

Urbanization and peri-urbanization: Aggressive competition and unresolved conflicts - The case of Chennai city in India

S Janakarajan

Professor, Madras Institute of Development Studies, Chennai, India; janak@mids.ac.in

Acknowledgements:

This paper is based upon the project NEGOWAT funded by DFID. The author is grateful for the field assistance provided by Mr.G.Prabahar and G.Jothi. An earlier version of this paper was published in Butterworth,J., Ducrot,R., Faysse,N and Janakarajan,S (Editors) (2007), Peri-Urban Water Conflicts: Supporting dialogue and negotiation, Delft, the Netherlands, IRC International Water and Sanitation Centre (Technical Series; no 50)

Abstract

The peri-urban areas have now become a highly contested terrain due to rapid urban expansion, demographic pressure, industrialization and the increasing natural resources crisis. The institutional vacuum prevailing in these areas further aggravates the intensity of problems in democratic countries such as India. This paper ventures to highlight the issue in the contest of urban and per-urban conflicts emerging in Chennai city. Following the introduction, Section 2 provides back ground information to the city such as urbanization process and delivery of urban services in Chennai city; Section 3 introduces the NEGOWAT project with objectives and methodology adopted; Section -4 discusses the overall nature and intensity of water conflicts in Chennai and peri-urban areas; Section 5 discusses the methodology, outcomes and difficulties encountered in developing multi-stakeholders' platforms and dialogues; Section 6 analyses water resources audits carried out in the context of Chennai and peri-urban areas. The last Section summarizes key lessons learnt and policy options available to move forward and to have more positive impact

Key Words

Peri-urban areas, NEGOWAT, water conflicts in Chennai, policy options

Section I Introduction: Underpinning issues

According to the Registrar General and Census Commissioner of India, large areas of the country would become more urban by 2026 (Times of India, 8 August 2006). The urbanization rate is likely to go up from 27.8% in 2001 to 38.2% in 2026. What is worthy of note is that three-fourths of the population in the Tamilnadu State will turn urban in another two decades – much more rapid than the country's average. The urban and peri-urban conflict gains enormous significance in this context.

What is Peri-urban area? The peri-urban area is neither rural nor urban. This terminology is derived from the word 'peripheral'. The expression peri-urban could be defined as fringe; edge city; urban stretch/sprawl; bordering villages. Effectively, these words also convey meanings of being *less important, incidental to main activities, outer edge, fringe to the main, spillover or over flown*. Nevertheless, the term peri-urban is not fully explicable because of complexities and ambiguities involved in it. Thus the Organization for Economic Co-operation and Development (OECD) in its report on peri-urban agriculture (OECD, 1979: 10) states as follows: "*The term peri-urban area, cannot be easily defined or delimited through unambiguous criteria. It is a name given to the grey area which is neither entirely urban nor purely rural in the traditional sense; it is at most the partly urbanized rural area. Whatever definition may be given to it, it cannot eliminate some degree of arbitrariness.*"¹

Of late, peri-urban areas have become a highly contested terrain due to rapid urban expansion, demographic pressure and industrialization. The institutional vacuum prevailing in these areas aggravates the intensity of problems in democratic countries such as India. Unplanned expansion of mega-cities and increasing scarcity of natural resources such as land and water for urban expansion have contributed to more intense conflicts and serious livelihood problems. The conventional notion that *cities are engines of growth* is not proving to be entirely true. On the contrary, growth of cities results in serious negative implications such as using rural and peri-urban areas as dumping yards for the wastes generated (solids, liquids and bio-medical), transportation of water, encroaching rural lands for urban expansion, transferring pollution loads etc.

As a consequence of all these, rural unemployment and poverty increases and livelihood options get shrunk. The direct outcome is the rural-urban and peri-urban – urban migration, which again intensifies pressure on urban infrastructure in cities such as housing, drinking water and sanitation, solid waste management etc. And, the vicious cycle continues. The need of the hour is to break this cycle: But how to break? What are the existing policy options? The present paper situates itself in the particular context of Chennai city in India. Motivation of the present

¹ "THERE IS AN INCREASING PERCEPTION THAT RURAL, PERI-URBAN AND URBAN ENVIRONMENTS OPERATE AS A SYSTEM RATHER THAN INDEPENDENTLY. MANY DEVELOPMENT SPECIALISTS CONCLUDE THAT RURAL DEVELOPMENT AND URBAN PLANNING ARE NECESSARILY LINKED ACTIVITIES. ACTIVITIES OR INTERVENTIONS IN ONE ARENA HAVE CONSEQUENCES, WHICH ARE OFTEN NEGATIVE, IN THE OTHER. AT THE SAME TIME, CREATIVE POLICIES CAN TURN LIABILITIES INTO RESOURCES AND BRIDGE THE RURAL-URBAN DIVIDE". D.L. IAQUINTA AND A.W. DRESCHER ([HTTP://WWW.FAO.ORG](http://www.fao.org))

exercise is to document and analyse water scarcity conditions in Chennai and nature and intensity of conflicts between Chennai and its peri-urban areas; the paper also explores to what extent multi-stakeholders' driven approach can provide long-term - sustainable solutions to growing problems of mega-cities such as Chennai.

The road map of the paper is as follows: Section 2 following introduction, provides back ground information to the city such as urbanization process and delivery of urban services in Chennai city; Section 3 introduces the NEGOWAT with objectives and methodology adopted; Section -4 discusses the overall nature and intensity of water conflicts in Chennai and peri-urban areas; Section 5 discusses the methodology, outcomes and difficulties encountered in developing multi-stakeholders' platforms and dialogues; Section 6 analyses water resources audits carried out in the context of Chennai and peri-urban areas. The last Section summarizes key lessons learnt and policy options available to move forward and to have more positive impact.

Section 2 Background information to the Chennai city

The Chennai basin is located between latitudes 12 °40'N and 13 °40'N and longitudes 79 °10'E and 80 °25'E in the Tamilnadu State of India. The Chennai basin consists of group of small rivers such as Araniyar, Kusathalayar, Cooum river, and Adyarriver. The total area of the Chennai basin is 7282 sq.km of which 5542 sq km lie in Tamilnadu and the rest in the adjacent Andhra Pradesh State. All the four rivers once brought fresh water in to the city. For instance, the Araniar, which runs to a total length of 132 km, drains an area of 1470 sq km of which roughly 50% falls within the state of Tamilnadu – finally joining the Bay of Bengal near Pazhaverkadu village. The Kusathalayar forms with the surplus from the Kaveripakkam tank (which is a part of the Palar Anicut system), across which Poondi reservoir has been constructed in 1945 with a view supplying drinking water to the Chennai city in the year 1945. The capacity of this reservoir is 77.91 Mm³ or 2753 mcft below the Poondi reservoirs, two regulators were constructed (namely, Thamaraipakkam anicut in the year 1879, and Valur anicur in 1872) basically with a view to regulating water during flood seasons. While Cooum river takes from Kesavaram Anicut (constructed across Kosathalayar river in the upstream), the Adayar river carried the surplus water the Chembarambakkam tank. There was another water course – a man-made canal called Buckingham canal constructed in the year 1806 linking up various lagoons all along the east coast to a total length of 618 km of which 161 km lie within the State of Tamilnadu. During the past, it served as useful navigational purpose.

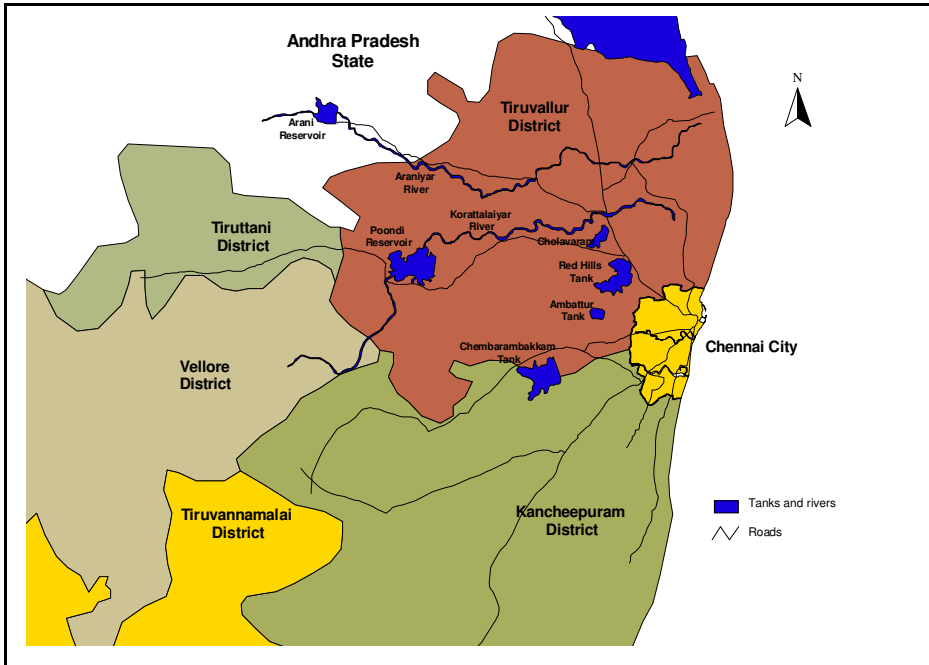
Major surface supply sources to the Chennai city are the following:

- Poondi reservoir – capacity: 77.91 Mm³ or 2753 mcft
- Red Hills – a lake (formerly an irrigation tank) – has been one of the most important sources since 1870. Capacity: 80.65 Mm³ or 2850 mcft
- Cholavaram – an irrigation tank until 1969 – contributes to the city's water supply- Capacity: 25.13 Mm³ or 888 mcft
- Chembarampakkam – formerly an irrigation tank – currently contributes to the city's water supply. Capacity: 103.03 Mm³ or 3645 mcft

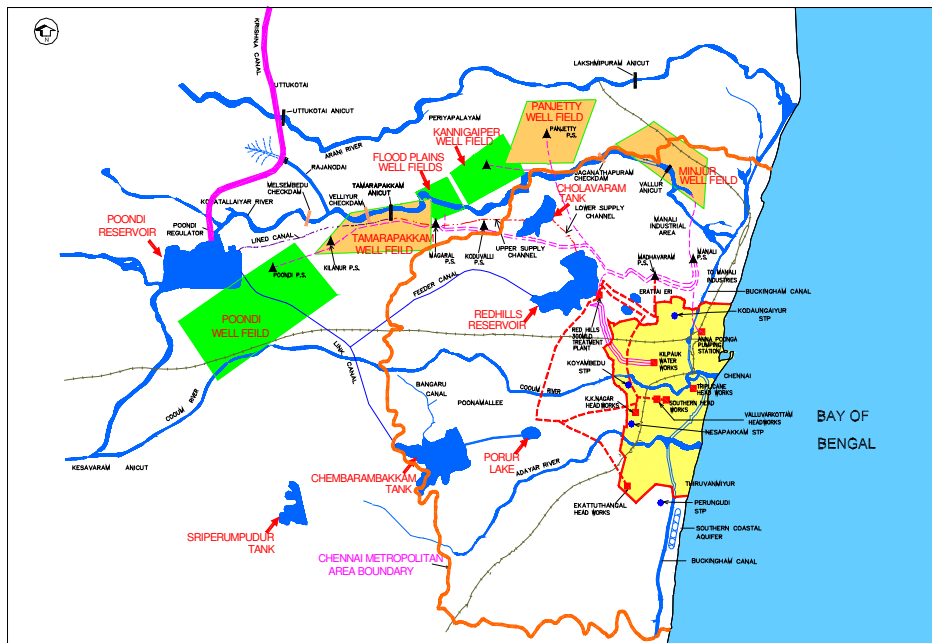
In recent times a few water supply augmentation measures have been implemented: They are Telugu Ganga project (to get water from Krishna basin from Andhra Pradesh state from a distance of about 400 km) and New Veeranam project to get water from the Veeranam tank

from a distance of over 250 km. In addition, a large number of well fields have been identified from the two adjacent districts of Tiruvallur and Kancheepuram which have been a big source of conflict between Metro-water Board and peri-urban villages. The latest attempt by the government (still in early stage) is desalination plants to generate 100 MLD (million litres a day) of water at a cost of 500 crores and another 150 to 200 MLD at a cost of Rs.1000 crores.

Map of city river basins and reservoirs



Map showing well fields around Chennai city's peri-urban areas



Water scarcity for the Chennai city is not new. The city has been historically water deficit due to lack of perennial river. Successive governments in the state of Tamilnadu have spent over Rs.40 billion on various drinking water supply augmentation measures to the city. The problem of water scarcity however continues to persist. The water supply in Chennai is hardly 76 lpcd (Litres per capita a day) which is the lowest compared to what is supplied in the major cities in India (Joel Ruet, Saravanan and Marie-Helene Zerach, 2002). But even this much supply is irregular. Only in exceptionally good years, 76 lpcd is supplied in an uninterrupted manner. In bad years (which are not infrequent for Chennai) water hardly flows through pipes but distributed through tanker-trucks in a haphazard fashion. In the month of July 2000, for example, piped water supply was only 59 lpcd. In response, the Metro Water Authority installed 4525 tanks and hired 400 trucks of 9000-12000 liter capacity to make water deliveries to under served areas.²

Acute water scarcity coupled with the inefficiency of the government has made those involved in water business rich in a short span of time. Needless to say, purified water companies are increasing in number in India. According to the Bureau of Indian Standards, 1200 bottling water companies are located across India of which 400 are in Tamilnadu and over 200 are in and around Chennai city. These companies make huge profits since they pay nothing towards license for groundwater extraction.³ Furthermore, tanker-transport industry which directly involves in transport of raw water from peri-urban villages makes huge profits by selling water.

“A Rs. 600-crore tanker industry is capitalising on Chennai’s acute water scarcity. Over 13,000 tankers are mining the surrounding farmlands for water”.⁴

Chennai city does not have access to a perennial river and has to depend primarily on three major erstwhile irrigation tanks and one small reservoir across a river that brings floods only for a few days during the monsoon. All these sources together supply about 300 MLD in a good year. For the past two decades, during the dry seasons, these sources have had to be supplemented by groundwater pumped from agricultural wells located in peri-urban villages, contributing around 125 MLD. The current water needs of the city and its urban agglomeration are almost double, of the order of 750 MLD and, it is estimated that by 2011, at 100 lpcd, the city would require about 660 MLD for an estimated population of 6.6 million. For the rest of the Madras Urban Agglomeration, an estimated 300 MLD would be required for its 3 million populations. If the estimated industrial requirement in 2011 is also added (would be another 250 MLD) then the total requirement of the city and its extended urban areas would be of the order of 1210 MLD. This is only a conservative estimate. But the current supply from the surface sources is nowhere near what is needed.

² *The Hindu*, July 7th, 2000. see also Moench and Janakarajan (2004)

³ <http://www.digantik.com/IPs/Digantik/aishwarya/bottle-business.htm>

⁴ http://www.infochangeindia.org/agenda3_08.jsp

Chennai water balance

As per MMWSSB's (Madras Metropolitan Water Supply and Sewerage Board) website:

- Chennai gets an average rainfall of 129 cm, which is much more than the national average
- Only about 5% of this rainfall actually gets into the ground
- 80% of Chennai's groundwater has been depleted and any further exploration could lead to further salt water ingress
- north-east monsoon and surface run-off from the Araniyar and the Kortalaiyar rivers replenishes:
- Poondi (2.2 mts deep) - yield in normal year 76.7 Mm³/day
- Sholavaram (3.4 m) - yield in normal year 22.5 Mm³/day
- Red Hills (3.8 m) yield in normal year 71 Mm³/day
- Total yield - 200 million litres a day (MLD)
- These reservoirs are shallow, spread over a total catchment area of 3,513 sq km.
- The water supply during years of normal rainfall is around 313 MLD (78 litres per capita a day, or lpcd) and during the drought years availability has been as low as 127 MLD (32 lpcd).
- Thus even during normal years there is shortage to the tune of 113 MLD for city water supply and this doubles during drought years.
- Industries in North Chennai and in particular in Manali industrial area are supplied about 125 MLD of water per day, which is roughly the shortage in normal years for city water supply
- To augment this shortage, (as per Metro Water website) Chennai City currently draws about 100 MLD of ground water from Arniar-Kortalaia basin (AK Basin). The estimated sustainable yield from this basin is 100 Mm³ per year but the current total extraction is 300 Mm³ per year, three times the sustainable yield.
- It can thus be seen that the shortage for the city is the quantity supplied to the industries and this shortage is managed by overdrawal from the A.K. Basin, leading to sea water intrusion into the aquifer and shortage for local water users.
- The other side of the story is more depressing: The water transported from peri-urban villages to Chennai has created serious livelihood problems for them (Janakarajan, 2006):
- Continuous water transport, in order to supplement the city's drinking water needs; have drained water resources in peri-urban villages. Groundwater table has dropped to

a significant low and in many parts, groundwater is completely dried or reached a dead-end with hard-rocks. The existing surface water bodies are completely neglected or encroached. Many farmers have become heavily indebted due to heavy investment that has gone into the well irrigation without adequate returns

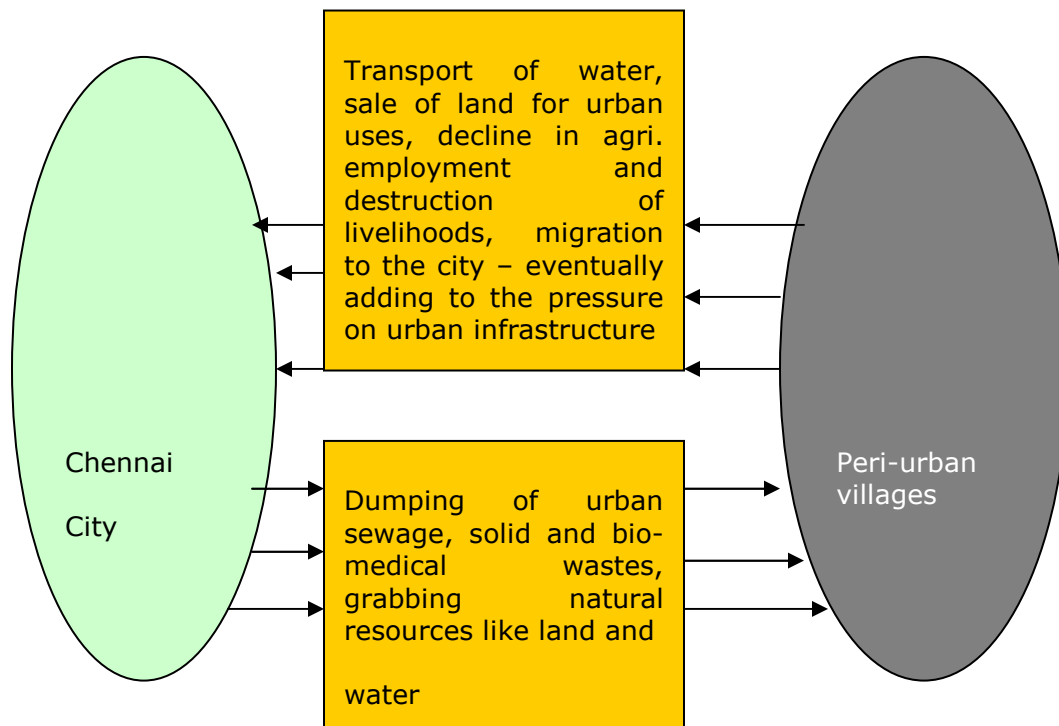
- This has affected seriously agricultural activities in the peri-urban villages resulting in shrunk in agricultural income. Employment opportunities have also reduced quite considerably. In turn, unemployment has emerged as a major problem in the villages. Landless agricultural labourers and marginal farmers started migrating to other villages and towns for want of employment; many have become a sort of foot-loose population migrating to cities and towns, creating pressure on the already stressed urban infrastructure
- While a small section is obviously gained in the last two or three decades – like those of water sellers, those employed in urban areas, traders, sand miners, brick manufacturers etc – a majority have been suffering due to lack of assured and gainful employment – whether farm or non-farm; Even water sellers who benefited a lot by selling water to the Metro Water Board started feeling the pinch of the crisis after drying up of their bore-wells. Quite a number of water sellers started constructing their houses when their business was good. At present these houses remain incomplete because of drying up of aquifers and cessation of contract between water sellers and Metro Water Board. Many of them have also purchased tractors on loan but at present remain in disuse because of lack of agricultural activities.
- Whatever non-farm job opportunities that have emerged in the peri-urban villages are only incidental and unplanned. Indeed, if at all anything such activities (like a sugar factory in PS village, many bottling water companies, brick manufacture, sand mining, chemical units etc. The most important question is therefore, what kind of abilities or the enabling environment that the peri-urban population (who are more vulnerable) possesses to diversify their livelihood strategies? An ability to adapt depends upon several factors such as education, transport net work, skill acquisition and so on. What concrete efforts are taken by the government to create this enabling environment?

Nevertheless, the urbanization process is quite rapid in Chennai: Many new housing colonies and settlement spring up in metropolitan areas without adhering to any plan or rules and regulation governing the Chennai metropolitan area. The haphazard development and growth or urban expansion has resulted in severe problems of management of civic amenities such as drinking water supply, sanitation, solid and sewage management etc. There are hundreds of civic associations in these areas, which struggle with local administrations (local Panchayats and municipal towns) to get the basic amenities. But the facilities provided are quite far from what is needed. Therefore not only the city but also the newly developing towns around metropolitan areas also choose peri-urban location for dumping their solid and liquid wastes.

On the whole what one encounters is a vicious cycle in which people migrate to the city for want of employment due to reasons such as drying up of groundwater resource, decline in agricultural employment and overall degradation in ecology and environment; On the other hand, the city experiences pressure due to increasing demographic pressure which in turn puts enormous pressure on urban infrastructure such as land, housing, drinking water, sanitation, solid, liquid and bio-medical waste management etc. Again in order to ease this pressure, the city keeps extending and thus the vicious cycle continues

(See Diagram 1)

Diagram 1: Pressure building between urban and peri-urban areas: The vicious cycle



Section -3 The NEGOWAT project –objectives and methodology adopted

Main Objectives

- The present project aims to document and analyze impacts of unregulated and unchecked horizontal urban expansion on natural resources, in particular water; its impact on poverty and livelihoods, ecology, environment, and on health conditions of people living in peri-urban areas.
- This project will also develop and test tools and institutional structures that support and enable effective stakeholder led water resources management for negotiating emerging conflicts and water rights. It aims to draw upon developments in Integrated Water Resources Management (IWRM), and decision support methodologies that can be readily understood and adapted to meet the needs of multi-stakeholder groups.

Methodology and tools of analysis

The methodology of the study has got different components:

- Broadly two segments of the Chennai peri-urban area have been identified: They are, A-K basin and Palar basin (for details of Palar and A-K basins, see Appendix 1 and 2)

- Besides official sources of data, a meso-level survey in these adjoining basins of the city (covering 23 villages and 41 villages respectively from Palar and A-K river basins) and a detailed survey in two villages (PS in the Palar and Magarel in the A-K basin) were conducted in 2004-05 with a view to collecting information on various aspects such as poverty and livelihoods, current and past water use pattern, nature, extent and history of rural-urban water market, impact of water sales on agriculture, employment, income, ecology and environment and so on.
- A water resource audit was conducted in Magarel village block and the Chennai city
- GIS was used for mapping over 2000 surface water bodies (tanks) in the two adjoining districts of Chennai city
- Agent-based Bayesian models or Bayesian networks, stakeholder analysis and conflict analysis were carried out to understand and characterize multi-stakeholder groups and their conflicting interests
- Development of stakeholder platforms and user groups for shared learning and for a sustained dialogue to promote stakeholder led IWRM

Section 4 Conflict analysis in Chennai and peri-urban areas

4.1 Background to Chennai peri-urban conflicts

The basic premise of the study is that water transport from peri-urban villages to the city has affected livelihoods in these villages due to declining agricultural activities and declining income. As a consequence, conflicts have occurred between urban and peri-urban interests. The key issues are, to what extent decline in agricultural employment is compensated by non-farm job creations in peri-urban villages? To what extent the conventional notion that *cities are engines of growth* is true?

Water transport from Chennai's peri-urban villages has a history of nearly four decades. The Metro Water Board started pumping groundwater from peri-urban villages in order to supplement the city's water requirement as early as in 1965. It identified rich aquifers (well fields) in the A-K basin as well as the Palar basin. The earliest well field identified was in Minjur (1965) in the A-K basin about 40 km north of Chennai. Not less than 100 MLD was pumped from the A-K basin well fields until recent times. Another 40 MLD was pumped from the Palar basin. Giant bore wells in these well fields were installed for round the clock pumping. The continuous pumping from these well fields has not only affected agriculture but also due to seawater intrusion entire aquifer has become saline. During peak seasons, the Metro Water transported at least 6000 tanker loads of water to the city from these well fields. Besides, numerous private operators also transported water from various peri-urban villages to supply many commercial establishments, hotels, construction sites and hospitals.

However, since the year 2000 the Chennai and its peri-urban villages were facing continuous drought as a result of which water table and water yields have started declining. Therefore, with a view compensating reduced yield of water, the Metro Water Board has started purchasing water from private agricultural wells. Over 180 private agricultural wells were identified from whom water was purchased at a price of Rs.25 to Rs.40 per tanker-load (depending upon season and quality of groundwater). From each well at least 10 to 18 loads of water was pumped (0.1 to 0.2 MLD). Many of these wells connected to the existing Metro Water

transmission system (include some pictures). The total estimated cost of hiring these agricultural wells is Rs.85 million per year including the cost of civil works, hiring charges and current consumption charges.⁵

In addition to the state agencies, the private operators and water companies also pump groundwater either to sell raw water or to sell bottled water after purification process. Everyday, at least 3000 tanker loads of water go into the city to meet the needs of multi-storied apartments, hotels, hospitals, other commercial establishments, construction activities etc. During peak summer months this number shoots up steeply. Furthermore, there are over 400 bottling water companies around the city, which suck a good deal of groundwater for commercial purposes.

The main reasons for conflicts in the peri-urban areas of Chennai are:

- Urban stress is transferred to peri-urban areas as a result of which there is a drain in natural resources such as land and water
- Mushrooming of urban settlements and housing colonies in PU villages results in escalation of drinking water demand and poses a much big threat in disposing of solid wastes and wastewater⁶.
- This problem gets aggravated due to institutional vacuum in peri-urban villages; urban infrastructure such as good roads, drainage facility and sanitation, solid waste management and so forth are a far cry in these areas. The existing democratically elected bodies such as Panchayat suffer from lack resources and support from government
- Industries relocate to peri-urban regions due to better land and water availability
- Land in the peri-urban areas is bought for urban use resulting in dramatic changes in land use pattern
- Increasing urban activities in the peri-urban areas leading to pollution and degradation of natural resources
- Changing land use leads to fall in agricultural employment in peri-urban areas, weakens agriculture and causes serious livelihood problems
- The village commons — land and traditional water bodies such as tanks— are either encroached upon or suffer from total neglect
- While need for infrastructure grows in peri-urban villages, the prevailing institutional vacuum leads to overall frustration which reflects in widespread conflicts and unrest

⁵ Nevertheless, there was a huge gap between demand and supply. While what is supplied in a normal year is to the extent of 400 mld, the total demand for the city, the rest of Chennai urban agglomeration and for industrial use is of the order of 1300 mld @ 100 liters per capita. The projected demand in 2021 is going to be around 1763 mld (Metro Water Board, Chennai, 2006).

⁶ For more details on solid and bio-medical wastes and wastewater management in Chennai, see Geeta Lakshmi and Janakarajan (2005a), Geeta Lakshmi and Janakarajan (2005b)

- Women who lose agricultural employment are the worst hit among the peri-urban population
- More specifically while some among the farming community benefit, a majority lose
- Farmers whose lands are demanded most for urban activities –such as those which are located along roadside plus those plots which have good groundwater potential; these farmers are real gainers who became rich through windfall profit; but these are handful farmers
- On the other extreme, landless agricultural labourers a majority of whom migrate either temporarily or permanently looking for jobs; A handful of them are better-off due to better wage; but for a majority opportunities are scarcely available for a decent living (Janakarajan, 2005)
- The worst affected are women and aged who are confined to villages and undertake all kinds of odd jobs for a meager wage
- In between these two extremes are those farmers whose lands are neither demanded (or suitable) for urban activities not could undertake successful cultivation due to lack of labour force and water; since traditional irrigation institutions such as tanks and springs are defunct, water sources for agriculture is ceased; this class of farmers remain in a dilemma whether to stay in villages / agriculture or seek different employment and leave the village; prospects of opportunities for a decent living for this class of farmers is not easily available

However, responses to all these impacts in peri-urban villagers are not uniform. While some villages have reacted violently, some others have meekly surrendered to the urban pressure. Following are only examples of two case studies, one each from the A-K basin and the Palar basin. There are many villages under these two categories.

Case study 1: The Velliyur village in the A-K basin:

In Velliyur village (located at a distance of 50 km from Chennai in the A-K basin), conflict broke out and took violent turns due to continuous pumping of groundwater for over 30 years. Total population of this village is 4379 (as per 2003 survey); Total wet land 834 acres; Total dry land: 966 acres; Total government land : 200 acres. Although the village has one large tank (with a command area of 804 acres), groundwater remains as the primary source of irrigation. In 1980, there were 280 agricultural wells in the range of 50-80 ft. Now there are 220 wells and the depth is in the range of 130-160 ft. Quality of water is deteriorated compared to 10 years ago. Since 1990 at least 60 dug wells were abandoned due to falling water table. Main crops were paddy and groundnut. In the year 2000 drinking water was supplied round the clock from 4 bore wells. In 2004 only 2 hrs per day is supplied from a total of 12 bore wells (of which 4 have already stopped supplying water).

Backdrop to conflicts Velliyur village:

In 1969, 11 bore wells were installed to pump water from the common land of the village in order to supplement water supply to Chennai city and to supply to nearby industries. The estimated water supplied from this village was 16 MLD in 1969. In 2000, out of 11 bore wells, 9 had failed; since then water is purchased from farmers. Total number of water selling farmers /

wells in the village is 75 from whom 40 MLD is collected; but this is reduced to 16.84 MLD in 2004. Of the 75 bore wells, which originally supplied water, only 55 were working in the year 2004. Furthermore, the TWAD Board was planning to install 7 bore wells in the common lands of Velliyur in order to supply water to Thiruvallur town; but due to the resistance from farmers only 4 were actually commissioned. Sand mining activity is quite extensive in the Kosathalaiyar riverbed, which has drastically reduced water yields in the riverbed aquifer.

The people of Velliyur village were quite passive who did not oppose water pumped from the common lands of the village for more than 3 decades. However, when groundwater table decreased progressively, farmers had to spend quite substantially on deepening activities. Agriculture as an occupation was very badly hit resulting in reduced farm income and employment. The livelihoods of small farmers and landless agricultural labourers were affected. Therefore, self help groups (SHG) have been opposing transport of water from this village since 1995. SHGs insisted that the Panchayat should pass a resolution banning water sales from Velliyur village; But the Panchayat did not do so since groundwater is pumped only from Government land. But since 2000, water is purchased from farmers, village population have revolted against water transport. Again the village Panchayat (elected body) refused to pass a resolution against water sales on the grounds that it is individual farmers who sell water from their own land. Since the property rights on groundwater are undefined nothing much could be done. Some of the village residents filed a case in the court to ban water sales from the village. They were successful in getting the stay but soon it was vacated through an appeal petition filed by a water-seller who was supported by the Metro Water Board. Under such duress, in the year 2003, almost all the agricultural land was left uncultivated and the landless population was either engaged by sand miners from the river or they migrated in search of employment.

Meanwhile, as a consequence of extensive sand mining water yields from wells were reduced considerably. When water-selling farmers protested against it, Metro water Board took up the issue with the government and stopped the sand mining activity. This has affected livelihoods landless agricultural labourers who were working with sand miners. This is a vicious cycle in which agricultural labourers were pushed into sand mining occupation due to distress in agriculture. But when the sand mining activity was banned, they also joined the protesting mass of the village. Thus the violent conflict broke out it broke out on 15th August, 2004. More than 400 strong village population gathered near the Metro Water Board pumping station The Metro water officials and higher officers of the revenue department arrived at the scene and tried to resolve the issue. Since the entire villagers were against water sales a peace committee was formed consisting of water-sellers, non-sellers, SHG's and officials.

During the peace committee meeting it was decided to stop the water sales from farmers to MW Board after 15 September 2004. Everyone including the MW officials, sellers, non-sellers and all other villagers agreed to abide by this decision. After the peace committee decision entire issue was put into cold storage until 14 September 2004. On the 15th of September, MW officials reported that water purchase will not be stopped since the higher authorities MW officials did not agree for the agreement arrived at the Peace Committee meeting; water-sellers were also willing to sell water. In the mean time water sellers tried to move the court and tried to obtain stay from the court against the decision taken during the peace committee meeting. Since the non-sellers had a doubt that the sellers might seek legal protection, they also moved the court to get a stay on water sales; It was an unsuccessful move for both sellers and non-sellers. Since water pumping was not stopped even on 16 September 2004 till 11.00 am the entire village gathered near the Metro Water Board's giant water storage sump from where

water was pumped. The road was blocked. Though the higher revenue department officials arrived, they did not agree for stopping water purchase from private wells.

At this point of time, some people from the agitating group broke the entire pipeline structures, which belonged to the MW Board; After this violent protest from people, police arrested 44 people belonging to Velliyur village and filed a First Information Report. They were arrested under Public Property Damaging Act and remanded for 15 days judicial custody. The MW Board demanded through the court of law a compensation of Rs.30,000 from the agitating mass for breaking structures belonged to them. The court also instructed the arrested farmers to pay the compensation but the case was never withdrawn till date. Present status: Water selling was started again. MW officials are asking more farmers to come forward to sell water. MW Board has pasted a notice and even circulated it among the farmers stating that whoever is willing to sell water can approach the MW to have an agreement for one year.

Case Study 2 : Palayaseevaram village in the Palar basin:

This village is located at a distance of 50 km distance from Chennai city closed to the national highway. Total population of the village is 5285 (as per 2001 census). Total wet land 1191 acres; dry (rain-fed) land: 1446 acres; Government land: 1068 acre. This village is located right on the Palar river and benefited a great deal from the river water for irrigation. This used to be an agriculturally prosperous village that has (had) access to 8 surface sources for irrigation with a total command area of 1191 acres. Groundwater served the purpose of only a supplementary irrigation. In 1980, there were 71 wells (24 wells in wet lands and 47 in dry lands) and depths were in the range of 24 to 27 feet. Now there are 150 wells and the depth is in the range of 60 to 100 feet. Out of these, 50 are bore wells and the rest are open wells. At the time of the survey in 2004, only 20 wells were in use. Quality of water as well as water table has declined drastically. Main crops in 1980 were paddy and sugarcane. Agricultural land was fully cultivated until 1985. In 1990 the area under paddy and sugarcane was already reduced to 200 and 100 acres respectively. In 2004, the area under paddy was only 15 acres and area under sugarcane was 10 acres. Weeds and wild vegetation are seen at present in most of the wetlands. In 1990 drinking water was supplied for 5 hours / day. In 2002 it is reduced to only one hour per day.

Backdrop to conflicts:

Originally, it was planned to pump water from the Palar riverbed to supply to the adjoining areas of the city such as Alandur, Pallavaram, Chrompet, Tambaram, Anakaputhur, Pammal, Chithilapakkam, Vandalur Zoo etc. The estimated demand for this region has been at least 45 MLD in 2004. It used to be 22 MLD in 1972 when it was originally decided to pump water from this village in order to supply water to these adjoining areas of the city. The people of Palayaseevaram village opposed this move on the grounds that it would affect the groundwater availability in the region. A memorandum was also submitted to the District Collector and issue was also taken up for discussion at the Chief Minister level. However, finally the government took a decision in favour of the city and against the interests of the village population. And, the work was executed. Accordingly, in 1972, the Tamilnadu Water Supply and Drainage Board (TWAD Board)⁷ dug 5 wells and subsequently six more wells in the Palar riverbed.

⁷ While Metro Water Board is responsible for supplying water to the city, the TWAD Board is responsible for supplying water to all other parts of the state.

For the past 5 years, supply of water in these wells is reduced drastically. Six more wells have been dug in the year 2004 on the other side of the river bank, which is part of the village called Pullambakkam / Thirumukkodal. The main reasons for the reduction of water supply in these wells are round the clock pumping for over three decades and substantial and illegal sand mining in the riverbed much beyond permissible limits. All these have adversely affected the agriculture in the village. Groundwater has become scarce even for drinking. Not only Palayaseevaram but also all villages in this stretch (such as Thimmavaram, Athur and Palur etc) was badly hit due to round the clock pumping either by the Metro Water Board or by the TWAD Board. Wherever these agencies were not pumping, private tanker trucks pumped water for selling in the city. In fact, there is a virtual competition between these two state agencies in pumping water to supply to their respective constituent population. The Sugar mill, which was constructed in the year 1987 in Palayaseevaram village, was severely opposed by the people. At present, the sugar mill generates good deal of effluent and discharges them into a village tank, which is supposed to provide irrigation to 423 acres in this village. Furthermore, the sugar factory has blocked the water flow in one of the main canals which eventually was supplying water to the big tank of the village. Therefore, in addition to groundwater pumping by the State agencies, the sugar factory has also been instrumental in destroying livelihoods of the village population.

How the conflict was represented?

Several petitions / memorandums have been sent to the government; a group of NGO organizations organized a series of demonstrations and has organized a public hearing meeting. The jurists of the public hearing committee (one of them was a retired Supreme Court Judge) severely condemned the illegal sand mining and competitive water pumping and suggested to the Government to appoint a Committee to go into the details of damage done to the river. But all these efforts never helped since both activities continued.

Present status of conflict in the village:

Struggle against the damage by the people of this village was weak and passive. People are absorbing the shock created due to water depletion or leaving the village for urban employment. Many have sold their lands and many more are planning to sell lands. If there are no severe conflicts despite severe damage to the ecology and livelihoods of this village, it is because of the reasons such as (a) location of the village on the main corridor linked to Chennai, (b) sand mining as a lucrative activity for the small farmers and landless agricultural population, (c) growing absentee landlords, (d) very powerful sugar mill lobby having highest political connections and threatening local people, (e) growth of non-farm employment such as in construction industry in urban areas, railway contract work, employment in the local sugar mill, vegetable and fruit selling in urban areas, other petty business etc. and (f) non-availability of farm labourers who find more gainful employment in non-farm activities such as sand mining, construction etc.

4.2 Conflict analysis

An in-depth conflict analysis between urban and peri-urban areas throws interesting light on clashing viewpoints of various stakeholders. This is summarized in the following tabular format.

Sl. No	Type of stakeholder	Reasons for conflict	Fighting against whom?
I	Farmers cum well	Reduction in profit due to	Those who protest against

	owners cum water-sellers	not selling water to MW Board	water sales to Metro Water and TWAD Board
2	Farmers (non-water selling well owners and all others in the village)	Destruction of livelihoods in villages due to declining water table and agriculture	Water sellers, Metro Water Board and TWAD Board
3	Landless agricultural labourers	Loss of income and livelihoods	Metro Water Board, TWAD Board, water-sellers who protested against sand mining since their wells do not receive recharge due to sand mining resulting in emptying of RBA
4	Metro Water Board	Compulsion to supplement the city's water needs	Protesting village population against water sales and competing with TWAD Board
5	TWAD Board	Compulsion to supply water to the city's adjoining areas	Protesting village population against water sales and competing with Metro Water Board
6	Private tanker operators	Reduction in profit	Those who protest against water sales to Metro Water and TWAD Board
7	Water companies	Reduction in profit	Those who protest against water sales and civil society organizations
8	City dwellers and residents' welfare associations	Reduction in drinking water supply	Protesting against Metro Water and TWAD Board
9	Civil society organizations	Destruction of livelihood and falling water table	Water sellers, illegal sand miners, Metro Water and TWAD Board

Section 5 Building multi-stakeholders' platform

5.1 Identification of stakeholders in the context of Chennai peri-urban water markets

Basically two sets of stakeholders could be identified who have diagonally opposite interests: (1) State and (2) Peri-urban village population.

State is represented by,

- Metro-Water Supply and Drainage Board
- Tamilnadu Water Supply and Drainage Board
- Chennai Metropolitan Development Authority
- Village Administrative Officer (VAO)
- Block Development Officer (BDO)
- Thasildar (the Revenue Department taluk-level head)
- District Collector
- Public Works Department (water resources)
- State and Central Groundwater Boards
- Chennai city Municipal Corporation
- Departments of Agriculture, Revenue, Forest and a few others who are concerned with water
- Tamilnadu Pollution Control Board
- Member of Legislative Assembly (MLA) and Member of Parliament (MP)

Peri-urban population is represented by

- Farmers (as a broad category) who live in peri-urban villages
- Village Panchayat
- Village level informal institutions

The broad category of farmers could be further differentiated into several sub-groups such as,

- Land and well owners,
- water sellers,
- non-water sellers,
- Land owners but non-well owners,
- Tenant cultivators,
- Landless agricultural labourers,
- Women self-help groups.

In addition to the broad category of farmers, a substantial section of non-agricultural population also live in the peri-urban villages including traders, employed in the other non-agricultural sector.

In addition to the above two sets of stakeholders, there are others who have either or indirect interests in the urban and peri-urban water supply and conflicts. They are represented by,

- Tanker-truck operators and their Association
- A large number of water companies who sell purified drinking water who are located in and around Chennai city
- A large number of high profile hospitals which are located in and around Chennai city
- A large number of high profile hotels located in and around Chennai city
- A large number of educational institutions located in and around Chennai city
- A large number of commercial enterprises, industries, major educational institutions and government offices located in and around Chennai city
- Flat promoters, Residents' Welfare Associations and other urban water users

The last batch of stakeholders represents the civil society. They include,

- Non-Governmental Organizations (NGOs)
- Activists
- Researchers
- Media

Strengths and weaknesses of stakeholders

Four sets of stakeholders have been identified: They are,

- (i) State (all official agencies and political leaders),
- (ii) Other urban stakeholders,
- (iii) Civil Society,
- (iv) Peri-urban agricultural and non- agricultural population.

It is not very difficult to judge strengths and weaknesses and exigency, legitimacy and power of these stakeholders. The state for instance is all powerful enjoying enormous power, control and authority. Other urban stakeholders go *hand in hand* or have *hand over hand* with the State in so far as exploiting resources from peri-urban villages. This set of stakeholders also demonstrate exigency and claim legitimacy in transporting water from peri-urban areas. In other words, 'the State' and 'other urban stakeholders' strengthen each other and eventually their strength and power becomes formidable. It is a real threatening alliance. In other words, other urban stakeholders constitute market which is more profit driven than anything else. The third set of stakeholders, namely, civil society organizations, activists, researchers and media indulges in investigating, writing and campaigning against depletion and pollution of resources in peri-urban and rural areas although play a critical role, this set of stakeholders, neither can they claim any legitimacy nor are they powerful.

Peri-urban population, unlike other stakeholders, does not constitute one single homogeneous group. A part of them, namely, water selling farmers, align with first and second set of stakeholders described above and make a short-term profit. But, it is very difficult to say whether they sell water voluntarily. Available evidence suggests that water-sellers are either compelled or encouraged to sell water to Metro Water Board. In the case of farmers selling water to private truck operators or private companies, the advances made by the latter trap them. Nevertheless, this class of farmers are viewed as enemies of farmers; but soon they realize their mistake since their wells go dry due to round the clock pumping.

All others sections of the peri-urban population are at the receiving end. They have to suffer the brunt of water transport and other damages to the local ecology and environment; this is a voiceless and powerless community. Even the democratically elected village Panchayat Board becomes powerless. What one finds in such a situation is virtual *institutional vacuum* and a sort of *neither here nor there* state of affairs. They are left with two options: One, stay and suffer and two, flee. The second option is generally exercised by a few who are educated and resource-rich.

Building multi-stake holders platform for a dialogue

The prevailing conditions in Chennai city is such that one cannot take extreme positions: An ideal situation is one in which both the Chennai city and peri-urban villages co-exist in a conflict-free state, cooperating with each other for each other's benefit; while cities can act as engines of development of both city and peri-urban areas, the latter can contribute to its development; a state where one can anticipate a win-win situation – from conflicts to cooperation.

Nevertheless, the critical question is how to reach this point from conflict to cooperation? It is neither easy to define this path nor can one define the time frame to travel through the path of conflict to cooperation. After all, conflicts occur primarily for reasons of prevalence of free riders that are also politically and economically powerful; this group will lose if cooperation among all stakeholders is attained. Whereas, the condition of the majority of peri-urban population, whom I would call *fatalists*, are losers any way. Therefore, this group will only be more than happy to participate in dialogue and reach the level of cooperation. Precisely for these reasons, it is not going to be easy to involve these diverse groups in a meaningful dialogue.

My theory is that until one reaches a *threshold level of crisis* the hitherto gainers may not be interested in dialogues because of operation of markets and the support that they enjoy from the State; but it does not mean that one should not start the dialogue process before. This is precisely where multi-stakeholders platform (MSP) and multi-stakeholders' dialogue (MSD) play a key role. In the case of Chennai city and peri-urban villages, it must be said that conflicts have reached an intense level but the threshold level of crisis is not yet reached unlike the cases of Palar and Cauvery basins⁸.

Multi-stakeholders' dialogue (MSD) experience in the context of negotiating Chennai and peri-urban water conflicts

The MSD has been initiated in the context of Chennai peri-urban area. A series of multi-stakeholder meetings have been held since July 2004 and the process continues till date. A committee of stakeholders with 64 members drawn from all sections has been formed. Several meetings have been held so far and many key issues were brain stormed.

Lessons from the MSD experience

- A sound research is a necessary condition for undertaking and carrying forward MSD
- Degree of success or failure of dialogue initiatives depends upon active and sustained state support
- Need for an untiring facilitator who can carry on with the job of facilitating and arranging a platform for the dialogue to continue

⁸ The present author has initiated MSD initiatives in conflict-ridden river basins of Palar and Cauvery in South India. In these river basins, conflicts have reached a threshold level of crisis in which even the highest judicial authority of the country could not travel too far. When *everything has failed* the MSD among all stakeholders is the only option for arriving at some kind of consensus and cooperation.

- Dialogues are never smooth; there will be lots of ups and downs; this should be expected
- Final outcome is uncertain; difficult to judge; But in the absence of a viable alternative there is a case for pushing the dialogue initiative as far as possible until one reaches anywhere near a viable solution

Solutions as emerged from MSD meetings

The stakeholders Committee discussed at length not only threats to livelihoods in peri-urban villages but also solutions to drinking water problems of the Chennai city. Several issues and solutions were discussed.

First, there was an unanimity in emphasizing the need for revamping water bodies such as tanks in peri-urban villages and suggest ways and means to the government for modernizing and strengthening them. Through this measure, not only that with improved groundwater level agriculture could be protected but also excess or unclaimed water could be diverted to the city's needs. This was taken up on a priority basis.

What have we done so far?

- All hydraulic particulars pertaining to 2600 tanks in two adjoining districts have been collected from the government records
- Gathered all relevant topo sheets (relating to year 1971) and digitized them in GIS
- All hydraulic particulars as recoded in original tank memoirs are being fed into the digitized maps
- What are we planning to do further?
- Next step is to get the latest satellite imageries and super impose them on the 1971 maps
- Finally the actual survey data of all 2600 tanks will be fed. Survey in 30 tanks have already been conducted with the help of stakeholders
- Three-time period picture of tanks will help us to identify those tanks, which are in retrievable shape. For such tanks we will work out the costs of rehabilitation and submit it to the government through the stakeholders' committee

Second, the Committee felt that solutions to Chennai water crisis needs to be approached carefully and such measures cannot be and should not be ad hoc as have been the practice in the past. In fact, before launching on mega projects like bringing water from other basins (such as Telugu Ganga) or Veeranam, many stakeholders expressed the opinion it is absolutely necessary to examine what is locally available. This point might appear irrelevant to many. But this is an extremely relevant question: Let us take the case of Chennai city. It is true that the city is neither located on the banks of any perennial river nor has any big perennial reservoirs from which water can be drawn. But consider the following option:

- There are at least 70 temple tanks and ponds located in different parts of the city, which used to get filled during monsoon months. Now most of them are silted up and supply channels have disappeared because of civil constructions all over. Need of the hour is to restore all these tanks to their original condition and restore flow of rain / flood water during monsoon months. Simplest way would be to link storm water drains with these tanks; otherwise, huge amount of floodwater wastefully flows into sewage drains or into the city's polluted rivers.

This particular measure would not cost much compared what is spent on big projects. The potential benefits that it may produce are remarkable. This will not only improve groundwater levels in the city (which is at present declining at the rate of 3 meters per year) but also improve the quality substantially. This will help mitigate the city's water problems to a large extent because, at present 60% of the city's water needs are met from groundwater.

Third, the city generates about 680 MLD of sewage water, which is at present not properly utilized. Except around 100 to 150 MLD, which is supplied to Chennai Petroleum and MFL after the primary treatment for industrial uses, the rest is unutilized. The sewage water is let into the city's rivers either untreated or after primary treatment. There is huge scope for recycling this water even for domestic uses. At least 80% of the sewage water (or 500 MLD) can be recovered and recycled. Environmental engineering experts point out that the cost of sewage water treatment is cheaper than seawater desalination.

Fourth, construct a series of check dams in Araniar and Kosathaliar to save rain water and augment groundwater recharge.

MSD in the final analysis

On the whole, a threshold level of crisis will make dialogue initiative more sustainable and will ensure active participation of all contending stakeholders; otherwise, only one set of stakeholders will participate. In the case of Chennai peri-urban villages, stakeholders' participation is less than expected level and many villages are getting swamped in the urbanization process

Section 6 Water Resource Audit⁹

This section seeks to address the issue of capacity of the Chennai city to manage with available water resource within its command for the present population and for the projected population. The results of an extensive assessment of access to and demand for water in Chennai are discussed in a separate paper on this theme.¹⁰ The main motivation behind this exercise is to (a) Identify and evaluate potentially viable options for tackling Chennai's water problems; (b) Develop a water-related vision for what might be achieved by 2015; (c) Develop a range of demand scenarios that take account of some of the most important factors that influence demand; and (d) Develop and evaluate a number of strategies for achieving the vision taking account of the demand scenarios and negative impacts on peri-urban areas.

⁹ The section on water resource audit was initiated by Patrick Moriarty and developed by Charles Bachelor. The present author is indebted to both of them for their generous help.

¹⁰ For a detailed discussion on water resource audit for Chennai and its metropolitan area, see Janakarajan, S, Charles Bachelor, Patrick Moriarty, Jothi G and Prabhakar G – draft (2005)

Main conclusions of the water resource audit are the following:

- Best estimates of Chennai's water supply and water demand indicate that current water supply is *at best* approximately half the demand based on a domestic demand of 150 lpcd. If the figures used are approximately correct, this suggests that the current average access to and use of domestic water is of the order of 75 lpcd in good years. Demand is increasing rapidly in line with factors such as rising population, increasing rural – urban migration and industrialization. Taken as a whole, the available evidence suggests that the Chennai's water supply situation is at a crisis point, particularly for poorer social groups.
- As households in relatively wealthier areas of the city are reported to be using well above this daily volume of water, households in poorer areas are using much less. There are severe - major problems with sanitation, sewage treatments and there is also plenty of evidence that indicates that Chennai's ever-increasing water footprint is causing real hardship for many water users in peri-urban villages. It is noticeable that most estimates of demand do not include delivery or conveyance losses. Quite obviously the lower the conveyance losses, the lower the infrastructural capacity required and the lower the pressure on water resources. Estimates of demand calculated by us include 25% allowances for conveyance losses.
- A major recommendation of this exercise is that the starting point for better management of Chennai's water services must be a long-term vision that also takes into account water resources development in the districts from which water will be supplied to the metropolitan area. It is recommended also that this vision be SMART (Specific, Measurable, Achievable, Realistic and Timebound) and an output of a consultative process that has the active involvement of all primary stakeholders.
- Four water demand scenarios are presented in this section. These are based on the assumption that issues linked to changing demand and population growth will continue to be the major drivers of water demand. Many other factors will also have a major bearing on demand for "blue" water (i.e. surface water or groundwater) as opposed to recycled water, treated wastewater or desalinated seawater.
- Supply and demand strategies: Twenty-two options for tackling Chennai's water problems are listed in the report. None of these are entirely new as they have all been identified by individuals and organisations with a long history of working in and around Chennai. Using the demand scenarios, which themselves include options for managing demand, the report identifies different water supply strategies and then evaluates these against the vision.
- It is estimated that, if Chennai's demand continues to increase at current rates and if the major source of "blue" water supply is rainfall in the metropolitan area and adjacent districts of Kancheepuram and Tiruvallur, then domestic and urban demand in the metro area and these two districts will be equivalent to 50% of all the renewable "blue" water in an average rainfall year

Section 7 Summary, key lessons learnt and policy options available to move forward

The most fundamental questions that we tried to answer in this study were;

- Since the urbanization is an inevitable process, should we let the peri-urban population / areas suffer? Or
- Is there a way in which the spread of urbanization could be used for the best use and advantage of both the populations?
- Why all hitherto policy options have failed in this regard? What are the suggested policy measures that would not only contribute to resolving urban and peri-urban conflicts but also would contribute to improving livelihood and environmental conditions in peri-urban villages?
- For a long time social science or hydrology related research were focusing more either on urban or rural issues. Peri-urban problems have become a subject matter for discussion only during the last couple decades. That urban and Peri-urban conflicts have surfaced as a major issue, which policy makers no longer can ignore, is clear from the fact many urban expansion plans have been stalled due to stiff resistance shown by peri-urban farmers¹¹. Hitherto all approaches to solve urban problems and stress have failed because rural, peri-urban or urban issues were treated isolation. Instead, there is an urgent need to view urban, peri-urban and rural segments of a region as a part of the single but integrated livelihood and eco-system. In other words, all three segments are very much a part of an integrated socio-economic developmental process of an economy. D.L. Iaquina and A.W. Drescher have expressed similar views: *Rural, peri-urban and urban form a linked system (R-PU-U), which constitutes an uneven multidimensional continuum.*¹² A fragmented approach would only bring about rural-urban and peri-urban – urban divide, besides contributing to destruction of ecology, environment and livelihood options in the rural and peri-urban areas.
- Following are some of the lessons learnt that need urgent policy interventions;
- Horizontal urban expansion encroaches upon natural resources, in particular land and water, enjoyed hitherto by rural and peri-urban communities. As a consequence, severe competition and conflicts spur up between urban and peri-urban areas. While Municipal corporations, Housing Boards and State Metro water agencies collectively negotiate claims over land and water rights on behalf urban areas, the peri-urban areas are represented individually and often are subject to threats. These kinds of negotiations are often one-sided because of unequal bargaining power enjoyed by these agencies. This is precisely the context in which a collective - multi-stakeholders' dialogue approach and a participatory planning process would be useful for a better negotiated democratic settlement.
- Though urban interests are deeply committed to make the most of the available land and water resources of rural and peri-urban areas hardly are these state agencies pay attention to document or analyze patterns and intensities of vulnerabilities and its long-term implications

¹¹ Two important projects of the Government of Tamilnadu could be sited as examples in this regard: First was the project which entailed shifting of the entire State secretariat to peri-urban villages at a distance of 40 KM in about 2000 acres. The second, was the construction of a satellite town at a distance of 50 KM from Chennai in an area of over 4000 acres. Both projects although were announced in the State Legislative Assembly had to be given up due to stiff opposition from peri-urban population.

¹² D.L. Iaquina and A.W. Drescher, 'Defining the peri-urban: rural-urban linkages and institutional connections' (by) (<http://www.fao.org>)

- Peri-urban population depends upon land for livelihood, commons for fuel wood and water for agriculture, animals rearing and for drinking; Therefore, entire livelihood options are affected due to transport of water to urban areas. These areas are in a state of decay, in particular for those, who depend upon agriculture for their livelihoods. This section is the majority. On the other hand, for those who benefit due to 'spillover effects of urban development' (e.g., enhanced land value due to locational advantage or due to water selling) is a minority. However, what is important is to examine, how the majority, whose livelihoods are affected cope with spillover effects. How sustainable the continuing and round the clock groundwater transport from peri-urban areas of Chennai? Are there any institutional mechanisms existing to cope with peri-urban issues relating to natural resource management? Role and functions of Panchayat bodies – Are they aware and what concrete actions have they taken so far to deal with the urban entry?
- The State institutions do not take any coordinated actions to preserve the local natural resources; instead they pull in different and opposite directions – due to 'fractured institutional set up'. There are no legal mechanism to protect livelihoods and ecology of peri-urban areas.
- This was the context in which the multi-stakeholders' dialogue in the peri-urban areas of Chennai was organized.
- In the MSD Committee meetings several measures were discussed with a view to providing solutions to Chennai city as well as to the peri-urban areas.
- Further, the MSD meetings have created a stir in Chennai with media reporting about the MSD processes extensively.
- Most importantly, the MSD initiative has an agenda of social learning as well as negotiation process for win-win settlement. This is opposed to centralized decision-making, which often fails. But the key question is how far can a researcher sustain the MSD process? NGOs need to be trained in conflict resolution. Stakeholder participation and ensuring their participation in MSD is a gradual process through research and stakeholder analysis.

REFERENCES

The Times of India, 8 August 2006.

FAO. 2002. Defining the peri-urban: rural-urban linkages and institutional connections. www.fao.org/docrep/003/X8050T/x8050t02.htm (accessed 7 September 2008)

The Hindu, 7 July 2000.

S. Janakarajan and Marcus Moench. 2002. Are wells a potential threat to farmers' wellbeing? The case of deteriorating groundwater irrigation in Tamilnadu, Working Paper No.174. Boulder, USA: Institute for Social Economic Transition.

www.digantik.com/IPs/Digantik/aishwarya/bottle-business.htm

R Srinivasan.2005. Stealing farmers' Water to Quench Chennai's Big Thirst. <http://infochangeindia.org/200510115605/Agenda/The-Politics-Of-Water/Stealing-farmers-water-to-quench-Chennai-s-big-thirst.html> (accessed on 5 September 2008)

Janakarajan, S. 2005. Dying agriculture, weakening environment and fading institutions: Declining livelihood options and capacity to adaptation for livelihood resilience in peri-urban villages of Chennai. *draft*

Geeta Lakshmi and Janakarajan.2005a. Solid waste management in Chennai. *draft*.

Geeta Lakshmi and Janakarajan.2005b, Problems of biomedical waste management in Chennai, *draft*.

Janakarajan, S, Charles Bachelor, Patrick Moriarty, Jothi G and Prabhakar G. 2005. *draft*

Box I Water market in the Chennai city

Tamil Nadu accounts for 50 per cent of the total mineral water business in India. And there are more than 400 registered units in this state out of which over 220 are located in and around Chennai. The water selling figures quoted by the South India packaged Drinking Water manufacturers Association is quite stunning:

Type of packaging	Price per unit	No of units sold per day	Total amount transacted (Rs)
250 ml polythene sachet	Rs.1	5 million	5.0 million
One liter bottle	Rs10 to 12	75,000	0.75 to 0.9 million
12 liter cans	Rs 20 to Rs. 30	100,000	2.0 to 3.0 million
25 liter bubble top containers	Rs.25 to Rs.40	25,000	0.625 to 1.0 million
Water tankers* carrying 10,000 to 12,000 liters	Rs.600 to Rs.1000	10,000	Rs 6.0 to 10.0 million

*The price variation is due to factors such as water quality, distance from where transported and the season (summer or monsoon months).

How does it translate into money transaction per day?

- Rs.14.3 million to 19.9 million / day (US \$ 0.3 to 0.4 million)
- Rs.429 million to 597 million / month (US\$ 9.5 to 13.3 million)
- Rs.5.15 billion to 7.16 billion / year (110.4 to 159.1 million)
- 5,15,000 to 7,16,000 tons of rice per year

With this money 2.82 million to 3.92 million people can have rice at the rate of 500 grams per capita per day for the whole year - at the rate of Rs.10 per kilogram of rice

Box 2 Chennai groundwater laws

There have been serious legal attempts to regulate Chennai water supply and wastewater management. The first prominent act to exclusively attend to the needs of the Chennai city's water problems was called Chennai Metropolitan Water Supply and Sewerage Act, 1978. The three main objectives of this Act were,

- Promoting and securing the planned development of water supply and sewerage service,
- Efficient operation, maintenance and regulation of the water supply and sewerage systems in Chennai Metropolitan Area and
- Preparing the immediate and long term measures to meet the future demands of water supply and sewerage services in the Chennai Metropolitan Area.

Unfortunately, even after 25 years of promulgation of this Act, the Chennai's water problems seemingly have reached serious proportions. In order to fill the growing gap between supply and demand, the Board resorted to tapping groundwater that is available from the peri-urban villages of the Chennai city. So greedy that the Chennai Metro Water Board was that with a view to protecting water supply to the Chennai city, an Act called Chennai Metropolitan Area Ground Water (Regulation) Act was enacted in 1987, prohibiting groundwater extraction in 229 notified villages around the Chennai city for any purpose other than domestic. Since then, the Act was amended twice to increase the notified villages to 243 and then to 302. Even though the main purpose of this Act was to control groundwater extraction and illegal transportation of water from these areas into the city, the main purpose of this Act is apparently grossly violated not only private individuals but by the government itself. Metro Water Board is very much a party to the over exploitation of ground water in these notified villages contributing to serious threat to livelihoods. Furthermore, in many villages groundwater quality has turned brackish or even saline due to seawater intrusion. Thousands of truck operators are still involved in commercial transaction in water in these villages. Worst of all, in some of these notified villages water companies have been established: Example: Mathur, a notified village in the Act, there are at least two water companies – Polo and Acqua – which pump raw water, purify and sell. Another Act called The Tamil Nadu Groundwater (Development and Management) Act, 2003, which has received the assent of the President, has been enacted with a view to protecting groundwater from hazards of over exploitation and to ensure its planned development and proper Management. But would all these Acts make any difference to the water problems of the

Chennai city and its peri-urban villages? Would these Acts be an answer or add fuel to the growing conflicts between urban and peri-urban areas?