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**USE AND MAINTENANCE OF  
LOW COST SANITATION FACILITIES  
STUDY OF SRINAGAR CITY  
JAMMU AND KASHMIR**

May, 1989

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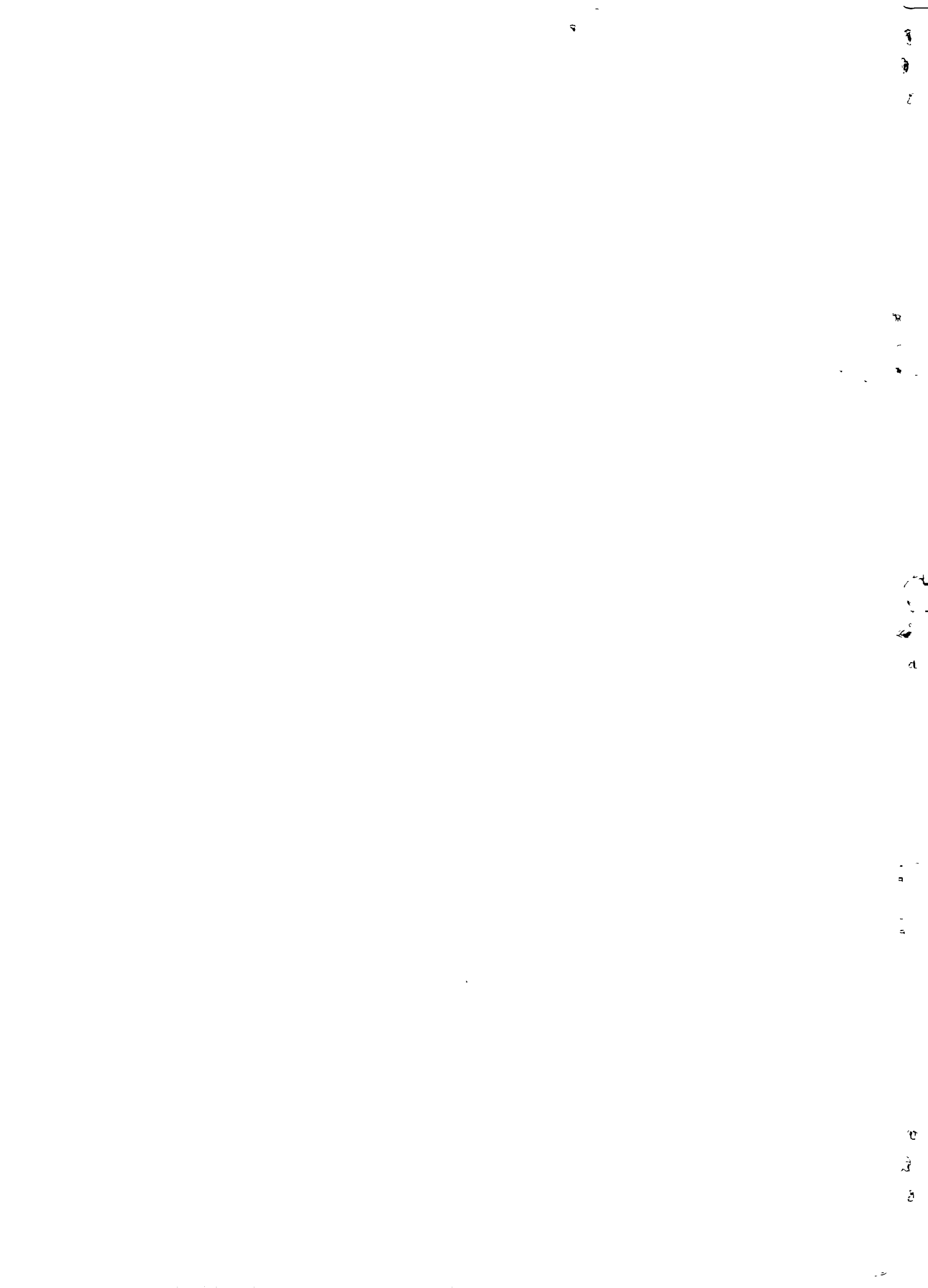
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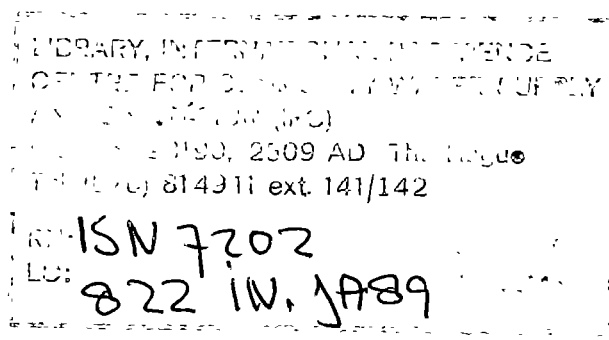
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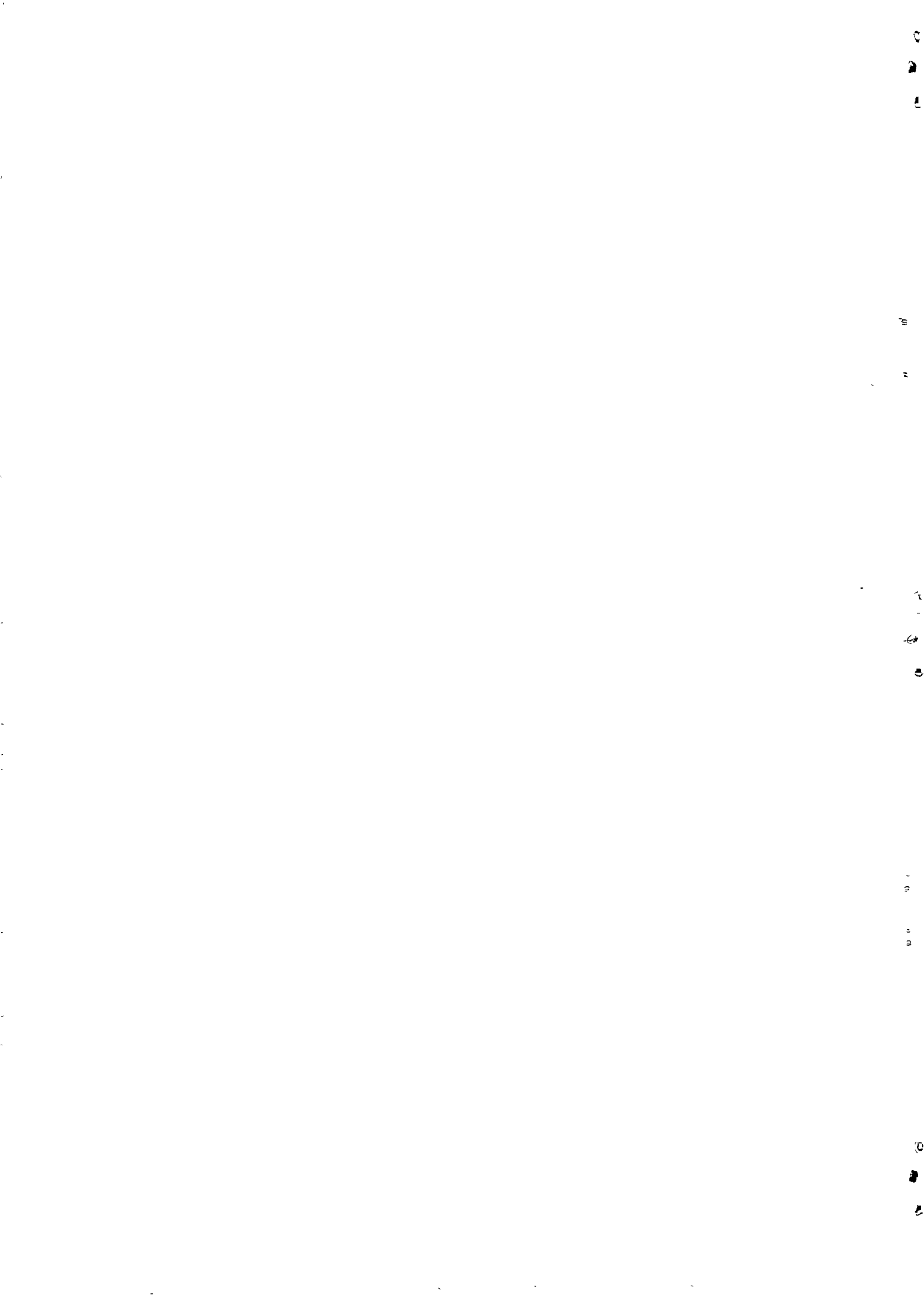
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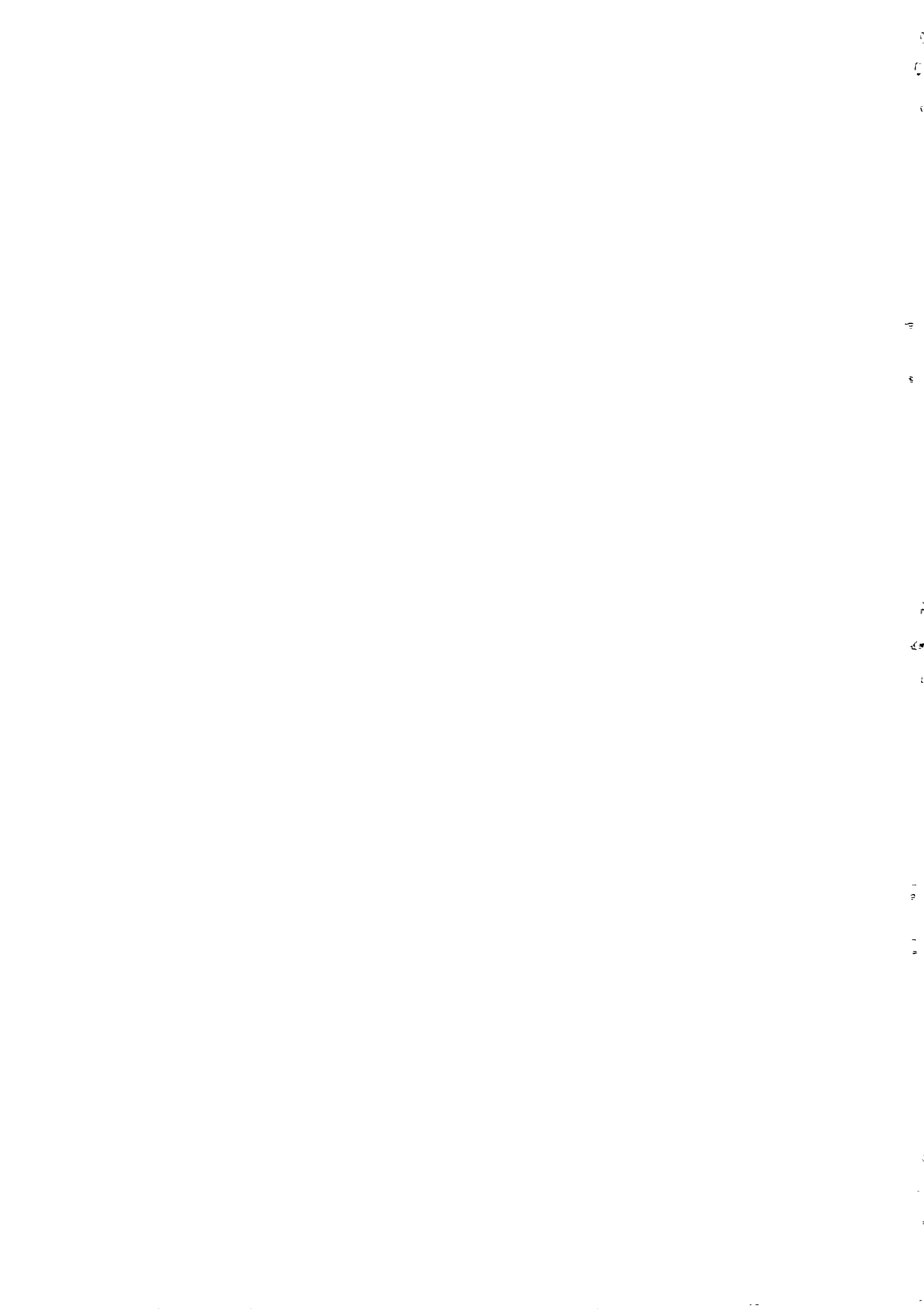
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## LIST OF ABBREVIATIONS

cu.ft.	-	Cubic feet
GPCD	-	Gallons per capita per day
HH	-	Household(s)
HSMI	-	Human Settlement Management Institute
HUDCO	-	Housing & Urban Development Corporation
MGD	-	Million gallons per day
MSL	-	Mean sea level
NGO	-	Non Government Organisation
O&M	-	Operation and maintenance
PHED	-	Public Health Engineering Department
SMC	-	Srinagar Municipal Council
SPSS	-	Statistical Package for Social Sciences
UEED	-	Urban Environmental Engineering Department

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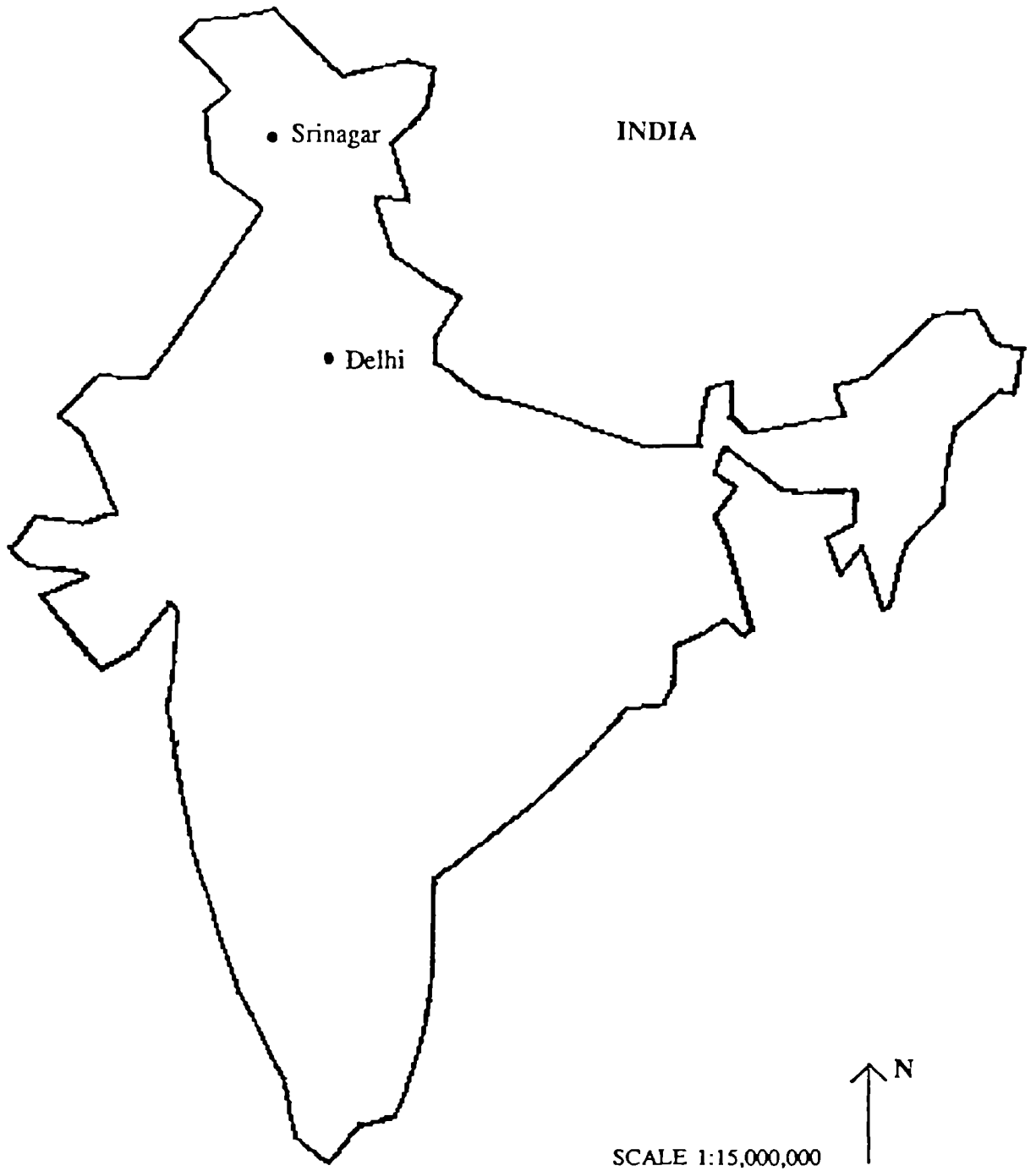
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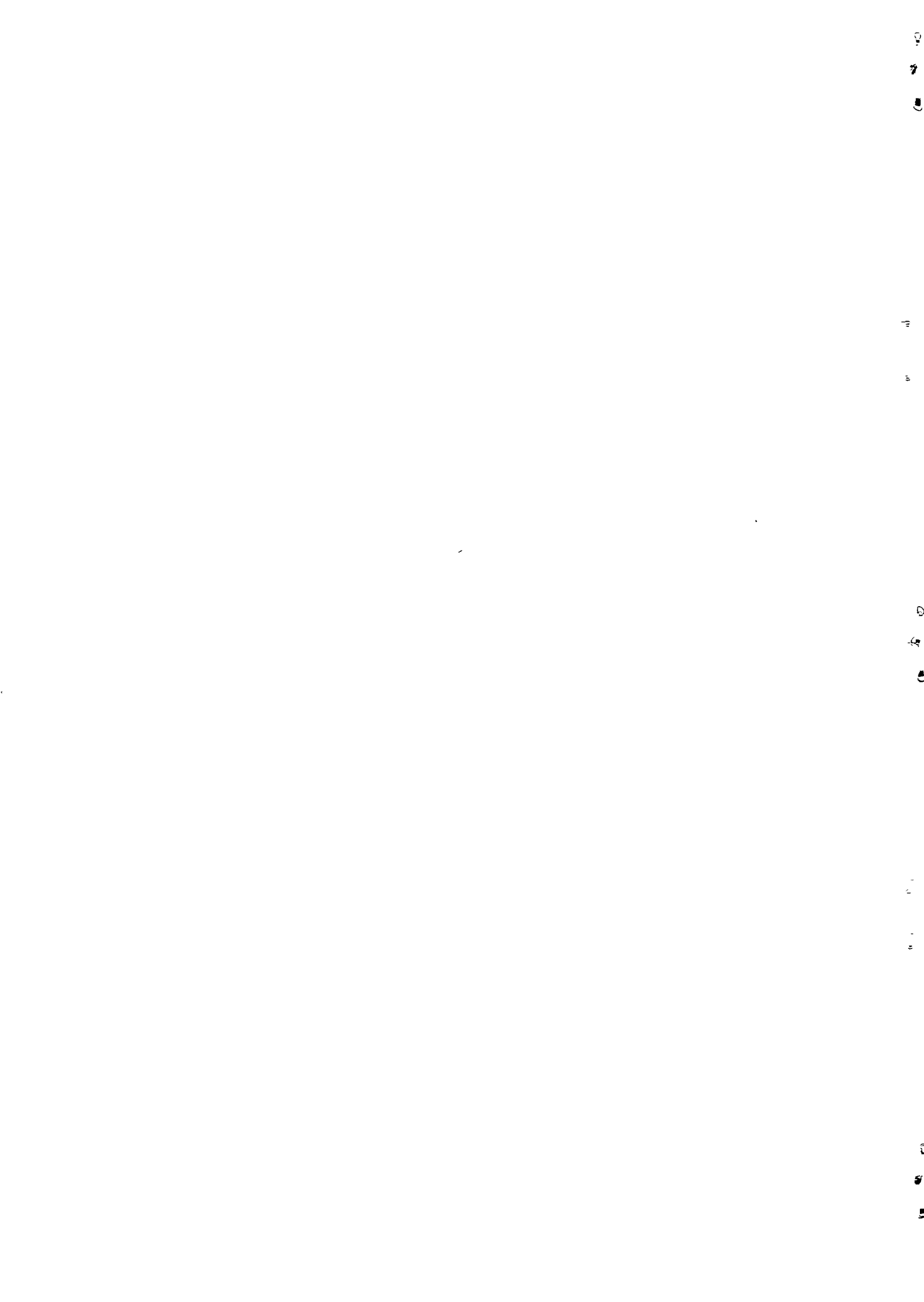
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LOCATION MAP - SRINAGAR, JAMMU & KASHMIR





# INTRODUCTION

This study forms the third and concluding part of a series of three research studies carried out by the Human Settlement Management Institute (HSMI) on low cost sanitation schemes in three locations - Raipur, Madhya Pradesh, Malkapur, Maharashtra and Srinagar, Jammu & Kashmir.

Owing to increasing national emphasis on the subject of sanitation in recent years, various ministries of the central government, international institutions, public sector organisations and prominent NGOs have implemented low cost sanitation schemes around the country. Issues related to the use and maintenance of these sanitation facilities as well as associated institutional arrangements are of key importance to their longer term functioning and effective service life.

It is found in many cases that both public and private facilities - once built - tend to malfunction soon after completion and to rapidly fall into disrepair. Major factors which determine such performance are seen to be design, financial and management/organisational arrangements and user attitudes.

Given the consequent enormous loss of capital as well as the lost benefits of improved health and well-being it is thought of major importance to try and improve this performance. This research is meant to chart the problem field and to develop initial operational recommendations for both remedy of existing schemes and the prevention of similar problems in the development of new schemes.

The importance of the issue becomes even more evident when it is realised that the total area of existing settlements increase continuously. The time has come when the total number of existing schemes by far outstrips the annual increment. Oddly enough however the concern of most agencies is still largely focussed on the development of new schemes.

Given the important role which decision makers and implementors play in the planning, development and delivery of such facilities it is thought of strategic importance to investigate the issue in direct interaction with the actors concerned - viz. the central/state/municipal agencies, associated NGOs and the communities involved.

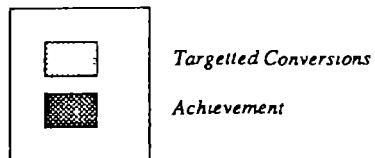
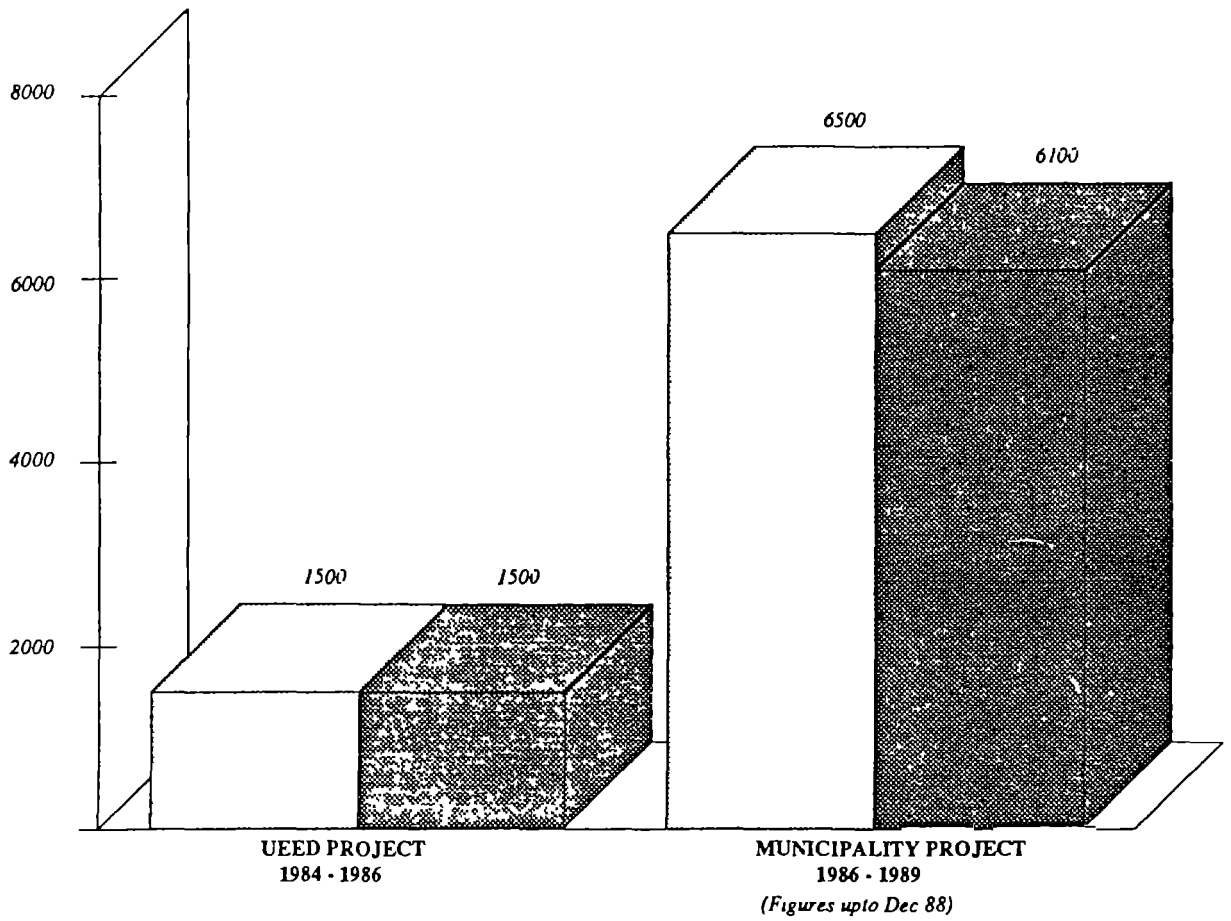
## *1.1 Study Background*

This study was conducted in the city of Srinagar, Jammu and Kashmir where the NGO, Sulabh International has been entrusted with the provision of 6500 units of two-pit, pour-flush latrines in a number of locations, around the city.

Earlier, in 1984 Sulabh was given the work of provision of low cost sanitation units by the Urban Environmental Engineering Department (UEED), Srinagar. This project was for the provision of 1500 units and was completed by the year 1986.

The agreement for the present project of 6500 units was signed between Srinagar Municipality on behalf of the State Government and Sulabh International in July 1986.

ACHIEVEMENT OF PHYSICAL TARGET  
LOW CAST SANITATION SCHEME  
SRINAGAR



Till December 1988, 6100 units had been completed out of which 5700 had been verified by the Srinagar Municipality (SMC).

In addition to the above Sulabh has also constructed a biogas based community toilet complex at Khan Khai Mohalla and seated toilet complex at Dana Mazar and Rambagh. These have since been handed over to the MC.

Under the scheme the overall budget, provided by the State Government and the Centre on a 50-50 basis, is released through the SMC. Unit costs are based on the 1985 figure of Rs. 1600 per latrine without superstructure. Sulabh has an office in Srinagar with a staff strength of 50 persons while 150 local masons have been recruited and have been trained in their Patna headquarters.

## *1.2 Salient Features of Srinagar*

Srinagar is the capital of Jammu and Kashmir State located in a valley surrounded by snow capped peaks in winter. The city has grown on the basis of its economic base and is heavily dependent on the tertiary sector which is fed by the tourist trade and by demands for goods and services generated by the armed forces. It is the jumping off point for other cities in the area like Baramulla, Gulmarg, Pahalgam and Leh in Ladakh. The city is characterised by the spectacular Dal Lake which is a special tourist attraction.

## *1.3 Climatic/Hydro-geological/Demographic Data*

Srinagar is located at a height of 1800 m. above MSL at a distance of 876 km. from New Delhi on National Highway number 1A which runs from Delhi to Baramulla. The annual temperature varies from an (average) high of 36 C in summer to 7.7 C in winter. The average annual rainfall is 564 mm.

The soil in the Srinagar Valley is classified as Gurtu (clayey) Bhil (ill drained) Dasan Inad (Saline) and Surzamine (silty soil). The local area is mostly situated on Bhil Dasan land and Surzamine. The soil is not sandy. It is mostly clayey, capable of retaining a high content of moisture. With a minor drizzle, therefore, roads, drains and the land get submerged. Water stagnation becomes an environmental hazard. There are some seismic zones which lie towards the southwest of Badgam and its adjacent areas.

Srinagar Urban Area comprising the Srinagar Municipality and Badami Bagh Cantonment area in 1961 had a total population of 2.91 lakhs distributed over an area of 47.08 sq. kms. In 1971, this urban area was elevated to an agglomeration comprising of Srinagar city including the municipality area, Badami Bagh Cantonment and outgrowths of Srinagar city as well as villages of Badgam District and stretched over to an area of 107.17 sq. kms. accommodating 4.31 lakhs of population. In 1981, the area was further extended to 157.54 sq.km. and enveloped 8 villages belonging to Srinagar, Chadura and Badgam Tehsils and the population increased to 6.05 lakhs. (Annexure-2)

The increase in area and growth of population of the Srinagar Urban Agglomeration and of the other components thereof during the past three decades is given in Annexure - 2.

## *Distribution of Population*

The main spurt of growth is taking place in the northern direction towards Gandarbal and in the southern direction towards the Airport. The distribution and the percentage growth of the population (ward-wise) in the decade 1971-81 is given in the table at Annexure - 1.

The above table reveals that the growth of population in the old city areas varies marginally between 2.37% in ward number 7 to 37% in ward number 10, while there is a substantial increase (of above 230%) in the peripheral areas of the old city comprising ward numbers 4, 16 and 17 which are located in the north and the south direction.

The present population of Srinagar is estimated to be about 8.45 lakhs and is expected to increase to 14.35 lakhs by the year 2001 (PHED figures).

### *1.4 Existing Physical Infrastructure*

Srinagar city is mostly served by a piped water system. There are three water treatment plants at Nishat, Alusteng and Doodganaga which have a combined output of 19.55 mgd (1984 figures) as per the following break-up:

Nishat	-	11.00 mgd
Alusteng	-	4.8 mgd
Doodganga	-	3.75 mgd
Total:		<u>19.55 mgd</u>

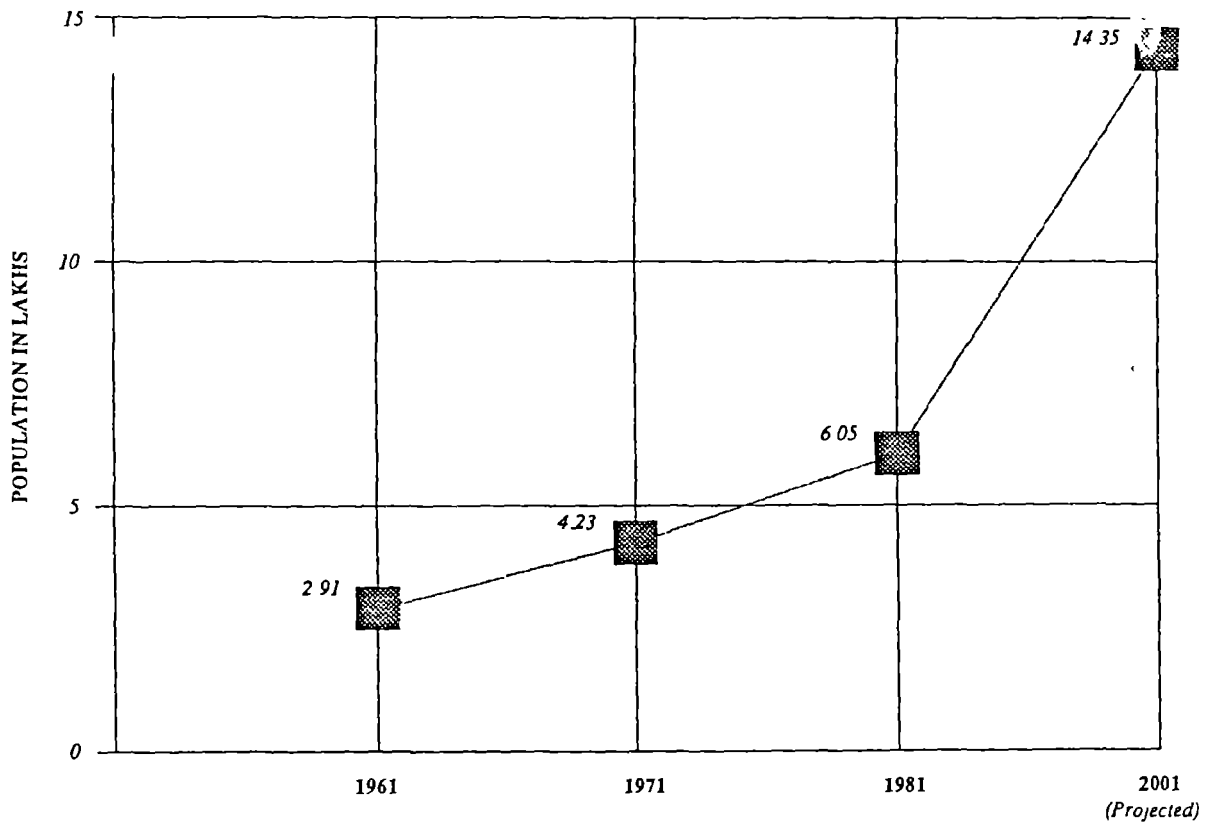
This works out to a per capita rate of supply of 23 gpcd on the basis of an estimated population of 8.45 lakhs. Actually, because of inequitable distribution across the city, some areas are supplied with less than 10 gpcd.

A number of augmentation schemes are planned and ongoing which, when complete, will increase the output of treated water to 42.55 mgd which will have to suffice for the PHED population projection of 14.35 lakhs by the year 2001.

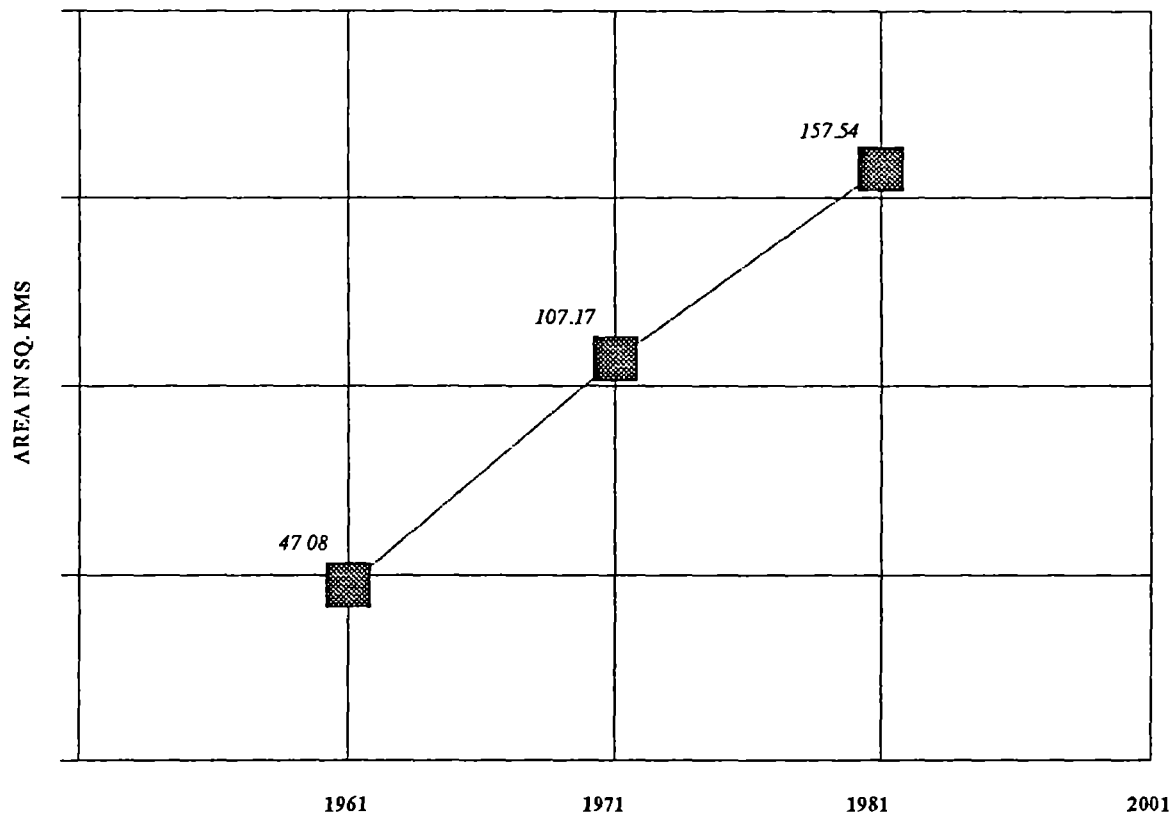
The existing conditions of drainage, sewerage and solid waste disposal are poor in Srinagar. The river Jhelum has become the main sewage and sullage carrying duct for the city. In addition there is no separate storm water drainage system. Mixed sullage and storm water flows are carried through a system of surface drains and buried conduits and are discharged untreated into natural water bodies (such as the Jhelum and Dal Lake) or into marshes and other low level lands.

At present most houses in the old city have service privies. The excreta is either removed by buckets or directly flushed into open drains. Civil lines and the newly developed areas are mostly provided with septic tanks. The same system is also used for public latrines in the city area.

# GROWTH OF SRINAGAR AGGLOMERATION (POPULATION)



# GROWTH OF SRINAGAR AGGLOMERATION (AREA)





The surface drains, which carry all waste water and storm water, tend to get clogged in the summer season when the combined flow is insufficient. During the rainy season, on the other hand, overflow occurs with attendant health hazards. Indiscriminate dumping of garbage into the surface drains is also a frequent reason for choking of the drains.

Other than the National Highway the total road length of pucca, tarred road in Srinagar was 278 km. as per the 1981 census.

## 2. RESEARCH OBJECTIVES & HYPOTHESIS

### 2.1 *Research Objectives*

The study in hand belongs typically to the field of applied research in the sense that it aims for the development of practical and immediately applicable guidelines.

The overall objective of the research is to contribute to better post construction performance of low cost sanitation facilities with the hinterlying aim to better serve public health and human well being in general.

The immediate objectives are the following:

1. To increase the attention of policy makers and implementors alike towards the issue of user response and O&M.
2. To develop operational recommendations in respect of planning, design, construction and post construction management which would result in a better O&M performance.
3. To develop materials for the HSMI workshops and related training activities.
4. To provide a base for continued and expanded research in the field.

### 2.2 *Research Hypothesis*

There are various factors which require consideration during the planning, design, implementation and operation and maintenance of low cost sanitation schemes.

#### **Overall**

- a. Successful longer term functioning and effectiveness of low cost sanitation facilities can only be achieved through a comprehensive management of the manifold determinants involved as listed below.

#### **Technology and Design**

- b. Technology and design should be conducive to easy, correct and straightforward use, operation and maintenance. There should be minimum use of sophisticated tools and equipment. Replacement of parts should be easy and available at low cost from local suppliers.
- c. Planning and design should fully reflect user's customs and preferences.
- d. Quality of the facilities should be sufficiently sturdy in order to withstand rough handling during use and maintenance.

## **Planning**

- e. There should be sufficient advance commitment of the beneficiary groups concerned both in terms of contributions towards the subsequent operation and maintenance activities.
- f. There should be sufficient involvement of NGOs neighbourhood groups, local women's groups and the households in the process of planning, development and maintenance.

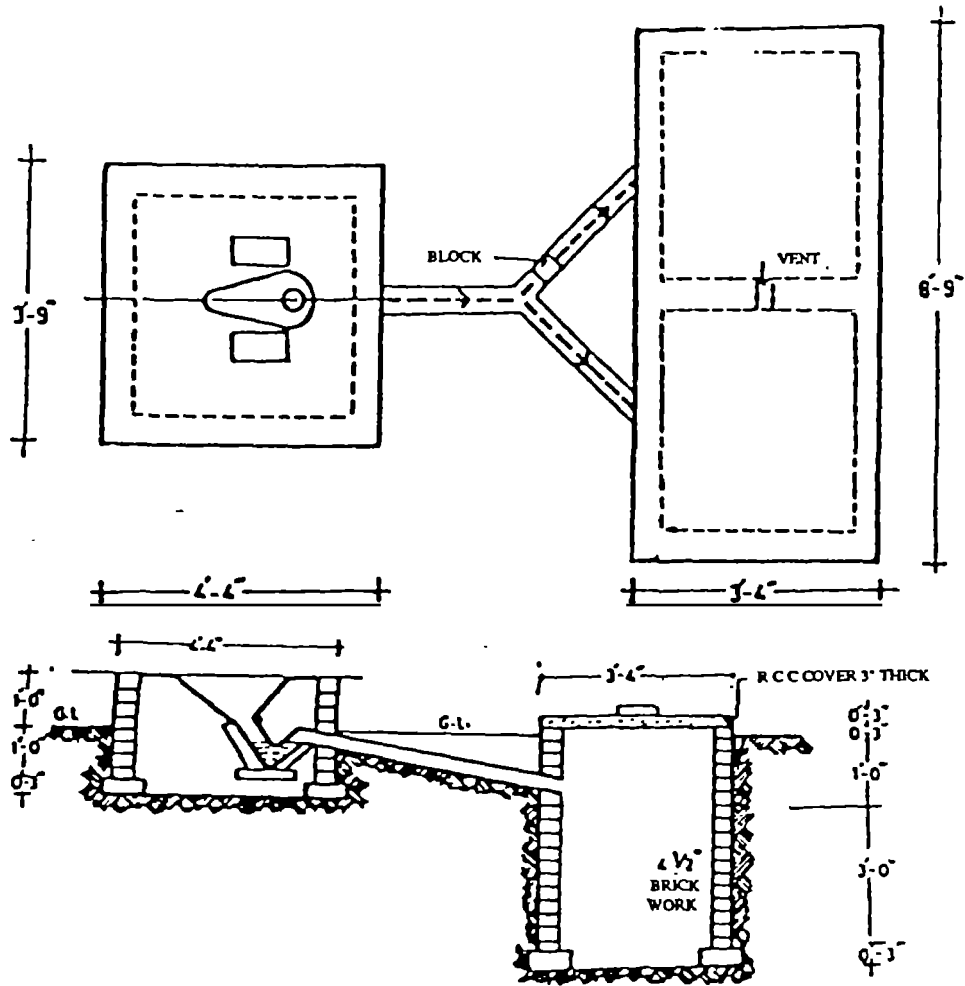
## **Social Factors**

- g. There should be sufficient awareness at the user level of the benefits to be gained from the proper use and maintenance of the facilities.

## **Management and Organisation**

- h. There should be sufficient supply of water in line with the sanitation system's requirement.
- i. There should be sufficient coordination and integration between the various sectoral agencies; there should also be a smooth hand over from the agencies which plan and construct to those which operate, manage and maintain after construction.
- j. Development and management of schemes should preferably be at Local Government level. Next to sufficient training, professional motivation is very important. Low cost sanitation schemes are often considered a sub-professional activity and are generally shied away from.

# PLAN AND ELEVATION TWO-PIT, POUR FLUSH LATRINE



### 3. DESCRIPTION OF THE RESEARCH

#### 3.1 *Methodology*

Information given by SMC indicated that, as per the present scheme, low cost sanitation units were constructed in nine of the seventeen wards of the city. Of the 6500 targetted, 5700 were verified as completed by the SMC. For the purpose of gathering primary data, a survey was conducted and a prestructured questionnaire (Annexure - 3) canvassed at the household (HH) level. A total of 150 questionnaires were canvassed on a random sample basis covering all nine wards where construction was undertaken. This constituted a 2.6% sample of the completed units. Six enumerators were identified with the help of officials of Sulabh for the canvassing of the questionnaires.

The questionnaire was structured to elicit information on various aspects including the socio-economic status of beneficiaries, satisfaction levels and reactions to the new latrines, hygiene parameters, sanitary habits of the community, existing infrastructural facilities and interviewers' observations. Primary data was also collected in the form of colour slides to aid easy presentation of the study in future. Further, in-depth interviews were held with officials of the SMC and Sulabh International to obtain the views of implementing agencies. Other secondary data was obtained from the Srinagar Master Plan documents (existing and revised) and Census of India publications.

Data processing of the information from the completed questionnaires was done at the HSMI with the SPSS computer package. Based on the computer analysed results, feed back from concerned professionals, study of secondary data and problems perceived, a diagnosis of the scheme has been attempted and a set of recommendations arrived at.

#### 3.2 *Project Details*

The present project under study, on the construction of 6500 low cost sanitary latrines, constitutes the first phase of a programme designed to cover more areas of Srinagar in the coming years. This phase was sanctioned for a total cost of Rs. 1.04 crores based on a unit cost of Rs. 1600 per latrine (without superstructure). Sulabh has extended a two-year warranty on the units and is presently looking after any post installation problems that occur. The majority of the latrines are for 5 to 6 users. However, if larger family sizes are encountered then the capacity of the leach pits are doubled.

The beneficiaries are given the units free and are supposed to build the superstructure at their own cost. Funding is provided jointly by the State and Central Governments with finances being released through the SMC.

Essentially every family possessing a ration card is eligible for inclusion in the project. It has been found that there is substantial demand for the facilities. A Low Cost Sanitation Committee has been constituted in the SMC. It is headed by the Deputy Administrator, with Chief Accounts and Executive Engineer of Works as members. Priority is generally given to the poorest section of the population although some latrines

have been constructed for more wealthy households. A batch by batch approach is followed with worst areas and high protocol areas being served first.

The various areas covered by the scheme may be categorised as follows:

1. Congested low income/middle income inner city areas.
2. Sparse high income inner city areas.
3. Urban fringe areas.
4. New suburban extensions.
5. Municipal staff housing colony.
6. Resettlement colony for minority group.

The hydro-geological characteristics of these areas varies from high water table, low areas with clayey soil, to low water table areas with a more rocky soil structure. There are also great differentials in density levels according to the location of each area.

Sulabh International maintains an office in Srinagar for their works in various towns in the state. The site works are supervised by their 40 supervisors who oversee the work of 150 locally recruited masons.

At the end of the two-year warranty period the responsibility for maintenance of the facilities will be transferred to the SMC. The department directly in charge will be under the Health Officer who works through 2 Municipal Sanitation Officers and Ward Officers in every ward of the city. The Ward Officer will be the officer directly responsible for all operation and maintenance aspects of the sanitary facilities being provided through the Sanitary Supervisors and Municipal Safai Karamcharis (Sweepers). The SMC employs a total of 2000 sweepers (1100 regular and 900 on daily wage).

## 4. MAJOR FINDINGS

### 4.1 Analysis of Household Questionnaires

#### Wardwise Coverage

The questionnaires were canvassed in all nine wards over which the scheme was spread. The number of questionnaires canvassed by each enumerator varied from 18 to 37 questionnaires each. The percentage distribution of HH per ward varied from a low of 0.7% in ward No.14 to a high of 15.4% in ward No.10.

#### Religion

Of the HH surveyed an overwhelming 91.9% belonged to the Muslim Community while 8.1% were Hindus.

#### Occupation

In the surveyed HH 40.4% belonged to the regular service sector with 37.0 being from the business sector. The occupationwise breakup is as follows:

Service	-	40.4%
Business	-	37.0%
Skilled Worker	-	18.5%
Jobless	-	4.1%

#### Education Levels

The largest percentage (46.5%) of the people were educated upto school level while 25.4% were college educated. The balance of 28.2% were found to be illiterate. This indicated that about 72% of the beneficiaries interviewed were formally educated.

#### Tenure Status

Nearly all the parties interviewed (98.6%) were the owners of the house being lived in.

#### Household Income

Nearly half of the interviewed beneficiaries were found to be in the middle income range of Rs.701-1500 per month. A large number aggregating to 37.6% were in the income range under Rs.700 per month. The income profile is as follows:

Rs. 0 - 700	-	37.6%
Rs. 701 - 1500	-	47.0%
Rs. 1501 - 2500	-	9.4%
Rs. Above 2500	-	6.0%

## **Residential Plot Area**

There was found to be an extremely large variation in plot size ranging from 20 - 1800 sq.m. This would seem to indicate that plot size does not have any direct relevance and the technology has been accepted by a wide spectrum of people.

## **Household Size**

Again in HH size there was found to be wide variation with sizes ranging from 1 to 18 members. The average family size was found to be 6.81 which is 24% above the national average of 5.5. The average number of adult males was 37.25% with female adults constituting 32.9%. Amongst the children below 18, there were 14% male children and 16% female children.

## **Difficulties During Conversion**

88.5% of the people said that they did not experience much difficulty during conversion. The difficulty expressed by the balance 11.5% consisted mainly of lack of alternate toilets available for use during the conversion.

## **Difficulties in Use by Children**

A large percentage (96%) of the children were found to experience no specific difficulty in latrine use. The high percentage should not, however, obscure the fact that there is a lot of open air defecation by children.

## **Instructions on Use of Facilities**

89.3% of the beneficiaries indicated that they had received written instructions on the use of the new latrines and their operation and maintenance.

## **Hygiene Parameters**

99.3% of the interviewed HH indicated that they use water for anal cleansing. On the use of soap for washing of hands after defecation, 67.8% professed to do so while a notable 31.8% said that they did not, or used other materials. A worrisome 87.1% evinced ignorance as to the danger of children's feces to human health.

## **Level of Satisfaction**

A high percentage of 82.6% were satisfied with the performance of the technology provided for latrine conversion.

## **Performance of Leaching Pits**

The great majority of the beneficiaries (83.1%) were satisfied with the performance



of the leaching pits. Of the balance the following reasons for dissatisfaction were observed:

Blockage	-	14.2%
Rapid filling	-	1.4%
Pan overflowing	-	0.7%
Pit overflowing	-	0.7%

In 98.6% of the cases, however, sullage water did not enter the pits to cause any of the above mentioned problems.

### **Pit Filling Time**

Since this was a new scheme, in 98.2% of the cases the first pit had not yet been filled.

### **Willingness to Pay**

Since this was a scheme for free provision, 96.2% of the beneficiaries were not willing to pay an extra monthly sum towards improvement in physical infrastructure services. A small percentage were willing to pay between Rs.2/- and Rs.25/- per month for additional/better services.

### **Water Supply**

About 90% of the families were served by piped water supply by means of house taps. The balance got their water from communal taps or other sources. 24% of the HH had a tap located in the toilet.

### **Health Improvement**

Only 8.3% of the people admitted to diseases before conversion. However 62.3% felt that the latrines had been responsible for improvement in health.

### **Community Organisations/Health Campaigns**

78.2% of the people had never witnessed any public health campaigns. Only 12.9% professed to have seen a family planning campaign. Again only 36.2% of the beneficiaries were a part of any community organisation. However 71.1% expressed willingness to join one.

### **Latrine Details**

It was found that 77.2% of the latrines had a pucca superstructure constructed by the beneficiaries themselves. 41.4% had these toilets adjoining bathing places. The location of the latrine was found to be outside the premises in the majority (89.1%) of the cases, most often in one corner of the plot.

## Area Cleanliness

The enumerators reported from visual observation that garbage was strewn around the house in 76.2% of the cases. This was supported by the finding that in 46.6% of the cases open surface drains were found choked.

### 4.2 Views of Concerned Agencies

#### 1 Srinagar Municipal Council

The SMC stands suspended and is under the charge of an Administrator from the state services. The main activity of the municipality in the area of environmental cleanliness is in street sweeping, solid waste collection and drain maintenance. Approximately 70% of the total budget, Rs.8 crores is spent on these items. The sanitation provisions under the Municipal Act are enacted through the office of the Municipal Health Officer.

The SMC is by and large very satisfied with the performance of Sulabh International with whom it has a good working relationship. Because of the two-year warranty provided, future requirements and responsibilities towards maintenance of the facilities are not seen to require immediate attention. The municipality foresees that the on-site facilities will, in fact, be the responsibility of the individual HH who can make direct arrangements with local sweepers for operation and maintenance.

On being interviewed by the researchers, the Municipal Health Officer had the following comments regarding the scheme:

- Both municipal officers and beneficiaries alike were not adequately conscious of the important connection between proper sanitation and improved health.
- There were a large number of cases of diarrhoea and gastro-enteritis in the city both of which are water/excreta borne diseases.
- Health education programmes are a dire necessity to create awareness particularly amongst the poorer, uneducated sections of the city dwellers.
- The central older parts of the city are a particular problem because of lack of space within plots and narrow access lanes. The municipality avoids siting of leaching pits under roads and pathways as they fear encroachment and subsequent litigation.
- Community latrines should be provided near public areas like markets, bus terminals etc.
- In-service, field training programmes are necessary for sanitary inspectors with a view to increase their understanding of the technology being applied and to improve motivation and commitment.
- The municipality does not have faith in popular participation. They claim that the people see the city government as an agency to be pressurised.

## **2 Sulabh International**

The main problem faced by Sulabh is the low unit cost that is applicable as per 1985-86 price levels. They feel that a price revision is in order to match the price increase of required materials which they have to buy at prevailing market rates.

Another problem faced is because of beneficiaries using soil and other particulate matter for anal cleansing which leads to blockages in some latrines. Sulabh is called upon to attend to such complaints and rectify/repair any damage done.

The NGO is satisfied with the acceptance of the new technology by the citizens of Srinagar. They receive requests for construction of toilets from many households who have not yet been targeted for conversion.

### **4.3 Related Findings**

#### **Designed Capacity Overload**

The number of users per latrine often exceeds the design capacity. This is caused by the fact that parts of premises are rented and multiple families start using the facilities designed only for 6 or 12 users.

#### **Junction Box Malfunction**

In a few cases it was noticed that sewage was flowing simultaneously to both pits due to a failure to sufficiently close one of the outlets in the junction box. This will, of course, lead to grave problems both at the time of pit switching and subsequent desludging. Additionally, in almost all cases the junction box was found to be badly hidden and often plastered or concreted over. This will cause difficulty when faults have to be rectified and/or pits have to be switched.

#### **Malyari Land**

A singular situation is found in the city. It has been a custom in the past to use human excreta as fertiliser or 'malyari' land i.e. HH land used for vegetable cultivation. On the one hand this practice is declining because of progressively less arable space being available within plots. On the other this traditional habit bodes well for future use of desludged pit deposits.

#### **Problems in Low Lying Areas**

In certain low lying areas, particularly in the new suburban extensions in the south of the city, the water table is very high - approximately 2-4 ft. below ground level. This interferes with the functioning of the pits since sufficient leaching action does not take place and the bottom of pits are sometimes submerged.

## **High Density Core Areas**

In much of the high density core areas of the city installation of low cost latrines is difficult because of lack of space mainly for the leach pits. The municipality is opposed to siting of pits under roads and pathways anticipating problems related to encroachment and excavation of road/path surfaces for desludging of pits.

## **Anal Cleansing Habits**

Despite the finding of the household survey to the contrary it has been observed that in a number of cases soil is used for anal cleansing as is testified to by the presence of small mounds of earth outside latrines. Sulabh officials have corroborated this by citing instances where they have attended to complaints of blockage caused by introduction of soil into the system.

## **Improper Flushing Practices**

A case commonly observed is improper flushing practice. Insufficient flushing water is often used despite close proximity of water supply leading to caking of the pan with excreta and consequent clogging.

## **Improper Superstructure**

Under the present scheme of free provision it is the responsibility of the beneficiaries to construct the toilet superstructure. In a large number of cases it was found that only part superstructure had been built often open to the sky. Wind blown debris and leaves, twigs etc. cause malfunction in such cases. This feature is predominant in low income areas.

## **Hygiene Awareness**

Hygiene awareness in Srinagar is inadequate. Rich and poor alike are in the habit of flushing night soil into the drains. The HH survey also revealed that an alarming 87% of the beneficiaries did not consider excreta harmful to health.

## 5. COMMENTS

The present scheme falls under the purview of the Low Cost Sanitation Committee set up by the SMC, the committee members being senior officers of the municipality. It is curious to note therefore that the Municipal Health Officer is not a member of this committee although it is his department which will be directly in charge of post installation issues once the facilities are transferred to the SMC.

The scheme was awarded to Sulabh International on the basis of an unit price of Rs. 1600/- per latrine (without superstructure). The break-up of quantities of material and current costs are as follows:

### Material

Item	Quantity	Cost
Bricks	650 Nos.	Rs. 650.00
Steel	7 Kgs.	Rs. 63.00
Cement	3 Bags	Rs. 250.00
Coarse Aggregate	10 cu.ft.	Rs. 60.00
Sand	35 cu.ft.	Rs. 105.00
Lifting Rings	4 Nos.	Rs. 20.00
Pan and Trap	1 Set	Rs. 150.00
Pit Digging	-	Rs. 40.00
	Sub total (a)	<u>Rs.1338.00</u>

### Manpower

Mason	2 Mandays	Rs. 140.00
Labour	2 Mandays	Rs. 70.00
Labour (material	2 Mandays	Rs. 70.00
	Sub total (b)	<u>Rs. 280.00</u>
	Total of (a) + (b)	Rs.1618.00
Overhead 25%		Rs. 404.50
	Grand total :	<u>Rs.2022.50</u>

It is seen that the unit cost no longer covers the basic cost of materials and labour at present prices. Sulabh has to do a continuous financial balancing act within the state, taking advance money from other projects in different towns in the hope of future adjustment.

The tradition of using night soil on malyari land is seen by the researchers as fortuitous for the future of low cost sanitation schemes in the Srinagar region. In such schemes

elsewhere, the final removal and disposal of the pit deposits is seen as a potential future problem. People generally think of night soil as something to be removed immediately from the premises. In the case of Srinagar, malyari use of pit deposits will solve the problem in those areas where open land is available within the plots.

It appears that the SMC has set no policy as to its own involvement in the after care of the sanitation facilities beyond the two-year warranty period. It is generally understood that the task will be that of the municipal health department working through its network of Ward Offices overseen by the respective Ward Officers. The Ward Offices are extremely important as they are the interface between the community and the SMC. In future they will have to receive and attend to any complaints regarding the facilities provided.

On inspection of some Ward Offices the researchers found them to be in a dilapidated condition. Some were even found to be unmanned by SMC staff and locked during working hours. It appears doubtful whether these offices will be able to take on additional responsibilities as required by the present (and any subsequent) schemes, in their present condition.

It was found that the communities were not involved in the planning, designing and implementation of the scheme in any way beyond an opinion as to the siting of the latrines.

Since the scheme is one of free provision of facilities, cost recovery of the capital cost does not come up for consideration here. However it is also notable that no advance commitment of the beneficiary groups was solicited in terms of contributions towards the subsequent operation and maintenance of facilities.

The researchers feel that because of free provision of the facilities the population by and large do not have much interest in the upkeep and/or betterment of the facilities since they do not experience the feeling of ownership that is generated by paying for a facility.

On the other hand it is worth noting that small groups of residents from various colonies have approached the SMC for improvements in physical infrastructure for which they have offered to pay.

A special case was found in a resettlement colony for the Tibetan population. The inhabitants have a good degree of literacy, belong to the middle income group and are, by and large, neat and clean in their personal clothing, house maintenance etc. Here the sanitation facilities were found to be in a spotless condition and all working perfectly.

It is generally opined by SMC and Sulabh officials that provision of units in the core areas is extremely difficult because of lack of space within plots, inadequate access etc. Despite these difficulties the researchers found a number of latrines functioning well in many houses in these areas.

## 6. CONCLUSIONS AND RECOMMENDATIONS

- There appears to be an important potential role of the municipal health department in further promoting proper on-site sanitation.
- The Municipal Health Officer should be a member of the Low Cost Sanitation Committee of the SMC.
- Health awareness campaigns need to be arranged and aggressively conducted in all sections of the city.
- Field demonstration units should be constructed in various areas and the communication media, such as the press and television, used for popularising future schemes.
- Congested core city areas need to be urgently addressed for sanitation provision. On the one hand the residents should be coerced to accept conversion, while the SMC should consider siting of leaching pits under footpaths and roads at least in these areas.
- It is important for the SMC to make an assessment of its own requirements beyond the two - year warranty period in terms of additional finances, equipment and personnel.
- The Ward Offices require urgent attention so as to upgrade them for the additional tasks of monitoring and maintenance which they will be called upon to fulfill.
- There should be an extension of service to those families who are willing to install units without subsidy from government.
- In-service, field training programmes are needed for the level of Sanitary Inspectors and Sanitary Supervisors with the objective of increasing their understanding of the technology being applied (with special emphasis on maintenance requirements) as well as to increase their confidence and commitment to the scheme.
- Emphasis should be consciously shifted from only physical target achievement to the broader goals of the project and should also keep in mind the after-care requirements.
- There should be a price escalation clause in the agreement signed for such schemes so that purchase of materials at market prices prevailing at the time of implementation is possible. This will aid quicker implementation.
- Despite the fact that the scheme is one of free provision of facilities, scope for beneficiary contribution should be seriously investigated, possibly towards operation and maintenance.

- There should be concerted effort to extend the scheme to all areas where malyari land is available within, or adjacent to, residential plots. In other areas municipal/horticulture departments should plan to buy pit deposits for use in gardens, parks etc.
- It may be desirable to reassess the design of the junction box to prevent short circuiting of pits.
- There is need to keep the junction box as visible and accessible as possible so as to facilitate easy opening during blockage and during switching of pits.



## Distribution of Population (Wardwise)

Ward Nos.	Population 1971	Population 1981	Growth of Population in percentage
1.	15415	22951	48.9
2.	14022	16719	19.2
3.	27551	35211	27.8
4.	11575	38438	232.08
5.	25024	47658	90.45
6.	28081	37100	32.12
7.	23816	24380	2.37
8.	24595	30212	28.84
9.	38032	42914	12.84
10.	31780	43734	37.61
11.	28886	36786	27.35
12.	28311	42889	51.49
13.	25401	34738	36.76
14.	26908	29321	8.97
15.	8841	30933	249.88
16.	13698	24717	80.44
17.	8026	27117	237.86
Boat Population	3421	19646	4747.28

Source : Srinagar Municipal Council.

## Growth of Srinagar - Yearwise

Sl. No.	Urban Component	Year	Area in sq kms.	Total persons	Decadal % variation	Person Male	Female
1.	Srinagar Urban Agglomeration	1951	250724	-	135325	115399	
		1961	47.08	291853	+ 16.40	156689	135164 <sup>a</sup>
		1971	a) 103.27	423253	+ 45.02	228227	195026 <sup>b</sup>
		1981	157.54	b) 604786	+ 42.90	324101	285901 <sup>b</sup>
a)	Srinagar (City)	1951		246522	-	132714	113808
		1961	41.44	285257	+ 15.76	152967	132290
		1971	97.65(I)	415271	+ 45.58	224067	191204
		1981	153.31	593561	+ 42.8	317372	276189
i)	Srinagar (M.C.)	1951		246522	-	132714	113808
		1961	41.44	285257	+ 15.71	152967	132290
		1971	82.88(X)	403412	+ 41.42	217765	185648
		1981	144.82	585464	+ 45.13	323190	281596
b)	Badami Bagh (Cantt. Area)	1951		4502	-	2611	1591
		1961	5.64	6596	+ 56.97	3722	2874
		1971	5.63	7982	+ 21.07	4160	3822
		1981	4.23	11225	+ 40.63	5818	5407

a) Excludes the Pampore town area of 3.89 sq. kms. and population of 8582.

b) Final figures supplied by Census Department.

(X) Area of new localities added in the municipality area after 1961.

(I) Includes Srinagar Municipality O.G. of 1635 persons and Badam districts out growth 6462 persons.

Source . Census of India

**HOUSEHOLD SURVEY QUESTIONNAIRE  
LOW COST SANITATION SCHEME  
SRINAGAR, JAMMU & KASHMIR**

- 1. Name of head of the family :
- 2. Address :
- 3. Religion :
- 4. Caste :
- 5. Occupational Status : Service/Business/Skilledwork/Jobless/Agriculture
- 6. Educational Level : Illiterate/School/College
- 7. Ownership of the house : Rented/Owned<sub>2</sub>
- 8.(a) Plot area : ..... m<sub>2</sub>
- Built up space : ..... m

Details of family members

	Age	Illiterate	School	College
Male Adult (A) Minor (M)	A			
	A			
	A			
	M			
	M			
	M			
Female Adult (A) Minor (M)	A			
	A			
	A			
	M			
	M			
	M			
Total				

9. Monthly family income level :  
 Upto Rs. 700  
 from 701-1500  
 1501-2500,2500 & above.
10. Motivation/Reasons for adopting low cost sanitary latrines. :
11. Any difficulty during conversion of the latrine. :
12. Do children have any difficulty in using the converted toilet? If yes, specify. : Yes/No
13. If instructions were supplied for the use of low cost latrines at the time of conversion. : Yes/No
14. Do you use water for anal cleansing. If no, what materials do you use. :
15. Is soap used for hand washing after defecation? : Yes/No
16. Do you consider a child's feces to be dangerous to health. : Yes/No
17. Does sullage/rain water enter pits. :
18. If satisfied with the performance of the latrine with leaching pits. : Yes/No  
 If no, reasons : blockages/fouling/rapid/filling of pits/pan over flowing/pit over flowing.
19. How long did first pit take before it was filled? :

## Observations of Interviewer .

1. Number of latrines in the house :
2. Location of Bath : Adjoining Toilet/Removed from Toilet/No Bath
3. Building material of toilet super structure : Kuccha/Pucca
4. Location of leaching pits : inside the house/outside the house.
5. What system of storm water/sullage disposal is available? : Covered/uncovered
6. Condition of drains : Choked/clean
7. Garbage strewn around house : Yes/No

20. If the manure of first pit was sold/used? (If yes, indicate value) : Yes/No
21. Monthly instalment for conversion of the latrine. : Rs.....  
Payable for .....months
- Do you pay : Yes/No
22. Total monthly HH expenditure on all infrastructure elements : Rs
23. Are you willing to pay an additional small sum monthly for better service : Yes/No  
If yes maximum amount Rs per month
24. Source of water supply. : House tap/communal tap/hand-pump/well/house handpump/well/any other.  
Is there tap in toilet : Yes/No
25. Water supply available per capita. : .....lit/cap/day
26. Which were main diseases before conversion? :  
Any improvement. :
27. What is the solid waste disposal system. :
28. Is there any community organisation functioning in your area. : Yes/No  
Would you like to join. : Yes/No
29. Has there been any public health campaign in your area. :  
- child health care  
- nutrition  
- diarrhea treatment  
- family planning  
- hygiene  
- water and health  
- any other