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EFFECTS OF CHANGING WATER SUPPLY INFRASTRUCTURE ON UNPAID AND PAID LABOUR OF SOUTH INDIAN WOMEN

The Case of Hosur 1971-1991

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INTRODUCTION

THE LINKS BETWEEN DOMESTIC WATER AND WOMEN'S LABOUR

The introduction of piped water is a labour-saving measure which is beneficial to women. In addition to assumptions of expectable improvements in the field of health this is one of the general assumptions of drinking-water policy of many governments. According to the argument women, as first responsible for the supply of water and for hygiene in the house, spend less time and energy on the daily trip to the well or the pump. This time could be used productively for income-generating activities/1. Feminist writers have developed arguments along similar lines, summarized by Dankelman and Davidson in the following statement:

> "The provision of adequate water is an essential prerequisite if women are to become more effective income-earners. Time saved in water collection directly influences their ability to be successful in these activities, which provide them with a better chance of feeding themselves and their families and so improve their health and potential productivity."
> (1988:32)(Van Wijk-Sijbesma,1985: 22,37,99,100)
> (Instraw, 1984:198)

The deputy director of the Water Supply Division of the Japanese government gives an idea of the time and energy needed for local supply of water, stating that 'a woman in an average family in rural areas walks a distance of 18.000 kilometre in her lifetime to fetch water'. The daily time and energy spent on the collection of domestic water varies of course considerably between urban and rural regions in Asia, between households of various socio-economic status and between hot and cold seasons.

Background of the research topic

In the transition from a rural to an urban organized economy parts of the reproductive work in a household, such as education,

health care, child care, housing and the supply of water are more and more supplied by basic services provided by public or private agencies. The new infrastructure of providing basic services is based on a specific gender division of labour in society and consequently its structure determines the new urban life patterns of men and women over generations. In particular built environment is not easy to adjust to contemporary needs. The location of factories, housing schemes, water systems, shopping centres and schools and the nature of public transport systems determines in what stage of her lifecycle, for how many hours per day women can work productively and what kind of productive work can be combined with reproductive work. In this sense the design of water supply systems connected with the housing infrastructure affects the pattern of time-use of inhabitants over the long run.

RESEARCH METHOD

The primary objective of this study is to quantify the link between the demand for and supply of water for domestic purpose and women's labour. The subject is placed within the context of population and development dynamics and the overall water infrastructure in a region. In this research paper the focus is on a newly industrialized area, where water is needed by an increasing number of households in a town and some villages, by agriculture for irrigation and by factories for industrial use. South India was chosen as a research setting where the traditional water supply was and still is unpaid work of women, mostly mothers, daughters and servants in households. The study is located in Hosur, a fast growing 'New Town' in South India, in

the state Tamil Nadu where in 1988 a survey was carried out on availability, demand for and supply of domestic water and access to modern water supply infrastructure/2.
The links between water supply and women's labour can be studied on different levels of analysis and over various periods. Theoretically there are evident links between (1) labour saving piped water, (2) better health of family-members and (3) spare time for productive work of women.

Seen from the household point of view higher productivity of women's labour can only be one of the effects of piped water, if the woman had access to productive labour beforehand. So the links at household level have to be made in a specific order: first access to productive work (0), then piped water (1), with the result of spare time which can be used in the more productive work (2+3).
Access to productive labour is a bottleneck in the Indian situation of structural unemployment. Access to formal employment is a privilege of the urban middle class of (educated) people who have certain connections. Young educated women have access to certain segments of the labour market. However if they marry, they often this privilege. Women work productively in agriculture, family enterprises and informal jobs; the drive to take on this type of employment arises from poverty and survival of the family. When a mimimum standard of living is attained, women tend to dismiss these types of heavy and low-paying jobs and set out to improve the living conditions of the family.
Thus modern water supply can help subgroups of women to work more productively; higher middle class women who have access to the

formal labour market and want to have a paid job and the poorest women who have to earn money in order to survive. In the case of women without access to paid employment modern water supply only leads to a higher level of welfare and better health conditions. In the short run it fails to stimulate the productivity of women's time-use. Although from an historical perspective on the macro-level this might be regarded as the orgin of the links in the order of piped water (1), healthy family (2), time for productive work, with consequent access to productive work (3). We will ask these questions in relation to specific social economic groups in Hosur.

In the light of the above the lay out and type of water infrastructure in Hosur play a crucial role and also determine the future time and energy the household members have to spend in order to fulfil their daily water requirements.

In order to get a clear picture of the effects of a changing water supply infrastructure on unpaid and paid female labour in Hosur we ask the following questions:

1) What does the picture of population dynamics and the related demand for several types of water supply in Hosur look like?
2) What is the structure of the water supply in Hosur like?
3) In which way is (female) labour the bridge between the demand and supply of domestic water in Hosur? How is the time -gained by the piped supply system- used?
4) Taking this into consideration, what are the policy implications?

Organization of the paper

In chapter 1 we start with the demand side of water, taking into account the population dynamics and the increasing water demands of the agricultural and industrial sectors in Hosur.

In chapter 2 the focus is on the supply side of water, with a

description of the physical and man-made water infrastructure and the timing of modern water supply systems in other cities, in other periods of time.

The element of labour provides a bridge between the demand and supply side of domestic water use. In 3.1 the requirements are shown in terms of time and energy spent by housewives and children as unpaid labour on fetching water from traditional sources. In 3.1.1 we describe paid labour by professional watercarriers. Part of this unpaid and paid (female) labour is transformed into formal employment for skilled male workers who are in charge of the Water Department of the municipality (3.2). In the Housing Schemes of Hosur the actual opportunity costs of female labour and the required extent of comfort have played an important role in the design of the modern water supply, as contrasted with labour intensive water supplies (wells and handpumps) in the other parts of the town where women's labour has a low level of potential productivity.

Access to formal employment and consequently to the modern Housing Schemes implies access to time and energy saving water supply, as shown in 3.3. Based on the preceding, the final chapter (4.) gives some recommendations for drinking-water policies.

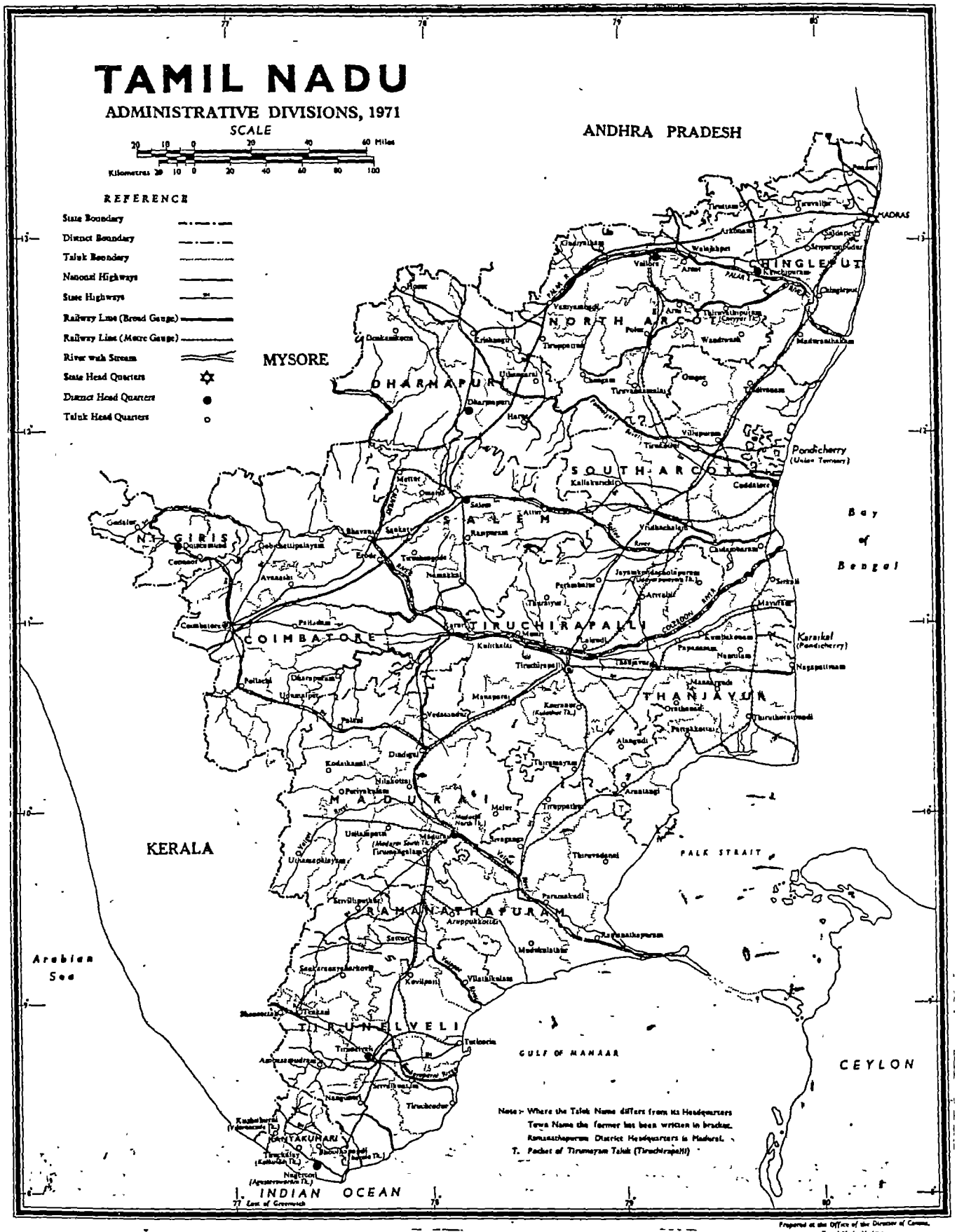


Figure 1. Location of Hosur in the Dharmapuri District

CHAPTER 1

THE DEMAND FOR WATER

1.1 Population dynamics in Hosur

In the seventies the Tamil Nadu Government adopted a planning strategy in order to reduce spatial inequalities within the state. Part of the strategy was to stimilate a selected number of growth poles in backward areas through industrialization.
One of so called New Towns that were selected was Hosur, located in Dharmapuri, a backward district in Tamil Nadu. In 1981 the overall district population was around 2 million people on a area of 9622 km2; the population density was 208 per km2. (Average density in Tamil Nadu is 372 p/km2).
In 1981 only 9.4% of the population of the district lived in urban areas, in small cities of maximal 50.000 inhabitants.
The occupational structure of the district is dominated by agriculture (83% of the active population). The district is part of a dry area with high temperatures and limited rainfall. Historically an important part of agriculture was dry farming. In recent years forestry and irrigation farming have been developed. The New Town Hosur, however, is repute to have a relatively cool climate with fine rains (see 2.1).
Hosur was chosen as a New Town for its favourable location; in a backward district in Tamil Nadu, near the Karnataka border and only 45 kilometres from Bangalore, the capital of Karnataka with a population of three million inhabitants.
The map (figure 1) shows the location of Hosur along the main road from Bangalore to Madras and the road to southern Tamil

Nadu. The main objective for planning a New Town in this area was to relocate the stream of migrants of Madras and Bangalore to a smaller town in order to spread the urbanization in a more balanced pattern over the country.

The de facto growth of the New Town Hosur lies in the mid-seventies due to immigration of people who came to find a job. The construction sector in Hosur required a number of unskilled and semi-skilled workers to build more than 100 factories. The first stream of migrants were industrial pioneers from Bangalore and Madras and construction workers from rural Tamil Nadu. Around 1977 the buildings of the first few factories were ready for use, and a new type of migrants arrived. Young single men, with middle and higher education migrated from urban areas - Bangalore and Madras in particular- in order to find a job in Hosur in accordance with their level of education.
Ten years later, in 1987, five Housing Schemes were completed, the required houses for formally employed migrants were ready for habitation, family members joined their sons and husbands, and the process of family building on a new scale in Hosur began.

It will be clear from the above that in the seventies and eighties 'migration' has contributed considerably to the population growth in Hosur. According to the Census data, Hosur-panchayat had 16.591 inhabitants in 1971 and 27.129 in 1981, with a exponential annual growth rate of 4.9. (see table 1)
Due to the situation where new industries attracted 10.000 workers in the mid seventies, 80 per cent of whom were young educated male workers, Hosur experienced inmigration of young

females, who migrated mainly for the purpose of marriage. The mid eighties were characterized by a baby-boom, which is expected to continue until the nineties. The population in 1991 is estimated at around 50.000. The statistical officer of Hosur, Kannan, reports an increase in birth rates of twenty percent in the years between 1970 and 1980. After 1980 he noticed a decline due to birth control efforts/3 and a rising number of urban migrants who practice an urban style of family planning.
Based on raw data of 1987 only we calculated a Crude Rate of Natural Increase of 3.7; even more than immigration, the natural increase (low number of deaths, high number of births) will contribute to the population growth of Hosur in the next decade. Given the character of the available data, the projection for a limited period of 15 years and the growth pole role of Hosur we have chosen to work with the exponential growth rates/4. Hosur's population between 1981-1985 grew at a EGR of:

$$\frac{35.000}{27.129} = e^{r.4}$$

$$\ln 1.29 = r \cdot 4$$

$$r = 6.4$$

Based on the information in 1.1 we have extrapolated the exponential growth rate of the periode 1981-1985 for the ten year period 1981-1991. For the year 2001 we made rough estimations based on three EGR's, 2.5, 3.5 and a very high one 6.5. Even with the (unrealistically) high variant we do not reach the figures of the New Town Planning Office, which gives Hosur a population of 150.000 in the year 2000/5.

Table 1. The population of Hosur 1871-2001

Year	population	Annual Growth	Exponential rate	Water supply
1871	6.360			
		-0.8		Well water
1881	5.869			
		-0.2		
1891	5.756			
		1.5		
1901	6.695			
		-1.2		
1911	5.913			
		0.2		
1918	6.000/*			English plan for water supply
		1.1		too costly: private and common
1951	8.712/**			wells
		2.9		
1961	11.683			Extra deep wells/municipality
		3.5		
1971	16.591			-second plan for water supply
		4.9		wells, handpumps
1981	27.129			-60 public taps, 43 handpumps,
		6.4		100 private wells, supply system in Housing Schemes
1991	51.449/***			-Supply from the Kavaranapalli-reservoir
2001				
Low	66.061/****	2.5		
Medium	73.009	3.5		
High	98.553	6.5		

* Source for population 1871-1918: Salem Gazeteer, 1918 & Statistical Atlas 1908

** Source: Census of India (1951,1961,1971,1981)

*** The population in Hosur in 1985 was 35.000 (EGR 6.4) in Meijer and Heins, 1985. In 1988 the planning office in Hosur estimated the current population at the level of 75.000. Based on research results of Meijer and Heins, 1987 we project a population of 42.408 in 1988 (EGR 6.4). A forecast by Sipcot for 1990 speaks of 50.000 inhabitants.

**** The New Town planning office estimates the future population in Hosur to be 150.000 in 2001. This is probably unrealistic. Even the high variant of our rough estimation is lower, around 100.000 people.

1.1.1 Changing demand for water in Hosur

The transformation of Hosur from a sleeping town into a dynamic area affects the overall demand for water as well as the composition of the demand. On the whole the shift in the pattern of water use can be characterized by the process of modernization with elements of irrigated agriculture, industrial use, and an urban life style of domestic water consumption.
Next to the changing pattern each element shows an overall growth in demand as a direct result of modernization and population growth in Hosur. Due to the lack of historical data, it is impossible to reconstruct the increase of total water use since 1950 in exact figures, but the increase must be impressive.

1.2 Domestic water demand

The domestic demand has also increased rapidly. Due to the distance people have to walk, and the energy required to collect water, the demand per capita has risen from 10 litrs per day to 100 or more litres per day.
In table 2 we give an overview of the pattern of domestic water used according to the source. The changing pattern in domestic water consumption is found in (1) the choice (and need) for different sources and (2) the differentiation in the quantity. Whereas a well was the common source for water before 1970, in Hosur most households had access to a well near the house. In the eighties most wells in Hosur are still in use, new ones are being built. Unfortunately the water drawn from these wells is no longer safe and fresh enough for drinking purposes. The few fresh

wells are in private ownership and carefully maintained by the owners.

Inhabitants of Hosur without access to private tap water draw water for drinking and cooking purposes from public taps and handpumps. Easily available water (well, or surface water) is used for washing, cleaning etc. The total amount of water used per person per day has declined in the old parts of the town, and increased in the Housing Schemes, where every house has a private tap connection, although in times of water scarcity only twenty minutes per day water runs through the pipelines (see figure 2).

Table 2
Domestic Consumption per capita per day by component and source in litres per day (l/c/d)

Component	Private well	public source	private tap	
Drinking & cooking	5	5	5	
Washing & cleaning	15	10	10-25	
Personal washing	15	10	10-25	
Waste disposal	0	0	5	
External use	15	0	0-10	
Toilets	5	0	30	
Other usage	5	5	0	
Total per capita	60	30	60-100	l/c/d

Based on the survey the following figures were calculated with respect to sources with public access (public wells, handpumps and public taps): the average minimum demand of 5 l/p/d water for drinking and cooking and 25 l/p/d cleaning water in total 30 litre domestic water use per capita per day (in neighbourhood II and III). Households with a private well near the house generally use more water, estimated at 60 l/p/d. In case of a private tap connection the average mimimum use is 30-60 l/p/d increasing to 60-100 l/p/d in case of full water supply with toilet flush and bathroom (in neighbourhood I).

In order to project the demand for domestic water over time in the growth pole Hosur, we have projected the future population of the town in table 1. The change in life styles over time (income, habitat) in relation to domestic water use is the second element needed, to solve the simple equation:

$$P_{(t)} \cdot DWuse_{(I,II,III)} = \text{total } DDw_{(t)}$$

Where:
$P_{(t)}$ = Population of Hosur in time t
DWuse= Daily water use per subgroup I,II,III
DDw = Domestic Demand for water
in litres per capita/day

The demand equation is more realistic if it is categorized in three groups of domestic water users living in:

I Satellite neighbourhoods with modern water supply system where around 30 % of Hosur's population live.
II Old town and the unorganised new neighbourhoods with its wells, pumps and taps, and 1200 private tap connections where 60 % of Hosur's population live
III Peripheral neighbourhoods with wells and some pumps, which account for 10 %.

The differentiation in quantities of required water per household is a result of the scarcity of water available for domestic use and the water infrastructure in Hosur. The tendency is shown in the cluster of neighbourhoods in figure 2.

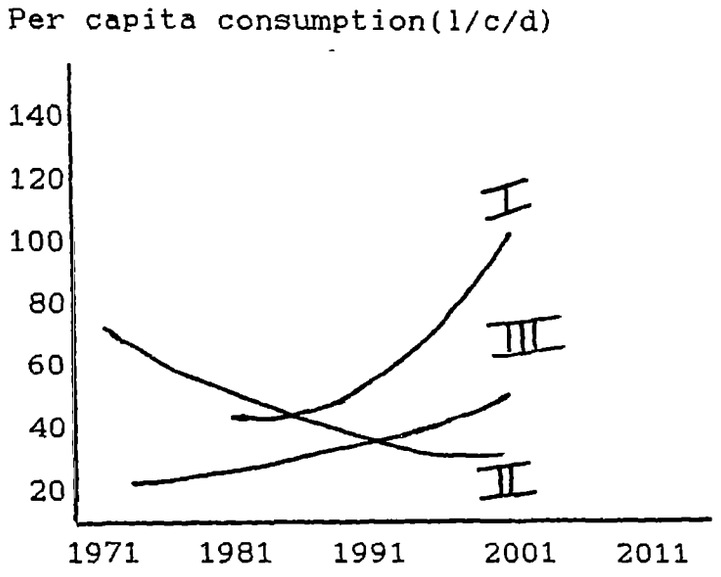


Figure 2 Domestic water consumption in Hosur by Neighbourhoods

In table 3 the outcome of the demand equation is given. At the turn of the century Hosur will need between 3.523 and 9.855 m3 water per day for domestic water consumption, according to our calculations. The domestic consumption of water in Hosur will only count for 6-10 % of the total demand for water.

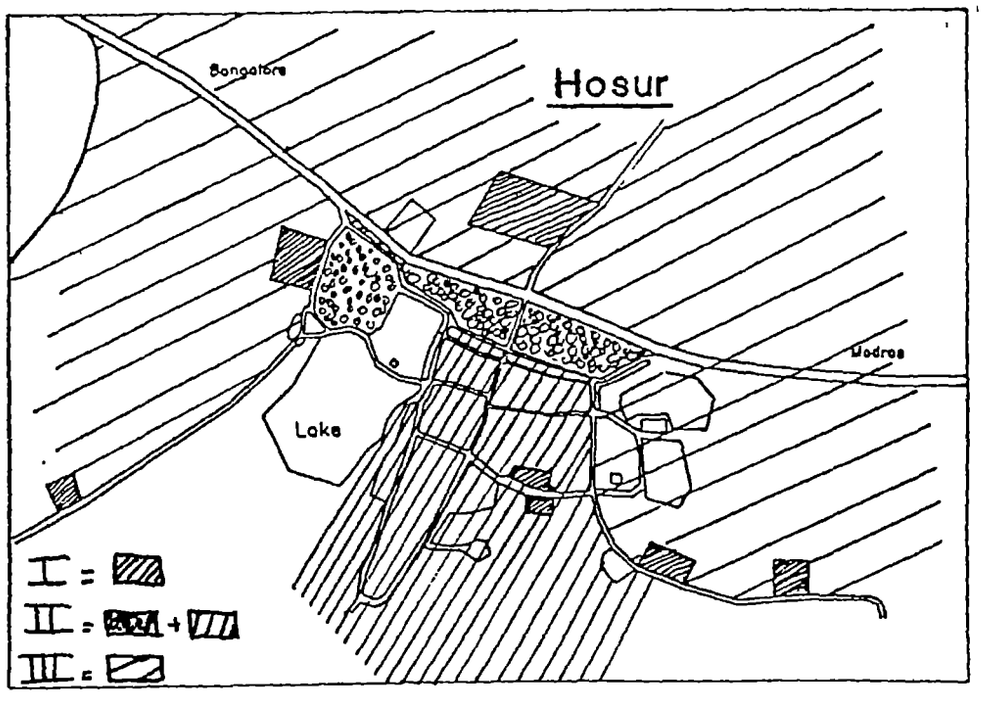
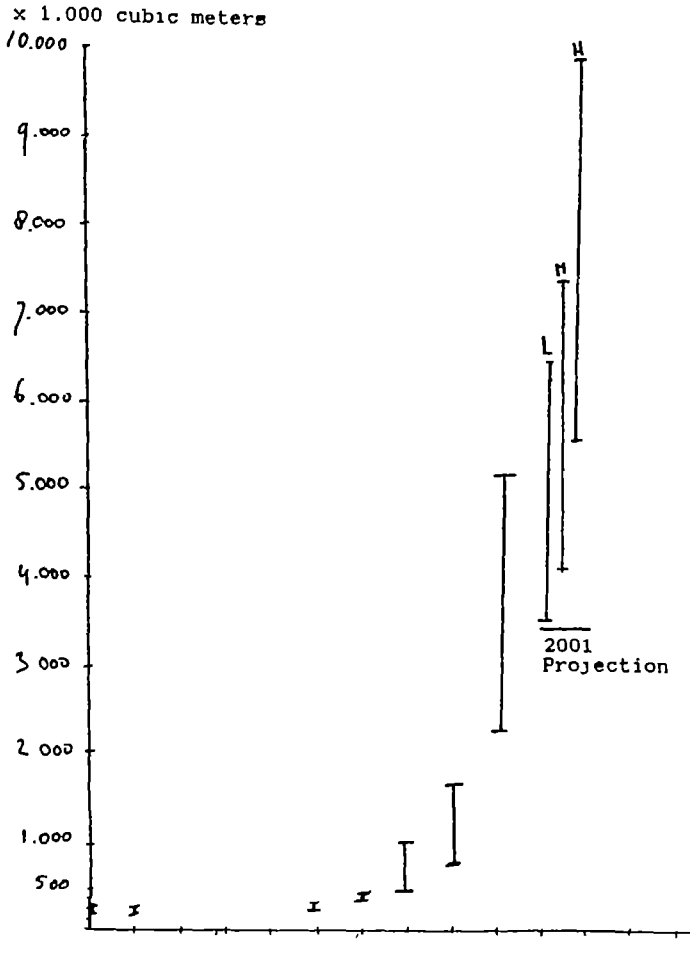


Figure 3 Hosur by Neighbourhood I,II and III

Table 3. Total Domestic Water Demand per day Hosur 1871-2001

Hosur 1951-2001 Year		population	DW use I,II,III		Total Demand Domestic Water	
1871		6.360	II) 30	x	190800	l/p/d
1881		5.869	II) 30	x	176070	
1891		5.756	II) 30	X	172680	
1901		6.695	II) 30	x	200850	
1911		5.913	II) 30	x	177390	l/p/d
1951		8.712	II) 30	x	261.372	
1961		11.683	II) 30	x	350.490	
1971		16.591	II) 30-60	x	497.910 - 995.820	
1981		27.129	II) 30-60	x	813.870-1.627.740	
1991		51.449	I) 100	x	1.714.980	
			II+III 30	x	1.028.990	
			total		2.743.980-5.144.900	
2001	Low	66.061	I) 100	x	2.202.050	
			II+III 30	x	1.321.232	
			total		3.523.282-6.606.100	
	Medium	73.009	I) 100	x	2.433.630	
			II+III 30	x	1.460.180	
			total		3.893.780-7.300.900	
	High	98.553	I) 100	x	3.285.100	
			II+III 30	x	1.971.060	
			total		5.256.160-9.855.300	

Figure 4. Total Domestic Water Demand (m3/d) 1901-2001



1.2.1 Agricultural demand for water

In 1974 15 per cent of all cultivated land was irrigated in the region around Hosur Taluk, against the state average of 43 per cent (Soil Survey, 1974). Paddy, sugarcane, bananas and cotton are cultivated on these lands. Seri culture, dairy farming and sugar cane factories are the most important agro-industries of the Dharmapuri District. Recently, new irrigated fields have been used for market gardening; vegetables, grapes and flower cultivation. With governmental help the number of irrigated acres has been extended, unfortunately no actual figures of total irrigated land are available.

Dry farming is still the dominant type of cultivation, the crops are ragi, jowar, cumbu, horsgram, redgram and cow pea.

Traditional gardening is done with mango trees, coconut, arecanut and tamarind.

Irrigation sources are the rivers Ponniar, Pambar and tanks. According to proposals, a reservoir across the Ponniar River will irrigate 8.000 acres of land (not completed in 1988) and a reservoir across the Chinnar River will irrigate 850 acres of land in the future.

Due to lack of data it can only be concluded that the agricultural demand for water tends to increase rapidly in Hosur Taluk. Farmers and government try to catch up with the overall trend in Tamil Nadu, large water reservoirs are constructed, irrigation pumps are set up and especially around Hosur small farmers have found a source of income in horticulture.

1.2.2 Industrial demand

Before 1977 the industrial demand for water in Hosur Taluk was negligible. Between 1977 and 1985 the construction of new factories and houses demanded a fair amount of water coming from wells near the building sites. Since from the outset the industrial area was stimulated and organized by the State government, the water demand of the factories was acknowledged. In 1977 the SIPCOT Water Supply Scheme was founded to fullfil the demand for all factories. In 1988 the factories formulated a total demand of 3150 m3 water per day, whereas the total domestic demand in 1988 is estimated at 2400 m3 per day (figure 3).

1.3 Current and future total demand

Whereas in 1971 the water demand of Hosur Taluk had an estimated composition of 94% for agriculture, 0 % for industrial sector and 6 % for domestic water use, this composition changed into a proportion of 82.5 % for agriculture, 10 % for industries and 7.5 % for municipality in the year 1988. For 2001 a composition of 70 % for agriculture, 20 % for industries and 10 % for municipality will be desirable (Postel, 1984: 17).
In absolute terms the three sectors expended their needs: since the seventies modern irrigation pumps have been used since the seventies in agriculture (approximately 26000 cubic meter water demand per day), since the eighties the industrial sector has built its own water supply system with tubewells and the SIPCOT-Water Supply Scheme pumps a daily average of 3150 cubic meter

water from a depth of 100 metres. In 1988 the industrial demand was in 1988 already 25 per cent higher than the total domestic demand of Hosur (2400 cubic meter).

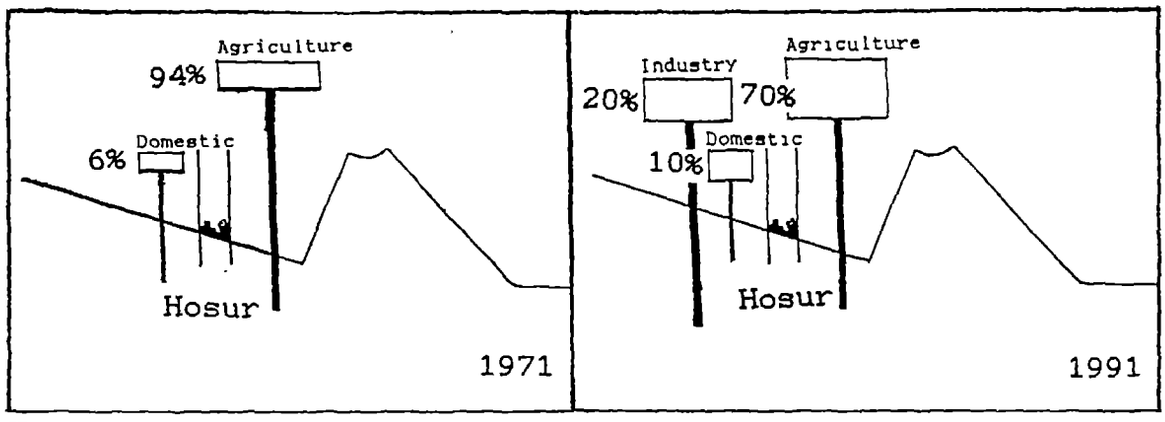


Figure 5. Composition of Total Water Demand in Hosur

1.4 Conclusions

From the above it can be concluded that the total demand for water in Hosur has increased rapidly since 1971. The planning strategy of the Tamil Nadu Government has given rise to an Industrial Zone around Hosur which has created an unknown industrial demand for water in Hosur. The population growth of Hosur -a major aim of the planning strategy- has added an increasing domestic demand for water. The policy of developing the agriculture sector through irrigation is a third water-demanding element in the region.

In chapter II we turn to the supply side of water. To what extent can these rapidly increasing demands for water be met?

NOTES

1.(INSTRAW,1984:191-198) and Ministry of Foreign Affairs- sector report, The Hague Oct 1988: Drinkwatervoorziening, sanitaire voorzieningen, drainage en afvalverwijdering in ontwikkelingslanden.
2.The survey was carried out in the dry period (1-1/1-4) of 1988 as part of the research programme of the Geography department of the University of Amsterdam, with help of M. Bark and A. Diekman, students of Geography and research assistance of Theresa, Sumathri, Chayum and Leena, inhabitants of Hosur.
3.In combination with the staff of the Health department, the revenue department and the Development Office have given family planning top priority since 1979. Targets are set and every day a number of sterilisations is performed in the Primary Health Care centres in the surrounding villages and in the Goverment Hospital in Hosur Town.
4. Annual exponential growth rate formula

$$EGR = \frac{P2}{P1} = e^{r.t}$$

Where:
P2= population at time 2
P1= population at time 1
r = growth rate
t = the numbers of years
e = base of natural logarithms (e=2.71828282)

5.This is only possible with a continued annual exponential growth rate of 10.7 over ten year.

$$\frac{150.000}{51.449} = e^{r.10}$$

CHAPTER II

THE SUPPLY OF WATER

2.1 Availability of water around Hosur

The Dharmapuri district is composed of a series of plains, valleys, plateaus and hills of varying heights ranging from 245 to 1450 metres (800 to 4750 feet). Hosur Taluk is located at 915 metres above sea-level, high enough to benefit from an atmosphere that is relatively cool. The district has a semi-arid, tropical climate. The maximum temperature ranges from 29- 36 degrees Celsius, the minimum (night) temperatures from 17 to 23 degrees. The physical infrastructure of water can be described in terms of three interrelated elements, rainfall, surface water and groundwater.

Rainfall

Hosur Taluk benefits both from the South West monsoon (250-360 mm rainfall between June and September) and the North-East monsoon 200-300 mm in October and November). The average total rainfall per year is 787 mm in Hosur, with substantial variations between 558 and 1.133 mm in dry and wet years within one decade.

Surface water

The Ponnair River drains the Mysore Plateau and crosses the Hosur-Krishnagiri road 17 kilometers from Hosur Town. A second major river in the Mysore Plateau is Chinnar River which runs of a lower level and joins the Chauvery River. Several smaller flows drain the area during the monsoons and join the Ponniar, Pambar or the Kalar River.

Furthermore there is a number of small lakes in Hosur Taluk. Hosur Town has two shallow lakes, which dry up in summer time,

and one artificial lake, the Rama Nayakkan Tank, built as a water reservoir for the castle of the muslim sultan Tippu in 1780. For the inhabitants of Hosur the water level in this tank is an important sign for the inhabitants of Hosur; when the tank dries up, Hosur has serious problems with the supply of water coming from shallow wells and handpumps. The reason is that lake water indirectly contributes to the ground water level.
On the other hand the lakes are stagnant water reservoirs and they are heavily polluted. The water is used only for irrigation and for washing clothes, cleaning cars. The borders of the lakes serve as public lavatories.

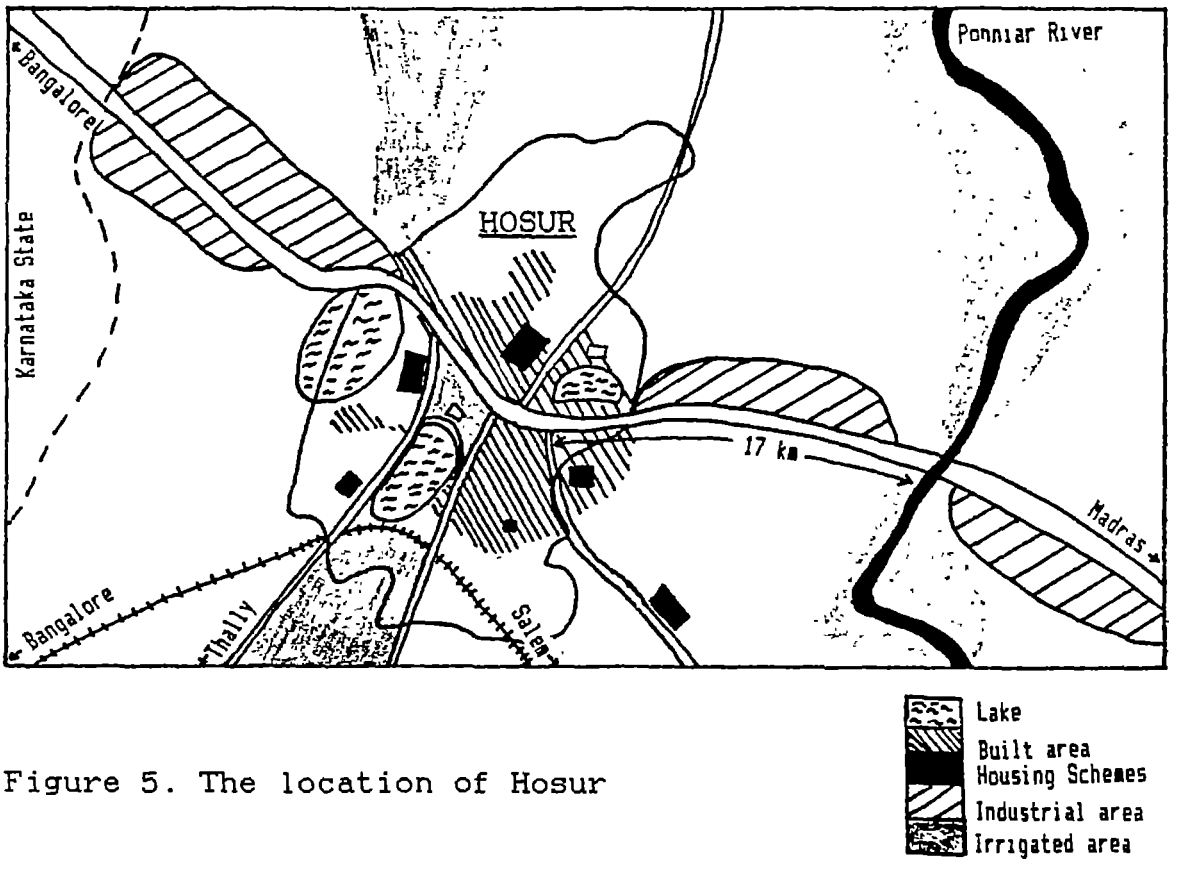


Figure 5. The location of Hosur

Groundwater

Historically the water table was not within easy reach in Hosur Taluk; in 1908 the Taluk included 1.286 handmade wells, which was a relatively small number. To reach the groundwater level a

well is dug 20 feet deep under good soil conditions, 40 in rocky soils (see 2.1.1). Without modern techniques and machine power, well irrigation is not very profitable in the Taluk: in order to reach the ground water, wells have to be constructed deep into rocky soils. Because of the geographically high location it is also a heavy and difficult task to raise water from groundwater level to the surface level. Until the seventies farmers mainly produced ragi-crop as staple food-grain, which is suitable for dry lands.

Recently the ground water in Hosur has been pumped at rates that exceed replenishment, thus causing the water table to fall. Heavy pumping for irrigation in Tamil Nadu and pumping for industrial use esspecially in Hosur Taluk has resulted in drops in the water table of 10-30 meters in a decade/1.

2.1.1 Changing water supply systems in Hosur

Dharmapuri district with its semi arid climate and hard rocky soils has experienced scarcity of water since time immemorial. Before the seventies agricultural and domestic water supply was provided by human or animal power. Wells were dug stone by stone. Families and labourers worked for months to build a well. In step wells the irrigation water was and is drawn by hand. In deeper wells the water for irrigation was drawn by a bullock and/or a man, walking in circles to turn the water wheel. In this way some old handmade tanks provided water for centuries (2.1). The domestic wells for drinking water were dug and maintained by private house owners. Water was (and often is) drawn from the well by hand with a pulley and a rope. In temples and at market

places there were wells for public use.
At the turn of this century the Taluk had -in total- 1.286 wells which were built, maintained and used in a labour-intensive privately-owned distribution system. The constraints of this distribution system are land ownership, traditional knowledge and technology, man/animal power and the accessibility to groundwater. Wells were 20 to 40 feet depth.
In combination with development planning and direct investment, modern technology and mechanical power have been applied since the seventies to uplift the backward district. The newly-built water schemes for irrigation and -particularly- for industries, represent a capital-intensive distribution system. Dams, reservoirs, tube and infiltration wells, pumps, booster stations, pipe lines and water towers have provided modern water supply systems. For these supplies human and animal power no longer provides a significant limitation. Capital, land ownership and scientific knowledge are the dominant factors in the modern water supply. Only in the final analysis the accessibility of (ground) water plays a decisive role. Tubewells for handpumps are on average 100 feet deep, a mechanical pump works often at 200 feet/2. With knowledge of the physical water infrastructure and heavy drills, pumps and pipe lines, water can be supplied in the driest area of Tamil Nadu.
However, in the long run mining of ground water through excessive pumping can create serious groundwater drought in Tamil Nadu/3.

2.2 Water supply: different types

In contemporary Hosur supply systems, based on human/animal

power and mechanical power, operate parallel to each other. In some cases modern mechanical water pumps have replaced the wells. In times of energy scarcity (power cuts and fuel scarcity are regular phenomenons) and when the new technology fails, people relapse into the traditional supply system.

Keeping this in mind the supply systems can be submided according to their power requirements into the group of human/animal energy (wells and handpumps with a depth of 20-100 feet) and the group of mechanical energy (mechanical pumps with a depth of 200 feet with an overhead tank, water tower and piped supply system with taps). These two groups will help to form an idea of the structure in water supply for households, agriculture and industry in the next paragraphs.

2.2.1 Supply structure for domestic water

The structure of the supply system in Hosur will be discussed in three clusters of neighbourhoods, starting with the Housing Schemes with a mechanical supply system (I), then we turn to the cluster with a mixed structure; the old town and unorganized new neighbourhoods, where private and public mechanical supply systems are used, but wells and handpumps predominate (II), and the third cluster, formed by the peripheral areas where wells and some handpumps are the main feature used (see figure 3).

I

In all six Satellite neighbourhoods a piped water supply system is in operation. The Housing Schemes in these neighbourhoods are expected to provide shelter for about 10.000 families in the decade 1980-1990. Actually 30 per cent of the inhabitants of Hosur live in a Housing Scheme (14.215 persons).
The water supply in these Housing Schemes has been collectively arranged by the Tamil Nadu Housing Board (TNHB). Water is pumped from deep borewells and stored in three TNHB-owned overhead tanks From here water is distributed to the houses through a network of pipe lines. For the two large Housing Schemes water is pumped from a reservoir near Thally to Hosur. Other Schemes are provided with water from borewells in the surroundings of Hosur. Most flats have one tap connection and as a result of rationing water is supplied by the tap 15 to 30 minutes per day (per two days in the dry period). In some Housing Schemes the houses are provided with water tanks with a store capacity of 200 litres, often at inhabitants costs increased to 400 litres. In the

smaller houses people store the tap water in plastic drums and pots. Water taxes are 6 per cent of the house rent. This implies that a family in an one-room flat pays 275 rp/month rent with 16 rp/month water tax, half a rupee per day (1988 prices). In times of mismanagement and/or water and power scarcity the dwellers have to rely on the two or three handpumps which are located in the Satellite Neighbourhoods. When the taps do not provide any water the inhabitants use these handpumps and relapse further into the traditional water supply network of the peripheral neigbourhoods.

In the dry season when the demand for domestic water is really high, TVS-company and other large employers order lorries full of fresh water for their employees in the Housing Schemes.

Table 4. Number of newly built houses in the Housing Schemes/4

Income Group	1979-81	1986	1988-89	total	%
High (> 30.000 RS/annum)	658	37	509	1204	32.2
Middle(15.000 - 30.000 RS/annum)	403	131	779	1313	35.1
Low (8.401 - 15.000 RS/annum)	260	481	447	1188	31.8
EWS (< 8.401 RS/annum)	36			36	0.9
Total number of houses Average household size 3.8	1357	649	1735	3741	100.0

Access to tap water

The Housing Schemes are built for employers in the industrial and governmental and banking sector. Access to the houses is given on a rental basis to households with a guaranteed, regular income in accordance with the income group for which the house was built. In this way around 14.500 people are provided with shelter and piped water for a part of the day; one third of the

actual total population in Hosur. Table 4 gives an overview of the timing and distribution of houses in the Satellite neighbourhoods.

It is obvious that households with lower incomes and people without formal employment hardly have access to the housing schemes in Hosur. Of the total number of houses not even 1 per cent is built for the so-called Economically Weaker Section (EWS). This implies also that these households have no access to the modern water supply that is provided for these houses.

II

The old town and the unorganized new neighbourhoods include 60 per cent of the population of Hosur (30.000 people in 5875 houses in 1988/5). The housing composition in the old town is mixed, there are streets with 50-100 year old houses and newly-built blocks of flats. The unorganized new neighbourhoods have a mixed structure of new one- and two-storied houses, mostly privately owned.

Between 1982 and 1988 the municipality of Hosur provided 1189 private tap connections mostly in the centre of the town. In some streets 120 houses have tap connections, other streets have only three or four connections. The official cost is the fixed watertax of 15 rp/month for a daily supply of 250 litre water free of charge (10.500 liter/month) and 1 rp maintainance charge. Extra water costs 1.25 rp per 1000 litre.

In practice, tap connections are only available in twenty streets of Hosur and in some of these streets bribes of 2000 rp had to be paid before Water Department was prepared to make the connection.

The network of these taps is supplied with water from the

infiltration wells in the Ponniar River. From here the water is pumped through a 17 km pipeline over a slope of 100 metres into the main overhead tank in the middle of Hosur.

Next to the private taps, fifty public taps have been distributed in Hosur Town. Because of rationing by town zone, water comes from the tap 15 to 30 minutes per day (per two or three days in the dry period). Taps at the end of the line are often without water all day. In the dry period of the year -from March to June- this water supply system can provide only 25 per cent of the normal capacity. In times of drought even less water is supplied by the taps. As an exception the Water Department ordered lorries with water for the population of Hosur Town in March 1986. However, this action was seen as an extreme case and will not recurrence according to the Water department. It is hoped that a permanent solution will be found in a pipeline from the Kelavarapalli reservoir. This requires the agreement as well as funds from the State government.

In 1988 around 80 per cent of the inhabitants of cluster II had no access to the private water tap system of the municipality. The water supply of around 24.000 people rely on 50 public taps, 43 handpumps and some dozens of wells. The network of wells was the traditional water source in Hosur. In the sixties the municipality had dug seven large public wells for the supply in town, which are still in use. Between 1980 and 1988 the water department installed 43 handpumps spread out over the town.

In the last decades some of the richer houseowners have built their own wells or borewells for mechanical pumps. The costs of digging a well is related to the depth (20-30 feet/6.1 -9.1 m.) and varies between 9500 and 16000 rp (1988 prices). The price for

a borewell (4.5 inch diameter, 200 feet/61 m./ depth) is 9000 rp. These prices show that only the upper class of Hosur -often landlords of more houses- can invest in a private source of water supply.

An additional element is the quality of water supply by different sources; the Ponniar water running from the taps is purified, on the other hand many shallow wells and handpumps give salty or insalubrious water which cannot be used for drinking and cooking purposes. Only deep tubewells, some handpumps and the mechanical pumps with a 30-60 meter depth give fresh water.

III

In the peripheral neighbourhoods more and more people are building their own houses or renting a room in rental blocks built by a landlord. The location of the houses is often next to small villages in the surroundings of Hosur.

Water supply is a real problem in this cluster. On the whole the landlords do not include water supply in their package of services. In addition the Water Department of Hosur Town hardly provides these houses with a water source. Four or five handpumps have been installed in the peripheral areas. Employees daily take home pots of water from the factory. Inhabitants who own a bicycle go to the nearest handpump to collect six pots of water in one go. Others rely on the existing wells and use as little water as possible.

2.2.2 Supply structure for irrigation water

Parallel to the traditional sources and types of supply of irrigation water, mechanical pumps are used to pump ground water and distribute it over the fields. This is done mainly by private farmers. Credits and bank loans are invested in private supply systems.

The water tax for farmers is counted per irrigated acre and crop. To protect the water table in Hosur, the Subcollector declared a ban on the private use of surface water of the lakes for irrigation in 1987.

The government had planned to start large-scale irrigation projects in the seventies. Due to the acquisition of land the main project was suspended for five years. However, in the future

the Kelavarapalli reservoir/6 will provide 8000 acres of land with irrigation water. The water tax will be 20 rp per acre/crop. A small reservoir for irrigation is built across the Chinnar River.

2.2.3 Supply structure for industrial water

Since 1977 the Hosur industrial sector operates its own water supply system. This SIPCOT-Water Supply Scheme consists of 32 deep wells and heavy pumps draw the water for the aquifer and push it into the nine water towers at the SIPCOT-area's. The water towers have a capacity of 140.000 gallon. In 1988 the hunderd and two factories which had joined the Sipcot Water Supply Scheme, were supplied with a sufficient total amount of 700.000 (= 3150 cubic meter) per day.
Initially the Sipcot-Water Supply Scheme planned to make use of a newly-built water reservoir near Kevaranapalli, 30 kilometers north from Hosur. The building of Kevaranapalli-dam started in 1977 and was planned mainly for irrigation purposes. For the future extra supply of water SIPCOT made arrangements for a pipeline from the reservoir to the industrial areas.

2.3 Conclusions

From the above we can conclude that since 1977 government and Panchayat have invested in Hosur Taluk considerable manpower and money in the construction of a modern mechanical water supply system for both domestic, agricultural and industrial use. Within ten, fifteen years, 40 per cent of the population of Hosur has

been served with piped water and although the supply is exceeded by the demand, most of the agricultural demand and the total industrial demand are met.

Seen from the supply side the results are encouraging. However if we look at the distribution of the supply another picture begins to take shape.

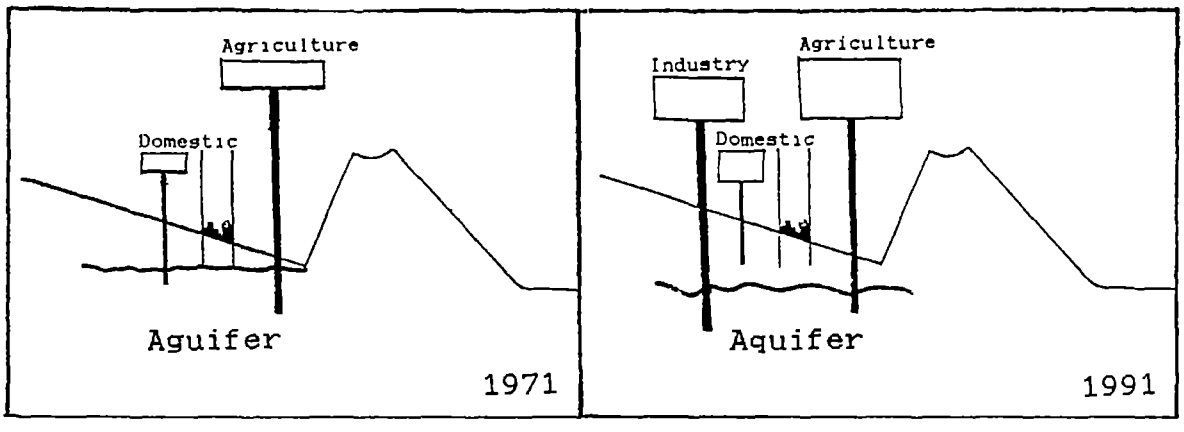


Figure 6. The falling water table effects domestic supply

We notice a division between the efforts made by the State government and by the Panchayat-government. It is obvious that at local level limited funds and manpower are available for operating a water supply system in the town. More than half the population rely on public sources for their water supply. In fact they rely on the efforts of the municipality. The wells and handpumps installed by the municipality are labour intensive in their supply system. Due to their scarcity and the rationing the fifty public taps are also labour- and time-intensive.

In addition to this through overpumping the water table is falling. Due to this, water from some sources with a depth of 20 to 100 feet (6-30 m) became salty and unsafe for drinking.

We must conclude that a combination of falling water tables and increasing demand makes the supply inadequate for 60 percent of

the population.

The State government/7 supports the large-scale capital intensive water supply projects. Specific groups in society benefit from the outcome of these projects. We saw that only the formally employed with regular incomes over 8.400 rp per year had access to the Housing Schemes with piped water. Furthermore the industrial sector and the landowners profit from the State efforts. Consequently the modern sector of society -in agriculture, industry and housing schemes- is exploiting water from deeper levels at the expense of the people without any entitlements in the modern sector. The rich can overcome the falling water table by using more powerful machines and longer pipe lines. The poorer section of society is unable to do this and the Panchayat is hardly in the position to help them.

NOTES

1.Tamil Nadu has become one of the notorious examples of mismanagement of water sources which causes an aquifer that is dwindling away. In Hosur water from some handpumps and wells becomes too salty to drink. The decline in the water table becomes visible in the change of water quality in Hosur; wells which provided fresh drinking water for decades, became salty last years.

2.Source:Sri Ganapathy Enterprises in Water Supply and Sanitation, Hosur 1988

3.Source: Economic and Political Weekly, 1987: 2165

4. Source: Activities of Tamil Nadu Housing Board in Dharmapuri District-internal report 1988.

5.Source: Population of Hosur (Meijer,1985:3) and Hosur Panchayat data, 1988.

6. The dam is completed in 1988, the irrigation project is planned to start in 1989.

7. The Tamil Nadu Water Supply in cooperation with the Tamil Nadu Housing Board and for industry the SIPCOT Water Supply Scheme and for agriculture the Kelavarapalli Reservoir Project

CHAPTER III

LABOUR AS A BRIDGE BETWEEN DEMAND AND SUPPLY OF DOMESTIC WATER

In chapter II we noticed the division in labour intensive and capital intensive water supply systems. Based on a water supply survey/1 it is estimated that sixty per cent of the households in Hosur supply their domestic water from a labour intensive source (1988). As a result of capital intensive water supply systems forty per cent has access to private tap connection.
In this chapter we look at the labour that is required to consume the water from different sources from the household perspective. In the actual domestic division of labour, unpaid labour of women and children narrow the gap between the demand of the household and the supply of water. The better-off households -without tap water- can substitute this unpaid household labour by paid servants and water carriers. In 3.2.1 we try to answer the question how the time per household spent on water supply relates to the time women can use productivily.

3.1 Unpaid labour of housewives and children

> "Cost of water in terms of the distance walked, cash payments or time spent in a queue seems an important factor in the choice in all areas." (White, 1977:108)

In Hosur most women select different sources for drinking water and the remaining household water demands. If possible the source with the best quality is selected for the supply of drinking water. The choice of the source for their other domestic water demand is determined by distance, time and energy costs.

Analysing the time spent on water supply in the three clusters of neighbourhoods we draw the following picture.

I

In the Satellite neighbourhoods 90 per cent of the households use the same source for their drinking water and the rest of their domestic water demands. 74 per cent of the households supply their drinking water from private tap connection, 65 per cent of the household use tap water for the rest of their domestic demands too. Because of rationing water flows once in one or two days. The timing of the water supply is uncertain to the population. If the water is running, reservoirs have to be filled. Consequently in this cluster most time is spent on waiting until the water is running through the pipe line.
In the Housing Schemes with a small private overhead tank on top of the blocks four to six households share one overhead tank. Water scarcity makes it necessary for individual households to claim their part of the daily supply and to store the water in smaller drums inside the house. For this reason a 'water-watch' must be at home. This duty is mainly performed by the person who takes care of the household. This is not necessarily a housewive, it can be a family member without full time obligations outside the house.

II

The water supply pattern in the old city and the unorganized new neighbourhoods gives a more complicated picture: 34 per cent of the households use one source. However, only half of this group (17 %) recieve all their water from private tap connections, 13.5

per cent rely on public taps and 3.5 % recieve their total water demands from wells or handpumps.

Because of bad water quality on the one hand and long distances, and queues on the other hand, 66% of the inhabitants decide to use different sources. For three or four pots of drinking water they go to the time consuming public taps or handpumps. One trip takes 10 to 30 minutes. They have to walk to the source, wait in the queue, tap the water and bring it home. In total, they spend 20 to 40 minutes a day for drinking water only.

Table 5. Percentage of households spending 10 minutes or more for one trip (25 liter) Hosur (N=281; 1988

	Neighbourhood: Satellite	Old City	Unorg. Nbh	Perifere	Hosur
Time per trip > 10 minutes water:					
drinking	14.8%	63.3%	49.5%	64.8%	48.7%
rest	8.2%	26.6%	43.8%	50.7%	34.2%
Different source used	10.0%	75.0%	57.3%	76.1%	55.7%

The rest of the water is taken from less time consuming sources -often the well-. It takes 5 minutes for half of the inhabitants, 10 or more minutes for 35 % and only 4% spend more than 30 minutes on one trip. The minimum needs of a household is on average 8 to 20 pots per day (120 - 300 liter). More than one hour per day is spent on this.

For cluster II we can conclude that 66 % of the households spend around **two hours of heavy labour on a minimum supply**. In the old city the water situation is worse than in the unorganized neighbourhoods (see table 5).

According to the traditional division of labour mainly women and their children fetch the water. In households without women, however, young men fetch the water or a water carrier is hired. III

In the peripheral neighbourhoods, water supply is extremely labour intensive for some inhabitants. Only 24 per cent use the one source for drinking and other water. The rich 21 percent can rely on private tap connection. Others use private wells. The main group have to fetch their water from what ever source is available. **The time spent per trip may run to one hour. The water used inside the house is restricted to the absolute minimum.** This will increase when the Panchayat provides more handpumps near the cluster of new built houses. (see figure 2 again)

To conclude this paragraph we can say that the labour demands for water supply differs for neighbourhood and choice of source. It affects the water demand. In cluster I water supply is not so much energy but time consuming; somebody has to stay at home to collect the water running from the tap. In cluster II for the 66 % without access to private taps, a limited water supply demands two hours per day, often by women and children. In cluster III water is extremely labour intensive for 89 percent of the people. There for the amount of water supplied is as little as possible.

3.1.1 Paid labour of water carriers

In times of water scarcity the professional group of water carriers in Hosur is expanding. The better-off households with no free labour available make use of the services of a water carrier. In 1988 we counted 150 professional water carriers in Hosur, divided into three subgroups. There is a group of hundred female water carriers. Like all women they each carry two water pots of 15 litre on their head and hip in one trip from the source to the house. For this labour they earn 25 paisa per pot but most households pay a lower price for a daily supply of 6-10 pots, 30-40 rp per month. This kind of job seems to be a residuel from an old service system; like domestic servants the water carriers recieve the daily leftovers from the client's kitchen and once a year they collect a sari and clothes for their children.

The male water carriers with cycles form a smaller group of 15 professionals in Hosur. They provide water to households in six pots per turn hanging on their cycle. The earnings are the same as those of the female water carriers.

A professional group by tradition are the water men with bullock carts. Around 45 men with carts bring water to large-scale consumers such as lodges, hospitals and rich households with store capacity. A drum of 180 litre is filled with water from a private well and carried to the customer by cart. The price they ask is 3 to 4 rp per trip. In the dry season a higher price is asked/2.

3.2 Formal employment in the water department

The control of domestic water supply was traditionally women's work. Through modernization and urbanization water supply tends to shift from unpaid women's labour into paid labour for male government cadre in urban areas. As result of power inequality which determines the formalization of the work, the capital input and the level of technology, the gender-specific colour of water supply is changing.

The design, organization and exploitation of modern supply systems are under control of the executive staff of local and district governmental departments. With better access to technical education and benefitting from the existing segmentation of the labour market, men mostly occupy the jobs. In Hosur female workers are observed only as part of the clerical staff of the water departments of the panchayat and SIPCOT. The engineers, foremen and decision takers are middle class men. In addition to that, the staff of the water department in Hosur is formed by urban migrants. The profession of sweeper is the main (casual) job at the department accessible to rural migrants and autochtonal inhabitants of Hosur: 16 of them are female and 43 male.

In this way women are losing their control over domestic water supply. They hardly have access to jobs and departments where new supply systems are designed. This tendency is true for the supply of electricity, gas and water. (I1O, 1984:74, given in table 8). Here again, unpaid work -orginally done by women in the domestic atmosphere like firewood collecting and water supply- is taken

over by male 'professionals'. **Women become 'consumers' and men 'producers' of basic services.**

In contribution of this point we notice that in the shift from rural to urban living conditions, the female labour force participation rate tends to decline before it increase again. The LFPR table of India has given a per cent of 16.49 of rural women in 1981. On the contrary the LFPR of urban women was 6.68 per cent in 1971 and 7.57 in 1981 (Escap, 1982:220)).

3.2.1 Opportunity cost of female labour

The labour saving capacity of piped water supply has been limited in Hosur until now. In neighbourhoods with piped water someone has to stay at home to collect water. An increase of time and labour demands for the domestic supply is observed in neighbourhoods with labour intensive supply systems. This as result of the conflicting demands and the decline of the water table. And hence at town level the direct link between piped water and rising productivity of women in Hosur can be seriously questioned.

If we turn to the household level only in better-off families the care for water can be taken by a grandmother or servants can be hired. Some women in this group have access to paid jobs, their monthly salary is 275 to 1000 rp (1986 prices). An indication of the opportunity costs of their labour is 2.4 to 3.3 rp per hour (see table 9). An argument can be made that these households pay 16 rp per month water tax and free 60 hours work on water supply at an average price of 2.85 rp. In theory it means a profit of 171-16= 155 rp per month.

Table 9. Working time and profit of female labour in Hosur

Time: Respondent	%/ day unpaid	%/ day paid	%/ day commuting	working time total	per hour profit
Supervisor	8	37	4	50%	2.4 rs
Teacher	12	43	4	59%	3.3 rs
Water carrier	14	43	-	57%	1.15 rs
Street seller	6	58	4	68%	0.21 rs

On the other side of the spectrum we have the poorest women who have to work for the survival of their family. They have no access to piped water neither to formal paid employment. On the contrary they work many hour per day, but their profit per hour is low: 0.21 to 1.15 rp for heavy work. On top of that they have to supply their own domestic water from a labour consuming source. Counting the opportunity costs of their labour in the same way the following is the outcome: 60 . 0.68= 40.8 rp per month. After paying the water tax the profit will still be on the side of the households: 40.8 - 16 = 24.8 rp per month. In the actual situation of Hosur these women lack the opportunity to save time on water supply in an other way than cutting their water demands.

For the large group of women who are not involved in paid work the opportunity costs are difficult to calculate, for that reason we leave this group out of this analysis.

To sum up it can be argued that at household level on both side of the spectrum of working women in Hosur it is profitable to have access to private tap water; although women with formal employment benefit economically much more than women working in informal jobs. Actually the first group is served by the

government with piped water, the second group is not.
However, the opportunity costs of labour fail to indicate the potential rise in productivity. Next to the availability of time women need access to productive sectors of society.

3.3 Differentiation in labour and income

In 3.2.1 it is shown that government policy on water supply in Hosur stimulates the strongest segments of society. Urban migrants live in Hosur are educated, have access to the formal jobs that are created in the industrial zone and in the related service sector. Due to the salary they earn they have access to modern Housing Schemes provided by the government. With help of modern facilities as piped water they can free a part of the domestic work what can be used productivily. The investments for this modern style of life is made by the government in education, subsidizing industry, transport, housing and water supply. The profits of the increasing productivity is in hands of the industrial factories and the benefitting households.
If we compare this to the government investments made for the rural migrants and the autochtonal inhabitants, it is clear that the power relations are strengthen by government policies in Hosur.
Starting from a backward position local people and rural migrants recieve relatively less govenmental incentives. At the same time the competition for basic services and employment is increasing by the growth of population due migration and natural increase. It is shown often that in case of scarcity of resources the strongest group benefits most. In this way differentiation in

labour and income and hence a dual society in Hosur has taken shape.

3.4 Conclusions

The labour requirements for water supply are low in the neighbourhoods where some women have access to the formal labour market. At an average profit of 155 rp per month they can replace domestic water supply for productive work. If the house is not supplied with piped water by the local government, it is more costly: a water carrier has to be hired for 30 to 40 rp a month (14-24 rp more for less quantity of water with bad quality). Women with paid work in the informal sector can not afford a water carrier, but they would profit from private tap water for 16 rp water tax. In addition to the savings in labour and energy, the health of the family can improved by tap water. This can be a major time saving effect for the women living in the town3.

NOTES

1.Source: Heyink Leestemaker, 1988:7

2.Source: Moniek Bark, 1989: unpublished.

3.The maintenance of wells is neglected: in 1985 Hosur struggled with a typhoid epidemic. In 1987 three children died from cholera. Paratyphoid, forms of dysentery and diarrhoeal diseases are commen in Hosur according to the records of the private hospital of dr. Sothi Rammalingan.

CHAPTER IV

POLICY IMPLICATIONS AND STRATEGIES

As written in a 1983 report of the Hosur New Town Development Office: "The present watersystem for Hosur is designed only for a ultimate population of 45.000." The Hosur Panchayat has a hard task to provide water for the entire future population.
As long as there is water scarcity, the richer families and factories will deeper their private water sources in order to reach the declining water table. The wells and handpumps will dry up.
To us part of the water problem of the local people is due to the growth model chosen by the state government. The industrial sector and irrigated agriculture is subsidized by the state in order to develop the area. The results of the development are not under control of the state but kept by a selected group: industrial headquarters in Bangalore and Madras, large land owners and employee's in the formal sector. Hardly any investment is made in the living conditions of local Hosur. Rural migrants and autochtonal inhabitants without entittlements in the modern sector have to operate in the margin of this development from the top. Without change this growth pole strategy will occure a drop in the living standard in Hosur town.

To us the major task of a municipality is to support their inhabitants with basic services in housing and water supply. This should be done on equal basis. From that point of view more efforts has to be made to provide all houses with piped water,

not only new Housing Schemes. Water charge of 16 rp per month is no barrier, even not to the poorest people in town. A pipe line for municipality water to the Kelavarapalli reservoir can be claimed at State government level.
In the meanwhile the Water Department should take care of the traditional water sources: wells have to be maintained, the pollution of the surface water has to be controlled and the tendency to dig cesspits next to wells and handpumps should be stopped. This in order to break the dangerous cycle of waste water pumped up as drinking-water.

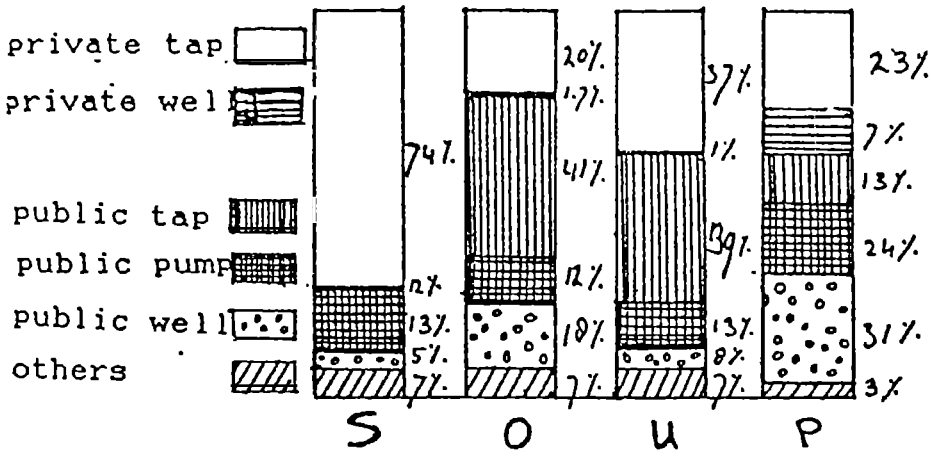
From the side of the inhabitants political pressure can exert to the municipality to achieve a better water supply system. Water committees can be formed per neighbourhood. Because of their knowlegde of water supply problems and water related diseases local women can be stimulated to take place in these committee. The communication between the water department and local people can improve if local people are employed in the water department. From the perspective of water awareness and equal access to employment it might be even local women who can to be employed.

Table 6. Source of drinking water in Hosur (N=281;1988)

	Neighbourhood: Satellite	Old City	Unorg. Nbh	Perifere	Hosur
private tap	73.8 %	20.0 %	37.1 %	22.5 %	37.7 %
private well	1.6	1.7	1.1	7.0	2.8
public tap	-.-	41.0	39.3	12.7	24.6
public pump	13.1	11.7	12.4	23.9	15.3
public well	4.9	18.3	7.9	31.0	15.3
others	6.6	6.6	6.6	2.8	4.3
total	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
Distance in minutes	68% <5m 15% >10m	48% 11-30m 63% >10 m	39% 11-30m 50% >10 m	60% 11-30m 65%>10m	

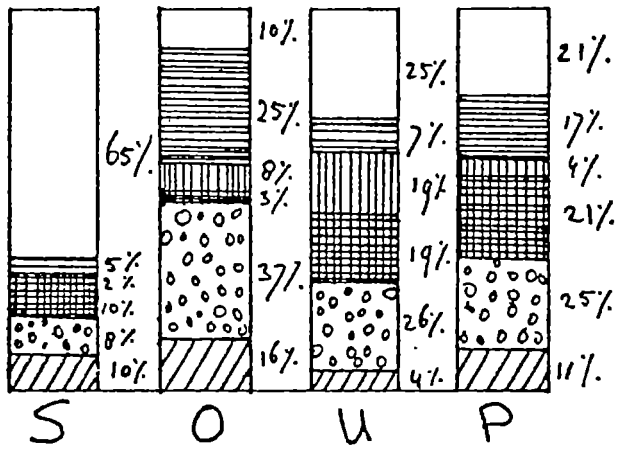
Table 7. Source of rest water in Hosur (N=281;1988)

	Neighbourhood: Satellite	Old City	Unorg. Nbh	Perifere	Hosur
private tap	65.6 %	10.0 %	24.7 %	21.1 %	29.5 %
private well	4.9	25.0	6.7	16.9	12.8
public tap	1.6	8.3	19.1	4.2	9.3
public pump	9.8	3.3	19.1	21.1	14.2
public well	8.2	36.7	25.8	25.4	24.2
open water	3.3	11.7	3.3	8.4	6.4
others	6.6	5.0	1.1	2.8	3.6
Total	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
Distance/trip in minutes	8%> 10m	27%> 10m	44%> 10m	51% >10m	

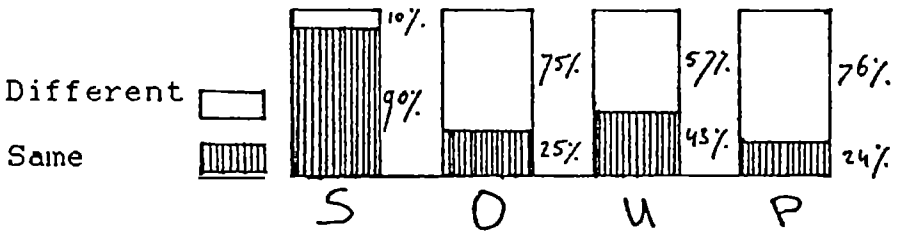


Satellite Old City Unorg. Perifere

. Bron voor drink water in Hosur (N=281;1988)



Bron voor de rest van het waterverbruik (N=281;1988)



Soort bron voor drinkwater en rest water in Hosur (N=281)

Table 8

Distribution of economically active population by sector, 1981

Sector	Male		Female	
	Number (Thousands)	*Percentage of male labour force*	*Number (Thousands)*	*Percentage of female labour force*
Agriculture	116 482	64.3	36 532	57.5
Mining	1 100	0.6	163	0.2
Manufacturing	21 480	11.8	3 662	5.7
Electricity, gas, and water	949	0.5	24	0.0
Construction	3 207	1.7	358	0.5
Wholesale/retail trade etc.	11 356	6.2	808	1.2
Transport, storage, and communications	5 898	3.2	170	0.2
Financing	1 656	0.9	107	0.1
Community, social, and personal services	15 410	8.5	3 146	4.9
Inadequately defined	3 526	1.9	18 551	28.2
Total				99.5

Source: ILO, *Yearbook of Labour Statistics, 1984* (Geneva), p. 74.

Female representation by sector, 1981
(Percentages)

Sector	*Female representation*
Agriculture	23.9
Mining	12.9
Manufacturing	14.6
Electricity, gas, and water	2.5
Construction	10.0
Wholesale/retail trade etc.	6.6
Transport, storage, and communications	2.8
Financing	6.1
Community, social, and personal services	17.0
Inadequately defined	84.0

Source: ILO, *Yearbook of Labour Statistics, 1984* (Geneva), p. 74.

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