



**Water Security in
Peri-Urban South Asia**

Adapting to Climate Change & Urbanization

**WATER SECURITY IN PERI-URBAN SOUTH ASIA
ADAPTING TO CLIMATE CHANGE AND URBANIZATION**

Scoping Study Report: Hyderabad

Ms. Sreoshi Singh



Working primarily on water security issues in Peri-Urban South Asia, across India, Bangladesh and Nepal, the project's main concerns are the rapidly changing peri-urban landscapes due to urbanisation and implications for water security in specific locations in the larger context of climate change. As an action research project, working across four locations in South Asia, it will serve as a basis for capacity-building at the grass roots level to address concerns of the poor, marginalised and other vulnerable communities to water security and seek to understand the dynamics of adaptation in the specific locations, for action and policy agenda at the regional level. It will build their capacities to cope with climate change induced water in-security.

The project is being coordinated by SaciWATERS, Hyderabad, India and executed in association with Bangladesh University of Engineering and Technology (BUET), Dhaka in Bangladesh and Nepal Engineering College (nec), Kathmandu in Nepal. This project is supported by Canada's International Development Research Centre (IDRC).

A scoping study was carried out for a period of six months from August 2010 – January 2011. It was an exploratory phase that investigated the key peri-urban and climate-change related issues in the research sites. The process of changing peri-urban landscape and its impact on water security and vulnerability was probed by literature review, field visits, discussions with various stakeholders, and use of other qualitative techniques. Specific sites were identified in Kathmandu (Nepal), Gurgaon, Hyderabad (India), and Khulna (Bangladesh) where the research would be carried out.

Four scoping study reports consolidate the outcome of this study. This is the Hyderabad Scoping Study Report.

Hyderabad Project

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December 2010
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1. Introduction

Description of Research Problem

Hyderabad is a part of the Rangareddy district of Andhra Pradesh. With a population of 5.53 million as per the 2001 census, Hyderabad is currently ranked as the sixth largest urban agglomeration in the country. Since the Structural Adjustment programme has come into force, the city has undergone tremendous changes. The population has grown manifold with large multinational corporations moving into the city and starting their operations followed by large-scale migration from other cities and rural areas for better economic opportunities. This has led to the city growing much beyond its boundaries owing to the increasing demand for space. The real estate sector has also gained much significance in the city. Some of the villages located along the fringe areas of the city of Hyderabad and Secunderabad are now appearing within the official map. The process is still ongoing and many of the changes are visible along the outer limits of the municipal corporation. However, this sudden growth has spelt much trouble in terms of basic resources, primarily water. The city which once received much of its water from few specific sources now depends on several sources to meet its water demands and still several areas remain dry even today for many days, especially in summers. Lack of proper management and strict regulations have led to degradation of several lakes in and around the city which once also served as surface storages of water used by local people. All these problems are slowly increasing the water insecurity for the people living at the peri-urban zones, whose life and livelihoods are torn apart not only by the expanding city eating into agricultural lands and destroying their livelihoods but also their basic access to water for daily chores. Newly growing enclaves around them either take over the water bodies within their boundaries or cover them up completely for building purposes. They often use the water from these lakes for recreational purposes which once belonged to the village around it. Lack of empowerment has prevented them from protesting against lopsided urban development. These issues coupled with the possible impact of climate change are likely to have a disastrous effect on the people, making them more vulnerable. Hence there is a need to understand the specific impact of urbanisation and what could be the challenges for the future and what can be done to adapt to these challenges. In this context, some research questions that have been framed for the study are:

1. What are the characteristics, typologies and dynamics of a peri urban zone in urban literature and how can these be contextualized in the case of Hyderabad?
2. What role has been played by HMDA in providing basic services in the peri urban zone and what implications do the development projects around Hyderabad have on their functioning?
3. What is the source of water across the peri-urban zone of Hyderabad?
4. How does the pattern of demand for water vary across the households in the peri urban zone?
5. What is the impact of the development process for quantity and quality of available water?
6. How does the changing availability of water affect livelihoods and domestic consumption?
7. Have there been any conflicts arising out of multiple users and uses?
8. What initiatives have been taken towards sustainable use of water by communities/different groups using water to handle possible conflicts?

Based on the above research questions, a set of sub research questions were devised (annexure 1).

Methodology of Scoping Study

Based on the above research questions, the study followed a specific methodology which has been broadly described below.

Firstly, an attempt was made to highlight on literature about urban growth and its impact on peripheral zones of large cities, better known as peri-urban. The review tried to examine how the process of urbanisation changes the physical, social and economic landscape of peri-urban zones, and with special emphasis on understanding access to natural resources. This also calls for understanding the governance structure of peri-urban areas, specifically because they are neither rural nor urban when it comes to access to basic amenities. Coupled with this crisis, the study has reviewed information and literature specific to climate change impact on cities and its implications on peri-urban areas. Specific reports and case studies of Hyderabad have also been reviewed as part of the exercise.

Secondly, these villages were visited initially to understand the issues of water as they exist on the ground and analysing in-depth about the water security and vulnerability issues that emerged from talking to local people as well as local administration. The discussions that were held with the community in each of these villages were based on the sub research questions. (Annexure I). Primary survey was undertaken in July, September and November, 2010. The purpose of field visits in three phases was to understand the scenarios pre and post monsoon especially to understand the level of stress on water resources.

Thirdly, based on these questions, analysis of concepts of water security, vulnerability, coping and adaptation for peri-urban areas have been qualified further in order to finalise the villages to be taken up in the final study based on the strength of the issues identified.

Apart from primary level survey, a discussion was undertaken with two large real estate developers, who are operating in these specific locations as well as the Hyderabad Metropolitan Water and Sewerage Board (HMWSSB) who are the sole in-charge of supplying water to the city of Hyderabad and some of its peri-urban areas. A discussion was also held with a member of an activist group in Hyderabad which operates through a network meant for better quality of life for all citizens.

This study was restricted to studying areas outside the municipal boundaries, but keeping within the Hyderabad Metropolitan Development Authority boundaries in the Rangareddy district, which is the most developed district of Andhra Pradesh. A mandal-wise list of villages within HMDA were available from HMDA as online resource, which was used as a base to start the process of selection of villages.

Review of literature

Development activities in the fringe areas of cities results in increasing mobility of production factors such as capital, labour, technology and information to the urban fringe near mega cities. This tends to make intensive demands on the environmental resources and poses problems by eating into valuable natural habitats like wetlands and core forest areas, and causes loss and damage to prime farmlands resulting in the increase of impervious surface. (OECD, 1990, Hasse and Lathrop,

2003). A study of peri urban dynamics by Narain and Nischal (2007) has found urban entrepreneurs taking a lead role as stakeholders and defining their rights over common properties like village ponds and lands, originally being managed by the villagers through collective contributions and later being sold annually by the gram panchayat because of poor maintenance.

Five classes of institutional arrangements have been identified as arising within the complex continuum from rural to urban and falling within the range of phenomena that scholars and practitioners have identified as peri-urban and which connect to a specific peri-urban type:

- village PU: network-induced (sojourning, circulation, migration);
- diffuse PU: amalgamated (diffuse migration);
- chain PU: reconstituted (chain migration);
- in-place PU: traditional (in situ urbanization);
- absorbed PU: residual (traditionalism with succession/displacement). Iaquineta and A.W. Drescher

This report attempts to identify the criticalities of increasing urbanisation on water security in peri urban areas of Hyderabad, which has largely remained as a historical city from the 15th century till 1947 when it was declared as part of Andhra Pradesh, a state within the Indian Union. In mid 1990s, when the Structural adjustment Programme was introduced by the Government of India, characterized advanced telecommunications and information processing and technologies, Hyderabad along with many other metropolitan cities became a node in the global web of economic flows and linkages and inturn made Ranga Reddy district, the most developed district of the state. This report reveals the results of a scoping study to identify the peri-urban areas of the city based on selected criteria and understand the dynamics of growth in these transition zones and the impact of urbanisation on specific selected locations and its implications for availability of and accessibility to water resources. The issues emanating from preliminary discussions with local people and other concerned agencies and contextualising the information with regard to water security and vulnerability has been the key concerns addressed in this report.

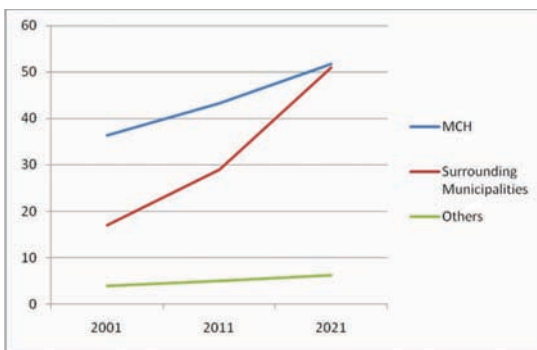
The Hyderabad Urban Agglomeration (HUA) consists of the Municipal Corporation of Hyderabad (MCH), 12-peripheral municipalities, Secunderabad Cantonment, Osmania

	1981-1991	1991-2001
MCH	45.24	19.02
Surrounding Municipalities	160.53	71.72
Others	39.13	25.00

Table 1 Percentage Growth Rate of Population in the components within HUA
Source: Calculation from data in GHMC Hyderabad City Development Plan, undated.

University and other areas. In recent times, the 12 surrounding municipalities have been assimilated and the Greater Hyderabad Municipal Corporation has been formed. The growth rate of population in these three components within the Hyderabad Urban Agglomeration is shown in the table below:

A future projection of population for the HUA is shown in the following graph. This graph reveals an interesting trend, whereby the population of the surrounding municipalities will grow very rapidly and is expected to touch the population of the main corporation, which indicated that growth and development has been happening and will continue to happen in the surrounding areas of the main city. These areas have become nodes of development in recent years and real estate sector has been boomed largely in these areas. If the level of urbanisation between these three components of the agglomeration is compared, the graph below would reveal some interesting figures.



Graph 1. Projected Population figures (in lakhs) for components of Hyderabad Urban Agglomeration (2001-2021)
Source: Calculation from data in GHMC Hyderabad City Development Plan, undated

The table below shows that the level of urbanisation has been decreasing from 1981-1991-2001, in the municipal corporation area of Hyderabad and the other areas. But, the surrounding municipalities show increasing levels of urbanisation during the same period. Another figure points to the density of population in the HUA along with surrounding districts, with Rangereddy (1 as marked in the figure 1) registering maximum density of population followed by other districts of Nalgonda (3 as marked in the figure 1), Medak (4) and Mehbubnagar(5). The darkest section indicates highest density shown in the centre of the figure as HUA.

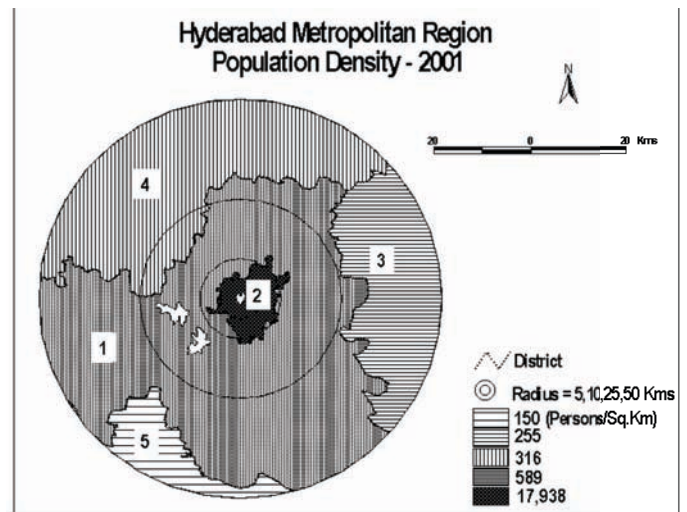


Figure 1. Source: Sreenivas and Grace, undated.

	1981	1991	2001
MCH	77.49	69.95	63.35
Surrounding Municipalities	14.02	22.71	29.67
Others	8.49	7.34	6.98

Table 1 Percentage Growth Rate of Population in the components within HUA
Source: Calculation from data in GHMC Hyderabad City Development Plan, undated.

Hyderabad is a city where globalization has penetrated into the urban system, with the new IT hubs located in the periphery of the city. Over and above, the city has experienced capital growth in high-technology manufacturing; financial and business related activities, etc. In 1996, the HITEC City project was inaugurated by the Government and towards the end of 1998, with 64 hectares of land (by the AP Government), 90% of the capital (Larsen & Toubro limited) and a joint venture with AP Industrial Infrastructure Corporation, the HITEC City was set up in the peri urban zone. Since then the landscape of Hyderabad has changed drastically. Urban analysts of 'information technology' from a variety of theoretical perspectives in a collection of articles (Brotchie et. al. 1987) have repeatedly talked about a shift to a new type of knowledge economy, in which intellectual capital is rapidly replaced by other forms of capital in the generation of wealth and that metropolitan regions are the new seats of knowledge where high-tech workers want to live and is fundamental to the geography of the 'New Economy'.

Within a decade after the first stone was laid, Madhapur village where HITEC City is now located, was in spatial continuity with Jubilee Hills, a posh suburb of Hyderabad with 17 villages and 51.70 sq km of area. (The Hindu Wednesday, October 10, 2001, Madhapur as part of the CDA has been a target for capital intensive, large-scale real estate projects undertaken within the Cyberabad Development Authority. Provisions have been made for encouraging Group Development, Gated Development and housing development like Row type, Enclaves, Group Housing/Group visa-versa traditional plotted development (Hyderabad Urban Development Authority). Another development corridor is the Hyderabad Airport Development Authority (HADA), which emerged with a view to promoting and securing planned development of the areas in and around the new International Airport at Shamshabad, the State government declared the area as a special development area under the aegis of the Andhra Pradesh Urban Areas (Development) Act, 1975. The jurisdiction of HADA covers 70 revenue villages and 19 hamlets all falling in Ranga Reddy district, with a total population of 1,54,646 (Census, 2001 cited in Report on

the Draft Master Plan for the HADA, 2003) largely engaged in agriculture and agro-based industries and other non-farm activities. The development of business/technology parks, special economic zones, planned residential colonies in this zone provides a different example of private-public partnerships, seeking to attract foreign investors into Hyderabad.

The Hyderabad Metropolitan Development Authority (HMDA) was formed in the year 2008, with an area of 7,100 sq km under its purview by the merging of the following erstwhile entities: Hyderabad Urban Development Authority (HUDA), Hyderabad Airport Development Authority (HADA), Cyberabad Development Authority (CDA) and Buddha Poornima Project Authority (BPPA).

Source of Water Supply for Hyderabad and its surrounding areas

From 1995 the Hyderabad Metropolitan Water Supply Sewerage Board (HMWSSB) resolved to take over the maintenance of water supply system of 9 municipalities adjoining Hyderabad. Accordingly, the Government of Andhra Pradesh directed the municipalities in March 1996 to hand over the water supply and sewerage operations to HMWSSB. The HMWSSB's activity in maintenance of water supply and sewerage system since its constitution in 1989 was confined to the Municipal Corporation of Hyderabad (MCH) covering an area of 172.6 sq. km.

So far water supply of only 3 municipalities - L.B.Nagar, Kukatpally and Outbullapur have been taken over by the board. At present, water is being supplied to Hyderabad city from four sources:

1. Osman Sagar on Musi river
2. Himayat Sagar on Esi river
3. Manjira Barrage on Manjira¹ river
4. Singur Dam on Manjira river

To cope with the increasing demand, the Government has undertaken a project worth Rs 809.62 crore with Maytas, Larsen and Toubro and Kirloskar Brothers for drawing water from the Godavari in Kondapak and Ghanpur along

¹Manjira is a tributary of the Godavari river and flows through the states of Maharashtra, Karnataka and Andhra Pradesh. Nizam Sagar was constructed across the Manjira River between Achampeta and Banjapalle villages of the Nizamabad district in Andhra Pradesh, India. Singur Reservoir on Manjira River in Medak District is a sustained drinking water source for Medak and Nizamabad districts of Hyderabad as well as the adjoining twin cities of Hyderabad and Secunderabad.

Karimnagar road near Hyderabad. The work entails transmission of 735 million litres per day of treated Godavari water from the reservoir. (DNA, 2008). For this purpose 140 acres of forest land from Rangareddy district is required for the proposed project. So far, there is no clearance from the forest department. Apart from forest areas, land acquisition in Karimnagar, Medak and Rangareddy is in progress, as reported by HMWS&SB director (projects) M Satyanarayana. He stated "If all goes well, residents of six surrounding municipal circles and two posh areas in the GHMC core area would get drinking water" (The Times of India, Oct 21, 2010) .

Water security for peri-urban areas in Hyderabad: Impact of urbanisation and Climate change

The development process in Hyderabad however has proved to be quite unsustainable and has turned out to be a serious threat to the city and its environs. The development has specially affected basic amenities especially water supply for the increasing population in the newly developing areas. Hyderabad being located in an area with hard-rock aquifer has very limited percolation while water drawn from the aquifer far exceeds the amount that is actually recharged. The groundwater depth during the dry season and during the monsoons when correlated to rainfall over the last 10 years can reveal the gravity of the problem (Massuel, et.al. undated). There has been progressive decline in the per cent of rainfall converted into inflows due to increased usage of surface and groundwater in the catchment areas surrounding Hyderabad. Historical data shows that there were 932 tanks in 1973 in and around Hyderabad which came down to 834 in 1996. Consequently the area under water bodies got reduced from 118 to 110 sq.km. About 18 water bodies of over 10 hectare size and 80 tanks of below 10-hectare size were lost during that period in the HUDA area. Besides the large water bodies, numerous small water bodies in the peri urban zones also shrunk, when the city underwent a wave of real estate growth (Ramachandraiah and Prasad 2008).

The area around the Rajiv Gandhi International Airport is a semi-arid zone, dotted with numerous lakes and kuntas.² There are 140 lakes and kuntas in this area, one of the largest being Himayatsagar on the northwest. One of the largest manmade is the Himayatsagar in the northwest, whose catchment lies in an area, where recent developments have started in full swing (Report on the Draft Master Plan for the erstwhile HADA, 2003). 70 per cent of this lake has already shrunk due to drying up of the smaller lakes in the surrounding areas accentuated by low rainfall and low groundwater recharge along with construction of the International Airport (Ramachandraiah and Prasad, 2004). The area also has good fertile agricultural lands, especially at Ravirala, Kongara, Chowdarypalli, Narkhoda, Adibhatla, Dosawada etc. (Report on the Draft Master Plan for the erstwhile HADA, 2003).

A survey done in Hyderabad in 2003, revealed the plight of low income households in accessing water supplied either once in alternate days for a few hours or once in three or four days (Kennedy and Ramachandraiah, 2006 cited in Ramachandraiah and Prasad, 2008). This is in sharp contrast to the large quantity of water supplied to the IT companies and other institutions like the Indian School of Business (ISB) and the National Academy of Construction (NAC). The drinking water is supplied by tankers (which make about 5 trips a day) by the local municipality. The plan to lay pipelines so that domestic connections can be given to those who have the ability to pay clearly points to the concept of 'users pay', which brings in the inequality and water equity issues.

A report by the Groundwater Board shows that in the Ranga Reddy district, "22 mandals out of 37, utilize more than 70% of the available ground water resource. Based on the stage of ground water development 15 mandals are categorized as safe (less 70% of available resource), 8 semi critical (70-90%) to critical (90-100%) and 12 over exploited (more than 100%). The maximum stage development of groundwater is 187% is in Shamirpet mandal, which falls within the peri urban areas of Hyderabad. Shamshabad and Maheswaram mandals, also

²Kunta is local term in telugu when referred to a small lake.

falling within the peri-urban area have been categorised as 'over exploited' (CGWB, Government of India, Southern Region, 2007: 22,23).

An Indo-German Project has associated itself with the city of Hyderabad with respect to issues of Climate change, water and transport. In their preliminary investigation, they observed that with Hyderabad's population expected to grow to 10.5 million inhabitants by 2015 and driven by consumption and lifestyle changes, per capita greenhouse gas emissions are constantly increasing. The use of traditional biomass for fuel (e.g., firewood) is high in peri-urban areas; at the same time, modernisation and urbanisation processes have led to a growth of commercial energy and indirect energy uses. The city has seen severe floods in 2002, strong heat waves in 2003 and three drought years between 2000 and 2007 in the city cores. Its surrounding regions have undergone serious damage especially to human life, property and economic advancement. (German Information Centre, 2009). The year 2010 has also seen too much and untimely rain even in winters, which was earlier not experienced in Hyderabad. The winter rains would take place for 10-15 days across the months of November and December in 2010, there has been 10 days of rains in November itself and it has been unusually humid (TOI, November 19, 2010).

The Andhra Pradesh State Water policy which came into existence in 2008 has several objectives in mind.

- Improving the productivity of the State's water resources to achieve economic, social, and environmental objectives through an outcome orientated approach for institutional and investment activities.
- Ensuring water security to the State's population to maximize the benefits to various users of water while minimizing vulnerability to droughts, floods, and pollution.
- Promoting sustainable use of groundwater.
- Conserving and protecting water bodies and wetlands, through regulation and enforcement of standards for water infrastructure, usage and waste disposal.
- Regulating the use of the land around water bodies.
- Enforcing the recycling of industrial effluents and wastewater for secondary uses (Andhra Pradesh State Water Policy, 2008)
- Regarding pricing of water, HMWSSB would try to bring about a tariff system where users would be charged

differently according to the scale of use. (Water Moves, 2008)

Despite some arguments about the need for 24x7 water supply, it has been countered by arguments, which call for 4 hours of daily uninterrupted supply, which is considered sufficient for any household. Moreover, this also leads to wastage of 20% of the water. If 24x7 supply actually takes place, further wastage is expected. What is needed is equitable distribution of water to all areas and sectors (ibid) must be one of the priorities in the policy documents.

Also agricultural practices in most peri urban villages are completely dependent on groundwater and as per current regulation like the Andhra Pradesh Land Water and Trees Act coupled with free electricity policy of the government, there is accelerated privatization of groundwater in the state as a whole (Ramachandrula, undated). Therefore policy intervention for equity and well as groundwater regulation especially for peri-urban zones must be taken up as priority.

In recent times there has been much hue and cry about the city of Hyderabad losing its water bodies either due to pollution or encroachment. Activists groups have developed a network involving experts from the sector called Save our Urban Lakes (SOUL). An informal discussion with one of the founding members, Dr. Jasveen Jairath revealed the grave situation that Hyderabad is in and why the government is not showing any kind of proactiveness with regard to the situation. She clearly highlighted the level of corruption which gives a stronghold to land developers to flout all building regulations. Also in Hyderabad, there is no planning done before a project starts, it begins later, which not only disrupts all the basic amenities but has detrimental impact on local communities. She strongly spoke in favour of the need to question the government policies regarding urban development policies and challenge them and that can only be done by further understanding and research coupled with pro active involvement of activist groups and networks. Her network has already communicated with local people around some of the lakes within the city that are under severe threat and have identified issues which need immediate attention of the policy makers.

Box 1. Activist viewpoint on the issue
Source: Personal interview with Dr. Jasveen Jairath on 26.11.2010

Analysis

The scoping study survey as mentioned earlier was undertaken beyond the Greater Hyderabad Municipal Corporation (GHMC) borders, but was restricted to revenue villages within the Hyderabad Metropolitan Development Authority (HMDA). At the initial stages in order to select the specific mandals for the study, secondary data from census was collected and analysed to understand the level of urbanisation and growth of urban population in the Hyderabad Urban Agglomeration (HUA) along with the surrounding mandals of the Rangareddy district.

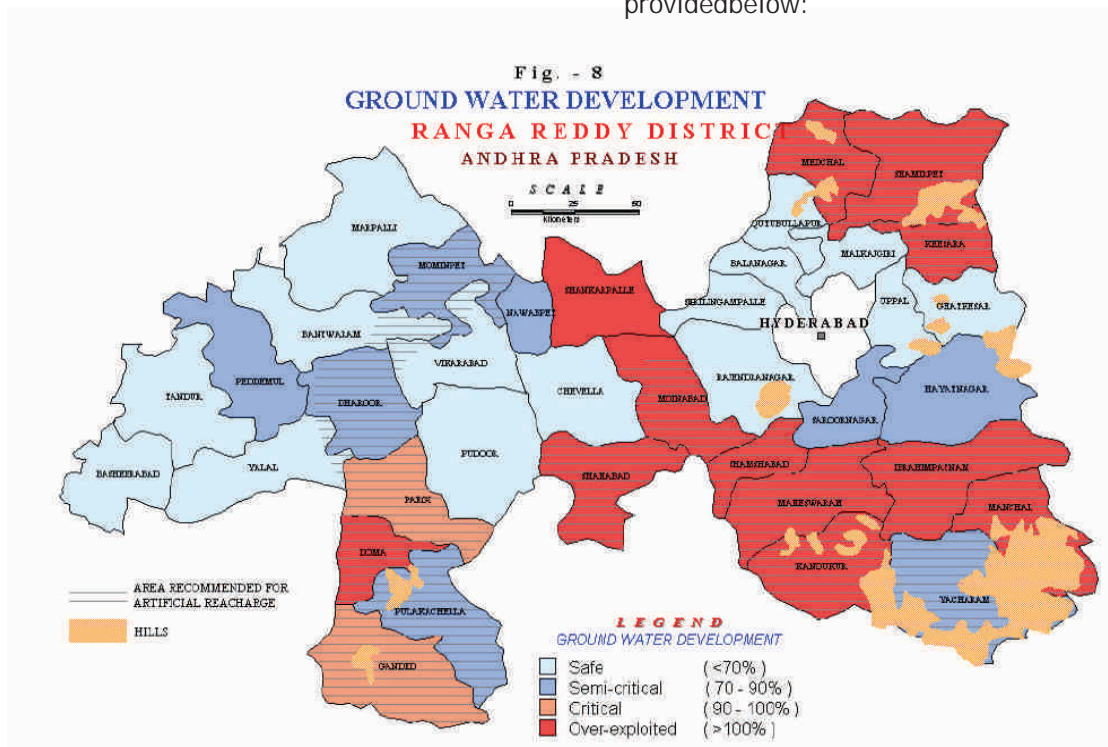
•Based on the analysis, four mandals were selected. Another basis for selection was groundwater status and real estate growth that had taken place in specific mandals. The Mandals selected were adjacent to Hyderabad and are listed below :

- Shamirpet located towards the north-east (over-exploited groundwater category)
- Qutubullahpur towards north-west, (safe groundwater category)
- Rajendranagar towards south east and south (safe groundwater category)
- Maheswaram towards the south-east (over-exploited groundwater category)

These mandals are shown in the map below. Qutubullahpur and Rajendranagar mandals as per the report by the CBGA, 2007 have been marked as safe zones. However, these mandals were selected because they had undergone maximum urban growth between 1991 and 2001 and assumed to have grown even more over the last 10 years following the economic boom. With this situation at hand, it was important to find out whether these two mandals could actually be categorised as safe, which would only be revealed after visiting the sites, where residential, commercial and industrial growth is maximum.

Villages within these mandals were selected based on their locations around residential and commercial complexes by referring to online information about location of large residential and commercial complexes in these specific mandals along with location of SEZs. These villages were then identified and located on wikimapia in order to understand the terrain from a bird's eye view. Some of these villages are so small that they could not be found on the map, so in such cases only larger villages were selected around a particular development enclave.

A total of 16 villages were initially selected and surveyed based on the sub research questions. A table representing the basic information of each of these villages is provided below:



Source: CGWB, Government of India, Southern Region, 2007

Names of villages visited and distance from Hyderabad	Name of the Mandal	Distance from the city centre	Socio-economic characteristics	Issues/Concerns
Aliabad	Shamirpet	25- 30 kms (approx)	Largely an agricultural village with some households engaged in the manufacturing and service sector in Hyderabad	Water for irrigation, drinking and other purposes is available through borewells. The Shamirpet lake is never full enough to be utilised for irrigation. Crops are largely water consuming like paddy. The channel constructed to bring water from Shamirpet now runs almost dry. Village population for drinking, cleaning and agriculture, SEZs, Commercial and residential complexes and government establishments like Airforce base.
Turkapally	Shamirpet	30 kms (approx)	Village farthest from the city, but well developed. Some agricultural land is left, but most people have started working in the city or are engaged in menial jobs in the SEZ located nearby.	Special Economic Zone (SEZ) ³ gets 24x7 water while no manjira connection in the village, which depends on groundwater for drinking which has high fluoride content.
Thumkunta	Shamirpet	15 kms (approx)	Relatively a very developed village located adjacent to the main road. Agriculture has almost ceased to exist and real estate development is visible with small apartment and individual houses spread around various parts of the village. Everyone is engaged in local business or are working in factories nearby or commuting to the city.	Receives manjira water for drinking and no further strong water related issues
Devara Yamjal	Shamirpet	20 kms (approx)	Tucked inside from the main road where most of the inhabitants are not practising agriculture due to low water table. Are engaged in small businesses in the village or are working in the other villages nearby.	Dependent on water released from Hakimpet, which has an airfoce station and huge quantities of government lands. Flouride pollution has destroyed the network of pipes in certain areas reducing the flow of water tremendously.

³A geographical region that has economic and other laws that is more free-market-oriented than a country's typical or national laws. "Nationwide" laws may be suspended inside a special economic zone. The category 'SEZ' covers a broad range of more specific zone types, including Free Trade Zones (FTZ), Export Processing Zones (EPZ), Free Zones (FZ), Industrial Estates (IE), Free Ports, Urban Enterprise Zones and others. Usually the goal of a structure is to increase foreign direct investment by foreign investors, typically an international business or a multinational corporation (MNC).

Kompally	Qutubullahpur	10-15 kms (approx)	Very large urban village adjacent to the main road. An insignificant number of villagers have agricultural lands left, but mostly not cultivated. Some factories and the service sector in the city are the main employers for the villagers. Largely occupied by migrants.	Domestic high end users but no manjira water. Water for all purposes is available through borewells.
Doolapally	Qutubullahpur		Very limited agriculture being pursued.	Problems in access to labour and fertilizer. Cost of crop production is very high due to high rates for diesel.
Mallampet	Qutubullahpur	30 kms (approx)	Relatively small village with a good proportion of migrants from other districts of Andhra Pradesh. Some households have held onto their agricultural lands but are not cultivating.	Much of the agricultural lands has been acquired for the outer ring road. Illegal water extraction by tankers, only one lake in the vicinity which is a source of water for the entire village, subject to pollution during the monsoons. Manjeera water is brought in tanks from other places and sold in the village.
Bachupally	Qutubullahpur	25 kms	No agriculture. All lands give away for realestate growth. Large number of migrants.	Dependent solely on bottled water for drinking because groundwater is polluted by the nearby factories. No majira connection despite repeated requests.
Manikonda Jagir	Rajendranagar	25-30 kms (approx)	Large village with huge population occupying 22 colonies, large proportion of migrants from other states of India and other districts of AP. All working in the manufacturing and serice sector. No agriculture is being pursued.	Very high end domestic users owing to largescale real estate growth, polluted groundwater for drinking, no manjira connection for villagers while manjira connection for the large residential complexes
Manikonda Jagir	Rajendranagar	25-30 kms (approx)	Very small village with a population that no longer depends on agriculture, because of less water in the Gandipet lake	Does not receive manjira water, but has a connection with the pipeline bringing water from the Gandipet lake to the city of Hyderabad. No conflicting issues.

Gandipet	Rajendranagar	30 kms	Very small village with a population that no longer depends on agriculture, because of less water in the Gandipet lake	Does not receive manjira water, but has a connection with the pipeline bringing water from the Gandipet lake to the city of Hyderabad. No conflicting issues.
Peerancheru	Rajendranagar	30 kms	No agriculturalists. People depend on work in the village/in Hyderabad city	All lands have been plotted for real estate. Large residential complexes are coming up in the village. No regular manjira water supply. Dependent on bottled water. Groundwater polluted severely by a hospital in the vicinity.
Gandhamguda	Rajendranagar	30 kms	Very little agricultural land which is cultivated by few, rest are engaged in manufacturing and service sector in the city.	Groundwater dependent. Some real estate development. No strong water issues.
Neknampur	Rajendranagar	30 kms	Very small village with no agriculture.	No conflicting water issues, depends on Manikonda for supply. Lake adjacent to the village is completely polluted.
Sardarnagar	Maheshwararm	35-40 kms (approx)	No agriculture being pursued. Most people work in the cities and very few in the Hardware Park	Groundwater dependent. No conflicting issues of water
Ravirala and Janaiguda			Latter is a hamlet, which is part of the Ravirala Panchayat. Some families still pursue agriculture though most of the agricultural lands in the village have been acquired for the Hardware Park and the Fab City	Polluted groundwater, forced acquisition of land with no compensation, loss of livelihood, water stress in the future due to the coming up of the Hardware Park and the Fab city. No manjira connection for drinking in the village while pipeline connected to Hardware Park and Fab City for 24x7 water supply from Nagarjunasagar.

⁴To match the hardware needs of the IT Companies in Hyderabad, APIIC has developed Hardware Park in an area of 1200 Acres of land, located at a distance of 14 KM from Hyderabad and adjacent to the International Air port. The Park is adjacent to Hyderabad -Srisaillam Highway near Raviryal village.

⁵India is making Hyderabad, in the state of Andhra Pradesh, a world-class hub for advanced semiconductor and electronics manufacturing stretched over an area of 1050 acres. This dedicated area has become known as Fab City. The development of Fab City is being promoted by the government of Andhra Pradesh (GoAP) which has tasked the Andhra Pradesh Industrial Infrastructure Corporation (APIIC) to oversee progress and establish public-private partnerships with developers. Government of Andhra Pradesh (GoAP) has committed to installing a pipeline, capable of carrying of 75708236 litres of water/day at concessional rates for multiple fabs and other manufacturing in Fab City.

While selecting the villages, some major considerations were identified and have been analysed in this report. They are:

- Category of PU as per literature within which the villages can be classified
- Location within a development zone: Implications for water availability
- Water uses and users and issues emerging therein accounting for water security

Contextualising the Peri-urban categories

If the peri-urban categories have to be contextualised for the 16 villages visited during the scoping study, it is seen that they can be placed within most of the categories stated in literature except chain peri-urban, the characteristics of which cannot be identified among the sites visited.

One village in Maheshwaram mandal (Sardarnagar) can be categorised within village peri-urban because geographically, the location of this village is a little away from the city but socio-psychologically it has been largely influenced by the urbanisation process and agriculture has almost ceased to exist. This village is characterised by out-migration to the city for work.

Three villages in the Shamirpet mandal (Turkapally, Aliabad and Devara Yamjal) one in Outubullahpur mandal (Mallampet), two in Rajendranagar mandal (Gandipet and Neknampur), two in Maheshwaram (Ravirala and Janaiguda) and two in Shamshabad mandal (Peddashahpur and Pedda Golkonda) can be categorised under 'in-place peri-urban' because geographically they are at the fringe of the city, between 35-40 kms from the core areas of the twin cities of Hyderabad and Secunderabad, which has started transforming itself, characterised by 'multiple-source point in-migration', but holds onto its traditional institutions to an extent and where there is an interface with urban formal structures like SEZs, Genome Park, ICICI Knowledge Park, large residential enclaves. The development process has led to growth of residential hubs attracting the population from the city to live here and in turn calls for possible oldtimer-newcomer conflict.

The remaining villages within Outubullahpur mandal (Kompally, Doolapally and Bachupally), Rajendranagar mandal (Manikonda Jagir, Peerancheru and Gandhamguda) can be largely included within the diffuse

peri-urban category. However, Manikonda Jagir to a large extent has already started showing some features of 'absorbed peri-urban'. Most of these areas have undergone natural increase in population because of the development enclaves which have come up over the last 10-15 years like IT parks, financial hubs etc.

Location: Implications for water availability

The peri-urban areas of Hyderabad, no matter which categories they belong to as per the descriptions stated above, are part of the Hyderabad Metropolitan Development Authority. The purpose of selecting villages within this development zone was firstly to identify the role of HMDA for development of basic infrastructure in the villages located within its jurisdiction. Another reason for selecting villages in this zone was because of their location outside the purview of the Municipal Corporation and therefore do not receive water supply from the Water Board and this has specific implication with regard to the primary research questions highlighted earlier. Most of these villages visited during the scoping study are undergoing mammoth changes in land use owing to developmental activities undertaken by the HMDA, APIIC and other related government departments who are in fact developing areas for attracting foreign investment into the city, but are not engaged in micro-level development of the villages. Most of the villages are not even aware that they are part of HMDA. The development projects around many of the villages visited have had detrimental impact on quality and quantity of water.

Water Security

In the context of the above discussions on the impact of the development enclaves for water availability in the peri-urban areas, the water security issue in these peri-urban areas may be analysed deeper. While analysing the issue of water security in peri-urban areas, the most important section that one needs to concentrate is on the users of water and uses to which water is put in the peri-urban zones, which solely determines the security perspective. In the villages of the four mandals where field visits were undertaken, the rationale behind the selection of villages was the variety of water users who exist there.

Shamirpet Mandal

In Shamirpet mandal, the largest users of water were the households for drinking and cleaning purposes, agriculture and newly developing residential and commercial enclaves like Special Economic Zones (SEZs), Genome Park⁶, ICICI Knowledge Park⁷. In Aliabad, farmers reported that they depended on the Shamirpet Lake for irrigation, from where a channel brought water to the village, but owing to insufficient rainfall in the last several years, the lake was never filled enough to support agriculture, resulting in shorter periods of cultivation and mostly for self consumption. Although most of the villagers here still practise agriculture, the water for irrigation is available from groundwater that is drawn

through bores upto 400 ft deep. Water for drinking is also available through bores installed by the panchayat and is stored in tanks which supply water for 6-7 hours daily through pump. The waterman plays a pivotal role in facilitating the process of water supply to all households in the village. To support their daily expenses, many villagers in Aliabad have shifted to working in the nearby factories or the city which is well connected by bus. Water of the lake is a lifeline for the people of this village and the lake is slowly being encroached by developmental activities. The channel string rain water has become defunct and only has a thin film of water sufficient enough for villagers to wash their clothes as seen in the collage of photos below.



The water man plays a vital role in Aliabad, Shamirpet near Hyderabad in facilitating the supply of water from the tank behind him to all households in the village



Engaging with local communities to understand issues of water in Aliabad



Agricultural practises in Aliabad are dependent on borewater and only in some cases water from the Shamirpet lake is available for irrigation, when the lake is full



A woman washing clothes in the waters of a channel in Aliabad village, constructed to hold rainwater and drain excess water into another channel bringing water from the nearby surface storage to the agricultural fields which remains dry during most part of the year

⁶Genome Valley is the first state-of-the-art biotech cluster in India for life science research, training and manufacturing activities. Advantages in Bio-pharma sector in Andhra Pradesh, enable more than hundred biotech companies to flourish in this sector. Spread over 600 sq. kms. around the IKP Knowledge Park, the SP Biotech Park and the ICRISAT Agri-business Incubator, the Genome Valley provides world-class infrastructure facilities to over 100 biotech companies.

⁷Launched by ICICI Bank Ltd. in partnership with the Government of Andhra Pradesh, the Park is committed to facilitating business-driven Research & Development.

In Devara Yamjal, agriculture has ceased to exist and the villagers are largely engaged in the manufacturing and tertiary sectors, and being located away from the main road, there has not been much impact of urbanisation although lands have been sold off for development purposes, largely residential. The problem in this village is however very unique and has implications as far as water security is concerned. The groundwater level in this village is extremely low and limited sources that are available are not sufficient for drinking and other domestic chores. Hence, the village receives water through a pipeline from a neighbouring village called Hakimpet, where the water table is higher and some villagers are engaged in agriculture. However, Hakimpet's land is largely occupied by an airforce base and other newly developing government colonies. Although Hakimpet village is part of Devara Yamjal panchayat, its location is in proximity to Secunderabad and adjacent to the main road. This village is likely to be urbanised further in the years to come, resulting in increased demand for water and with erratic monsoons and lack of management practises in place, the available groundwater in Hakimpet will also be under severe stress. In such situations, Devara yamjal's access to water may also be restricted. Moreover, the pipeline bringing water to Devara yamjal and those distributing water to different parts of the village has also been clogged by salt and fluoride deposits which restrict the smooth flow of water. This water is however filtered through a treatment plant which was set up by the Byrraju Foundation initially, and is now being managed by the panchayat on a meagre payment from the villagers (Rs 1.5 for 12 litres can of water), but this amount is not sufficient and the panchayat has to use its own funds to maintain the structure. The pipeline if replaced will require funds upto 1 crore, which is an impossible amount of money for the panchayat to raise. Even to repair the most troublesome sections, the cost involved would be 15-20 lakhs, which the panchayat cannot afford at the moment. With limited finds and dependency on neighbouring village for its water, Devara yamjal is at threat as far as water security is concerned.

Turkapally and Thumkunta (former farthest from the city and the latter nearest to the city) have very different

scenarios, though both have experienced the impact of urbanisation. Thumkunta (amongst those surveyed) is the only village within the HMDA, which receives Manjira water for drinking. Separate bores have been installed by the panchayat for other purposes. This village is in an advantageous position because it is nearer to the city and therefore receives Manjira supply. The panchayat member spoken to reported that the primary reason for villagers discontinuing agriculture was the depleting groundwater levels. Severe fluctuation in groundwater level has been noticed by the villagers. In summers, the private water tankers) bring water from surrounding villages. Some villagers also sell water from their lands, where the water level is high. Being located on the main road, it experienced rapid growth through real estate development and villagers found it more lucrative to sell their lands and invest the money for small business in the city. This village would never be able to access water from the Shamirpet Lake because of the higher terrain on which it is located, which was another serious cause of lack of water. Turkapally on the other hand has no access to manjira water supply, although the adjacent SEZ, ICICI Knowledge Park and the Genome and Biotechnology Park receive 24x7 manjira supply from the water board. Many villagers work in the SEZ and that is their source of livelihood, since agriculture is on the decline. During summer months, there is a scarcity of drinking water which is then accessed through tankers that bring water from specific locations in the village, where the water table is high. The landowner charges for the water drawn from his bore and the villagers pay for it, though the fluoride levels are quite high and results in health problems for many who cannot afford bottled water. Repeated requests for a manjira connection has been turned down by the government officials who ask the panchayat to pay a high amount of money to get a connection. In case of Turkapally, there is a severe water equity issue, which emerged during the field visit and the economically and socially powerless villagers' lives are at stake.



Research team in communication with villagers in Turkapally, the site for SEZ, Genome Park, Biotechnology Park and ICICI Knowledge Park



Lake in the vicinity of Turkapally. Some fishing is also done in this lake.



Prajay Water Front, a large residential complex in Turkapally along the side of the lake



Genome Park coming up in Turkapally

Outubullahpur Mandal

In this mandal, four villages were visited during the scoping study. The person who spoke to the Hyderabad research team was Mr. B. Satyanarayana, who is the single window Chairman for Kompally, Bahadurpally and Doolapally. Talking about the changing practises of livelihood in these three villages, he mentioned that these three villages are facing severe crisis of fertilizer. The cost of bringing fertilizer from faraway places tends to increase the cost of production whereby output is costlier.

“Local markets sell products at lower prices. Why should a farmer engage in agriculture? Most of them are now moving into non-agricultural sector and working in Secunderabad, which pays them well enough for their personal luxuries”, said the single window Chairman. Secunderabad can be reached within 30 minutes by the State Transport buses.

Another reason for people to sell their lands for real estate development as reported by the Chairman is the problem of labour.

With the NREGA coming into place, labourers are few and those who are willing to work ask for very high rates upto Rs 250/- per day for work from 10 in the morning to 5 in the evening along with food. This becomes very expensive for a landowner wanting to continue with agriculture as means of livelihood. Moreover, labourers are not willing to relocate either. The cost of diesel has been rising making it difficult to irrigate the land. A few landowners who still wish to continue agriculture have sold their lands and bought new lands near Dindigul and are cultivating there. Water per se is not a crisis in these villages and right now despite real estate development in the vicinity; the villagers are not threatened because most of them are not occupied. The reason is said to be inertia and scepticism within the people to invest in property in Hyderabad owing to the recent demand for a separate Telengana state, which has led to reduced land prices. Most of the bores used for agriculture are upto 600 feet deep and water for drinking is available through manjira water supply every 2-3 days for 2 hours. Villagers store their water before the next supply. Since this village was visited during the monsoons, this village reported that 2010 has been a year of very good rains and the surrounding lakes have been filled upto the brim only after 12 years.

Bachupally village, also part of the Outubullapur mandal is located on the other side of Hyderabad in an area where real estate growth has taken place in full swing. It is just 6 kms from the nearest locality of Kukatpally which falls within the jurisdiction of the municipality. The nearest village is Nizampet which has been influenced by increasing urbanisation and has completely given way to high rise buildings and large residential complexes and there is a very high demand for water, which is fulfilled either through the borewells or through tankers which bring water from the surrounding villages, 5-10 kms away. Despite being within the Hyderabad Metropolitan Development Authority, this village does not have a source of clean drinking water and is dependent on the bottled water or water delivered through tankers. Most of the agricultural lands in the village have been sold, because agriculture could not be pursued due to water pollution, which has proved to be dangerous for drinking as well. Even today, some local people who cannot afford bottled water are forced to drink the water that is polluted by the chemical factories.

The gram panchayat, sarpanch, an old woman named Kamsaiyah, seemed completely frustrated with her attempts to bring manjira water to the village. The agitated Kamsaiya said, "get me manjira water and then come and talk to me". She however, mentioned how lands have gone over time and villagers have shifted from agriculture and moved to the tertiary sector. There are about 8 lakes in the vicinity but all of them are polluted. Many villagers who quit agriculture are either working in the chemical factories, or elsewhere in the city. Some of them have bought lands in Sangareddy and are cultivating there. No new factories have come up but the existing ones continue to pollute in a big way. The users of water in this village are factories and households (lower income and higher income groups). Another problem faced by the village is severe water logging problems. Being on a lower ground, it is badly affected after rains, when water tends to collect here causing much havoc. Meetings have been held with officials in recent times with regard to both these issues, and they have been promised manjira water, but nothing has materialised till date. The demand for water in the domestic sector is ever increasing with new residential enclaves mushrooming in all directions, somewhat abruptly. This calls for severe water stress for the village, which comprises low income households who have to survive on polluted water for their daily needs.

Mallampet, 7-8 kms away from Bachupally is one of the villages from where water is brought in tankers during summers and is a very interesting case in point. This is one of the many villages from where the tankers extract water, largely private entrepreneurs. This village was selected after visiting Bachupally, where people mentioned that water is brought from Mallampet. The Sarpanch, Vekatesham indicated that the village has about 500 households, with about 50 acres of agricultural land left but only a small portion of it is actually being cultivated. Some villagers have sold their lands and have bought lands near Narsapur. The primary reason indicated by him for change in the livelihood pattern is the cost of labour in agriculture. "If industry pays Rs 150/day and agriculture pays only Rs 80/day, the labourer prefers to work in the industry", says the sarpanch. The primary source of water in the village comes from 15 bores that have been dug all over the village upto 400 ft deep.

If lakes are full, the water table tends to be high and with 8 hours of electricity, water can be easily pumped and distributed to all the households for their personal uses and there isn't much scarcity. This year the lakes are full because of good rains. The first bore was dug in 1987, which later dried up and due to pollution of the water from the surrounding industries; new bores had to be dug later. Five years back, some more have been dug due to increasing demand for water in several other parts of the village along with new storage facilities and new pipe connections. To maintain this as well as a treatment plant which has been set up, Rs 2 is collected monthly from each household. The village seems to be self-sufficient, but the illegal extraction of water has been a source of worry for the panchayat. For agricultural purposes, there are separate bores installed by villagers. But because of right to water tied to right to land, many of the villagers who have a bores dug in their lands for agriculture are actually selling water to private tanker companies who in turn are selling it to the industries nearby. Each villager makes about 150-200 from each tanker and the tankers visit the village almost 15 times in a day to abstract water. The villagers are finding this more profitable than agriculture itself. Some villagers are also buying manjira water in big tanks from surrounding villages which get the supply and are selling it to the village community at Rs 10-15 (approx)

for 20 litres. Many of the bores located near the lakes, tend to get further polluted especially during the monsoons, when the entire drainage water from the villages flow into these lakes. The water pollution problem started in 1986. When the surrounding villages created a hue and cry over their sources of water becoming unsuitable, several complaints were filed, and the government regulations stopped any further growth of industries. "Only new factories cannot be set up as per the regulation, but the existing ones still operate and discharge their effluents into the lakes", says the Sarpanch. During the construction of the ring road, almost 78 acres of land has been acquired. The construction is underway. However, the impact of builders and real estate developers have not been felt very strongly in the village itself, though lands have been sold to developers and have been plotted for future growth. However, only till 1997, agriculture was the source of income for a large part of the village. And later, since 2002, with real estate boom, households started selling their lands. But there are no large apartment complexes in the vicinity. The water security concerns also emerged very strongly during the field visit to Mallampet, whose water resources are being randomly exploited by illegal tankers, selling water to the industries, who in turn pollute the groundwater, by releasing effluents. This is a vicious cycle which needs further investigation.



Factories near Bachupally, that are responsible for polluting the groundwater which is completely unsuitable for drinking and for agriculture and has affected all the surface sources in the nearby villages, except a few



Private water tankers flourish and operate in Mallampet, near Hyderabad where the surface water is still available for use and farmers too sell water from their borewells, situated near the surface water sources to these entrepreneurs for reselling to the industries and other residential areas devoid of regular drinking water supply from the Water Board, while local people suffer



Manjira water being sold in the Mallampet village near Hyderabad in tankers brought from villages where regular Manjira supply is available from the Water Board.



Outer Ring Road is under construction. Land from the village has been acquired for this purpose

Rajendranagar Mandal

Manikonda is a large urban village which now has 22 colonies. Approaching from Hi-tech city, this is the next largest residential hub of Hyderabad, which falls under the jurisdiction of the panchayat. A little couched inside, Manikonda has grown into an overcrowded area, where construction activities continue unabated. The population is dominated by migrants, original settlers and high level administrators and the other rich classes, who have found this to be the ideal location for their new investment plans. Moreover, Manikonda has been considered as the most sought after locations for real estate development, may be because of its proximity to the cyber hub as well as the new airport. No agricultural land is left in the village and hence no agriculturalists. The village had almost 2000 acres of land which was earlier irrigated through wells. Even the Gandipet lake water was used for dairy and pottery industries in the area. In the last 10-15 years, all these activities have completely disappeared leaving behind concrete structures mushrooming all over, with no regular manjira water supply. This so called 'village' is even today dependent on borewater for all purposes. There are six bores around the village which are upto 700-800 ft deep. During summers, situation worsens to the extent that some families even migrate to other colonies in Hyderabad where their relatives stay. Owing to no strict building laws, none of the new buildings including old ones have any rainwater harvesting systems in place.

After several complaints and requests for manjira connection, the government is likely to take up a project of Rs 600 crores to supply manjira water to Manikonda Jagir and 5 villages around it. But everyone is still waiting. During the visit, some public taps were also visible on the main Manikonda road, where people had cued up to fill their pots and pans. One of the largest real estate projects in the area is the Lanco Hills. This project has 6 towers of 31 floors each with a huge area surrounding it and has promised to provide manjira water to its valued buyers.



Local communities cued up to fill pots and pans from a public tap in Manikonda



Brick kilns are profitable business options for local people at Manikonda



The Musi river at Manikonda is completely polluted with garbage

Box 2. Lanco Hills Project

The Lanco Hills Project in Manikonda is spread across 108 acres surrounded by 3 lakes. The entire project consists of commercial spaces including an SEZ and non-SEZ IT Park, a large shopping mall, 6 towers of high rise residences, each from 24 to 32 floors, comprising 1500 flats, a 120 floor signature tower, independent villas, business class hotel, 5-star deluxe hotel and one of the largest club houses in India etc. There are swimming pools and other recreation facilities like fountains, planned for the township. This large scaled project has an expected water requirement of 22,71,247 litres of water per day. But the developer has planned to arrange for a supply of 34,06,870 litres of water per day by acquiring two separate 24 hr manjira water connections. Apart from this, it has taken a natural lake of 25 acres on lease for 99 years for development and water needs. The remaining water needs for the project will be fulfilled by bore wells.

Source: Personal interview with officials of Lanco Hills Project, Hyderabad on 25.11.2010.

Some of issues that emanate from the discussion with local people are the tremendous water security issue likely to be faced by Manikonda in the years to come, even if Manjira water reaches every household. Most of Hyderabad does not receive full share of Manjira water during summers, because of the drop in the level of water in the river. Considering this situation, who is likely to suffer and at what cost is something that will emerge as very crucial in the study of this village. Also what would be the community's reaction to receiving few hours of water

for basic needs as compared to those living in the adjacent high-rise buildings receiving 24 hours water supply and in some case for several recreational purposes, apart from basic demands. At what cost will they receive this regular supply?

Gandipet is a small village near the Himayatsagar Lake where the primary source of water is through borewell. Although no agricultural lands are left in the village, Gandipet is not much threatened in terms of water, because there hasn't been much real estate development here. This village brings water from Kokapet, a neighbouring village, some 5 kms away which receives manjeera water and villagers from Gandipet bring manjeera in large water tanks for their consumption. This village does not have many users as far as water is concerned and therefore issues with regard to water security have not emerged.

Another village within Rajendranagar is Peerancheru and Gandhamguda. Both these are located very near each other. Much of the information about Gandhamguda was available from Peerancheru. Peerancheru has also witnessed real estate growth and the process of urbanisation has led to complete demise of agriculture. However, the villagers complain that they had to stop cultivating their lands because the groundwater was being polluted because of a 23 acres dumping ground nearby whose area was huge, but later several complaints led to reduction of the area. A garbage recycling plant was set up, which caused further pollution. According to the respondent Vithayia, at the time of inauguration of the

garbage recycling plant, the then Chief Minister asked the villagers to leave the village to avoid the problems but none agreed. Many of them sold their lands for real estate growth and earned a huge sum of money, but due to lack of other skills and improper management of the money, they soon realised that the money earned was over just to pay for their daily bread. This has brought them back to an extremely vulnerable situation. Some of the farmers even face threat from the Income Tax department for cases filed against them. Some agricultural land (15 to 20 acres) is left in Gandhamguda, where cultivation is being practised but on a very small scale and the crops grown are less water consuming and are dependent on borewater for irrigation. The source of drinking water for the village is borewater coupled with manjeera water supplied and stored in a separate tank once in 15 days, depending on timely payment of bills by the panchayat.

Three to four panchayats together are trying to get a supply for their respective villages. Another source of pollution in the groundwater is a private hospital, which releases its wastes into the lake located behind it. This lake was a primary source of water for irrigation and drinking even 7-8 years back for villagers in Peerancheru, but they were forced to stop cultivating because their crops failed. Villagers who have been drinking this water have fallen sick repeatedly and hence depend on bottled water which is not affordable for most of the families. This village had some serious issues especially the livelihood perspectives where agricultural practises have died, money earned through selling of lands have been wasted leaving villagers at the brink of poverty and with water resources being polluted; the situation is likely to turn grave with the increasing need to buy water on a daily basis.



The Manjeera water tank in Peerancheru from where water is available only once in 15-20 days when payment is made



New residential complexes near Peerancheru, whose boundary wall runs behind the panchayat office complex



Shadan hospital near Peerancheru releases wastes into the lake



The residential complex will be responsible for the upkeep of the lake which is already polluted

Neknampur is a very small village near Manikonda but has not been influenced to a large extent by the real estate boom. Most of the lands have been plotted for homes but nothing has come up. The Ibrahim Cheruvu is adjacent to the village and the water too is polluted. The village is expected to receive manjeera water very soon from a pipeline connected to Manikonda. About 350 acres of land around this village has been largely acquired for the Alkapuri Township, but construction has not begun as yet. Water security issues are also not very strong in this village because there are no competitive users.

Maheshwaram Mandal:

The Maheshwaram Mandal located farthest from the city near the Hyderabad International Airport has been a target for several MNCs to start operating owing to its proximity to the airport as well as the outer ring road. APIIC has developed a Hardware park which is partially operational. Lands have already been allocated to different companies as it appeared on the signboards out the Hardware Park boundary wall. The Fab City project is also a huge initiative in this Mandal and is likely have implications for water security in the years to come when the entire project starts operating.

The Sardarnagar village, formerly part of Thukkuguda panchayat became an independent entity in 1995 and is one of the many villages located adjacent to the Hardware Park. However, this village has not lost agricultural lands to the Hardware Park. Some of the lands that have been acquired for the Hardware Park are scrublands and forest lands, which has implication for groundwater recharge at a macro level for the entire area because these are natural recharge zones being encroached by concrete structures. Sardarnagar panchayat office informed that the Hardware Park receives water directly through a pipeline from Nagarjunasagar for 24x7 water and some villages located near this pipeline take water in tanks from this pipeline and bring it to their villages, otherwise fluoride levels in the groundwater is very high in this area. The panchayat mentioned that as part of Rural Water Scheme (RWS), they have been promised a water connection from the Nagarjunasagar pipeline for their village, but nothing has been given in writing to the panchayat. They informed that the next village of Ravirala has been facing a lot of problems associated with groundwater and much of their agricultural lands and other hamlets within Ravirala panchayat have lost agricultural lands to the Hardware Park and the Fab City.

A visit to the next village Ravirala revealed many of interesting facts. The village lost agricultural lands to the Hardware Park. Some grassland has also been taken into the boundaries of the Hardware Park. The Sarpanch informed that much of the operations in the Hardware Park are yet to start and construction is underway, but they are already facing pollution problems due to waste generation for a solar power unit. However, this unit has promised to discharge its effluent through a pipeline into the Musi, which is equally detrimental for the downstream population. However, nothing has been undertaken by the company as yet. Another small hamlet called Janaiguda, a little further away from Ravirala, but within the same panchayat, has been the worst sufferers of the development process whereby their lands were forcefully taken away for the Fab City and no compensation was paid on account that this category of land is 'endowment land' because it has a temple within it and no compensation can therefore be sought. A large number of villagers have no source of livelihood and are in an extremely vulnerable situation. Almost 1200 acres of land has been acquired and the boundary wall runs very close to the village. The Fab City has also taken 2 kuntas within its boundaries when the land acquisition happened. The Fab City has a land that has been designated towards building a Common Effluent Treatment plant, but no construction has begun and the land is empty; only a board indicating the same is visible. The farmers in Ravirala and Janaiguda are dependent on borewater for agriculture but the water levels are declining steadily and are also polluted because of fertilizers apart from the high fluoride content which makes it unsuitable for drinking. Ravirala has a lake within its boundaries, which has dried up over the years and more so because of illegal excavation of loose sand for construction purposes. This sand is extremely unsuitable but the activity has been continuing unabated and many villagers along with local administrative heads are involved, which has made it very difficult to stop this practise. When we visited the lake, we saw its vast expanse and much to our surprise, we saw a group of 'dhobis' washing clothes along the banks where there was still some water left. A large area on the banks of the lake was being used to dry the clothes. An informal interaction with them revealed that they had been using water of this lake for washing clothes in the past, but when the lake started drying up, it became difficult for them, so they installed a bore on the bed of the lake to extract water in which they now wash their clothes.

Almost 100 households are dependent on this activity, which had been practised by their forefathers. If the water stress increases in the area due to the activities being undertaken, then their source of livelihood will be threatened. They also confirmed that illegal sand mining and washing are also reasons for drying up of the lake. These two villages have multiple uses and users of water,

likely to become a complex web of issues in the long run when the Hardware Park and Fab City starts operating. The high level of fluoride and other pollutants in the groundwater is already a threat for the villagers and loss of land and associated livelihood leaves the people vulnerable to future developments including climate change.



Companies allocated lands within the Hardware Park near Ravirala



Dhobi communities in Ravirala depend on a nearby lake for water to wash their clothes, brought from the city. The lake has now dried up. A bore inserted at the base of the lake provides the water required to carry on their activities



Janaiguda village- where the temple and agricultural lands around have been forcefully taken away from the villagers against no compensation for setting up the Fab City



The Fab City is still undergoing construction. Only a Solar plant is operating which releases its effluents into the groundwater polluting it. The Hardware Park and Fab City gets water from a pipeline from Nagarjunasagar

Climate Change Perspectives

With regard to all these villages, climate change is not on the cards because the local people do not understand it as playing a very crucial role in their lives. What they partially are able to relate to is the climate variability that they are noticing over the last 4 to 5 years. For them the importance of rainfall is connected to a rise in water table and in some areas which are close to lakes; it is connected to filling up the lakes to the brim, whereby they are water secure. During visits to these villages, it was clearly revealed that after 10-12 years, 2010 has been a year of excess rainfall and has extended beyond the monsoon months resulting in crop failure in some cases. However, lakes have been filled up to the brim in and around Hyderabad causing floods in some core areas of the city. The gates of the Himayatsagar had to be opened to release water as was observed while visiting the Gandipet village.

Based on the above analysis, some very pertinent issues emerged in the peri-urban villages that were visited based on which the villages for the final study could be finalised. However, investigation levels varied from village to village

depending on the kind of problems that emerged or did not emerge. These problems identified in the different sets of villages in different mandals may be quickly reiterated as:

- High dependency on groundwater for the agriculture and domestic sectors
- High fluoride levels in the groundwater
- Unequal access to water within the same village
- Dependency on neighbouring villages for supply of water for drinking
- Pollution of groundwater and surface water bodies due to release of effluents
- Loss of agricultural lands along with water bodies
- Rampant abstraction of water by private tankers
- Water logging problems
- Selling of water by farmers within the village community
- Illegal sand mining
- Loss of livelihood

Based on the above issues, the villages from each of the Mandals that have been selected for the final study are shown in the table below highlighting on the issues portrayed by each of the clusters.

Name of the Mandal	Names of villages selected	Issues identified
Shamirpet	Aliabad	<ul style="list-style-type: none"> □ Problem of dependency on groundwater for the agriculture and domestic sectors □ High dependency on the nearby Shamirpet lake □ Water of the Shamirpet lake is shared by 4 other villages for irrigation if levels are full □ No manjira water available
Qutubullapur	Mallampet	<ul style="list-style-type: none"> □ Rampant abstraction of water by private tankers □ Water logging problems □ Selling of water by farmers within the village community □ Pollution of groundwater and surface water bodies due to release of industrial effluents
Rajendranagar	Peerancheru	<ul style="list-style-type: none"> □ High fluoride levels in the groundwater □ Pollution of groundwater and surface water bodies due to release of industrial effluents □ Loss of agricultural lands along with water bodies □ Loss of livelihood
Rajendranagar	Peerancheru	<ul style="list-style-type: none"> □ Loss of agricultural lands □ Dependency on neighbouring villages for supply of water for drinking □ High fluoride levels in the groundwater □ Pollution of groundwater and surface water bodies due to release of industrial effluents □ Equity issues (Hardware Park, Fab City and domestic uses at the village level)

Name of the Mandal	Names of villages selected	Issues identified
		<ul style="list-style-type: none"> • along with water bodies • Illegal sand mining • Drying up of surface storages • Threatened livelihoods • Groundwater polluted by chemical fertilisers and high fluoride content.

In the above the best selection has been done based on the issues identified in each. However, the final study may need to investigate into a few more villages especially in the Shamirpet and Rajendranagar mandals, since stronger issues may emerge if a few more villages are visited. In that case the final list of villages for the study is likely to change during the next phase of the study.

Summary and Conclusion

Hyderabad as a city started growing since the opening of the economy and became a hub for IT companies and other financial corporations. To provide office space for the newly upcoming enclaves, the government provided land and other basic amenities in order to attract further growth. However, rapid real estate growth in specific locations saw many of the peri-urban villages, earlier outside the main city limits, getting quickly absorbed within the municipal boundaries to be provided regular services. In this process however, large tracts of agricultural lands along with water bodies were taken over for developing large residential complexes. Further efforts were also made by the Government to develop SEZs and other commercial enclaves in new peri-urban locations, which are outside the city administration but within a specified development zone for which agricultural lands were also acquired. This process of annexing agricultural land has caused much threat to the lives and livelihoods of the local villagers around Hyderabad. One of the primary problems faced by the residents of peri-urban areas is loss of their primary source of income which forces them to migrate to the city for work coupled with unequal access to water. In recent times, continuous pressure on the available groundwater sources has left 22 out of 37 mandals around Hyderabad within Rangareddy district using more than 70% of groundwater as per the report by the Groundwater Board. In particular, peri-urban areas have lost several lakes during the process of development, which were earlier natural sources of water for agriculture and several other

economic activities. With the increase in the number of concrete structures, the catchment area of the larger lakes around Hyderabad that have historically remained primary sources of water for the city has been reduced. With the pressure on surface sources increasing, newer sources have been tapped by the Water Board and recently the Godavari project has been undertaken to bring water apart from the four sources which are already in place for supply to Hyderabad city. The entire scenario is extremely unbalanced and calls for serious implications for the future, more so with the extreme climatic variability. The State Water Policy has highlighted some of the serious issues, but all of them pertain either to the urban or to the rural areas. There are no specific policies for the peri-urban zones, that lie in between and get choked, leaving people more vulnerable.

The primary survey was conducted in 17 villages across four mandals of the Ranga Reddy district during the scoping study to understand people's responses to urbanisation and its impacts. The survey also attempted to understand social and economic relations within the villages and how it determined the capacity to cope with rising pressure on available resources. The survey also revealed several aspects of land acquisition for development and its impact on the lives and livelihoods of people living in the peri-urban zones. The survey of all the villages unveiled the extreme stress on groundwater and in some cases how pollution of groundwater due to increasing urbanisation and other economic activities have left many areas in extreme risk.

Some areas though not too far from the city limits, undergoing large scale real estate development, still do not receive Manjira drinking water from the Water Board, which is supplied to the rest of the city giving them no option but to incur out of pocket expenditure on bottled water or drink the highly polluted water as was the case in Manikonda, Bachupally and Peerancheru.

. In Manikonda, the extreme pressure on water especially during summer months sometimes forced local residents to migrate to their friends and relatives in the city. Moreover, Manikonda Jagir clearly exhibited the case of economic and political power playing a dominant role. A renowned real estate developer, The Lanco Group promised water for all the luxuries by acquiring two Manjira water connections from the Water Board and incorporating 3 lakes within its boundaries for one of its largest and most sought after residential complex, The Lanco Hill. In this process, the poor residents around this area have not only lost their access to the lakes but also could not get themselves together to acquire a Manjira connection through its elected Panchayat members. Same was the case of Turkapally in Shamirpet where manjira water was being provided to the SEZ, Genome Park, and in Ravirala, to the Hardware Park and Fab City through special pipelines from Nagarjunasagar for 24 hours, when the local people were severely suffering from water pollution due to high levels of fluoride.

Agriculture has ceased to exist in most of the villages, due to high cost of production (Doolapally and Kompally) and lack of sufficient sources of clean water for irrigation. This was noticed in Bachupally and Peerancheru, the latter being threatened by groundwater pollution by a hospital in its vicinity which releases wastes into the nearby lake as well the presence of a dumping ground in the village. Villagers were forced to stop cultivating and later sold their lands to the developers. Some villages have become a continuous prey for tank entrepreneurs who extract water from private bores located near the high water tables and the farmer in the village is paid a reasonable amount, which improves his economic condition than meagre returns from cultivation.

Farmers in the peri-urban village of Janaiguda were forced to give away their lands against no compensation to the Government for the construction of the Fab City, owing to the fact that they were Endowment Lands. This has left them with no land to cultivate robbing them off their livelihoods completely, when revenue authorities clearly mention that the government takes over possession of endowment land to extend "social benefits" like construction of houses for weaker sections and distribution of land pattas for poor, but not for commercial ventures. Owing to lack of social and economic empowerment, the people have not been able to protest against this action by the government. Lack of the safe

water has only accentuated the problems further as observed in many of the villages. The capacities of people to cope with water stress depend largely on their economic status and connections with local political leaders, who are sometimes involved in several illegal practises, from which some villagers gain. This situation was seen in Ravirala, where illegal sand mining from the bed of a lake in the village was being undertaken and this has resulted in drying up of the lake. Most of these villages are bearing the brunt of the unplanned and skewed development process and depend on the government to take appropriate steps to improve their situations. For many, this wait has been quite endless and has resulted in further deterioration of their lives.

Based on the issues and perspectives emerging in the scoping study, further research will be undertaken in details to understand water security at the family level and what impact it has on the economic and social conditions in each household. Therefore villages that have been selected for the study over the next three years will be surveyed through semi-structured interviews to understand specific concerns on a household level and to delve deeper into those issues. This will help in identifying the vulnerable groups in the villages. The research will also involve conducting Focus Group Discussions with each of the affected groups. During this phase an attempt will also be made to plan necessary interventions for some of the action points that have emerged in some of the villages and to identify the stakeholders who could be involved in the process. These action points relate to:

- Pollution in groundwater in Peerancheru and Bachupally due to commercial activities; high fluoride levels in water in all the villages
- Rampant extraction of groundwater in Mallampet
- Real estate development in Manikonda Jagir
- Protecting the livelihoods of dhobis in Ravirala and farmers in Janaiguda

Another very important aspect which could not be explored during the scoping study is the impact of climate change. This aspect is not very clearly understood by the villagers and an initial process of sensitisation will be required in order to get their views on the issue of climate change. It will also be important to understand whether the views of villagers reflect as climate change or climate variability. Once this perspective is clear it will be easier to understand how people cope with these variabilities as the case may be and what kind of adaptation strategies could be identified.

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