

## **Gone Land, Gone Water: Crossing Fluid Boundaries in Periurban Gurgaon and Faridabad, India**

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### **Abstract**

The northwest Indian state of Haryana, one of India's major food baskets, is witnessing a process of urbanisation characterized by large-scale acquisition of agricultural lands for urban uses. This paper examines the implications of this process for water use and management practices in periurban areas of Gurgaon and Faridabad, two of the state's fastest growing districts. The many ways in which periurban residents lose access to water are described; falling water tables because of competing pressures, relocation of polluting factories in the vicinity, longer routes for water collection and the acquisition of common property water sources. The current debate in the media over land acquisition has centred on financial compensations. However, since rights to water are de facto tied to rights to land, the acquisition of lands also implies a loss of access to water sources.

The paper uses a qualitative research design – semi-structured interviews, focus group discussions and meetings with key informants – to examine these issues in two villages in each of these districts. A property rights structure separating land and water rights, though essential, is difficult to implement. Institutions for mobilising periurban residents in collaboration with rural and urban governments shall be needed to address these concerns.

**Keywords;** periurban, common property resources, institutions, property rights, India

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## **Introduction: Conceptual Groundwork for the Analysis of Periurban Issues**

Urbanisation and economic growth are recognized to be the most distinguishing features of the past century (McGranahan, 2006). There is currently a demographic shift world-wide, characterized by the movement of people from rural to urban areas at an increasing rate (World Bank, 2000). In the mid-1970s, less than 40 percent of the world's population is estimated to have lived in urban areas; by 2025 the figure is likely to be 60 percent. Changes in the urban population are particularly likely to affect low income countries. In 1950, 41 of the world's 100 largest cities were in developing countries. By 1995 the number rose to 64 and the proportion has increased ever since.

Rapid urban expansion in many nations proceeds concomitantly with the growth of periurban areas that have elements of both "urban" and "rural" characteristics and present new challenges to urban growth management (Tacoli, 2006). Though there is no consensus on the definition of the word "periurban", the word is generally used in three different ways, namely, to denote a place, concept or a process (Narain and Nischal, 2007). As a place, periurban refers to rural fringe areas surrounding cities. These are villages near the administrative and geographical boundaries of cities. This conceptualisation is, however, challenged by such scholars as Iaquinta and Drescher (2000) who underpin the importance of the underlying institutional contexts; it is the co-existence of rural and urban activities and institutions that defines periurban, rather than the sheer proximity to towns or urban centres.

Brook et al. (2003) note that "periurban" is better understood as a process, representing a transition between rural and urban and the flows of goods and services between villages and urban centres. These flows sustain periurban livelihoods.

More broadly, "periurban" could be understood as a concept used to refer to an interface between three systems, namely, the agricultural system, the urban system, and the natural resource system (Allen, 2003). As an analytic construct, "periurban" allows us to study the relationship between rural and urban activities, processes, and institutions.

In this context, we often talk of periurban as an "interface", a sort of meeting ground for the "rural" and the "urban". The PUI (Periurban Interface) is understood to have certain environmental, social, and institutional characteristics. Environmentally, it represents a heterogeneous mosaic of natural ecosystems, productive or agro- ecosystems, and urban ecosystems affected by the material and energy flows demanded by both urban and rural systems (Allen, 2003). Socially, the PUI is dynamic and heterogeneous; local residents, migrants, farmers, real estate agents, industrial entrepreneurs, and the urban middle class may all co-exist in the same territory. Social forms are constantly created, modified, and discarded (Iaquinta and Drescher, 2000).

Institutionally, the PUI is complex, since many administrative activities may fall within the purview of neither rural nor of urban governments. In the Hubli-Dharwad region, for instance, it was difficult to install a sewage treatment plant as it was not clear, who - the urban or the rural government - would pay for it (Brook et al., (2003). At the same time, periurban dwellers are confronted with both urban and rural laws and institutions, breeding a situation of legal pluralism. Periurban issues tend to be low on the priority of policy makers and planners, who tend to think in terms of the conventional dichotomy of urban and rural development. Besides, periurban boundaries, like the resource that is the subject of this paper, namely, water, tend to be fluid; they keep shifting geographically, as a village gets reclassified as a town, and a medium-sized town grows into a city.

Tacoli (2006) notes that the administrative specialisation and segregation between the “rural/agricultural/natural resources” sector and the “urban/manufacturing and services/infrastructure” sector does not seem to allow policy makers and officials to fully recognize the significance of the linkages between “rural” and “urban” locations, people, and activities. Several regional studies show a marked increase among most rural households of the time devoted to, and the income share derived from non-farm incomes. While households remain central units of production and consumption as assumed by much rural development theory and practice, they are probably better defined instead as multi-activity and multi-local units, in which members engage in a variety of income-generation activities in a number of different locations.

In this paper, the word “periurban” is used not only in its geographical sense, but more widely as an analytic construct to study the relationships between urban and rural activities, processes, and institutions. The villages chosen for this study were located at varying distances from the nearest towns and urban centres, and it is not possible to delineate a specific distance around a city that would constitute “periurban”. However, all four villages had strong linkages with the nearest urban centres and in all four, water access and use patterns were impacted upon in different ways as a consequence of urban expansion. The focus of this paper is on these implications of urbanisation for rural water use and access and a “periurban” conceptual lens is used to look at these interactions and linkages.

These problems, further, are shown to emerge as a result of an institutional lacuna arising from the absence of a mechanism to integrate rural planning with urban development. The dichotomous nature of the two results in a situation that fails to provide a framework for dealing with the impacts of urbanisation on the rural periphery. Further, in a situation where rights to water are de facto tied to rights to land, the acquisition of lands for urban expansion – a common phenomenon that has sustained urban expansion not only in India but in several other countries of the world - also implies the loss of access to water sources.

### **The Context of this Research: Delhi’s Growing Population and Periurban Spillover into Gurgaon and Faridabad**

The Delhi UA (Urban Agglomeration) has grown by over 4 percent annually in every decade since 1931 (Kundu, 2008). Among metropolitan cities in the country, this pattern has been perhaps unique to Delhi. Even in the 1990s, when there was a deceleration in urban growth in the country, the Delhi UA maintained a high growth and reported acceleration.

The population of Delhi has risen steadily over recent decades (NCRPB, 2001): from 1.7 million in 1951, to 4.1 million in 1971, 9.4 million in 1991, and 13.4 million in 1999. The 2001 census put Delhi’s total population at 13.8 million; it is now expected to be of the order of about 15 million. It is expected to grow to over 19.5 million by 2011.

It is interesting to note that a substantial proportion of this increase is accounted for by migrant population. Over the period 1981-1991, for instance, almost 50 percent of the population growth was due to migrants; over 70 percent of these were from neighbouring Uttar Pradesh, Haryana, and Rajasthan (Kundu, 2008). Urban Delhi has expanded over geographical space as well. The census of 2001 reported an addition of 33 new towns that were rural settlements in 1991 (Kundu, 2008). This growth dynamic has brought in large chunks of village land within Delhi’s urban fold, creating a new set of dynamics of rural-urban transition and relationships.

This growth has taken place both within as well as outside the urbanizable limits (Kundu, 2008). It is, however, the peripheral areas that have absorbed the majority of the migrants. This trend,

along with a real estate boom and the development of major transport corridors, has led to the emergence of a PUI in all directions around Delhi.

Urban transition in India reflects a metropolitan region, comprising UAs, or cities and their outgrowths (Kumar, 2001). The spilling over of population from India's major cities into these areas has occurred since the 1990s, sustained by a middle class housing demand that has caused the population to move to the outskirts of the city where land is cheaper (Shaw, 2005). Typically, rapid population growth in the main city results in increased demand for land and higher housing costs which in turn result in the outward movement of people from the main city to the city fringes, where they look for cheaper accommodation and residential land (Kumar, 2001). This phenomenon is now happening in several metropolises in India.

Increases in urban population and the need for better connectivity to cities, in turn, fuel the growth of urban related infrastructure. This drives up land prices and changes land use patterns. As a consequence, land in the periurban areas gradually becomes monetized (Brook et al., 2003; Kumar, 2001). This can be witnessed in districts such as Gurgaon and Faridabad where a real estate boom has transformed the pace of development. There has been a massive land acquisition process; land has been acquired by the state and private corporations for several industrial, residential and recreation purposes, changing land use away from agriculture and allied activities.

While once a sleepy town at the outskirts of Delhi, the potential of Gurgaon city - the headquarters of the district - was quickly realized soon after the Indian economy embarked upon a process of economic reforms and liberalisation in the 1990s. There have been several reasons for the growth of Gurgaon city (Narain, 2007). The first of these is the proximity to Delhi, the National Capital, located about 32 km away and in particular, the international airport, located just about 12 km away. Further, the State Government of Haryana took several policy initiatives to invite industries in Gurgaon following the phase of economic reforms and liberalisation initiated in 1991. The most recent such initiative has been the setting up of SEZs (Special Economic Zones).

Gurgaon has seen a real estate boom since the 1990s and the landscape of the new city is dominated by skyscrapers housing the offices of corporate giants, modern shopping malls and residential facilities. It has emerged as one of India's major outsourcing hubs, housing major multinationals. Following this industrial growth, thousands of professionals have made their home in Gurgaon. The fast growing population with an ever-increasing purchasing power has created a huge demand for housing, and property prices have escalated steadily in recent years.

Following closely on the heels of Gurgaon is Faridabad, located, too, in the state of Haryana (Narain and Nischal, 2007). Faridabad is about 25 km from Delhi. It is the most densely populated district in the state. With a share of about 5 percent of the total land, it accommodates 10 percent of its population. The population density, as per the 2001 Indian population census, is 1020 persons per sq. km, as against 372 for Haryana as a whole.

The growth of Faridabad has been fuelled by a well-connected network of road and electricity. The Delhi-Mathura National Highway No.2 (Shershah Suri Marg) passes through the centre of the District. A broad gauge railway line of the Central Railways passes through the district, as do most of the trains going to south and west of India. A Railway Station is located in Faridabad city on the Delhi-Mathura double track broad-gauge line of the Central Railways that runs parallel to the highway No. 2. Faridabad has lately emerged as a major industrial hub of North India.

### **Methodology and Research Sites**

This paper describes the implications of the trends for water use and management in two periurban villages in each of these districts. The study adopts a qualitative research design, relying on an ethnographic approach; a mix of semi-structured interviews, meetings with key informants, direct observation and focus group discussions. A brief profile of the villages chosen for study is presented below.

### *Basai*

Basai lies in Gurgaon district of Haryana, about 3 km from the Gurgaon city, on the road that connects Gurgaon to Farookhnagar. It is located adjacent to sectors 9 and 10 of Gurgaon, two of the city's major residential areas that have been developed by acquiring land from the village. Basai has also provided land for the water treatment plant of HUDA (Haryana Urban Development Authority) that supplies drinking water to most of Gurgaon city. In all, about six-seventh of the village's agricultural land has been acquired for urban and residential purposes over a period of two decades.

As regards social composition, the village is dominated by the *Jaats* – the agriculturists - numerically and in terms of land ownership. The village also has a substantial migrant population comprising migrant labour from Rajasthan and Bihar. The main crops grown are wheat, sorghum, pearl-millet, and fodder crops. In addition, some farmers are able to cultivate paddy that is irrigated by a sewage canal emanating from the Gurgaon city. There is a large number of *pucka* (concrete) houses that have been built or renovated recently, as a result of fresh cash inflows from large-scale sale of agricultural lands. However, with the acquisition of agricultural lands and the erosion of a basis for livelihoods, idleness and alcoholism have been on the rise.<sup>1</sup>

The village has a railway station that provides a transit point for residents of the adjoining districts of the state to come into Gurgaon. On account of its proximity to the city, Basai provides an important transit point for travel into the more "rural" areas of Gurgaon with its local bus stand and auto-rickshaw stand. A large number of jeeps and auto-rickshaws can be seen parked at the entrance of Basai, providing an important means of semi-public transport between Gurgaon and the more "interior" villages.

### *Sultanpur*

Sultanpur is located 9 km from Gurgaon city, further down from Basai on the road to Farookhnagar. The village is dominated by the *Rajputs* - the agriculturists - numerically, and in terms of land ownership. The village is not served by an irrigation canal and the groundwater is saline. Under these circumstances, farmers cultivate the less water consumptive crops, namely, pearl-millet, sorghum, wheat and mustard.

This village is located adjacent to the Sultanpur National Park, a wetland known for its population of resident and migrant birds that was developed by acquiring land from this village. Sultanpur National Park was accorded this status in 1971. Being located close to the Sultanpur National Park, the agricultural fields of this village are threatened by recurrent attacks from the *Nilgai* (blue bull) - an antelope - and the villagers often face penalty on account of the straying of their cattle into the National Park.

Sultanpur village, much like Basai, has seen land acquisitions for a variety of purposes over the last two decades; further land acquisition is on the anvil for the development of an SEZ by Reliance Industries, the corporate giant. A distinguishing feature of the village is the

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<sup>1</sup> For more on the implications of land acquisition in this village, see Narain (in press).

concentration of a large section of its population in *dhaanis* (hamlets). These are settlements near or in the agricultural fields, wherein village residents have moved in order to be closer to the agricultural fields. However, at the time of this research, the agricultural lands were to be acquired for the development of the SEZ. This raised questions about the security of land tenure, and was a source of much angst and apprehension among the periurban residents.

### *Shahpur Khurd*

Shahpur Khurd is a village in Ballabgarh block of Faridabad district. The village is reached via a short unmetalled road that takes off from National Highway 2. It has a population of about 1000 people. The village is inhabited by four social groups; Jaats, *Harijan*, *Koli* and *Outcaste*. The Jaats are the most powerful socially and economically. They constitute 70 percent of the village population; the Harijans represent 25 percent. The other inhabitants, that is, the Kolis and Outcastes, are in a minority.

The *kharif* (monsoon season) crops are pearl-millet and sorghum, while the *rabi* (winter) crops are wheat, *burseem* (a fodder crop) and mustard. This cropping pattern prevails predominantly on account of the limited availability of irrigation; the groundwater is saline and only about 10 per cent of the cultivated land is served by a canal. The village is located at the tail-end of the canal and the farmers often do not receive their authorized share of water. Under these circumstances, only a small minority of farmers is able to cultivate such crops as paddy or sugarcane.

Borewells are the predominant source of irrigation. Diesel-powered borewells are common. Almost all farmers own private borewells. Groundwater is also sold at the rate of Rs. 40 per hour of water pumped.<sup>2</sup> In recent years, a large number of brick kilns have come up in the vicinity. The residents of Shahpur Khurd maintain strong ties with Ballabgarh and Faridabad, and commute to these urban centres to sell their agricultural produce as well as for purchases of their household needs.

### *Karnera*

Karnera also lies in Ballabgarh Block of Faridabad district. It has a population of 2000 people, comprising about 200 households. Of the 200 households, about 80 comprise *Tyagis*, the agriculturists. They are the dominant group in the village, socially, numerically, and in terms of land ownership. The other groups are *Brahmans Khati*, *Kumbhaars* (potters), *Harijans*, and *Gowariyas*. The village has about 400 electoral votes.

The main crops grown are wheat, potato, and burseem in the rabi season and pearl-millet, paddy, sorghum, and some vegetables in the kharif season. Inadequate water availability was cited as the major factor restricting sugarcane cultivation. Another factor was the distance of the nearest sugar mill; it is located at Palwal, about 30 km away. There is a dairy in the village that procures milk from the farmers; the adjoining town of Ballabgarh also provides a market for the dairy produce.

The net cultivated area is about 400 hectares, all of which has been brought under irrigation. Both surface and groundwater are used. Another source of irrigation is the Gurgaon Sewerage Canal originating from Delhi. Like Shahpur Khurd, the residents of this village maintain strong links with Ballabgarh and Faridabad and these linkages play a crucial role in supporting their livelihoods.

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<sup>2</sup> 1 US dollar is approximately 50 Indian Rupees.

## Implications of Urbanisation for Rural Water Use

Urban settlements have always been dependent upon their hinterlands, as a source of natural resources and rural products, as a sink for wastes and as sites for expansion (McGranahan, 2006); urban expansion transforms not only the land that becomes urbanized but also the land whose use is determined by demand both for land based products and for resources such as water whose appropriation changes land use patterns. Periurban settlements, thus, tend to be at the receiving end of urban development and bear the brunt of the development of urban residential and industrial areas. Pressures on water can come from many quarters; farmers' access to water for irrigation may be adversely affected as groundwater succumbs to other competing uses, such as those from industry, farm-houses, recreation and conservation. At the same time, the deteriorating access to power, that is diverted to meet the requirements of the growing city, reduces the effectiveness with which water can be used for agricultural purposes.

### *Competing pressures on groundwater resources*

These effects are particularly evident in the case of Sultanpur. The context of vulnerability as shaped by the limited availability of water described above has been aggravated by developments and changes in land use patterns around the village over past decades. On the one hand, the mushrooming of farm-houses and the development of the Sultanpur National Park in 1971 in the vicinity has aggravated the stress on the village's groundwater resources; on the other hand, the erratic supply of electricity – that is diverted to meet the growing requirements of the expanding city - hampers with the operation of tube wells. The reduced availability of power also affects the quality of life of the villagers in other ways.

The water table depth is about 60 feet and the water table is falling further. A rough estimate, based on discussions with the villagers, was that the water table level has been falling by five to seven feet every year. The state had a flood in 1977 after which the water table rose steadily. After the 1980s, however, the water table has fallen steeply and recent efforts at locating groundwater have even reported tube well failure. The main reason for this is the mushrooming of farm-houses in the vicinity that pump local groundwater and the digging of tube wells to release water into the Sultanpur National Park.

The erratic availability of power also interferes with the water pumping activity. This problem has become more acute in recent years as electricity supply has been diverted to meet the city's requirements. In the absence of reliable power supply farmers are forced to pump water whenever power is available, rather than when their crops need it. The erratic availability of power and falling water table levels were repeatedly identified by periurban residents as the most important problems confronting them.

### *Location of water treatment plants: local effects*

The location of water treatment plants in periurban areas to supply water to the city may also have adverse impacts on local conditions. The Basai water treatment plant that came up to supply water to Gurgaon city has been a mixed blessing for Basai's residents.

Although, it has made available drinking water to the residents of Basai and has provided irrigation to some farmers as well, the location of the water treatment plant has led to a rise in the local water table level, posing a threat to buildings in the region. Broken pipes and leaks from the water treatment plant have led to an increase in the mosquito population and are a cause of several vector borne diseases. With the rise in the water table the adjacent agricultural fields are known to be losing their productivity. Farmers are unable to grow wheat on this tract of land and it seemed that in the years to come, they would be unable to grow any crop at all.

“HUDA has given water, but has not paid attention to other problems”, was a perspective often expressed in field interviews.

*Impact of polluting industries on local water sources*

The process of industrial decentralisation and the imposition of a strict judicial policy of reducing environmental pollution of central cities to match the requirements of global cities have also contributed to the growth of UAs. The failure of the State Executive and polity to effect changes in the urban environment, combined with the pressures of investment agencies, multinational and transnational corporations, can be seen in the relocation of polluting industries to the peripheral areas. Supreme Court directives have often been issued in India for the closure of hazardous polluting industries in the urban core and their relocation to the peripheries, preferably in the extended metropolitan zone or the periurban regions (Kumar, 2001).

Many industries are located at the edge of the city because the wastes that they produce rarely receive adequate treatment. Community members often take advantage of the fact that in periurban areas the regulatory capacity of the government authorities is weak, particularly in those areas that are outside the municipal boundaries (Parkinson and Tayler, 2003).

The location of factories near the *phirni* (boundary) of the Shahpur Khurd village was identified as a perpetual source of noise and groundwater pollution; the untreated wastes from the factories found their way into the groundwater aquifers. These factories had been relocated from Delhi and were identified as a nuisance by periurban residents. Residents complained of a vibrating sensation in the ground throughout the day caused by their operation. They strongly felt that these factories should be located at least a certain distance away from the village, and particularly from religious places.

*Links with land and tenure: demise of local water management institutions and sources of water*

The impact of the emergence of the PUI is also felt on CPR (Common Property Resource) institutions for water management, such as the *johads* (village ponds). This was observed in all the four villages chosen for study. These impacts were felt most by the periurban poor and landless, as common property resources on which they depended for their livelihoods were diverted to urban activities.

Basai village initially had six johads of which three lay on the land that was acquired by HUDA for the development of residential sectors in Gurgaon, and one lay on a tract of land that was acquired for the development of a public school. The fifth one, located near the fields, was polluted with wastewater on account of discharges from a factory in the vicinity. This was considered no longer fit for use by the livestock. An important group of people thus affected here were the potters who depended on the johads for the desilting and on horses and livestock for carrying the clay to their places of work. With the takeover of both the grazing lands as well as the johads, the bases for their traditional livelihoods had been eroded and they had been forced to move into alternative occupations.

In Sultanpur village, among the *Panchayat* (unit of village local self-governance) land that was proposed to be acquired for the development of the Reliance SEZ was land over which was installed a water supply tank managed and operated by the PHED (Public Health and Engineering Department). This tank was the source of drinking water supply to much of the village.

Besides, the acquisition of land for the construction of a highway inconvenienced periurban residents by affecting their routes and access to water sources. Since the local groundwater is



saline, the residents of Sultanpur obtain water from a distance of about 1.5 km away by crossing a railway track. With the construction of the highway, they had to divert their route to the point of water collection and walk a longer distance.

#### *Changing locus of control over village resources*

An important impact of the PUI is that the locus of control over village resources shifts to outside the village, as urban residents take part in the auction of village ponds and lands. Once again, this has implications for the livelihoods of those who depend on them.

In Shahpur Khurd, there are three johads. They primarily cater to the drinking water needs of the livestock. Earlier, the village ponds were managed through collective contributions of labour and capital by the villagers. Now, however, the Johad is auctioned and the proceeds of the johad are retained by the Panchayat for welfare activities in the village. The johad is auctioned to contractors who use it for fishing, and these contractors come predominantly from outside the village – particularly from Delhi. Though this is an important source of financial resources for the village Panchayat, it also means that the locus of control over village resources has shifted outside the village.

A similar process was seen in the village Karnera. There are 5 johads, of which 3 are auctioned for fisheries. After 1952, with the take over by the Panchayat of the johad, the tradition of auctioning the johads started. Before 1952, the villagers used to desilt it. Now, the Panchayat gives the johads on auction. The *pattedar* (contractor) takes the johad on auction for a period of two to three years. This task is taken on contract normally by Muslims. There are no Muslims in the village and these Muslims come from outside the village – predominantly from Delhi. The johads are used for fisheries and for the cultivation of a fruit called *singhara* (water chestnut). The adjacent towns provide a market for fish and singhara.

An important impact of auctioning of the johads is that the potters have lost their rights to a livelihood. Their traditional occupation has been pottery; however, they do not have any access to clay any longer, which they used to get from the johads. The potters do not own agricultural land and now work predominantly as agricultural labourers.

#### *Water use in periurban agriculture*

Periurban agriculture is most often not officially recognized as an urban land use, even though it is widely practiced in several areas (WII-IWMI, 2006). Several characteristics of periurban agriculture in the study villages may be noted; perhaps the most significant of these are the variety of irrigation sources, the prevalence of both formal and informal means of water allocation, the crucial role of periurban agriculture in supporting livelihoods and the use of wastewater.

Periurban agriculture has been understood to have an important role in providing employment to poor people in the fringe areas of Delhi (Marshall et al., 2003). Landless people are involved in periurban agriculture as agricultural labourers or through the cultivation of leased land. Whole families are engaged in intensive but small-scale horticulture. Vegetable cultivation, in particular, is conducted mainly by farmers with low socio-economic status cultivating small or marginal landholdings. This type of vegetable cultivation supports livelihoods primarily through food provision, income generation and employment.

A distinguishing characteristic of periurban agriculture is the diversity in sources of irrigation. In village Basai, for instance, depending upon the location of the agricultural fields, farmers were able to benefit from different sources of irrigation. In the absence of an irrigation canal most farmers irrigated through private tubewells. Apart from these, there were two other sources.

First, there was an underground pipe that had been laid down to bring water from the HUDA water treatment plant to a temple in the village. Farmers whose fields lay along this pipe, irrigated by making a cut through the pipe and diverting water to their fields. Second, farmers whose fields lay along a sewage canal emanating from Gurgaon city were able to irrigate from that source as well. From a perspective of irrigation, therefore, the best placed were those whose lands were geographically scattered such that they could irrigate from different sources.

It is important to note, however, that while periurban residents may receive water for agriculture from a variety of sources, water supply for irrigation in northwest India is likely to be intermittent and uncertain. Partly this is to do with the design characteristics of irrigation systems - that are protective in nature - seeking to divide a water supply thinly over a large area (Narain, 2003; Mollinga, 1998). In northwest India, in the states of Haryana, Punjab and Uttar Pradesh, this is accomplished through a *warabandi* system- a mechanism of water allocation that rations out water supplies through a system wherein canals and distributaries operate by rotation and farmers are expected to take water on a specified time and day of the week. Further, both statutory and non-statutory forms of water allocation co-exist. Water is allocated on the basis of a time for taking water as defined in the *warabandi* schedule. However, this schedule is not always practiced, as farmers deviate from it on the basis of their own *bhaichara* (social relations). Thus, there is a statutory *warabandi* schedule - that defines a farmer's water right and determines the pattern of resource allocation; however, farmers engage in an exchange of their time shares based on their mutual understanding and *bhaichara*. Water rights are defined through state law, but realized through another normative system, that is based on social relationships, pointing to the existence of legal pluralism (Narain, 2003). This was noticed in Shahpur Khurd and Karnera, both of which are served by irrigation canals.

An important source of irrigation for periurban agriculture is urban wastewater. Wastewater is known to have a high potential for reuse in agriculture (WII-IWMI, 2006). It offers an opportunity for increasing food and environmental security by avoiding direct pollution of rivers and surface water, conserving significant proportion of river basin waters and disposing off municipal wastewater in a low-cost, sanitary manner. Though wastewater use in agriculture is an age-old practice, there is understood to be not enough systematic information on it, particularly on issues such as farmers' needs and preferences and health and environmental risks.

Within a periurban context, sewage-irrigated agriculture enables farmers to overcome constraints to agriculture that are posed by poor quality groundwater or the absence of an irrigation canal and thereby, widen the farmers' cropping choices. Among the villages studied, sewage based irrigation was found to be particularly important in Basai. The discharge of sewage from the city of Gurgaon became an important source of irrigation for the cultivation of paddy that would otherwise not have been possible given the poor availability of groundwater and the absence of canal irrigation. The benefits of sewage based agriculture were shared unequally among periurban residents, however, depending predominantly on the location of their fields.

The use of urban wastewater emerges as an important rural-urban linkage in the form of resource transfers from urban to rural areas. The sewage water from Gurgaon is auctioned by HUDA among different villages and the village that wins the auction sees the water distributed among the farmers who take it turn by turn at a predetermined rate (it is approximately Rs 900-1000 per hour).

### **Conflicts and Social Mobilisation**

At a macro level, there is evidence of growing stress on water resources, particularly in Gurgaon. The influx of new settlers in recent years has put tremendous pressure on the fragile rural

infrastructure. Even as residential areas with modern facilities are built, Gurgaon has been plagued by poor infrastructure, especially badly maintained roads, erratic power supply and a growing pressure on its water resources.<sup>3</sup> According to the CGWB (Central Groundwater Board), 70 percent of Gurgaon's water needs are met through groundwater and the water table is dropping at a rate of 1 metre every year. Officially, Gurgaon has been declared a "dark zone" by the CGWB in terms of groundwater overexploitation. However, this has not stopped the government from its current pace of urbanisation marked by the issuing of licenses for the construction of huge residential complexes and malls.

As competing pressures around water increase, evidences of rural-urban conflict are beginning to be seen. In the third week of March 2008, farmers living near Gurgaon breached the Gurgaon canal that is the major supplier of water to the city, forcing the residents of Gurgaon city to buy water from private sources (tankers) at prices as high as Rs.500-700 per 5,000 litres.<sup>4</sup> About 400 water tankers had to be pressed into service to supply tube well water to the people of Gurgaon on March 24 2008; this could meet just about 30 percent of the total demand for water. The water crisis in Gurgaon is seen as an outcome of the short-sightedness of the government in issuing licenses for malls and residential areas without taking cognizance of the water availability.

There have recently emerged some efforts at mobilisation around water. Most of these efforts are led by CBOs (Community based Organisations). For instance, in Gurgaon, RWAs (Resident Welfare Associations) have moved judicial authorities against the issue of licenses to builders and property dealers in the wake of the steadily diminishing water supplies as manifest in the falling groundwater levels.<sup>5</sup> Some efforts are also being made for supply augmentation; NGOs (Non Government Organisations) like SURGE (Society for Urban Regeneration) have been instrumental in constructing water harvesting pits.

### **Issues for Governance and Public Policy: Overcoming the Rural-Urban Dichotomy in Development**

As can be seen above, urbanisation processes are impacting the access of periurban residents to water in a variety of ways. Generalisations are difficult and a much localized approach is needed to examine the various ways in which urbanisation affects periurban residents' access to water of a sufficient quality and quantity, as well as water management practices and institutions.

There has been much attention in the media lately on the subject of land acquisition and the financial compensation of land-owners in the process, both in Gurgaon as well as elsewhere in the country. In fact, protests against land acquisition in Singur in West Bengal have acquired much political and media attention. However, the implications of these processes for access to water have received scant attention. In a situation where rights to water are tied to rights to land, the acquisition of lands for industrial and urban development implies de facto the loss of access to water sources as well. When private agricultural lands are acquired, access to local groundwater sources is lost. Likewise, access to CPRs like village ponds is lost when the lands on which they are located are acquired.

Even as far as the acquired lands are concerned, the compensation has thus far been confined to land-owners while tenants and sharecroppers have not been part of a rehabilitation policy.

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<sup>3</sup> Elaborate accounts of these problems can be read in various issues of *Gurgaon Plus*, a weekly supplement to *The Times of India*, one of the country's leading dailies

<sup>4</sup> This was reported in an article *Private tankers take Gurgaon hostage* in *The Hindustan Times*, March 25, 2008, p.1.

<sup>5</sup> These incidents are often reported in the media.

Several studies show that it is the landless and poor who tend to depend much more on CPRs.<sup>6</sup> Further, tenants and sharecroppers are often not registered. These systems of land tenure persist on the basis of social relations. There would, therefore, be no basis for claiming compensation for them even if it were part of a rehabilitation policy.

While a separation of rights in water from rights to land is imperative, and there has been an ongoing debate in India on the subject, it remains difficult to operationalize. Besides, in a setting where contiguous tracts of land are acquired for such activities as the development of SEZs, a separation of rights in water would have little significance unless periurban residents are compensated for the water to which they lose access. Needless to say, assigning a value of compensation for the access to water that is lost (groundwater beneath private agricultural lands or village ponds that are located on lands that are acquired for other purposes) is going to be methodologically, ideologically and operationally complex.

At a more fundamental level, as noted earlier in this paper, periurban governance challenges arise because of the fragmented approach to urban and rural development. Urban authorities define their mandate narrowly in terms of developing urban areas, not accounting for its rural consequences. The mandate of HUDA, for instance, is defined in terms of the development of urban areas, even when it entails land acquisitions from rural areas. HUDA does not have as part of its mandate how to deal with the (rural) consequences of land acquisition for (urban) development, such as the erosion of rural livelihoods or the loss of access to CPRs.

Further, conspicuous by its absence is a platform for interaction between the village Panchayat and HUDA to debate or negotiate on matters of land acquisition, or its consequences. There is no mechanism for the mediation of the land acquisition process. The village Panchayat has had little role in this, and seems to have been subordinated by HUDA in this context.

The whole process of land acquisition by the state government is a somewhat mechanical activity, comprising the issuance of a notice, the filing of records by the *patwaari* (village level record keeper), and the disbursement of compensation. The interaction of the village Panchayat is with the block level authorities further up the hierarchy in the three-tier Panchayati Raj system and not with the urban bodies like HUDA.

As India continues to urbanize, an important challenge will be to integrate planning for urban and rural development. An important thrust in the report of the Rural Urban Relationship Committee (1966) was to explore inter-institutional problems to deal with rural-urban interactive growth; essentially the committee recommended urban development in the twilight zone of rural-urban interaction. The 74th Amendment to the Constitution of India provides an entry-point and an opportunity for this by suggesting the creation of DPCs (District Planning Committees) and MPCs (Municipal Planning Committees). The mandate of these committees is the effective integration of rural and urban planning and spatial and economic development for the entire district (Brook et al., 2003). The state of Karnataka has seen the emergence of the joint Planning Boards to bridge the gap between urban and rural planning in each district.<sup>7</sup> There is a need for creating such organisations on a larger scale to integrate and address the concerns of the PUI.

### **Potential of Local Level Approaches**

In periurban areas, which are in transition from rural to urban, and have inadequate institutional cover, and are difficult to bring directly within the purview of rural and urban

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<sup>6</sup> For a recent analysis of this, see Mishra et al. (2008).

<sup>7</sup> However, in practice, only one such example is found in Bellary District of the state (Brook et al., 2003).

jurisdictions, community-based organisations have enormous potential to improve local environmental conditions, to resolve political conflicts in governance and to scale up environmental management activities (Dahiya, 2003). There are several cases of local level action in addressing the periurban challenges world-wide, and in India, that offer important lessons for scaling up and replicating.

*The experience of community-based organisations in Colombo, Sri Lanka*

The CMC (Colombo Municipal Council) adopted new approaches to address the problems of periurban areas (Dayaratne and Samarawikrama, 2003). It introduced an intervention in the low-income communities of urban and periurban areas; the intervention comprised the organisation of periurban dwellers into community-based self-help groups called CDCs (Community Development Councils). Supported by the Public Health Department, the programme was aimed at low-income groups, with a focus on such activities as health education, social awareness, self-help methodology and environmental hygiene. Environmental Management was an important thrust area, especially, sanitation that was either not available or inadequate. 300 settlements with a population of about 75,000 residents were organized into CDCs. Community Action Planning was undertaken.

This project enabled most of the 300 communities to obtain financial and technical assistance from the CMC and other agencies to upgrade and scale up communal amenities in the periurban areas, such as communal toilets, stand-pipes for water, covered drains, paving of access roads, as well as women's income generating activities. They also made links with nearby churches and temples to obtain regular religious services that were normally denied to new inhabitants. Since 1987, and after the setting up of the provincial councils the CDCs have extended beyond the urban region to the periurban and rural areas of the western province.

The case of the CMC basically points to the need for and potential of building local level collective institutions. On account of the unique nature of periurban problems, characterized by poor institutional cover, the formation of self-help groups provides a viable entry point to ameliorate problems arising from inadequate access. However, the formation of such self-help groups requires the presence of strong catalysts like NGOs at the local level, or strong local leadership. An important issue is also the sustainability of such organizations and their ability to garner an independent financial resource base. Besides, since periurban areas are often characterized by migration and the resultant erosion of social capital, building such collective institutions can be a difficult task.

*Revival of awami tanks in Karachi, Pakistan*

Similarly, Municipal water supply in Karachi had become grossly inadequate with regard to users' needs and expectations; this was particularly true of periurban locations, especially low-income settlements that have very limited access to municipal water supplies (Ahmed and Sohail, 2003). A solution was found in the use of *awami* tanks (community-managed public tanks). Communities with the support of public agencies were able to generate cooperative solutions to address their basic needs by reviving the *awami* tanks. However, the assumption that there would be some day, soon a piped water supply put off extending *awami* tank operations.

The case of the revival of *awami* tanks points to the potential of reviving local water sources that are collectively managed; in the four villages studied in this paper, this would point to the potential of and need for reviving *johads* through recharge measures and strengthening the norms, customs and practices associated with their maintenance. However, in periurban areas, migration and loss of interest in agriculture pose practical constraints to maintaining an interest in the preservation of common property resources. Besides, many of these water sources are

often filled and acquired for residential and other urban uses, as seen in the villages chosen for this study.

#### *Participatory Action Planning in Hubli-Dharwad, India*

Research and community-based action plans were formulated in 2000-01 on improving livelihoods and enhancing the natural resource base in six periurban villages of Hubli-Dharwad in Southern India (Halkatti et al., 2003). The implementation of this initiative brought out the strong relevance of partnerships among several actors in addressing the periurban agenda. These interventions were made possible through collaboration among the University of Agricultural Sciences, the BAIF Development Research Foundation, India Development Service, Best Practices Foundation, the University of Wales, Bangor, Community-Based Organizations and public organisations as the Hubli-Dharwad Municipal Corporation, Hubli-Dharwad Urban Development Authority, the Dharwad Zilla Panchayat, the Karnataka State Pollution Control Board and others.

The activities of the Shri Shankara Mahalir Manram were effective in addressing similar concerns in Pammal, a small town on the periphery of Chennai in Southern India (Dahiya, 2003). Both the above initiatives point to the need for platforms for bringing together diverse stakeholder and actors. However, such initiatives work when actors can act through a shared vision, with adequate support from local governments.

#### **Conclusion**

As India continues to urbanize and cities expand with an enlarging ecological foot-print, integrating rural and urban planning will be extremely important to mitigate the negative impacts of this. In the absence of a property rights structure for water or institutions for integrated water resource management across urban and rural areas, conflicts over water will continue to intensify. While some of these will be visible, others shall be more tacit, such as the loss of water sources as a result of land acquisition.

As shown in this paper, there is a variety of ways in which current patterns of urbanisation impact periurban residents' access to water. They may lose access to groundwater as water tables fall in response to new demands for industry or recreation or lands overlying aquifers are acquired; the periurban residents' access to water sources may get disturbed through the construction of highways and widening of roads; factories may get relocated to village peripheries and contaminate the local environment and water sources. Besides, traditional sources of water like village ponds may get filled and acquired for residential and other urban purposes. These processes particularly affect landless and minority groups whose dependence on such CPRs tends to be quite high. In the absence of adequate institutional cover, the pre-emption of water sources for urban purposes places them out of the reach of rural population, with adverse implications for their quality of life and human well-being. The absence of a property rights structure for water leads to a situation where water access is insecure; furthermore, since rights to water are tied to rights to land, it follows that land acquisition also diminishes the access of periurban residents to water.

Conventional approaches to urban and rural development will be ineffective in ameliorating the concerns of periurban dwellers in the absence of direct local level action in which NGOs, community-based organisations and periurban residents themselves have a role to play. This requires the creation of platforms that bring together rural and urban governments, planning authorities and periurban residents, even though the actual functioning of these platforms will be shaped by power relationships among the actors. Such recent efforts have been underway in Chennai in South India (Janakarajan, 2009).

The proposal for the creation of District Planning Committees noted in this paper provides a viable entry point for integrated planning, though much would depend on the political will in Indian states to carry this out. The potential of local level approaches as demonstrated in the examples provided in the paper suggests the need to support such local level initiatives wherever they exist.

Generalisations are difficult - much localized approaches to analyze these changes are needed, employing process documentation, participatory and ethnographic research. These should then be used as a basis for devising local level interventions. Managing a fluid resource across fluid boundaries is not going to be easy; but nevertheless, an essential challenge for planners and policymakers in the years to come.

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