth over Previous Year		12.4 %	13.3 %

Source : Budget Statement of Allahabad Nagar Nigam for 2001 to 2003

The above table is prepared on cash basis, i.e., the amount received actually during the year is reflected in the statement. As may be seen, there is a reasonable growth in collection of total taxes even though property tax collections have been growing marginally.
The income generated by Allahabad *Nagar Nigam* is not sufficient to meet its operating cost hence every year the Central and State Government transfers funds to meet the deficit.

Table 5-2 shows the Income and Expenditure of Allahabad *Nagar Nigam* for the period 2000-2001 to 2002-2003. Data on income from Octroi tax prior to its being abolished was not available for analysis.

Table 5-2: Income and Expenditure Account of Allahabad Nagar Nigam

(Unit million Rs.)

Current Account Income						
Description	**2000-2001**		**2001-2002**		**2002-2003**	
	Amount	**%**	**Amount**	**%**	**Amount**	**%**
1. Tax Revenue	42.38	8.9	60.91	16.8	81.44	21.7
a. Property Tax	36.53	7.7	41.05	11.3	46.52	12.4
b. Other Taxes	5.85	1.2	19.86	5.5	34.92	9.3
c. Octroi Tax	-		-		-	
2.Other Revenue	41.67	8.8	27.19	7.5	34.04	9.1
3 State transfer Maint.	124.71	26.4	27.00	7.5	4.78	1.3
4.State Transfers- Developmental activities	264.79	55.9	247.17	68.2	254.58	67.9
Total Revenue	**473.55**		**362.27**		**374.84**	
Current Account Expenditure						
1. Salary	267.35	61.3	255.28	67.6	232.25	65.6
a. Tax Staff	30.68		27.86		24.70	
b. Sweepers	153.89	35.3	148.17	39.3	131.21	37.1
c. Other	57.37		56.21		50.22	
d. Pension	25.41		23.04		26.12	
2. Maintenance and Others	125.79	28.8	82.71	21.9	85.25	24.1
3. Capital Expense	10.03		21.29		16.42	
4. Others	32.95		17.73		20.07	
Total Expenditure	**436.11**		**377.01**		**353.99**	

Source : Budget Statement of Allahabad Nagar Nigam for 2001 to 2003

As per the Income and Expenditure statement of Allahabad *Nagar Nigam*, transfers from the state government comprises the largest component of income even though in 2002-2003 income from taxes went up to about 22% of total income. Salaries comprise almost 65% of total expenditure of which the salaries of sweepers alone account for about 35% to 39% of total expenditure and about 57% of total salaries. The expenditure on maintenance has been only around 24% in 2002-2003, reducing from 28% in 2000-2001.

The Property Tax in Allahabad is 10% of the Annual Rental Value. Incentive of 10% of the amount due is given if the payment of tax is made within the due date. In case of delay, penalty of 10% is charged on the entire bill value.

Jal Sansthan

Manpower

Allahabad *Jal Sansthan* has total staff strength of 817 permanent employees. This includes 202 pump attendants, 276 *Khalasis*, 98 Helpers in addition to the other operating staff. The Allahabad *Jal Sansthan* is headed by a General Manager and has 4 Executive Engineers, 7 Assistant Engineers and 25 Junior Engineers.

Revenue Sources and Analysis

Allahabad *Jal Sansthan* maintains its books of account on a double entry system. The accounts have been finalised and Balance Sheet prepared up to 31-03-2000. An independent external firm of Chartered Accountants is doing the audit of accounts. Water charge, water tax and sewer tax and sewer charge is the main heads of revenue. The water tax is 12.5% of the Annual Rental Value of the property (as calculated by the *Nagar Nigam*) and sewer tax is 3% of the Annual Rental Value or 25% of the water charge where annual rental value is not available. Water charge is calculated on the basis of a tariff chart. The *Jal Sansthan* calculates both the water tax and water charge and bill is raised for the higher of the two amounts. Table 5-3 shows the growth in the Tax revenue of the Allahabad *Jal Sansthan*

Table 5-3: Growth of Revenue of Allahabad Jal Sansthan

(Unit million Rs.)

Description	1996-1997	1997-1998	1998-1999	1999-2000
Total Revenue	48.78	56.44	62.76	86.2
Growth in revenue		15.7%	11.1%	37.3%
Water Tax and Charge	45.26	52.43	57.90	81.20
Water Tax % of Total revenue	92.8%	92.9%	92.2%	94.2%
Sewer Tax	3.52	4.01	4.86	5.00
Sewer Tax % of Total Revenue	7.2%	7.1%	7.8%	5.8%

Source: Audited Balance sheet for the years 1997,1998, 1999,2000

The above table shows that there is a constant growth in the revenue both from water and sewer. The above figures represent amounts collected and, in the absence of data on billing, it is difficult to comment on the collection efficiency.

On an analysis of the Income and Expenditure statement of the Allahabad *Jal Sansthan* it is noticed that water charge is approximately 60% to 70 % of its own revenue. However, it is interesting to note that the water tax is only 18% of the total revenue. Sewer tax and sewer charge are very insignificant components of revenue as they are 5% and 1%, respectively. The State Government gives grant to meet the expenditure on electricity, which is paid directly to the UP Power Corporation.

On the expenditure side there are two major heads, manpower cost and electricity cost. However, the electricity cost is met by the grant received from the state and the manpower cost was 42% in 1996-1997, which increased to around 63% of the total expenditure in 1999-2000.

Table 5-4 shows the Income and Expenditure of the *Jal Sansthan* for the years 1996-1997 to 1999-2000

Table 5-4: Income & Expenditure Account of Allahabad Jal Sansthan

(Unit million Rs.)

Current Account Income								
Description	**1996-1997**		**1997-1998**		**1998-1999**		**1999-2000**	
	Amount	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**
1.Water Tax	10.81	16.5	11.54	16.3	12.69	18.0	13.80	14.5
2. Sewer Tax	3.52	5.3	4.01	5.7	4.86	6.9	5.00	5.2
3. Water Charge	34.46	52.5	40.89	57.9	45.21	64.1	67.40	70.7
4. Other Income	7.50	11.4	5.57	7.9	7.77	11.0	9.04	9.6
5 Grants	9.25	14.3	8.57	12.1				
Total	**65.54**		**70.57**		**70.53**		**95.24**	
Current Account Expenditure								
1. Salary	42.12	41.8	44.18	46.0	50.47	43.4	72.06	62.7
2.Consumables	4.25	4.2	3.96	4.1	4.92	4.2	8.55	7.4
3. Electricity	34.36	34.2	34.36	35.8	45.00	38.7	15.83	13.8
4. Others	19.94	19.8	10.51	10.9	13.33	13.7	16.03	16.1
Total	**100.67**		**96.03**		**116.19**		**114.95**	

Source: Audited Balance sheet for the years 1997, 1998, 1999, 2000

It may be seen that the growth in both income and expenditure has been marginal. It is difficult to believe that with such levels of income and expenditure the operation and maintenance of the assets would be of a level that could ensure their sustainability.

6. VARANASI CITY

Nagar Nigam

Historically Varanasi is a Holy City and attracts a large floating population in the form of pilgrims, which entail additional burden on the existing civic facilities.

The Varanasi *Nagar Nigam* was formed in 1960 with the objective to provide all the necessary basic civic facilities to the residents and visitors of the Varanasi City. These services include the cleaning of drains and gutters, solid waste management, maintenance of roads, lighting, etc. *Nagar Nigam* has divided the city into 5 zones and 91 wards for administrative and management purposes. The sanitation aspect of the city is taken care by the Health and Sanitation Department, which has Health Officers, Additional Health Officers, Zonal Health Officer and Sanitary Inspector.

Manpower

Nagar Nigam has a staff strength of 3,814, which includes the C and D Grade employees, comprising of chemists, draftsman, cashiers, clerks, compounders, sweepers, peons, etc. In financial terms the expenditure on salary translates into nearly 62% of the total annual expenditure of the Varanasi *Nagar Nigam* and is constantly rising despite of no new recruitment. The salary of C & D Grade employees accounts for nearly 55% of the total annual expenditure on salary.

The maintenance of sewers is the responsibility of the Health and Sanitation Department of the Varanasi *Nagar Nigam*. Presently this department has 4 Chief Sanitary Inspectors, 15 Sanitary Inspectors, 88 Sanitary Supervisors (Head Sweepers) and 2,344 Sweepers. The maintenance of sewers and drains is entrusted to these people. These persons were recruited by the *Nagar Nigam* and over the years they gather experience by self-learning and by the knowledge imparted by their seniors, no formal training was imparted.

Varanasi *Nagar Nigam* has a system of contracting out the manpower when required mostly during peak times, i.e. monsoon season. The Government of India regulations do not permit hiring of new manpower, whereas the existing employees are approaching retirement age. Hence, the organisation has a shortage of manpower that can handle the ever-increasing workload. Every year before the onset of the monsoon nearly 100 labourers are contracted.

Revenue Sources and Analysis

The back office of the Varanasi *Nagar Nigam* works in watertight compartments. The information does not flow freely and smoothly within departments. There is also lack of data sharing with other organisations (such as Annual Rental Value of properties, number of properties assessed, etc.) This is mainly due to lack of use of mechanised systems. Accounts are maintained manually on a single entry system.

The Accounts and Audit department has total staff strength of 32 and the Tax department has strength of 94 personnel both at junior and senior levels. Section 99 to 103 of the UP Municipalities Act 1916 lay down the method of preparation of Budget and the manner the expenditure is to be made. The Varanasi *Nagar Nigam* prepares monthly and annual budget manually.

Property tax is the main item of revenue for *Nagar Nigam*, which is 10 percent of the assessed Annual Rental Value. Varanasi *Nagar Nigam* has nearly 145,000 properties under the tax net generating a revenue of Rs.50.46 million in the financial year ending 31st March 2003 this amounts to 38% of the total revenue of that year (excluding Grants from state). It is believed that this will go up further with the implementation of the self-assessment. In addition to this the other sources of tax income are Advertisement Tax, Vehicle Tax, etc. Tax comprises of 65% of the total revenue of the *Nigam* and the

balance 35% of the revenue is generated from rentals, sale, fines etc. Table 6-1 shows the growth in the Tax Revenue of the Varanasi *Nagar Nigam* from 1998-1999 to 2002-2003

Table 6-1: Growth in the Tax revenue since 1998-99 to 2002-03

(unit million Rs.)

Description	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003
Property Tax	33.58	35.24	36.82	45.90	50.46
Growth over Previous Year		5%	4.49%	24.66%	10%

The income generated by Varanasi *Nagar Nigam* is not sufficient to meet its operating cost hence every year the Central and State Government transfers fund to meet the deficit. This transfer is in lieu of Octroi Tax, which was abolished in 1990. Table 6-2 shows the Income and Expenditure of *Nagar Nigam* Varanasi and also the income prior to the abolishing of the Octroi Tax and the compensation now received from the State Government. The year 1989-1990 is the last year when Octroi was received for the full year.

Table 6-2 :Income & Expenditure Account Varanasi Nagar Nigam

(Unit million Rs.)

Current Account Income										
Description	**1989-1990**		**1999-2000**		**2000-2002**		**2001-2002**		**2002-2003**	
	Amount	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**
1. Tax Revenue	70.30	51.2	43.83	12.3	52.41	10.1	68.78	15.6	90.12	21.8
a. Property Tax	7.00		35.24		36.82		45.90		50.46	
b. Other Taxes	2.20		8.59		15.59		22.88		39.66	
c. Octroi Tax	61.10	44.4								
2.Other Revenue	37.27	27.2	30.54	8.6	57.59	11.1	44.07	10	47.28	11.4
4. State Transfers	29.84	21.6	281.79	79.1	404.82	78.8	327.32	74.4	275.72	66.8
Total Revenue	**137.40**		**356.15**		**514.83**		**440.17**		**413.13**	
Current Account Expenditure										
1. Salary	75.57	67.8	232.02	72	295.51	63	283.18	64	244.90	62
a. Tax Staff	9.96		26.92		30.98		30.56		27.10	
b. Sweepers	43.83		132.47		161.38		160.05		135.84	
c. Other	16.81		70.20		56.73		58.81		49.55	
d. Pension	4.37		24.43		46.48		33.77		32.43	
2. Maintenance	23.04	20.6	77.72	24	154.18	33	134.76	31	132.80	34
3. Others	13.43	11.6	12.11	4	15.90	4	22.24	5	17.30	4
Total Expenditure	**111.44**		**321.84**		**465.66**		**440.18**		**395.00**	

Source : Budget Statement of Varanasi Nagar Nigam for 1989-90, 1999 to 2003

The above table shows that prior to abolishing of Octroi Tax it was one of the largest sources of revenue to the city. However, after the abolishing of the Octroi Tax, the UP State Government provides money as compensation to the Nigam. The State transfer does not sufficiently compensate for the loss of Octroi revenue. For example, if we consider the tax revenue of 1989-1990 it was Rs.70.30 million of which Octroi Tax amounted to Rs.61.10 million, which is approximately 87% of the tax revenue. Keeping the same ratio with a Tax income of Rs.90.12 million in the year 2002-2003 the Octroi Tax revenue would have been around Rs.693.23 million. However the States share, as a compensation for loss of Octroi Revenue is only Rs.275.72 million which is just 1/3 rd of what mathematically should have been the revenue. This shows that if the Octroi Tax was not abolished the Varanasi Nagar Nigam would have not required any financial assistance from the State exchequer.

Annual Rental Value under the Self Assessment Scheme

It is necessary to understand the meaning and importance of Annual Rental Value. Annual Rental Value is the amount at which the property can be let out. The second term used here is Self Assessment Scheme. Under the Self Assessment Scheme Nagar Nigams have shifted the onus of determining the Annual Rental Value of the property to the owner of the property. While determining the Annual

Rental Value of any property under the self assessment scheme there are several factors such as the location of the house, the size of road in front of the house or the building, the type of construction, carpet area of the building, size of plot on which the building is constructed. Each of these factors has a value attached to it. While arriving at the value exclusions and discounts are given for the areas like Kitchen, Balconies and common area. Discount of 32.5% is given to the owner in case the property is self-occupied and is older than 20 years. In case the property is less than 20 years old and is self occupied then the discount offered is 25%. In case of new self occupied properties the discount is only 7.5%. The Property Tax in Varanasi is 10% of the value so derived using the above method. Incentive of 10% of the amount due is given if the payment of tax is done within the due date. In case of delay penalty of 10% is charged on the entire bill value.

Roles and Functions

On a broader level, the *Nagar Nigam* handles the following responsibilities like Health and Sanitation, Primary Education, Solid Waste Management, plantation, slaughterhouses, cleaning of roads, Maintenance of Ghats, etc.

With special reference to the surface and underground drainage system, Varanasi *Nagar Nigam* is involved in:

- Cleaning of surface drains and desilting of deep drains
- Construction and maintenance of surface drains, deep drains along the road and lanes within municipal maintenance

Additionally, Varanasi *Nagar Nigam* is responsible only for the maintenance of the branch sewers of smaller sizes and some portion of main sewers in the city. The laterals and the branch sewers being small in size and form the most initial components of the sewer network are easier to maintain. This kind of maintenance does not require heavy mechanical equipment and is generally carried out manually. Varanasi *Nagar Nigam* is currently managing this with their staffs that are not formally trained but have gained experience over the years. The current maintenance staff strength at the moment is inadequate when it comes to the maintenance of the sewers. During the rainy season any major breakdown are attended first and the staff is diverted from routine maintenance and cleaning. Hence, the routine maintenance and cleaning jobs suffer. The regular daily maintenance of sewers takes place only when such a need arises or when a complaint is made from the public. The routine annual maintenance takes place mainly from April/May before the onset of monsoon. During this period all the drains and sewers are cleaned and cleared for blockages.

Breakdown maintenance record is generally noted in a register. However, no separate files are maintained to record this. The records of routine maintenance, which takes place only once a year before monsoons, are recorded manually. Although a complaint register is kept in the office, files are not maintained regularly.

Generally in case of complex problems where mechanically aided cleaning is required *Jal Sansthan* is approached for help.

Complaint Redressal

A sanitary inspector is responsible for taking down the complaints from the respective wards. The site people come to the "*chouki*" and take note of the complaints. Varanasi *Nagar Nigam* claims that all the complaints are addressed within 24 hours. However, if a complaint is registered in the evening or the work is tedious, attending to complaints can take more than 24 hours.

Jal Sansthan

Till 1975, the Municipal Corporation (Now Nagar Nigam) was a single organization that looked after all the operation and maintenance of the infrastructure including water supply and sewerage and the Local Self Government, Engineering Department of the U.P. Govt. undertook the planning and construction of the capital works. However, with the arrival of the International Monetary Fund, it was decided that two separate entities will be required. One will be responsible for construction and execution while the other one will be mainly into operation and maintenance of these structures. Accordingly, under the water supply and sewage Act, 1975 Jal Nigam was established for capital works and Jal Sansthans were created for operation and maintenance. Allahabad Jal Sansthan came into existence in 1976 under the U.P. Water and Sewerage Act 1975. It was entrusted with the work of cleaning and maintaining the trunk and main sewers. The production and distribution of clean potable drinking water is also looked after by the Jal Sansthan.

Manpower

Varanasi *Jal Sansthan* has a total staff strength of around 727, which includes 303 class IV staff and 201 Sub Station Attendant. To look after the maintenance of sewers, there are around 16 persons. As and when there is a need for additional manpower, people are hired on contract basis. The manpower cost is one of the largest expenditure head and translates into 40% of annual expenditure or nearly 64% of the income of the Varanasi *Jal Sansthan* (excluding grant for electricity).

Revenue Sources and Analysis

Varanasi *Jal Sansthan* is in the process of computerisation, computers have now been purchased and an effort is being made to store the data and daily records on the computer. However, no accounting software is being used. Plans are to maintain the documentation of the collection of water tax and sewer tax electronically.

Varanasi *Jal Sansthan* maintains its accounts on a double entry system of accounting and gets it accounts audited by an external firm of Chartered Accountant.

Water Charge, Water Tax and Sewer Tax are the main heads of revenue. The Water Tax is 12.5% of the Annual Rental Value of the property (as calculated by the *Nagar Nigam*) and Sewer tax is 4% of the Annual Rental Value or 25% of the water Charge. Water and Sewer Tax amount to approx 70% of the revenue of the Varanasi *Jal Sansthan*. The revenue from Tax and Water Charge is sufficient enough to take care of the operating cost of the Sansthan. Electricity and Salary are two major heads of expenditure, which put together comprise nearly 80% of the total expenditure, of which Salary is 40% and Electricity is around 40%. The UP State Government gives a Grant to meet the electricity obligation. Table 6-3 shows the growth in the Tax revenue of the Varanasi *Jal Sansthan.*

Table 6-3: Growth of Revenue of Varanasi Jal Sansthan

(unit million Rs.)

Description	1997-1998	1998-1999	1999-2000	2000-2001
Total Revenue	60.36	81.81	89.37	98.37
Water Tax and Charge	51.73	70.09	79.35	88.67
Water Tax % of Total revenue	85.70%	85.67%	88.79%	90.14%
Sewer Tax	6.38	6.59	6.85	9.04
Sewer Tax % of Total Revenue	10.57%	8.05%	7.66%	9.19%

Source: Audited Balance sheet for the years 1998, 1999, 2000, 2001

Table 6-4 shows the Income and Expenditure of the Varanasi Jal Sansthan for the past 4 years.

Table 6-4 :Income & Expenditure Account Varanasi Jal Sansthan.

(Unit million Rs.)

Current Account Income								
Description	**1997-1998**		**1998-1999**		**1999-2000**		**2000-2001**	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
1.Water Tax	24.30	40.2%	48.78	59.6%	62.01	69.3%	66.32	67.4%
2. Sewer Tax	6.38	10.6%	6.59	8.0%	6.85	7.6%	9.04	9.2%
3. Water Charge	27.73	45.9%	21.31	26.0%	17.34	19.4%	22.35	22.7%
4. Other Income	2.26	3.2%	2.81	3.4%	1.76	1.9%	0.63	0.7%
5 Grants			2.32	3.0%	1.41	1.8%		
Total	60.36		81.81		89.37		98.33	
Current Account Expenditure								
1. Salary	55.33	41%	66.47	42%	79.96	44%	85.65	40%
2.Consumables	5.25	4%	5.41	3%	5.37	3%	5.09	2%
3. Electricity	51.18	38%	60.29	38%	72.05	40%	100.12	46%
4. Others	22.46	17%	26.00	17%	24.34	13%	25.10	12%
Total	134.22		158.37		181.73		215.95	

Source: Audited Balance sheet for the years 1998,1999,2000,2001

Roles and Functions

Varanasi Jal Sansthan is responsible mainly for the cleaning and maintenance of the main and trunk sewers. The cleaning is mostly done through use of mechanical equipments. Jal Sansthan is presently operating with 6 bucket winching machines and 4 jetting cum suction units. In the first phase of the Ganga Action Plan, Jal Sansthan has procured one jetting cum suction machine, 3 gully pit emptiers and one pay loader which enable the department to clean the sewer lines.

Often on request of Nagar Nigam, Jal Sansthan carries out the cleaning for branch sewers also as Nagar Nigam has neither the equipment nor technical expertise to carry out complex operations.

Varanasi Jal Sansthan currently maintains the following sewer lines:

1. Main and Trunk Sewer
2. Orderly Bazaar sewer
3. Kamachchha Brick sewer
4. Durga Kund Brick Sewer
5. Bengali Tola Brick sewer
6. Rewari Talab brick sewer
7. Baluabeer brick sewer
8. G.T. road Main sewer
9. Nawapura brick sewer
10. Marwadeeh main sewer

Complaint Redressal

A register is kept in the office. The control table is provided for taking down all the complaints received by the citizens. Site people on coming to the office take note of these complaints and attend to them.

Appendix C

Appendix C

Description of the City and the City Office

Utsunomiya City is located at 100 km north of Tokyo. It is the largest city and capital of Tochigi Prefecture. The area practices predominantly agriculture and there is no outstanding manufacturing industry. But, as a center of the Prefecture, it had developed a city center where retail shops once flourished. Due to downturn of Japanese economy and the competing large retail outlets recently located on the outskirts of the city, shops in city center are now losing business.

The Mayor and the city council members are elected by citizens' votes. The Council is a legislative wing, and the City office is Executive wing of the city. The Mayor is in charge of the city office. He is assisted by one deputy mayor and one revenue officer. They are appointed by the Mayor from among the employees of the city office, and approved by the Council.

In the City, Water Supply and Wastewater Bureau, headed by one director, is providing the services. The Bureau's accounting is separated from other accountings of the city office. The director reports to deputy mayor and the Mayor, who is the legal representative of the water supply and sewerage service provider, that is one of the city's important businesses.

The city tax : population = Yen 81,000 million : 449,000 = Yen 180,000 per head = Rs. 72,000 per head
Population : Employees of the city office = 448,814 : 3,743 = 120 : 1
The city revenue : citizen = Yen 289,100 million : 449,000 = Yen 644,000 per head = Rs. 258,000
The city revenue : the city employee = Yen 289,100 million : 3,743 = Yen 77.2 million per head = Rs. 31 million
Revenue on water & sewerage : citizen = Yen 36,700 million : 449,000 = Yen 81,800 per head = Rs. 32,720
Revenue on water & sewerage : employees of W&S div. = Yen 36,700 million : 356 = Yen 103 million per head = Rs. 41.2 million

Note: Yen 2.5 = 1 Indian Rupee

City Account: Revenue and Expenditure

(thousand Yen)

	1999/00		2000/01		2001/02		2002/03	
Revenue								
General Account	168,696,148	58.2%	158,232,488	54.7%	156,074,618	54.0%	156,862,267	
Total Special Account	85,094,022	29.3%	94,143,409	32.6%	98,785,179	34.2%		
Business Account	36,144,617	12.5%	36,695,370	12.7%	34,281,402	11.9%		
Total City Revenue	289,934,787	100.0%	289,071,267	100.0%	289,141,199	100.0%		
Expenditure								
General Account	164,936,808	56.7%	149,823,005	53.3%	148,881,339	52.0%	151,277,281	
Total Special Account	84,639,269	29.1%	92,490,568	32.9%	97,782,613	34.2%		
Business Account	41,133,698	14.1%	39,041,754	13.9%	39,428,238	13.8%		
Total City Expenditure	290,709,774	100.0%	281,355,327	100.0%	286,092,190	100.0%		
Balance								
General Account	3,759,341	2.2%	8,409,483	5.3%	7,193,279	4.6%	5,584,986	3.6%
Total Special Account	454,753	0.3%	1,652,841	1.0%	1,002,566	0.6%		
Business Account	-4,989,081	-3.0%	-2,346,384	-1.5%	-5,146,836	-3.3%		
Total City Balance	-774,987	-0.5%	7,715,940	4.9%	3,049,009	2.0%		

General Account: Revenue and Expenditure

(thousand Yen)

	1999/00		2000/01		2001/02		2002/03	
Revenue								
City Tax	82,222,588	48.7%	80,611,233	50.9%	81,375,294	52.1%	80,722,216	51.5%
National Transfer/Subsidy	45,724,239	27.1%	44,748,335	28.3%	40,737,611	26.1%	36686429	23.4%
City Bond	15,525,600	9.2%	10,394,100	6.6%	9,135,200	5.9%	12,708,750	8.1%
Revenue on City's Asset	932,126	0.6%	790,629	0.5%	1,081,094	0.7%	498,274	0.3%
Miscellaneous Revenue	15,754,009	9.3%	16,166,349	10.2%	16,192,949	10.4%	14,734,104	9.4%
Others	8,537,587	5.1%	5,521,842	3.5%	7,552,469	4.8%	11,512,494	7.3%
Total Revenue	168,696,148	100.0%	158,232,488	100.0%	156,074,618	100.0%	156,862,267	100.0%
Expenditure								
City Council	876,187	0.5%	849,542	0.6%	835,878	0.6%	807,606	0.5%
Policy and Administration	15,779,547	9.6%	13,354,609	8.9%	14,343,641	9.6%	16,450,812	10.9%
Citizen Life	30,318,045	18.4%	26,215,757	17.5%	28,637,146	19.2%	30,250,245	20.0%
Health and Welfare	25,414,787	15.4%	20,474,472	13.7%	16,644,181	11.2%	19,860,520	13.1%
Labor	265,037	0.2%	262,170	0.2%	261,973	0.2%	281,374	0.2%
Agricultur/Forestry/Fishery	2,360,826	1.4%	2,586,494	1.7%	3,036,841	2.0%	2,580,552	1.7%
Trade and Industry	14,300,201	8.7%	12,009,396	8.0%	12,096,766	8.1%	11,731,465	7.8%
Civil Engineering Work	38,384,032	23.3%	39,385,667	26.3%	36,904,349	24.8%	34,391,488	22.7%
Fire Fighting	4,821,505	2.9%	5,097,933	3.4%	5,541,111	3.7%	4,495,641	3.0%
Education	19,068,041	11.6%	16,348,145	10.9%	17,357,018	11.7%	16,900,728	11.2%
Disaster	36,225	0.0%	0	0.0%	0	0.0%	26,779	0.0%
City Bond	12,250,043	7.4%	12,253,632	8.2%	13,144,204	8.8%	13,464,510	8.9%
Miscellaneous	1,062,332	0.6%	985,188	0.7%	78,231	0.1%	35,559	0.0%
Total Expenditure	164,936,808	100.0%	149,823,005	100.0%	148,881,339	100.0%	151,277,281	100.0%

Source: Utsunomiya City Office

Total City Tax Collection

(thousand Yen)

City Tax Item	1999/00		2000/01		2001/02		2002/03	
Total City Tax Collected	82,222,588	100.0%	80,611,232	100.0%	81,375,294	100.0%	80,722,216	100.0%
Total accrual	81,065,828	98.6%	79,370,575	98.5%	80,048,358	98.4%	79,312,789	98.3%
Total arrears collected	1,156,760	1.4%	1,240,657	1.5%	1,326,935	1.6%	1,409,426	1.7%
Citizen Tax	34,257,366	41.7%	33,656,791	41.8%	33,615,740	41.3%	32,659,402	40.5%
Individual	23,662,725	28.8%	22,742,842	28.2%	22,969,821	28.2%	22,562,549	28.0%
Accrual	23,325,168		22,407,096		22,631,710		22,202,855	
Arrears	337,557		335,747		338,111		359,694	
Juridical person	10,594,641	12.9%	10,913,949	13.5%	10,645,919	13.1%	10,096,853	12.5%
Accrual	10,567,888		10,889,440		10,600,486		10,055,479	
Arrears	26,754		24,509		45,433		41,374	
Property Tax	35,119,105	42.7%	34,172,271	42.4%	35,045,818	43.1%	35,721,201	44.3%
Property tax	34,948,643		33,982,140		34,862,282		35,531,228	
Accrual	34,301,015		33,269,137		34,096,094		34,714,371	
Arrears	647,627		713,004		766,189		816,857	
National transfer	170,462		190,131		183,536		189,973	
Light Vehicle Tax	336,284	0.4%	349,382	0.4%	369,993	0.5%	383,274	0.5%
Accrual	330,907		343,743		363,008		375,983	
Arrears	5,377		5,639		6,985		7,291	
Tobacco Tax	3,572,169	4.3%	3,557,419	4.4%	3,460,461	4.3%	3,334,241	4.1%
Special Tax on Land Possess	262,063	0.3%	142,146	0.2%	89,914	0.1%	92,628	0.1%
Accrual	259,581		132,747		89,698		69,048	
Arrears	2,482		100,328		216		23,580	
Public Bath Tax	12,689	0.0%	10,597	0.0%	9,234	0.0%	8,281	0.0%
Business Establishment Tax	2,900,375	3.5%	3,110,740	3.9%	3,085,934	3.8%	2,777,433	3.4%
Accrual	2,887,525		3,099,675		3,068,078		2,773,599	
Arrears	12,851		11,065		17,856		3,834	
Urban Planning Tax	5,762,538	7.0%	5,611,886	7.0%	5,698,198	7.0%	5,745,755	7.1%
Accrual	5,638,426		5,471,055		5,546,053		5,588,959	
Arrears	124,112		140,831		152,145		156,796	

Source: Utsunomiya City Office

Special Account & Business Account: Revenue and Expenditure

(thousand Yen)

	1999/00		2000/01		2001/02	
Revenue						
National Health Insurance	26,601,514	31.3%	28,824,714	30.6%	29,804,064	30.2%
Care Insurance Special Account	-	-	10,186,626	10.8%	11,938,884	12.1%
Credit for fatherless family/widowed woman	115,061	0.1%	118,556	0.1%	128,977	0.1%
Elderly Insurance	30,667,610	36.0%	29,614,958	31.5%	31,044,595	31.4%
Village Wastewater Project	1,188,438	1.4%	1,041,533	1.1%	886,683	0.9%
Bicycle Racing	19,363,624	22.8%	17,058,325	18.1%	16,955,350	17.2%
Centran Wholesale Market	809,569	1.0%	772,331	0.8%	914,994	0.9%
Slaughterhouse/ Wholesale Market	716,380	0.8%	375,180	0.4%	431,373	0.4%
Parking Lot	358,231	0.4%	2,512,814	2.7%	2,796,066	2.8%
Urban Development Projects	1,693,236	2.0%	1,551,559	1.6%	1,289,450	1.3%
Land Readjustment Project 3	1,778,240	2.1%	227,803	0.2%	384,775	0.4%
Land Readjustment Project 1	1,334,929	1.6%	1,402,999	1.5%	1,317,027	1.3%
Land Readjustment Project 2	295,092	0.3%	268,712	0.3%	690,301	0.7%
Scholarship Account	172,098	0.2%	187,299	0.2%	202,641	0.2%
Total Special Account	85,094,022	100.0%	94,143,409	100.0%	98,785,179	100.0%
Water Supply Services	16,057,843	44.4%	15,407,118	42.0%	14,482,655	42.2%
Operating Revenue	12,288,068	34.0%	12,340,216	33.6%	12,187,804	35.6%
Capital Revenue	3,769,775	10.4%	3,066,902	8.4%	2,294,851	6.7%
Sewerage Services	20,086,773	55.6%	21,288,252	58.0%	19,798,747	57.8%
Operating Revenue	11,034,122	30.5%	11,309,116	30.8%	11,356,399	33.1%
Capital Revenue	9,052,651	25.0%	9,979,136	27.2%	8,442,348	24.6%
Total Business Account	36,144,617	100.0%	36,695,370	100.0%	34,281,402	100.0%
Expenditure						
National Health Insurance	26,501,569	31.3%	27,951,268	30.2%	29,405,810	30.1%
Care Insurance Special Account	-	-	9,572,636	10.3%	11,909,352	12.2%
Credit for fatherless family/widowed woman	77,663	0.1%	67,650	0.1%	56,219	0.1%
Elderly Insurance	30,667,425	36.2%	29,614,714	32.0%	31,044,594	31.7%
Village Wastewater Project	1,188,051	1.4%	1,041,080	1.1%	886,439	0.9%
Bicycle Racing	19,241,437	22.7%	17,040,369	18.4%	16,930,605	17.3%
Centran Wholesale Market	790,196	0.9%	755,944	0.8%	770,087	0.8%
Slaughterhouse/ Wholesale Market	716,380	0.8%	-	-	-	-
Parking Lot	345,934	0.4%	372,270	0.4%	307,800	0.3%
Urban Development Projects	1,693,235	2.0%	2,512,813	2.7%	2,796,066	2.9%
Land Readjustment Project 3	1,660,276	2.0%	1,508,119	1.6%	1,209,241	1.2%
Land Readjustment Project 1	1,290,371	1.5%	227,551	0.2%	384,774	0.4%
Land Readjustment Project 2	294,879	0.3%	1,370,838	1.5%	1,212,406	1.2%
Scholarship Account	171,853	0.2%	268,396	0.3%	668,820	0.7%
Total Special Account	84,639,269	100.0%	92,490,568	100.0%	97,782,613	100.0%
Water Supply Services	17,964,297	43.7%	17,379,422	44.5%	17,064,305	43.3%
Operating Expense	11,212,067	27.3%	11,046,548	28.3%	11,053,839	28.0%
Capital Expense	6,752,230	16.4%	6,332,874	16.2%	6,010,466	15.2%
Sewerage Services	23,169,400	56.3%	21,662,332	55.5%	22,363,933	56.7%
Operating Expense	10,765,800	26.2%	11,100,945	28.4%	11,177,690	28.3%
Capital Expense	12,403,601	30.2%	10,561,387	27.1%	11,186,243	28.4%
Total Business Account	41,133,698	100.0%	39,041,754	100.0%	39,428,238	100.0%

Balance						
National Health Insurance	99,945	0.4%	873,446	3.0%	398,254	1.3%
Care Insurance Special Account	-	-	613,990	6.0%	29,532	0.2%
Credit for fatherless family/widowed woman	37,398	32.5%	50,906	42.9%	72,758	56.4%
Elderly Insurance	185	0.0%	244	0.0%	1	0.0%
Village Wastewater Project	387	0.0%	453	0.0%	244	0.0%
Bicycle Racing	122,187	0.6%	17,956	0.1%	24,745	0.1%
Centran Wholesale Market	19,373	2.4%	16,387	2.1%	144,907	15.8%
Slaughterhouse/ Wholesale Market	0	0.0%	-	-	-	-
Parking Lot	12,297	3.4%	2,140,544	85.2%	2,488,266	89.0%
Urban Development Projects	1	0.0%	-961,254	-62.0%	-1,506,616	-116.8%
Land Readjustment Project 3	117,964	6.6%	-1,280,316	-562.0%	-824,466	-214.3%
Land Readjustment Project 1	44,559	3.3%	1,175,448	83.8%	932,253	70.8%
Land Readjustment Project 2	213	0.1%	-1,102,126	-410.2%	-522,105	-75.6%
Scholarship Account	245	0.1%	-81,097	-43.3%	-466,179	-230.1%
Total Special Account	454,753	0.5%	1,652,841	1.8%	1,002,566	1.0%
Water Supply Services	-1,906,454	-11.9%	-1,972,304	-12.8%	-2,581,650	-17.8%
Operating Balance	1,076,001	8.8%	1,293,668	10.5%	1,133,965	9.3%
Capital Balance	-2,982,456	-79.1%	-3,265,972	-106.5%	-3,715,615	-161.9%
Sewerage Services	-3,082,627	-15.3%	-374,080	-1.8%	-2,565,186	-13.0%
Operating Balance	268,323	2.4%	208,171	1.8%	178,709	1.6%
Capital Balance	-3,350,950	-37.0%	-582,251	-5.8%	-2,743,895	-32.5%
Total Business Account	-4,989,081	-13.8%	-2,346,384	-6.4%	-5,146,836	-15.0%

Source: Utsunomiya City Office

Organization of a City Office in Japan

Division / Section	Functions and Roles of Section	Units under the Section	Employee 3,743
Secretariat to the City Council			3
General administration	Secretaries to chairman/vice chairman, protocol, assembly house, research, public relations, etc.	General administration unit, research unit	12
Legislature section	General assembly, councilor consultation, party meeting, committees, petition, etc.	Legislature unit, committee unit	7
Integrated Policy Division			6
Policy consultation section	Masterplan, coordination, adjoining vicinity planning, statistics, etc.		18
Local policy section	Promotion of regional development plan, integrated development projects, etc.		10
Transportation policy section	Transportation plan, transportation safety, parking, etc.		13
City center revitalization section	Coordination for revitalization/ activation of downtown		7
Information policy section	Local information, IT, information system, etc.		18
Public relations section	Citizen consultation, opinion survey, press, publications		14
Public Administration Operation Division			6
Public Administration operation section	Decentralization/delegation, public administration reform, ordinance/regulation, draft legislation, public administration procedures, archive, history of city, information disclosure, disaster protection, election, etc.		29
Financial control section	Budget, final account, financial plan, city bond, national transfer (subsidy), etc.		14
Personnel section	Recruit, salary, human resource development, welfare of employee, etc.		49
Secretary section	Secretaries to mayor/deputy mayor, award/punishment, international relations, etc.	*Note: Mayor is elected. Deputy mayor is appointed among from employees of the city office.*	13
Section to promote integration of adjoining municipalities	Coordination of process/system/organization for integration of adjoining towns/villages, planning thereof		8
Revenue and Asset Division			6
Asset management section	Management of city office building, equipment, vehicles, etc.	Management unit, property unit, vehicle unit	46
Contract section	Competitive bidding, award of contract	Contract unit, facility/equipment unit	17
Land acquisition section	Land acquisition, city's land development authority	Administration unit, land units	13
General tax section	Tax collection, consultation with citizens on taxation, procedures on unpaid tax, tax certificates, etc.	Taxation system unit, tax promotion unit, taxation consultation units, collection unit, arrear collection unit	54
Citizen tax section	Taxation of juridical/individual citizen tax, light vehicle tax, etc.	Juridical citizen tax units, individual citizen tax units	53
Property tax section	Taxation of property tax on land, building/house and redeemed asset; certificate on fixed assets, etc.	Certification unit, land unit, building/ house units, redeemed asset unit	61

Citizen Life Division			8
Self-governance promotion section	Citizens' day, assistance to citizen activity, neighborhood body, crime prevention by neighborhood, mutual help for traffic mishap, local community center, consumer life center, examination of weights/measures, consumer protection, consumer consultation, etc.	Local administration unit, citizen activity unit, local/neighborhood promotion unit, consumer life center, weight/measure investigation and certification room, consolidated organization of neighborhood bodies	38
Local/community service section	Local/community services, one-stop service, local citizen center, crematoria, cemetery, etc.	Service promotion unit, control unit, facilities unit, crematoria maintenance unit, local citizen centers, extension/ branch offices, crematoria, cemeteries, parks	147
Citizen section	Address register, family register (birth, death, marriage), resident certificate, seal register, foreign resident register, tentative number plate, burial/cremation permit, permit for use of crematoria and coffin car, etc.	Planning unit, certification unit, family register unit, resident unit, foreign resident unit, extension/branch offices	54
National pension section	National health insurance, insurance tax, high medical expense, national pension, collection of pension insurance, etc.	Control unit, insurance benefit unit, insurance tax unit, premium collection unit, national pension unit	41
Gender equivalence promotion section	Promotion of gender equivalence, family support center, etc.	Promotion unit, project unit, gender equivalence promotion center, family support center, woman/marriage consultation room	10
Youth section	Sound upbringing of youth and the juvenile, upbringing organization, overseas tour, etc.	Sound upbringing unit, youth protection & guidance center, vocational guidance homes	14
Health and Welfare Division			9
General health and welfare section	Consultation on general health and welfare, social welfare organizations and facilities, etc.	Plan & coordination unit, guidance & audit unit, facility development unit, general consultation unit, hygienic laboratory	34
Health section	Care for pregnant/maternity/baby/infants, mother & baby handbook, consultation on mother & baby health, child care class, infant health examination, child care hotline, classes for health care, etc.	Planning unit, mother & baby health unit, adult health unit, health center	58
Care insurance section	General care insurance, care need assessment, collection of care insurance, consultation on care services	Planning unit, care service unit, care need assessment unit, care insurance unit	33
Welfare section	Livelihood protection, local welfare commissioner, juvenile welfare commissioner, veteran pension, organization of the bereaved, etc.	Control unit, protection units	38
Elderly and disabled welfare section	Promotion of caretaking city, consultation with elderly & disabled, home-help, caretaker assistance center, day service, organization of respect for elderly, handbook of disabled, home for elderly, elderly welfare center, facilities for	Planning unit, local livelihood assistance unit, elderly welfare unit, disabled welfare unit, facility unit, medical welfare unit, elderly homes, disabled homes	118
Child welfare section	Nursery, nursing saloon, child welfare facility, child speech consultation room, children's home (orphanage), children with absent parents, etc.	Control unit, child welfare unit, nursery unit, child speech consultation room, nurseries	357
Public health center	Management of health center, statistics, blood donation, approval/guidance/supervision of medical facilities and medicine sales	Medical section (control unit, medical unit)	10
	Approval of environmental hygienic business, disposal of ownerless dog/cat, approval of food hygienic facilities	Public hygiene section (environmental hygiene unit, food hygiene unit)	17
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Environment Division			8
Environmental planning section	Environment masterplan, fundamental ordinance on environment, guidelines for environmental consideration, new energy, environment related studies, ISO on	Plan & coordination unit, promotion unit (ISO on environment), environmental study center	19
Environmental conservation section	Conservation of natural environment, measures for domestic wastewater, sewage treating unit (jokaso), inbuilt land, air pollution, water pollution, noise, etc.	Environmental service unit, research and guidance unit	13
Resource recycling promotion section	Masterplan on solid waste disposal, reduction & recycling of wastes, final disposal site	Planning unit, recycling unit, room for construction of disposal site	20
Waste disposal control unit	Approval of private business for industrial waste disposal	Appraisal unit, research unit	12
Clean center	Plan on solid waste disposal, solid waste management, incineration plant, etc.	Control & coordination unit, collection guidance unit, facility maintenance unit, clean centers, incineration plants	306
Trade and Industry Division			8
Trade and tourism section	Commerce promotion, guidance to shops, municipal parking, tourism promotion, promotion of local specialty	Commercial credit unit, tourism unit	14
Industry section	To invite industries, guidance on location, promotion of manufacturing technology, labor issues, vocational training,	Industry unit, labor policy unit	13
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Agricultural policy section	Agriculture promotion, agriculture census, maintenance of agro-forest park, agricultural structure reform, production control, etc.	Plan & coordination unit, agricultural structure reform unit, paddy field conservation unit	22
Agriculture promotion section	To encourage agriculture successor, agriculture credit, protection against agriculture disaster, technology uplifting, product distribution, forestry promotion, guidance on livestock industry, etc.	Promotion unit, agricultural product unit, forestry unit, livestock unit	17
Land improvement section	Land improvement, wastewater disposal in agricultural villages, improvement of paddy field	Planning unit, area development unit, land improvement unit	15
Construction Division			9
Road construction section	Acquisition of land for road, construction & improvement of municipal road, two-level crossing, railway crossing, bridge, etc.	Planning unit, land acquisition unit, road units	26
City street section	Planning, implementation & land acquisition for construction of street under urban development plan, etc.	Land unit, street unit	12
Road maintenance section	Protection of roads, maintenance & repair of roads, road occupation permit, etc.	Planning unit, road management unit, road registration unit, maintenance unit, narrow road improvement unit, illegal public property investigation unit, maintenance offices	104
River section	Maintenance of rivers, floodplain occupation permit, etc.	Planning unit, river management unit, river land unit, urban river unit, river improvement	28
Construction section	Design, supervision of construction & maintenance of public buildings	Control unit, education facility unit, public facility unit, civil engineering facility unit	25
Equipment section	Design & maintenance of equipment for supply & disposal of water, sanitation, fuel gas and electricity, etc.	Control unit, equipment unit, electricity unit	16
Housing section	City-owned rental housing, special high grade rental houses, etc.	Planning unit, housing control unit, construction work unit	18
Land register investigation section	Land registry map, land register book, etc.	Land register investigation unit	15

Urban Development Division			8
Urban development plan section	Urban development plan, control of development actions, outdoor advertisement, neighborhood plans, etc.	Control unit, planning unit, town view unit, development guidance unit	24
Urban redevelopment section	Planning, guidance, etc. of urban redevelopment projects	Research & planning unit, project guidance unit	8
Construction guidance section	Consultation on construction, permit under construction standard law, etc.	Guidance unit, examination units	25
Park & green area section	Development of park & green area, urban forestation, etc.	Tree planting unit, planning unit, facility unit, consultation room for tree planting, park management office	48
Land readjustment plan section	Planning, research, guidance, etc. on land readjustment projects	Control unit, planning unit, guidance units	22
Eastern land readjustment project section	Land readjustment project 1, land readjustment project 2	Project 1 unit, project 2 unit	21
Western land readjustment project section	Land readjustment project 3, land readjustment project 4	Project 3 unit, project 4 unit	19
East area of main station land readjustment project office	East area of main station land readjustment project, etc.	Construction work unit, compensation unit	13
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Business adminis-tration section	Regulation, documentation, personnel/wage, training, contract, management of buildings, etc.		29
Service center	Application for closure/opening of connection valves, measurement of consumption, tariff, user charge, collection, acceptance & examination of connection works, etc.		54
Distribution control center	Operation & maintenance of water treatment plants, distribution control, water quality control, etc.		72
Waterworks maintenance section	Operation & maintenance of distribution pipes, leakage survey, repair, response to users' voice, etc.		28
Waterworks construction section	Future plan, design & constriction of expansion/ improvement projects		18
Sewerage construction section	Sewerage development plan, design & construction of expansion projects		30
Sewerage facility management section	Operation & maintenance of sewage treatment plants, pumping stations, sewers		93
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Secretariat to Education Committee			8
Education planning section	General coordination of education sector, information disclosure, creation/abolition of school, education census, personnel, procurement contract, scholarship, promotion of kindergarten, private school, school zones, etc.	Education promotion unit, control unit, school zone adjustment unit	13
School education section	Admission/transfer/withdrawal, personnel of teachers, learning guidance, selection of textbooks, health & exercise in school, security education, measures against bullying, etc.	Entrance unit, teacher unit, guidance/ assistance unit, health & exercise unit, pupil guidance unit	20
School administration section	School equipment & utilities, school lunch, management of school facilities, etc.	Control unit, school lunch unit, school facility unit	36
Lifetime learning section	Lifetime learning, citizen's university, coming-of-age celebration, etc.	Control unit, lifetime learning unit, social education unit	21
Culture section	Promotion of art/culture, citizens' art festival, cultural heritage, historical/archaeological sites, etc.	Culture promotion unit, cultural property protection unit	25
Sports promotion section	Promotion of sport activities, management of athletic facilities, etc.	Planning unit, citizen sports unit, Japan Cup unit	23
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Secretariat to election administration committee	Voting promotion, administration of various elections, etc.		
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Secretariat to agriculture committee	Measures to agriculture successor, agricultural land register, farmer pension, certification of agricultural use of land, etc.	Agriculture policy unit, agricultural land adjustment unit	14
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Source: Utsunomiya City Office

Appendix D

Appendix D

TERMS OF REFERENCE
Agra Municipal Reform Project

Background and context

Under the Yamuna Action Plan (YAP) project, sewerage facilities have been created in 15 towns (8 towns in UP including Agra, 6 towns Haryana and Delhi). The responsibility for maintenance of these assets is vested with the respective Urban Local Body in each town. However, these agencies lack the financial, institutional and technical capacity to effectively manage these assets. Japan Bank for International Cooperation (JBIC) conducted a study to identify the institutional and capacity building measures for ULBs in these towns.

During presentation of the results of this study to the Government of Uttar Pradesh (GoUP), a suggestion was given to JBIC to conduct a specific study for *Agra Nagar Nigam* (ANN) by contextualizing the best practices from other ULBs in the country that have successfully implemented and sustained municipal reform measures.

Accordingly, a specific study titled "Collaborative Study on Municipal Reforms in Agra Nagar Nigam" was initiated by JBIC. The objectives of the study were as follows:

1. Facilitate key stakeholders (senior management and municipal councilors to develop a consensus on the nature and direction of reform process within ANN)
2. Develop a detailed action plan for key reform initiatives by contextualizing the best practices in the country
3. Demonstrate the impact of reform through a pilot project that can be potentially replicated to other areas in ANN

The study adopted a highly participative approach in which a reform team headed by the Mayor of Agra was constituted. The team also consisted of the *Nagar Ayukta* (MNA), heads of departments in ANN, General Manager, Agra Jal Sansthan and key councillors from all political parties. As many as seven workshops were held during the course of the study to obtain consensus from the Reform Team at each stage.

Six areas were shortlisted for preparation of detailed action plan for reform. These include:

1. Implementation of Self-Assessment System (SAS) for Property Tax
2. Implementation of Capital Cost method for non-residential properties
3. Private Sector Participation in operation and maintenance of municipal services
4. Public participation in service delivery
5. Strengthening financial management system
6. Implementing complaint redressal system

A pilot project consisting of primary and secondary collection of garbage from an extension colony in Agra was also configured in close involvement with citizens and ANN. Proposals were invited from three parties from which one party was short-listed and the consultants also prepared draft contractual documents.

1. Objectives of the proposed AMR project

In order to implement the core recommendations in each of the reform areas, it is necessary to appropriately configure a specific project titled "Agra Municipal Reform", hereinafter referred to as the AMR Project.
The objectives of the proposed project are as follows:

1. Putting up appropriate systems for effective revenue mobilization from Property Tax

(for both residential and non-residential properties)

2. Developing and implementing pilot projects through private sector participation in improving service delivery in municipal services. These pilot projects would be implemented in four service areas – water supply, SWM, sewerage and street lighting
3. Implementing a large scale public participation programme in Agra
4. Putting up appropriate systems for complaint redressal and financial management

Successful implementation of the reform programme in Agra could become a role model for implementation across other towns in Uttar Pradesh. The scope of the AMR Project has been limited to a 15-18 month time frame. While the action plan for reform presented in the report indicates a phasing plan over the next 3-5 years (especially for private sector participation projects), only the first phase projects (specifically the pilot projects identified in street lighting and solid waste management) have been considered as part the AMR project.

2. Project Components and activities

The specific project components for implementing the AMR project have been identified along the specific areas of reform is listed below:

Component 1 - Property Tax

A. Training of ANN revenue staff on Self-Assessment System and Capital Cost method for non-residential properties:

All the employees of the revenue department, including Tax superintendent, Assistant tax superintendent, Revenue inspector and the Tax collector would be trained on the new Self-Assessment System (SAS) and the Capital Cost Method for assessing non- residential properties.

Note:

(i) Agra Nagar Nigam has started the Self Assessment System (SAS) for the residential properties. Revenue staff has also been trained on the SAS.

(ii) Capital Cost method of assessment of non-residential/commercial properties is already in vogue and the Engineering and Revenue Staff has been trained for this system.

(iii) The consultant's would improve upon this system and provide supervisory and advisory support during the period of the project.

B. Development of PT handbook:

A user-friendly Property Tax handbook is being prepared by ANN and would be available for sale at a nominal price (or distributed to public free of cost). The PT handbook would be used as a potent tool to communicate about the PT rules to the citizens. About 2,00,000 PT handbooks are proposed to be printed for distribution.

Note:

(i) The user-friendly property tax handbook had been prepared and launched in July 2002. The handbook has been made available to the concerned staff for appropriate follow up. The Property Tax handbook is available for sale to the general public at Rs.10/- per copy. The handbook also contains the bank challan, in triplicate, for depositing the assessed tax in their neighbourhood bank/branch at their convenience. So far 110000 Property Tax handbooks have been printed and made available for sale distribution.

(ii) The consultants may give any suggestions for qualitative improvement of the handbooks. The actual printing etc. will be undertaken by Nagar Nigam on their own.

C. Complete physical survey of the city and general assessment:

At present the quality of information regarding the PT assesses is very poor. Under the SAS a complete and accurate assessment list is necessary. Hence, for the successful implementation of the SAS information would need to be sourced, reconciled and corrected from multiple sources. The reconciled information obtained from the entire population of Agra would then have to be entered into

the computerized database. While the Revenue department would undertake the actual reconciliation of data, the process of converting the manual information into computerized format would require external professional support.

Note:

(i) Nagar Nigam has engaged a consultant to undertake the property listing and identification based on GIS Land mapping in April 2001. The firm is preparing digitized based maps after detailed physical surveys and preparing GIS. Revenue clerks have also been trained for computerization of the property records.

(ii) The consultant for the AMR project will need to carry on the work by building on the deliverables and output of the earlier consultants and also work hand in hand during the overlapping period of appointment. It will be with scope of work of AMR project to undertake the contact. Survey on basis of the base maps available with Nagar Nigam. The staff of Nagar Nigam Property tax deptt. will be used during the exercise. The contact survey will focus on collection of not more than 10 attributes based on the format to be prepared in consultation with Agra Nagar Nigam. However, one of the attributes essentially will be plinth area of the properties, which will be calculated on found by a simple method of Length X Breadth (at least 95% accuracy). The data so collected will be linked to the spatial maps available with Nagar Nigam Agra in GIS format. The consultants shall also devise a scientific numbering system for all dwelling units within the area under the Agra Nagar Nigam jurisdiction.

(iii) GoUP has nominated an Additional Mukhya Nagar Adhikari (AMNA) who will be the TEAM LEADER for the whole exercise including the Property Tax Revenue. This will ensure that central coordination is maintained and ensures that PT improvements are being performed objectively. This will ensure proper disciplinary approach to collection and installation of PT system.

D. Development of a software for PT- database design & and application software:

Prior to the start of the software development process the System Requirement Definition would be designed by a software developer in close co-ordination with ANN in order to minimize the glitches in software design. About 10 personal computers would be procured to be used for the data entry in different zones. The computers, however, would physically be located at the Head Office.

Note:

(i) Tenders have been invited on 23-08-2002 for the purchase of 10 new PCs and other accessories as plotter printer LAN, etc. The computer room furnishing in the ANN head office is also in progress.

(ii) ANN will be procuring the GIS software and have the base maps in GIS format for the Area under ANN jurisdiction. The consultants will need to customize that software and develop property tax specific application. Also any further software to be developed should be totally compatible with the GIS software.

E. Finalise bank collection system:

Systems would be put in place to provide for the PT payable under SAS to be collected through banks. Firstly, the banks have to be identified; the registers/records of remittances and procedures have to be established to reconcile the daily balances of remittances through the bank, etc.

Note: *Banks/branches have been empanelled through the city to receive the PT payable under SAS, along with the duly filled up forms of SAS. The reconciliation of daily balances of remittances is also in progress through these banks/branches.*

F. Integration of Revenue function with Agra Jal Sansthan

As part of the initiative of integrating the revenue collection staff of both ANN and AJS, there would be interaction with the senior offices, State Government. This would be done with an aim of taking stock of the staff inventory of both organisations, revising the organisation structure, revising geographic jurisdictions, negotiating the proposal with the labour unions, etc.

Note: *Due instructions are awaited from GoUP for integration of revenue function with AJS.*

G. Planning and implementing the PR campaign:
Planning a massive PR campaign to increase the awareness of the SAS system of determining PT would be done by identifying a suitable PR agency and planning the PR activities. The PR activities planned would then be implemented by using various channels to disseminate information throughout the year. The communication campaign would be interspersed with media events.
Note: *The PR campaign for SAS awareness has been started along with the introduction of SAS system. The detailed planning and implementation of the PR campaign in extension to the efforts started by ANN have to be worked out in consultation with the consultant appointed by JBIC.*

H. Conducting Property Tax camps:
Property tax camps for tax mobilization are expected to be carried out throughout the year. There would be about 25 such camps carried out each quarter. The process of conducting such camps would be institutionalized.
Note:

(i) *The details of property tax camps to be under taken in the various areas of the city have to be worked out by the consultant in consultation with ANN*
(ii) *Public Participation could be more effective if cooperation with Consumer products based private sector companies is sought for sponsoring events.*

I. ANN to prepare specific proposals for seeking clarifications and guidelines, which should be provided by GoUP :
ANN would be supported in preparation of detailed proposals and submitting to Government of Uttar Pradesh for approval in different areas including 'Discounts to be provided to tax assesses for payment within specified dates', 'Collection of water and sewerage charges along with PT', etc.
Note: *Detailed shall be worked out in consultation with the consultant for preparing specific proposals for seeking clarification and guidelines forwarded by GoUP*

The following would be the outputs and benefits that would be realized by implementing the above activities:

- Trained revenue staff who would have clear idea of deliverables and targets;
- A PT management system which is computerized leading to effective monitoring and control which are essential in plugging the revenue leakages
- An updated database of properties and tax assesses
- Greater public awareness and acceptance of the new system

There would also be considerable financial benefit that would accrue by implementing the above project. Implementation of the above project would ensure that the 100% of the properties are under the tax net. Additionally, changeover to the SAS using Unit Area Method is expected to yield about 50 – 100% (on a conservative basis) additional revenues by assessment values and preventing under assessment.

<u>Component 2 - Private sector Participation in service delivery</u>

Implementation of the following projects involving private sector participation:

1. **Primary and secondary collection of garbage**:
   Currently, there is a proposal by an NGO to conduct primary and secondary collection of garbage from the 7500 households of Kamla Nagar that is sustained through user fees. The project would involve a one-time capital investment costs by ANN towards procurement of cycle carts, bins, uniform, tools, etc. Though the user fees will be used to support this programme, there would be an additional cost component towards providing O&M support to the private player for the fifteen month period that will be met by the ANN separately.

   The following are the expected benefits by the implementation of this project:
   - Efficiency and timeliness of services to the residents

- People's active participation in civic management
- O&M costs would be partly borne by the citizens
- The project could serve as a model project, which could be replicated in the other parts of the city.

The Consultant is only expected to provide technical guidance to ensure sustainability is maintained after the 15 months of the project completion.

2. **Transportation of garbage to landfill site:**
ANN will work to develop a private sector contract for the collection of garbage from the dhalao point and transportation to the landfill site would be managed in a selected area through private operator. The project would cover about 10% of the total area of Agra, i.e. about 20sq.km. The project would involve a one-time capital cost towards upgradation of existing vehicles of ANN before handing over to the private operator. As a cost component, it would also entail the cost of O&M support to the private player for three months towards the manpower and fuel expenses.

The following are the expected benefits by the implementation of this project:

- Greater cleanliness and improved hygienic conditions on account of efficient garbage disposal,
- Increased efficiency in the operation of garbage transportation,
- The greater efficiency achieved by the Private sector player could be used as a benchmark improving ANN's own performance,
- The project could serve as a model project, which could be replicated in the other parts of the city.

The Consultant is only expected to provide only technical guidance to ensure sustainability is maintained after the 15 months of the project completion.

3. **Primary collection and composting of biodegradable garbage from hotels:**
Such a project would involve collection of biodegradable garbage from hotels on a daily basis, transportation of garbage to composting site, composting of the garbage. The project is currently operating in a limited area by an NGO at Agra. The objective would be to scale up the current project and make it financially self sustainable through user charges. All large sources of biodegradable wastes would be covered under the scheme under this project. The cost of operations could be partially or fully recovered through user charges from hotels and sale of compost.

The following are the expected benefits by the implementation of this project:

- Reduction in the load on landfill sites,
- Better hygienic conditions near the municipal bins,
- The ongoing project on composting biodegradable wastes could be made financially sustainable through the expansion of operations and the imposition of user charges.

The Consultant is only expected to provide only technical guidance to ensure sustainability is maintained after the 15 months of the project completion.

4. **O&M of street lights:**
The operation and maintenance of all streetlights in a particular locality or geographical area could be given to one private agency. The project being envisaged would have a scope of operating & maintaining about 1000 streetlights or about 8-10% of the total area of the city.

The following are the expected benefits by the implementation of this project:

- Efficient operations that would mean timely replacement of defective bulbs.
- The project could serve as a model project, which could be replicated in the other parts of the city.
- Greater cost savings by involving the private sector participant.

The Consultant is only expected to provide only technical guidance to ensure sustainability is maintained after the 15 months of the project completion.

For all the projects listed out above the following activities need to be carried out:

A. Detailed structuring of each of the projects:
The detailed structuring of the project would involve defining the scope of work clearly, assessing the conditions under which the project would be suitable, arriving at the duration of the project, etc.

B. Managing the project contracting process:
As part of managing the project contracting process the bid documents would be prepared, bids would be invited by floating tenders, the bids would then be evaluated based on the criteria of evaluation developed jointly with ANN and finally the private player would be selected. The final contract document would then be prepared after detailed negotiations with the potential private party.

C. Monitoring the operation of projects:
Once the contract is in place an institutional mechanism for the continuous monitoring of the projects would be put in place.

Component 3 - Public Participation

The scope of this activity would include managing a large public participation programme through the platform of "Agra Safai Abhiyan". The specific activities would include:

A. Facilitating formation of resident associations and citizen committees:
Partnerships would be entered into on a proactive basis with civil communities, NGOs/CBOs etc.

B. Structuring formal mechanisms for interaction between ANN and citizen groups:
The partnerships forged would be formalised through appropriate contracts and institutional mechanisms would be established for continuing and proactive interaction between ANN and the citizen groups.

C. Planning and coordination of activities for Agra Safai Abhiyan:
The activities for the Agra Safai Abhiyan would be planned meticulously and implemented.

D. Coordinating all activities relating to print and electronic media including preparation of short audio-visual films

As part of leveraging public relations as a prime strategic tool for encouraging large-scale community participation, several initiatives would be taken to utilise PR for eliciting public participation in municipal services. As part of the PR initiative the public would constantly kept informed about the activities of ANN through press conferences, media interviews, seminars, etc. Apart from information dissemination the PR exercise would also involve developing short video films on successful initiatives by various community groups to be broadcast on local television channels as well as cinema halls.

The following would be the outputs and benefits that would be realised by implementing the above activities:

- A better civic sense leading to better waste management by citizens
- A platform for involvement of the public in future initiatives
- The formation of at least 5 Resident Welfare Associations in different parts of the city
- The project could serve as a model project, which could be replicated in the other parts of the city
- Reduction in the overall cost of Solid Waste Management due to the successful implementation of the 'Agra Safai Abhiyan' campaign

Component 4 – Complaint Redressal System

A. Integrating ward level offices and head office of ANN:
The integration of the ward-level offices of ANN would be done through Radio Transmitters, which would be procured and provided to each of the zonal engineers.

B. Strengthening infrastructure in field offices of ANN:

Investments would be made to improve the basic infrastructure like telephone, seating space, etc., in the field offices of ANN.

C. Development of detailed manual for complaint redressal:
A manual for complaint redressal would be prepared detailing the roles and responsibilities of the personnel involved along with the procedures to be followed under the complaint redressal system.

D. Training of staff on the complaint redressal process:
The staff involved would be trained on the complaint redressal process on improvement of their softer skills required while dealing with the general public.

E. Monitoring the complaint redressal process:
The institutionalised complaint redressal process would then be monitored on an ongoing basis for a period of 6-8 months to refine and better the system.

The following would be the outputs and benefits that would be realised by implementing the above activities:

- Increased willingness to pay due to an efficient grievance redressal mechanisms coupled with greater public participation and private sector initiatives, which would pave the way for imposing conservancy tax for areas served by ANN
- Closer and effective monitoring of the sanitary field workers because of better feedback mechanisms.
- The project could serve as a model project, which could be replicated in other service lines

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
NATIONAL RIVER CONSERVATION DIRECTORATE (NRCD)
MINISTRY OF ENVIRONMENT AND FORESTS

THE STUDY
ON
WATER QUALITY MANAGEMENT PLAN
FOR
GANGA RIVER
IN
THE REPUBLIC OF INDIA

FINAL REPORT

VOLUME III MASTER PLAN FOR PROJECT CITIES

VOLUME III-10 FINANCIAL AND ECONOMIC EVALUATION

JULY 2005

TOKYO ENGINEERING CONSULTANTS CO., LTD.
CTI ENGINEERING INTERNATIONAL CO., LTD.

FINAL REPORT

ON

WATER QUALITY MANAGEMENT PLAN FOR GANGA RIVER

JULY 2005

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VOLUME V PILOT PROJECT FOR SANITARY IMPROVEMENT OF MANIKARNIKA GHAT

VOLUME III-10

FINANCIAL AND ECONOMIC EVALUATION

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CHAPTER 1 METHODOLOGY OF ECONOMIC AND FINANCIAL EVALUATION

1.1 GENERAL

A project shall be evaluated taking engineering, economic/financial and socio-environmental aspects into consideration. Engineering aspect is studied with respect to the technical feasibility of the project from the viewpoint of construction, operation and maintenance. Environmental aspect is studied in terms of socio-environmental impacts from the viewpoint of water environment, living environment, biodiversity, social environment and so forth.

With regard to economic aspect of the project, economic evaluation is conducted to determine how much the project contributes to the people who live in cities along the river Ganga from economic viewpoints in terms of monetary value by estimating economic return of the project.

Economic evaluation of the project using economic analysis is made based on economic costs and economic benefits. The economic costs are derived from financial costs taking into account the market distortion caused by laws or regulations since some of the financial prices or costs do not reflect the real economic value because of the said distortion.

Economic benefits can be estimated based on tangible and intangible benefits derived from the project in monetary terms. In other words, economic analysis evaluates the degree of economic impacts of the project in monetary term that the Project would bring about in national and/or regional economy.

With regard to financial aspect of the project, financial evaluation is conducted to determine whether the project is financially viable for the enterprise, in this case, "Water Supply and Sewerage Treatment Public Services Provider" (hereinafter referred as "the Public Service Provider"), taking financial costs and benefits into account. Financial costs include actual initial investment cost, operation and maintenance cost and replacement cost. Financial benefits include the actual revenue collected through taxes and/or charges for sewerage services during the operation of the facilities constructed through the project.

1.2 BASIC CONCEPTS AND METHODOLOGY OF ECONOMIC EVALUATION

The project is economically evaluated based on estimated economic benefits and costs in the entire project life in terms of their present values. The following are basic concepts and methodology of economic evaluation.

(1) Type of Economic Benefits

Economic benefits that can be expected from the project in which sewerage service is improved and thus water quality of rivers is improved include (1) monetary amount of willingness of people to pay (WTP) for improved services, (2) saved amount of medical expenditure of people and saved amount of expenditure of subsidized government medical institutions as hospitals, (3) saved amount of salaries/wages of the people by reduced water borne diseases. The latter two benefits are derived as a result of decrease in water borne diseases attributed to improved water environment by the project.

i) Amount of WTP for Improvement of Water Quality of the River Ganga

To estimate the amount of WTP for improvement of water quality of the river Ganga, the results of *A Cost-Benefit Analysis of the Ganga Action Plan*[1] (hereinafter referred to as "GAP Cost-Benefit

[1] "*A Cost-Benefit Analysis of the Ganga Action Plan*" the Ministry of Environment and Forests, the Government of India and the Department for International Development, the Government of the United Kingdom, January 1998.

Report") are applied to this Study. It means that a specified methodology so called as "Contingent Valuation Method (CVM) is to be applied in this kind of project.

ii) Amount of WTP for Improved Sewage Disposal Service

The amount of WTP for improved sewage disposal service can be also estimated based on CVM. The amount of WTP is used for estimating not a basic unit for setting up a tariff system but a basic unit of economic benefit. It indicates that the amount of WTP is the value of improved services attained by the project and estimated by the users and non-users. In other words, there may be a virtual market for the services improved by the project, and people valuate such services with a certain amount of monetary value. This value is called as "the amount of WTP".

iii) Benefit from Saving of Medical Expenditure

Sewerage project contributes to improve the people's living environment. If living environment is improved, the occurrence of some water borne disease may be decreased and thus medical costs can be saved. Both the people's medical expenditure or fees and governmental expenditure on medical institutions that receive government subsidy are decreased. This saving is one of the economic benefits for the people and the nation since this saving can be utilized for other purposes if people save a certain amount of medical expenditure. It can be expected that purchasing power or capability of the people could be increased due to improvement of water environment.

In estimating this benefit, average saved amount per patient and that of public expenditure per patient is estimated by using following data.

(a) suffering rate of water borne disease to the total number of diseases (%),
(b) effect rate of this kind of project to the water borne disease (%),
(c) numbers of outpatients and inpatients suffered by water borne disease and
(d) financial situation of such medical institutions consisting of revenue and expenditure

iv) Benefit from Saving of Salaries/Wages Decrease

If the people suffer from water borne diseases and go to a hospital, they cannot come to their working places and decrease their income. In India, if they can get a certificate from a medical institution such as hospital, their salaries and/or wages are not reduced. However, in this case, offices or such working places should pay salaries and/or wages to their employees without any productive activities by them. Saving of the loss of personal income and that of company income caused by these diseases can be identified as one of the economic benefits if the suffering rate of water borne diseases is decreased due to improvement of water environment.

The saving amount of salaries and/or wages can be estimated using medical data above and average income per capita.

v) Environmental Benefit due to Improvement of Water Quality

If water quality of the river Ganga becomes cleaner than the existing one due to the project, bathing population at the ghats along the river can be expected to come back to the river. The bathing people can be divided into two categories as regular users and occasional users. The regular users are the people who are living in and around the site and near the river. The occasional users are the people who come from the four corners of whole India with religious purposes. The regular users can also be expected to belong to the group in category of (ii) and (iii) above. On the other hand, the occasional users consist of the people who visit river mainly for religious purposes and as sightseeing spots. These people may spend a lot of money in the cities along the river Ganga and this may contribute to the regional economy. This is one of the economic benefits so called as "a Benefit of Contribution to the Local Economy". Under existing condition of water quality of the river Ganga, numbers of the

bathing population in the targeted four cities have been surveyed by JICA Study Team in 2003 and the results is shown in Table 1 in Appendix A and summarized as follows:

Table 1.1 Bathing Population in Targeted Four Cities along the River Ganga

City	Number of Regular Users	Number of Occasional Users
	(Persons/day)	(Persons/day)
Allahabad	18,650	N.A
Kanpur	555	N.A
Lucknow	713	N.A
Varanasi	24,090	306,925

vi) Other Economic Benefits

Furthermore, there may be other intangible economic benefits of the project such as benefits derived from improved bio-diversity and increase of agricultural production because of improved water quality for irrigation. However, it is very difficult to estimate these benefits in monetary terms.

(2) Identification of Economic Costs

Economic costs can be converted from financial costs. To estimate economic costs, financial (actual) costs are modified using Standard Conversion Factor (SCF) for tradable equipment and materials, shadow price for land acquisition cost and/or housing compensation, and for labours for the construction works, cost of transfer items such as personal income tax and corporate income tax, which all distort the real value of services, material, labour, etc.

(3) Economic Evaluation Indices

Economic costs and benefits throughout the project life are converted in present value adopting certain discount rate such as 10 % and B/C and Net Present Value of the project are estimated. The discount rate in which the total present value of economic costs equals that of economic benefits (discounted B/C=1) is called as "economic internal rate of return (EIRR)" and used as an index of project evaluation to judge project economic feasibility and viability. EIRR is to be calculated using a cash flow of economic costs and benefits during the project life. EIRR is defined by the following formula:

$$\sum_{t=1}^{t=T} \frac{C_t}{(1+R_e)^t} = \sum_{t=1}^{t=T} \frac{B_t}{(1+R_e)^t}$$

Where, T = the last year of the project life,
C_t = an annual economic cost flow of the project under study in year t,
B_t = an annual benefit flow derived from the project in year t, and
R_e = the Economic Internal Rate of Return (EIRR) (a discount rate to be used for costs resulted at the same amount of the benefits in terms of the present value).

Net Present Value (NPV) of the project is expressed as "discounted benefits – discounted costs" and defined by following formula:

$$NPV = B - C = \sum_{t=1}^{t=T} \frac{B_t}{(1+R_e)^t} - \sum_{t=1}^{t=T} \frac{C_t}{(1+R_e)^t}$$

It indicates that, if the present value of the benefits subtracted by the present value of the costs is positive, the project is regarded as financially reliable for execution.

B/C Ratio is defined by the following formula:

$$B/C = \sum_{t=1}^{t=T} \frac{B_t}{(1+R_e)^t} \Big/ \sum_{t=1}^{t=T} \frac{C_t}{(1+R_e)^t}$$

This index indicates that, if the ratio of the present value of the benefits dividing by the present value of the costs is more than "1.00", the project is regarded as financially reliable for execution.

In this project, the project life is assumed to be 30 years after the target year of 2030. A cash flow of economic costs and benefits from the first year of the construction works to the end of the project life is prepared for economic evaluation.

In the cash flow, economic cost of annual operation and maintenance (O&M) is included and economic costs of replacement of electric and mechanical (E&M) equipment are included once in 15 years after installation since E&M equipment of the initial works is not durable throughout the project life.

1.3 BASIC CONCEPTS AND METHODOLOGY OF FINANCIAL EVALUATION

The project is financially evaluated by comparing financial benefits and costs for the entire project life in terms of present values. The following are basic concepts and methodology of financial evaluation.

(1) Type of Financial Benefit

Financial benefit indicates the monetary amount of the revenue generated from improved sewerage service by the project and collected by service provider. In the State of Uttar Pradesh, a service provider for sewerage and water supply called as "Jal Sansthan" belonging to Municipal Corporation (called as "Nagar Nigam") is a project implementation organization. Financial evaluation is conducted to assess financial feasibility of the project for a service provider or a project implementation organization.

(2) Type of Financial Costs

Financial costs include costs for construction, taxes, land acquisition, engineering for detailed design and supervision, physical contingency, administration and replacement of equipment in the project life. Price escalation is excluded from the costs in financial evaluation.

(3) Financial Evaluation Indices

Financial costs and benefits throughout the project life are converted in present value adopting certain discount rate such as 10 % and B/C and Net Present Value of the project are estimated. The discount rate in which the total present value of financial costs equals that of financial benefits (discounted B/C=1) is called as "financial internal rate of return (FIRR)" and used as an index of project evaluation to judge project financial feasibility and viability. FIRR is to be calculated using a cash flow of costs and benefits during the project life. FIRR is defined by the following formula:

$$\sum_{t=1}^{t=T} \frac{C_t}{(1+R_f)^t} = \sum_{t=1}^{t=T} \frac{B_t}{(1+R_f)^t}$$

Where, T = the last year of the project life,
C_t = an annual economic cost flow of the project under study in year *t*,
B_t = an annual benefit flow derived from the project in year *t*, and
R_f = the Financial Internal Rate of Return (FIRR) (a discount rate to be used for costs resulted at the same amount of the benefits in terms of the present value).

Net Present Value (NPV) of the project is expressed as "B-C" and defined by the following formula:

$$NPV = B - C = \sum_{t=1}^{t=T} \frac{B_t}{(1+R_f)^t} - \sum_{t=1}^{t=T} \frac{C_t}{(1+R_f)^t}$$

It indicates that, if the present value of the benefits after subtracting the present value of costs is positive, the project is regarded as financially reliable for execution.

The B/C Ratio is defined by the following formula:

$$B/C = \sum_{t=1}^{t=T} \frac{B_t}{(1+R_f)^t} \Big/ \sum_{t=1}^{t=T} \frac{C_t}{(1+R_f)^t}$$

It indicates that, if the ratio of the present value of the benefits divided by the present value of the costs is more than "1.00", the project is regarded as financially reliable for execution.

In this project, the project life is assumed to be 30 years after the target year of 2030. A cash flow of financial costs and benefits from the first year of the construction works to the end of the project life is prepared for financial evaluation.

In the cash flow, annual operation and maintenance (O&M) cost is included and replacement costs of electric and mechanical (E&M) equipment are included once in 15 years after installation since E&M equipment of the initial works is not durable throughout the project life.

CHAPTER 2

LUCKNOW CITY

CHAPTER 2 LUCKNOW CITY

2.1 ECONOMIC EVALUATION

2.1.1 Estimation of Economic Benefit

(1) WTP for Improvement of Water Quality of the River Ganga/Gomti

According to the GAP Cost-Benefit Report, the Willingness-to pay (WTP) for improvement of water quality of the river Ganga was estimated at Rs.167 per household per annum in a 1995/96 price level, and this WTP has been adopted in this project by converting it to a price level of 2003, the base year of cost and benefit estimation of the project, using the Consumer Price Index (CPI) as shown in Table 2 in Appendix A, in which an average CPI-based inflation rate is estimated at 8.69 % per annum. Using this inflation rate, the amount of WTP in 2003 price was calculated at Rs.326 per annum per household. To estimate annual WTP for a city, total population of the city is multiplied by this unit economic benefit.

(2) WTP for Sewage Disposal Service

According to the Survey on Public Awareness made by JICA Study Team in 2003, the amount of WTP for sewage disposal service is estimated at Rs.151 per month per household as shown in Table 3 in Appendix A. The annual amount of this WTP is Rs.1,812 per household. However, this amount is less than the actual expenditure for sewage disposal service (Rs.3,048). This fact is not reasonable. So JICA Study Team regards the actual expenditure as WTP for improved sewerage service in estimating economic benefits.

The amount of the WTP above is the basic unit for estimation of economic benefit. Using this basic unit, the annual economic benefit is calculated by multiplying the number of the households connected with sewer. Projecting the future sewerage service coverage, sewerage coverage population and household are estimated in Table 4 in Appendix A. In the estimation, the following average family sizes estimated based on the results of Public Awareness Survey by JICA Study Team in 2003 are used.

Table 2.1 Average Family Size in Each City

(Unit: persons per household)

Income group	Lucknow	Kanpur	Allahabad	Varanasi
Low	6.18	6.38	6.67	7.64
Medium	5.99	6.03	6.10	7.60
High	6.27	6.80	6.20	6.97
Average	6.15	6.40	6.32	7.40

Source: Public Awareness Survey by JICA Study Team in 2003

Multiplying the basic unit of economic benefit by the number of households connected with sewer in a city, annual economic benefit in the city was estimated.

The benefit will increase according to the increase of the number of sewerage connected households until the year 2030, the target year of the Sewerage Master Plan. After the year 2030, it is assumed that the same amount of economic benefit in the year 2030 occur until the end of the project life, as the capacity of sewage treatment plant is designed to cover the sewerage population in the year 2030.

(3) Saving of Medical Expenditure Due to Decrease of Suffering Rate of Water Borne Diseases

Generally, suffering rate of water borne diseases to the total morbidity rate may be 30 %. However, the

morbidity rate caused by water borne diseases was 38.0 % of the total morbidity rate in Varanasi in 1997 in case of without the sewerage project, and the average ratio of three (3) cities of Patna, Kanpur and Haridwar in case of with the sewerage project[2] was 17.7 %. These cases were applied in the GAP Cost-Benefit Report and these are also applied for this project. The difference of 20.3 % (= 38.0 % - 17.7 %) is a basic factor for estimation of economic benefit based on the saving of medical expenditure.

Regarding medical expenditures, following information/data are available for medical expenditures in "A Benefit Incidence Analysis for India"[3].

Original Information/Data (1995/96):

For Outpatient in the State of Uttar Pradesh:		
Average number of visits to public hospitals:	50.7	visit/1,000 person per annum
Average amount of charges per outpatient:	48.5	Rs. /visit (average of Rs. 43- 54 for all India)
Average amount of public subsidies per outpatient:	103.1	Rs./visit per outpatient
For Inpatient in the State of Uttar Pradesh:		
Average number of hospitalisation:	1,018	times/100,000 persons
Average staying days:	14.6	days/hospitalisation
Average amount of charges per inpatient:	71.7	Rs./day
Average amount of public subsidies per inpatient:	618.3	Rs./day

In the above data, physical data are applied to this project directly. But monetary data are converted to 2003 price level using the CPI (= 8.69% per annum) since monetary data is in 1995/96 price level. The following are converted values.

Converted Information/Data to Present Value:

For Outpatient in the State of Uttar Pradesh:		
Average number of visits to public hospitals:	50.7	visit/1,000 person per annum
Average amount of charges per outpatient:	94.5	Rs. /visit
Average amount of public subsidies per outpatient:	200.7	Rs./visit per outpatient
For Inpatient in the State of Uttar Pradesh:		
Average number of hospitalisation:	1,018	times/100,000 persons
Average staying days:	14.6	days/hospitalisation
Average amount of charges per inpatient:	139.6	Rs./day
Average amount of public subsidies per inpatient:	1,204.2	Rs./day

All the patients should pay some amount of money as transportation cost to visit the hospitals. Usually, they use cycle-rickshaws. This transportation cost borne by the patients was found out as follows through interview survey of some patients and cycle-rickshaw drivers in Varanasi in this study, and is applied for Lucknow assuming to be similar in nature.

[2] M.N. Murty "*A Cost Benefit Analysis of the Ganga Action Plan*" Oxford University Press, 2000.

[3] National Council of Applied Economic Research, ed. "*Who Benefits from Public Health Spending in India*" 2002.

Table 2.2 Transportation Cost per Patient to Visit Hospitals

Name of hospital	Radius from the place of origin to hospitals	Maximum transportation cost (Rs.)	Minimum transportation cost (Rs.)	Average transportation cost (Rs.) per patient
Nagar Mahapalika Hospital	1.5 km	10	5	7.5
Shiv Prasad Gupta Hospital	3.5 km	15	5	10
Ramakrishna Mission Hospital	3.5 km	15	5	10
Child Welfare & Maternity Hospital	1.5 km	10	5	7.5
Ballabhram Saligram Hospital	2.5 km	10	5	7.5
BHU Hospital	2.5 km	10	5	7.5
Overall average				8.33

This transportation cost is added to the medical expenditures as it forms a part of the medical expenditures.

(4) Saving of Salaries/Wages Due to Decrease of Suffering Rate of Water Borne Diseases

If the people living along the river Ganga get some water borne diseases, they should visit to and/or stay in a medical institution such as hospitals or local health centres. Their salaries and/or wages are decreased depending on frequency of visits to the medical institutions or number of days stayed in the hospitals. Of course, when they can get some kind of certification from medical institution and submit it to the working place, their salaries/wages would not be decreased, but in this case, the owners of such working places should pay salaries/wages to their employees without any productive activities. This is a loss of earnings of the company. If the suffering rate of water borne diseases can be decreased, this economic loss could be reduced.

The average income for each city is summarized in the following table and illustrated in Figure 1 to 4 in Appendix A.

Table 2.3 Average Income Level by Income Group and by City

(unit: Rs./month per household)

Income group	Lucknow	Kanpur	Allahabad	Varanasi
Low	3,382	3,047	2,660	3,017
Medium	10,976	7,965	9,174	9,123
High	31,885	16,446	20,902	19,338
Simple average	15,414	9,153	10,912	10,493

Source: Public Awareness Survey by JICA Study Team in 2003

People who may cause this kind of damage/loss are only working members in each household. The average family sizes are already estimated above. The number of the working members per household is 1.50 persons in Lucknow according to the 2001 Census of India. Further, the average amount of per capita income is estimated as Rs.9,689 in Lucknow.

(5) Contribution to Local Economy Derived from Bathing Population

According to information of local officials, if the water quality of the river Ganga becomes cleaner than the present one, Ghat users will be increased to about 10 % for regular users, and 5 % for occasional users. Using this information, the increase of daily bathing population is projected as shown in Table 5 in Appendix A.

i) Regular Users

When people go to bathe at the Ghats along the river Gomti, they usually use cycle rickshaw with

payment of Rs.10 per time. This transportation cost should be doubled for coming and returning. And, they expend money for something to drink and eat like snacks with average amount of Rs.25/day. Based on this, this expenditure is estimated at around Rs.45/day (=Rs.10*2+Rs.25/day).

ii) Occasional Users

The occasional users come from far, so they expend much more transportation cost than the regular users. They usually spend for stay at the places they visit for several days along with expenses on beverages, snacks and food. According to information obtained from local officials, the average expenditure can be estimated at around Rs.150 per day for only staying and for something to drink and eat but the transportation cost cannot be estimated and is not included. So the said expenditure is conservative one. The transportation cost cannot be estimated because it depends on places from where the people come.

(6) Summary of Economic Benefit

The unit economic benefits as follows are summarized in following table.

i) WTP for improvement of water quality of the river Gomti
ii) WTP for sewage disposal services
iii) Saving of the medical expenditure due to decrease of suffering rate of water borne diseases
iv) Saving of salaries/wages due to decrease of suffering rate of water borne diseases
v) Incremental contribution to the regional economy derived from bathing population

Table 2.4 Summary of Unit Economic Benefit

As of 2003 price level

City	WTP for improvement of water quality of the river	WTP for sewage disposal service	Incremental saving of Medical expenditure due to decrease of suffering rate of water borne diseases		Incremental saving of salaries/wages due to decrease of suffering rate of water borne diseases		Contribution to local economy derived from increased bathing population	
			Outpatient	Inpatient	Outpatient	Inpatient	Regular users	Occasional users
	Rs./annum per household						Rs./annum per person	
Lucknow	326	1,820	10	125	4	11	16,425	0
Kanpur	326	1,152	10	130	2	7	16,425	0
Allahabad	326	512	10	128	3	10	16,425	54,750
Varanasi	326	1,080	12	150	3	9	16,425	54,750

The annual benefits are estimated multiplying the unit economic benefit by the entire annual served households in the case 1), the annual connected households in the cases of 2), 3) and 4), and daily incremental bathing population in the case 5).

2.1.2 Estimation of Economic Cost

(1) Cost Estimation Basis

To convert the project costs or financial costs to economic costs, the following factors are considered.

1) Standard Conversion Factor (SCF)

Standard Conversion Factor (SCF) should be taken into account for tradable equipment and materials when the financial cost is converted into the economic cost. The SCF is calculated at 0.88101 as shown in Table 6 in Appendix A with its calculation process.

Income Tax:

Corporate income tax to the contractor: 35 % for the contractors and personal income tax: 10 % for the labour according to the Income Tax Act in India. The corporate income tax is applied for net profit of contractors and personal income tax is applied for total labour cost. In the case of this project, net profit of contractors is assumed as 10 % of the direct construction cost.

2) Shadow Wage Rate of Unskilled Labour

Actually, shadow wage rate of unskilled labour is quite complicated to estimate. But the formula to estimate it can be simplified as following:

$$SWCF = \frac{(GRDP - AO) / (EAP - APSL)}{DRDP / EAP}$$

Where, *SWCF*: shadow wage rate (conversion factor for shadow wage),
GRDP: the Gross Regional Domestic Products,
AO: actual output by permanent skilled labour,
EAP: the Entire Economic Active Population, and
APSL: number of actual permanent skilled labour.

Enough data for estimating SWCF are not available. 0.5 of the shadow wage rate was applied in the GAP Cost-Benefit Report. The same SWCF is applied to this project since this project is similar to the project mentioned in GAP Cost-Benefit Report.

3) Shadow Price of Land

Most of the land to be acquired for constructing facilities in the project is currently under agricultural use. Therefore, agricultural productivity is one of index for estimation of shadow price of land. The formula is as follow:

$$SPRL = \frac{A_g O / CA}{FP_p}$$

Where, *SPRL*: a shadow price rate for land,
A_gO: amount of agricultural products,
CA: harvested or cropped area (ha), and
FP_p: financial price of land to be acquired for the Project.

Following data are available in the GAP Cost-Benefit Report to estimate Shadow Price of Land (SPRL), and using these data, SPRL is estimated at 0.0059. The economic cost of land acquisition can be estimated based on the financial cost for land multiplying this shadow price rate.

Crop area:	26,609	(1,000 ha as of 1999/00 in Uttar Pradesh)
GRDP in agricultural products	627,320	(million Rs. as of 1999/00 in Uttar Pradesh)
Financial price of land to be acquired	4,000	(1,000 Rs/ha) *

* Source: Interview survey to UP Jal Nigam by JICA Study Team

In this case, GRDP of agricultural products is applied instead of the amount of agricultural products (A_gO) above.

Others

- Price escalation should not be included in the costs.
- A discount rate of 10% is to be applied for evaluation.
- Project life up to 2060 is set at 30 years after the target year

(2) Economic Cost

The Project costs and financial and economic cost of sewerage development for Lucknow are estimated in Table 7 in Appendix A in detail and summarized in following table.

Table 2.5 Summary of Sewerage Construction Costs (Lucknow)

(unit: million Rs)

	Cost Item	Total
(1)	Construction Cost	18,881
	Facilities (STP&PS)	4,329
	Pipe works	14,552
(2)	Land Acquisition	634
(3)	Engineering Cost	2,832
(4)	Administration Cost	1,888
(5)	Sub-total (1+2+3+4)	24,235
(6)	Physical Contingency	4,847
(7)	Financial Cost (5+6)	29,082
(8)	Economic Cost	18,903

Yearly cost flow of financial and economic cost estimated is shown as follows:

Table 2.6 Yearly Flow of Construction Costs of the Project (Lucknow)

(Unit: million Rs.)

Cost Item	Total	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Financial Cost	29,082	1,781	2,100	2,498	923	923	564	564	564	3,018	3,407	2,037
Economic Cost	18,903	923	1,472	1,766	588	588	360	360	360	1,934	2,366	1,355

Cost Item	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Financial Cost	1,535	1,535	764	764	764	764	765	764	764	764	764	764
Economic Cost	979	979	487	487	487	487	488	487	487	487	487	487

In addition to construction costs, it is assumed that replacement costs is required every 15 years after the completion of pumping station and sewage treatment plant within project life. The replacement cost flow is estimated in Table 7 in Appendix A.

The yearly operation and maintenance (O&M) cost upto the target year of 2030 is estimated and summarized as follows:

Table 2.7 Yearly Flow of Operation and Maintenance Costs of the Project (Lucknow)

(Unit: million Rs.)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Financial Cost	0	0	0	197	197	197	197	197	366	366	377
Economic Cost	0	0	0	114	114	114	114	114	212	212	218

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Financial Cost	406	406	406	406	406	406	406	406	406	406	406	406
Economic Cost	235	235	235	235	235	235	235	235	235	235	235	235

After the target year of 2030, O&M cost is required. It is assumed that the annual O&M cost after 2030 within project life of 30 years is the same as O&M cost in 2030.

2.1.3 Economic Evaluation

Economic evaluation for the project is made by using a cash flow of costs and benefits as shown in Table 8 in Appendix A considering the conditions and assumptions discussed above. The result of economic evaluation is summarized as follows:

Table 2.8 Results of Economic Evaluation (Lucknow)

Index	Value
NPV	-3,026 million Rs.
EIRR	6.1 %
B/C	0.70

Note; a discount rate of 10 % is applied to estimate NPV and B/C.

The EIRR of the project for Lucknow is estimated at 6.1 %, which is less than 10 %, a general criterion of economic feasibility. The World Bank recommends that, in a case of public works based on basic human needs, EIRR should be at least 5 % in developing countries. The EIRR of this project is higher than 5 % and thus the project is economically feasible considering the nature of this project as basic human needs.

2.2 FINANCIAL EVALUATION

2.2.1 Estimation of Financial Benefits

To estimate financial benefits of project, sewerage tariff system should be newly set considering existing tariff system and an affordability of people to pay (ATP).

(1) Existing Tariff System

There are following 3 types of taxes related to sewerage tariff in India:

i) Real Property Tax for houses and lands,
ii) Water Tax, and
iii) Sewer Tax.

In the State of Uttar Pradesh, the tax rates are:

i) Real Property Tax: 15.0% of an annual rental value of properties (lands),
ii) Water Tax: 12.5% of the annual rental value of properties, and
iii) Sewer Tax: 3.0% of the annual rental value of properties.

The rates differ only little depending upon cities and areas, but in the targeted 4 cities, the same rates are applied.

There is no advanced payment and/or initial payment for connection to sewer, but the people should bear the cost of connection works without any other charge for recovering the cost for sewage treatment plant. They are required to pay water tax or water charge once every 2 months, and sewer tax or charge are required to be paid once or twice a year.

If water supply network and/or public tap is located within 100 m from the house, the household should pay water tax irrespective of their status of connection. The households that are required to pay water tax should also pay sewer tax.

Provided that, the household has been connected with water supply network, both water tax and water charge are calculated and the household should pay the higher one of them. It means that there are two

systems as “water tax” and “water charge”. The households that are required to pay water charge should also pay sewer charge at the rate of 25 % of the amount of the water charge. The water charge system consists of fixed rate portion and specified portion for consumed water volume.

(2) Affordability to Pay and Existing Expenditure for Sewage Disposal Service

The connection rate to existing sewerage services is around 56 % in Lucknow, and the rate of capability of households to pay is only 59 % of the connected ones in 2003 as shown in Table 3 in Appendix A according to the Survey on Public Awareness by JICA Study Team.

The average expenditure for existing sewage disposal service is 1.65 % of the total average household expenditure [= (Rs.254/household per month × 12 months) /(Rs.15,414/household per month × 12 months)] in Lucknow according to the result of the Public Awareness Survey. The average expenditure for existing sewage disposal service is estimated at Rs.3,048/annum per household.

The Pan American Health Organization (PAHO) recommends that the affordability of people to pay for the services of water supply and sewerage is 5 % of the total income per household as a maximum consisting of 3.5 % for water supply and 1.5 % for sewage disposal service. Although the existing expenditure of people in Lucknow for sewage disposal service is a little more than 1.5 %, the PAHO’s criterion, they are paying the amount. Therefore, it can be said that this amount, i.e., Rs.3,048/annum per household for sewage disposal service, is affordable.

2.2.2 Estimation of Financial Cost

The project costs or financial costs have already been estimated in previous section together with economic costs. The detail financial costs estimated are shown in Table 7 in Appendix A. The cost flow of construction cost, O&M cost and replacement cost is also estimated in the previous section and shown in Table 7 in Appendix A.

2.2.3 Financial Evaluation

(1) Basic Evaluation

In this type of the project for development and improvement of public utility or social infrastructure so called as “public works”, it may not be adequate to analyse cost recovering ability by financial benefit (revenue from collection of user charge). The required cost for sewerage service is much more than that for water supply service. Nevertheless, the charge for sewerage service is usually lower than that for water supply. Following illustrations depict a Japanese example of cost recovery of sewerage service.

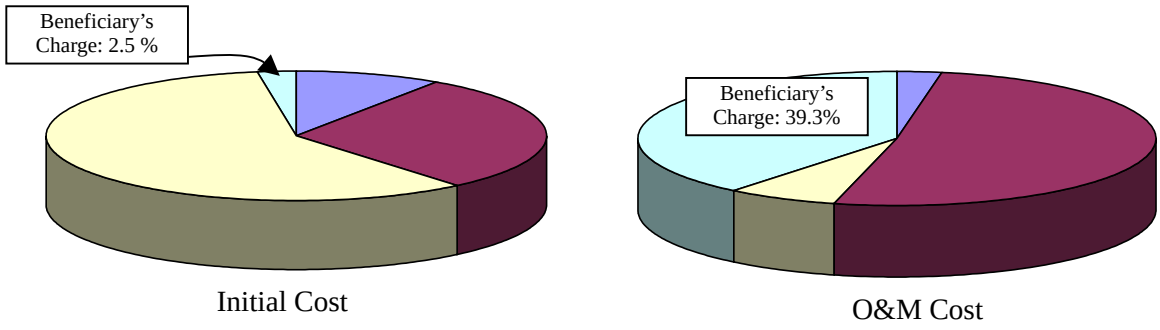


Figure 2.1 Share Rates of Beneficiaries (Users) in Initial Cost and O&M Cost for Sewerage Service in Japanese Case

As shown in the figures above, the beneficiary's initial connection charge (advance payment) can recover only 2.5 % of the total initial cost and user service charge can recover about 40 % of the O&M cost in Japan. A major fraction of the remaining costs are financed by the general account of the central government and/or the local government.

Among the OECD member countries, there is no country that can recover initial cost and O&M cost by the revenue collected from users.

Therefore, financial evaluation is at first made under existing expenditure for sewage disposal service and sewerage tax/charge collection rate. Then, if the project is not feasible under the existing condition, two cases are studied considering construction cost sharing by other means (government general account or grant) and proposed collection rate.

(2) Case of existing expenditure for sewerage service and collection rate

Financial evaluation for the project is made in case of existing expenditure for sewerage service and existing tax/charge collection rate (75 %) by using the cash flow as shown in Table 9 (1) in Appendix A. The results are summarized as follows:

Table 2.9 Results of Financial Evaluation (Lucknow)

Index	Value
NPV (discount rate at 10 %)	-6,907 Rs. million in NPV
FIRR:	Not able to calculate
B/C (discount rate at 10 %)	0.61

Condition: existing household expenditure for sewage disposal and existing tax/charge collection rate (75%)

In this case, FIRR cannot be calculated because the financial costs, especially construction cost, exceeds much more than the financial benefits and no discount rate, at which the cost equals the benefit, is found. Also the NPV of the project is negative (- Rs.6,907 million) and B/C ratio is below 1 (0.61). These indicate that the project is not financially feasible in case if the entire construction cost is recovered from only user charge (sewerage tax/charge) with existing charge collection rate.

(3) Case of construction cost sharing by other means and proposed collection rate

In the evaluation above, it is realized that large amount of construction cost cannot be recovered from user charge only. Then, the following cases are studied considering O&M cost recovery, adequate cost sharing of construction costs by other means such as government general account or grant and proposed collection rate.

i) some portion of the construction cost shall be recovered by user charge
ii) all O&M cost is recovered by user charge
iii) proposed collection rate shall be 95 %
iv) the portion of the construction cost recovered by user charge shall be decided by assuming the project financial return (FIRR) at 10 %
v) user's expenditure for sewage disposal service is 2 % of total household expenditure (Rs. 3,699 per annum per household)

Considering this condition, two cases are studied as show in Table 9 (2) and (3) in Appendix A. Following table summarizes the results:

Table 2.10 Case Study of Financial Evaluation (Lucknow)

Index	Case 1 Condition: • Existing collection rate (75%), • Percentage of household expenditure for sewage service (2%) • To obtain 10% FIRR	Case 2 Condition: • Existing collection rate (95%), • Percentage of household expenditure for sewage service (2%) • to obtain 10% FIRR
Contribution rate of accumulated revenue (user charge) to total construction cost in project life (%)	39%	56%

In the case one that existing collection rate is adopted, 28 % of the construction cost can be recovered by user charge (sewerage tax/charge). If the collection rate is improved to 95 %, 42 % of the construction cost can be recovered by user charge (sewerage tax/charge).

These results indicate that the project may be financially feasible to recover only full cost of O&M and replacement cost. In addition, the financial benefits (revenue from user charge) can recover several tens percentage of the construction or initial investment cost.

CHAPTER 3

KANPUR CITY

CHAPTER 3 KANPUR CITY

3.1 ECONOMIC EVALUATION

3.1.1 Estimation of Economic Benefit

(1) WTP for Improvement of Water Quality of the River Ganga

According to the GAP Cost-Benefit Report, the Willingness-to pay (WTP) for improvement of water quality of the river Ganga was estimated at Rs.167 per household per annum in a 1995/96 price level, and this WTP has been adopted in this project by converting it to a price level of 2003, the base year of cost and benefit estimation of the project, using the Consumer Price Index (CPI) as shown in Table 2 in Appendix A, in which an average CPI-based inflation rate is estimated at 8.69 % per annum. Using this inflation rate, the amount of WTP in 2003 price was calculated at Rs.326 per annum per household. To estimate annual WTP for a city, total population of the city is multiplied by this unit economic benefit.

(2) WTP for Sewage Disposal Service

According to the Survey on Public Awareness made by JICA Study Team in 2003, the amount of WTP for sewage disposal service is estimated at Rs.96 per month per household as shown in Table 3 in Appendix A. The annual amount of this WTP is Rs.1,152 per household.

The amount of the WTP above is the basic unit for estimation of economic benefit. Using this basic unit, the annual economic benefit is calculated by multiplying the number of the households connected with sewer. Projecting the future sewerage service coverage, sewerage coverage population and household are estimated in Table 4 in Appendix A. In the estimation, the following average family sizes estimated based on the results of Public Awareness Survey by JICA Study Team in 2003 are used.

Table 3.1 Average Family Size in Each City

(Unit: persons per household)

Income group	Lucknow	Kanpur	Allahabad	Varanasi
Low	6.18	6.38	6.67	7.64
Medium	5.99	6.03	6.10	7.60
High	6.27	6.80	6.20	6.97
Average	6.15	6.40	6.32	7.40

Source: Public Awareness Survey by JICA Study Team in 2003

Multiplying the basic unit of economic benefit by the number of households connected with sewer in a city, annual economic benefit in the city was estimated.

The benefit will increase according to the increase of the number of sewerage connected households until the year 2030, the target year of the Sewerage Master Plan. After the year 2030, it is assumed that the same amount of economic benefit in the year 2030 occur until the end of the project life, as the capacity of waste water treatment plant is designed to cover the sewerage population in the year 2030.

(3) Saving of Medical Expenditure Due to Decrease of Suffering Rate of Water Borne Diseases

Generally, suffering rate of water borne diseases to the total morbidity rate may be 30 %. However, the morbidity rate caused by water borne diseases was 38.0 % of the total morbidity rate in Varanasi in 1997 in case of without the sewerage project, and the average ratio of three (3) cities of Patna, Kanpur

and Haridwar in case of with the sewerage project[4] was 17.7 %. These cases were applied in the GAP Cost-Benefit Report and these are also applied for this project. The difference of 20.3 % (= 38.0 % - 17.7 %) is a basic factor for estimation of economic benefit based on the saving of medical expenditure.

Regarding medical expenditures, following information/data are available for medical expenditures in "A Benefit Incidence Analysis for India"[5].

Original Information/Data (1995/96):

For Outpatient in the State of Uttar Pradesh:		
Average number of visits to public hospitals:	50.7	visit/1,000 person per annum
Average amount of charges per outpatient:	48.5	Rs. /visit (average of Rs. 43- 54 for all India)
Average amount of public subsidies per outpatient:	103.1	Rs./visit per outpatient
For Inpatient in the State of Uttar Pradesh:		
Average number of hospitalisation:	1,018	times/100,000 persons
Average staying days:	14.6	days/hospitalisation
Average amount of charges per inpatient:	71.7	Rs./day
Average amount of public subsidies per inpatient:	618.3	Rs./day

In the above data, physical data are applied to this project directly. But monetary data are converted to 2003 price level using the CPI (= 8.69% per annum) since monetary data is in 1995/96 price level. The following are converted values.

Converted Information/Data to Present Value:

For Outpatient in the State of Uttar Pradesh:		
Average number of visits to public hospitals:	50.7	visit/1,000 person per annum
Average amount of charges per outpatient:	94.5	Rs. /visit
Average amount of public subsidies per outpatient:	200.7	Rs./visit per outpatient
For Inpatient in the State of Uttar Pradesh:		
Average number of hospitalisation:	1,018	times/100,000 persons
Average staying days:	14.6	days/hospitalisation
Average amount of charges per inpatient:	139.6	Rs./day
Average amount of public subsidies per inpatient:	1,204.2	Rs./day

All the patients should pay some amount of money as transportation fare to visit the hospitals. Usually, they use cycle-rickshaws. This transportation cost borne by the patients was found out through interview survey of some patients and cycle-rickshaw drivers in Varanasi in this study, and is applied for Kanpur assuming to be similar in nature.

[4] M.N.Murty "*A Cost Benefit Analysis of the Ganga Action Plan*" Oxford University Press, 2000.

[5] National Council of Applied Economic Research, ed. "*Who Benefits from Public Health Spending in India*" 2002.

Table 3.2 Transportation Cost per Patient to Visit Hospitals

Name of hospital	Radius from the place of origin to hospitals	Maximum transportation cost (Rs.)	Minimum transportation cost (Rs.)	Average transportation cost (Rs.) per patient
Nagar Mahapalika Hospital	1.5 km	10	5	7.5
Shiv Prasad Gupta Hospital	3.5 km	15	5	10
Ramakrishna Mission Hospital	3.5 km	15	5	10
Child Welfare & Maternity Hospital	1.5 km	10	5	7.5
Ballabhram Saligram Hospital	2.5 km	10	5	7.5
BHU Hospital	2.5 km	10	5	7.5
Overall average				8.33

This transportation cost is added to the medical expenditures as a part of the medical expenditures.

(4) Saving of Salaries/Wages Due to Decrease of Suffering Rate of Water Borne Diseases

If the people living along the river Ganga get some water borne diseases, they should visit to and/or stay in a medical institution such as hospitals or local health centres. Their salaries and/or wages are decreased based on the number of visits to the medical institutions or number of days stayed in the hospitals. Of course, when they can get some kind of certification from medical institution and submit it to the working place, their salaries/wages would not be decreased, but in this case, the owners of such working places should pay salaries/wages to their employees without any productive activities. This is a loss of earnings of the company. If the suffering rate of water borne diseases can be decreased, this economic loss could be reduced.

The average income for each city is summarized in the following table and illustrated in Figure 1 to 4 in Appendix A.

Table 3.3 Average Income Level by Income Group and by City

(unit: Rs./month per household)

Income group	Lucknow	Kanpur	Allahabad	Varanasi
Low	3,382	3,047	2,660	3,017
Medium	10,976	7,965	9,174	9,123
High	31,885	16,446	20,902	19,338
Simple average	15,414	9,153	10,912	10,493

Source: Public Awareness Survey by JICA Study Team in 2003

People who may cause this kind of damage/loss are only working members in each household. The average family sizes are already estimated above. The number of the working members per household is 1.54 person in Kanpur according to the 2001 Census of India. Moreover, the average amount of per capita income is estimated as Rs.5,173 in Kanpur.

(5) Contribution to Local Economy Derived from Bathing Population

According to information of local officials, if the water quality of the river Ganga becomes cleaner than the present one, Ghat users will be increased to about 10 % for regular users, and 5 % for occasional users. Using this information, the increase of daily bathing population is projected as shown in Table 5 in Appendix A.

i) Regular Users

When people go to bathe at the Ghats along the river Ganga, they usually use cycle rickshaw with payment of Rs.10 per time. This transportation cost should be doubled for coming and returning.

And, they expend money for something to drink and eat like snacks with average amount of Rs.25/day. Based on this, this expenditure is estimated at around Rs.45/day (=Rs.10*2+Rs.25/day).

ii) Occasional Users

The occasional users travel from far distances, so they expend much more transportation cost than spent by the regular users. They usually spend for their stay for several days at the places they visit besides the expenses on beverages, snacks and food. According to the information obtained from local officials, the average expenditure can be estimated as about Rs.150 per day for only staying and for beverages and food but the transportation cost cannot be estimated and is not included. So the said expenditure is conservative one. The transportation cost cannot be estimated because it depends on places from where the people come.

(6) Summary of Economic Benefit

The unit economic benefits as follows are summarized in following table.

i) WTP for improvement of water quality of the river Ganga
ii) WTP for sewage disposal service
iii) Saving of the medical expenditure due to decrease of suffering rate of water borne diseases
iv) Saving of salaries/wages due to decrease of suffering rate of water borne diseases
v) Incremental contribution to the regional economy derived from bathing population

Table 3.4 Summary of Unit Economic Benefit

As of 2003 price level

City	WTP for improvement of water quality of the river	WTP for sewage disposal service	Incremental saving of Medical expenditure due to decrease of suffering rate of water borne diseases		Incremental saving of salaries/wages due to decrease of suffering rate of water borne diseases		Contribution to local economy derived from increased bathing population	
			Outpatient	Inpatient	Outpatient	Inpatient	Regular users	Occasional users
	Rs./annum per household				Rs./annum per person			
Lucknow	326	1,820	10	125	4	11	16,425	0
Kanpur	326	1,152	10	130	2	7	16,425	0
Allahabad	326	512	10	128	3	10	16,425	54,750
Varanasi	326	1,080	12	150	3	9	16,425	54,750

The annual benefits are estimated multiplying the unit economic benefit by the entire annual served households in the case 1), the annual connected households in the cases of 2), 3) and 4), and daily incremental bathing population in the case 5).

3.1.2 Estimation of Economic Cost

(1) Cost Estimation Basis

To convert the project costs or financial costs to economic costs, the following factors are considered.

1) Standard Conversion Factor (SCF)

Standard Conversion Factor (SCF) should be taken into account for tradable equipment and materials when the financial cost is converted into the economic cost. The SCF is calculated at 0.88101 as shown in Table 6 in Appendix A with its calculation process.

Income Tax:

Corporate income tax to the contractor: 35 % for the contractors and personal income tax: 10 % for the labour according to the Income Tax Act in India. The corporate income tax is applied for net profit of contractors and personal income tax is applied for total labour cost. In the case of this project, net profit of contractors is assumed as 10 % of the direct construction cost.

2) Shadow Wage Rate of Unskilled Labour

Actually, shadow wage rate of unskilled labour is quite complicated to estimate. But the estimation can be made using the following simplified formula:

$$SWCF = \frac{(GRDP - AO) \big/ (EAP - APSL)}{DRDP \big/ EAP}$$

Where, *SWCF*: shadow wage rate (conversion factor for shadow wage),
GRDP: the Gross Regional Domestic Products,
AO: actual output by permanent skilled labour,
EAP: the Entire Economic Active Population, and
APSL: number of actual permanent skilled labour.

Enough data for estimating SWCF are not available. However, the shadow wage rate of 0.5 was applied in the GAP Cost-Benefit Report. The same SWCF is applied to this project since this project is similar to the project mentioned in GAP Cost-Benefit Report.

3) Shadow Price of Land

Most of the land to be acquired for constructing facilities in the project is currently under agricultural use. Therefore, agricultural productivity is one of index for estimation of shadow price of land. The formula is as follow:

$$SPRL = \frac{A_gO \big/ CA}{FP_p}$$

Where, *SPRL*: a shadow price rate for land,
A_gO: amount of agricultural products,
CA: harvested or cropped area (ha), and
FP_p: financial price of land to be acquired for the Project.

Following data are available in the GAP Cost-Benefit Report to estimate Shadow Price of Land (SPRL), and using these data, SPRL is estimated at 0.0059. The economic cost of land acquisition can be estimated based on the financial cost for land multiplying this shadow price rate.

Crop area:	26,609	(1,000 ha as of 1999/00 in Uttar Pradesh)
GRDP in agricultural products	627,320	(million Rs. as of 1999/00 in Uttar Pradesh)
Financial price of land to be acquired	4,000	(1,000 Rs/ha) *

* source: Interview survey to UP Jal Nigam by JICA Study Team

In this case, GRDP of agricultural products is applied instead of the amount of agricultural products (A_gO) above.

4) Others
- Price escalation should not be included in the costs.
- A discount rate of 10% is to be applied for evaluation.
- Project life up to 2060 is set at 30 years after the target year

(2) Economic Cost

The Project costs and financial and economic cost of sewerage development for Kanpur are estimated in Table 10 in Appendix A in detail and summarized in following table.

Table 3.5 Summary of Sewerage Construction Costs (Kanpur)

(unit: million Rs)

	Cost Item	Total
(1)	Construction Cost	14,667
	Facilities (STP&PS)	2,736
	Pipe works	11,931
(2)	Land Acquisition	707
(3)	Engineering Cost	2,200
(4)	Administration Cost	1,467
(5)	Sub-total (1+2+3+4)	19,041
(6)	Physical Contingency	3,808
(7)	Financial Cost (5+6)	22,849
(8)	Economic Cost	14,619

Yearly cost flow of financial and economic cost estimated is shown as follows:

Table 3.6 Yearly Flow of Construction Costs of the Project (Kanpur)

(Unit: million Rs.)

Cost Item	Total	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Financial Cost	22,849	1,672	1,413	1,506	435	435	209	209	209	2,839	1,970	2,196
Economic Cost	14,619	774	1,007	1,076	278	278	133	133	133	1,843	1,286	1,443

Cost Item	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Financial Cost	1,706	1,707	624	624	663	624	690	624	624	624	624	624
Economic Cost	1,088	1,089	398	398	427	398	447	398	398	398	398	398

In addition to construction costs, it is assumed that replacement costs is required every 15 years after the completion of pumping station and sewage treatment plant within project life. The replacement cost flow is estimated in Table 10 in Appendix A.

The yearly operation and maintenance (O&M) cost upto the target year of 2030 is estimated and summarized as follows:

Table 3.7 Yearly Flow of Operation and Maintenance Costs of the Project (Kanpur)

(Unit: million Rs.)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Financial Cost	0	0	0	227	227	227	227	227	387	387	387
Economic Cost	0	0	0	132	132	132	132	132	224	224	224

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Financial Cost	408	408	408	408	408	408	408	408	408	408	408	408
Economic Cost	236	236	236	236	236	236	236	236	236	236	236	236

After the target year of 2030, O&M cost is required. It is assumed that the annual O&M cost after

2030 within project life of 30 years is the same as O&M cost in 2030.

3.1.3 Economic Evaluation

Economic evaluation for the project is made by using a cash flow of costs and benefits as shown in Table 11 in Appendix A considering the conditions and assumptions discussed above. The result of economic evaluation is summarized as follows:

Table 3.8 Results of Economic Evaluation (Kanpur)

Index	Value
NPV	-2,994 million Rs.
EIRR	Not able to calculated (Negative)
B/C	0.61

Note; a discount rate of 10 % is applied to estimate NPV and B/C.

The EIRR of the project for Kanpur is not possible to calculate as the cost-benefit cash flow cannot return any positive discount rate. Therefore, the project may not be economically feasible.

In the Master Plan, the implementation of public participation and awareness (PP/PA) activities for the project is planned. Through these activities, the enhancement of the WTP for improvement of river water quality and sewerage service is expected. If PP/PA activities enhance the existing WTP by following percentage the project would be economically feasible for Kanpur.

Percentage of Existing WTP to be Enhanced to Ensure Economic Feasibility

Index	Value
EIRR 5 %	9 %
EIRR 10 %	70 %

The World Bank recommends that the EIRR should be at least 5 % even for this kind of projects to establish public utilities of basic human needs.

To obtain at least 5 % of EIRR, the WTP for improvement of river water quality and sewerage service is required to be enhanced by about 10 percent for the Kanpur project through PP/PA activities.

3.2 FINANCIAL EVALUATION

3.2.1 Estimation of Financial Benefits

To estimate financial benefits of project, sewerage tariff system should be newly set considering existing tariff system and an affordability of people to pay (ATP).

(1) Existing Tariff System

There are following 3 types of taxes related to sewerage tariff in India:

i) Real Property Tax for houses and lands,
ii) Water Tax, and
iii) Sewer Tax.

In the State of Uttar Pradesh, the tax rates are:

i) Real Property Tax: 15.0% of an annual rental value of properties (lands),
ii) Water Tax: 12.5% of the annual rental value of properties, and

iii) Sewer Tax: 3.0% of the annual rental value of properties.

The rates differ only little depending upon cities and areas, but in the targeted 4 cities, the same rates are applied.

There is no advanced payment and/or initial payment for connection to sewer, but the people should bear the cost for connection works without any other charge for recovering the cost for sewage treatment plant. They should pay water tax or water charge once every 2 months, and sewer tax or charge are normally required to be paid once or twice a year.

If water supply network and/or public tap is located within 100 m from the house, the household should pay water tax despite the condition that they are connected or not. The households that are required to pay water tax should also pay sewer tax.

If the household has a connection with water supply network, both water tax and water charge are calculated and household should pay the higher one. It means that there are two systems as "water tax" and "water charge". The household who should pay water charge should pay sewer charge too with a rate of 25 % of the amount of the water charge. The water charge system consists of fixed rate portion and specified portion for consumed water volume.

(2) Affordability to Pay and Existing Expenditure for Sewage Disposal Service

The connection rate to existing sewage services is around 48 % in Kanpur, and the rate of capability of households to pay is only 64 % of those which are connected in 2003 as shown in Table 3 in Appendix A according to the Survey on Public Awareness by JICA Study Team.

The average expenditure for existing sewage disposal service is 2.0 % of the total average household expenditure [= (Rs.184/household per month × 12 months) /(Rs.9,153/household per month × 12 months)] in Kanpur according to the result of the Public Awareness Survey. The average expenditure for existing sewage service is estimated at Rs.2,208/annum per household.

The Pan American Health Organization (PAHO) recommends that the affordability of people to pay for the services of water supply and sewerage is 5 % of the total income per household as a maximum consisting of 3.5 % for water supply and 1.5 % for sewage disposal service. Although the existing average expenditure of resident in Kanpur for sewage disposal service is more than 1.5 % of total expenditure, the PAHO's criterion, they are paying it. Therefore, it can be said that this amount, i.e., Rs.2,208/annum per household for sewage disposal service, is affordable.

3.2.2 Estimation of Financial Cost

The project costs or financial costs have already been estimated in previous section together with economic costs. The detail financial costs estimated are shown in Table 10 in Appendix A. The cost flow of construction cost, O&M cost and replacement cost is also estimated in the previous section and shown in Table 10 in Appendix A.

3.2.3 Financial Evaluation

(1) Basic Evaluation

In this type of the project for development and improvement of public utility or social infrastructure so called as "public works", it may not be adequate to analyse cost recovering ability by financial benefit (revenue from collection of user charge). The required cost for sewerage service is much more than that for water supply service. Nevertheless, the charge for sewerage service is usually lower than that for water supply. Following illustrations present a Japanese example of cost recovery in the case of

sewerage service.

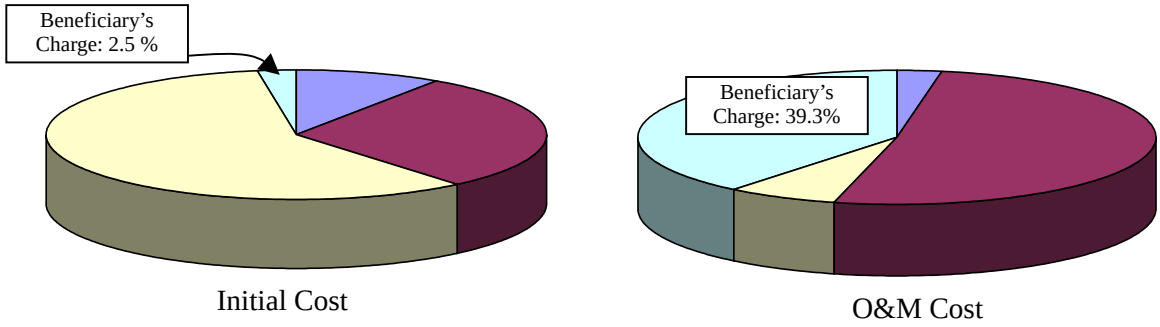


Figure 3.1 Share Rates of Beneficiaries (Users) in Initial Cost and O&M Cost for Sewerage Service in Japanese Case

As shown in the figures above, the beneficiary's initial connection charge (advance payment) can recover only 2.5 % of the total initial cost and user service charge can recover about 40 % of the O&M cost in Japan. The remaining costs are financed by the general account of the central government and/or the local government.

Among the OECD member countries, there is no country that can recover initial cost and O&M cost by the revenue collected from users.

Therefore, financial evaluation is at first made under existing expenditure for sewerage service and sewerage tax/charge collection rate. Then, if the project is not feasible under the existing condition, two cases are studied considering ability to pay (ATP) for sewage service, construction cost sharing by other means (government general account or grant) and proposed collection rate.

(2) Case of existing expenditure for sewage service and collection rate

Financial evaluation for the project is made in case of existing expenditure for sewerage service and existing tax/charge collection rate (75 %) by using the cash flow as shown in Table 12 (1) in Appendix A. The results are summarized as follows:

Table 3.9 Results of Financial Evaluation (Kanpur)

Index	Value
NPV (discount rate at 10 %)	-5,876 Rs. million in NPV
FIRR:	Not able to calculate
B/C (discount rate at 10 %)	0.65

Condition: existing household expenditure for sewage disposal and existing tax/charge collection rate (75%)

In this case, FIRR cannot be calculated because the financial costs, especially construction cost, exceeds much more than the financial benefits and no discount rate, at which the cost equals the benefit, is found. Also the NPV of the project is negative (- Rs. 5,876 million) and B/C ratio is below 1 (0.65). These indicate that the project is not financially feasible in case if the entire construction cost is recovered from user charge (sewerage tax/charge) only with existing charge collection rate.

(3) Case of construction cost sharing and proposed collection rate

In the evaluation above, it is realized that large amount of construction cost cannot be recovered from user charge only. Then, the following cases are studied considering O&M cost recovery, adequate cost

sharing of construction costs and proposed collection rate.

i) some portion of the construction cost shall be recovered by user charge
ii) all O&M cost is recovered by user charge
iii) proposed collection rate shall be 95 %
iv) the portion of the construction cost recovered by user charge shall be decided by assuming the project financial return (FIRR) at 10 %
v) user's expenditure for sewage disposal service is 2 % of total household expenditure (Rs. 2,197 per annum per household)

Considering this condition, two cases are studied as show in Table 12 (2) and (3) in Appendix A. Following table summarizes the results:

Table 3.10 Case Study of Financial Evaluation (Kanpur)

Index	Case 1 Condition: • Existing collection rate (75%), • Percentage of household expenditure for sewage service (2%) • to obtain 10% FIRR	Case 2 Condition: • Existing collection rate (95%), • Percentage of household expenditure for sewage service (2%) • to obtain 10% FIRR
Percentage of construction cost that can be recovered by user charge (%)	10%	20%

In the case one that existing collection rate is adopted, 18 % of the construction cost can be recovered by user charge (sewerage tax/charge). If the collection rate is improved to 95 %, 30 % of the construction cost can be recovered by user charge (sewerage tax/charge).

These results indicate that the project may be financially feasible to recover only full cost of O&M and replacement cost. In addition, the financial benefits (revenue from user charge) can recover several tens percentage of the construction or initial investment cost.

CHAPTER 4

ALLAHABAD CITY

CHAPTER 4 ALLAHABAD CITY

4.1 ECONOMIC EVALUATION

4.1.1 Estimation of Economic Benefit

(1) WTP for Improvement of Water Quality of the River Ganga

According to the GAP Cost-Benefit Report, the Willingness-to pay (WTP) for improvement of water quality of the river Ganga was estimated at Rs.167 per household per annum in a 1995/96 price level, and this WTP has been adopted in this project by converting it to a price level of 2003, the base year of cost and benefit estimation of the project, using the Consumer Price Index (CPI) as shown in Table 2 in Appendix A, in which an average CPI-based inflation rate is estimated at 8.69 % per annum. Using this inflation rate, the amount of WTP in 2003 price was calculated at Rs.326 per annum per household. To estimate annual WTP for a city, total population of the city is multiplied by this unit economic benefit.

(2) WTP for Sewage Disposal Service

According to the Survey on Public Awareness made by JICA Study Team in 2003, the amount of WTP for sewage disposal service is estimated at Rs.42 per month per household as shown in Table 3 in Appendix A. The annual amount of this WTP is Rs.504 per household. However, this amount is less than the actual expenditure for sewage disposal service (Rs. 1,380). This fact is not reasonable. So JICA Study Team regards the actual expenditure as WTP for improved sewerage service in estimating economic benefits.

The amount of the WTP above is the basic unit for estimation of economic benefit. Using this basic unit, the annual economic benefit is calculated by multiplying the number of the households connected with sewer. Projecting the future sewerage service coverage, sewerage coverage population and household are estimated in Table 4 in Appendix A. In the estimation, the following average family sizes estimated based on the results of Public Awareness Survey by JICA Study Team in 2003 are used.

Table 4.1 Average Family Size in Each City

(Unit: persons per household)

Income group	Lucknow	Kanpur	Allahabad	Varanasi
Low	6.18	6.38	6.67	7.64
Medium	5.99	6.03	6.10	7.60
High	6.27	6.80	6.20	6.97
Average	6.15	6.40	6.32	7.40

Source: Public Awareness Survey by JICA Study Team in 2003

Multiplying the basic unit of economic benefit by the number of households connected with sewer in a city, annual economic benefit in the city was estimated.

The benefit will increase according to the increase of the number of sewerage connected households until the year 2030, the target year of the Sewerage Master Plan. After the year 2030, it is assumed that the same amount of economic benefit in the year 2030 occur until the end of the project life, as the capacity of waste water treatment plant is designed to cover the sewerage population in the year 2030.

(3) Saving of Medical Expenditure Due to Decrease of Suffering Rate of Water Borne Diseases

Generally, suffering rate of water borne diseases to the total morbidity rate may be 30 %. However, the morbidity rate caused by water borne diseases was 38.0 % of the total morbidity rate in Varanasi in

1997 in case of without the sewerage project, and the average ratio of three (3) cities of Patna, Kanpur and Haridwar in case of with the sewerage project[6] was 17.7 %. These cases were applied in the GAP Cost-Benefit Report and these are also applied for this project. The difference of 20.3 % (= 38.0 % - 17.7 %) is a basic factor for estimation of economic benefit based on the saving of medical expenditure.

Regarding medical expenditures, following information/data are available for medical expenditures in "A Benefit Incidence Analysis for India"[7].

Original Information/Data (1995/96):

For Outpatient in the State of Uttar Pradesh:		
Average number of visits to public hospitals:	50.7	visit/1,000 person per annum
Average amount of charges per outpatient:	48.5	Rs. /visit (average of Rs. 43- 54 for all India)
Average amount of public subsidies per outpatient:	103.1	Rs./visit per outpatient
For Inpatient in the State of Uttar Pradesh:		
Average number of hospitalisation:	1,018	times/100,000 persons
Average staying days:	14.6	days/hospitalisation
Average amount of charges per inpatient:	71.7	Rs./day
Average amount of public subsidies per inpatient:	618.3	Rs./day

In the above data, physical data are applied to this project directly. But monetary data are converted to 2003 price level using the CPI (= 8.69% per annum) since monetary data is in 1995/96 price level. The following are converted values.

Converted Information/Data to Present Value:

For Outpatient in the State of Uttar Pradesh:		
Average number of visits to public hospitals:	50.7	visit/1,000 person per annum
Average amount of charges per outpatient:	94.5	Rs. /visit
Average amount of public subsidies per outpatient:	200.7	Rs./visit per outpatient
For Inpatient in the State of Uttar Pradesh:		
Average number of hospitalisation:	1,018	times/100,000 persons
Average staying days:	14.6	days/hospitalisation
Average amount of charges per inpatient:	139.6	Rs./day
Average amount of public subsidies per inpatient:	1,204.2	Rs./day

All the patients should pay some amount of money for transportation when they visit to the hospitals. Usually, they use cycle-rickshaws. This transportation cost borne by the patients was estimated as follows through interview survey of some patients and cycle-rickshaw drivers in Varanasi in this study, and is applied for Allahabad assuming to be similar in trend:

[6] M.N.Murty "*A Cost Benefit Analysis of the Ganga Action Plan*" Oxford University Press, 2000.

[7] National Council of Applied Economic Research, ed. "*Who Benefits from Public Health Spending in India*" 2002.

Table 4.2 Transportation Cost per Patient to Visit Hospitals

Name of hospital	Radius from the place of origin to hospitals	Maximum transportation cost (Rs.)	Minimum transportation cost (Rs.)	Average transportation cost (Rs.) per patient
Nagar Mahapalika Hospital	1.5 km	10	5	7.5
Shiv Prasad Gupta Hospital	3.5 km	15	5	10
Ramakrishna Mission Hospital	3.5 km	15	5	10
Child Welfare & Maternity Hospital	1.5 km	10	5	7.5
Ballabhram Saligram Hospital	2.5 km	10	5	7.5
BHU Hospital	2.5 km	10	5	7.5
Overall average				8.33

This transportation cost is added to the medical expenditures being a part of the medical expenditures.

(4) Saving of Salaries/Wages Due to Decrease of Suffering Rate of Water Borne Diseases

If the people living along the river Ganga get some water borne diseases, they should visit to and/or stay in a medical institution such as hospitals or local health centres. Their salaries and/or wages are decreased according to number of visits to the medical institutions or number of days stayed in the hospitals. Of course, when they can get some kind of certification from medical institution and submit it to the working place, their salaries/wages would not be decreased, but in this case, the owners of such working places should pay salaries/wages to their employees without any productive activities. This is a loss of earnings of the company. If the suffering rate of water borne diseases can be decreased, this economic loss could be reduced.

The average income for each city is summarized in the following table and illustrated in Figure 1 to 4 in Appendix A.

Table 4.3 Average Income Level by Income Group and by City

(unit: Rs./month per household)

Income group	Lucknow	Kanpur	Allahabad	Varanasi
Low	3,382	3,047	2,660	3,017
Medium	10,976	7,965	9,174	9,123
High	31,885	16,446	20,902	19,338
Simple average	15,414	9,153	10,912	10,493

Source: Public Awareness Survey by JICA Study Team in 2003

People who may cause this kind of damage/loss are only working members in each household. The average family sizes are already estimated above. The number of the working members per household is 1.78 persons in Allahabad according to the 2001 Census of India. The average amount of per capita income is estimated as Rs.6,215 in Allahabad.

(5) Contribution to Local Economy Derived from Bathing Population

According to information from local officials, if the water quality of the river Ganga becomes cleaner than the present one, Ghat users will be increased to about 10 % for regular users, and 5 % for occasional users. Using this information, the increase of daily bathing population is projected as shown in Table 5 in Appendix A.

i) Regular Users

When people go to bathe at the Ghats along the river Ganga or Yamuna, they usually use cycle rickshaw with payment of Rs.10 per time. This transportation cost should be doubled for coming and

returning. And, they expend money for something to drink and eat like snacks with average amount of Rs.25/day. Based on this, this expenditure is estimated at around Rs.45/day (=Rs.10*2+Rs.25/day).

ii) Occasional Users

The occasional users come from far, so they expend much more transportation cost than that of the regular users. They usually spend for stay at the places they visit for several days in addition to their expenses on beverages, snacks and food. According to information of the local officials, the average expenditure can be estimated at around Rs.150 per day for only staying and for something to drink and eat but the transportation cost cannot be estimated and is not included. So the said expenditure is conservative one. The transportation cost cannot be estimated because it depends on places where the people come.

Among the Ghats in Allahabad, the Sangam Nose Ghat, the Sangam (Triveni) Ghat and several other Ghats are the most important Ghats for Hindu Festivals called as "**Kumbh Mela**" held once every 12 years, "**Ardhkumbh Mela**" held in the mid of two (2) **Kumbh Melas**, and "**Magh Mela**" held once every year for a duration of about one (1) month each.

In these Hindu fairs, the number of occasional visitors for bathing is several times of that in Varanasi. The gathering peak in Magh Mela during one month is as follows:

(a) 1^{st} peak: the day of full moon of 10^{th} month of Hindu Calendar (lunar calendar) starting from March,
(b) 2^{nd} peak: 14^{th} day of January of solar calendar,
(c) 3^{rd} peak: the day of new moon of the 10^{th} month of Hindu calendar,
(d) 4^{th} peak: 5^{th} day after the new moon day above, and
(e) 5^{th} peak: the day of full moon of 11^{th} month of Hindu calendar.

Several hundred thousands people usually visit here in each peak of the Magh Mela according to information from local intellectuals (around 500,000 people per day or more come according to the interview survey). In "**Kumbh Mela**" and "**Ardhkumbh Mela**", around 1 million people per day are usually coming to have holy dip for religious purposes. Based on this information, bathing population per day in Allahabad is estimated.

(6) Summary of Economic Benefit

The unit economic benefits as follows are summarized in following table.

1) WTP for improvement of water quality of the river Ganga
2) WTP for sewage disposal service
3) Saving of the medical expenditure due to decrease of suffering rate of water borne diseases
4) Saving of salaries/wages due to decrease of suffering rate of water borne diseases
5) Incremental contribution to the regional economy derived from bathing population

Table 4.4 Summary of Unit Economic Benefit

As of 2003 price level

City	WTP for improvement of water quality of the river	WTP for sewage disposal service	Incremental saving of Medical expenditure due to decrease of suffering rate of water borne diseases		Incremental saving of salaries/wages due to decrease of suffering rate of water borne diseases		Contribution to local economy derived from increased bathing population	
			Outpatient	Inpatient	Outpatient	Inpatient	Regular users	Occasional users
	Rs./annum per household						Rs./annum per person	
Lucknow	326	1,820	10	125	4	11	16,425	0
Kanpur	326	1,152	10	130	2	7	16,425	0
Allahabad	326	512	10	128	3	10	16,425	54,750
Varanasi	326	1,080	12	150	3	9	16,425	54,750

The annual benefits are estimated multiplying the unit economic benefit by the entire annual served households in the case 1), the annual connected households in the cases of 2), 3) and 4), and daily incremental bathing population in the case 5).

4.1.2 Estimation of Economic Cost

(1) Cost Estimation Basis

To convert the project costs or financial costs to economic costs, the following factors are considered.

1) Standard Conversion Factor (SCF)

Standard Conversion Factor (SCF) should be taken into account for tradable equipment and materials when the financial cost is converted into the economic cost. The SCF is calculated at 0.88101 as shown in Table 6 in Appendix A with its calculation process.

2) Income Tax

Corporate income tax to the contractor: 35 % for the contractors and personal income tax: 10 % for the labour according to the Income Tax Act in India. The corporate income tax is applied for net profit of contractors and personal income tax is applied for total labour cost. In the case of this project, net profit of contractors is assumed as 10 % of the direct construction cost.

3) Shadow Wage Rate of Unskilled Labour

Actually, shadow wage rate of unskilled labour is quite complicated to estimate. But the formula has been simplified in order to estimate it and is given as follows:

$$SWCF = \frac{(GRDP - AO) \big/ (EAP - APSL)}{DRDP \big/ EAP}$$

Where, *SWCF*: shadow wage rate (conversion factor for shadow wage),
GRDP: the Gross Regional Domestic Products,
AO: actual output by permanent skilled labour,
EAP: the Entire Economic Active Population, and
APSL: number of actual permanent skilled labour.

Enough data for estimating SWCF are not available. However, the shadow wage rate of 0.5 was

applied in the GAP Cost-Benefit Report. The same SWCF is applied to this project since this project is similar to the project mentioned in GAP Cost-Benefit Report.

4) Shadow Price of Land

Most of the land to be acquired for constructing facilities in the project is currently under agricultural use. Therefore, agricultural productivity is one of index for estimation of shadow price of land. The formula is as follow:

$$SPRL = \frac{A_gO \,/\, CA}{FP_p}$$

Where, $SPRL$: a shadow price rate for land,
A_gO: amount of agricultural products,
CA: harvested or cropped area (ha), and
FP_p: financial price of land to be acquired for the Project.

Following data are available in the GAP Cost-Benefit Report to estimate Shadow Price of Land (SPRL), and using these data, SPRL is estimated at 0.0059. The economic cost of land acquisition can be estimated based on the financial cost for land multiplying this shadow price rate.

Crop area:	26,609	(1,000 ha as of 1999/00 in Uttar Pradesh)
GRDP in agricultural products	627,320	(million Rs. as of 1999/00 in Uttar Pradesh)
Financial price of land to be acquired	4,000	(1,000 Rs/ha) *

* source: Interview survey to UP Jal Nigam by JICA Study Team

In this case, GRDP of agricultural products is applied instead of the amount of agricultural products (A_gO) above.

5) Others

- Price escalation should not be included in the costs.
- A discount rate of 10% is to be applied for evaluation.
- Project life up to 2060 is set at 30 years after the target year

(2) Economic Cost

The Project costs and financial and economic cost of sewerage development for Allahabad are estimated in Table 13 in Appendix A in detail and summarized in following table.

Table 4.5 Summary of Sewerage Construction Costs (Allahabad)

(unit: million Rs)

	Cost Item	Total
(1)	Construction Cost	5,657
	Facilities (STP&PS)	1,681
	Pipe works	3,976
(2)	Land Acquisition	620
(3)	Engineering Cost	849
(4)	Administration Cost	566
(5)	Sub-total (1+2+3+4)	7,691
(6)	Physical Contingency	1,538
(7)	Financial Cost (5+6)	9,230
(8)	Economic Cost	5,806

Yearly cost flow of financial and economic cost estimated is shown as follows:

Table 4.6 Yearly Flow of Construction Costs of the Project (Allahabad)

(Unit: million Rs.)

Cost Item	Total	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Financial Cost	9,230	1,088	1,335	1,209	224	224	50	50	50	773	683	569
Economic Cost	5,806	606	954	678	143	143	32	32	32	443	456	372

Cost Item	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Financial Cost	431	432	194	194	365	194	195	195	195	195	195	195
Economic Cost	275	276	123	123	251	123	124	124	124	124	124	124

In addition to construction costs, it is assumed that replacement costs is required every 15 years after the completion of pumping station and sewage treatment plant within project life. The replacement cost flow is estimated in Table 13 in Appendix A.

The yearly operation and maintenance (O&M) cost upto the target year of 2030 is estimated and summarized as follows:

Table 4.7 Yearly Flow of Operation and Maintenance Costs of the Project (Allahabad)

(Unit: million Rs.)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Financial Cost	0	0	0	227	227	227	227	227	387	387	387
Economic Cost	0	0	0	132	132	132	132	132	224	224	224

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Financial Cost	408	408	408	408	408	408	408	408	408	408	408	408
Economic Cost	236	236	236	236	236	236	236	236	236	236	236	236

After the target year of 2030, O&M cost is required. It is assumed that the annual O&M cost after 2030 within project life of 30 years is the same as O&M cost in 2030.

4.1.3 Economic Evaluation

Economic evaluation for the project is made by using a cash flow of costs and benefits as shown in Table 14 in Appendix A considering the conditions and assumptions discussed above. The result of economic evaluation is summarized as follows:

Table 4.8 Results of Economic Evaluation (Allahabad)

Index	Value
NPV	-2,040 million Rs.
EIRR	Not able to calculated (Negative)
B/C	0.42

Note; a discount rate of 10 % is applied to estimate NPV and B/C.

The EIRR of the project for Allahabad is not possible to calculate as the cost-benefit cash flow cannot return any positive discount rate. Therefore, the project may not be economically feasible.

In the Master Plan, the implementation of public participation and awareness (PP/PA) activities for the project is planned. Through these activities, the enhancement of the WTP for improvement of river water quality and sewerage service is expected. If PP/PA activities enhance the existing WTP by following percentage the project would be economically feasible for Allahabad.

Percentage of Existing WTP to be Enhanced to Ensure Economic Feasibility

Index	Value
EIRR 5 %	20%
EIRR 10 %	64 %

The World Bank recommends that the EIRR should be at least 5 % even for this kind of projects to establish public utilities of basic human needs.

To obtain at least 5 % of EIRR, the WTP for improvement of river water quality and sewerage service is required to be enhanced by 20percent for the Allahabad project through PP/PA activities.

4.2 FINANCIAL EVALUATION

4.2.1 Estimation of Financial Benefits

To estimate financial benefits of project, sewerage tariff system should be newly set considering existing tariff system and an affordability of people to pay (ATP).

(1) Existing Tariff System

There are following 3 types of taxes related to sewerage tariff in India:

i) Real Property Tax for houses and lands,
ii) Water Tax, and
iii) Sewer Tax.

In the State of Uttar Pradesh, the tax rates are:

i) Real Property Tax: 15.0% of an annual rental value of properties (lands),
ii) Water Tax: 12.5% of the annual rental value of properties, and
iii) Sewer Tax: 3.0% of the annual rental value of properties.

The rates differ little depending upon cities and areas, but in the targeted 4 cities, the same rates are applied.

There is no advanced payment and/or initial payment for connection to sewer, but the people should bear the cost for connection works without any other charge for recovering the cost for sewage treatment plant. They should pay water tax or water charge once every 2 months, and sewer tax or

charge are required to be paid once or twice a year.

If water supply network and/or public tap is located within 100 m from the house, the household should pay water tax irrespective of they are connected or not. The households that are required to pay water tax should also pay sewer tax.

If the household has a connection with water supply network, both water tax and water charge are calculated and household should pay the higher one. It means that there are two systems as "water tax" and "water charge". The households that are required to pay water charge should pay sewer charge too at the rate of 25 % of the amount of the water charge. The water charge system consists of fixed rate portion and specified portion for consumed water volume.

(2) Affordability to Pay and Existing Expenditure for Sewage Disposal Service

The connection rate to existing sewage services is around 32 % in Allahabad, and the rate of capability of households to pay is only 83 % of those which are connected in 2003 as shown in Table 3 in Appendix A according to the Survey on Public Awareness by JICA Study Team.

The average expenditure for existing sewage disposal service is 1.05 % of the total average household expenditure [= (Rs.115/household per month × 12 months) /(Rs.10,912/household per month × 12 months)] in Allahabad according to the result of the Public Awareness Survey. The average expenditure for existing sewage service is estimated at Rs.1,380 /annum per household.

The Pan American Health Organization (PAHO) recommends that the affordability of people to pay for the services of water supply and sewerage is 5 % of the total income per household as a maximum consisting of 3.5 % for water supply and 1.5 % for sewage disposal service. Although the existing average expenditure of resident in Allahabad for sewage disposal service is more than 1.5 % of total expenditure, the PAHO's criterion, they are paying it. Therefore, it can be said that this amount, i.e., Rs.1,964 /annum per household for sewage disposal service, is affordable.

4.2.2 Estimation of Financial Cost

The project costs or financial costs have already been estimated in previous section together with economic costs. The detail financial costs estimated are shown in Table 13 in Appendix A. The cost flow of construction cost, O&M cost and replacement cost is also estimated in the previous section and shown in Table 13 in Appendix A.

4.2.3 Financial Evaluation

(1) Basic Evaluation

In this type of the project for development and improvement of public utility or social infrastructure so called as "public works", it may not be adequate to analyse cost recovering ability by financial benefit (revenue from collection of user charge). The required cost for sewerage service is much more than that for water supply service. Nevertheless, the charge for sewerage service is usually lower than that for water supply. Following illustrations present a Japanese example of cost recovery in the case of sewerage services.

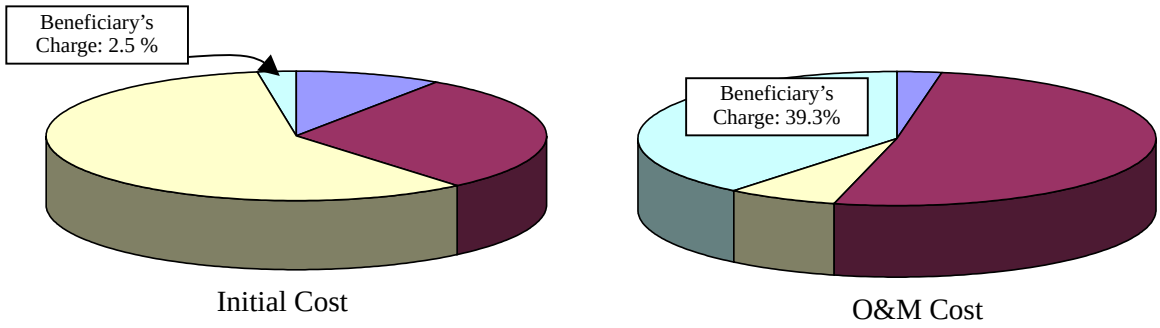


Figure 4.1 Share Rates of Beneficiaries (Users) in Initial Cost and O&M Cost for Sewerage Service in Japanese Case

As shown in the figures above, the beneficiary's initial connection charge (advance payment) can recover only 2.5 % of the total initial cost and user service charge can recover about 40 % of the O&M cost in Japan. The major fractions of remaining costs are financed by the general account of the central government and/or the local government.

Among the OECD member countries, there is no country that can recover initial cost and O&M cost by the revenue collected from users.

Therefore, financial evaluation is at first made under existing expenditure for sewerage service and sewerage tax/charge collection rate. Then, if the project is not feasible under the existing condition, two cases are studied considering ability to pay (ATP) for sewage service, construction cost sharing by other means (government general account or grant) and proposed collection rate.

(2) Case of existing expenditure for sewage service and collection rate

Financial evaluation for the project is made in case of existing expenditure for sewerage service and existing tax/charge collection rate (75 %) by using the cash flow as shown in Table 15 (1) in Appendix A. The results are summarized as follows:

Table 4.9 Results of Financial Evaluation (Allahabad)

Index	Value
NPV (discount rate at 10 %)	-1,950 Rs. million in NPV
FIRR:	Not able to calculate
B/C (discount rate at 10 %)	0.46

Condition: existing household expenditure for sewage disposal and existing tax/charge collection rate (75%)

In this case, FIRR cannot be calculated because the financial costs, especially construction cost, exceeds much more than the financial benefits and no discount rate, at which the cost equals the benefit, is found. Also the NPV of the project is negative (Rs. -1,950 million) and B/C ratio is below 1 (0.46). These indicate that the project is not financially feasible in case if the entire construction cost is recovered from user charge (sewerage tax/charge) only with existing charge collection rate.

(3) Case of construction cost sharing and proposed collection rate

In the evaluation above, it is realized that large amount of construction cost cannot be recovered from user charge only. Then, the following cases are studied considering O&M cost recovery, adequate cost sharing of construction costs and proposed collection rate.

i) some portion of the construction cost shall be recovered by user charge
ii) all O&M cost is recovered by user charge
iii) proposed collection rate shall be 95 %
iv) the portion of the construction cost recovered by user charge shall be decided by assuming the project financial return (FIRR) at 10 %
v) user's expenditure for sewage disposal service is 2 % of total household expenditure (Rs. 2,619 per annum per household)

Considering this condition, two cases are studied as show in Table 15 (2) and (3) in Appendix A. Following table summarizes the results:

Table 4.10 Case Study of Financial Evaluation (Allahabad)

Index	Case 1 Condition: • Existing collection rate (75%), • Percentage of household expenditure for sewage service (2%) • to obtain 10% FIRR	Case 2 Condition: • Existing collection rate (95%), • Percentage of household expenditure for sewage service (2%) • to obtain 10% FIRR
Percentage of construction cost that can be recovered by user charge (%)	21%	33%

In the case one that existing collection rate is adopted, 21 % of the construction cost can be recovered by user charge (sewerage tax/charge). If the collection rate is improved to 95 %, 33 % of the construction cost can be recovered by user charge (sewerage tax/charge).

These results indicate that the project may be financially feasible to recover only full cost of O&M and replacement cost. In addition, the financial benefits (revenue from user charge) can recover several tens percentage of the construction or initial investment cost.

CHAPTER 5

VARANASI CITY

CHAPTER 5 VARANASI CITY

5.1 ECONOMIC EVALUATION

5.1.1 Estimation of Economic Benefit

(1) WTP for Improvement of Water Quality of the River Ganga

According to the GAP Cost-Benefit Report, the Willingness-to pay (WTP) for improvement of water quality of the river Ganga was estimated at Rs.167 per household per annum in a 1995/96 price level, and this WTP has been adopted for calculations in this project by converting it to a price level of 2003, the base year of cost and benefit estimation of the project, using the Consumer Price Index (CPI) as shown in Table 2 in Appendix A, in which an average CPI-based inflation rate is estimated at 8.69 % per annum. Using this inflation rate, the amount of WTP in 2003 price was calculated at Rs.326 per annum per household. To estimate annual WTP for a city, total population of the city is multiplied by this unit economic benefit.

(2) WTP for Sewage Disposal Service

According to the Survey on Public Awareness made by JICA Study Team in 2003, the amount of WTP for sewage disposal service is estimated at Rs.90 per month per household as shown in Table 3 in Appendix A. The annual amount of this WTP is Rs.1,080 per household. However, this amount is less than the actual expenditure for sewage disposal service (Rs. 1,860). This fact is not reasonable. So JICA Study Team regards the actual expenditure as WTP for improved sewerage service in estimating economic benefits.

The amount of the WTP above is the basic unit for estimation of economic benefit. Using this basic unit, the annual economic benefit is calculated by multiplying the number of the households connected with sewer. Projecting the future sewerage service coverage, sewerage coverage population and household are estimated in Table 4 in Appendix A. In the estimation, the following average family sizes estimated based on the results of Public Awareness Survey by JICA Study Team in 2003 are used.

Table 5.1 Average Family Size in Each City

(Unit: persons per household)

Income group	Lucknow	Kanpur	Allahabad	Varanasi
Low	6.18	6.38	6.67	7.64
Medium	5.99	6.03	6.10	7.60
High	6.27	6.80	6.20	6.97
Average	6.15	6.40	6.32	7.40

Source: Public Awareness Survey by JICA Study Team in 2003

Multiplying the basic unit of economic benefit by the number of households connected with sewer in a city, annual economic benefit in the city was estimated.

The benefit will increase according to the increase of the number of sewerage connected households until the year 2030, the target year of the Sewerage Master Plan. After the year 2030, it is assumed that the same amount of economic benefit in the year 2030 occur until the end of the project life, as the capacity of waste water treatment plant is designed to cover the sewerage population in the year 2030.

(3) Saving of Medical Expenditure Due to Decrease of Suffering Rate of Water Borne Diseases

Generally, suffering rate of water borne diseases to the total morbidity rate may be 30 %. However, the morbidity rate caused by water borne diseases was 38.0 % of the total morbidity rate in Varanasi in

1997 in case of without the sewerage project, and the average ratio of three (3) cities of Patna, Kanpur and Haridwar in case of with the sewerage project[8] was 17.7 %. These cases were applied in the GAP Cost-Benefit Report and these are also applied for this project. The difference of 20.3 % (= 38.0 % - 17.7 %) is a basic factor for estimation of economic benefit based on the saving of medical expenditure.

Regarding medical expenditures, following information/data are available for medical expenditures in "A Benefit Incidence Analysis for India"[9].

Original Information/Data (1995/96):

For Outpatient in the State of Uttar Pradesh:		
Average number of visits to public hospitals:	50.7	visit/1,000 person per annum
Average amount of charges per outpatient:	48.5	Rs. /visit (average of Rs. 43- 54 for all India)
Average amount of public subsidies per outpatient:	103.1	Rs./visit per outpatient
For Inpatient in the State of Uttar Pradesh:		
Average number of hospitalisation:	1,018	times/100,000 persons
Average staying days:	14.6	days/hospitalisation
Average amount of charges per inpatient:	71.7	Rs./day
Average amount of public subsidies per inpatient:	618.3	Rs./day

In the above data, physical data are applied to this project directly. But monetary data are converted to 2003 price level using the CPI (= 8.69% per annum) since monetary data is in 1995/96 price level. The following are converted values.

Converted Information/Data to Present Value:

For Outpatient in the State of Uttar Pradesh:		
Average number of visits to public hospitals:	50.7	visit/1,000 person per annum
Average amount of charges per outpatient:	94.5	Rs. /visit
Average amount of public subsidies per outpatient:	200.7	Rs./visit per outpatient
For Inpatient in the State of Uttar Pradesh:		
Average number of hospitalisation:	1,018	times/100,000 persons
Average staying days:	14.6	days/hospitalisation
Average amount of charges per inpatient:	139.6	Rs./day
Average amount of public subsidies per inpatient:	1,204.2	Rs./day

All the patients should pay some amount of money as transportation cost to visit the hospitals. Usually, they use cycle-rickshaws. This transportation cost borne by the patients was estimated as follows through interview survey of some patients and cycle-rickshaw drivers in Varanasi.

[8] M.N.Murty "*A Cost Benefit Analysis of the Ganga Action Plan*" Oxford University Press, 2000.

[9] National Council of Applied Economic Research, ed. "*Who Benefits from Public Health Spending in India*" 2002.

Table 5.2 Transportation Cost per Patient to Visit Hospitals

Name of hospital	Radius from the place of origin to hospitals	Maximum transportation cost (Rs.)	Minimum transportation cost (Rs.)	Average transportation cost (Rs.) per patient
Nagar Mahapalika Hospital	1.5 km	10	5	7.5
Shiv Prasad Gupta Hospital	3.5 km	15	5	10
Ramakrishna Mission Hospital	3.5 km	15	5	10
Child Welfare & Maternity Hospital	1.5 km	10	5	7.5
Ballabhram Saligram Hospital	2.5 km	10	5	7.5
BHU Hospital	2.5 km	10	5	7.5
Overall average				8.33

This transportation cost is added to the medical expenditures as a part of the medical expenditures.

(4) Saving of Salaries/Wages Due to Decrease of Suffering Rate of Water Borne Diseases

If the people living along the river Ganga get some water borne diseases, they should visit to and/or stay in a medical institution such as hospitals or local health centers. Their salaries and/or wages are decreased according to frequency of visits to the medical institutions or number of days stayed in the hospitals. Of course, when they can get some kind of certification from medical institution and submit it to the working place, their salaries/wages would not be decreased, but in this case, the owners of such working places should pay salaries/wages to their employees without any productive activities. This is a loss of earnings of the company. If the suffering rate of water borne diseases can be decreased, this economic loss could be reduced.

The average income for each city is summarized in the following table and illustrated in Figure 1 to 4 in Appendix A.

Table 5.3 Average Income Level by Income Group and by City

(unit: Rs./month per household)

Income group	Lucknow	Kanpur	Allahabad	Varanasi
Low	3,382	3,047	2,660	3,017
Medium	10,976	7,965	9,174	9,123
High	31,885	16,446	20,902	19,338
Simple average	15,414	9,153	10,912	10,493

Source: Public Awareness Survey by JICA Study Team in 2003

People who may cause this kind of damage/loss are only working members in each household. The average family sizes are already estimated above. The number of the working members per household is 1.75 persons in Varanasi according to the 2001 Census of India. The average amount of per capita income is estimated as Rs.5,170 in Varanasi.

(5) Contribution to Local Economy Derived from Bathing Population

According to information from local officials, if the water quality of the river Ganga becomes cleaner than the present one, Ghat users will be increased to about 10 % for regular users, and 5 % for occasional users. Using this information, the increase of daily bathing population is projected as shown in Table 5 in Appendix A.

i) Regular Users

When people go to bathe at the Ghats along the river Ganga, they usually use cycle rickshaw with payment of Rs.10 per time. This transportation cost should be doubled for coming and returning.

And, they expend money for something to drink and eat like snacks with average amount of Rs.25/day. Based on this, this expenditure is estimated at around Rs.45/day (=Rs.10*2+Rs.25/day).

ii) Occasional Users

The occasional users come from far, so they expend much more transportation cost than the regular users. They usually spend for stay at the places they visit for several days in addition to their expenses or beverages, snacks and food. According to information of the local officials, the average expenditure can be estimated at around Rs.150 per day for only staying and for something to drink and eat but the transportation cost cannot be estimated and is not included. So the said expenditure is conservative one. The transportation cost cannot be estimated because it depends on places where the people come.

iii) Varanasi Ghat

Ghat is a riverbank provided with steps or slopes leading to a river for bathing or cremation. Ritual bathing is taken in the sacred river Ganga. Varanasi is well known as a city of ghats as well as religious and spiritual city where to liberate soul from human body to ultimate is considered very poise. Ghats in Varanasi have great religious and historical importance. Every day thousands of people visit in Varanasi and in important fairs hundred thousands people gather in the city for holy dips and rituals from all over the India. In addition, the city is one of the most famous tourist places in India and attracts domestic and foreign tourists.

According to the Department of Culture, Varanasi, there are 84 ghats along the river Ganga in Varanasi. Out of these 77 ghats are listed below.

List of Ghats along the Ganga River in Varanasi

Sl. No.	Site Name	Sl. No.	Site Name		
	Bhelupur Ward		**Dashashwamedh Ward**		**Kotawali Ward**
1	Assi Ghat	29	Raja Ghat	53	Mehta Ghat
2	Ganga Mahal Ghat	30	Babuwa Pandey Ghat	54	Ram Ghat
3	Reevan Ghat	31	Pandey Ghat	55	Jatar Ghat
4	Tulsi Ghat	32	Dimpatiya Ghat	56	Raja Gwalior Ghat
5	Bhadaini Ghat	33	Chowshahi Ghat	57	Bala Ghat
6	Janki Ghat	34	Raja Mahal Ghat	58	Panch Ganga Ghat
7	Anandi Mai Ghat	35	Munshi Ghat	59	Durga Ghat
8	Vachchhraj Ghat	36	Darbhanga Ghat	60	Brahma Ghat
9	Jain Ghat	37	Ahilyabai Ghat	61	Bundi Parkota Ghat
10	Shri Nishad Raj Ghat	38	Sheetla Ghat	62	Lal Ghat
11	Panch Kot Ghat	39	Prayag Ghat	63	Shir Hnuman Gharhi Ghat
12	Prabhu Ghat	40	Dashashwamedh Ghat	64	Gay Ghat
13	Chet Singh Ghat	41	Dr. Rajendra Prasad Ghat		
14	Niranjani Ghat	42	Maan Mandir Ghat		
15	Mahainrvani Ghat	43	Tripur Bharavi Ghat		**Adampur IInd Ward**
16	Shivala Ghat	44	Meer Ghat	65	Badrinath Ghat
17	Gularia Ghat	45	Lalita Ghat	66	Trilochan Ghat
18	Dandi Ghat			67	Gola Ghat
19	Prachin Hanuman Ghat		**Chowk Ward**	68	Mehashwar Ghat
20	Karnatak State Ghat	46	Sindia Ghat	69	Samka Ghat
21	Harishchandra Ghat	47	Manikarnika Ghat	70	Teliyana Nala Ghat
22	Lali Ghat	48	Sankta Ghat	71	Naya Ghat
23	Vijay Nagar Ghat	49	Gaushala Ghat	72	Nishad Ghat
24	Kedar Ghat	50	Jalasen Ghat	73	Prahalad Ghat
25	Chowkia Ghat	51	Ganga Mahal Ghat	74	Raj Ghat
26	Someshwar Ghat	52	Ganesh Ghat	75	Bhaisasur (Raj Ghat) Ghat
27	Mansarovar Ghat			76	Khrikeya Ghat
28	Narad Ghat			77	Keshav Ghat

(6) Summary of Economic Benefit

The unit economic benefits as follows are summarized in following table.

i) WTP for improvement of water quality of the river Ganga
ii) WTP for sewage disposal service
iii) Saving of the medical expenditure due to decrease of suffering rate of water borne diseases
iv) Saving of salaries/wages due to decrease of suffering rate of water borne diseases
v) Incremental contribution to the regional economy derived from bathing population

Table 5.4 Summary of Unit Economic Benefit

As of 2003 price level

City	WTP for improvement of water quality of the river	WTP for sewage disposal service	Incremental saving of Medical expenditure due to decrease of suffering rate of water borne diseases		Incremental saving of salaries/wages due to decrease of suffering rate of water borne diseases		Contribution to local economy derived from increased bathing population	
			Outpatient	Inpatient	Outpatient	Inpatient	Regular users	Occasional users
	Rs./annum per household						Rs./annum per person	
Lucknow	326	1,820	10	125	4	11	16,425	0
Kanpur	326	1,152	10	130	2	7	16,425	0
Allahabad	326	512	10	128	3	10	16,425	54,750
Varanasi	326	1,080	12	150	3	9	16,425	54,750

The annual benefits are estimated multiplying the unit economic benefit by the entire annual served households in the case 1), the annual connected households in the cases of 2), 3) and 4), and daily incremental bathing population in the case 5).

5.1.2 Estimation of Economic Cost

(1) Cost Estimation Basis

To convert the project costs or financial costs to economic costs, the following factors are considered.

1) Standard Conversion Factor (SCF)

Standard Conversion Factor (SCF) should be taken into account for tradable equipment and materials when the financial cost is converted into the economic cost. The SCF is calculated at 0.88101 as shown in Table 6 in Appendix A with its calculation process.

2) Income Tax

Corporate income tax to the contractor: 35 % for the contractors and personal income tax: 10 % for the labour according to the Income Tax Act in India. The corporate income tax is applied for net profit of contractors and personal income tax is applied for total labour cost. In the case of this project, net profit of contractors is assumed as 10 % of the direct construction cost.

3) Shadow Wage Rate of Unskilled Labour

Actually, shadow wage rate of unskilled labour is quite complicated to estimate. But to estimate it following simplified formula can be used:

$$SWCF = \frac{(GRDP - AO) / (EAP - APSL)}{DRDP / EAP}$$

Where, *SWCF*: shadow wage rate (conversion factor for shadow wage),
GRDP: the Gross Regional Domestic Products,
AO: actual output by permanent skilled labour,
EAP: the Entire Economic Active Population, and
APSL: number of actual permanent skilled labour.

Enough data for estimating SWCF are not available. However, the shadow wage value 0.5 was applied in the GAP Cost-Benefit Report. The same SWCF is applied to this project since this project is similar to the project mentioned in GAP Cost-Benefit Report.

4) Shadow Price of Land

Most of the land to be acquired for constructing facilities in the project is currently under agricultural use. Therefore, agricultural productivity is one of index for estimation of shadow price of land. The formula is as follow:

$$SPRL = \frac{A_g O / CA}{FP_p}$$

Where, *SPRL*: a shadow price rate for land,
A_gO: amount of agricultural products,
CA: harvested or cropped area (ha), and
FP_p: financial price of land to be acquired for the Project.

Following data are available in the GAP Cost-Benefit Report to estimate Shadow Price of Land (SPRL), and using these data, SPRL is estimated at 0.0059. The economic cost of land acquisition can be estimated based on the financial cost for land multiplying this shadow price rate.

Crop area:	26,609	(1,000 ha as of 1999/00 in Uttar Pradesh)
GRDP in agricultural products	627,320	(million Rs. as of 1999/00 in Uttar Pradesh)
Financial price of land to be acquired	4,000	(1,000 Rs/ha) *

* Source: Interview survey to UP Jal Nigam by JICA Study Team

In this case, GRDP of agricultural products is applied instead of the amount of agricultural products (A_gO) above.

5) Others

- Price escalation should not be included in the costs.
- A discount rate of 10% is to be applied for evaluation.
- Project life upto 2060 is set at 30 years after the target year

(2) Economic Cost

The project cost and financial and economic cost of sewerage development for Varanasi are estimated in Table 16 in Appendix A in detail and summarized in following table.

Table 5.5 Summary of Sewerage Construction Costs (Varanasi)

(unit: million Rs)

	Cost Item	Total
(1)	Construction Cost	7,887
	Facilities (STP&PS)	2,110
	Pipe works	5,777
(2)	Land Acquisition	596
(3)	Engineering Cost	1,183
(4)	Administration Cost	789
(5)	Sub-total (1+2+3+4)	10,455
(6)	Physical Contingency	2,091
(7)	Financial Cost (5+6)	12,546
(8)	Economic Cost	8,007

Yearly cost flow of financial and economic cost estimated is shown as follows:

Table 5.6 Yearly Flow of Construction Costs of the Project (Varanasi)

(Unit: million Rs.)

Cost Item	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Financial Cost	12,546	1,368	1,691	1,695	423	423	423	149	149	149	149	149	1,007
Economic Cost	8,007	732	1,180	1,169	270	270	270	95	95	95	95	95	513

Cost Item	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Financial Cost	686	473	383	575	396	270	249	249	249	249	249	249	249	249
Economic Cost	471	311	244	388	269	175	159	159	159	159	159	159	159	159

In addition to construction costs, it is assumed that replacement costs is required every 15 years after the completion of pumping station and sewage treatment plant within project life. The replacement cost flow is estimated in Table 16 in Appendix A.

The yearly operation and maintenance (O&M) cost upto the target year of 2030 is estimated and summarized as follows:

Table 5.7 Yearly Flow of Operation and Maintenance Cost of the Project (Varanasi)

(Unit: million Rs.)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Financial Cost	147	147	147	147	147	147	147	147	184	184	189
Economic Cost	85	85	85	85	85	85	85	85	106	106	109

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Financial Cost	201	201	201	201	201	201	201	201	201	201	201	201
Economic Cost	116	116	116	116	116	116	116	116	116	116	116	116

After the target year of 2030, O&M cost is required. It is assumed that the annual O&M cost after 2030 within project life of 30 years is the same as O&M cost in 2030.

5.1.3 Economic Evaluation

Economic evaluation for the project is made by using a cash flow of costs and benefits as shown in Table 17 in Appendix A considering the conditions and assumptions discussed above. The result of economic evaluation is summarized as follows:

Table 5.8 Results of Economic Evaluation (Varanasi)

Index	Value
NPV	5,444 million Rs.
EIRR	14.2%
B/C	1.8

Note; a discount rate of 10 % is applied to estimate NPV and B/C.

The EIRR of the project for Varanasi is estimated at 14.2 %, which exceeds 10 %, a general criterion of economic feasibility. Therefore, the project is economically feasible. The World Bank recommends that, in a case of public works based on basic human needs, EIRR should be at least 5 % in developing countries. The EIRR of the project also exceeds this criterion.

5.2 FINANCIAL EVALUATION

5.2.1 Estimation of Financial Benefits

To estimate financial benefits of project, sewerage tariff system should be newly set considering existing tariff system and an affordability of people to pay (ATP).

(1) Existing Tariff System

There are following 3 types of taxes related to sewerage tariff in India:

i) Real Property Tax for houses and lands,
ii) Water Tax, and
iii) Sewer Tax.

In the State of Uttar Pradesh, the tax rates are:

i) Real Property Tax: 15.0% of an annual rental value of properties (lands),
ii) Water Tax: 12.5% of the annual rental value of properties, and
iii) Sewer Tax: 3.0% of the annual rental value of properties.

The rates differ very little depending upon cities and areas, but in the targeted 4 cities, the same rates are applied.

There is no advanced payment and/or initial payment for connection to sewer, but the people should bear the cost for connection works without any other charge for recovering the cost for sewage treatment plant. They should pay water tax or water charge once every 2 months, and sewer tax or charge should be paid once or twice a year.

If water supply network and/or public tap is located within 100 m from the house, the household should pay water tax irrespective of their connection status. The household who are required to pay water tax should also pay sewer tax.

If the household has a connection with water supply network, both water tax and water charge are calculated and household should pay the higher one. It means that there are two systems as “water tax” and “water charge”. The household who should pay water charge should also pay sewer charge with a rate of 25 % of the amount of the water charge. The water charge system consists of fixed rate portion and specified portion for consumed water volume.

(2) Affordability to Pay and Existing Expenditure for Sewage Disposal Service

The connection rate to existing sewage services is estimated as around 61 % in Varanasi, and the rate

of capability of households to pay is only 66 % of those which are connected in 2003 as shown in Table 3 in Appendix A according to the Survey on Public Awareness by JICA Study Team.

The average expenditure for existing sewage disposal service is 1.5 % of the total average household expenditure [= (Rs.155/household per month × 12 months) /(Rs.10,493/household per month × 12 months)] in Varanasi according to the result of the Public Awareness Survey. The average expenditure for existing sewage service is estimated at Rs.1,860/annum per household.

The Pan American Health Organization (PAHO) recommends that the affordability of people to pay for the services of water supply and sewerage is 5 % of the total income per household as a maximum consisting of 3.5 % for water supply and 1.5 % for sewage disposal service. The existing average expenditure of resident in Varanasi for sewage disposal service is 1.5 % of total expenditure, the same as PAHO's criterion. This amount, i.e. Rs.1,860/annum per household for sewage disposal service, is affordable.

5.2.2 Estimation of Financial Cost

The project costs or financial costs have already been estimated in previous section together with economic costs. The detail financial costs estimated are shown in Table 16 in Appendix A. The cost flow of construction cost, O&M cost and replacement cost is also estimated in the previous section and shown in Table 16 in Appendix A.

5.2.3 Financial Evaluation

(1) Basic Evaluation

In this type of the project for development and improvement of public utility or social infrastructure so called as "public works", it may not be adequate to analyse cost recovering ability by financial benefit (revenue from collection of user charge). The required cost for sewerage service is much more than that for water supply service. Nevertheless, the charge for sewerage service is usually lower than that for water supply. Following illustrations depict a Japanese example of cost recover in the case of sewerage service.

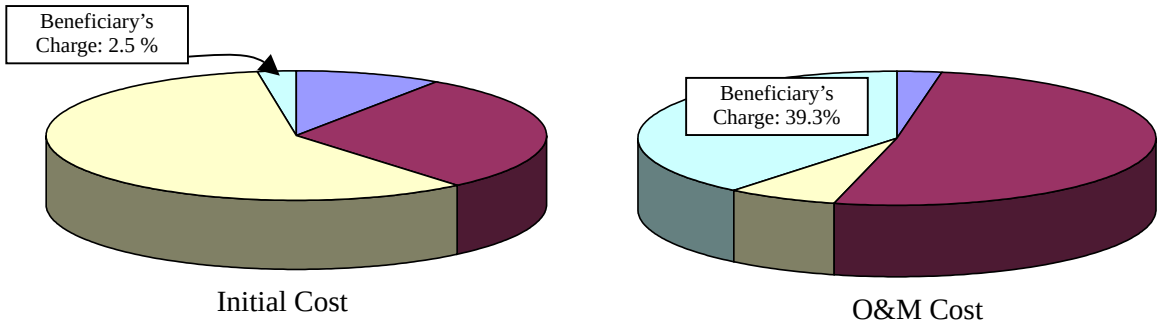


Figure 5.1 Share Rates of Beneficiaries (Users) in Initial Cost and O&M Cost for Sewerage Service in Japanese Case

As shown in the figures above, the beneficiary's initial connection charge (advance payment) can recover only 2.5 % of the total initial cost and user service charge can recover about 40 % of the O&M Cost in Japan. The major fraction of remaining costs is financed by the general account of the central government and/or the local government.

Among the OECD member countries, there is no country that can recover initial cost and O&M cost by the revenue collected from users.

Therefore, financial evaluation is at first made under existing expenditure for sewerage service and sewerage tax/charge collection rate. Then, if the project is not feasible under the existing condition, two cases are studied considering ability to pay (ATP) for sewage service, construction cost sharing by other means (government general account or grant) and proposed collection rate.

(2) Case of existing expenditure for sewage service and collection rate

Financial evaluation for the project is made in case of existing expenditure for sewerage service and existing tax/charge collection rate (75 %) by using the cash flow as shown in Table 18 (1) in Appendix A. The results are summarized as follows:

Table 5.9 Results of Financial Evaluation (Varanasi)

Index	Value
NPV (discount rate at 10 %)	-6,510 Rs. million in NPV
FIRR:	Not able to calculate
B/C (discount rate at 10 %)	0.20

Condition: existing household expenditure for sewage disposal and existing tax/charge collection rate (75%)

In this case, FIRR cannot be calculated because the financial costs, especially construction cost, exceeds much more than the financial benefits and no discount rate, at which the cost equals the benefit, is found. Also the NPV of the project is negative (Rs. -6,510 million) and B/C ratio is far below 1 (0.20). These indicate that the project is not financially feasible in case if the entire construction cost is recovered from only user charge (sewerage tax/charge) with existing charge collection rate.

(3) Case of construction cost sharing and proposed collection rate

In the evaluation above, it is realized that large amount of construction cost cannot be recovered from user charge only. Then, the following cases are studied considering O&M cost recovery, adequate cost sharing of construction costs and proposed collection rate.

i) some portion of the construction cost shall be recovered by user charge
ii) all O&M cost is recovered by user charge
iii) proposed collection rate shall be 95 %
iv) the portion of the construction cost recovered by user charge shall be decided by assuming the project financial return (FIRR) at 10 %
v) user's expenditure for sewage disposal service is 2 % of total household expenditure (Rs.2,518 per annum per household)

Considering this condition, two cases are studied as show in Table 18 (2) and (3) in Appendix A. Following table summarizes the results:

Table 5.10 Case Study of Financial Evaluation (Varanasi)

Index	Case 1 Condition: • Existing collection rate (75%), • Percentage of household expenditure for sewage service (2%) • to obtain 10% FIRR	Case 2 Condition: • Existing collection rate (95%), • Percentage of household expenditure for sewage service (2%) • to obtain 10% FIRR
Percentage of construction cost that can be recovered by user charge (%)	2%	8%

In the case one that existing collection rate is adopted, 2 % of the construction cost can be recovered by user charge (sewerage tax/charge). If the collection rate is improved to 95 %, 8 % of the construction cost can be recovered by user charge (sewerage tax/charge).

These results indicate that the project may be financially feasible when only the costs of O&M and replacement are covered by user charge or revenue from sewerage service. The financial benefits (revenue from user charge) can recover only small fraction of the construction or initial investment cost.

Appendix A

Table 1 Estimated Number of Ghat Users in Targeted Four Cities

City	Number of Regular (Persons/d	Number of (Persons/
Allahabad	18,650	N.A
Kanpur	555	N.A
Lucknow	713	N.A
Varanasi	24,090	306,925

Allahabad (Unit: Persons/Day)

Name of Ghat	Regular Users	
	Original Survey Results	Rounded for Analysis
Balua Ghat	100	100
Kakrahha Ghat Meerapur	500	500
Rasoolabad Ghat	100	100
Dashaswamegh Ghat	3,000	3,000
Sangam Nose Ghat	10,000	10,000
Sangam (Triveni) Ghat	3,000	3,000
Arail Ghat	200	200
Junsi Ghat	1,000	1,000
Chatnag Ghat	200	200
Gau Ghat	100	100
haphamau Ghat	200	200
Mankameshwar Ghat	150	150
Saraswati Ghat*	0	0
Neem Sarai Newa Ghat	100	100
Total excl.Ghat with *		18,650
Average per Ghat		1,435

Remarks:

Kanpur (Unit: Persons/Day)

Name of Ghat	Regular Users	
	Original Survey Results	Rounded for Analysis
Jageswartemple Ghat*	0	0
Karbata Ghat, Nawab Ganj*	0	0
Rani Ghat	300 to 400	350
Mazeen Ghat	10 to 20	15
Hospital Ghat*	0	0
Permat Ghat*	0	0
Hanuman Ghat	4 to 6	5
Lalha Ghat*	0	0
Buriha Ghat*	0	0
Sarsaiya Ghat*	0	0
Guptar Ghat*	0	0
Bhagwat Dass Ghat*	0	0
Gola Ghat	50 to 100	75
Burihya Ghat*	0	0
Sidhnat Htemple Ghat	100 to 120	110
Total excl.Ghat with *		555
Average per Ghat		111

Lucknow (Unit: Persons/Day)

Name of Ghat	Regular Users	
	Original Survey Results	Rounded for Analysis
Kudia Ghat	100 - 150	125
Rastogi Ghat	150	150
Lalloo Mal Ghat	100	100
Shankar Bhawan Ghat	5 - 10	8
Pipra Ghat	10 - 20	15
Kaliesh Puri Ghat	15	15
Krondha Ghat	50	50
Shukla Ghat (Pucca Pul)	200	200
Maharaja Agrasen Ghat (Dali Ga	50	50
Total excl.Ghat with *		713
Average per Ghat		79

Varanasi (Unit: Persons/Day)

Name of Ghat	Regular Users			Ocassional Users		
	Male	Female	Total	Male	Female	Total
Assi Ghat	1,800	600	2,400	13,000	12,000	25,000
Ganga Mahal Ghat	125	75	200	700	700	1,400
Rezvan Ghat	40	60	100	1,300	1,800	3,100
Tulsi Ghat	100	200	300	1,000	2,000	3,000
Bhadeni Ghat	40	10	50	200	50	250
Janki Ghat	150	100	250	500	400	900
Annadi Mai Ghat	150	100	250	1,200	800	2,000
Vacchraj Ghat	175	125	300	1,700	1,300	3,000
Jain Ghat	80	20	100	800	200	1,000
Shri Neshadraj Ghat	60	15	75	700	100	800
Panch Kot Ghat	65	15	80	700	200	900
Prabhu Ghat	60	10	70	300	50	350
Chet Singh Ghat	50	10	60	250	50	300
Niranjanj Ghat	80	20	100	400	100	500
Mahanirvani Ghat*	-	-		-	-	
Shivala Ghat	30	30	60	300	400	700
Gularia Ghat	150	50	200	500	800	1,300
Dandi Ghat	400	100	500	500	700	1,200
Prachin Hanuman Ghat	100	50	150	800	1,200	2,000
Karnataka State Ghat*	50	-		125	25	
Harishchander Ghat*	-	-		-	-	
Lali Ghat	40	10	50	125	25	150
Vijay Nagar Ghat	325	125	450	800	400	1,200
Kedar Ghat	400	400	800	2,500	2,500	5,000
Chowki Ghat	50	25	75	75	50	125
Someshwar Ghat	70	30	100	300	200	500
Mansarovar Ghat	70	30	100	350	250	600
Narad Ghat	300	100	400	1,000	2,000	3,000
Raja Ghat	500	200	700	3,000	5,000	8,000
Babuwa Pandey Ghat	100	50	150	300	400	700
Pandey Ghat	450	50	500	500	1,500	2,000
Dimpatiya Ghat*	10	-		75	25	
Chwshahi Ghat	500	100	600	500	1,500	2,000
Ranamahal Ghat	460	40	500	300	100	400
Munshi Ghat	280	100	380	2,800	1,200	4,000
Darbhnga Ghat	350	20	370	1,500	1,000	2,500
Ahilyabai Ghat	50	75	125	3,000	4,000	7,000
Sheetra Ghat	75	100	175	1,500	2,500	4,000
Deshwamegh Ghat	1,500	2,000	3,500	40,000	60,000	100,000
Rajendra Prasad Ghat	500	350	850	2,500	6,000	8,500
Prayag Ghat	125	175	300	2,000	3,000	5,000
Maan Mandir Ghat	300	100	400	2,500	2,500	5,000
Tripura Bharavi Ghat	200	100	300	1,700	1,300	3,000
Meer Ghat	100	50	150	700	300	1,000
Lalita Ghat	125	25	150	700	200	900
Sindia Ghat	250	100	350	1,500	1,500	3,000
Manikarnika Ghat	350	50	400	4,000	1,000	5,000
Sankta Ghat*	N	N		-	-	
Bohshala Ghat	25	25	50	400	600	1,000
Jalasen Ghat	60	15	75	400	100	500
Gnagamahal Ghat*	-	-		-	-	
Ganesh Ghat*	-	-		-	-	
Mehta Ghat	175	75	250	400	1,100	1,500
Ram Ghat	60	40	100	600	1,400	2,000
Jatar Ghat	75	25	100	600	200	800
Raja Gwaliar Ghat	80	20	100	600	200	800
Bala Ghat	150	50	200	700	300	1,000
Panch Ghat	250	150	400	2,000	2,000	4,000
Durga Ghat	300	100	400	3,000	2,000	5,000
Brhama Ghat	200	100	300	1,200	800	2,000
Bundi Parkota Ghat	55	15	70	350	150	500
Sheetra Ghat (2nd)	125	75	200	400	300	700
Lal Ghat	35	15	50	350	250	600
Shir Hanuman Gharhi Gh	400	150	550	2,500	2,000	4,500
Cow Ghat	300	200	500	2,000	3,000	5,000
Badrinath Ghat	200	100	300	800	1,200	2,000
Trilochan Ghat	450	150	600	4,500	3,500	8,000
Gola Ghat	400	100	500	600	400	1,000
Mehashwar Ghat	475	25	500	2,000	3,000	5,000
Samka Ghat	150	50	200	200	800	1,000
Teliyana Nala Ghat	150	75	225	1,500	4,000	5,500
Naya Ghat	230	70	300	3,000	6,000	9,000
Nishad Ghat*	15	5		-	-	
Prahalad Ghat	450	350	800	3,000	3,500	6,500
Raj Ghat	125	75	200	800	1,200	2,000
Bhaisasur (Raj Ghat) Gha	50	10	60	250	50	300
Khrikeya Ghat	100	50	150	450	1,000	1,450
Aadi Keshwa Ghat	150	40	190	3,000	12,000	15,000
Total excl.Ghat with *	16,345	8,145	24,490	134,600	172,325	306,925
Average per Ghat	234	116	350	1,923	2,462	4,385

(Note) Data for Ghat with * are imcomplete, so excluded in the analysis.
Source: Interview Survey by JICA Study Team, 2003.

Table 2 Group-wise Consumer Price Index for Industrial Workers in India

A. Consumer Price Index (Base : 1982=100)

Year	Financial year average index for:						
	General	Food	Pan, Supari, Tobacco and Intoxicants	Fuel & Light	Housing	Clothing, Bedding and Footwear	Misc.
1990-91	193	199	243	186	185	154	187
1991-92	219	230	280	204	198	169	210
1992-93	240	254	315	220	212	185	232
1993-94	258	272	340	234	224	201	251
1994-95	284	304	368	243	237	227	273
1995-96	313	337	397	260	255	253	294
1996-97	342	369	432	295	280	271	322
1997-98	366	388	479	328	304	286	354
1998-99	414	445	515	353	389	296	386
1999-00	428	446	565	379	437	306	416
2000-01	444	453	592	454	463	315	442

B. Variation Against Previous Year

Year	Price Increasing Ratios against Previous Year for:						
	General	Food	Pan, Supari, Tobacco and Intoxicants	Fuel & Light	Housing	Clothing, Bedding and Footwear	Misc.
1990-91	-	-	-	-	-	-	-
1991-92	13.47%	15.58%	15.23%	9.68%	7.03%	9.74%	12.30%
1992-93	9.59%	10.43%	12.50%	7.84%	7.07%	9.47%	10.48%
1993-94	7.50%	7.09%	7.94%	6.36%	5.66%	8.65%	8.19%
1994-95	10.08%	11.76%	8.24%	3.85%	5.80%	12.94%	8.76%
1995-96	10.21%	10.86%	7.88%	7.00%	7.59%	11.45%	7.69%
1996-97	9.27%	9.50%	8.82%	13.46%	9.80%	7.11%	9.52%
1997-98	7.02%	5.15%	10.88%	11.19%	8.57%	5.54%	9.94%
1998-99	13.11%	14.69%	7.52%	7.62%	27.96%	3.50%	9.04%
1999-00	3.38%	0.22%	9.71%	7.37%	12.34%	3.38%	7.77%
2000-01	3.74%	1.57%	4.78%	19.79%	5.95%	2.94%	6.25%
Average Annual Increase Rate Since 1990-91	8.69%	8.57%	9.31%	9.33%	9.61%	7.42%	8.98%

Source : Labour Bureau, Govt. of India.

Table 3 Existing Connection Rate, Existing Capability to Pay, Average Existing Charge and Willingness to Pay

City/Income Group	Estimated connection rate to existing sewerage system (Existing connection rate) (%)	Rate of capability to pay for sewerage service of connected household with existing sewerage system (%)	Wastewater disposal service			
			Average household expenditure for sewage disposal including existing sewerage service		Amount of willingness to pay (WTP) for improved sewerage service pre household	
			(Rs./month)	(Rs./year)	(Rs./month)	(Rs./year)
Lucknow						
Low Income Group	21.13%	40.00%	58	696	38	456
Medium Income Group	58.15%	63.55%	275	3,300	96	1,152
High Income Group	87.21%	73.33%	429	5,148	321	3,852
Simple Average	55.50%	58.96%	254	3,048	151	1,812
Kanpur						
Low Income Group	32.46%	72.97%	92	1,104	32	384
Medium Income Group	53.85%	72.62%	88	1,056	78	936
High Income Group	58.57%	46.34%	373	4,476	178	2,136
Simple Average	48.29%	63.98%	184	2,208	96	1,152
Allahabad						
Low Income Group	11.90%	60.00%	74	888	15	180
Medium Income Group	41.67%	88.14%	101	1,212	42	504
High Income Group	43.90%	100.00%	169	2,028	71	852
Simple Average	32.49%	82.71%	115	1,380	42	504
Varanasi						
Low Income Group	39.84%	36.73%	42	504	22	264
Medium Income Group	70.75%	75.25%	90	1,080	65	780
High Income Group	72.22%	84.62%	333	3,996	183	2,196
Simple Average	60.94%	65.53%	155	1,860	90	1,080

Source: Public Awareness Survey, JICA Study Team, 2003.

Table 4 Population Projection by Each City

Population Projection by Each City

Year	Lucknow	Kanpur	Allahabad	Varanasi
2005	2,653,826	3,073,528	1,123,204	1,418,960
2006	2,749,003	3,200,378	1,153,390	1,469,099
2007	2,844,179	3,327,228	1,183,576	1,519,239
2008	2,939,355	3,454,078	1,213,762	1,569,378
2009	3,034,532	3,580,930	1,243,949	1,619,518
2010	3,129,707	3,707,780	1,274,135	1,669,657
2011	3,224,883	3,834,630	1,304,321	1,719,796
2012	3,320,060	3,961,480	1,334,507	1,769,936
2013	3,415,237	4,088,330	1,364,693	1,820,075
2014	3,510,411	4,215,181	1,394,879	1,870,215
2015	3,605,588	4,342,031	1,425,102	1,920,354
2016	3,726,861	4,427,834	1,460,429	1,972,898
2017	3,848,136	4,513,638	1,495,755	2,025,443
2018	3,969,409	4,599,441	1,531,082	2,077,987
2019	4,090,681	4,685,244	1,566,408	2,130,532
2020	4,211,954	4,771,048	1,601,735	2,183,076
2021	4,333,229	4,856,851	1,637,058	2,235,620
2022	4,454,502	4,942,654	1,672,384	2,288,165
2023	4,575,775	5,028,458	1,707,710	2,340,709
2024	4,697,048	5,114,261	1,743,036	2,393,254
2025	4,818,323	5,200,064	1,778,362	2,445,798
2026	4,939,596	5,285,868	1,813,688	2,498,342
2027	5,060,868	5,371,671	1,849,014	2,550,887
2028	5,182,141	5,457,474	1,884,340	2,603,431
2029	5,303,416	5,543,278	1,919,666	2,655,976
2030	5,424,689	5,629,081	1,957,766	2,708,520

Projected Sewerage Connection Rate by Each City

Year	Lucknow	Kanpur	Allahabad	Varanasi
2005	0.166	0.207	0.185	0.317
2006	0.166	0.203	0.185	0.317
2007	0.166	0.198	0.185	0.318
2008	0.166	0.202	0.193	0.319
2009	0.166	0.206	0.198	0.321
2010	0.166	0.211	0.206	0.323
2011	0.220	0.220	0.218	0.327
2012	0.274	0.230	0.229	0.332
2013	0.328	0.293	0.240	0.337
2014	0.382	0.299	0.252	0.341
2015	0.436	0.305	0.262	0.346
2016	0.459	0.324	0.338	0.357
2017	0.482	0.344	0.368	0.369
2018	0.506	0.364	0.398	0.380
2019	0.530	0.385	0.428	0.392
2020	0.554	0.406	0.458	0.405
2021	0.578	0.427	0.488	0.417
2022	0.602	0.449	0.519	0.430
2023	0.626	0.471	0.549	0.442
2024	0.651	0.493	0.580	0.455
2025	0.675	0.516	0.610	0.469
2026	0.700	0.539	0.641	0.482
2027	0.725	0.562	0.672	0.495
2028	0.750	0.586	0.702	0.509
2029	0.775	0.609	0.733	0.523
2030	0.800	0.670	0.812	0.537

Projection of Total Households by Each City

Year	Lucknow	Kanpur	Allahabad	Varanasi
2005	431,860	479,920	177,651	191,679
2006	447,348	499,727	182,425	198,452
2007	462,836	519,535	187,199	205,225
2008	478,324	539,342	191,974	211,998
2009	493,812	559,149	196,748	218,772
2010	509,300	578,956	201,523	225,545
2011	524,788	598,764	206,297	232,318
2012	540,277	618,571	211,071	239,091
2013	555,765	638,378	215,846	245,864
2014	571,253	658,185	220,620	252,637
2015	586,741	677,992	225,400	259,410
2016	606,476	691,390	230,988	266,508
2017	626,211	704,788	236,575	273,606
2018	645,946	718,186	242,162	280,704
2019	665,681	731,584	247,750	287,802
2020	685,415	744,982	253,337	294,899
2021	705,151	758,380	258,924	301,997
2022	724,885	771,778	264,511	309,095
2023	744,620	785,175	270,099	316,193
2024	764,355	798,573	275,686	323,291
2025	784,090	811,971	281,273	330,389
2026	803,825	825,369	286,861	337,487
2027	823,560	838,767	292,448	344,585
2028	843,295	852,165	298,035	351,683
2029	863,030	865,563	303,622	358,781
2030	882,765	878,961	309,649	365,879

Projection of Sewerage Connected Households by Each City

Year	Lucknow	Kanpur	Allahabad	Varanasi
2005	71,689	99,343	32,865	60,762
2006	74,260	101,445	33,749	62,909
2007	76,831	102,868	34,632	65,262
2008	79,402	108,947	37,051	67,627
2009	81,973	115,185	38,956	70,226
2010	84,544	122,160	41,514	72,851
2011	115,453	131,728	44,973	75,968
2012	148,036	142,271	48,335	79,378
2013	182,291	187,045	51,803	82,856
2014	218,218	196,797	55,596	86,149
2015	255,819	206,788	59,055	89,756
2016	278,372	224,010	78,074	95,143
2017	301,834	242,447	87,060	100,961
2018	326,849	261,420	96,380	106,668
2019	352,811	281,660	106,037	112,818
2020	379,720	302,463	116,028	119,434
2021	407,577	323,828	126,355	125,933
2022	436,381	346,528	137,281	132,911
2023	466,132	369,817	148,284	139,757
2024	497,595	393,696	159,898	147,097
2025	529,261	418,977	171,577	154,952
2026	562,678	444,874	183,878	162,669
2027	597,081	471,387	196,525	170,570
2028	632,471	499,369	209,221	179,007
2029	668,848	527,128	222,555	187,642
2030	706,212	588,904	251,435	196,477

Source: Estimated by JICA Study Team by means of extra-polation by ward based on the census data.

Table 5 Estimated Incremental Daily Bathing Population after the Project

Year	Lucknow	Kanpur	Allahabad	Varanasi		
	(Regular)	(Regular)	(Regular)	(Occasional)	(Regular)	(Occasional)
2003						
2004						
2005	77	60	1,974	2,494	2,552	15,963
2006	80	62	2,028	2,543	2,624	16,280
2007	82	64	2,082	2,594	2,695	16,604
2008	85	67	2,137	2,645	2,767	16,935
2009	88	69	2,191	2,698	2,838	17,272
2010	91	71	2,245	2,752	2,910	17,615
2011	93	73	2,299	2,806	2,981	17,966
2012	96	76	2,354	2,862	3,053	18,323
2013	99	78	2,408	2,919	3,125	18,688
2014	102	80	2,462	2,977	3,196	19,059
2015	104	82	2,517	3,037	3,268	19,438
2016	108	84	2,582	3,097	3,336	19,825
2017	111	85	2,647	3,159	3,405	20,220
2018	115	87	2,712	3,221	3,474	20,622
2019	118	89	2,776	3,285	3,543	21,032
2020	122	90	2,841	3,351	3,612	21,450
2021	125	92	2,906	3,417	3,680	21,877
2022	129	94	2,971	3,485	3,749	22,312
2023	132	95	3,036	3,555	3,818	22,756
2024	136	97	3,101	3,626	3,887	23,209
2025	139	98	3,166	3,698	3,956	23,671
2026	143	100	3,231	3,771	4,024	24,142
2027	146	102	3,296	3,846	4,093	24,622
2028	150	103	3,361	3,923	4,162	25,112
2029	153	105	3,426	4,001	4,231	25,611
2030	157	107	3,491	4,080	4,299	26,121

(Note) 1. Basic Daily Bathing Population as of 2003:

Table 6 Calculation of Standard Conversion Factor

(Unit: million Rs.)

Year	Import Amount*	Export Amount*	Import Duties (Custom Duties)**	Export Tax	Export Subsidies
1992-93	633,745	536,883	237,764	0	0
1993-94	731,010	697,514	221,927	0	0
1994-95	899,707	826,741	267,891	0	0
1995-96	1,226,781	1,063,533	357,568	0	0
1996-97	1,389,197	1,188,171	428,510	0	0
1997-98	1,541,763	1,301,006	401,928	0	0
1998-99	1,783,319	1,397,531	406,683	0	0
1999-00	2,152,365	1,595,614	484,196	0	0
2000-01	2,308,728	2,035,710	341,630	0	0
Total	12,666,614	10,642,704	3,148,096	0	0
Source:				SCF =	0.88101

*: Handbook of Statistics on Indian Economy, Reserve Bank of India, 2001.

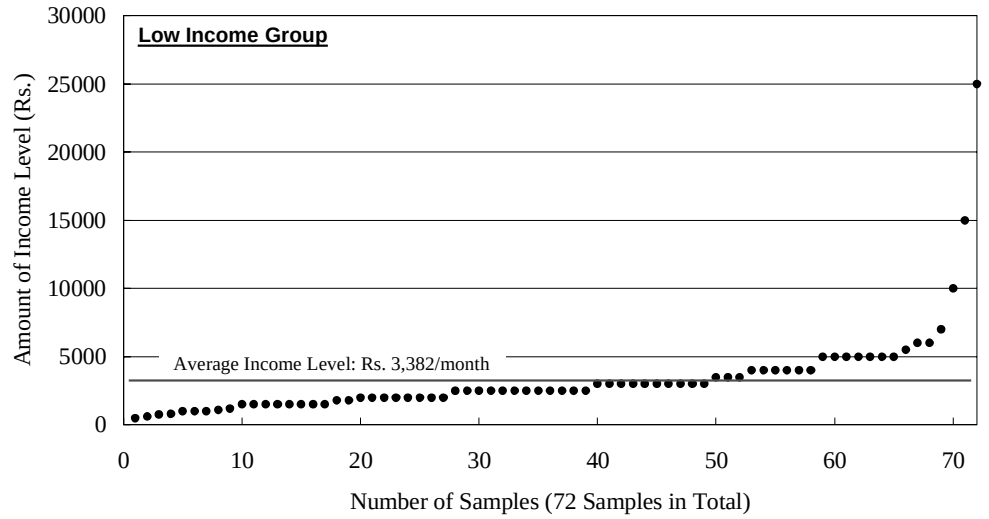
**: Indian Public Finance Statistics 2002-2003.

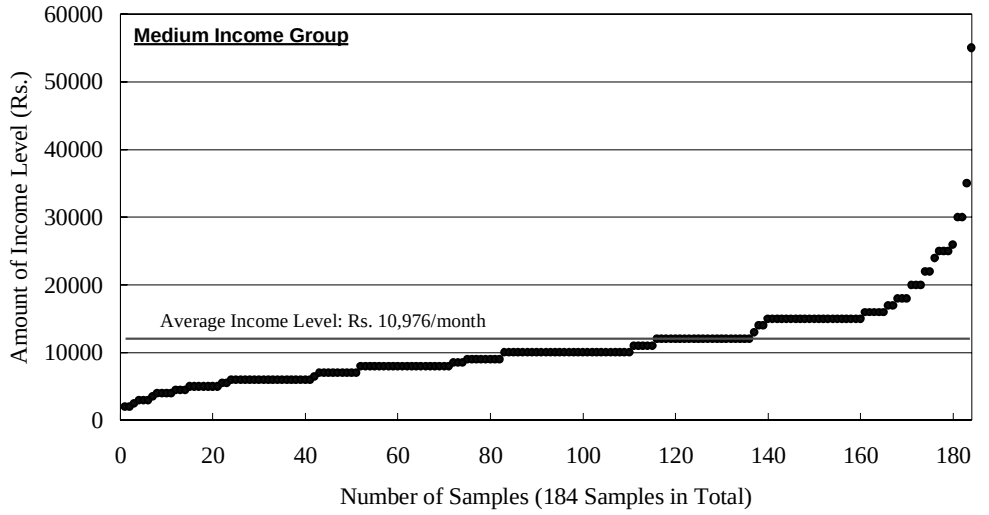
Note: $$SCF = \frac{\sum I + \sum E}{(\sum I + \sum I_{customs}) + (\sum E - \sum E_{tax} + \sum E_{subsidy})}$$

Where, SCF = standard conversion factor,
I = import amount,
E = export amount
$I_{customs}$ = import duties (custom duties)
E_{tax} = export tax, and
$E_{subsidy}$ = export subsidies.

Figure 1 Income Level of Lucknow

Source: A result of the Study on Public Awareness made by JICA Study Team, 2003.





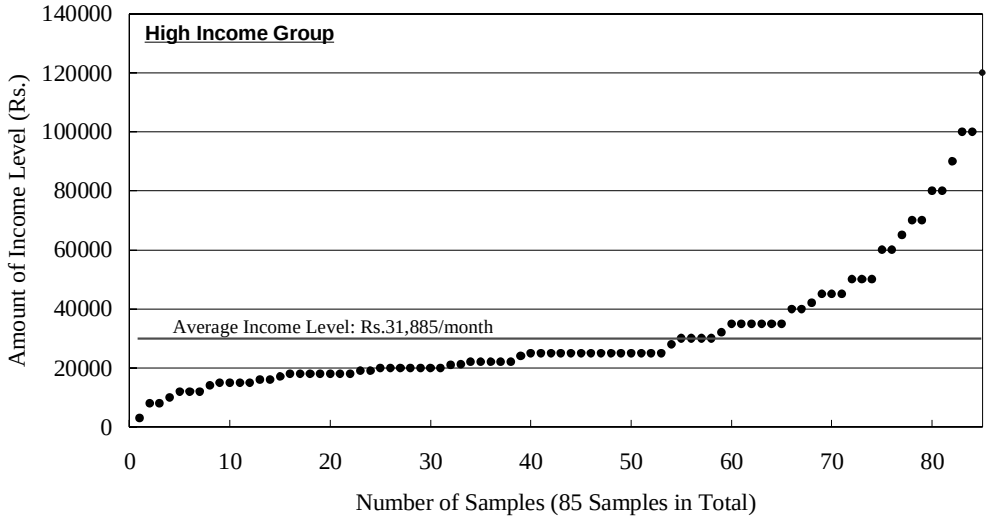


Figure 2 Income Level of Kanpur

Source: A result of the Study on Public Awareness made by JICA Study Team, 2003.

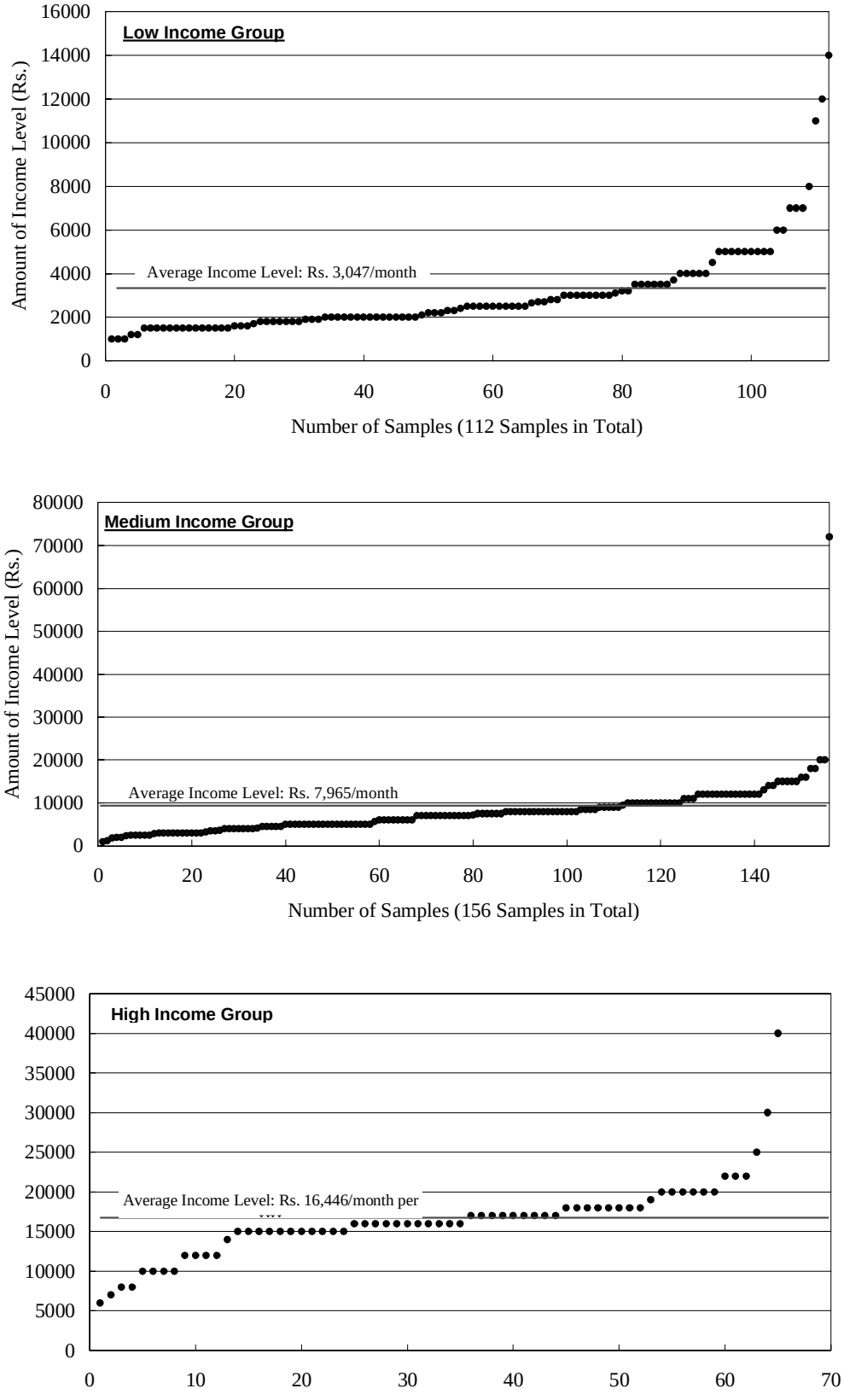
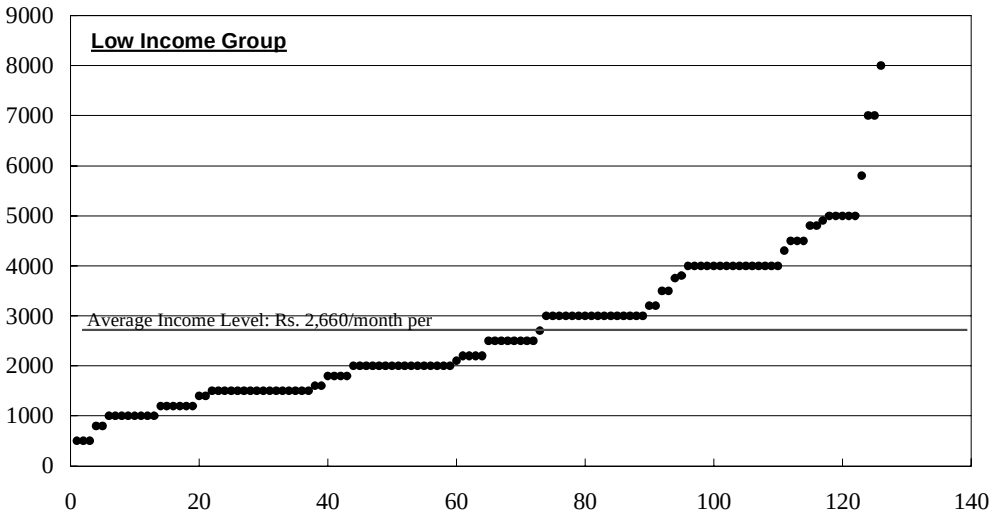
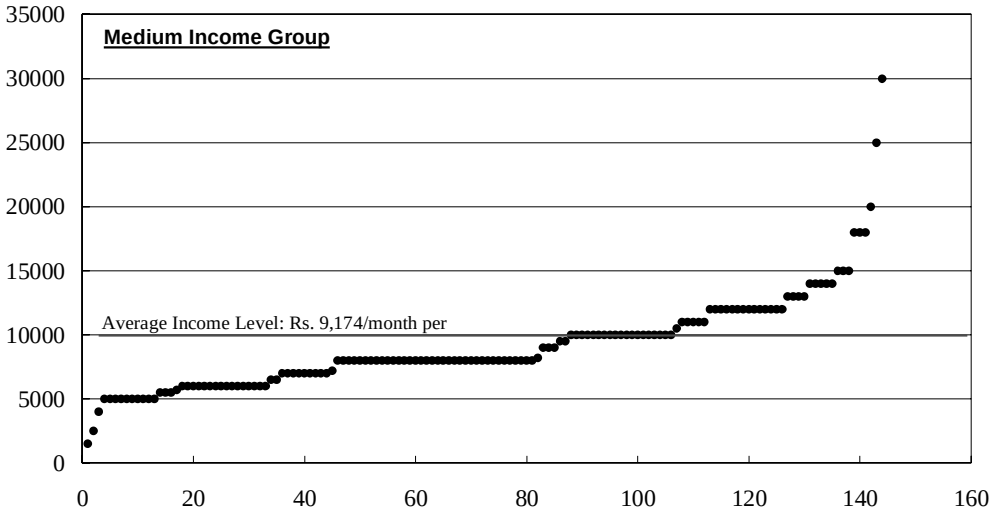


Figure 3 Income Level of Allahabad

Source: A result of the Study on Public Awareness made by JICA Study Team, 2003.





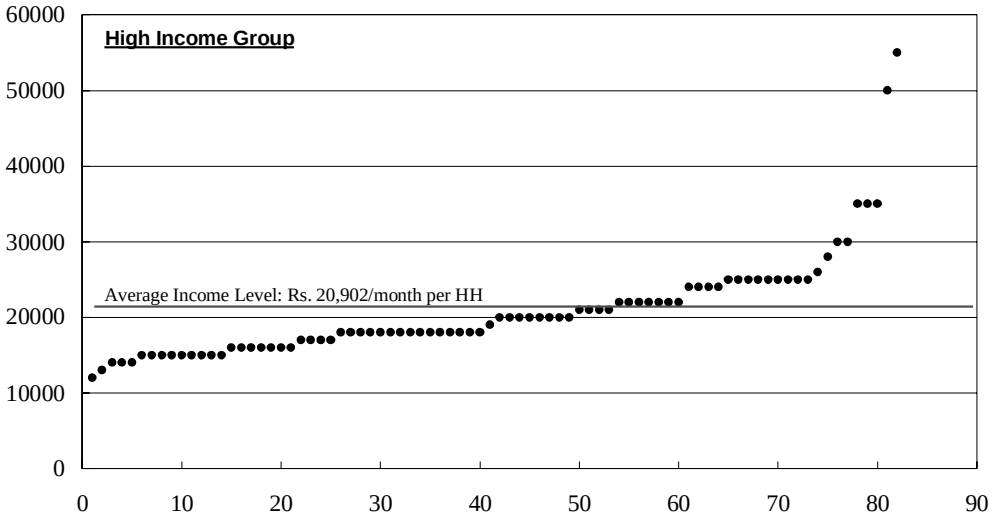


Figure 4 Income Level of Varanasi

Source: A result of the Study on Public Awareness made by JICA Study Team, 2003.

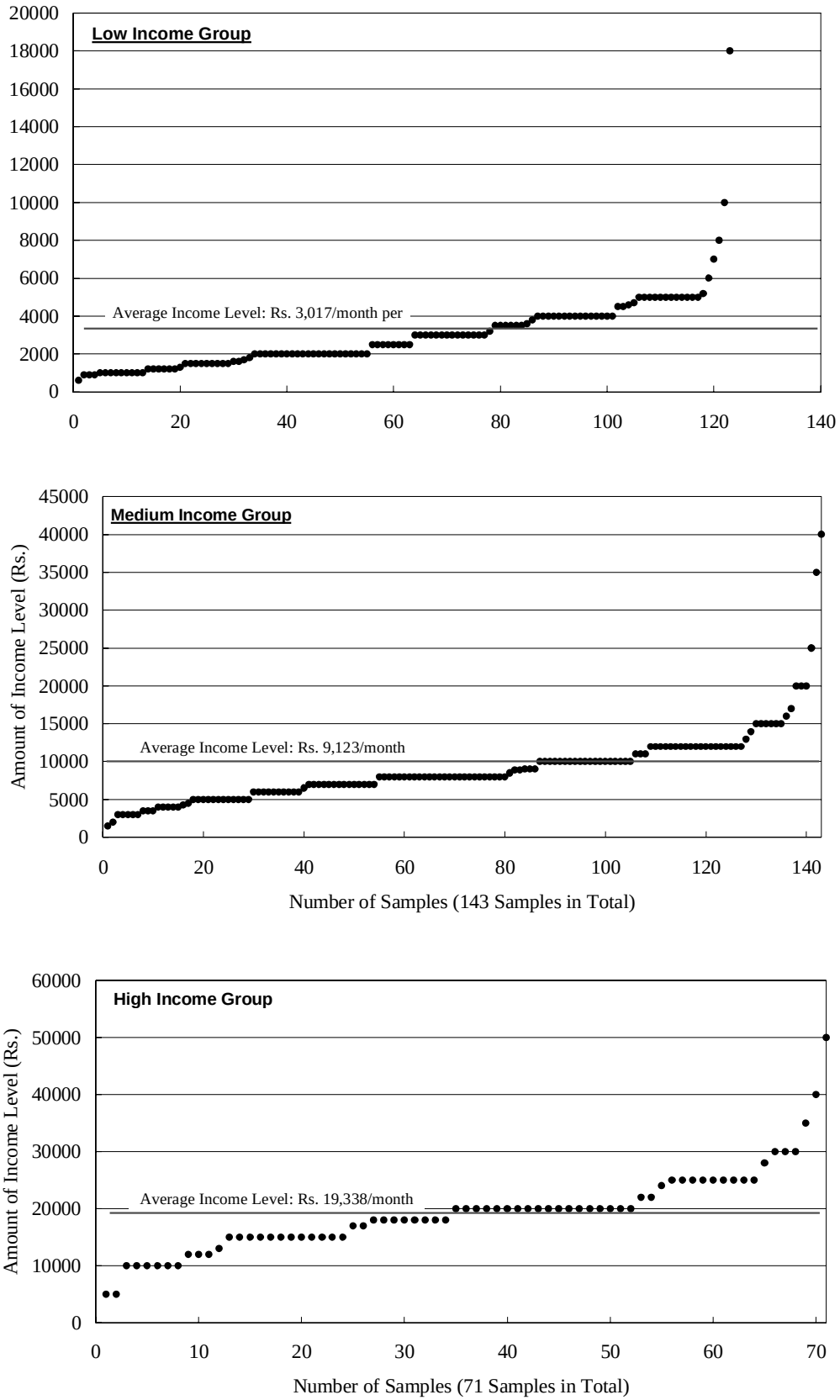


Table 7 Cost Flow of the Project for Lucknow (Financial cost and economic cost of construction, O&M and replacement)

Construction Works (Unit: Rs. Million)

	Cost Item	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(1)	Construction Cost	18,881	0	0	0	837	1,400	1,665	615	615	376	376	376	1,855	2,271	1,358	1,023	1,023	509	509	509	509	510	509	509	509	509	509
	Facilities (STP&PS)	4,329	0	0	0	256	798	1,040	0	0	0	0	0	742	1,158	335	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pipe works	14,552	0	0	0	581	602	625	615	615	376	376	376	1,113	1,113	1,023	1,023	1,023	509	509	509	509	510	509	509	509	509	509
(2)	Land Acquisition	634	0	0	0	438	0	0	0	0	0	0	0	196	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(3)	Engineering Cost	2,832	0	0	0	126	210	250	92	92	56	56	56	278	341	204	153	153	76	76	76	76	77	76	76	76	76	76
(4)	Administration Cost	1,888	0	0	0	84	140	167	62	62	38	38	38	186	227	136	102	102	51	51	51	51	51	51	51	51	51	51
(5)	Sub-total (1+2+3+4)	24,235	0	0	0	1,484	1,750	2,081	769	769	470	470	470	2,515	2,839	1,698	1,279	1,279	636	636	636	636	638	636	636	636	636	636
(6)	Physical Contingency	4,847	0	0	0	297	350	416	154	154	94	94	94	503	568	340	256	256	127	127	127	127	128	127	127	127	127	127
(7)	Financial Cost (5+6)	29,082	0	0	0	1,781	2,100	2,498	923	923	564	564	564	3,018	3,407	2,037	1,535	1,535	764	764	764	764	765	764	764	764	764	764
(8)	Economic Cost	18,903	0	0	0	923	1,472	1,766	588	588	360	360	360	1,934	2,366	1,355	979	979	487	487	487	487	488	487	487	487	487	487

Replacement Costs of E&M of facility

The Year incurred		2025	2040	2055	2033	2048
(9)	Total STP&PS	2,094	2,094	2,094	2,235	2,235
(10)	Financial cost of replacement	628	628	628	671	671
(11)	Economic cost of replacement	408	408	408	436	436
	Description	JICA 1st phase			JICA 2nd phase	

Sanctioned cost of facility (STP&PS)

	2025	2040	2055	sum
	4,023	4,023	4,023	22,821
	1,207	1,207	1,207	6,846
	784	784	784	4,448
UP Sanctioned				

Year of operatic	2010
Cost	4,023

Note: E&M of facilities will be replaced once in 15 years
Sanctioned facilities is regarded as existing and only replacement costs will be incurred once in 15 years.
Construction cost of sanctioned facilities were roughly estimated by JICA Study team.

Operation and Maintenance Works (O&M Works) including existing, sanctioned and proposed facilities (Unit: Rs. Million)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(11) Financial Cost	0	0	0	0	0	0	197	197	197	197	197	366	366	377	406	406	406	406	406	406	406	406	406	406	406	406
(12) Economic Cost	0	0	0	0	0	0	114	114	114	114	114	212	212	218	235	235	235	235	235	235	235	235	235	235	235	235
	Start of operation of proposed facility																									

(Note)

Engineering Cost:	15%	of Direct Construction Cost. The half is LC portion and the other half is FC portion.
Administration Cost:	10%	of Direct Construction Cost.
Physical Contingency:	20%	of Direct Construction Cost.
Equipment/materials:	70%	
Labor Cost:	30%	
Equipment/materials:	30%	
Labor Cost:	70%	
SCF:	0.88101	(SCF: Standard Conversion Factor for tradable goods)
Contractor's Profit:	10%	of Direct Construction Cost and Engineering Cost in LC portion.
Corporate Income Tax:	35%	of corporate income.
Personal Income Tax:	10%	of labor cost.
Shadow Price Rate:	**0.0059**	**of land acquisition cost.**
Shadow Wage Rate:	**0.5**	**of labor cost.**
Replacement	30%	of total cost of STP and PS, every 15 years

input column

Table 8 Calculation of Economic Internal Rate of Return (EIRR) for Lucknow

(Unit: Rs. Million)

Year in Order	Fiscal Year	Economic Cost				Economic Benefit									Cash Balance
		Const-ruction Cost	O&M Cost	Re-place-ment cost	Total	WTP for Improve-ment of River Water Quality		WTP for Sewage Disposal Service		Saving of Medical Expendi-tures	Saving of Salaries/ Wages	Contribution to Local Economy		Total	
												Annual Regular Users			
						Total HHs	Basic unit:	Connected HHs	Basic unit:	Basic unit:	Basic unit:	Population Projection	Basic unit:		
							326		3,048	135	15		16,425		
	2005														
	2006														
	2007														
1	2008	923	0	0	923		0		0	0	0		0	0	-923
2	2009	1,472	0	0	1,472		0		0	0	0		0	0	-1,472
3	2010	1,766	0	0	1,766		0		0	0	0		0	0	-1,766
4	2011	588	114	0	703	524,788	171	115,453	352	16	2	93	2	542	-161
5	2012	588	114	0	703	540,277	176	148,036	451	20	2	96	2	651	-51
6	2013	360	114	0	474	555,765	181	182,291	556	25	3	99	2	766	292
7	2014	360	114	0	474	571,253	186	218,218	665	29	3	102	2	886	412
8	2015	360	114	0	474	586,741	191	255,819	780	35	4	104	2	1,011	537
9	2016	1,934	212	0	2,146	606,476	198	278,372	848	38	4	108	2	1,090	-1,057
10	2017	2,366	212	0	2,578	626,211	204	301,834	920	41	5	111	2	1,171	-1,407
11	2018	1,355	218	0	1,574	645,946	211	326,849	996	44	5	115	2	1,258	-316
12	2019	979	235	0	1,214	665,681	217	352,811	1,075	48	5	118	2	1,347	133
13	2020	979	235	0	1,214	685,415	223	379,720	1,157	51	6	122	2	1,440	226
14	2021	487	235	0	722	705,151	230	407,577	1,242	55	6	125	2	1,535	813
15	2022	487	235	0	722	724,885	236	436,381	1,330	59	7	129	2	1,634	912
16	2023	487	235	0	722	744,620	243	466,132	1,421	63	7	132	2	1,736	1,013
17	2024	487	235	0	722	764,355	249	497,595	1,517	67	7	136	2	1,843	1,120
18	2025	488	235	1,192	1,915	784,090	256	529,261	1,613	71	8	139	2	1,950	35
19	2026	487	235	0	722	803,825	262	562,678	1,715	76	8	143	2	2,064	1,342
20	2027	487	235	0	722	823,560	268	597,081	1,820	81	9	146	2	2,180	1,458
21	2028	487	235	0	722	843,295	275	632,471	1,928	85	9	150	2	2,300	1,578
22	2029	487	235	0	722	863,030	281	668,848	2,039	90	10	153	3	2,423	1,701
23	2030	487	235	0	722	882,765	288	706,212	2,153	95	11	157	3	2,549	1,827
24	2031	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
25	2032	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
26	2033	0	235	436	671	882,765	288	706,212	2,153	95	11	157	3	2,549	1,878
27	2034	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
28	2035	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
29	2036	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
30	2037	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
31	2038	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
32	2039	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
33	2040	0	235	1,192	1,427	882,765	288	706,212	2,153	95	11	157	3	2,549	1,122
34	2041	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
35	2042	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
36	2043	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
37	2044	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
38	2045	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
39	2046	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
40	2047	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
41	2048	0	235	436	671	882,765	288	706,212	2,153	95	11	157	3	2,549	1,878
42	2049	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
43	2050	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
44	2051	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
45	2052	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
46	2053	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
47	2054	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
48	2055	0	235	1,192	1,427	882,765	288	706,212	2,153	95	11	157	3	2,549	1,122
49	2056	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
50	2057	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
51	2058	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
52	2059	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
53	2060	0	235	0	235	882,765	288	706,212	2,153	95	11	157	3	2,549	2,314
Total		18,903	######	4,448	34,442		13,181		89,154	3,949	439		118	#######	72,398
Net Present Value (Discount Rate at 10 %)					10,082									10,460	378
EIRR:															10.5%
B/C															1.04

Table 9 (1)

Calculation of Financial Internal Rate of Return (FIRR) under Full Construction Cost Recovery with Existing Sewage Disposal Service Expenditure and Existing Charge Collection Rate in Lucknow

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost: Construction Cost	O&M cost	Replacement cost	Total	Financial Benefit: Existing Expenditure for Sewage Disposal Service: Connected HHs (Number)	Basic unit: 3,048	Cash Balance
	2005	0	0	0	0			0
	2006	0	0	0	0			0
	2007	0	0	0	0			0
1	2008	1,781	0	0	1,781			-1,781
2	2009	2,100	0	0	2,100	81,973	187	-1,913
3	2010	2,498	0	0	2,498	84,544	193	-2,304
4	2011	923	197	0	1,120	115,453	264	-856
5	2012	923	197	0	1,120	148,036	338	-781
6	2013	564	197	0	761	182,291	417	-344
7	2014	564	197	0	761	218,218	499	-262
8	2015	564	197	0	761	255,819	585	-176
9	2016	3,018	366	0	3,384	278,372	636	-2,747
10	2017	3,407	366	0	3,773	301,834	690	-3,083
11	2018	2,037	377	0	2,414	326,849	747	-1,667
12	2019	1,535	406	0	1,941	352,811	807	-1,134
13	2020	1,535	406	0	1,941	379,720	868	-1,072
14	2021	764	406	0	1,170	407,577	932	-238
15	2022	764	406	0	1,170	436,381	998	-172
16	2023	764	406	0	1,170	466,132	1,066	-104
17	2024	764	406	0	1,170	497,595	1,138	-32
18	2025	765	406	1,835	3,006	529,261	1,210	-1,796
19	2026	764	406	0	1,170	562,678	1,286	117
20	2027	764	406	0	1,170	597,081	1,365	195
21	2028	764	406	0	1,170	632,471	1,446	276
22	2029	764	406	0	1,170	668,848	1,529	359
23	2030	764	406	0	1,170	706,212	1,614	445
24	2031	0	406	0	406	706,212	1,614	1,208
25	2032	0	406	0	406	706,212	1,614	1,208
26	2033	0	406	671	1,077	706,212	1,614	538
27	2034	0	406	0	406	706,212	1,614	1,208
28	2035	0	406	0	406	706,212	1,614	1,208
29	2036	0	406	0	406	706,212	1,614	1,208
30	2037	0	406	0	406	706,212	1,614	1,208
31	2038	0	406	0	406	706,212	1,614	1,208
32	2039	0	406	0	406	706,212	1,614	1,208
33	2040	0	406	1,835	2,241	706,212	1,614	-627
34	2041	0	406	0	406	706,212	1,614	1,208
35	2042	0	406	0	406	706,212	1,614	1,208
36	2043	0	406	0	406	706,212	1,614	1,208
37	2044	0	406	0	406	706,212	1,614	1,208
38	2045	0	406	0	406	706,212	1,614	1,208
39	2046	0	406	0	406	706,212	1,614	1,208
40	2047	0	406	0	406	706,212	1,614	1,208
41	2048	0	406	671	1,077	706,212	1,614	538
42	2049	0	406	0	406	706,212	1,614	1,208
43	2050	0	406	0	406	706,212	1,614	1,208
44	2051	0	406	0	406	706,212	1,614	1,208
45	2052	0	406	0	406	706,212	1,614	1,208
46	2053	0	406	0	406	706,212	1,614	1,208
47	2054	0	406	0	406	706,212	1,614	1,208
48	2055	0	406	1,835	2,241	706,212	1,614	-627
49	2056	0	406	0	406	706,212	1,614	1,208
50	2057	0	406	0	406	706,212	1,614	1,208
51	2058	0	406	0	406	706,212	1,614	1,208
52	2059	0	406	0	406	706,212	1,614	1,208
53	2060	0	406	0	406	706,212	1,614	1,208
Total		29,082	19,146	6,846	55,075		67,246	12,172
NPV (Discount Rate at 10 %)					11,862		7,255	-6,907
EIRR:								-
B/C								0.61

Note: * Assuming 10 % discount rate

Table 9 (2)

Calculation of Financial Internal Rate of Return (FIRR) with Existing Expenditure for Sewage Disposal Service with the Existing Charge Collection Rate of 75% in Lucknow

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost: Construction Cost shared by user	39%	O&M cost	Replacement cost	Total	Financial Benefit: Existing Expenditure for Sewage Disposal Service: Connected HHs (Number)	Basic unit: 3,699	Cash Balance
	2005	0		0	0	0	0	0	0
	2006	0		0	0	0	0	0	0
	2007	0		0	0	0	0	0	0
1	2008	695		0	0	695	0	0	-695
2	2009	819		0	0	819	81,973	227	-592
3	2010	974		0	0	974	84,544	235	-739
4	2011	360		197	0	557	115,453	320	-236
5	2012	360		197	0	557	148,036	411	-146
6	2013	220		197	0	417	182,291	506	89
7	2014	220		197	0	417	218,218	605	188
8	2015	220		197	0	417	255,819	710	293
9	2016	1,177		366	0	1,543	278,372	772	-771
10	2017	1,329		366	0	1,695	301,834	837	-857
11	2018	794		377	0	1,171	326,849	907	-265
12	2019	598		406	0	1,004	352,811	979	-26
13	2020	598		406	0	1,004	379,720	1,053	49
14	2021	298		406	0	704	407,577	1,131	427
15	2022	298		406	0	704	436,381	1,211	507
16	2023	298		406	0	704	466,132	1,293	589
17	2024	298		406	0	704	497,595	1,380	677
18	2025	298		406	1,835	2,539	529,261	1,468	-1,071
19	2026	298		406	0	704	562,678	1,561	857
20	2027	298		406	0	704	597,081	1,656	953
21	2028	298		406	0	704	632,471	1,755	1,051
22	2029	298		406	0	704	668,848	1,856	1,152
23	2030	298		406	0	704	706,212	1,959	1,255
24	2031	0		406	0	406	706,212	1,959	1,553
25	2032	0		406	0	406	706,212	1,959	1,553
26	2033	0		406	671	1,077	706,212	1,959	883
27	2034	0		406	0	406	706,212	1,959	1,553
28	2035	0		406	0	406	706,212	1,959	1,553
29	2036	0		406	0	406	706,212	1,959	1,553
30	2037	0		406	0	406	706,212	1,959	1,553
31	2038	0		406	0	406	706,212	1,959	1,553
32	2039	0		406	0	406	706,212	1,959	1,553
33	2040	0		406	1,835	2,241	706,212	1,959	-282
34	2041	0		406	0	406	706,212	1,959	1,553
35	2042	0		406	0	406	706,212	1,959	1,553
36	2043	0		406	0	406	706,212	1,959	1,553
37	2044	0		406	0	406	706,212	1,959	1,553
38	2045	0		406	0	406	706,212	1,959	1,553
39	2046	0		406	0	406	706,212	1,959	1,553
40	2047	0		406	0	406	706,212	1,959	1,553
41	2048	0		406	671	1,077	706,212	1,959	883
42	2049	0		406	0	406	706,212	1,959	1,553
43	2050	0		406	0	406	706,212	1,959	1,553
44	2051	0		406	0	406	706,212	1,959	1,553
45	2052	0		406	0	406	706,212	1,959	1,553
46	2053	0		406	0	406	706,212	1,959	1,553
47	2054	0		406	0	406	706,212	1,959	1,553
48	2055	0		406	1,835	2,241	706,212	1,959	-282
49	2056	0		406	0	406	706,212	1,959	1,553
50	2057	0		406	0	406	706,212	1,959	1,553
51	2058	0		406	0	406	706,212	1,959	1,553
52	2059	0		406	0	406	706,212	1,959	1,553
53	2060	0		406	0	406	706,212	1,959	1,553
Total		11,342		19,146	6,846	37,334		81,609	44,274
NPV (Discount Rate at 10 %)						5,948		6,014	66
FIRR:									10.2%
B/C									1.01

Note: Percentage of user share of construction cost to obtain about 10 % FIRR

Table 9 (3)

Calculation of Financial Internal Rate of Return (FIRR) with Existing Expenditure for Sewage Disposal Service with the Proposed Charge Collection Rate of 95% in Lucknow

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost: Construction Cost shared by user	56%	O&M cost	Replacement cost	Total	Financial Benefit: Existing Expenditure for Sewage Disposal Service: Connected HHs (Number)	Basic unit: 3,699	Cash Balance
	2005	0		0	0	0	0	0	0
	2006	0		0	0	0	0	0	0
	2007	0		0	0	0	0	0	0
1	2008	997		0	0	997	0	0	-997
2	2009	1,176		0	0	1,176	81,973	288	-888
3	2010	1,399		0	0	1,399	84,544	297	-1,102
4	2011	517		197	0	714	115,453	406	-308
5	2012	517		197	0	714	148,036	520	-193
6	2013	316		197	0	513	182,291	641	128
7	2014	316		197	0	513	218,218	767	254
8	2015	316		197	0	513	255,819	899	386
9	2016	1,690		366	0	2,056	278,372	978	-1,078
10	2017	1,908		366	0	2,274	301,834	1,061	-1,213
11	2018	1,141		377	0	1,518	326,849	1,149	-369
12	2019	859		406	0	1,265	352,811	1,240	-26
13	2020	859		406	0	1,265	379,720	1,334	69
14	2021	428		406	0	834	407,577	1,432	599
15	2022	428		406	0	834	436,381	1,533	700
16	2023	428		406	0	834	466,132	1,638	804
17	2024	428		406	0	834	497,595	1,749	915
18	2025	428		406	1,835	2,670	529,261	1,860	-810
19	2026	428		406	0	834	562,678	1,977	1,144
20	2027	428		406	0	834	597,081	2,098	1,265
21	2028	428		406	0	834	632,471	2,223	1,389
22	2029	428		406	0	834	668,848	2,350	1,517
23	2030	428		406	0	834	706,212	2,482	1,648
24	2031	0		406	0	406	706,212	2,482	2,076
25	2032	0		406	0	406	706,212	2,482	2,076
26	2033	0		406	671	1,077	706,212	2,482	1,405
27	2034	0		406	0	406	706,212	2,482	2,076
28	2035	0		406	0	406	706,212	2,482	2,076
29	2036	0		406	0	406	706,212	2,482	2,076
30	2037	0		406	0	406	706,212	2,482	2,076
31	2038	0		406	0	406	706,212	2,482	2,076
32	2039	0		406	0	406	706,212	2,482	2,076
33	2040	0		406	1,835	2,241	706,212	2,482	241
34	2041	0		406	0	406	706,212	2,482	2,076
35	2042	0		406	0	406	706,212	2,482	2,076
36	2043	0		406	0	406	706,212	2,482	2,076
37	2044	0		406	0	406	706,212	2,482	2,076
38	2045	0		406	0	406	706,212	2,482	2,076
39	2046	0		406	0	406	706,212	2,482	2,076
40	2047	0		406	0	406	706,212	2,482	2,076
41	2048	0		406	671	1,077	706,212	2,482	1,405
42	2049	0		406	0	406	706,212	2,482	2,076
43	2050	0		406	0	406	706,212	2,482	2,076
44	2051	0		406	0	406	706,212	2,482	2,076
45	2052	0		406	0	406	706,212	2,482	2,076
46	2053	0		406	0	406	706,212	2,482	2,076
47	2054	0		406	0	406	706,212	2,482	2,076
48	2055	0		406	1,835	2,241	706,212	2,482	241
49	2056	0		406	0	406	706,212	2,482	2,076
50	2057	0		406	0	406	706,212	2,482	2,076
51	2058	0		406	0	406	706,212	2,482	2,076
52	2059	0		406	0	406	706,212	2,482	2,076
53	2060	0		406	0	406	706,212	2,482	2,076
Total		16,286		19,146	6,846	42,278		103,371	61,093
NPV (Discount Rate at 10 %)						7,596		7,618	21
FIRR:									10.0%
B/C									1.00

Note: Percentage of user share of construction cost to obtain about 10 % FIRR

Table 10 Cost Flow of the Project for Kanpur (Financial cost and economic cost of construction, O&M and replacement)

Construction Works (Unit: Rs. Million)

	Cost Item	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(1)	Construction Cost	14,667	0	0	0	654	942	1,004	290	290	139	139	139	1,788	1,313	1,464	1,137	1,138	416	416	442	416	460	416	416	416	416	416
	Facilities (STP&PS)	2,736	0	0	0	261	633	695	0	0	0	0	0	651	176	250	0	0	0	0	26	0	44	0	0	0	0	0
	Pipe works	11,931	0	0	0	393	309	309	290	290	139	139	139	1,137	1,137	1,214	1,137	1,138	416	416	416	416	416	416	416	416	416	416
(2)	Land Acquisition	707	0	0	0	576	0	0	0	0	0	0	0	131	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(3)	Engineering Cost	2,200	0	0	0	98	141	151	44	44	21	21	21	268	197	220	171	171	62	62	66	62	69	62	62	62	62	62
(4)	Administration Cost	1,467	0	0	0	65	94	100	29	29	14	14	14	179	131	146	114	114	42	42	44	42	46	42	42	42	42	42
(5)	Sub-total (1+2+3+4)	19,041	0	0	0	1,394	1,178	1,255	363	363	174	174	174	2,366	1,641	1,830	1,421	1,423	520	520	553	520	575	520	520	520	520	520
(6)	Physical Contingency	3,808	0	0	0	279	236	251	73	73	35	35	35	473	328	366	284	285	104	104	111	104	115	104	104	104	104	104
(7)	Financial Cost (5+6)	22,849	0	0	0	1,672	1,413	1,506	435	435	209	209	209	2,839	1,970	2,196	1,706	1,707	624	624	663	624	690	624	624	624	624	624
(8)	Economic Cost	14,619	0	0	0	774	1,007	1,076	278	278	133	133	133	1,843	1,286	1,443	1,088	1,089	398	398	427	398	447	398	398	398	398	398

Replacement Costs of E&M of facility

Sanctioned cost of facility (STP&PS)

The Year incurred	2025	2040	2055	2033	2048	2038	2053	2040	2055	2025	2040	2055	Sum
(9) Total STP&PS	1,589	1,589	1,589	1,077	1,077	26	26	44	44	1,790	1,790	1,790	12,431
(10) Financial cost of replacement	477	477	477	323	323	8	8	13	13	537	537	537	3,729
(11) Economic cost of replacement	305	305	305	207	207	5	5	8	8	344	344	344	2,387
Description	JICA 1st phase			JICA 2nd phase		UP Sanctioned 1st phase							

Year of operatic	2010
Cost	1,790
	1st phase

Note: E&M of facilities will be replaced once in 15 years
Sanctioned facilities is regarded as existing and only replacement costs will be incurred once in 15 years.
Construction cost of sanctioned facilities were roughly estimated by JICA Study team.

Operation and Maintenance Works (O&M Works) including existing, sanctioned and proposed facilities (Unit: Rs. Million)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(11) Financial Cost	0	0	0	0	0	0	227	227	227	227	227	387	387	387	408	408	408	408	408	408	408	408	408	408	408	408
(12) Economic Cost	0	0	0	0	0	0	132	132	132	132	132	224	224	224	236	236	236	236	236	236	236	236	236	236	236	236
	Start of operation of proposed facility																									

(Note)

Engineering Cost:	15%	of Direct Construction Cost. The half is LC portion and the other half is FC portion.
Administration Cost:	10%	of Direct Construction Cost.
Physical Contingency:	20%	of Direct Construction Cost.
Equipment/materials:	70%	
Labor Cost:	30%	
Equipment/materials:	30%	
Labor Cost:	70%	
SCF:	0.88101	(SCF: Standard Conversion Factor for tradable goods)
Contractor's Profit:	10%	of Direct Construction Cost and Engineering Cost in LC portion.
Corporate Income Tax:	35%	of corporate income.
Personal Income Tax:	10%	of labor cost.
Shadow Price Rate:	**0.0059**	**of land acquisition cost.**
Shadow Wage Rate:	**0.5**	**of labor cost.**
Replacement	30%	of total cost of STP and PS, every 15 years

input column

Table 11 Calculation of Economic Internal Rate of Return (ERR) for Kanpur

(Unit: Rs. Million)

Year in Order	Fiscal Year	Economic Cost				Economic Benefit									Cash Balance
		Const-ruction Cost	O&M Cost	Re-place-ment cost	Total	WTP for Improve-ment of River Water Quality		WTP for Sewage Disposal Service		Saving of Medical Expendi-tures	Saving of Salaries/ Wages	Contribution to Local Economy		Total	
						Total HHs	Basic unit:	Connected HHs	Basic unit:	Basic unit:	Basic unit:	Annual Regular Users			
							326		2,208	140	9	Population Projection	16,425		
	2005														
	2006														
	2007														
1	2008	774	0	0	774		0		0	0	0		0	0	-774
2	2009	1,007	0	0	1,007		0		0	0	0		0	0	-1,007
3	2010	1,076	0	0	1,076		0		0	0	0		0	0	-1,076
4	2011	278	132	0	409	598,764	195	131,728	291	18	1	73	1	507	98
5	2012	278	132	0	409	618,571	202	142,271	314	20	1	76	1	538	129
6	2013	133	132	0	265	638,378	208	187,045	413	26	2	78	1	650	386
7	2014	133	132	0	265	658,185	215	196,797	435	28	2	80	1	680	415
8	2015	133	132	0	265	677,992	221	206,788	457	29	2	82	1	710	445
9	2016	1,843	224	0	2,067	691,390	225	224,010	495	31	2	84	1	755	-1,313
10	2017	1,286	224	0	1,510	704,788	230	242,447	535	34	2	85	1	803	-707
11	2018	1,443	224	0	1,667	718,186	234	261,420	577	37	2	87	1	852	-815
12	2019	1,088	236	0	1,324	731,584	238	281,660	622	39	3	89	1	904	-421
13	2020	1,089	236	0	1,325	744,982	243	302,463	668	42	3	90	1	957	-368
14	2021	398	236	0	634	758,380	247	323,828	715	45	3	92	2	1,012	378
15	2022	398	236	0	634	771,778	252	346,528	765	49	3	94	2	1,070	435
16	2023	427	236	0	664	785,175	256	369,817	817	52	3	95	2	1,129	466
17	2024	398	236	0	634	798,573	260	393,696	869	55	4	97	2	1,190	555
18	2025	447	236	649	1,333	811,971	265	418,977	925	59	4	98	2	1,254	-79
19	2026	398	236	0	634	825,369	269	444,874	982	62	4	100	2	1,319	685
20	2027	398	236	0	634	838,767	273	471,387	1,041	66	4	102	2	1,386	752
21	2028	398	236	0	634	852,165	278	499,369	1,103	70	4	103	2	1,457	822
22	2029	398	236	0	634	865,563	282	527,128	1,164	74	5	105	2	1,526	892
23	2030	398	236	0	634	878,961	287	588,904	1,300	82	5	107	2	1,676	1,042
24	2031	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
25	2032	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
26	2033	0	236	207	443	878,961	287	588,904	1,300	82	5	107	2	1,676	1,233
27	2034	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
28	2035	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
29	2036	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
30	2037	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
31	2038	0	236	5	241	878,961	287	588,904	1,300	82	5	107	2	1,676	1,435
32	2039	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
33	2040	0	236	657	893	878,961	287	588,904	1,300	82	5	107	2	1,676	783
34	2041	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
35	2042	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
36	2043	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
37	2044	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
38	2045	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
39	2046	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
40	2047	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
41	2048	0	236	207	443	878,961	287	588,904	1,300	82	5	107	2	1,676	1,233
42	2049	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
43	2050	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
44	2051	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
45	2052	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
46	2053	0	236	5	241	878,961	287	588,904	1,300	82	5	107	2	1,676	1,435
47	2054	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
48	2055	0	236	657	893	878,961	287	588,904	1,300	82	5	107	2	1,676	783
49	2056	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
50	2057	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
51	2058	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
52	2059	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
53	2060	0	236	0	236	878,961	287	588,904	1,300	82	5	107	2	1,676	1,440
Total		14,619	######	2,387	28,263		13,476		53,496	3,392	218		82	70,665	42,402
Net Present Value (Discount Rate at 10 %)					7,702									7,208	-494
EIRR:															9.1%
B/C															0.94

Table 12 (1)

Calculation of Financial Internal Rate of Return (FIRR) under Full Construction Cost Recovery with Exiting Sewage Expenditure and Existing Charge Collection Rate in Kanpur

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit			Cash Balance
		Const-ruction Cost	O&M cost	Re-place-ment cost	Total	Existing Expenditure for Sewerage Treatment Services			
						Connect-ed HHs	Basic unit: 2,208		
0	2004								
1	2005				0			0	
2	2006				0			0	
3	2007				0			0	
4	2008	1,672	0	0	1,672			-1,672	
5	2009	1,413	0	0	1,413			-1,413	
6	2010	1,506	0	0	1,506			-1,506	
7	2011	435	227	0	662	131,728	218	-444	
8	2012	435	227	0	662	142,271	236	-426	
9	2013	209	227	0	436	187,045	310	-126	
10	2014	209	227	0	436	196,797	326	-110	
11	2015	209	227	0	436	206,788	342	-93	
12	2016	2,839	387	0	3,226	224,010	371	-2,855	
13	2017	1,970	387	0	2,357	242,447	401	-1,955	
14	2018	2,196	387	0	2,583	261,420	433	-2,150	
15	2019	1,706	408	0	2,114	281,660	466	-1,647	
16	2020	1,707	408	0	2,115	302,463	501	-1,614	
17	2021	624	408	0	1,032	323,828	536	-496	
18	2022	624	408	0	1,032	346,528	574	-458	
19	2023	663	408	0	1,071	369,817	612	-459	
20	2024	624	408	0	1,032	393,696	652	-380	
21	2025	690	408	1,014	2,112	418,977	694	-1,418	
22	2026	624	408	0	1,032	444,874	737	-295	
23	2027	624	408	0	1,032	471,387	781	-251	
24	2028	624	408	0	1,032	499,369	827	-205	
25	2029	624	408	0	1,032	527,128	873	-159	
26	2030	624	408	0	1,032	588,904	975	-57	
27	2031	0	408	0	408	588,904	975	567	
28	2032	0	408	0	408	588,904	975	567	
29	2033	0	408	323	731	588,904	975	244	
30	2034	0	408	0	408	588,904	975	567	
31	2035	0	408	0	408	588,904	975	567	
32	2036	0	408	0	408	588,904	975	567	
33	2037	0	408	0	408	588,904	975	567	
34	2038	0	408	8	416	588,904	975	559	
35	2039	0	408	0	408	588,904	975	567	
36	2040	0	408	1,027	1,435	588,904	975	-460	
37	2041	0	408	0	408	588,904	975	567	
38	2042	0	408	0	408	588,904	975	567	
39	2043	0	408	0	408	588,904	975	567	
40	2044	0	408	0	408	588,904	975	567	
41	2045	0	408	0	408	588,904	975	567	
42	2046	0	408	0	408	588,904	975	567	
43	2047	0	408	0	408	588,904	975	567	
44	2048	0	408	323	731	588,904	975	244	
45	2049	0	408	0	408	588,904	975	567	
46	2050	0	408	0	408	588,904	975	567	
47	2051	0	408	0	408	588,904	975	567	
48	2052	0	408	0	408	588,904	975	567	
49	2053	0	408	8	416	588,904	975	559	
50	2054	0	408	0	408	588,904	975	567	
51	2055	0	408	1,027	1,435	588,904	975	-460	
52	2056	0	408	0	408	588,904	975	567	
53	2057	0	408	0	408	588,904	975	567	
54	2058	0	408	0	408	588,904	975	567	
55	2059	0	408	0	408	588,904	975	567	
56	2060	0	408	0	408	588,904	975	567	
Total		22,849	19,432	3,729	46,010		40,122	-5,888	
NPV (Discount Rate at 10 %)					9,302		5,073	-6,439	
EIRR:								-	
B/C								0.55	

Table 12 (2)

Calculation of Financial Internal Rate of Return (FIRR) with Sewage Service Expenditure and Existing Charge Collection Rate of 75% in Kanpur

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit			Cash Balance
		Const-ruction Cost shared by user 10%	O&M cost	Re-place-ment cost	Total	Proposed Charge Level for Sewerage Treatment Services			
						Connect-ed HHs	Basic unit: 2,196		
0	2004								
1	2005	0	0	0	0	0	0	0	
2	2006	0	0	0	0	0	0	0	
3	2007	0	0	0	0	0	0	0	
4	2008	167	0	0	167	0	0	-167	
5	2009	141	0	0	141	0	0	-141	
6	2010	151	0	0	151	0	0	-151	
7	2011	44	227	0	271	131,728	217	-54	
8	2012	44	227	0	271	142,271	234	-36	
9	2013	21	227	0	248	187,045	308	60	
10	2014	21	227	0	248	196,797	324	76	
11	2015	21	227	0	248	206,788	341	93	
12	2016	284	387	0	671	224,010	369	-302	
13	2017	197	387	0	584	242,447	399	-185	
14	2018	220	387	0	607	261,420	431	-176	
15	2019	171	408	0	579	281,660	464	-115	
16	2020	171	408	0	579	302,463	498	-81	
17	2021	62	408	0	470	323,828	533	63	
18	2022	62	408	0	470	346,528	571	100	
19	2023	66	408	0	474	369,817	609	135	
20	2024	62	408	0	470	393,696	648	178	
21	2025	69	408	1,014	1,491	418,977	690	-801	
22	2026	62	408	0	470	444,874	733	262	
23	2027	62	408	0	470	471,387	776	306	
24	2028	62	408	0	470	499,369	822	352	
25	2029	62	408	0	470	527,128	868	398	
26	2030	62	408	0	470	588,904	970	500	
27	2031	0	408	1,086	1,494	588,904	970	-524	
28	2032	0	408	0	408	588,904	970	562	
29	2033	0	408	98	506	588,904	970	464	
30	2034	0	408	0	408	588,904	970	562	
31	2035	0	408	0	408	588,904	970	562	
32	2036	0	408	0	408	588,904	970	562	
33	2037	0	408	0	408	588,904	970	562	
34	2038	0	408	153	561	588,904	970	409	
35	2039	0	408	0	408	588,904	970	562	
36	2040	0	408	43	451	588,904	970	519	
37	2041	0	408	0	408	588,904	970	562	
38	2042	0	408	0	408	588,904	970	562	
39	2043	0	408	0	408	588,904	970	562	
40	2044	0	408	0	408	588,904	970	562	
41	2045	0	408	0	408	588,904	970	562	
42	2046	0	408	1,086	1,494	588,904	970	-524	
43	2047	0	408	0	408	588,904	970	562	
44	2048	0	408	98	506	588,904	970	464	
45	2049	0	408	0	408	588,904	970	562	
46	2050	0	408	0	408	588,904	970	562	
47	2051	0	408	0	408	588,904	970	562	
48	2052	0	408	0	408	588,904	970	562	
49	2053	0	408	153	561	588,904	970	409	
50	2054	0	408	0	408	588,904	970	562	
51	2055	0	408	43	451	588,904	970	519	
52	2056	0	408	0	408	588,904	970	562	
53	2057	0	408	0	408	588,904	970	562	
54	2058	0	408	0	408	588,904	970	562	
55	2059	0	408	0	408	588,904	970	562	
56	2060	0	408	0	408	588,904	970	562	
Total		2,285	19,432	3,775	25,492		39,904	14,412	
NPV (Discount Rate at 10 %)					2,856		2,848	-8	
FIRR:								9.9%	
B/C								1.00	

Note: Percentage of user share of construction cost to obtain about 10 % FIRR

Table 12 (3)

Calculation of Financial Internal Rate of Return (FIRR) with Sewage Service Expenditure with the Proposed Charge Collection Rate of 95% in Kanpur

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit			Cash Balance
		Const-ruction Cost shared by user 20%	O&M cost	Re-place-ment cost	Total	Proposed Charge Level for Sewerage Treatment Services			
						Connect-ed HHs	Basic unit: 2,196		
0	2004								
1	2005	0	0	0	0	0	0	0	
2	2006	0	0	0	0	0	0	0	
3	2007	0	0	0	0	0	0	0	
4	2008	334	0	0	334	0	0	-334	
5	2009	283	0	0	283	0	0	-283	
6	2010	301	0	0	301	0	0	-301	
7	2011	87	227	0	314	131,728	275	-39	
8	2012	87	227	0	314	142,271	297	-17	
9	2013	42	227	0	269	187,045	390	122	
10	2014	42	227	0	269	196,797	411	142	
11	2015	42	227	0	269	206,788	431	163	
12	2016	568	387	0	955	224,010	467	-488	
13	2017	394	387	0	781	242,447	506	-275	
14	2018	439	387	0	826	261,420	545	-281	
15	2019	341	408	0	749	281,660	588	-162	
16	2020	341	408	0	749	302,463	631	-118	
17	2021	125	408	0	533	323,828	676	143	
18	2022	125	408	0	533	346,528	723	190	
19	2023	133	408	0	541	369,817	772	231	
20	2024	125	408	0	533	393,696	821	289	
21	2025	138	408	1,014	1,560	418,977	874	-686	
22	2026	125	408	0	533	444,874	928	395	
23	2027	125	408	0	533	471,387	983	451	
24	2028	125	408	0	533	499,369	1,042	509	
25	2029	125	408	0	533	527,128	1,100	567	
26	2030	125	408	0	533	588,904	1,229	696	
27	2031	0	408	1,086	1,494	588,904	1,229	-266	
28	2032	0	408	0	408	588,904	1,229	821	
29	2033	0	408	98	506	588,904	1,229	723	
30	2034	0	408	0	408	588,904	1,229	821	
31	2035	0	408	0	408	588,904	1,229	821	
32	2036	0	408	0	408	588,904	1,229	821	
33	2037	0	408	0	408	588,904	1,229	821	
34	2038	0	408	153	561	588,904	1,229	667	
35	2039	0	408	0	408	588,904	1,229	821	
36	2040	0	408	43	451	588,904	1,229	777	
37	2041	0	408	0	408	588,904	1,229	821	
38	2042	0	408	0	408	588,904	1,229	821	
39	2043	0	408	0	408	588,904	1,229	821	
40	2044	0	408	0	408	588,904	1,229	821	
41	2045	0	408	0	408	588,904	1,229	821	
42	2046	0	408	1,086	1,494	588,904	1,229	-266	
43	2047	0	408	0	408	588,904	1,229	821	
44	2048	0	408	98	506	588,904	1,229	723	
45	2049	0	408	0	408	588,904	1,229	821	
46	2050	0	408	0	408	588,904	1,229	821	
47	2051	0	408	0	408	588,904	1,229	821	
48	2052	0	408	0	408	588,904	1,229	821	
49	2053	0	408	153	561	588,904	1,229	667	
50	2054	0	408	0	408	588,904	1,229	821	
51	2055	0	408	43	451	588,904	1,229	777	
52	2056	0	408	0	408	588,904	1,229	821	
53	2057	0	408	0	408	588,904	1,229	821	
54	2058	0	408	0	408	588,904	1,229	821	
55	2059	0	408	0	408	588,904	1,229	821	
56	2060	0	408	0	408	588,904	1,229	821	
Total		4,570	19,432	3,775	27,777		50,545	22,768	
NPV (Discount Rate at 10 %)					3,578		3,607	29	
FIRR:								10.2%	
B/C								1.01	

Note: Percentage of user share of construction cost to obtain about 10 % FIRR

Table 13 Cost Flow of the Project for Allahabad (Financial cost and economic cost of construction, O&M and replacement)

Construction Works (Unit: Rs. Million)

	Cost Item	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(1)	Construction Cost	5,657	0	0	0	543	890	583	149	149	33	33	33	425	455	379	287	288	129	129	243	129	130	130	130	130	130	130
	Facilities (STP&PS)	1,681	0	0	0	267	613	419	0	0	0	0	0	92	122	54	0	0	0	0	114	0	0	0	0	0	0	0
	Pipe works	3,976	0	0	0	276	277	164	149	149	33	33	33	333	333	325	287	288	129	129	129	129	130	130	130	130	130	130
(2)	Land Acquisition	620	0	0	0	228	0	279	0	0	0	0	0	113	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(3)	Engineering Cost	849	0	0	0	81	134	87	22	22	5	5	5	64	68	57	43	43	19	19	36	19	20	20	20	20	20	20
(4)	Administration Cost	566	0	0	0	54	89	58	15	15	3	3	3	43	46	38	29	29	13	13	24	13	13	13	13	13	13	13
(5)	Sub-total (1+2+3+4)	7,691	0	0	0	907	1,113	1,008	186	186	41	41	41	644	569	474	359	360	161	161	304	161	163	163	163	163	163	163
(6)	Physical Contingency	1,538	0	0	0	181	223	202	37	37	8	8	8	129	114	95	72	72	32	32	61	32	33	33	33	33	33	33
(7)	Financial Cost (5+6)	9,230	0	0	0	1,088	1,335	1,209	224	224	50	50	50	773	683	569	431	432	194	194	365	194	195	195	195	195	195	195
(8)	Economic Cost	5,806	0	0	0	606	954	678	143	143	32	32	32	443	456	372	275	276	123	123	251	123	124	124	124	124	124	124

Replacement Costs of E&M of facility

	The Year incurred	2025	2040	2055	2033	2048	2038	2053
(9)	Total STP&PS	1,299	1,299	1,299	268	268	114	114
(10)	Financial cost of replacement	390	390	390	80	80	34	34
(11)	Economic cost of replacement	245	245	245	51	51	22	22
	Description	JICA 1st phase			JICA 2nd phase			

Sanctioned cost of facility (STP&PS)

2025	2040	2055	Sum
133	133	133	5,060
40	40	40	1,518
25	25	25	956
UP Sanctioned			

Year of operatic	2010
Cost	**133**
	1st phase

Note: E&M of facilities will be replaced once in 15 years
Sanctioned facilities is regarded as existing and only replacement costs will be incurred once in 15 years.
Construction cost of sanctioned facilities were roughly estimated by JICA Study team.

Operation and Maintenance Works (O&M Works) including existing, sanctioned and proposed facilities (Unit: Rs. Million)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(11)	Financial Cost	0	0	0	0	0	0	92	92	92	92	92	100	100	103	114	114	114	114	114	114	114	114	114	114	114	114
(12)	Economic Cost	0	0	0	0	0	0	53	53	53	53	53	58	58	60	66	66	66	66	66	66	66	66	66	66	66	66
		Start of operation of proposed facility																									

(Note)

Engineering Cost:	15%	of Direct Construction Cost. The half is LC portion and the other half is FC portion.
Administration Cost:	10%	of Direct Construction Cost.
Physical Contingency:	20%	of Direct Construction Cost.
Equipment/materials:	70%	
Labor Cost:	30%	
Equipment/materials:	30%	
Labor Cost:	70%	
SCF:	0.88101	(SCF: Standard Conversion Factor for tradable goods)
Contractor's Profit:	10%	of Direct Construction Cost and Engineering Cost in LC portion.
Corporate Income Tax:	35%	of corporate income.
Personal Income Tax:	10%	of labor cost.
Shadow Price Rate:	**0.0059**	**of land acquisition cost.**
Shadow Wage Rate:	**0.5**	**of labor cost.**
Replacement	30%	of total cost of STP and PS, every 15 years

input column

Table 14 Calculation of Economic Internal Rate of Return (EIRR) for Allahabad

(Unit: Rs. Million)

Year in Order	Fiscal Year	Economic Cost				Economic Benefit											
		Const-ruction Cost	O&M Cost	Re-place-ment cost	Total	WTP for Improve-ment of River Water Quality		WTP for Sewage Disposal Service		Saving of Medical Expendi-tures	Saving of Salaries/ Wages	Contribution to Local Economy				Total	Cash Balance
												Annual Regular Users		Occasional Users			
						Total HHs	Basic unit:	Connected HHs	Basic unit:	Basic unit:	Basic unit:	Population Projection	Basic unit:	Population Projection	Basic unit:		
							326		1,380	138	13		16,425		54,750		
	2005																
	2006																
	2007																
1	2008	606		0	606		0		0	0	0		0		0	0	-606
2	2009	954		0	954		0		0	0	0		0		0	0	-954
3	2010	678		0	678		0		0	0	0		0		0	0	-678
4	2011	143	53	0	196	206,297	67	44,973	62	6	1	2,299	38	2,806	154	174	-22
5	2012	143	53	0	196	211,071	69	48,335	67	7	1	2,353	39	2,862	157	181	-14
6	2013	32	53	0	85	215,846	70	51,803	71	7	1	2,408	40	2,919	160	189	104
7	2014	32	53	0	85	220,620	72	55,596	77	8	1	2,462	40	2,977	163	197	113
8	2015	32	53	0	85	225,400	73	59,055	81	8	1	2,516	41	3,036	166	205	120
9	2016	443	58	0	500	230,988	75	78,074	108	11	1	2,581	42	3,096	170	237	-263
10	2017	456	58	0	514	236,575	77	87,060	120	12	1	2,646	43	3,158	173	254	-260
11	2018	372	60	0	431	242,162	79	96,380	133	13	1	2,711	45	3,221	176	271	-160
12	2019	275	66	0	341	247,750	81	106,037	146	15	1	2,776	46	3,285	180	289	-52
13	2020	276	66	0	342	253,337	83	116,028	160	16	2	2,841	47	3,350	183	307	-35
14	2021	123	66	0	189	258,924	84	126,355	174	17	2	2,906	48	3,417	187	326	136
15	2022	123	66	0	189	264,511	86	137,281	189	19	2	2,971	49	3,485	191	345	156
16	2023	251	66	0	318	270,099	88	148,284	205	20	2	3,036	50	3,554	195	365	47
17	2024	123	66	0	189	275,686	90	159,898	221	22	2	3,101	51	3,625	198	386	196
18	2025	124	66	270	460	281,273	92	171,577	237	24	2	3,165	52	3,697	202	406	-54
19	2026	124	66	0	190	286,861	94	183,878	254	25	2	3,230	53	3,771	206	428	238
20	2027	124	66	0	190	292,448	95	196,525	271	27	3	3,295	54	3,846	211	450	260
21	2028	124	66	0	190	298,035	97	209,221	289	29	3	3,360	55	3,922	215	473	282
22	2029	124	66	0	190	303,622	99	222,555	307	31	3	3,425	56	4,000	219	496	306
23	2030	124	66	0	190	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	353
24	2031	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
25	2032	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
26	2033	0	66	51	117	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	426
27	2034	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
28	2035	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
29	2036	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
30	2037	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
31	2038	0	66	22	88	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	455
32	2039	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
33	2040	0	66	270	336	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	207
34	2041	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
35	2042	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
36	2043	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
37	2044	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
38	2045	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
39	2046	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
40	2047	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
41	2048	0	66	51	117	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	426
42	2049	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
43	2050	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
44	2051	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
45	2052	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
46	2053	0	66	22	88	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	455
47	2054	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
48	2055	0	66	270	336	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	207
49	2056	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
50	2057	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
51	2058	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
52	2059	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
53	2060	0	66	0	66	309,649	101	251,435	347	35	3	3,490	57	4,080	223	543	477
Total		5,806	3,216	956	9,977		4,701		13,929	1,393	131		2,665		10,430	######	12,842
Net Present Value (Discount Rate at 10 %)					3,509											2,301	-1,208
EIRR:																	6.1%
B/C																	0.66

Table 15 (1)

Calculation of Financial Internal Rate of Return (FIRR) under Full Construction Cost Recovery with Exiting Sewage Expenditure and Existing Charge Collection Rate in Allahabad

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit		
		Const-ruction Cost	O&M cost	Re-place-ment cost	Total	Existing Expenditure for Sewerage Treatment Services		Cash Balance
						Connect-ed HHs	Basic unit: 1,380	
0	2004							
1	2005				0			0
2	2006				0			0
3	2007				0			0
4	2008	606	0	0	606			-606
5	2009	954	0	0	954			-954
6	2010	678	0	0	678			-678
7	2011	143	53	0	196	44,973	47	-149
8	2012	143	53	0	196	48,335	50	-146
9	2013	32	53	0	85	51,803	54	-31
10	2014	32	53	0	85	55,596	58	-27
11	2015	32	53	0	85	59,055	61	-24
12	2016	443	58	0	500	78,074	81	-420
13	2017	456	58	0	514	87,060	90	-424
14	2018	372	60	0	431	96,380	100	-332
15	2019	275	66	0	341	106,037	110	-231
16	2020	276	66	0	342	116,028	120	-222
17	2021	123	66	0	189	126,355	131	-59
18	2022	123	66	0	189	137,281	142	-47
19	2023	251	66	0	318	148,284	153	-164
20	2024	123	66	0	189	159,898	165	-24
21	2025	124	66	270	460	171,577	178	-283
22	2026	124	66	0	190	183,878	190	0
23	2027	124	66	0	190	196,525	203	13
24	2028	124	66	0	190	209,221	217	26
25	2029	124	66	0	190	222,555	230	40
26	2030	124	66	0	190	251,435	260	70
27	2031	0	66	0	66	251,435	260	194
28	2032	0	66	0	66	251,435	260	194
29	2033	0	66	51	117	251,435	260	143
30	2034	0	66	0	66	251,435	260	194
31	2035	0	66	0	66	251,435	260	194
32	2036	0	66	0	66	251,435	260	194
33	2037	0	66	0	66	251,435	260	194
34	2038	0	66	22	88	251,435	260	172
35	2039	0	66	0	66	251,435	260	194
36	2040	0	66	270	336	251,435	260	-76
37	2041	0	66	0	66	251,435	260	194
38	2042	0	66	0	66	251,435	260	194
39	2043	0	66	0	66	251,435	260	194
40	2044	0	66	0	66	251,435	260	194
41	2045	0	66	0	66	251,435	260	194
42	2046	0	66	0	66	251,435	260	194
43	2047	0	66	0	66	251,435	260	194
44	2048	0	66	51	117	251,435	260	143
45	2049	0	66	0	66	251,435	260	194
46	2050	0	66	0	66	251,435	260	194
47	2051	0	66	0	66	251,435	260	194
48	2052	0	66	0	66	251,435	260	194
49	2053	0	66	22	88	251,435	260	172
50	2054	0	66	0	66	251,435	260	194
51	2055	0	66	270	336	251,435	260	-76
52	2056	0	66	0	66	251,435	260	194
53	2057	0	66	0	66	251,435	260	194
54	2058	0	66	0	66	251,435	260	194
55	2059	0	66	0	66	251,435	260	194
56	2060	0	66	0	66	251,435	260	194
Total		5,806	3,216	956	9,977		10,447	469
NPV (Discount Rate at 10 %)					2,636		1,216	-1,950
EIRR:								-
B/C								0.46

Table 15(2)

Calculation of Financial Internal Rate of Return (FIRR) with Sewage Service Expenditure and Existing Charge Collection Rate of 75% in Allahabad

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit		
		Const-ruction Cost shared by user 21%	O&M cost	Re-place-ment cost	Total	Proposed Charge Level for Sewerage Treatment Services		Cash Balance
						Connect-ed HHs	Basic unit: 1,964	
0	2004							
1	2005	0	0	0	0	0	0	0
2	2006	0	0	0	0	0	0	0
3	2007	0	0	0	0	0	0	0
4	2008	127	0	0	127	0	0	-127
5	2009	200	0	0	200	0	0	-200
6	2010	142	0	0	142	0	0	-142
7	2011	30	53	0	83	44,973	66	-17
8	2012	30	53	0	83	48,335	71	-12
9	2013	7	53	0	60	51,803	76	16
10	2014	7	53	0	60	55,596	82	22
11	2015	7	53	0	60	59,055	87	27
12	2016	93	58	0	151	78,074	115	-36
13	2017	96	58	0	154	87,060	128	-25
14	2018	78	60	0	138	96,380	142	4
15	2019	58	66	0	124	106,037	156	32
16	2020	58	66	0	124	116,028	171	47
17	2021	26	66	0	92	126,355	186	94
18	2022	26	66	0	92	137,281	202	110
19	2023	53	66	0	119	148,284	218	100
20	2024	26	66	0	92	159,898	236	144
21	2025	26	66	270	362	171,577	253	-109
22	2026	26	66	0	92	183,878	271	179
23	2027	26	66	0	92	196,525	289	197
24	2028	26	66	0	92	209,221	308	216
25	2029	26	66	0	92	222,555	328	236
26	2030	26	66	0	92	251,435	370	278
27	2031	0	66	1,086	1,152	251,435	370	-782
28	2032	0	66	0	66	251,435	370	304
29	2033	0	66	98	164	251,435	370	207
30	2034	0	66	0	66	251,435	370	304
31	2035	0	66	0	66	251,435	370	304
32	2036	0	66	0	66	251,435	370	304
33	2037	0	66	0	66	251,435	370	304
34	2038	0	66	153	219	251,435	370	151
35	2039	0	66	0	66	251,435	370	304
36	2040	0	66	43	109	251,435	370	261
37	2041	0	66	0	66	251,435	370	304
38	2042	0	66	0	66	251,435	370	304
39	2043	0	66	0	66	251,435	370	304
40	2044	0	66	0	66	251,435	370	304
41	2045	0	66	0	66	251,435	370	304
42	2046	0	66	1,086	1,152	251,435	370	-782
43	2047	0	66	0	66	251,435	370	304
44	2048	0	66	98	164	251,435	370	207
45	2049	0	66	0	66	251,435	370	304
46	2050	0	66	0	66	251,435	370	304
47	2051	0	66	0	66	251,435	370	304
48	2052	0	66	0	66	251,435	370	304
49	2053	0	66	153	219	251,435	370	151
50	2054	0	66	0	66	251,435	370	304
51	2055	0	66	43	109	251,435	370	261
52	2056	0	66	0	66	251,435	370	304
53	2057	0	66	0	66	251,435	370	304
54	2058	0	66	0	66	251,435	370	304
55	2059	0	66	0	66	251,435	370	304
56	2060	0	66	0	66	251,435	370	304
Total		1,219	3,216	3,031	7,466		14,868	7,401
NPV (Discount Rate at 10 %)					964		977	13
FIRR:								10.2%
B/C								1.01

Note: Percentage of user share of construction cost to obtain about 10 % FIRR

Table 15 (3)

Calculation of Financial Internal Rate of Return (FIRR) with Sewage Service Expenditure with the Proposed Charge Collection Rate of 95% in Allahabad

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit		
		Const-ruction Cost shared by user 33%	O&M cost	Re-place-ment cost	Total	Proposed Charge Level for Sewerage Treatment Services		Cash Balance
						Connect-ed HHs	Basic unit: 1,964	
0	2004							
1	2005	0	0	0	0	0	0	0
2	2006	0	0	0	0	0	0	0
3	2007	0	0	0	0	0	0	0
4	2008	200	0	0	200	0	0	-200
5	2009	315	0	0	315	0	0	-315
6	2010	224	0	0	224	0	0	-224
7	2011	47	53	0	100	44,973	84	-16
8	2012	47	53	0	100	48,335	90	-10
9	2013	10	53	0	64	51,803	97	33
10	2014	10	53	0	64	55,596	104	40
11	2015	10	53	0	64	59,055	110	46
12	2016	146	58	0	204	78,074	146	-58
13	2017	150	58	0	208	87,060	162	-46
14	2018	123	60	0	182	96,380	180	-2
15	2019	91	66	0	157	106,037	198	41
16	2020	91	66	0	157	116,028	216	60
17	2021	41	66	0	107	126,355	236	129
18	2022	41	66	0	107	137,281	256	149
19	2023	83	66	0	149	148,284	277	128
20	2024	41	66	0	107	159,898	298	192
21	2025	41	66	270	377	171,577	320	-57
22	2026	41	66	0	107	183,878	343	236
23	2027	41	66	0	107	196,525	367	260
24	2028	41	66	0	107	209,221	390	283
25	2029	41	66	0	107	222,555	415	308
26	2030	41	66	0	107	251,435	469	362
27	2031	0	66	1,086	1,152	251,435	469	-683
28	2032	0	66	0	66	251,435	469	403
29	2033	0	66	98	164	251,435	469	305
30	2034	0	66	0	66	251,435	469	403
31	2035	0	66	0	66	251,435	469	403
32	2036	0	66	0	66	251,435	469	403
33	2037	0	66	0	66	251,435	469	403
34	2038	0	66	153	219	251,435	469	250
35	2039	0	66	0	66	251,435	469	403
36	2040	0	66	43	109	251,435	469	360
37	2041	0	66	0	66	251,435	469	403
38	2042	0	66	0	66	251,435	469	403
39	2043	0	66	0	66	251,435	469	403
40	2044	0	66	0	66	251,435	469	403
41	2045	0	66	0	66	251,435	469	403
42	2046	0	66	1,086	1,152	251,435	469	-683
43	2047	0	66	0	66	251,435	469	403
44	2048	0	66	98	164	251,435	469	305
45	2049	0	66	0	66	251,435	469	403
46	2050	0	66	0	66	251,435	469	403
47	2051	0	66	0	66	251,435	469	403
48	2052	0	66	0	66	251,435	469	403
49	2053	0	66	153	219	251,435	469	250
50	2054	0	66	0	66	251,435	469	403
51	2055	0	66	43	109	251,435	469	360
52	2056	0	66	0	66	251,435	469	403
53	2057	0	66	0	66	251,435	469	403
54	2058	0	66	0	66	251,435	469	403
55	2059	0	66	0	66	251,435	469	403
56	2060	0	66	0	66	251,435	469	403
Total		1,916	3,216	3,031	8,163		18,832	10,669
NPV (Discount Rate at 10 %)					1,234		1,237	3
FIRR:								10.0%
B/C								1.00

Note: Percentage of user share of construction cost to obtain about 10 % FIRR

Table 16 Cost Flow of the Project for Varanasi (Financial cost and economic cost of construction, O&M and replacement)

Construction Works (Unit: Rs. Million)

	Cost Item	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(1)	Construction Cost	7,887	653	1,127	1,130	282	282	282	99	99	99	99	99	454	457	315	255	383	264	180	166	166	166	166	166	166	166	166
	Facilities (STP&PS)	2,110	289	613	530	0	0	0	0	0	0	0	0	176	202	60	0	128	98	14	0	0	0	0	0	0	0	0
	Pipe works	5,777	364	514	600	282	282	282	99	99	99	99	99	278	255	255	255	255	166	166	166	166	166	166	166	166	166	166
(2)	Land Acquisition	596	324	0	0	0	0	0	0	0	0	0	0	272	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(3)	Engineering Cost	1,183	98	169	170	42	42	42	15	15	15	15	15	68	69	47	38	57	40	27	25	25	25	25	25	25	25	25
(4)	Administration Cost	789	65	113	113	28	28	28	10	10	10	10	10	45	46	32	26	38	26	18	17	17	17	17	17	17	17	17
(5)	Sub-total (1+2+3+4)	10,455	1,140	1,409	1,413	353	353	353	124	124	124	124	124	840	571	394	319	479	330	225	208	208	208	208	208	208	208	208
(6)	Physical Contingency	2,091	228	282	283	71	71	71	25	25	25	25	25	168	114	79	64	96	66	45	42	42	42	42	42	42	42	42
(7)	Financial Cost (5+6)	12,546	1,368	1,691	1,695	423	423	423	149	149	149	149	149	1,007	686	473	383	575	396	270	249	249	249	249	249	249	249	249
(8)	Economic Cost	8,007	732	1,180	1,169	270	270	270	95	95	95	95	95	513	471	311	244	388	269	175	159	159	159	159	159	159	159	159

Replacement Costs of E&M of facility

	The Year incurred	2022	2037	2052	2033	2048	2037	2052
(9)	Total STP&PS	1,432	1,432	1,432	438	438	240	240
(10)	Financial cost of replacement	430	430	430	131	131	72	72
(11)	Economic cost of replacement	274	274	274	84	84	46	46
	Description	JICA 1st phase			JICA 2nd phase		JICA 2nd phase	

Sanctioned cost of facility (STP&PS)

2025	2040	2055	sum
74	74	74	
22	22	22	1,762
14	14	14	1,124
UP Sanctioned			

Year of operatic	2007
Cost	74
	1st phase

Note: E&M of facilities will be replaced once in 15 years
Sanctioned facilities is regarded as existing and only replacement costs will be incurred once in 15 years.
Construction cost of sanctioned facilities were roughly estimated by JICA Study team.

Operation and Maintenance Works (O&M Works) including existing, sanctioned and proposed facilities (Unit: Rs. Million)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(11)	Financial Cost				147	147	147	147	147	147	147	147	184	184	189	201	201	201	201	201	201	201	201	201	201	201	201
(12)	Economic Cost	0	0	0	85	85	85	85	85	85	85	85	106	106	109	116	116	116	116	116	116	116	116	116	116	116	116
		Start of operation of proposed facility																									

(Note)

Engineering Cost:	15%	of Direct Construction Cost. The half is LC portion and the other half is FC portion.
Administration Cost:	10%	of Direct Construction Cost.
Physical Contingency:	20%	of Direct Construction Cost.
Equipment/materials:	70%	
Labor Cost:	30%	
Equipment/materials:	30%	
Labor Cost:	70%	
SCF:	0.88101	(SCF: Standard Conversion Factor for tradable goods)
Contractor's Profit:	10%	of Direct Construction Cost and Engineering Cost in LC portion.
Corporate Income Tax:	35%	of corporate income.
Personal Income Tax:	10%	of labor cost.
Shadow Price Rate:	**0.0059**	**of land acquisition cost.**
Shadow Wage Rate:	**0.5**	**of labor cost.**
Replacement	30%	of total cost of STP and PS, every 15 years

Table 17 Calculation of Economic Internal Rate of Return (EIRR) for Varanasi

(Unit: Rs. Million)

Year in Order	Fiscal Year	Economic Cost				Economic Benefit											
		Const-ruction Cost	O&M Cost	Re-place-ment cost	Total	WTP for Improve-ment of River Water Quality		WTP for Sewage Disposal Service		Saving of Medical Expendi-tures	Saving of Salaries/ Wages	Contribution to Local Economy				Total	Cash Balance
												Annual Regular Users		Occasional Users			
						Total HHs (nos.)	Basic unit: 326	Connected HHs (nos.)	Basic unit: 1,860	Basic unit: 162	Basic unit: 12	Population Projection	Basic unit: 16,425	Population Projection	Basic unit: 54,750		
1	2005	732	0	0	732												-732
2	2006	1,180	0	0	1,180												-1,180
3	2007	1,169	0	0	1,169												-1,169
4	2008	270	85	0	355	211,998	69	67,627	201	11	1	2,767	45	8,467	464	791	436
5	2009	270	85	0	355	218,772	71	70,226	131	11	1	2,838	47	8,635	473	734	378
6	2010	270	85	0	355	225,545	74	72,851	136	12	1	2,910	48	8,807	482	752	397
7	2011	95	85	0	180	232,318	76	75,968	141	12	1	2,981	49	8,982	492	771	591
8	2012	95	85	0	180	239,091	78	79,378	148	13	1	3,053	50	9,161	502	791	611
9	2013	95	85	0	180	245,864	80	82,856	154	13	1	3,125	51	9,343	512	812	632
10	2014	95	85	0	180	252,637	82	86,149	160	14	1	3,196	52	9,529	522	832	652
11	2015	95	85	0	180	259,410	85	89,756	167	15	1	3,268	54	9,719	532	853	673
12	2016	513	106	0	620	266,508	87	95,143	177	15	1	3,336	55	9,912	543	878	258
13	2017	471	106	0	577	273,606	89	100,961	188	16	1	3,405	56	10,109	553	904	327
14	2018	311	109	0	421	280,704	92	106,668	198	17	1	3,474	57	10,310	564	930	509
15	2019	244	116	0	360	287,802	94	112,818	210	18	1	3,543	58	10,516	576	957	597
16	2020	388	116	0	504	294,899	96	119,434	222	19	1	3,612	59	10,725	587	986	482
17	2021	269	116	0	385	301,997	98	125,933	234	20	2	3,680	60	10,939	599	1,014	629
18	2022	175	116	274	565	309,095	101	132,911	247	22	2	3,749	62	11,156	611	1,043	479
19	2023	159	116	0	275	316,193	103	139,757	260	23	2	3,818	63	11,378	623	1,073	798
20	2024	159	116	0	275	323,291	105	147,097	274	24	2	3,887	64	11,604	635	1,104	829
21	2025	159	116	14	289	330,389	108	154,952	288	25	2	3,956	65	11,835	648	1,136	847
22	2026	159	116	0	275	337,487	110	162,669	303	26	2	4,024	66	12,071	661	1,168	893
23	2027	159	116	0	275	344,585	112	170,570	317	28	2	4,093	67	12,311	674	1,201	925
24	2028	159	116	0	275	351,683	115	179,007	333	29	2	4,162	68	12,556	687	1,235	959
25	2029	159	116	0	275	358,781	117	187,642	349	30	2	4,231	69	12,806	701	1,269	994
26	2030	159	116	0	275	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,030
27	2031	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
28	2032	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
29	2033	0	116	84	200	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,104
30	2034	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
31	2035	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
32	2036	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
33	2037	0	116	320	436	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	868
34	2038	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
35	2039	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
36	2040	0	116	14	130	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,174
37	2041	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
38	2042	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
39	2043	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
40	2044	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
41	2045	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
42	2046	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
43	2047	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
44	2048	0	116	84	200	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,104
45	2049	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
46	2050	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
47	2051	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
48	2052	0	116	320	436	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	868
49	2053	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
50	2054	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
51	2055	0	116	14	130	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,174
52	2056	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
53	2057	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
54	2058	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
55	2059	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
56	2060	0	116	0	116	365,879	119	196,477	365	32	2	4,299	71	13,060	715	1,305	1,188
Total		8,007	5,885	1,124	15,016		5,739		16,167	1,401	104		3,456		34,807	61,674	######
Net Present Value (Discount Rate at 10 %)		4,799														9,212	6,178
EIRR:																	15.6%
B/C																	1.9

Table 18 (1)

Calculation of Financial Internal Rate of Return (EIRR) under Full Construction Cost Recovery with Exiting Sewerage Expenditure and Existing Charge Collection Rate in Varanasi

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit		Cash Balance
		Const-ruction Cost	O&M cost	Re-place-ment cost	Total	Existing Expenditure for Sewage Disposal Service		
						Connect-ed HHs	Basic unit: 1,860	
0	2004							
1	2005	1,368	0	0	1,368			-1,368
2	2006	1,691	0	0	1,691			-1,691
3	2007	1,695	0	0	1,695			-1,695
4	2008	423	147	0	570	67,627	94	-476
5	2009	423	147	0	570	70,226	98	-472
6	2010	423	147	0	570	72,851	102	-469
7	2011	149	147	0	296	75,968	106	-190
8	2012	149	147	0	296	79,378	111	-185
9	2013	149	147	0	296	82,856	116	-180
10	2014	149	147	0	296	86,149	120	-176
11	2015	149	147	0	296	89,756	125	-170
12	2016	1,007	184	0	1,191	95,143	133	-1,058
13	2017	686	184	0	869	100,961	141	-728
14	2018	473	189	0	661	106,668	149	-512
15	2019	383	201	0	583	112,818	157	-426
16	2020	575	201	0	775	119,434	167	-608
17	2021	396	201	0	597	125,933	176	-421
18	2022	270	201	430	900	132,911	185	-715
19	2023	249	201	0	450	139,757	195	-255
20	2024	249	201	0	450	147,097	205	-244
21	2025	249	201	22	472	154,952	216	-256
22	2026	249	201	0	450	162,669	227	-223
23	2027	249	201	0	450	170,570	238	-212
24	2028	249	201	0	450	179,007	250	-200
25	2029	249	201	0	450	187,642	262	-188
26	2030	249	201	0	450	196,477	274	-176
27	2031	0	201	0	201	196,477	274	73
28	2032	0	201	0	201	196,477	274	73
29	2033	0	201	131	332	196,477	274	-58
30	2034	0	201	0	201	196,477	274	73
31	2035	0	201	0	201	196,477	274	73
32	2036	0	201	0	201	196,477	274	73
33	2037	0	201	502	702	196,477	274	-428
34	2038	0	201	0	201	196,477	274	73
35	2039	0	201	0	201	196,477	274	73
36	2040	0	201	22	223	196,477	274	51
37	2041	0	201	0	201	196,477	274	73
38	2042	0	201	0	201	196,477	274	73
39	2043	0	201	0	201	196,477	274	73
40	2044	0	201	0	201	196,477	274	73
41	2045	0	201	0	201	196,477	274	73
42	2046	0	201	0	201	196,477	274	73
43	2047	0	201	0	201	196,477	274	73
44	2048	0	201	131	332	196,477	274	-58
45	2049	0	201	0	201	196,477	274	73
46	2050	0	201	0	201	196,477	274	73
47	2051	0	201	0	201	196,477	274	73
48	2052	0	201	502	702	196,477	274	-428
49	2053	0	201	0	201	196,477	274	73
50	2054	0	201	0	201	196,477	274	73
51	2055	0	201	22	223	196,477	274	51
52	2056	0	201	0	201	196,477	274	73
53	2057	0	201	0	201	196,477	274	73
54	2058	0	201	0	201	196,477	274	73
55	2059	0	201	0	201	196,477	274	73
56	2060	0	201	0	201	196,477	274	73
Total		12,546	10,159	1,762	24,467		12,068	-12,398
NPV (Discount Rate at 10 %)					7,637		1,501	-6,510
EIRR:								-
B/C								0.20

Table 18 (2)

Calculation of Financial Internal Rate of Return (FIRR) with Proposed Charge Level for Sewerage Treatment Services with the Existing Charge Collection Rate of 75% in Varanasi

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit		Cash Balance
		Const-ruction Cost shared by user 2%	O&M cost	Re-place-ment cost	Total	Proposed Charge for Sewage Disposal Service (2 % of household income)		
						Connect-ed HHs	Basic unit: 2,520	
0	2004							
1	2005	27	0	0	27	0	0	-27
2	2006	34	0	0	34	0	0	-34
3	2007	34	0	0	34	0	0	-34
4	2008	8	147	0	156	67,627	128	-28
5	2009	8	147	0	156	70,226	133	-23
6	2010	8	147	0	156	72,851	138	-18
7	2011	3	147	0	150	75,968	144	-7
8	2012	3	147	0	150	79,378	150	0
9	2013	3	147	0	150	82,856	157	6
10	2014	3	147	0	150	86,149	163	13
11	2015	3	147	0	150	89,756	170	19
12	2016	20	184	0	204	95,143	180	-24
13	2017	14	184	0	197	100,961	191	-6
14	2018	9	189	0	198	106,668	202	3
15	2019	8	201	0	208	112,818	213	5
16	2020	11	201	0	212	119,434	226	14
17	2021	8	201	0	209	125,933	238	29
18	2022	5	201	0	206	132,911	251	45
19	2023	5	201	0	206	139,757	264	59
20	2024	5	201	0	206	147,097	278	72
21	2025	5	201	22	228	154,952	293	65
22	2026	5	201	0	206	162,669	307	102
23	2027	5	201	0	206	170,570	322	117
24	2028	5	201	0	206	179,007	338	133
25	2029	5	201	0	206	187,642	355	149
26	2030	5	201	0	206	196,477	371	166
27	2031	0	201	1,086	1,287	196,477	371	-916
28	2032	0	201	0	201	196,477	371	171
29	2033	0	201	98	298	196,477	371	73
30	2034	0	201	0	201	196,477	371	171
31	2035	0	201	0	201	196,477	371	171
32	2036	0	201	0	201	196,477	371	171
33	2037	0	201	0	201	196,477	371	171
34	2038	0	201	153	354	196,477	371	17
35	2039	0	201	0	201	196,477	371	171
36	2040	0	201	43	244	196,477	371	128
37	2041	0	201	0	201	196,477	371	171
38	2042	0	201	0	201	196,477	371	171
39	2043	0	201	0	201	196,477	371	171
40	2044	0	201	0	201	196,477	371	171
41	2045	0	201	0	201	196,477	371	171
42	2046	0	201	1,086	1,287	196,477	371	-916
43	2047	0	201	0	201	196,477	371	171
44	2048	0	201	98	298	196,477	371	73
45	2049	0	201	0	201	196,477	371	171
46	2050	0	201	0	201	196,477	371	171
47	2051	0	201	0	201	196,477	371	171
48	2052	0	201	0	201	196,477	371	171
49	2053	0	201	153	354	196,477	371	17
50	2054	0	201	0	201	196,477	371	171
51	2055	0	201	43	244	196,477	371	128
52	2056	0	201	0	201	196,477	371	171
53	2057	0	201	0	201	196,477	371	171
54	2058	0	201	0	201	196,477	371	171
55	2059	0	201	0	201	196,477	371	171
56	2060	0	201	0	201	196,477	371	171
Total		251	10,159	2,784	13,193		16,351	3,157
NPV (Discount Rate at 10 %)					1,517		1,528	10
FIRR:								10.4%
B/C								1.01

Note: Percentage of user share of construction cost to obtain about 10 % FIRR

Table 18 (3)

Calculation of Financial Internal Rate of Return (FIRR) with Proposed Charge Level for Sewerage Treatment Services with the Proposed Charge Collection Rate of 95% in Varanasi

(Unit: Rs. Million)

Year in Order	Fiscal Year	Financial Cost				Financial Benefit		Cash Balance
		Const-ruction Cost shared by user 8%	O&M cost	Re-place-ment cost	Total	Proposed Charge for Sewage Disposal Service (2 % of household income)		
						Connect-ed HHs	Basic unit: 2,520	
0	2004							
1	2005	109	0	0	109	0	0	-109
2	2006	135	0	0	135	0	0	-135
3	2007	136	0	0	136	0	0	-136
4	2008	34	147	0	181	67,627	162	-19
5	2009	34	147	0	181	70,226	168	-13
6	2010	34	147	0	181	72,851	174	-7
7	2011	12	147	0	159	75,968	182	23
8	2012	12	147	0	159	79,378	190	31
9	2013	12	147	0	159	82,856	198	39
10	2014	12	147	0	159	86,149	206	47
11	2015	12	147	0	159	89,756	215	56
12	2016	81	184	0	264	95,143	228	-36
13	2017	55	184	0	238	100,961	242	3
14	2018	38	189	0	227	106,668	255	29
15	2019	31	201	0	231	112,818	270	39
16	2020	46	201	0	247	119,434	286	39
17	2021	32	201	0	232	125,933	301	69
18	2022	22	201	0	222	132,911	318	96
19	2023	20	201	0	221	139,757	335	114
20	2024	20	201	0	221	147,097	352	132
21	2025	20	201	22	243	154,952	371	128
22	2026	20	201	0	221	162,669	389	169
23	2027	20	201	0	221	170,570	408	188
24	2028	20	201	0	221	179,007	429	208
25	2029	20	201	0	221	187,642	449	229
26	2030	20	201	0	221	196,477	470	250
27	2031	0	201	1,086	1,287	196,477	470	-817
28	2032	0	201	0	201	196,477	470	270
29	2033	0	201	98	298	196,477	470	172
30	2034	0	201	0	201	196,477	470	270
31	2035	0	201	0	201	196,477	470	270
32	2036	0	201	0	201	196,477	470	270
33	2037	0	201	0	201	196,477	470	270
34	2038	0	201	153	354	196,477	470	116
35	2039	0	201	0	201	196,477	470	270
36	2040	0	201	43	244	196,477	470	227
37	2041	0	201	0	201	196,477	470	270
38	2042	0	201	0	201	196,477	470	270
39	2043	0	201	0	201	196,477	470	270
40	2044	0	201	0	201	196,477	470	270
41	2045	0	201	0	201	196,477	470	270
42	2046	0	201	1,086	1,287	196,477	470	-817
43	2047	0	201	0	201	196,477	470	270
44	2048	0	201	98	298	196,477	470	172
45	2049	0	201	0	201	196,477	470	270
46	2050	0	201	0	201	196,477	470	270
47	2051	0	201	0	201	196,477	470	270
48	2052	0	201	0	201	196,477	470	270
49	2053	0	201	153	354	196,477	470	116
50	2054	0	201	0	201	196,477	470	270
51	2055	0	201	43	244	196,477	470	227
52	2056	0	201	0	201	196,477	470	270
53	2057	0	201	0	201	196,477	470	270
54	2058	0	201	0	201	196,477	470	270
55	2059	0	201	0	201	196,477	470	270
56	2060	0	201	0	201	196,477	470	270
Total		1,004	10,159	2,784	13,946		20,711	6,765
NPV (Discount Rate at 10 %)					1,892		1,935	43
FIRR:								10.6%
B/C								1.02

Note: Percentage of user share of construction cost to obtain about 10 % FIRR

Appendix B

APPENDIX B

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Appendix B Socio-Economic Conditions

1 GANGA BASIN

Along the Ganga River, there are following 10 states as (1) Himachal Pradesh, (2) Haryana, (3) Rajasthan, (4) Uttaranchal, (5) Uttar Pradesh, (6) Madhya Pradesh, (7) Bihar, (8) Jharkand, (9) Dehli, and (10) West Bengal.

Under these states, there are 253 districts relating to the Ganga River Basin. Following Table shows their list, and its detail is shown in Table 1 in Annex.

Table 1.1 List of States and Districts Related to the Ganga River Basin

State	District Related to the Ganga Basin
Himachal Pradesh	Shimla, Sirmaur, Solan (3 Districts among 12 districts)
Haryana	Ambala, Bhiwani, Faridabad, Fatehabad, Gurgaon, Hisar, Jhajjar, Jind, Kaithal, Karnal, Kurukshetra, Mahendragarh, Panchkula, Panipat, Rewari, Rohtak, Sirsa, Sonipat, Yamuna Nagar (all of 19 districts)
Rajasthan	Ajmer, Alwar, Banswara, Baran, Bharatpur, Bhilwara, Bundi, Chittaurgarh, Dausa, Dhaulpur, Dunagarpur, Jaipur, Jhalawar, Jhunjhunun, Karauri, Kota, Nagaur, Rajsamand, Sawai Madhopur, Sikar, Tonk, Udaipur (22 districts among the 32 districts)
Uttaranchal	Almora, Bageshwar, Chamoli, Champawat, Dehradun, Hardwar, Nainital, Pauri Garhwar, Pithorahgarh,Rudraprayag, Tehri Garhwal, Udham Singh Nagar, Uttarkashi (All of 13 districts)
Uttar Pradesh	Agra, Aligarh, Allahabad, Ambedkar Nagar, Auraiya, Azamgarh, Bagpat, Bahraich, Ballia, Balranpur, Banda, Barabanki, Bareilly, Basti, Bijnor, Budaun, Bulandshahr, Chandauri, Chitrakoot, Deoria, Etah, Etawah, Faizabad, Farrukhabad, Fatehpur, Firozabad, Gautam Buddha Nagar, Ghaziabad, Ghazipur, Gonda, Gorakhpur, Hamirpur, Hardoi, Hathras, Jalaun, Jaunpur, Jhansi, Jyotiba Phule Nagar, Kannauj, Kanpur Dehat, Kanpur Nagar, Kaushambi, Kheri, Kushi Nagar, Lalitpur, Lucknow, Maharajganj, Mahoba, Mainpuri, Mathura, Mau, Meerut, Mirzapur, Moradabad, Muzaffar Nagar, Pilibhit, Puratapgarh, Rae Bareli, Rampur, Saharanpur, Sant Kabir Nagar, Sant Ravidas Nagar, Shahjahanpur, Shrawasti, Shiddharth Nagar, Sitapur, Sonbhadra, Sultanpur, Unnao, Varanasi (All of 70 districts)
Madhya Pradesh	Balaghat, Bhind, Bhopal, Chhatarpur, Chhindwara, Damoh, Datia, Dewas, Dhar, Dindori, Guna, Gwalior, Hoshangabad, Indore, Jabalpur, Katni, Mandla, Mandsaur, Morena, Narsinghpur, Neemuch (Nimach), Panna, Raisen, Rajgarh, Ratlam, Rewa, Sagar, Satna, Sehore, Seoni, Shahdol, Shajapur, Sheopur, Shivpuri, Sidhi, Tikamgarh, Ujjain, Umaria (Bandhavgarh), Vidisha (39 districts among 45 districts)
Bihar	Araria, Aurangabad, Banka, Begusarai, Bhagarpur, Bhojpur, Buxar, Darbhanga, East (Purba) Champaran, Gaya, Gopalganj, Jamui, Jehanabad, Kaimur (Bhabua), Katihar, Khagaria, Kishanganj, Lukheesarai (Lakisarai), Madhepura, Madhubani, Munger, Muzaffarupur, Nalanda, Nawada, Patna, Purnia, Rohtas, Saharsa (Koshi), Samastipur, Saran, Sheikhpura, Sheohar (Shivhar), Sitamarhi, Siwan, Supaul, Vaishali, West (Paschim) Champaran (All of 37 districts)
Jharkhand	Bokaro, Chatra, Devghar, Dhanbad, Dumka, East (Purba) Singhbhum, Garhwa, Giridih, Godda, Gumla, Hazaribag, Jamtara, Kodarma, Latehar, Lohardaga, Pakur, Palamu, Ranchi, Sahibganj, Seraikela, Simdega, West (Paschim) Singhbhum (All of 22 districts)
Delhi	Central Delhi, East Delhi, New Delhi, North Delhi, North East Delhi, North West Delhi, South Delhi, South West Delhi, West Delhi (All of 9 districts)
West Bengal	Bankura, Barddhaman, Birbhum, Cooch Behar (Kochi Bihar), Darjiling, East Midnapore (Medinipur), Hoogly (Hugli), Howrah (Haora), Jalpaiguri, Kolkata, Maldah, Murshidabad, Nadia, North 24 Parganas, North (Uttar) Dinajpur, Puruliya, South 24 Parganas, South (Dakshin) Dinajpur, West Midnapore (Medinipur) (All of 19 districts)

2 POPULATION

Population in the districts mentioned above is as summarized in the following table and its details are shown in Table 2 in Annex.

Table 2.1 Population of States Related to the Ganga River Basin

State/ District	Population in 1991	Population in 2001	Annual Average Increase Ratio
Whole India	**843,387,888**	**1,027,015,247**	**1.99%**
Himachal Pradesh	1,379,367	1,679,476	1.99%
Haryana	16,446,338	21,082,989	2.51%
Rajasthan	31,412,357	40,099,798	2.47%
Uttaranchal	7,113,500	8,479,562	1.77%
Uttar Pradesh	131,998,836	166,052,859	2.32%
Madhya Pradesh	42,512,671	52,800,683	2.19%
Bihar	64,530,457	82,878,796	2.53%
Jharkhand	20,389,624	25,133,467	2.11%
Delhi	9,420,637	13,782,976	3.88%
West Bengal	68,078,064	80,221,171	1.65%
Total	393,281,851	492,211,777	2.27%

Source: Census 1991 and 2001.

As of 2001, the population of the districts shares around 48 % to that of the whole India according to the Census of India 2001.

3 GROSS DOMESTIC PRODUCT

Following tables show the Gross Domestic Products of the states related to the Ganga River Basin:

Table 3.1 GRDP in the States Related to the Ganga River Basin (New Series)

A. At Current Price (Unit: million Rs.)

State	in 1991/92	in 2001/02	Annual Average Increase Ratio
Whole India	**5,890,860**	**20,940,130**	**13.19%**
Himachal Pradesh	27,996	118,553	18.16%
Haryana	172,510	531,774	12.61%
Rajasthan	266,320	818,761	11.82%
Uttaranchal	N.A	N.A	-
Uttar Pradesh	712,470	2,085,681	11.80%
Madhya Pradesh	385,330	1,128,387	10.94%
Bihar	311,990	796,313	9.99%
Jharkhand	N.A	N.A	-
Delhi	75,643	590,702	33.81%
West Bengal	435,430	1,422,717	12.88%
Total	2,387,689	7,492,889	13.00%

B. At 1993/94 Constant Price (Unit: million Rs.)

State	in 1991/92	in 2001/02	Annual Average Increase Ratio
Whole India	**7,018,630**	**12,654,290**	**5.63%**
Himachal Pradesh	39,477	75,476	7.00%
Haryana	206,300	317,627	4.24%
Rajasthan	310,370	520,183	4.21%
Uttaranchal	N.A	N.A	-
Uttar Pradesh	837,020	1,259,879	3.91%
Madhya Pradesh	447,340	724,901	3.95%
Bihar	394,880	512,016	2.01%
Jharkhand	N.A	N.A	-
Delhi	136,952	386,084	11.91%
West Bengal	482,320	873,031	6.25%
Total	2,854,659	4,669,197	4.63%

Source: Indian Economic Survey 2002-2003, and Web-Site named as "Indiastat.com".

According to the above tables, share rates of the GRDP of the states related to the Ganga River Basin to the whole India are 35.8 % at current price level, and 36.9 % at 1993/94 constant price.

On the other hand, the annual average growth ratios at current price level and at 1993/94 constant price level are slightly lower than those of the whole India as 13.0 % (13.2 % in India) and 4.6 % (5.6 %) as shown in the above tables. Details are shown in Table 3 in Annex.

4 FINANCIAL SITUATION IN THE NATION

According to the statistic record on the national finance[1], total amount of expenditure of the national Government of India has not been covered by the total revenue of it. Detail of the national financial situation is as shown in Table 4 to 7 in Annex, and following table shows its summary:

Table 4.1 Consolidated Receipts and Expenditures in India (1997-98 to 2002-03)

Consolidated Receipts and Expenditures in India

(Unit: million Rs.)

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
Receipts	6,054,724	6,542,497	8,566,514	6,931,091	7,791,890	8,332,147
Revenue Account (Current Account)	2,182,995	2,398,891	2,815,529	3,077,238	3,181,203	3,559,481
CapitalAccount	3,871,730	4,143,607	5,750,986	3,853,853	4,610,687	4,772,666
Expenditures	6,644,786	6,949,558	7,046,389	6,653,465	7,672,161	8,144,349
Revenue Account (Current Account)	2,777,323	3,004,833	3,431,682	3,426,474	3,755,825	4,080,389
CapitalAccount	3,867,463	3,944,725	3,614,707	3,226,992	3,916,336	4,063,960
Conslidated Net Surplus (+)/Deficit (-)	-590,062	-407,061	1,520,125	277,625	119,729	187,798

Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".

As shown in the above table, the financial situation of the national Government shows rather healthy since 1999-2000. It means that the Government finance supported since that year by both the tax revenue in revenue account (current account) and receipts in the public debt in capital account rising sharply in 1999-2000 as shown in Table 4 in Annex.

Following table shows a summary of the national receipts in revenue account (current account). In the total tax revenue, around 62 % - 74 % comes from the taxes on commodities and services which are indirect taxes. Details are shown in Table 4 in Annex.

Table 4.2 Statement of Revenue in India

(Unit: million Rs.)

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
A. Tex Revenue	1,257,127	1,293,168	1,552,295	1,886,030	1,870,601	2,162,661
(a) Taxes on Income and Expenditure	346,467	319,432	413,004	681,737	690,634	829,286
Corporation tax	200,160	245,291	306,923	356,963	366,091	461,724
Taxes on Income other than corporation tax	35,892	57,549	91,245	317,640	320,041	368,584
Hotels reciepts tax	22	2	5	8	12	25
Interest tax	12,052	12,638	12,115	4,145	1,893	-2,753
Other taxes on income and expenditure	98,341	3,951	2,716	2,982	2,596	1,706
(b) Taxes on Property and Capital Transactions	1,224	1,719	1,285	1,317	1,346	1,524
(c) Taxes on Commodities and Services	906,308	968,846	1,134,397	1,198,304	1,173,641	1,326,119
(d) Taxes on Union Teritories	3,129	3,171	3,610	4,672	4,982	5,733
B. Non-Tax Revenue	925,867	1,105,723	1,263,233	1,191,208	1,310,602	1,396,820
C. Grants-in-Aid and Contributions	10,184	9,873	11,079	8,135	17,516	18,682
External Grant Assistance	9,108	8,955	10,563	7,279	16,648	17,153
Aid Materials and Equipment	1,077	918	516	856	868	1,530
D. Non-Tax Revenue of Union Territories	3,253	3,673	4,121	4,470	5,210	5,578
Other Union Territories	3,253	3,673	4,121	4,470	5,210	5,578
Total Revenue of the Year	2,182,995	2,398,891	2,815,529	3,077,238	3,181,203	3,559,481

Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".

Among the receipts in revenue account (current account), the amount in grant-in-aid is less than 1 % consisting of external grant assistance and aid materials & equipment as shown in the following table.

[1] Indian Public Finance Statistics 2001-02, Ministry of Finance.

Table 4.3 Share Rate of Grant-In-Aid to the Total Revenue Receipts in India

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
In Currency (Unit: million Rs.)						
C. Grants-in-Aid and Contributions	10,184	9,873	11,079	8,135	17,516	18,682
External Grant Assistance	9,108	8,955	10,563	7,279	16,648	17,153
Aid Materials and Equipment	1,077	918	516	856	868	1,530
Share Rate of Grant-In-Aid to the Total Receipts in Revenue Account						
C. Grants-in-Aid and Contributions	0.47%	0.45%	0.51%	0.37%	0.80%	0.86%
External Grant Assistance	0.42%	0.41%	0.48%	0.33%	0.76%	0.79%
Aid Materials and Equipment	0.05%	0.04%	0.02%	0.04%	0.04%	0.07%
Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".						
D. Non-Tax Revenue of Union Territories	3,253	3,673	4,121	4,470	5,210	5,578
Other Union Territories	3,253	3,673	4,121	4,470	5,210	5,578
Total Revenue of the Year	2,182,995	2,398,891	2,815,529	3,077,238	3,181,203	3,559,481
Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".						

On the other hand, the share rate of the external debt to the capital income ranges from 2.0 % to 3.2 % since 1997-98 as shown in the following table.

Table 4.4 Share Rate of External Debt to the Total Capital Income in India

(Unit: million Rs.)

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
A. Public Debt	3,766,649	3,952,973	5,608,230	3,664,606	4,366,889	4,353,707
Internal Debt of Central Government	3,688,061	3,852,828	5,509,297	3,491,327	4,218,992	4,230,185
External Debt	78,588	100,146	98,933	173,280	147,897	123,521
Share Rate of External Debt to the Total Capital Income	**2.03%**	**2.59%**	**2.56%**	**4.48%**	**3.82%**	**3.19%**
B. Recoveries of Loans and Advances	95,963	131,894	125,515	167,993	207,334	387,452
C. Miscellaneous Capital Receipts	9,118	58,739	17,240	21,254	36,465	31,507
Total Capital Receipts of the Year	3,871,730	4,143,607	5,750,986	3,853,853	4,610,687	4,772,666
Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".						

Following table shows a summary of expenditure in revenue account (current account) in India. According to this table, the expenditure for general services are major one shared at almost half of the total expenditure. The expenditure for general services consists of Organs of State, Fiscal Services, Interest Payment and Servicing Debt, Administrative Services, Pensions and Miscellaneous General Services, and Defence Services.

Table 4.5 Expenditure and Their Share Rate of Each Category to the Total Expenditure in Revenue Account (Current Account) in India

(Unit: million Rs.)

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
In Currency						
A. General Services	1,142,197	1,353,829	1,630,470	1,749,985	1,880,253	2,019,285
B. Social Services	112,399	136,832	161,349	171,305	190,646	202,346
C. Economic Services	979,794	990,953	1,052,223	1,107,122	1,237,288	1,399,877
D. Grants-In-Aid and Contribution	532,674	510,809	574,022	383,794	431,567	441,473
E. Disburesement of Union Territories	10,260	12,410	13,619	14,268	16,071	17,407
Total Expenditure of the Year	2,777,323	3,004,833	3,431,682	3,426,474	3,755,825	4,080,389
Share Rate of Each Category of Expenditure						
A. General Services	41.13%	45.06%	47.51%	51.07%	50.06%	49.49%
B. Social Services	4.05%	4.55%	4.70%	5.00%	5.08%	4.96%
C. Economic Services	35.28%	32.98%	30.66%	32.31%	32.94%	34.31%
D. Grants-In-Aid and Contribution	19.18%	17.00%	16.73%	11.20%	11.49%	10.82%
E. Disburesement of Union Territories	0.37%	0.41%	0.40%	0.42%	0.43%	0.43%
Total Expenditure of the Year	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".

The expenditure for economic services is the second largest one as the amount. It consists of Agriculture and Allied Activities, Rural Development, Special Areas Programme, Irrigation and Flood Control, Energy, Industry and Minerals, Transport, Communication, Science Technology and Environment, and General Economic Services.

Among these economic development expenditures, the expenditures for Agriculture and Allied Activities and Transport are the top group as shared at 22.1 % and 36.6 % respectively. Furthermore, Rural Development, Energy, Industry and Minerals, and Communication are the second group as shared at 8.4 %, 6.4 %, 9.4 % and 6.3 % respectively to the total expenditure for the economic services as of 2002-23. The expenditure for General Economic Services shares as high as almost the same with the second group at 6.1 %, but it may consist of several items of expenditures which are unable to specify for categorizing.

The third largest expenditure group is Grants-In-Aid and Contribution, and it consists of Grants-In-Aid to State Governments, Grants-In-Aid to Union Territory Governments, Payment of States' Share of Union Excise Duties, Technical and Economic Cooperation with Other Countries, and Aid Materials and Equipment. Among these categories, the Grants-In-Aid to State Governments is the top sharing at 95.4 % to the total expenditure for grant-in-aid. It means that almost all Grants-In-Aid are for the government transfer to the states.

The expenditures for Social Services is the fourth group as sharing at only around 5 % to the expenditure as shown in the above table. It consists of General Education, Technical Education, Sports and Youth Services, Art and Culture, Medical Public Health, Family Welfare, Water Supply and Sanitation, Housing, Urban Development, Information and Publicity, Broadcasting, Welfare of Scheduled Castes, Scheduled Tribes and Other Backward Classes, Labour and Employment, Social Security and Welfare, Nutrition, Relief on Account of Natural Calamities, Other Social Services, and Secretariat-Social Services.

Among them, the expenditure for General Education is the top as sharing at 36.2 % to the total expenditure for the Social Services as of 2002-23. The second group of the expenditures for Social Services is Medical Public Health and Housing sharing at 10.8 % and 10.9 % respectively. The expenditure for Water Supply and Sanitation concerning the Project is belonging to the third expenditure group sharing at only 4.7 % to the total expenditure for the Social Services as of 2002-23.

5 FINANCIAL SITUATION IN THE STATE OF UTTAR PRADESH

Table hereunder shows an overall summary of the financing situation of the State of Uttar Pradesh. Details are shown in Table 8 to 11 in Annex.

As shown in the table below, the closing balance has been deficit since 1997-98. In the year 2000-01 and 2001-02, the closing balance became positive side, but these are still estimate (R.E. means "revised estimate", and B.E. means "budget estimate"). It means that the financial status of the State of Uttar Pradesh is under the unpredictable situation.

Table 5.1 Overall Financing Situation of the State of Uttar Pradesh

(Unit: million Rs.)

Item	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
Current Account: Surplus (+), Deficit (-)	-20,296	-23,352	-31,789	-46,215	-86,958	-72,467	-58,186	-40,319
Revenue	133,940	152,207	160,288	175,735	173,790	215,010	276,239	301,294
Expenditure	154,237	175,559	192,077	221,950	260,749	287,477	334,425	341,613
Capital Account: Surplus (+), Deficit (-)	53,056	31,570	32,084	39,268	72,678	57,061	72,760	40,773
Revenue	87,961	63,864	70,166	83,573	126,553	115,737	163,744	131,629
Expenditure	34,905	32,294	38,083	44,305	53,875	58,676	90,984	90,856
Total: Surplus (+), Deficit (-)	32,760	8,218	295	-6,947	-14,280	-15,406	14,574	453
Revenue	221,902	216,071	230,455	259,308	300,343	330,748	439,983	432,923
Expenditure	189,142	207,852	230,160	266,255	314,624	346,153	425,409	432,470
Opening Balance	-	32,760	8,218	295	-6,947	-14,280	-15,406	14,574
Closing Balance	32,760	8,218	295	-6,947	-14,280	-15,406	14,574	453

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

The largest amount receipts' category in the State of Uttar Pradesh is the Tax Revenue sharing at around 80 % since 1997-98 as shown in the table below.

Table 5.2 Share Rate of Each Category of Receipts in Revenue Account (Current Account) in the State of Uttar Pradesh

(Unit: million Rs.)

Receipts	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
In Currency								
Tax Revenue	88,381	105,029	123,784	141,129	136,812	168,798	207,085	245,300
Non-Tax Revenue	45,560	47,178	36,505	34,607	36,978	46,212	69,155	55,994
States own Non-Tax Revenue	18,901	24,049	13,188	12,941	14,754	20,177	17,912	17,780
Grants from the Centre	26,658	23,129	23,317	21,665	22,224	26,036	51,243	38,214
Total Receipts in Revenue Account (Current Account)	133,940	152,207	160,288	175,735	173,790	215,010	276,239	301,294
Share Rate of Receipts to the Total Receipts in Revenue Account (Current Account)								
Tax Revenue	65.99%	69.00%	77.23%	80.31%	78.72%	78.51%	74.97%	81.42%
Non-Tax Revenue	34.01%	31.00%	22.77%	19.69%	21.28%	21.49%	25.03%	18.58%
States own Non-Tax Revenue	14.11%	15.80%	8.23%	7.36%	8.49%	9.38%	6.48%	5.90%
Grants from the Centre	19.90%	15.20%	14.55%	12.33%	12.79%	12.11%	18.55%	12.68%
Total Receipts in Revenue Account (Current Account)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

On the other hand, the largest revenue category is the Loans and Advances from Centre (the national Government) sharing at 30.8 % as shown in the following table.

Table 5.3 Amount of Capital Receipts by Category in the State of Uttar Pradesh

(Unit: million Rs.)

Receipts	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E)
External Debt	-	-	-	0	0	-	-	-
Internal Debt	19,156	13,167	12,391	16,044	27,673	34,897	30,494	20,713
Loans and Advances from Centre	32,167	27,652	32,600	41,977	56,871	33,888	46,006	40,482
Special Securities Issued to NSSF	-	-	-	-	-	32,557	38,000	38,650
Recovery of Loans	8,386	1,517	2,258	3,272	7,622	2,628	6,493	6,564
Inter-State Settlement (Net)	0	0	0	0	0	-	-	-
Contingency Fund (Net)	-4,269	-439	569	-1,357	-2,229	548	2,400	-
Small Savings and Provident Funds etc. (Net)	4,848	5,873	6,334	11,638	12,806	13,150	13,663	9,079
Reserve Funds (Net)	4,372	5,464	6,511	7,468	8,916	11,608	12,617	11,518
Deposits and Advances	9,961	7,992	13,146	7,886	3,982	156	11,031	3,826
Suspense and Miscellaneous Funds	11,355	1,314	-1,212	-1,943	10,035	-12,114	2,039	797
Appropriation to Contingency Fund (Net)	0	0	0	0	0	-	-	-
Miscellaneous Capital Receipts	0	0	0	0	0	-	-	-
Remittances (Net)	1,986	1,324	-2,432	-1,413	877	-1,580	1,000	-
Capital Receipts in Total	87,961	63,864	70,166	83,573	126,553	115,737	163,744	131,629

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

In tax revenue, the amount of state of own taxes share at only 50 % or slightly more than 50 % to the total tax revenue during last 8 years since 1994-95 as shown in the following table, and remaining comes from other taxes consisting of Income Tax, Estate Duty, and Union Excise Duties sharing by the national Government.

Table 5.4 Receipts in Tax Revenue in the State of Uttar Pradesh

(Unit: million Rs.)

Receipts	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
In Currency								
States own Tax Revenue	48,783	54,689	63,060	69,980	79,101	94,009	106,043	127,328
1. Taxes on Income	29	29	61	63	138	59	60	70
2. Taxes on Property and Capital Transactions	6,925	7,982	9,489	10,259	11,201	12,948	16,564	18,411
3. Taxes on Commodities and Services	41,829	46,679	53,509	59,657	67,762	81,002	89,419	108,848
Share in Central Taxes	39,598	50,340	60,724	71,149	57,711	74,789	101,042	117,972
Tax Revenue in Total	88,381	105,029	123,784	141,129	136,812	168,798	207,085	245,300
Share Rate of Receipts to the Total Receipts in Revenue Account								
States own Tax Revenue	55.20%	52.07%	50.94%	49.59%	57.82%	55.69%	51.21%	51.91%
1. Taxes on Income	0.03%	0.03%	0.05%	0.04%	0.10%	0.03%	0.03%	0.03%
2. Taxes on Property and Capital Transactions	7.84%	7.60%	7.67%	7.27%	8.19%	7.67%	8.00%	7.51%
3. Taxes on Commodities and Services	47.33%	44.44%	43.23%	42.27%	49.53%	47.99%	43.18%	44.37%
Share in Central Taxes	44.80%	47.93%	49.06%	50.41%	42.18%	44.31%	48.79%	48.09%
Tax Revenue in Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

Among the state own taxes, Taxes on Income consisting of Agricultural Income Tax and Taxes on Professions, Trades, Callings and Employment are less than 1 % which means negligible small scale. The amounts of Taxes on Property and Capital Transactions consisting of Land Revenue, Stamps and Registration Fees, and Urban Immovable Property Tax share ranging from 7 % to 8 % to the total Tax Revenue as shown in the above table.

The amount of Taxes on Commodities and Services consisting of Sales Taxes, State Excise, Taxes on Vehicles, Taxes on Goods and Passengers, Taxes and Duties on Electricity, Entertainment Tax, and Other Taxes and Duties is the major receipt item sharing at 44.5 % to 49.5 % to the total Tax Revenue. These are the indirect taxes. These situation means that the direct taxes are collected with very low

collection rate.

Following table shows a summary of categorized expenditure and its share rates in each category of Revenue Account (Current Account) in the State of Uttar Pradesh.

Table 5.5 Expenditures and Share Rates in Revenue Account in the State of Uttar Pradesh

(Unit: million Rs.)

Expenditure	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
In Currency								
I. Developmental Expenditure (A + B)	85,419	91,339	105,903	117,777	137,031	144,294	161,086	153,479
A. Social Services	47,494	54,991	63,742	75,014	88,823	86,770	102,578	105,030
B. Economic Services	37,925	36,348	42,161	42,762	48,208	57,524	58,508	48,450
II. Non-Developmental Expenditure (General Services) (A to F)	66,453	81,481	83,194	97,999	114,977	134,575	162,728	177,634
A. Organs of State	2,156	3,022	2,757	3,307	3,117	3,722	4,503	4,924
B. Fiscal Services (i to iii)	3,986	4,759	5,498	6,231	7,141	7,351	9,113	8,986
C. Interest Payments and Servicing of Debt	32,174	37,392	45,963	53,312	62,737	74,819	95,766	106,341
D. Administrative Services (i to v)	14,429	17,464	19,648	24,473	24,120	27,988	32,933	36,897
E. Pensions	13,708	18,845	9,328	10,676	17,863	20,607	20,305	20,395
F. Miscellaneous General Services	-	-	-	-	-	87	108	91
III. Grants-In-Aid and Contributions	-	-	-	-	-	-	-	-
IV. Compensation and Assignments to Local Bodies and Panchayati Raj Institutions	2,365	2,738	2,980	6,175	8,740	8,609	10,611	10,500
V. Reserve with Finance Department	0	0	0	0	0	-	-	-
Expenditure in Total in Revenue Account (Current Account)	154,237	175,559	192,077	221,950	260,749	287,477	334,425	341,613
Share Rate by Item of Expenditure to the Total Expenditure in Revenue Account (Current Account)								
Developmental Expenditure (A + B)	55.38%	52.03%	55.14%	53.06%	52.55%	50.19%	48.17%	44.93%
A. Social Services	30.79%	31.32%	33.19%	33.80%	34.06%	30.18%	30.67%	30.75%
B. Economic Services	24.59%	20.70%	21.95%	19.27%	18.49%	20.01%	17.50%	14.18%
II. Non-Developmental Expenditure (General Services) (A to F)	43.08%	46.41%	43.31%	44.15%	44.10%	46.81%	48.66%	52.00%
A. Organs of State	1.40%	1.72%	1.44%	1.49%	1.20%	1.29%	1.35%	1.44%
B. Fiscal Services (i to iii)	2.58%	2.71%	2.86%	2.81%	2.74%	2.56%	2.72%	2.63%
C. Interest Payments and Servicing of Debt	20.86%	21.30%	23.93%	24.02%	24.06%	26.03%	28.64%	31.13%
D. Administrative Services (i to v)	9.36%	9.95%	10.23%	11.03%	9.25%	9.74%	9.85%	10.80%
E. Pensions	8.89%	10.73%	4.86%	4.81%	6.85%	7.17%	6.07%	5.97%
F. Miscellaneous General Services	-	-	-	-	-	0.03%	0.03%	0.03%
III. Grants-In-Aid and Contributions	-	-	-	-	-	-	-	-
IV. Compensation and Assignments to Local Bodies and Panchayati Raj Institutions	1.53%	1.56%	1.55%	2.78%	3.35%	2.99%	3.17%	3.07%
V. Reserve with Finance Department	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Expenditure in Total in Revenue Account (Current Account)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

According to the above table, the expenditure consists of 5 categories as Developmental Expenditure, Non-Developmental Expenditure, Grants-In-Aid and Contributions, Compensation and Assignments to Local Bodies and Panchayati Raj Institutions and Reserve with Finance Department.

Among them, the expenditures for Developmental Expenditure and Non-Developmental Expenditure are the major expenditures categories, and that for the former is slightly larger than the latter in the actual cases since 1994-05 till 1999-2000 as shown in the above table.

The Development Expenditure consists of Education, Sports, Art and Culture, Medical and Public Health, Family Welfare, Water Supply and Sanitation, Housing, Urban Development, Welfare of Scheduled Caste, Scheduled Tribes and Other Backward Classes, Labour and Labour Welfare, Social Security and Welfare, Food and Nutrition, Relief on account of Natural Calamities, and Others as shown in the table below.

Table 5.6 Expenditures and Share Rates in Social Expenditure in the State of Uttar Pradesh

(Unit: million Rs.)

Expenditure	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
In Currency								
Education, Sports, Art and Culture	29,658	33,832	38,736	41,961	57,314	57,123	65,226	63,013
Medical and Public Health	8,916	10,052	11,551	14,219	12,339	10,547	11,374	13,735
Family Welfare	-	-	-	-	-	2,156	2,635	3,853
Water Supply and Sanitation	2,012	2,566	2,995	5,283	3,953	3,128	5,087	5,297
Housing	146	138	163	191	128	151	172	153
Urban Development	222	330	923	1,458	1,448	765	1,199	1,297
Welfare of Scheduled Caste, Scheduled Tribes and Other Backward Classes	2,743	2,989	3,972	5,861	6,301	5,829	6,781	7,217
Labour and Labour Welfare	685	721	833	1,449	1,065	1,076	1,351	1,416
Social Security and Welfare	2,092	2,786	2,739	3,191	3,775	4,154	5,702	7,034
Food and Nutrition	0	0	0	0	0	-	-	-
Relief on account of Natural Calamities	758	1,222	1,518	1,074	2,006	1,342	2,501	1,536
Others*	263	356	313	328	493	499	552	477
Expenditure for Social Services in Total	47,494	54,991	63,742	75,014	88,823	86,770	102,578	105,030
Share Rate of Each Itemof Expenditure to the Total Expenditure for Social Services								
Education, Sports, Art and Culture	62.45%	61.52%	60.77%	55.94%	64.53%	65.83%	63.59%	60.00%
Medical and Public Health	18.77%	18.28%	18.12%	18.95%	13.89%	12.15%	11.09%	13.08%
Family Welfare	-	-	-	-	-	2.48%	2.57%	3.67%
Water Supply and Sanitation	4.24%	4.67%	4.70%	7.04%	4.45%	3.61%	4.96%	5.04%
Housing	0.31%	0.25%	0.26%	0.25%	0.14%	0.17%	0.17%	0.15%
Urban Development	0.47%	0.60%	1.45%	1.94%	1.63%	0.88%	1.17%	1.24%
Welfare of Scheduled Caste, Scheduled Tribes and Other Backward Classes	5.77%	5.44%	6.23%	7.81%	7.09%	6.72%	6.61%	6.87%
Labour and Labour Welfare	1.44%	1.31%	1.31%	1.93%	1.20%	1.24%	1.32%	1.35%
Social Security and Welfare	4.41%	5.07%	4.30%	4.25%	4.25%	4.79%	5.56%	6.70%
Food and Nutrition	0.00%	0.00%	0.00%	0.00%	0.00%	-	-	-
Relief on account of Natural Calamities	1.60%	2.22%	2.38%	1.43%	2.26%	1.55%	2.44%	1.46%
Others*	0.55%	0.65%	0.49%	0.44%	0.55%	0.57%	0.54%	0.45%
Expenditure for Social Services in Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

Among them, the expenditure for Education, Sports, Art and Culture is largest one sharing at 60 % or more. The second one is the expenditure for Medical and Public Health ranging from 11 % to19 % of its share rates. The share rates of Water Supply and Sanitation related to the Project is ranging only from 3.6 % to 7.0 % since 1994-95 as shown in the above table.

The economic development expenditure consists of Agriculture and Allied Activities, Rural Development, Special Area Programmes, Irrigation and Flood Control, Energy (Power), Industry and Minerals, Transport and Communications, Science, Technology and Environment, and General Economic Services as shown in the table below.

Table 5.7 Expenditures and Share Rates in Economic Expenditure in the State of Uttar Pradesh

(Unit: million Rs.)

Expenditure	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
In Currency								
Agriculture and Allied Activities	7,291	8,008	9,024	10,080	11,470	15,514	17,177	16,345
Rural Development	12,042	7,712	10,203	9,791	12,322	19,441	23,489	15,531
Special Area Programmes	2,405	2,692	3,783	3,987	4,963	4,299	2,036	-
Irrigation and Flood Control	10,926	13,140	14,341	13,964	14,281	11,661	9,381	9,070
Energy (Power)	0	343	0	0	0	-	-	-
Industry and Minerals	1,193	1,072	1,005	813	939	1,064	1,750	1,392
Transport and Communications	3,443	2,679	2,983	3,108	3,195	4,620	3,576	5,074
Science, Technology and Environment	69	83	75	78	70	78	97	70
General Economic Services	556	620	747	942	970	848	1,003	968
Expenditure for Economic Services in Total	37,925	36,348	42,161	42,762	48,208	57,524	58,508	48,450
Share Rate of Each Itemof Expenditure to the Total Expenditure for Economic Services								
Agriculture and Allied Activities	19.22%	22.03%	21.40%	23.57%	23.79%	26.97%	29.36%	33.74%
Rural Development	31.75%	21.22%	24.20%	22.90%	25.56%	33.80%	40.15%	32.05%
Special Area Programmes	6.34%	7.41%	8.97%	9.32%	10.29%	7.47%	3.48%	-
Irrigation and Flood Control	28.81%	36.15%	34.02%	32.66%	29.62%	20.27%	16.03%	18.72%
Energy (Power)	0.00%	0.94%	0.00%	0.00%	0.00%	-	-	-
Industry and Minerals	3.15%	2.95%	2.38%	1.90%	1.95%	1.85%	2.99%	2.87%
Transport and Communications	9.08%	7.37%	7.08%	7.27%	6.63%	8.03%	6.11%	10.47%
Science, Technology and Environment	0.18%	0.23%	0.18%	0.18%	0.14%	0.14%	0.17%	0.14%
General Economic Services	1.47%	1.71%	1.77%	2.20%	2.01%	1.47%	1.71%	2.00%
Expenditure for Economic Services in Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

According to the table, the expenditures for Agriculture and Allied Activities, and Rural Development are the largest ones ranging from 55 % to 65 % totally during last several years. The expenditure for Irrigation and Flood Control being partly related to the Project are ranging from 16 % to 36 % of its share since 1994-05.

In the State of Uttar Pradesh, the Capital Expenditure is also report by category. Following table shows its summary.

Table 5.8 Categorized Capital Expenditure in the State of Uttar Pradesh

(Unit: million Rs.)

Item	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
In Currency								
I. Total Capital Outlay	12,965	11,294	14,354	16,676	20,970	25,334	43,729	44,574
II. Discharge of Internal Debt	387	3,963	560	2,769	6,890	6,364	1,859	5,235
III. Repayment of Loans to the Centre	5,950	6,433	7,501	8,743	9,999	11,223	18,026	22,196
IV. Loans and Advances by State Governments (1+2)	15,603	10,605	15,667	16,116	16,016	15,756	27,370	18,851
Capital Expenditure in Total	34,905	32,294	38,083	44,305	53,875	58,676	90,984	90,856
Share Rate of Each Expenditure Category to the Total Capital Expenditure								
I. Total Capital Outlay	37.14%	34.97%	37.69%	37.64%	38.92%	43.18%	48.06%	49.06%
II. Discharge of Internal Debt	1.11%	12.27%	1.47%	6.25%	12.79%	10.85%	2.04%	5.76%
III. Repayment of Loans to the Centre	17.05%	19.92%	19.70%	19.73%	18.56%	19.13%	19.81%	24.43%
IV. Loans and Advances by State Governments (1+2)	44.70%	32.84%	41.14%	36.38%	29.73%	26.85%	30.08%	20.75%
Capital Expenditure in Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

As shown in the above table, the expenditure for Total Capital Outlay and Loans and Advances by State Government share around 70 % or more since 1994-95. The Total Capital Outlay means the direct investment for the development consisting of Social Services and Economic Services. And, the Loans and Advances by State Government mean the loans and advances for the development projects for both the Social Services and Economic Services in the State.

6 FINANCIAL SITUATION OF UTTAR PRADESH JAL NIGAM (UPJN)

Following table shows a summary of balance sheet of Uttar Pradesh Jal Nigam (UPJN). According

to this table, the UPJN has been suffered deficits in these 3 years for the assets of UPJN only.

Table 6.1 Summary of Balance Sheet of Uttar Pradesh Jal Nigam

(Unit: million Rs.)

Credit	Fiscal Year			Debit	Fiscal Year		
	1998-99	1999-2000	2000-01		1998-99	1999-2000	2000-01
Current Assets	33,023	37,149	42,859	Liabilities	44,105	48,552	55,046
Fixed Asset	10,701	11,186	12,025	Surplus or Deficit for the Year	-381	-217	-163
Total Assets of UPJN Only	43,724	48,335	54,883	Total Liability of UPJN Only	43,724	48,335	54,883
Assets of Civil and Design Services	6,771	8,489	10,462	Liabilities of Civil and Design Services	6,524	8,199	10,153
				Surplus or Deficit for the Year in Grand Total	247	290	309
Grand Total of Assets	50,495	56,824	65,345	Grand Total of Liability	50,495	56,824	65,345

Source: UPJN.

However, the UPJN has managed civil works and design services additionally with their assets consisting of Civil Wing and Nalkoop Wing, and they produce surpluses offsetting the deficits of UPJN itself as shown in the above table. Therefore, financial situation of the UPJN is healthy in total. Details are shown in Table 12 in Annex.

Income of the UPJN mainly consists of Centage, Survey and Project Fee, Interest on Loan, Other Interest, and Grant from UP State Government for Maintenance Scheme, Grant from UP State Government for H.R.D., Income from Maintenance Scheme, Other Income, and Grant Paid from UP State Government for Loan of Life Insurance Corporation.

And its expenditure mainly consists of Salaries and Wages, Travelling and Daily Allowance, Interest, Expenditure on Maintenance Schemes, Other Expenses and Pension and Gratuity. A summary of their income and loss (expenditure) statement is shown below, and details are shown in Table 13 in Annex.

The major works of UPJN is a management of water supply facilities and sewerage treatment facilities. According to the said Table 13 in Annex, the Expenditure on Maintenance Scheme for such facilities is only around 13 % of the total expenditures. It may be dispersed in the other expenditure items such as Salaries and Wages, Travelling and Daily Allowance, or Other Expenses and so forth.

Table 6.2 Summary of Income and Loss (Expenditure) Statement of Uttar Pradesh Jal Nigam

(Unit: million Rs.)

Income	Fiscal Year			Loss (Expenditure)	Fiscal Year		
	1998-99	1999-2000	2000-01		1998-99	1999-2000	2000-01
Income in Total	1,570	1,618	1,869	Loss (Expenditure) in Total	1,945	1,831	2,027
				Surplus or Deficit before Depreciation	-375	-212	-157
				Depreciation	-6	-5	-5
				Net Surplus or Deficit after Depreciation for the Year	-381	-217	-163

Source: UPJN.

A list of fixed assets of the UPJN is shown Table 14 in Annex. According this record, the main fixed assets of the UPJN is W.W. Assets UPJN Own Scheme's Hand Pump sharing at 95.4 % of total value of the fixed assets as of 2000-01.

7 EXISTING SOCIO-ECONOMIC FEATURES IN TARGETED FOUR CITIES ALONG THE RIVER BASIN

7.1 GENERAL

The targeted 4 cities belong to the Uttar Pradesh State that has 17 divisions. Among the divisions,

Lucknow Division has 6 districts as Hardoi, Kheri, Lucknow, Raibareli, Sitapur and Unnao, Kanpur Division has also 6 districts as Auraiya, Etawah, Farrukhabad, Kannauj, Kanpur Dehat and Kanpur Nagar, Varanasi Division has 4 districts as Chandauli, Ghazipur, Jaunpur, and Varanasi and, Allahabad division has also 3 districts as Allahabad, Bareilly, Pilibhi and Shahjahanpur.

Among districts, Lucknow district has 4 tehsils (the administration unit under district), and Lucknow UA (urban agglomeration) is one of the tehsils. The Lucknow City is a part of Lucknow UA, but it shares at 95 % or more. The other cities are under almost the same situation.

Kanpur Nagar Districts has 3 tehsils, and Kanpur City belongs to the Kanpur UA. Varanasi District has 2 tehsils, and Varanasi City situated in the Varanasi UA.

On the other hand Allahabad is called as "town" under the Indian administrative criteria based on the population size. Allahabad district has 7 tehsils, and Allahabad Town belongs to the Allahabad UA.

These cities and town are governed by each Municipal Corporation (locally called as "Nagar Nigam"), and are the targeted areas (hereinafter referred to as "the targeted cities/town").

7.2 POPULATION

Following table shows a summarized population situation in the targeted 4 cities/town along the Ganga River Basin and details are shown in Table15 in Annex.

Table 7.1 Population of the Targeted Four Cities/Town

Targeted Cities/Town	Area (km2)	Population		Average Annual Population Growth 1991-2001	Number of Households by City/Town as of 1991 (HHs)	Average Family Size as of 1991 (persons/ HH)	Estimated Number of Households as of 2001 (HHs)	Population Density as of 2001 (Persons/km2)
		1991	2001					
Lucknow City	310.10	1,619,115	2,207,340	3.15%	283,188	5.72	386,070	7,118
Kanpur City	266.74	1,874,409	2,532,138	3.05%	325,310	5.76	439,461	9,493
Varanasi City	83.05	929,270	1,100,748	1.71%	125,602	7.40	148,779	13,254
Allahabad Town	63.07	792,858	990,298	2.25%	126,995	6.24	158,620	15,702

Sources: Uttaranchal and Uttar Pradesh at a Glance 2003, edited Jagran Research Centre, and the Census 1991 and 2001.

According to the above table, Lucknow and Kanpur Cities are top 2 in population and their annual average growths as 2,207,340 and 2,532,138 as of 2001, and 3.15 % and 3.05 % per annum during last 10 years respectively. Population in Allahabad Town is still less than 1 million in population as of the same year.

Number of Households (HHs) not reported yet in the Census of India 2001. When the family sizes are assumed at the same with those in 1991, the number of HHs in Lucknow, Kanpur, Varanasi and Allahabad may be estimated at 386,070, 439,461, 148,779, and 158,620 respectively as of 2001. Therefore, the average family size are estimated at 5.72 persons/HH, 5.76 persons/HH, 7.40 persons/HH and 6.24 persons/HH respectively.

The highest population density is 15,702 persons per km^2 in Allahabad, the second: 13,254 persons/km^2 in Varanasi, the third: 9,493 persons/km^2 in Kanpur, the fourth: 7,118 persons/km^2 in Lucknow as shown in the above table.

7.3 WORK FORCE

Unfortunately, the work force as of 2001 is not reported yet in Census of India 2001 as shown in Table16 in Annex. For reference, the work force as of 1991 is indicated hereunder.

Table 7.2 Work Force in the Targeted Four Cities/Town

Targeted Cities/Town	Population and Number of HHs as of 1991		Total Work Force as of 1991	Non-Workers	Number of Households by City/Town as of 1991 (HHs)	Working Persons per Household (Persons/HH)
	Population	Number of HHs				
Lucknow City	1,619,115	283,188	434,294	1,184,821	283,188	1.53
Kanpur City	1,874,409	325,310	480,970	1,393,439	325,310	1.48
Varanasi City	929,270	125,602	255,508	673,762	125,602	2.03
Allahabad Town	792,858	126,995	200,020	592,838	126,995	1.58

Sources: Uttaranchal and Uttar Pradesh at a Glance 2003, edited Jagran Research Centre, and the Census 1991.

In 1991, the largest work force is 480,980 persons in Kanpur, the second: 1,184,821 persons in Lucknow, the third: 673,762 persons in Varanasi, and the fourth: 592,838 in Allahabad.
On the other hand, the largest average working persons per HH is 2.03 persons/HH in Varanasi, and the other cities and town are almost the same level as Lucknow: 1.53 persons/HH, Kanpur: 1.48 persons/HH and 1.58 persons/HH.

7.4 GROSS DOMESTIC PRODUCT IN THE STATE OF UTTAR PRADESH

Situation of GDP in Uttar Pradesh is as shown in Table 17 in Annex and summarized as follows:

Table 7.3 Gross Domestic Product in the State of Uttar Pradesh

A. At Current Price (Unit: million Rs.)

Industry	At Current Price		Annual Average Growth	Share rate as of 1999/00
	1993-94	1999-00		
Agriculture,Forestry & Fishing	351,130	654,000	10.92%	34.85%
Mining & Quarrying	6,980	16,900	15.88%	0.90%
Manufacturing	118,300	321,570	18.14%	17.14%
Electricity, Gas & Water Supply	29,990	71,260	15.52%	3.80%
Construction	38,640	89,790	15.09%	4.79%
Trade, Hotels & Restaurant	113,350	262,520	15.02%	13.99%
Transport, Storage & Communication	45,210	95,550	13.28%	5.09%
Financing,Insurance, Real Estate & Business Services	22,870	62,850	18.35%	3.35%
Other Services	149,080	301,970	12.48%	16.09%
Gross Domestic Product At Factor Cost	875,550	1,876,410	13.55%	100.00%
Population (Million)	152	173		
Per Capita Income (Rs.)	5,779	10,871		

B. At Constant Price (Unit: million Rs.)

Industry	At 1993/94 Constant Price		Annual Average Growth	Share rate as of 1999/00
	1993-94	1999-00		
Agriculture,Forestry & Fishing	351,130	417,930	2.95%	34.68%
Mining & Quarrying	6,980	13,210	11.22%	1.10%
Manufacturing	118,300	222,240	11.08%	18.44%
Electricity, Gas & Water Supply	29,990	25,240	-2.83%	2.09%
Construction	38,640	57,150	6.74%	4.74%
Trade, Hotels & Restaurant	113,350	152,110	5.02%	12.62%
Transport, Storage & Communication	45,210	65,430	6.35%	5.43%
Financing,Insurance, Real Estate & Business Services	22,870	56,230	16.18%	4.67%
Other Services	149,080	195,650	4.63%	16.23%
Gross Domestic Product At Factor Cost	875,550	1,205,190	5.47%	100.00%
Population (Million)	152	173		
Per Capita Income (Rs.)	5,779	6,982		

Source : Web-site named as "Uttar Pradesh.com".

As shown in above tables, the actual growth of GRDP in the State of Uttar Pradesh is 5.5 % during the period from 1993/94 to 1999/00.

Among the industry of origin, the agricultural sector shows a largest share rate as around 35 % at both the current price level and at the 1993/94 constant price level in 1999/00. The second one is the

manufacturing sector showing at around 17 % at the current price level and 18 % at the 1993/94 constant price level in the same year. And, the third one is the commercial sector consisting of trade, hotels and restaurants showing at 14 % at current price level and 13 % at 1993/94 constant price level also in the same year.

GRDP in the targeted 4 cities/town could not be clarified this time, so the study will be made more thoroughly later on.

7.5 FINANCIAL SITUATION OF THE TARGETED CITIES/TOWN

Financial status in each city will be reported in each chapter as (1) Chapter 2 for Lucknow, (2) chapter 3 for Kanpur, (3) Chapter 4 for Allahabad and (4) Chapter 5 for Varanasi for convenience.

7.6 BALANCE OF PAYMENT

The amount of payment exceeds the amount of receipts in India as a whole since 1991-92 except the year 1995-96 as shown in Table 18 in Annex nevertheless the export amount exceeds the import amount as shown in Table 19 in Annex.

7.7 PRICE AND EXCHANGE RATE

7.7.1 Price

Following table shows consumer price fluctuation situation since 1990-91 till 2000-01. In a item of "General", it has been increased by almost 2.5 times with average annual inflation rate of 8 % or more during these 11 years according to this table.

Table 7.4 Consumer Price Fluctuation Situation in India

A. Consumer Price Index (Base : 1982=100)

Year	Financial year average index for:						
	General	Food	Pan, Supari, Tobacco and Intoxicants	Fuel & Light	Housing	Clothing, Bedding and Footwear	Misc.
1990-91	193	199	243	186	185	154	187
1991-92	219	230	280	204	198	169	210
1992-93	240	254	315	220	212	185	232
1993-94	258	272	340	234	224	201	251
1994-95	284	304	368	243	237	227	273
1995-96	313	337	397	260	255	253	294
1996-97	342	369	432	295	280	271	322
1997-98	366	388	479	328	304	286	354
1998-99	414	445	515	353	389	296	386
1999-00	428	446	565	379	437	306	416
2000-01	444	453	592	454	463	315	442

B. Variation Against Previous Year

Year	Price Increasing Ratios against Previous Year for:						
	General	Food	Pan, Supari, Tobacco and Intoxicants	Fuel & Light	Housing	Clothing, Bedding and Footwear	Misc.
1990-91	-	-	-	-	-	-	-
1991-92	13.47%	15.58%	15.23%	9.68%	7.03%	9.74%	12.30%
1992-93	9.59%	10.43%	12.50%	7.84%	7.07%	9.47%	10.48%
1993-94	7.50%	7.09%	7.94%	6.36%	5.66%	8.65%	8.19%
1994-95	10.08%	11.76%	8.24%	3.85%	5.80%	12.94%	8.76%
1995-96	10.21%	10.86%	7.88%	7.00%	7.59%	11.45%	7.69%
1996-97	9.27%	9.50%	8.82%	13.46%	9.80%	7.11%	9.52%
1997-98	7.02%	5.15%	10.88%	11.19%	8.57%	5.54%	9.94%
1998-99	13.11%	14.69%	7.52%	7.62%	27.96%	3.50%	9.04%
1999-00	3.38%	0.22%	9.71%	7.37%	12.34%	3.38%	7.77%
2000-01	3.74%	1.57%	4.78%	19.79%	5.95%	2.94%	6.25%
Average Annual Increase RateSince 1990-91	8.69%	8.57%	9.31%	9.33%	9.61%	7.42%	8.98%

Source : Labour Bureau, Govt. of India.

7.7.2 Exchange Rate

Following table shows a summary of exchange rates of Indian currency of Rupees against the several foreign currencies during last 6 years. Details are shown in Table 20 in Annex.

Table 7.5 Exchange Rate of Indian Currency of Rupees

(Unit: Rupees per unit of foreign currency)

Year	SDR		U.S. Dollar		Pound Sterling		Japanese Yen*	
	Average	End-Year	Average	End-Year	Average	End-Year	Average	End-Year
1995-96	50.48	50.16	33.45	34.35	52.35	52.43	-	33.20
1996-97	50.89	49.80	35.50	35.92	56.36	58.69	-	30.91
1997-98	50.67	52.77	37.16	39.50	61.02	66.16	-	30.33
1998-99	57.51	57.61	42.07	42.44	69.55	68.36	-	37.32
1999-00	58.93	58.75	43.33	43.61	69.85	69.51	-	42.65
2000-01	59.55	58.80	45.68	46.64	67.55	66.58	-	40.74

Source : Handbook of Statistics on Indian Economy, Reserve Bank of India, 2001.

7.8 FAMILY ECONOMY

Following Table shows a summary of the survey results made by JICA Study Team in 2003. These figures are supported by official statistic data publicized on several official web-sites. Family economies in detail in each city are also discussed in each chapter as (1) Chapter 2 for Lucknow, (2) chapter 3 for Kanpur, (3) Chapter 4 for Allahabad and (4) Chapter 5 for Varanasi for convenience.

Table 7.6 Income Level in Each Targeted City

(Rs./month per HH)

Income Group	Amount of Average Income Level			
	Allahabad	Kanpur	Lucknow	Varanasi
Low Income Group	2,660	3,047	3,382	3,017
Medium Income Group	9,174	7,965	10,976	9,123
High Income Group	20,902	16,446	31,885	19,338
Overall Simple Average	10,912	9,153	15,414	10,493

Source: A result of the Study on Public Awareness made by JICA Study Team, 2003.

Annex Table 1 States and Districts Related to the Ganga River Basin

(Note) ○ : Districts related to the Ganga River Basin.

10 States and 253 Districts in total as of 2003

State/ District	Related to the Basin
Himachal Pradesh	
Bilaspur	
Chamba	
Hamirpur	
Kangra	
Kinnaur	
Kullu	
Lahaul/Spiti	
Mandi	
Shimla	○
Sirmaur	○
Solan	○
Una	
Haryana	
Ambala	○
Bhiwani	○
Faridabad	○
Fatehabad	○
Gurgaon	○
Hisar	○
Jhajjar	○
Jind	○
Kaithal	○
Karnal	○
Kurukshetra	○
Mahendragarh	○
Panchkula	○
Panipat	○
Rewari	○
Rohtak	○
Sirsa	○
Sonipat	○
Yamuna Nagar	○
Rajasthan	
Ajmer	○
Alwar	○
Banswara	○
Baran	○
Barmer	
Bharatpur	○
Bhilwara	○
Bikaner	
Rajasthan (continued)	
Bundi	○
Chittaurgarh	○
Churu	
Dausa	○
Dhaulpur	○
Dunagarpur	○
Ganga Nagar	
Hanumagarh	
Jaipur	○
Jaisalmer	
Jalor	
Jhalawar	○
Jhunjhunun	○
Jodhpur	
Karauri	○
Kota	○
Nagaur	○
Pali	
Rajsamand	○
Sawai Madhopur	○
Sikar	○
Sirohi	
Tonk	○
Udaipur	○
Uttaranchal	
Almora	○
Bageshwar	○
Chamoli	○
Champawat	○
Dehradun	○
Hardwar	○
Nainital	○
Pauri Garhwar	○
Pithorahgarh	○
Rudraprayag	○
Tehri Garhwal	○
Udham Singh Nagar	○
Uttarkashi	○
Uttar Pradesh	
Agra	○
Aligarh	○
Uttar Pradesh (continued)	
Allahabad	○
Ambedkar Nagar	○
Auraiya	○
Azamgarh	○
Bagpat	○
Bahraich	○
Ballia	○
Balranpur	○
Banda	○
Barabanki	○
Bareilly	○
Basti	○
Bijnor	○
Budaun	○
Bulandshahr	○
Chandauri	○
Chitrakoot	○
Deoria	○
Etah	○
Etawah	○
Faizabad	○
Farrukhabad	○
Fatehpur	○
Firozabad	○
Gautam Buddha Nagar	○
Ghaziabad	○
Ghazipur	○
Gonda	○
Gorakhpur	○
Hamirpur	○
Hardoi	○
Hathras	○
Jalaun	○
Jaunpur	○
Jhansi	○
Jyotiba Phule Nagar	○
Kannauj	○
Kanpur Dehat	○
Kanpur Nagar	○
Kaushambi	○
Kheri	○
Uttar Pradesh (continued)	
Kushi Nagar	○
Lalitpur	○
Lucknow	○
Maharajganj	○
Mahoba	○
Mainpuri	○
Mathura	○
Mau	○
Meerut	○
Mirzapur	○
Moradabad	○
Muzaffar Nagar	○
Pilibhit	○
Puratapgarh	○
Rae Bareli	○
Rampur	○
Saharanpur	○
Sant Kabir Nagar	○
Sant Ravidas Nagar	○
Shahjahanpur	○
Shrawasti	○
Shiddharth Nagar	○
Sitapur	○
Sonbhadra	○
Sultanpur	○
Unnao	○
Varanasi	○
Madhya Pradesh	
Balaghat	○
Barwani	
Betul	
Bhind	○
Bhopal	○
Chhatarpur	○
Chhindwara	○
Damoh	○
Datia	○
Dewas	○
Dhar	○
Dindori	○
Guna	○
Madhya Pradesh (continued)	
Gwalior	○
Harda	
Hoshangabad	○
Indore	○
Jabalpur	○
Jhabua	
Katni	○
Khandwa (East Nimar)	
Khargone (West Nimar)	
Mandla	○
Mandsaur	○
Morena	○
Narsinghpur	○
Neemuch (Nimach)	○
Panna	○
Raisen	○
Rajgarh	○
Ratlam	○
Rewa	○
Sagar	○
Satna	○
Sehore	○
Seoni	○
Shahdol	○
Shajapur	○
Sheopur	○
Shivpuri	○
Sidhi	○
Tikamgarh	○
Ujjain	○
Umaria (Bandhavgarh)	○
Vidisha	○
Bihar	
Araria	○
Aurangabad	○
Banka	○
Begusarai	○
Bhagarpur	○
Bhojpur	○
Buxar	○
Darbhanga	○
Bihar (continued)	
East (Purba) Champaran	○
Gaya	○
Gopalganj	○
Jamui	○
Jehanabad	○
Kaimur (Bhabua)	○
Katihar	○
Khagaria	○
Kishanganj	○
Lakheesarai (Lakisarai)	○
Madhepura	○
Madhubani	○
Munger	○
Muzaffarupur	○
Nalanda	○
Nawada	○
Patna	○
Purnia	○
Rohtas	○
Saharsa (Koshi)	○
Samastipur	○
Saran	○
Sheikhpura	○
Sheohar (Shivhar)	○
Sitamarhi	○
Siwan	○
Supaul	○
Vaishali	○
West (Paschim) Champaran	○
Jharkhand	
Bokaro	○
Chatra	○
Devghar	○
Dhanbad	○
Dumka	○
East (Purba) Singhbhum	○
Garhwa	○
Giridih	○
Godda	○
Gumla	○
Hazaribag	○
Jharkhand (continued)	
Jamtara	○
Kodarma	○
Latehar	○
Lohardaga	○
Pakur	○
Palamu	○
Ranchi	○
Sahibganj	○
Seraikela	○
Simdega	○
West (Paschim) Singhbhum	○
Delhi	
Central Delhi	○
East Delhi	○
New Delhi	○
North Delhi	○
North East Delhi	○
North West Delhi	○
South Delhi	○
South West Delhi	○
West Delhi	○
West Bengal	
Bankura	○
Barddhaman	○
Birbhum	○
Cooch Behar (Kochi Bihar)	○
Darjiling	○
East Midnapore (Medinipur)	○
Hoogly (Hugli)	○
Howrah (Haora)	○
Jalpaiguri	○
Kolkata	○
Maldah	○
Murshidabad	○
Nadia	○
North 24 Parganas	○
North (Uttar) Dinajpur	○
Puruliya	○
South 24 Parganas	○
South (Dakshin) Dinajpur	○
West Midnapore (Medinipur)	○

Remarks: Dumka - Separated from Santhal Pargana
Jamtara - Separated from Santhal Pargana
Latehar - Separated from Palamu
Seraikela - Separated from West Singhbhum
Simdega - Separated from Gumla
East Midnapore - Separated from Medinipur
West Midnapore - Separated from Medinipur

Source: "India Image -a Gateway to Government of India Info over the Web-", and road guide maps of "Himachal Pradesh", "Haryana", Rajasthan", "Uttaranchal", "Uttar Pradesh", Madhya Pradesh", "Bihar", "Jharkhand", "Delhi", and "West Bengal".

ANNEX Table 2 Population of Districts Related to the Ganga River Basin (1/2)

State/ District	Population in 1991	Population in 2001
Himachal Pradesh		
Shimla	617,404	721,745
Sirmaur	379,695	458,351
Solan	382,268	499,380
Total	1,379,367	1,679,476
Haryana		
Ambala	797,480	1,013,660
Bhiwani	1,163,376	1,424,554
Faridabad	1,477,252	2,193,276
Fatehabad	638,000	806,158
Gurgaon	1,146,065	1,657,669
Hisar	1,209,206	1,536,417
Jhajjar	715,120	887,392
Jind	980,408	1,189,725
Kaithal	781,836	945,631
Karnal	1,035,363	1,274,843
Kurukshetra	669,350	828,120
Mahendragarh	681,856	812,022
Panchkula	310,406	469,210
Panipat	698,086	967,338
Rewari	610,609	764,727
Rohtak	776,953	940,036
Sirsa	903,556	1,111,012
Sonipat	1,045,137	1,278,830
Yamuna Nagar	806,278	982,369
Total	16,446,338	21,082,989
Rajasthan		
Ajmer	1,729,204	2,180,526
Alwar	2,296,600	2,990,862
Banswara	1,155,591	1,500,420
Baran	810,340	1,022,568
Bharatpur	1,651,573	2,098,323
Bhilwara	1,593,084	2,009,516
Bundi	770,248	961,269
Chittaurgarh	1,484,156	1,802,656
Dausa	994,404	1,316,790
Dhaulpur	749,497	982,815
Dunagarpur	874,575	1,107,037
Jaipur	3,887,778	5,252,388
Jhalawar	956,982	1,180,342
Jhunjhunun	1,582,381	1,913,099
Karauri	927,694	1,205,631
Kota	1,220,495	1,568,580
Nagaur	2,144,819	2,773,894
Rajsamand	822,714	986,269
Sawai Madhopur	875,731	1,116,031
Sikar	1,842,905	2,287,229
Tonk	975,002	1,211,343
Udaipur	2,066,586	2,632,210
Total	31,412,357	40,099,798
Uttaranchal		
Almora	611,253	630,446
Bageshwar	228,416	249,453
Chamoli	325,256	369,198
Champawat	190,933	224,461
Dehradun	1,025,646	1,279,083
Hardwar	1,143,478	1,444,213
Nainital	574,136	762,912
Pauri Garhwal	670,888	696,851
Pithorahgarh	416,651	462,149
Rudraprayag	200,512	227,461
Tehri Garhwal	520,541	604,608
Udham Singh Nagar	966,076	1,234,548
Uttarkashi	239,716	294,179
Total	7,113,500	8,479,562
Uttar Pradesh		
Agra	2,751,048	3,611,301
Aligarh	2,449,531	2,990,388
Allahabad	3,899,550	4,941,510
Ambedkar Nagar	1,629,292	2,025,373
Auraiya	1,028,331	1,179,496
Azamgarh	3,128,609	3,950,808
Baghpat	1,030,432	1,164,388
Bahraich	1,840,401	2,384,239
Ballia	2,262,194	2,752,412
Balrampur	1,368,676	1,684,567
Banda	1,266,143	1,500,253
Barabanki	2,115,027	2,673,394
Bareilly	2,834,516	3,598,701
Basti	1,686,300	2,068,922
Bijnor	2,461,927	3,130,586
Budaun	2,448,345	3,069,245
Bulandshahr	2,391,826	2,923,290
Chandauli	1,274,801	1,639,777
Chitrakoot	595,989	800,592
Deoria	2,183,777	2,730,376
Etah	2,244,984	2,788,270
Etawah	1,102,090	1,340,031
Faizabad	1,685,569	2,087,914
Farrukhabad	1,284,395	1,577,237
Fatehpur	1,899,380	2,305,847
Firozabad	1,533,076	2,045,737
Gautam Buddha Nagar	877,865	1,191,263
Ghaziabad	2,230,650	3,289,540
Ghazipur	2,416,656	3,049,337
Gonda	2,204,491	2,765,754
Gorakhpur	3,066,040	3,784,720
Hamirpur	884,492	1,042,374
Hardoi	2,747,161	3,397,414
Hathras Mahamaya Nagar	1,126,920	1,333,372
Jalaun	1,219,415	1,455,859
Jaunpur	3,214,683	3,911,305
Jhansi	1,417,443	1,746,715
Jyotiba Phule Nagar	1,155,715	1,499,193
Kannauj	1,158,410	1,385,227
Kanpur Dehat	1,303,198	1,584,037
Kanpur Nagar	3,253,510	4,137,489
Kaushambi	1,021,808	1,294,937
Kheri	2,419,215	3,200,137
Kushi Nagar	2,256,326	2,891,933
Lalitpur	751,998	977,447
Lucknow	2,762,801	3,681,416
Maharajganj	1,676,368	2,167,041
Mahoba	581,963	708,831
Mainpuri	1,311,008	1,592,875
Mathura	1,630,231	2,069,578
Mau	1,445,777	1,849,294
Meerut	2,417,555	3,001,636
Mirzapur	1,657,148	2,114,852
Moradabad	2,965,306	3,749,630
Muzaffar Nagar	2,842,430	3,541,952
Pilibhit	1,283,107	1,643,788
Pratapgarh	2,210,730	2,727,156
Rae Bareli	2,322,662	2,872,204
Rampur	1,502,149	1,922,450
Saharanpur	2,309,000	2,848,152
Sant Kabir Nagar	1,152,135	1,424,500
Sant Ravidas Nagar	1,077,593	1,352,056
Shahjahanpur	1,987,417	2,549,458
Shravasti	923,353	1,175,428
Shiddharth Nagar	1,607,981	2,038,598
Sitapur	2,857,094	3,616,510
Sonbhadra	1,075,052	1,463,468
Sultanpur	2,569,184	3,190,926
Unnao	2,200,478	2,700,426
Varanasi	2,508,109	3,147,927
Total	131,998,836	166,052,859
Madhya Pradesh		
Balaghat	1,365,857	1,445,760
Bhind	1,218,991	1,426,951

(To be continued)

(note) A lot of districts have been separated from the former ones since 1991. Therefore, figures in 1991are estimated based on the growth ratio reported in the Census 2001.
Sources: Census1991 and 2001.

ANNEX Table 2 Population of Districts Related to the Ganga River Basin (2/2)

State/ District	Population in 1991	Population in 2001
Bhopal	1,351,471	1,836,784
Chhatarpur	1,158,119	1,474,633
Chhindwara	1,568,710	1,848,882
Damoh	898,148	1,081,909
Datia	515,365	627,818
Dewas	1,033,798	1,306,617
Dhar	1,367,411	1,740,577
Dindori	511,624	579,312
Guna	1,310,285	1,665,503
Gwalior	1,392,347	1,629,881
Hoshangabad	886,447	1,085,011
Indore	1,835,905	2,585,321
Jabalpur	1,768,063	2,167,469
Katni	881,924	1,063,689
Mandla	779,616	893,908
Mandsaur	956,876	1,183,369
Morena	1,279,123	1,587,264
Narsinghpur (Narsimhapur)	785,526	957,399
Neemuch (Nimach)	598,315	725,457
Panna	687,956	854,235
Raisen	876,494	1,120,159
Rajgarh	992,749	1,253,246
Ratlam	971,862	1,214,536
Rewa	1,554,977	1,972,333
Sagar	1,647,745	2,021,783
Satna	1,465,376	1,868,648
Sehore	841,342	1,078,769
Seoni	1,000,852	1,165,893
Shahdol	1,323,082	1,572,748
Shajapur	1,033,259	1,290,230
Sheopur	431,479	559,715
Shivpuri	1,132,955	1,440,666
Sidhi	1,373,464	1,830,553
Tikamgarh	940,851	1,203,160
Ujjain	1,383,066	1,709,885
Umaria (Bandhavgarh)	420,828	515,851
Vidisha	970,410	1,214,759
Total	42,512,671	52,800,683

State/ District	Population in 1991	Population in 2001
Bihar		
Araria	1,611,674	2,124,831
Aurangabad	1,540,026	2,004,960
Banka	1,292,503	1,608,778
Begusarai	1,814,723	2,342,989
Bhagarpur	1,910,037	2,430,331
Bhojpur	1,792,756	2,233,415
Buxar	1,087,702	1,403,462
Darbhanga	2,510,870	3,285,473
Purba Champaran	3,042,961	3,933,636
Gaya	2,664,757	3,464,983
Gopalganj	1,704,340	2,149,343
Jamui	1,051,523	1,397,474
Jehanabad	1,174,911	1,511,406
Kaimur (Bhabua)	983,294	1,284,575
Katihar	1,825,325	2,389,533
Khagaria	987,223	1,276,677
Kishanganj	984,078	1,294,063
Lukheesarai (Lakisarai)	646,420	801,173
Madhepura	1,177,749	1,524,596
Madhubani	2,832,052	3,570,651
Munger	943,576	1,135,499
Muzaffarpur	2,953,950	3,743,836
Nalanda	1,996,230	2,368,327
Nawada	1,359,652	1,809,425
Patna	3,618,231	4,709,851
Purnia	1,878,864	2,540,788
Rohtas	1,917,440	2,448,762
Saharsa (Koshi)	1,132,390	1,506,418
Samastipur	2,717,037	3,413,413
Saran	2,572,979	3,251,474
Sheikhpura	420,244	525,137
Sheohar (Shivhar)	377,709	514,288

State/ District	Population in 1991	Population in 2001
Sitamarhi	2,013,793	2,669,887
Siwan	2,170,893	2,708,840
Supaul	1,342,877	1,745,069
Vaishali	2,146,047	2,712,389
Paschim Champaran	2,333,623	3,043,044
Total	64,530,457	82,878,796
Jharkhand		
Bokaro	1,454,394	1,775,961
Chatra	612,693	790,680
Devghar (Deoghar)	933,127	1,161,370
Dhanbad	1,949,547	2,394,434
Dumka	1,495,670	1,754,571
Purba(i) Singhbhum	1,613,135	1,978,671
Garhwa	801,357	1,034,151
Giridih	1,496,234	1,901,564
Godda	861,166	1,047,264
Gumla	1,153,962	1,345,520
Hazaribag	1,836,081	2,277,108
Jamtara		
Kodarma	394,778	498,683
Latehar		
Lohardaga	288,889	364,405
Pakur (Pakaur)	564,272	701,616
Palamu	1,649,845	2,092,004
Ranchi	2,214,108	2,783,577
Sahibganj	736,821	927,584
Seraikela		
Simdega		
Paschim Singhbhum	1,787,937	2,080,265
Total	20,389,624	25,133,467

(Remarks)
Dumka - separated from Santhal Pargana, **Jamtara** - separated from Santhal Pargana, **Latehar** - separated from Palamu, **Serai - kela** - separated from West Singhbhum, and **Simdega** - separated from Gumla.

State/ District	Population in 1991	Population in 2001
Delhi		
Central Delhi	656,545	644,005
East Delhi	1,023,070	1,448,770
New Delhi	167,665	171,806
North Delhi	688,251	779,788
North East Delhi	1,085,228	1,763,712
North West Delhi	1,778,288	2,847,395
South Delhi	1,502,873	2,258,367
South West Delhi	1,084,687	1,749,492
West Delhi	1,434,031	2,119,641
Total	9,420,637	13,782,976
West Bengal		
Bankura	2,805,011	3,191,822
Barddhaman	6,050,803	6,919,698
Birbhum	2,555,604	3,012,546
Cooch Behar (Kochi Bihar)	2,171,073	2,478,280
Darjiling	1,299,903	1,605,900
East Midnapore (Medinipur)	8,332,013	9,638,473
Hoogly (Hugli)	4,355,381	5,040,047
Howrah (Haora)	3,729,503	4,274,010
Jalpaiguri	2,800,530	3,403,204
Kolkata	4,399,716	4,580,544
Maldah	2,636,980	3,290,160
Murshidabad	4,740,272	5,863,717
Nadia	3,852,193	4,603,756
North 24 Parganas	7,281,715	8,930,295
North (Uttar) Dinajpur	1,897,004	2,441,824
Puruliya	2,224,669	2,535,233
South 24 Parganas	5,715,125	6,909,015
South (Dakshin) Dinajpur	1,230,568	1,502,647
West Midnapore (Medinipur)		
Total	68,078,064	80,221,171

(Remarks)
East Midnapore - Separated from Medinipur and West Midnapore - Separated from Medinipur

(note) A lot of districts have been separated from the former ones since 1991. Therefore, figures in 1991are estimated based on the growth ratio reported in the Census 2001.
Sources: Census1991 and 2001.

ANNEX Table 3 GRDP in the States Related to the Ganga River Basin (New Series)

(Unit: million Rs.)

State	Gross Regional Domestic Product (GRDP)												Annual Average Increase Ratio
	in 1990/91	in 1991/92	in 1992/93	in 1993/94	in 1994/95	in 1995/96	in 1996/97	in 1997/98	in 1998/99	in 1999/00	in 2000/01	in 2001/02	
At Current Price													
Whole India	**5,109,540**	**5,890,860**	**7,317,573**	**8,771,777**	**10,225,252**	**10,732,710**	**13,130,015**	**13,901,480**	**15,981,270**	**17,619,320**	**19,177,240**	**20,940,130**	**13.19%**
Himachal Pradesh	18,915	27,996	37,072	46,515	55,871	63,503	72,561	81,752	92,581	100,478	109,518	118,553	18.16%
Haryana	143,980	172,510	183,120	216,650	257,210	292,160	350,220	377,890	429,410	471,840	494,565	531,774	12.61%
Rajasthan	239,690	266,320	313,020	330,260	415,670	473,390	577,070	644,830	656,350	678,050	763,578	818,761	11.82%
Uttaranchal	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	-
Uttar Pradesh	611,440	712,470	778,870	875,550	1,021,370	1,157,430	1,381,290	1,481,750	1,707,800	1,876,420	1,943,577	2,085,681	11.80%
Madhya Pradesh	360,080	385,330	432,280	527,520	586,110	658,000	753,450	810,420	907,370	1,026,720	1,054,104	1,128,387	10.94%
Bihar	279,330	311,990	337,300	390,250	441,840	446,380	537,120	605,140	662,530	720,840	746,699	796,313	9.99%
Jharkhand	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	-
Delhi	23,995	75,643	127,265	196,654	241,240	261,889	310,382	376,072	443,101	504,770	539,312	590,702	33.81%
West Bengal	375,230	435,430	466,810	534,140	620,110	738,320	820,270	979,660	1,157,190	1,332,110	1,318,772	1,422,717	12.88%
Total	2,052,660	2,387,689	2,675,737	3,117,539	3,639,421	4,091,072	4,802,363	5,357,514	6,056,332	6,711,228	6,970,124	7,492,889	13.00%
At 1993/94 Constant Price													
Whole India	**6,928,710**	**7,018,630**	**7,377,920**	**7,813,450**	**8,380,310**	**8,995,630**	**9,700,830**	**10,165,940**	**10,827,480**	**11,484,420**	**11,986,850**	**12,654,290**	**5.63%**
Himachal Pradesh	35,868	39,477	43,085	46,515	50,868	53,720	57,223	60,832	65,041	68,291	71,885	75,476	7.00%
Haryana	201,190	206,300	206,640	216,650	231,990	237,630	265,700	268,670	283,390	303,060	306,030	317,627	4.24%
Rajasthan	330,330	310,370	353,020	330,260	391,230	408,540	455,990	497,160	457,040	439,290	501,314	520,183	4.21%
Uttaranchal	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	-
Uttar Pradesh	826,370	837,020	851,170	875,550	926,470	965,680	1,065,560	1,066,390	1,140,260	1,205,190	1,216,274	1,259,879	3.91%
Madhya Pradesh	473,460	447,340	479,520	527,520	542,910	571,570	608,500	614,280	655,200	674,063	699,488	724,901	3.95%
Bihar	411,500	394,880	378,060	390,250	421,150	396,490	440,150	461,020	491,960	509,220	499,338	512,016	2.01%
Jharkhand	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	-
Delhi	111,970	136,952	161,921	196,654	219,242	221,812	251,128	287,339	310,990	338,868	366,714	386,084	11.91%
West Bengal	447,950	482,320	497,650	534,140	570,410	612,610	655,220	709,710	759,690	816,240	832,417	873,031	6.25%
Total	2,838,637	2,854,659	2,971,066	3,117,539	3,354,270	3,468,052	3,799,471	3,965,401	4,163,571	4,354,222	4,493,460	4,669,197	4.63%

(Note)

- Uttaranchal has been separated from Uttar Prodesh since 1991. Therefore, figures in Uttar Pradesh are the total of existing Uttaranchal and Uttar Prodesh.
- Jharkhand has been separated from Bihar since 1991. Therefore, figure in Bihar in 1990/91 is the total of existing Jharkhand and Bihar.
- Madhya Pradesh has been divided in 2 states as Madhya Pradesh and Chattisgarh in 1993/94. Therefore, Figures in Madhya Pradesh are the total of both the said states.
- Figures in 1992/93, in 1993/94, in 1994/95, in 1996/97 for Whole India, and figures in 1990/91, in 1991/92, and in 1992/93 for Himachal Pradesh and Delhi are estimated by means of inter-poration.
- Figures in 1999/00, in 2000/01, and in 2001/02 for Himachal Pradesh in the column of "At Current Price" and "At 1993/94 Constant Price" and for Madhya Pradesh in the column of "At 1993/94 Constant Price" are estimated by means of extra-poration.
- Figures in 2000/01, in 2001/02 for the other states are estimated by means of extra-poration.

Source: Indian Economic Survey 2002-2003, and Web-Site named as "Indiastat.com".

ANNEX Table 4 Annual Financial Statement in Current Revenue in India

(Unit: million Rs.)

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
A. Tex Revenue	1,257,127	1,293,168	1,552,295	1,886,030	1,870,601	2,162,661
(a) Taxes on Income and Expenditure	346,467	319,432	413,004	681,737	690,634	829,286
Corporation tax	200,160	245,291	306,923	356,963	366,091	461,724
Taxes on income other than corporation tax	35,892	57,549	91,245	317,640	320,041	368,584
Hotels reciepts tax	22	2	5	8	12	25
Interest tax	12,052	12,638	12,115	4,145	1,893	-2,753
Other taxes on income and expenditure	98,341	3,951	2,716	2,982	2,596	1,706
(b) Taxes on Property and Capital Transactions	1,224	1,719	1,285	1,317	1,346	1,524
Estate duty	3	-1	-11	3	7	3
Taxes on wealth	1,130	1,620	1,329	1,317	1,354	1,539
Gift tax	91	100	-33	-3	-15	-18
(c) Taxes on Commodities and Services	906,308	968,846	1,134,397	1,198,304	1,173,641	1,326,119
Customs	401,928	406,683	484,196	475,422	402,683	448,516
Union excise duties	479,616	532,462	619,018	685,261	725,554	823,095
Service tax	15,863	19,567	21,280	26,134	33,019	41,222
Sales tax	223	139	103	253	453	715
Other taxes and duties on commodities and services	8,679	9,997	9,800	11,233	11,932	12,570
(d) Taxes on Union Teritories	3,129	3,171	3,610	4,672	4,982	5,733
B. Non-Tax Revenue	925,867	1,105,723	1,263,233	1,191,208	1,310,602	1,396,820
(a) Fiscal Services	8,736	8,730	10,968	9,184	10,823	11,564
Currency, coinage and mint	6,080	6,887	8,384	7,447	8,840	9,042
Other fiscal services	2,656	1,843	2,583	1,737	1,983	2,522
(b) Interest Receipts, Dividends and Profits	332,675	394,724	477,744	502,811	595,170	659,157
Interest Receipts	253,233	300,620	382,211	367,064	422,279	446,855
Interest from state and union territories Govts	178,066	-	254,449	-	-	-
Interest from railways	14,637	-	18,639	-	-	-
Interest from telecommunications	2,865	-	1,725	-	-	-
Other interest receipts	57,664	-	107,399	-	-	-
Dividends and profits	79,442	94,104	95,533	135,747	172,891	212,302
(c) Other Non-Tax Revenue	571,020	688,723	759,322	666,609	681,882	701,840
(i) General Services	51,649	59,512	65,808	77,473	90,526	96,094
(ii) Social and Community Services	7,130	6,583	8,026	3,491	2,828	4,053
Education, sports, arts and culture	69	116	143	415	512	358
Medical and public health	314	391	609	684	677	1,115
Family welfare	307	128	152	192	166	156
Water supply and sanitation	0	1	0	4	0	0
Housing	457	480	917	508	535	729
Urban development	7	-	-	-	0	1
Information and publicity	254	278	410	975	875	1,633
Broadcasting	5,685	5,157	5,750	680	7	2
Labor and employment	24	20	39	23	43	38
Social security and welfare	12	13	6	9	12	21
Other social services	1	0	1	1	1	1
(iii) Economic Services	512,240	622,628	685,489	585,645	588,528	601,693
C. Grants-in-Aid and Contributions	10,184	9,873	11,079	8,135	17,516	18,682
External Grant Assistance	9,108	8,955	10,563	7,279	16,648	17,153
Aid Materials and Equipment	1,077	918	516	856	868	1,530
D. Non-Tax Revenue of Union Territories	3,253	3,673	4,121	4,470	5,210	5,578
Other Union Territories	3,253	3,673	4,121	4,470	5,210	5,578
Total Revenue of the Year	2,182,995	2,398,891	2,815,529	3,077,238	3,181,203	3,559,481

Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".

ANNEX Table 5 Annual Financial Statement in Current Expenditure in India

(Unit: million Rs.)

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
A. General Services	1,142,197	1,353,829	1,630,470	1,749,985	1,880,253	2,019,285
(a) Organs of State	14,436	13,846	15,639	15,943	14,759	1,724
(b) Fiscal Services	26,286	28,539	29,710	30,244	30,402	32,093
(i) Tax Collection	16,736	18,749	19,762	21,176	22,137	23,656
(ii) Other Fiscal Services	9,550	9,790	9,949	9,068	8,265	8,437
(c) Interest Payment and Servicing Debt	656,373	778,824	945,925	1,032,244	1,141,727	1,248,871
(d) Administrative Services	71,997	83,676	91,589	97,832	106,105	118,892
(e) Pensions and Miscellaneous General Services	100,084	136,946	181,291	184,965	189,330	190,853
(f) Defense Services	273,021	311,999	366,316	388,757	397,930	426,852
B. Social Services	112,399	136,832	161,349	171,305	190,646	202,346
General Education	34,816	47,715	49,129	51,286	53,683	73,309
Technical Education	5,823	8,047	9,801	10,649	11,853	13,644
Sports and Youth Services	1,246	1,598	1,808	2,096	2,734	2,790
Art and Culture	2,505	2,801	3,172	3,501	4,316	5,262
Medical Public Health	10,133	13,814	15,812	18,226	20,334	21,929
Family Welfare	3,228	3,094	5,214	6,610	7,647	7,974
Water Supply and Sanitation	4,805	5,860	6,410	7,954	8,398	9,594
Housing	13,631	17,368	17,784	18,473	22,741	22,041
Urban Development	91	84	117	134	162	135
Information and Publicity	1,600	1,842	1,894	2,021	2,041	1,954
Broadcasting	12,565	13,408	14,420	9,609	9,301	9,672
Welfare of Scheduled Castes, Scheduled Tribes and Other Backward Classes	2,060	839	1,414	1,388	1,253	1,648
Labor and Employment	5,589	7,057	8,382	8,718	8,364	7,567
Social Security and Welfare	10,743	12,399	12,894	14,523	14,154	7,509
Nutrition	54	59	71	76	81	71
Relief on Account of Natural Calamities	2,774	-	12,091	15,000	22,500	16,000
Other Social Services	31	37	40	42	50	82
Secretariat-Social Services	708	810	898	999	1,035	1,166
C. Economic Services	979,794	990,953	1,052,223	1,107,122	1,237,288	1,399,877
(a Agriculture and Allied Activities	128,751	150,916	166,969	193,308	254,490	309,394
(b) Rural Development	49,019	51,613	51,237	42,910	61,568	117,031
(c) Special Areas Programme	5,247	8,537	14,555	23,119	19,395	17,686
(d) Irrigation and Flood Control	2,161	2,589	2,949	3,351	3,875	3,298
Major and medium irrigation	959	1,188	1,242	1,188	1,270	1,239
Minor irrigation	692	823	922	1,028	1,468	1,203
Command Areas Development	35	20	30	28	14	19
Flood control and drainage	476	558	755	1,107	1,123	838
(e) Energy	151,021	24,845	31,800	33,977	131,333	89,296
(f) Industry and Minerals	91,143	103,232	127,279	132,028	117,598	131,703
(g) Transport	307,690	321,799	375,707	448,450	482,832	511,671
(h) Communication	174,632	215,886	226,043	158,859	81,844	87,772
(i) Science Technology and Environment	26,273	29,283	31,605	35,277	41,475	47,043
(j) General Economic Services	43,856	82,253	24,080	35,843	42,878	84,985
D. Grants-In-Aid and Contribution	532,674	510,809	574,022	383,794	431,567	441,473
Grants-In-Aid to State Governments	297,379	250,962	289,966	367,894	414,932	421,362
Grants-In-Aid to Union Territory Governments	7,141	7,477	8,410	8,947	9,957	10,305
Payment of States' Share of Union Excise Duties	224,460	246,651	269,580	-	-	-
Technical and Economic Cooperation with Other Countries	3,706	5,720	6,066	6,953	6,678	9,806
Aid Materials and Equipment	-13	-	-	-	-	-
E. Disburesement of Union Territories	10,260	12,410	13,619	14,268	16,071	17,407
Total Expenditure of the Year	2,777,323	3,004,833	3,431,682	3,426,474	3,755,825	4,080,389

Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".

ANNEX Table 6 Annual Financial Statement in Capital Receipts in India

(Unit: million Rs.)

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
A. Public Debt	3,766,649	3,952,973	5,608,230	3,664,606	4,366,889	4,353,707
Internal Debt of Central Government	3,688,061	3,852,828	5,509,297	3,491,327	4,218,992	4,230,185
Market Loans	433,896	837,531	866,084	1,002,055	1,142,135	1,250,000
14-day Treasury Bills	2,269,607	1,712,512	1,270,739	830,148	782,127	1,095,798
91-day Treasury Bills	640,180	166,968	81,550	72,550	202,159	264,021
182-day Treasury Bills	-	-	16,000	41,000	18,000	-
364-day Treasury Bills	-	-	28,000	135,000	180,881	261,264
Ways and Means Advances	172,390	922,570	1,249,720	1,313,000	1,709,530	1,189,610
Securities Against Small Savings	-	-	1,851,998	83,163	87,546	-
Others	171,989	213,247	145,206	14,410	96,616	169,492
External Debt	78,588	100,146	98,933	173,280	147,897	123,521
B. Recoveries of Loans and Advances	95,963	131,894	125,515	167,993	207,334	387,452
State Governments	71,059	91,616	97,454	116,198	136,308	292,786
Union Teritory Governments	191	3,137	452	717	3,714	10,244
Foreign Governments	446	303	766	938	735	931
Other Loans and Advances	24,192	36,839	26,783	50,076	66,458	83,372
Union Teritory Governments without Legilature	75	-	61	63	119	120
C. Miscellaneous Capital Receipts	9,118	58,739	17,240	21,254	36,465	31,507
Total Capital Receipts of the Year	3,871,730	4,143,607	5,750,986	3,853,853	4,610,687	4,772,666

Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".

ANNEX Table 7 Annual Financial Statement in Capital Expenditure in India

(Unit: million Rs.)

Items	1997 -98	1998 -99	1999 -2000	2000 -01	2001 -02	2002 -03
Capital Expenditure	202,254	251,997	290,232	254,257	312,951	304,971
A. General Services	99,740	109,008	128,715	136,391	177,977	163,233
B. Social Services	6,045	9,735	10,860	8,059	-33,778	9,018
Education, Sports, Art and Culture	129	125	143	141	173	184
Medical and Public Health	256	570	558	-113	285	377
Family Welfare	1	1	-	-	-	-
Water Supply and Sunitation	80	180	180	200	200	200
Housing	2,984	3,962	5,477	4,679	4,646	4,360
Urban Development	950	1,480	1,350	2,100	2,200	2,320
Information and Publicity	90	98	152	156	79	40
Broadcasting	406	185	965	-	-42,581	-
Welfare for Scheduled Castes, Scheduled Tribes and Other Backward Classes	930	2,805	1,903	770	1,135	1,313
Social Security and Welfare	133	280	100	-	-	100
Other Social Services	86	49	33	126	87	124
C. Economic Services	94,284	130,333	146,658	105,247	165,367	129,353
Agriculture and Allied Activities	3,353	3,156	2,180	422	446	556
Rural Development	-	-	-	-	-	0
Special Areas Programme	552	893	799	992	3,472	1,982
Irrigation and Flood Control	148	85	77	59	85	88
Energy	19,159	22,046	21,629	20,570	35,167	27,536
Industry and Minerals	7,216	6,323	7,072	5,934	16,020	7,821
Transport	37,169	39,518	59,795	57,684	83,724	87,561
Communication	510	581	721	8,224	7,210	1,248
Science, Technology and Environment	2,074	2,853	4,284	4,500	5,739	4,827
General Economic Services	24,103	54,877	50,101	6,864	13,506	-2,264
Disburesement of Union Territories	2,185	2,922	3,999	4,560	3,384	3,367
Public Debt	3,310,499	3,226,792	3,050,883	2,695,122	3,217,248	3,396,772
Internal Debt of Central Government	3,242,821	3,145,842	2,963,749	2,596,893	3,125,357	3,153,914
Market Loans	108,911	147,655	163,316	272,747	264,889	274,115
14-days Treasury Bills	2,189,624	1,721,013	1,315,145	816,747	797,662	1,064,461
91-days Treasury Bills	68,180	167,967	81,351	69,000	170,450	217,759
182-days Treasury Bills	-	-	16,000	26,000	16,000	137,656
364-days Treasury Bills	-	-	110,000	130,000	150,000	195,881
Ways and Means Advances	152,390	912,150	1,270,320	1,268,870	1,711,720	1,241,370
Others	723,717	197,057	7,617	13,529	14,636	22,672
External Debt	67,678	80,950	87,134	98,229	91,891	242,859
Loans and Advances	354,690	465,918	273,574	277,581	386,095	362,026
A. Social Services	1,082	938	1,338	1,790	51,946	15,902
Water Supply and Sanitation	335	23	168	-	-	-
Housing	48	36	70	137	101	112
Urban Development	700	880	1,100	260	7,844	13,500
Broadcasting	-	-	-	1,393	44,001	2,290
B. Economic Services	44,766	49,928	48,447	59,934	79,087	50,150
Agriculture and Allied Activities	2,647	2,396	2,225	1,545	2,191	1,906
Special Areas Programme	1,784	1,725	2,215	1,672	1,442	-
Irrigation and Flood Control	-	-	-	-	-	270
Energy	17,649	16,819	20,923	16,506	5,740	3,820
Industry and Minerals	19,847	26,738	19,212	22,395	67,631	33,025
Transport	2,834	2,239	3,868	4,700	1,926	3,524
Communication	-	-	-	13,000	-	7,210
Science, Technology and Environment	4	11	4	6	7	7
General Economic Services	-	-	-	110	150	387
C. Other Loans	308,842	415,052	223,789	215,857	255,062	295,974
Loans and Advances to State Governments	294,997	397,119	211,156	201,152	241,538	277,197
Loans and Advances to Union Territory Governments	9,610	10,856	3,463	3,748	3,747	5,110
Advances to Foreign Governments	1,545	2,163	2,304	3,525	3,080	8,060
Loans to Government Servants etc.	2,675	4,893	6,847	7,427	6,678	5,590
Miscellaneous Loans	15	22	20	6	20	17
Loans of Union Territories	20	18	19	32	43	191
Loans for Other Union Territories	20	18	19	32	43	191
Total of Capital Expenditures of the Year	3,867,463	3,944,725	3,614,707	3,226,992	3,916,336	4,063,960

Source: The Ministry of Finance, excerpted from the web-site named "Indiabudget.nic.in".

ANNEX Table 8 Annual Financial Statement in Current Revenue in Uttar Pradesh

(Unit: million Rs.)

Receipts	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
Revenue Receipts	133,940	152,207	160,288	175,735	173,790	215,010	276,239	301,294
Tax Revenue	88,381	105,029	123,784	141,129	136,812	168,798	207,085	245,300
States own Tax Revenue	48,783	54,689	63,060	69,980	79,101	94,009	106,043	127,328
1. Taxes on Income	29	29	61	63	138	59	60	70
Agricultural Income Tax	0	0	0	0	73	-	-	-
Txes on Professions, Trades, Callings and Employment	29	29	61	63	64	59	60	70
2. Taxes on Property and Capital Transactions	6,925	7,982	9,489	10,259	11,201	12,948	16,564	18,411
Land Revenue	538	625	726	666	883	1,161	900	906
Stamps and Registration Fees	6,315	7,348	8,751	9,560	10,318	11,776	15,664	17,505
Urban Immovable Property Tax	72	9	12	33	0	12	-	-
3. Taxes on Commodities and Services (1 to 7)	41,829	46,679	53,509	59,657	67,762	81,002	89,419	108,848
1. Sales Tax	26,054	29,668	34,732	39,349	44,577	50,993	57,344	71,687
State Sales Tax	26,054	21,867	25,974	28,196	31,956	32,795	39,667	50,690
Central Sales Tax	0	1,487	1,420	2,371	1,823	4,241	4,250	5,023
Sales Tax on Motor Spirit and Lubricants	0	5,585	6,668	8,182	10,088	13,593	12,762	15,904
Other Receipts	0	729	671	600	710	364	666	70
2. State Excise	11,046	11,586	13,229	14,041	16,313	21,263	22,512	24,602
3. Taxes on Vehicles	1,081	1,255	1,395	1,666	2,113	5,121	2,602	3,810
4. Taxes on Goods and Passengers	1,948	2,284	2,214	2,224	2,382	1,003	4,090	5,641
5. Taxes and Duties on Electricity	687	757	783	1,109	1,009	1,264	1,577	1,591
6. Entertainment Tax	0	1,129	954	1,268	1,319	1,359	1,215	1,402
7. Other Taxes and Duties	1,013	1	202	0	50	-	79	116
Share in Central Taxes	39,598	50,340	60,724	71,149	57,711	74,789	101,042	117,972
Income Tax	14,390	20,087	24,101	37,608	25,834	29,482	-	-
Estate Duty	0	0	0	2	22	-	-	-
Union Excise Duties	25,208	30,253	36,623	33,539	31,855	45,307	-	-
Non-Tax Revenue	45,560	47,178	36,505	34,607	36,978	46,212	69,155	55,994
States own Non-Tax Revenue	18,901	24,049	13,188	12,941	14,754	20,177	17,912	17,780
1. Interest Receipts	3,734	4,638	4,790	4,843	4,280	4,767	4,383	4,316
2. Dividends and Profits	93	35	68	58	62	59	55	59
3. General Services	10,341	13,187	1,937	1,917	3,334	3,334	3,319	3,102
4. Social Services	828	1,071	1,428	1,685	2,221	3,032	3,104	3,795
Education, Sports, Art and Culture	412	494	547	959	1,013	1,376	1,198	2,140
Medical and Public Health and Family Welfare	198	151	217	258	438	526	1,315	1,017
Housing	65	59	50	60	33	154	231	252
Urban Development	9	61	3	27	4	67	301	320
Labour and Employment	44	67	49	44	124	160	29	35
Social Security and Welfare	35	57	161	121	172	264	26	26
Water Supply and Sanitation	0	1	1	20	2	10	-	-
Others	66	180	401	196	436	475	5	5
5. Fiscal Services	0	1	8	7	43	1	-	-
6. Economic Services	3,905	5,119	4,957	4,431	4,814	8,984	7,051	6,509
Agriculture (Crop Husbandry)	272	212	196	179	175	165	244	268
Animal Husbandry	42	56	69	94	68	28	64	181
Fisheries	11	15	32	23	17	13	21	26
Forestry and Wild Life	819	1,011	1,045	1,133	1,259	1,605	1,211	711
Co-operation	73	92	60	43	46	178	93	113
Other Agricultural Programmes	15	23	30	13	29	87	39	41
Major and Medium Irrigation Projects	655	1,040	1,008	409	491	402	1,016	1,965
Minor Irrigation	279	406	368	341	351	366	56	111
Village and Small Industries	14	98	10	13	12	78	7	12
Industries	1,231	1,499	1,603	1,542	1,504	1,812	2,201	2,402
Road Transport	7	9	9	9	10	13	12	20
Tourism	67	35	32	51	42	247	-	0
Others	419	624	496	582	809	3,991	2,088	661
Grants from the Centre	26,658	23,129	23,317	21,665	22,224	26,036	51,243	38,214
1. State Plan Schemes	26,658	8,667	12,591	12,618	12,172	13,996	14,422	15,814
2. Central Plan Schemes	0	1,142	971	1,140	1,256	684	1,449	1,524
3. Centrally Sponsored Schemes	0	4,851	5,057	5,998	6,956	8,088	17,531	14,735
4. Non-Plan Grants (a to c)	0	8,469	4,698	1,909	1,840	3,269	17,841	6,141
a. Statutory Grants	0	7,427	3,606	672	757	3,182	15,540	4,370
b. Grants to Releif on Account of Natural Calamities	0	0	938	990	1,041	-	1,097	1,152
c. Others	0	1,042	153	248	42	87	1,204	619

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

ANNEX Table 9 Annual Financial Statement in Current Expenditure in Uttar Pradesh

(Unit: million Rs.)

Expenditure	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
Total Expenditure (I+II+III+IV+V)	154,237	175,559	192,077	221,950	260,749	287,477	334,425	341,613
I. Developmental Expenditure (A + B)	85,419	91,339	105,903	117,777	137,031	144,294	161,086	153,479
A. Social Services	47,494	54,991	63,742	75,014	88,823	86,770	102,578	105,030
Education, Sports, Art and Culture	29,658	33,832	38,736	41,961	57,314	57,123	65,226	63,013
Medical and Public Health	8,916	10,052	11,551	14,219	12,339	10,547	11,374	13,735
Family Welfare	-	-	-	-	-	2,156	2,635	3,853
Water Supply and Sanitation	2,012	2,566	2,995	5,283	3,953	3,128	5,087	5,297
Housing	146	138	163	191	128	151	172	153
Urban Development	222	330	923	1,458	1,448	765	1,199	1,297
Welfare of Scheduled Caste, Scheduled Tribes and Other Backward	2,743	2,989	3,972	5,861	6,301	5,829	6,781	7,217
Labour and Labour Welfare	685	721	833	1,449	1,065	1,076	1,351	1,416
Social Security and Welfare	2,092	2,786	2,739	3,191	3,775	4,154	5,702	7,034
Food and Nutrition	0	0	0	0	0	-	-	-
Relief on account of Natural Calamities	758	1,222	1,518	1,074	2,006	1,342	2,501	1,536
Others*	263	356	313	328	493	499	552	477
B. Economic Services	37,925	36,348	42,161	42,762	48,208	57,524	58,508	48,450
Agriculture and Allied Activities (i to xii)	7,291	8,008	9,024	10,080	11,470	15,514	17,177	16,345
i) Crop Husbandry	2,898	2,759	2,808	3,374	4,171	6,169	6,181	6,743
ii) Soil and Water Conservation	791	1,213	1,774	1,375	1,730	3,687	4,336	3,439
iii) Animal Husbandry	1,007	1,105	1,127	1,622	1,423	1,240	1,701	1,714
iv) Dairy Development	102	125	118	111	84	65	80	77
v) Fisheries	137	148	144	145	120	227	272	250
vi) Forestry and Wild Life	922	1,079	1,287	1,647	1,803	1,929	2,339	1,988
vii) Plantations	63	83	104	81	114	111	121	167
viii) Food Storage and Warehousing	406	443	486	558	647	782	780	755
ix) Agricultural Research and Education	573	646	730	633	811	774	632	584
x) Agricultural Finance Institutions	0	0	0	0	0	-	-	-
xi) Co-operation	351	368	403	479	515	476	565	548
xii) Other Agricultural Programmes	40	39	42	55	51	53	170	81
Rural Development	12,042	7,712	10,203	9,791	12,322	19,441	23,489	15,531
Special Area Programmes	2,405	2,692	3,783	3,987	4,963	4,299	2,036	-
Irrigation and Flood Control	10,926	13,140	14,341	13,964	14,281	11,661	9,381	9,070
Energy (Power)	0	343	0	0	0	-	-	-
Industry and Minerals (i to iii)	1,193	1,072	1,005	813	939	1,064	1,750	1,392
i) Village and Small Industries	574	873	818	606	702	781	838	835
ii) Industries @	185	155	180	207	235	241	911	558
iii) Others**	435	44	8	0	2	42	1	-
Transport and Communications (i + ii)	3,443	2,679	2,983	3,108	3,195	4,620	3,576	5,074
i) Roads and Bridges	3,418	2,657	2,942	3,081	3,168	4,347	3,273	4,784
ii) Others @@	26	23	41	27	27	272	303	290
Science, Technology and Environment	69	83	75	78	70	78	97	70
General Economic Services (i to iv)	556	620	747	942	970	848	1,003	968
i) Secretariat - Economic Services	252	255	340	425	433	395	450	473
ii) Tourism	45	72	76	89	92	87	96	70
iii) Civil Supplies	87	90	96	127	162	56	49	61
iv) Others +	172	204	234	301	283	311	408	365
II. Non-Developmental Expenditure (General Services) (A to F)	66,453	81,481	83,194	97,999	114,977	134,575	162,728	177,634
A. Organs of State	2,156	3,022	2,757	3,307	3,117	3,722	4,503	4,924
B. Fiscal Services (i to iii)	3,986	4,759	5,498	6,231	7,141	7,351	9,113	8,986
i) Collection of Taxes and Duties	3,714	4,694	5,437	6,141	7,073	7,274	9,012	8,910
ii) Transfers to Road Fund, Education Cess Fund, etc.	0	0	0	0	0	-	-	-
iii) Other Fiscal Services	272	64	61	91	68	77	101	76
C. Interest Payments and Servicing of Debt	32,174	37,392	45,963	53,312	62,737	74,819	95,766	106,341
Appropriation for Reduction or Avoidance of Debt	3,406	4,143	5,353	6,419	7,571	9,288	11,744	13,254
Interest Payments (i to iv)	28,769	33,249	40,610	46,893	55,166	65,531	84,022	93,087
i) Interest on Loans from the Centre	16,038	19,556	22,785	25,943	30,558	36,963	38,842	40,039
ii) Interest on Internal Debt	6,554	6,148	9,713	11,373	12,743	15,309	23,921	30,570
of which: Interest on Market Loans	5,950	3,800	9,063	10,254	11,340	13,323	15,742	17,433
iii) Interest on Small Savings, Provident Funds, etc.	3,381	3,985	4,809	5,551	7,440	8,178	11,156	11,760
iv) Others	2,796	3,559	3,303	4,026	4,425	5,081	10,102	10,718
D. Administrative Services (i to v)	14,429	17,464	19,648	24,473	24,120	27,988	32,933	36,897
i) Secretariat-General Services	368	482	602	784	770	913	1,180	9,165
ii) District Administration	1,146	983	1,033	1,629	1,535	1,689	2,644	1,677
iii) Police	10,204	11,011	12,919	15,892	16,239	17,650	20,773	19,031
iv) Public Works	239	1,814	2,028	2,552	2,148	3,898	2,917	2,705
v) Others	2,472	3,175	3,065	3,616	3,429	3,838	5,418	4,319
E. Pensions	13,708	18,845	9,328	10,676	17,863	20,607	20,305	20,395
F. Miscellaneous General Services	-	-	-	-	-	87	108	91
of which : Payment on account of State Lotteries	8,195	11,120	270	36	0	-	1	1
III. Grants-In-Aid and Contributions	-	-	-	-	-	-	-	-
IV. Compensation and Assignments to Local Bodies and Panchayati Raj Institutions	2,365	2,738	2,980	6,175	8,740	8,609	10,611	10,500
V. Reserve with Finance Department	0	0	0	0	0	-	-	-

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

ANNEX Table 10 Annual Financial Statement in Capital Receipts in Uttar Pradesh

(Unit: million Rs.)

Receipts	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E)
Capital Receipts	87,961	63,864	70,166	83,573	126,553	115,737	163,744	131,629
External Debt	-	-	-	0	0	-	-	-
Internal Debt	19,156	13,167	12,391	16,044	27,673	34,897	30,494	20,713
Market Loans	0	12,347	10,336	13,662	23,766	25,560	15,384	15,384
Loans from LIC	0	0	0	0	0	-	-	223
Loans from SBI and Other Banks	0	20	26	-70	40	5,950	-	-
National Agicultural Cedit Fund of RBI	0	411	1,141	2,176	2,227	2,582	5,402	4,442
Loans from NCDC	0	52	6	119	295	198	95	129
Loans from Others	19,156	337	881	157	1,345	607	9,613	534
of which: Land Compensation and Other Bonds	0	0	0	108	108	-	-	-
Loans and Advances from Centre	32,167	27,652	32,600	41,977	56,871	33,888	46,006	40,482
State Plan Schemes	32,167	12,781	18,632	20,011	22,548	25,505	36,363	39,611
Central Plan Schemes	0	2	1	1	2	1	-	229
Centrally Sponsored Schemes	0	234	641	182	211	227	618	618
Non-Plan	0	14,636	13,327	19,950	34,110	56	25	25
Share of Small Savings	0	14,630	13,297	19,915	34,065	-	-	-
Releif for Natural Calamities	0	0	0	0	0	56	25	25
Others	0	7	30	35	45	-	-	-
Ways and Means Advances from Centre	0	0	0	0	0	-	-	-
Loans for Special Schemes	0	0	0	1,833	0	8,099	9,000	-
Special Securities Issued to NSSF	-	-	-	-	-	32,557	38,000	38,650
Recovery of Loans	8,386	1,517	2,258	3,272	7,622	2,628	6,493	6,564
Housing	36	30	51	32	48	150	117	104
Urban Development	-58	8	-138	15	79	199	131	154
Agriculture (Crop Husbandry)	3,832	574	1,644	2,185	3,741	818	4,339	2,765
Food Storage and Warehousing	1	4	10	1	3	1	2	2
Co-operation	-956	184	174	119	204	281	479	108
Minor Irrigation etc.	1	0	0	0	0	-	-	-
Power Projects	5,015	343	-460	0	2,668	159	40	40
Village and Small Industries	32	27	33	42	23	60	54	61
Industries and Minerals	473	54	416	536	470	499	927	1,527
Road Transport	1	0	114	2	9	8	10	10
Government Servants etc.	127	274	299	315	341	371	388	388
Others	-116	18	116	26	37	83	7	1,407
Inter-State Settlement (Net)	0	0	0	0	0	-	-	-
Contingency Fund (Net)	-4,269	-439	569	-1,357	-2,229	548	2,400	-
Small Savings and Provident Funds etc. (Net)	4,848	5,873	6,334	11,638	12,806	13,150	13,663	9,079
State Provident Fund	4,106	5,186	5,727	10,936	11,219	12,092	12,565	8,010
Others	742	687	607	703	1,587	1,058	1,098	1,069
Reserve Funds (Net)	4,372	5,464	6,511	7,468	8,916	11,608	12,617	11,518
Depreciation/Renewal Reserve Funds	672	616	710	836	1,127	996	898	1,030
Sinking Funds	3,406	4,143	5,353	6,418	7,571	9,288	11,724	10,457
Famine Relief Fund	0	1	2	1	1	1	0	0
Others	294	705	446	213	218	1,323	-5	30
Deposits and Advances	9,961	7,992	13,146	7,886	3,982	156	11,031	3,826
Civil Deposits	3,069	3,555	8,689	4,523	-18,246	-659	3,781	-497
Deposits of Local Funds	5,379	4,377	4,473	3,320	16,414	801	7,250	4,323
Civil Advances	219	5	-4	-4	-132	5	-	-
Others	1,294	54	-11	48	5,946	9	-	-
Suspense and Miscellaneous Funds	11,355	1,314	-1,212	-1,943	10,035	-12,114	2,039	797
Suspense	10,452	-585	-1,587	-3,157	6,851	-13,378	-	-
Others	903	1,899	375	1,214	3,184	1,264	2,039	797
Appropriation to Contingency Fund (Net)	0	0	0	0	0	-	-	-
Miscellaneous Capital Receipts	0	0	0	0	0	-	-	-
Remittances (Net)	1,986	1,324	-2,432	-1,413	877	-1,580	1,000	-

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

ANNEX Table 11 Annual Financial Statement in Capital Expenditure in Uttar Pradesh

(Unit: million Rs.)

Expenditure	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01 (R.E.)	2001-02 (B.E.)
Total Disbursements (I+II+III+IV)	34,905	32,294	38,083	44,305	53,875	58,676	90,984	90,856
I. Total Capital Outlay (1+ 2)	12,965	11,294	14,354	16,676	20,970	25,334	43,729	44,574
1. Developmental (a+b)	12,425	10,148	13,318	15,520	19,924	24,828	41,883	42,924
(a) Social Services	1,906	1,866	2,992	3,760	2,757	2,568	4,517	1,884
Education, Sports, Art and Culture	348	447	396	549	293	215	635	457
Medical and Public Health	558	541	644	823	576	631	818	812
Water Supply and Sanitation	13	5	1	38	1	51	-	13
Housing	171	356	449	256	178	150	269	172
Urban Development	5	5	40	189	8	-	500	-
Welfare of Scheduled Caste, Scheduled Tribes and Other Backward Classes	780	470	1,439	1,861	1,665	1,513	2,217	411
Social Security and Welfare	14	20	4	0	7	2	45	18
Others	18	23	19	44	28	6	34	1
(b) Economic Services	10,519	8,282	10,326	11,759	17,167	22,260	37,366	41,040
Agriculture and Allied Activities (i to xi)	73	-754	-1,904	818	96	6,332	878	1,885
i) Crop Husbandry	43	41	-46	-58	-17	611	1,150	1,637
ii) Soil and Water Conservation	0	0	0	0	0	-	-	-
iii) Animal Husbandry	14	38	148	58	42	21	123	137
iv) Dairy Development	61	92	81	29	72	38	165	22
v) Fisheries	0	26	1	0	0	-	-	-
vi) Forestry and Wild Life	1	1	11	-75	-2	-	-	-
vii) vii) Plantations	0	0	0	0	0	-	-	-
viii) Food Storage and Warehousing	-42	-1,279	-2,315	837	-330	5,553	-872	-295
ix) Agricultural Research and Education	0	0	0	0	0	-	10	100
x) Co-operation	-5	327	216	26	329	109	302	284
xi) Others	0	0	0	0	0	-	-	-
Rural Development	172	242	157	258	37	5	3,304	7,968
Special Area Programmes	1,144	1,870	2,601	2,517	3,655	3,517	4,244	2,000
Major and Medium Irrigation and Flood Control	3,723	2,597	5,107	4,235	4,271	6,120	9,714	10,584
Energy	0	1	0	0	1,200	1,000	7,703	10,863
Industry and Minerals (i to iv)	731	355	102	345	283	54	1,004	621
i) Village and Small Industries	123	25	41	183	90	21	152	30
ii) Iron and Steel Industries	0	0	0	0	0	-	-	-
iii) Non-Ferrous Mining and Metallurgical Industries	0	0	30	0	0	-	-	-
iv) Others	608	331	31	162	193	34	853	591
Transport (i + ii)	4,570	3,847	3,780	3,313	7,157	5,166	10,207	6,936
i) Roads and Bridges	2,866	3,673	3,689	3,259	7,183	5,119	10,178	6,936
ii) Others	1,705	174	91	54	-26	47	29	-
Communications	0	0	0	0	0	-	-	-
Science, Technology and Environment	0	0	0	4	37	-	3	22
General Economic Services (i +ii)	105	124	483	269	433	66	309	161
i) Tourism	86	79	184	228	433	66	310	162
ii) Others	19	45	299	42	0	-	-1	-1
2. Non-Developmental (General Services)	540	1,146	1,036	1,157	1,046	505	1,846	1,651
II. Discharge of Internal Debt	387	3,963	560	2,769	6,890	6,364	1,859	5,235
Market Loans	29	3,057	18	2,264	5,568	4,823	20	2,797
Loans from L.I.C.	59	66	66	76	81	79	85	85
Loans from NABARD	90	634	240	89	218	1,025	1,360	1,995
Loans from National Cooperative Development Corporation	116	144	151	142	132	118	152	166
Others incl. Land Compensation Bonds	93	63	86	200	892	319	242	192
III. Repayment of Loans to the Centre	5,950	6,433	7,501	8,743	9,999	11,223	18,026	22,196
IV. Loans and Advances by State Governments (1+2)	15,603	10,605	15,667	16,116	16,016	15,756	27,370	18,851
1. Developmental Purposes (a+b)	15,508	10,414	15,616	16,071	15,957	15,708	27,201	18,679
(a) Social Services	1,289	680	1,669	579	511	1,556	4,803	4,689
Education, Sports, Art and Culture	-	-	-	-	-	-	-	-
Housing	173	184	468	58	10	5	165	129
Government Servants (Housing)	282	0	148	163	171	678	388	410
Others	834	496	1,053	358	330	873	4,251	4,151
(b) Economic Services	14,219	9,733	13,947	15,493	15,445	14,152	22,398	13,990
Crop Husbandry	2,933	2,518	2,266	2,526	2,477	2,260	2,910	2,910
Soil and Water Conservation	0	0	0	0	0	-	-	-
Food Storage and Warehousing	-	-	-	-	-	11	13	-
Co-operation	203	203	223	182	176	294	240	241
Major and Medium Irrigation, etc.	-	-	-	-	-	-	-	-
Power Projects	8,922	5,500	9,388	9,713	9,877	9,051	17,137	7,318
Village and Small Industries	64	99	7	23	29	35	87	100
Other Industries and Minerals	813	514	776	791	1,427	750	1,369	1,600
Others	1,283	899	1,287	2,258	1,460	1,750	643	1,820
2. Non-Developmental Purposes (a+b)	96	191	51	45	60	48	169	172
a) Government Servants (other than Housing)	96	191	51	45	60	48	169	172
b) Miscellaneous	0	0	0	0	0	-	-	-

Source: The Reserve Bank of India, excerpted from the web-site named "Indiastat.com".

ANNEX Table 12 Balance Sheet of Uttar Pradesh Jal Nigam

(Unit: million Rs.)

Credit	Fiscal Year			Debit	Fiscal Year		
	1998-99	1999-2000	2000-01		1998-99	1999-2000	2000-01
Current Assets	33,023	37,149	42,859	**Liabilities**	44,105	48,552	55,046
Materials	2,203	2,294	2,210	Loan from UP State Government	2,959	3,086	3,201
Operation Fund	2,203	2,294	2,210	Operation Fund	0	0	0
Loan Fund	0	0	0	Loan Fund	2,959	3,086	3,201
Commissioned Projects	280	279	262	Loan from Life Insurance Corporation (LIC)	173	154	142
Operation Fund	280	279	262	Operation Fund	0	0	0
Loan Fund	0	0	0	Loan Fund	173	154	142
Balance Out Lay	24,453	28,371	32,204	Loan from HUDCO	0	0	0
Operation Fund	24,453	28,371	32,204	Operation Fund	0	0	0
Loan Fund	0	0	0	Loan Fund	0	0	0
Current Assets	3,269	2,272	4,367	Grant from UP State Government	32,077	35,273	40,135
Operation Fund	1,415	1,247	1,532	Operation Fund	0	0	0
Loan Fund	1,854	1,025	2,835	Loan Fund	32,077	35,273	40,135
Inter Fund Current Account	302	539	294	Deposits Received for Projects	6,887	8,171	9,551
Operation Fund	-37,543	-41,953	-46,252	Operation Fund	6,819	8,075	9,433
Loan Fund	37,845	42,493	46,546	Loan Fund	69	97	118
Inter Divisional Transaction	1,048	1,873	1,947	Current Liabilities	2,203	2,434	2,814
Operation Fund	5,614	6,744	7,032	Operation Fund	2,158	2,389	2,768
Loan Fund	-4,566	-4,871	-5,085	Loan Fund	45	46	45
Debt Service of Loan to Local Bodies	188	189	189	Centage on Materials Unconsumed	291	294	277
Operation Fund	0	0	0	Operation Fund	291	294	277
Loan Fund	188	189	189	Loan Fund	0	0	0
Wages and Means Advance to Jal Sansthan	0	0	0	Divisional Surplus Upto Previous Year	-810	-1,191	-1,409
Operation Fund	0	0	0	Operation Fund	-3,256	-3,637	-4,123
Loan Fund	0	0	0	Loan Fund	2,446	2,445	2,714
Loan to Jal Sansthan	771	802	833	Depreciation Reserve	61	66	71
Operation Fund	0	0	0	Operation Fund	61	66	71
Loan Fund	771	802	833	Loan Fund	0	0	0
Loan to Local Bodies	508	530	552	Pension and Gratuity Reserve	60	60	60
Operation Fund	0	0	0	Operation Fund	60	60	60
Loan Fund	508	530	552	Loan Fund	0	0	0
Wages and Means to Local Bodies	0	0	0	Excess of Assets Over Liabilities	205	205	205
Operation Fund	0	0	0	Operation Fund	216	216	216
Loan Fund	0	0	0	Loan Fund	-11	-11	-11
Fixed Asset	10,701	11,186	12,025	**Surplus or Deficit for the Year**	-381	-217	-163
Fixed Assets	7,814	8,319	9,242	Operation Fund	-381	-486	-661
Operation Fund	7,814	8,319	9,242	Loan Fund	-1	269	498
Loan Fund	0	0	0				
Investments	2,887	2,867	2,783				
Operation Fund	1,730	1,676	1,811				
Loan Fund	1,157	1,191	972				
Total Assets of UPJN Only	43,724	48,335	54,883	Total Liability of UPJN Only	43,724	48,335	54,883
Assets of Civil and Design Services	6,771	8,489	10,462	**Liabilities of Civil and Design Services**	6,524	8,199	10,153
Civil Wing	6,660	8,272	10,088	Civil Wing	6,416	7,990	9,793
Nalkoop Wing	111	217	374	Nalkoop Wing	107	208	361
				Surplus or Deficit for the Year in Grand Total	247	290	309
				Civil Wing	243	282	295
				Nalkoop Wing	4	8	14
Grand Total of Assets	50,495	56,824	65,345	Grand Total of Liability	50,495	56,824	65,345

Source: UPJN.

ANNEX Table 13 Income and Loss (Expenditure) Statement of Uttar Pradesh Jal Nigam

(Unit: million Rs.)

Income	Fiscal Year		
	1998-99	1999-2000	2000-01
Centage	641	594	566
Operation Fund	639	594	566
Loan Fund	2	0	0
Survey and Project Fee	93	54	43
Operation Fund	93	54	43
Loan Fund	0	0	0
Interest on Loan	56	62	48
Operation Fund	0	0	0
Loan Fund	56	62	48
Interest on Capital During Construction Period	0	0	0
Operation Fund	0	0	0
Loan Fund	0	0	0
Other Interest	177	217	403
Operation Fund	102	166	245
Loan Fund	75	52	158
Interest Moratorium	0	0	0
Operation Fund	0	0	0
Loan Fund	0	0	0
Grant from UP State Government for Maintenance Scheme	78	240	368
Operation Fund	0	0	2
Loan Fund	78	240	366
Grant fron UP State Government for H.R.D.	6	16	18
Operation Fund	0	0	0
Loan Fund	6	16	18
Income from Maintenance Scheme	109	123	148
Operation Fund	109	123	148
Loan Fund	0	0	0
Other Income	378	282	255
Operation Fund	369	282	255
Loan Fund	9	0	0
Debt Service Charge	0	0	0
Operation Fund	0	0	0
Loan Fund	0	0	0
Grant Paid from UP State Government for Loan of Life Insurance Corporation	32	29	20
Operation Fund	0	0	0
Loan Fund	32	29	20
Income in Total	1,570	1,618	1,869
Operation Fund	1,312	1,219	1,259
Loan Fund	257	399	611

Loss (Expenditure)	Fiscal Year		
	1998-99	1999-2000	2000-01
Loss (Expenditure)	1,945	1,831	2,027
Operation Fund	1,687	1,700	1,914
Loan Fund	258	130	112
Salaries and Wages	1,123	1,035	1,146
Operation Fund	1,123	1,035	1,146
Loan Fund	0	0	0
Traveling and Daily Allowance	22	23	26
Operation Fund	22	23	26
Loan Fund	0	0	0
Interest	361	283	264
Operation Fund	103	153	152
Loan Fund	258	130	112
Expenditure on Maintenance Schemes	237	203	259
Operation Fund	237	203	259
Loan Fund	0	0	0
Other Expenses	138	155	147
Operation Fund	138	155	147
Loan Fund	0	0	0
Pension and Gratuity	64	131	184
Operation Fund	64	131	184
Loan Fund	0	0	0
Surplus or Deficit before Depreciation	-375	-212	-157
Operation Fund	-374	-481	-656
Loan Fund	-1	269	499
Depreciation	-6	-5	-5
Operation Fund	-6	-5	-5
Loan Fund	0	0	0
Net Surplus or Deficit after Depreciation for the Year	-381	-217	-163
Operation Fund	-381	-486	-661
Loan Fund	-1	269	499

Source: UPJN.

ANNEX Table 14 Fixed Assets in Uttar Pradesh Jal Nigam

(Unit: thousand Rs.)

Description	Fiscal Year		
	1998-99	1999-2000	2000-01
Land	10,370	10,370	10,371
Buildings	89,524	90,956	101,274
Vehicles	18,131	18,056	17,909
Furnitures and Fixtures	28,613	29,418	29,706
Survey Equipments	3,230	3,237	3,309
Drilling Equipments	36,936	37,925	37,925
Lifting Equipments	3,535	3,554	3,554
Laboratory Equipments	298	300	300
Roads	426	426	426
Generators	0	0	0
Tube Wells	3,240	4,521	4,521
Cement Mixers	2	2	2
Pumps	1,814	3,893	3,895
Drawing Instruments	0	0	0
Other Equipments	2,999	2,999	2,999
Flocculators	0	0	0
Work Shop Machinery	85	85	85
W.W. Assets UPJN Own Scheme's Pipe Line	131,045	140,995	140,995
W.W. Assets UPJN Own Scheme's Hand Pump	7,425,998	7,899,917	8,812,925
W.W. Assets UPJN Own Scheme's Others	684	13,788	13,788
Capital W.I.P	56,603	58,483	57,525
Total	7,813,533	8,318,925	9,241,509

ANNEX Table 15 Population and Number of Households in Targetted Four Cities/Town

State/Division/District/City/Town	Area (km^2)	Population				Average Annual Population Growth 1991-2001	Number of Households by City/Town as of 1991 (HHs)	Average Family Size as of 1991 (persons/HH)	Estimated Number of Households as of 2001 (HHs)	Population Density as of 2001 (Persons/km^2)
		1971	1981	1991	2001					
Whole Uttar Pradesh (17 Divisions)	240,928	82,128,110	104,109,048	132,061,653	166,052,859	2.32%	22,377,820	5.90	28,137,623	689
Whole Lucknow Division (6 districts)	31,081	9,833,560	12,283,998	15,309,333	19,468,107	2.43%	2,673,915	5.73	3,400,283	626
Whole Lucknow District (4 Tehsils)	2,528	1,617,846	2,014,574	2,762,801	3,681,416	2.91%	490,810	5.63	654,001	1,456
Lucknow UA*	338			1,669,204	2,266,933	3.11%	293,130	5.69	398,098	6,717
Lucknow City	310			1,619,115	2,207,340	3.15%	283,188	5.72	386,070	7,118
Whole Kanpur Division (6 districts)	14,790	6,000,864	7,434,011	9,121,725	11,203,517	2.08%	1,500,980	6.08	1,843,539	758
Whole Kanpur Nagar District (3 Tehsils)	3,030	2,996,232	3,742,223	2,418,487	4,137,489	5.52%	423,425	5.71	724,385	1,366
Kanpur UA*	283			2,029,889	2,690,486	2.86%	341,866	5.94	453,121	9,513
Kanpur City	267			1,874,409	2,532,138	3.05%	325,310	5.76	439,461	9,493
Whole Varanasi Division (4 districts)	11,547	6,389,547	8,178,409	10,491,835	11,748,346	1.14%	1,444,730	7.26	1,617,752	1,017
Whole Varanasi Nagar District (2 Tehsils)	1,578	2,852,459	3,701,006	4,860,582	4,787,704 1)	-0.15%	646,155	7.52	636,467	3,034
Varanasi UA*	88			1,030,863	1,211,749	1.63%	128,211	8.04	150,708	13,809
Varanasi City	83			929,270	1,100,748	1.71%	125,602	7.40	148,779	13,254
Whole Allahabad Division (3 districts)	15,130	5,638,239	7,170,503	9,031,254	11,269,450	2.24%	1,507,650	5.99	1,881,288	745
Whole Allahabad District (7 Tehsils)	5,425	2,937,278	3,797,033	4,921,313	6,236,447 2)	2.40%	779,915	6.31	988,334	1,150
Allahabad UA*	NA			844,546	1,049,579	2.20%	133,851	6.31	166,346	NA
Allahabad Town	63			792,858	990,298	2.25%	126,995	6.24	158,620	15,702

(Note) *: Urban Agglomeration

1) Total of Varanasi and Chandauli Districts. Chandauli District was formed from the the Ex-Varanasi District since 1991. Population in existing Varanasi District as of 2001 is 3,147,927 based on "2001 Census".

2) Total of Allahabad and Kaushambi Districts. Kaushambi District was formed from the the Ex-Allahabad District since 1991. Population in existing Allahabad District as of 2001 is 4,941,510 based on "2001 Census".

Targeted 4 cities/town.

Sources: Uttaranchal and Uttar Pradesh at a Glance 2003, edited Jagran Research Centre, and the Census 1991 and 2001.

ANNEX Table 16 Work Force in Targetted Four Cities/Town

State/Division/District/City/Town	Population as of 2001	Estimated Number of Households as of 2001** (HHs)	Work Force as of 2001				Non-Workers	Working Persons per Household (Persons/HH)
			Total	Main Workers	Marginal Workers	Cultivators		
Whole Uttar Pradesh (17 Divisions)	166,052,859	28,137,623	45,021,128	8,121,261	14,727,304	22,172,563	121,031,731	1.60
Whole Lucknow Division (6 districts)	19,468,107	3,400,283	5,376,468	1,012,252	1,357,592	3,006,624	14,091,639	1.58
Whole Lucknow District (4 Tehsils)	3,681,416	654,001	981,722	579,418	187,784	214,520	2,699,694	1.50
Lucknow UA*	2,266,933	398,098	2,266,933					NA
Lucknow City	2,207,340	386,070	2,207,340					NA
Whole Kanpur Division (6 districts)	11,203,517	1,843,539	2,994,390	966,650	710,534	1,317,206	8,209,127	1.62
Whole Kanpur Nagar District (3 Tehsils)	4,137,489	724,385	1,113,671	701,384	198,968	213,319	3,023,818	1.54
Kanpur UA*	2,690,486	453,121	2,690,486					NA
Kanpur City	2,532,138	439,461	2,532,138					NA
Whole Varanasi Division (4 districts)	11,748,346	1,617,752	3,003,720	463,339	1,136,670	1,403,711	8,744,626	1.86
Whole Varanasi Nagar District (2 Tehsils)	3,147,927	418,478	732,681	317,759	214,661	200,261	2,415,246	1.75
Varanasi UA*	1,211,749	150,708	1,211,749					NA
Varanasi City	1,100,748	148,779	1,100,748					NA
Whole Allahabad Division (3 districts)	11,269,450	1,881,288	3,308,717	371,127	1,395,779	1,541,811	7,960,733	1.76
Whole Allahabad District (7 Tehsils)	4,941,510	783,116	1,393,795	267,622	587,855	538,318	3,547,715	1.78
Allahabad UA*	1,049,579	166,346	1,049,579					NA
Allahabad Town	990,298	158,620	990,298					NA
Reference as of 1991:			(As of 1991)					
Lucknow UA*	2,029,889	293,130	444,903	442,450	2,453	0	1,584,986	1.52
Lucknow City	1,619,115	283,188	434,294	431,875	2,419	0	1,184,821	1.53
Kanpur UA*	2,029,889	341,866	508,615	508,571	44	0	1,521,274	1.49
Kanpur City	1,874,409	325,310	480,970	480,928	42	0	1,393,439	1.48
Varanasi UA*	1,030,863	128,211	259,441	255,690	3,751	0	771,422	2.02
Varanasi City	929,270	125,602	255,508	251,763	3,745	0	673,762	2.03
Allahabad UA*	844,546	133,851	213,261	209,093	4,168	0	631,285	1.59
Allahabad Town	792,858	126,995	200,020	195,864	4,156	0	592,838	1.58

(Note) *: Urban Agglomeration
**: Based on Table 4.3.1.
Targeted 4 cities/town.

Sources: Uttaranchal and Uttar Pradesh at a Glance 2003, edited Jagran Research Centre, and the Census 1991 and 2001.

ANNEX Table 17 Gross Regional Domestic Product by Economic Activity in Uttar Pradesh

A. At Current Price (Unit: million Rs.)

Industry	At Current Price							Annual Average Growth
	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	
Agriculture,Forestry & Fishing	351,130	398,000	441,810	525,400	538,440	604,100	654,000	10.92%
Agriculture	333,090	378,170	422,920	506,260	517,640	576,530	627,320	11.13%
Forestry & Logging	14,330	15,870	14,730	14,820	15,990	21,910	20,590	6.23%
Fishing	3,710	3,960	4,160	4,320	4,810	5,660	6,090	8.61%
Mining & Quarrying	6,980	8,420	10,620	11,630	13,080	14,380	16,900	15.88%
Manufacturing	118,300	157,630	170,180	215,620	214,670	278,940	321,570	18.14%
Electricity, Gas & Water Supply	29,990	36,930	45,610	48,090	57,520	69,330	71,260	15.52%
Construction	38,640	42,700	52,740	62,610	75,820	82,190	89,790	15.09%
Trade, Hotels & Restaurant	113,350	134,660	156,420	195,690	214,320	236,150	262,520	15.02%
Transport, Storage & Communication	45,210	52,110	58,200	68,670	75,820	86,110	95,550	13.28%
Financing,Insurance, Real Estate & Business Services	22,870	27,210	34,840	45,140	52,560	57,480	62,850	18.35%
Other Services	149,080	163,720	187,000	208,440	239,520	279,130	301,970	12.48%
Gross Domestic Product At Factor Cost	875,550	1,021,380	1,157,420	1,381,290	1,481,750	1,707,810	1,876,410	13.55%
Population (Million)	152	155	158	162	165	169	173	
Per Capita Income (Rs.)	5,779	6,583	7,307	8,552	8,985	10,130	10,871	

B. At Constant Price

Industry	At 1993/94 Constant Price							Annual Average Growth
	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	
Agriculture,Forestry & Fishing	351,130	359,150	374,110	403,840	385,690	395,410	417,930	2.95%
Agriculture	333,090	340,720	354,970	384,820	365,720	373,850	395,470	2.90%
Forestry & Logging	14,330	14,510	15,060	14,830	15,480	16,430	17,060	2.95%
Fishing	3,710	3,920	4,080	4,190	4,490	5,130	5,400	6.46%
Mining & Quarrying	6,980	7,690	8,840	9,630	9,790	11,240	13,210	11.22%
Manufacturing	118,300	143,130	143,610	174,010	165,140	199,700	222,240	11.08%
Electricity, Gas & Water Supply	29,990	32,650	33,960	34,190	34,640	36,580	25,240	-2.83%
Construction	38,640	38,700	44,520	46,510	54,380	54,080	57,150	6.74%
Trade, Hotels & Restaurant	113,350	120,740	124,590	137,310	132,560	142,210	152,110	5.02%
Transport, Storage & Communication	45,210	47,500	49,920	54,860	56,820	60,650	65,430	6.35%
Financing,Insurance, Real Estate & Business Services	22,870	24,980	26,160	40,520	49,790	52,910	56,230	16.18%
Other Services	149,080	151,930	159,980	164,690	177,590	187,480	195,650	4.63%
Gross Domestic Product At Factor Cost	875,550	926,470	965,690	1,065,560	1,066,400	1,140,260	1,205,190	5.47%
Population (Million)	152	155	158	162	165	169	173	
Per Capita Income (Rs.)	5,779	5,971	6,097	6,597	6,466	6,764	6,982	

Source : Web-site named as "Uttar Pradesh.com".

ANNEX Table 18 Overall Balance of Payment (1991/92 - 2000/01)

In Rupees

(Unit: million Rs.)

	Items	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01
I.	Merchandise										
	A. Exports, f.o.b.	449,230	547,610	711,460	843,290	1,084,810	1,211,930	1,327,030	1,444,360	1,627,530	2,052,870
	B. Imports, c.i.f.	514,170	720,000	838,690	1,127,490	1,465,420	1,737,540	1,905,080	1,999,140	2,401,120	2,706,630
	Trade Balance (A - B)	-64,940	-172,390	-127,230	-284,200	-380,610	-525,610	-578,050	-554,780	-773,590	-653,760
II.	Invisibles, net	42,590	44,750	90,890	178,350	184,150	362,790	369,220	386,890	570,280	539,450
III.	Current Account (I + II)	-22,350	-127,640	-36,340	-105,850	-196,460	-162,820	-208,830	-167,890	-203,310	-114,310
IV.	Capital Account (A to F)	95,090	118,820	304,130	287,450	155,970	405,020	375,360	350,340	481,042	390,930
	A. Foreign Investment	3,400	16,990	132,820	154,490	163,120	218,290	199,610	101,690	225,042	232,670
	B. External Assistance, net	73,950	57,480	59,630	47,980	33,560	39,980	34,630	34,840	39,150	20,790
	C. Commercial Borrowings, net	38,070	-10,950	19,040	32,380	45,480	100,040	145,580	185,570	13,600	188,320
	D. Rupee Debt Service	-27,850	-23,350	-33,020	-30,900	-31,060	-25,420	-27,840	-33,080	-30,590	-27,630
	E. NRI Deposits, net	10,080	60,970	37,800	5,390	38,210	118,940	43,250	40,600	67,090	105,670
	F. Other Capital	-2,560	17,680	87,860	78,110	-93,340	-46,810	-19,870	20,720	166,750	-128,890
V.	Overall Balance (III + IV)	72,740	-8,820	267,790	181,600	-40,490	242,200	166,530	182,450	277,732	276,620
VI.	Monetary Movements (VII+VIII+IX)	-72,740	8,820	-267,790	-181,600	40,490	-242,200	-166,530	-182,450	-277,700	-28,697
VII.	Reserves (Increase -/ Decrease +)	-93,510	-24,810	-273,660	-145,750	97,980	-207,590	-143,670	-165,930	-266,480	-27,547
VIII.	IMF, net	20,770	33,630	5,870	-35,850	-57,490	-34,610	-22,860	-16,520	-11,220	-1,150
IX.	SDR Allocation	0	0	0	0	0	0	0	0	0	0

Note : Wherever data are not available, figure has been shown as nil.

Source : Handbook of Statistics on Indian Economy, Reserve Bank of India, 2001.

In US Dollars

(Unit: US$ million)

	Items	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01
I.	Merchandise										
	A. Exports, f.o.b.	18,266	18,869	22,683	26,855	32,311	34,133	35,680	34,298	37,542	44,894
	B. Imports, c.i.f.	21,064	24,316	26,739	35,904	43,670	48,948	51,187	47,544	55,383	59,264
	Trade Balance (A - B)	-2,798	-5,447	-4,056	-9,049	-11,359	-14,815	-15,507	-13,246	-17,841	-14,370
II.	Invisibles, net	1,620	1,921	2,898	5,680	5,449	10,196	10,007	9,208	13,143	11,791
III.	Current Account (I + II)	-1,178	-3,526	-1,158	-3,369	-5,910	-4,619	-5,500	-4,038	-4,698	-2,579
IV.	Capital Account (A to F)	3,777	2,936	9,695	9,156	4,689	11,412	10,011	8,260	11,100	8,435
	A. Foreign Investment	133	557	4,235	4,807	4,805	6,153	5,390	2,412	5,191	5,102
	B. External Assistance, net	3,037	1,859	1,901	1,526	883	1,109	907	820	901	427
	C. Commercial Borrowings, net	1,456	-358	607	1,030	1,275	2,848	3,999	4,362	313	4,011
	D. Rupee Debt Service	-1,240	-878	-1,053	-983	-952	-727	-767	-802	-711	-617
	E. NRI Deposits, net	290	2,001	1,205	172	1,103	3,350	1,125	960	1,540	2,317
	F. Other Capital	101	-245	2,800	2,604	-2,425	-1,321	-643	508	3,866	-2,805
V.	Overall Balance (III + IV)	2,599	-590	8,537	5,787	-1,221	6,793	4,511	4,222	6,402	5,856
VI.	Monetary Movements (VII+VIII+IX)	-2,599	590	-8,537	-5,787	1,221	-6,793	-4,511	-4,222	-6,402	-5,856
VII.	Reserves (Increase -/ Decrease +)	-3,385	-698	-8,724	-4,644	2,936	-5,818	-3,893	-3,829	-6,142	-5,830
VIII.	IMF, net	786	1,288	187	-1,143	-1,715	-975	-618	-393	-260	-26
IX.	SDR Allocation	0	0	0	0	0	0	0	0	0	0

Note : . Denotes data not available separately and have been clubbed elsewhere.

Source : Handbook of Statistics on Indian Economy, Reserve Bank of India, 2001.

ANNEX Table 19 Year-wise Foreign Trade of Export, Import & Trade Balance (1970-71 to 2000-01)

(Unit: million Rs.)

Year	Exports			Imports			Trade Balance		
	Oil	Non-Oil	Total	Oil	Non-Oil	Total	Oil	Non-Oil	Total
1970-71	86	15,267	15,353	1,359	14,983	16,342	1,273	-284	989
1971-72	105	15,976	16,082	1,941	16,304	18,245	1,836	328	2,164
1972-73	290	19,425	19,715	2,040	16,634	18,674	1,751	-2,791	-1,040
1973-74	123	25,112	25,234	5,603	23,951	29,554	5,480	-1,161	4,320
1974-75	136	33,152	33,288	11,570	33,618	45,188	11,433	466	11,900
1975-76	189	40,174	40,363	12,257	40,391	52,648	12,068	217	12,285
1976-77	187	51,241	51,427	14,134	36,604	50,738	13,947	-14,636	-689
1977-78	157	53,922	54,079	15,510	44,693	60,202	15,353	-9,229	6,124
1978-79	142	57,119	57,261	16,768	51,339	68,106	16,626	-5,780	10,846
1979-80	189	63,996	64,184	32,671	58,755	91,426	32,482	-5,241	27,242
1980-81	249	66,858	67,107	52,635	72,857	125,492	52,386	5,999	58,384
1981-82	2,209	75,850	78,059	51,893	84,183	136,076	49,683	8,333	58,017
1982-83	12,353	75,681	88,034	56,219	86,708	142,928	43,867	11,027	54,894
1983-84	15,881	81,827	97,707	48,320	109,995	158,315	32,439	28,168	60,608
1984-85	18,182	99,255	117,437	54,091	117,252	171,342	35,909	17,997	53,905
1985-86	6,447	102,499	108,946	49,894	146,683	196,577	43,447	44,184	87,631
1986-87	4,112	120,407	124,520	28,106	172,852	200,958	23,994	52,445	76,438
1987-88	6,488	150,249	156,737	40,429	182,008	222,437	33,942	31,759	65,701
1988-89	5,050	197,265	202,315	43,576	238,776	282,352	38,527	41,511	80,037
1989-90	6,967	269,618	276,584	62,725	290,558	353,284	55,759	20,941	76,699
1990-91	9,378	316,198	325,576	108,161	323,768	431,929	98,783	7,569	106,352
1991-92	10,223	430,195	440,418	131,267	347,241	478,508	121,045	-82,954	38,090
1992-93	13,793	523,090	536,883	171,417	462,328	633,745	157,625	-60,762	96,863
1993-94	12,478	685,036	697,514	180,462	550,548	731,010	167,984	-134,488	33,496
1994-95	13,090	813,651	826,741	186,126	713,581	899,707	173,036	-100,070	72,965
1995-96	15,178	1,048,356	1,063,533	251,736	975,045	1,226,781	236,559	-73,311	163,248
1996-97	17,104	1,171,067	1,188,171	356,285	1,032,912	1,389,197	339,182	-138,156	201,026
1997-98	13,110	1,287,897	1,301,006	303,412	1,238,351	1,541,763	290,302	-49,545	240,757
1998-99	3,762	1,393,769	1,397,531	269,193	1,514,126	1,783,319	265,431	120,357	385,787
1999-00	1,685	1,593,929	1,595,614	546,486	1,605,879	2,152,365	544,802	11,949	556,751
2000-01	85,417	1,950,293	2,035,710	714,965	1,593,762	2,308,728	629,549	-356,531	273,018

Source : Handbook of Statistics on Indian Economy, Reserve Bank of India, 2001.

ANNEX Table 20 Exchange Rates of the Rupee vis-a-vis the SDR, US Dollar & Pound Sterling (Financial Year-Average and End Year Rates)

(Unit: Rupees per unit of foreign currency)

Year	SDR		U.S. Dollar		Pound Sterling		Japanese Yen*	
	Average	End-Year	Average	End-Year	Average	End-Year	Average	End-Year
1970-71	7.50	7.50	7.56	7.50	18.00	18.13	-	-
1971-72	7.67	7.90	7.47	7.28	18.40	19.04	-	2.31
1972-73	8.46	9.24	7.68	7.66	18.84	18.97	-	2.54
1973-74	9.40	9.46	7.79	7.84	18.80	18.76	-	2.79
1974-75	9.62	9.72	7.94	7.79	18.80	18.78	-	2.59
1975-76	10.36	10.38	8.68	8.97	18.39	17.19	-	2.94
1976-77	10.35	10.21	8.98	8.80	15.57	15.14	-	3.00
1977-78	10.16	10.43	8.59	8.43	15.43	15.66	-	3.52
1978-79	10.43	10.49	8.23	8.15	15.97	16.86	-	4.19
1979-80	10.49	10.25	8.10	8.19	17.66	17.75	-	3.41
1980-81	10.18	10.06	7.91	8.19	18.50	18.38	-	4.03
1981-82	10.34	10.40	8.97	9.35	17.11	16.65	-	4.25
1982-83	10.56	10.75	9.67	9.97	16.14	14.75	-	4.25
1983-84	10.94	11.39	10.34	10.71	15.42	15.45	-	4.62
1984-85	11.93	12.32	11.89	12.43	14.87	15.45	-	4.96
1985-86	12.92	13.99	12.23	12.31	16.85	18.25	-	6.12
1986-87	15.45	16.62	12.78	12.89	19.07	20.75	-	8.06
1987-88	17.12	17.97	12.97	13.03	22.09	24.35	-	10.56
1988-89	19.26	20.21	14.48	15.66	25.60	26.40	-	12.53
1989-90	21.37	22.41	16.65	17.32	26.92	28.30	-	12.05
1990-91	24.84	26.41	17.94	19.64	33.19	34.05	-	14.53
1991-92	33.43	35.51	24.47	31.23	42.52	53.69	-	24.94
1992-93	37.14	43.65	30.65	31.24	51.69	46.62	-	25.03
1993-94	43.89	44.31	31.37	31.37	47.21	46.52	-	28.06
1994-95	45.79	49.16	31.40	31.50	48.82	50.57	-	31.57
1995-96	50.48	50.16	33.45	34.35	52.35	52.43	-	33.20
1996-97	50.89	49.80	35.50	35.92	56.36	58.69	-	30.91
1997-98	50.67	52.77	37.16	39.50	61.02	66.16	-	30.33
1998-99	57.51	57.61	42.07	42.44	69.55	68.36	-	37.32
1999-00	58.93	58.75	43.33	43.61	69.85	69.51	-	42.65
2000-01	59.55	58.80	45.68	46.64	67.55	66.58	-	40.74

(Note) 1. Data from 1970-71 to 1991-92 are based on Official Exchange Rates.

2. Data from 1992-93 onwards are based on FEDAI (Foreign Exchange Dealers' Association of India) Indicative Rates.

3. The Euro replaces the Deutsche Mark w.e.f. January 1, 1999.

*: Based on the web-site named as "OANDA.Com" at the end of each Calender Year. Rupees per 100 Japanese Yen.

Source : Handbook of Statistics on Indian Economy, Reserve Bank of India, 2001