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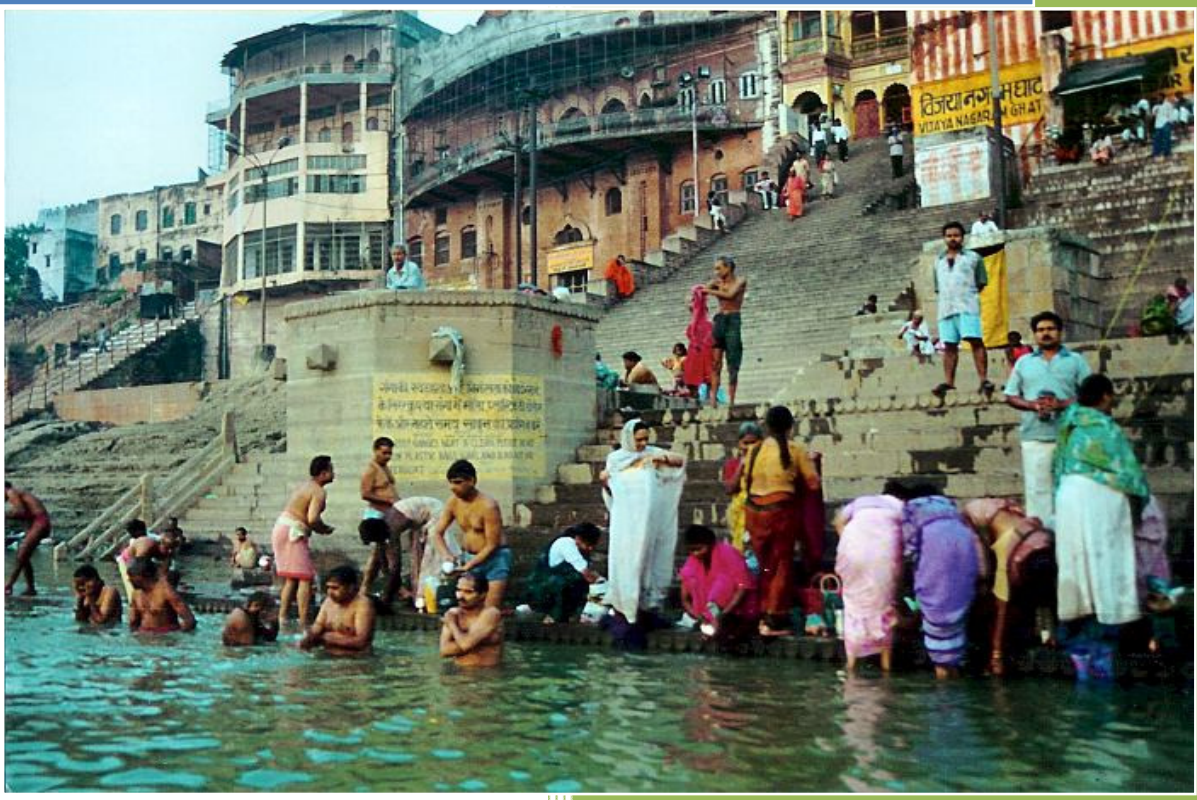
INTL 442

India: Urbanization, sustainable development and poverty alleviation



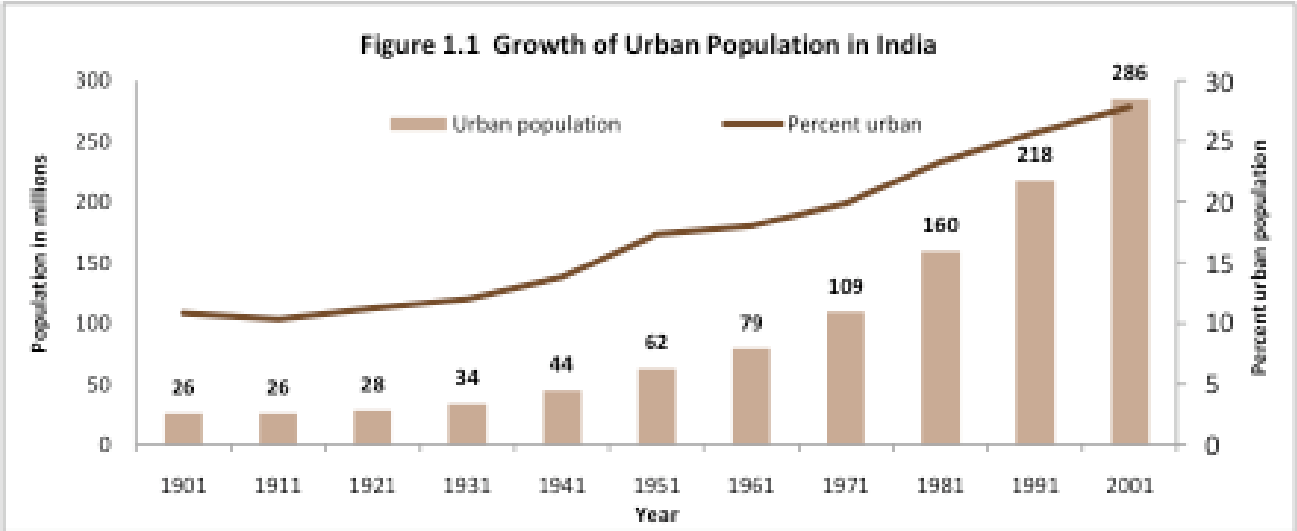
Introduction

In September of 2000 leaders of the world came together at the Millennium Summit to create the Millennium Development Goals (MDG's); a set of goals to improve the current global climate. These goals have been fundamental in the struggle against poverty worldwide and greatly influence regional policy. The goals are as follows: end poverty and hunger, achieve universal education, gender equality, child health, maternal health, combat HIV/AIDS, promote environmental sustainability and achieve global partnership by the year 2015 (UN Millennium project; 2006). This report will focus on India's efforts to achieve environmental sustainability in conjunction with population growth, environmental policy, climate change, rapid urbanization and goals to mitigate such effects for the future.

In accordance with the seventh MDG, to ensure environmental sustainability, new stipulations were conceived at the Copenhagen Climate Summit in December of 2009. (BBC News; 2009) At the summit India pledged to cut their carbon emissions by 20-25% in the next ten years. (BBC News; 2009) While this announcement came as a shock to many because of India's previous refusal to stipulate a figure for their emissions, it shows India's true commitment to combat environmental issues that have previously, and will continue to have detrimental effects on India's health and economy.

As the world's 4th largest emitter, India is under a lot of global pressure to reduce their emissions; it is also however in the best interest of its 1.3 billion people who are considered the most vulnerable nation in the world to climate change by the Indian Minister of Environment. (Revi 2008; 208) Over the next 40 years however India is expected to undergo one of the largest shifts in history; its population is expected to reach 1.6 billion by 2060 and its urban population

is projected to more than double from 300 million to 700 million. (Revi 2008; 208) With this massive increase in population density India's vulnerability to environmental hazards and disease will continue to grow unless greater regional strategies are implemented. Such cooperation has the power to make the dreams of SAARC (South Asian Association For Regional Cooperation) a reality.



Effects of Climate Change

Climate change can manifest in a multitude of ways, from a rise in sea level to a change in precipitation. Small imbalances or changes can have lasting and devastating effects on unsuspecting communities. Populations near the coast, in low-lying areas, or near major rivers are more at risk to current climate hazards such as cyclones, high winds, flooding, coastal erosion, and sea-level rise. (Bhagat 2007; 2)

In terms of environmental vulnerability, precipitation is a major concern especially for low lying areas susceptible to flooding. With a projected 10-20 percent increase in monsoon

precipitation and 7-20 percent projected annual increase in precipitation in many regions, vulnerability to flooding is higher now than it has ever been and will continue to threaten poor communities that make up half of India's urban population. (Revi 2008; 213) Flooding can have numerous effects particularly on health in urban areas. Flooding decreases sanitation, wipes out infrastructure, causes massive dislocation and gives rise to water borne diseases such as diarrhea, cholera and typhoid. (Kumar 2008; 37)

Mumbai is especially vulnerable to flooding because of its population density as well as the fact that the majority of the population lives in low-lying areas. (Kumar 2008; 38) These areas are dominated by the urban poor who are vulnerable on a number of fronts to environmental hazards. Rising sea levels and poor drainage systems also contribute Mumbai's vulnerability. (Revi 2008; 220) Flooding can also have negative effects on high rise buildings, affecting the general structural stability of most urban infrastructure. (Kumar 2008; 45)

Mumbai Floods

While affects of climate change on flooding are expected for the future there have already been a number of environmental disasters that have affected the region. On July 26, 2005 Mumbai was hit with 94 cm of rain in less than 24 hours, one of

Figure 1 Low-lying areas in South Mumbai

the highest amounts of rainfall in one place ever recorded. (Bhagat 2007; 7) Over 1000 people perished in the region, water inundated almost every corner of the city and the majority of city services shut down for an unprecedented five days. (Revi 2008; 215) While the rich were also affected by this disaster, the 49% of Mumbai's population that lives in rural slums were hit the worst.

The reasons for this disaster are numerous and heavily debated however, Mumbai was not alone in their post-disaster struggle. Both Chennai and Bangalore were also affected by major downpours that rendered their cities immobile. Some commonalities can be drawn for all areas affected by this environmental disaster:

- Densely populated urban areas (high vulnerability)
- Lack of early warning systems
- Urban planning deficiencies
- Environmentally threatened

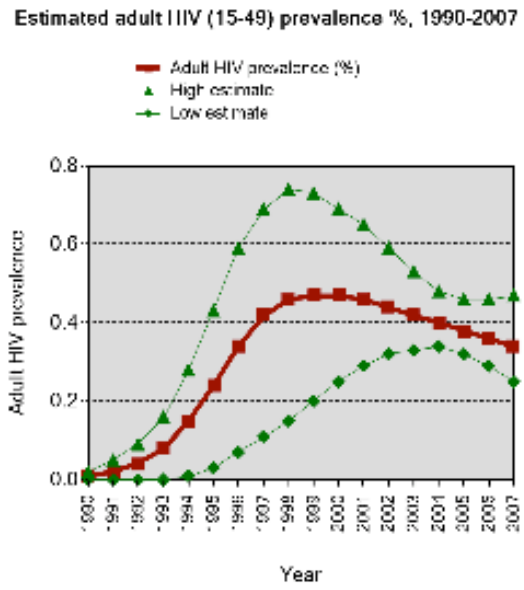
List courtesy of (Revi 2008; 215) and (Bhagat 2007; 8)

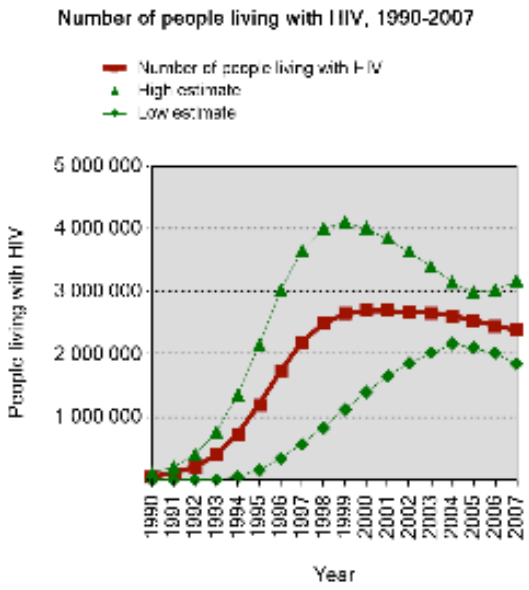
The urban planning deficiencies that are clear from the experiences of Mumbai, Chennai and Bangalore are characteristic of disaster vulnerability that is affecting most urban cities in India as well as throughout the South Asian region. However disaster vulnerability does not only affect the slums; increased frequency of disasters and poor response systems are undermining development agendas, the accumulation of wealth, and security throughout the region. (Bhagat 2007; 6)

With an unprecedented 1.3 billion people living in India today, according to the World Bank, unsustainable and short term thinking behind development also greatly contributes to environmental vulnerability. It is clear from present land use of the city that the environment in

most areas is being marginalized in exchange for urban development, wiping out many mangrove forests and open green areas that serve as carbon sinks for the region.

Water scarcity is another major problem in the region. While climate change can cause heavy downpours it can also exacerbate the frequency and severity of droughts across the region such as the 1943 Bengal famine that was caused by a major drought throughout the region and claimed many lives. (Rothermund) Because Indian agriculture is heavily dependent on the monsoon season for water as well as food production to feed its people, droughts have had devastating effects across India.





HIV/AIDS

According to the World Health Organization in 2007, within India the AIDS/ HIV virus had affected approximately 2.4 million people. In December 1999, the National AIDS Control Agency Organization, Ministry of Health and Family Welfare launched the AIDS Control Program-II. The program urges growing partnerships between the government, NGOs and civil

society. The programs two main objectives are to reduce the spread of the HIV infection and to strengthen India's capacity to respond to HIV/AIDS on a long-term basis. The program has already developed community care centers for people living with HIV/AIDS, school AIDS education and a National AIDS helpline. (Ministry of Health and Family Welfare 2007)

Pollution

An Indian architect working on city planning and sewage mitigation once said: "All the ills of urban development exist in this one city, [New Delhi]." Environmental pollution problems, especially those that resulted from afflicted water causing diseases, were identified by the beginning of the century in India (Gandhi). In 1968 the UN decided to hold a conference on the human environment, the first time this kind of dialogue had ever been proposed. According to Indira Gandhi, "the environmental problems of developing countries are not the side effects of excessive industrialization but reflect the inadequacy of development" (Gandhi). Also according to Indira and many other "developing" countries, development is essential to improving the "environment of living" (Gandhi). Development, although it does have its detriments, provides food, water, sanitation, and shelter to billions of people around the world. India has recently been praised for their innovative techniques in entering the global economy, but pollution levels in the soil, water, and air may be hindering this country's ability to sustain their economic growth. The distribution of trace metals (Cu, Zn, Fe, Mn, Cd, Cr, Pb, and Ni) have been found in the water of dozens of the country's rivers. This is especially evident in the bed sediments of the River Hindon and the River Yamunav (Sharma 2000). India has excelled in many areas of economic development, but pollution is one they are still struggling with.

Indoor air pollution

Although fossil fuels, hydropower and nuclear power supply most of human society's direct energy needs, a majority of the world's population relies principally on fuel wood, animal dung and crop residues for their fuels (Smith 2000). Because many of these alternative energy sources are found in rural areas, it is the rural people who are most susceptible to indoor air pollution (IAP). Due to lack of infrastructure and cooking technology, the air quality in rural homes is almost always sub-par developing countries where the majority of households rely on solid fuels (coal or biomass as wood, crop residues, and dung), but there are many remaining uncertainties (Smith 2000). Arsenic has been found in groundwater in seven districts of West Bengal a population of about 34 million people. Recent surveys indicate that 560 villages are arsenic-affected and more than a million people are drinking arsenic contaminated water and more than 200,000 people are suffering from arsenic-related diseases, most commonly children (Smith 2000).

There is consistent evidence that indoor air pollution increases the risk of "chronic obstructive pulmonary disease" and "acute respiratory infections in childhood", the most important cause of death among children under 5 years of age in developing countries (WHO 2001). Evidence also exists of associations with "low birth weight, increased infant and prenatal mortality, pulmonary tuberculosis, nasopharyngeal and laryngeal cancer, cataract, and, specifically in respect of the use of coal, with lung cancer and asthma" (WHO 2001). According to a 2008 World Health Organization study "Exposure to indoor air pollution may be responsible for nearly 2 million excess deaths in developing countries and for some 4% of the global burden of disease."

To mitigate this principally rural issue, the government of India has taken urban steps to stop the emissions of chlorofluorocarbons. They see the ever-expanding cities as the first step

towards setting a “green” example. Four companies in India “Gujarat Fluorochemicals, Chemplast Sanmar, Mafatlal Industries and SRF Ltd. account for approximately 15 percent of the world’s production of CFCs” (Oh). Those companies announced they plan to introduce cleaner production technologies to limit the amount of "rogue" CFC emissions that escape into the atmosphere. This is a huge step for the country to work towards being as how India has emerged as the world's second biggest manufacturer of CFCs after China (Oh). As part of the Montreal Protocol, India agreed to a phase out the production of CFCs and other ozone-depleting chemicals through a slow and meticulous process. Under the Protocol, India and other developing nations created timetables and financial assistance to slowly eliminate the production of these ozone-depleting chemicals. Along with taking drastic corporate action, these mega companies have plans to support public awareness campaigns aimed at medium-sized companies who are trying to expand (Oh). The majority of these programs are targeting refrigerator and air-conditioning manufacturers and are educating and offering incentives for these companies to produce more green technologies.

Waste disposal

There has been a significant increase in MSW (municipal solid waste) generation in India in the last few decades (Pandey 2000). This is largely because of rapid population growth and economic development in the country. Solid waste management has become a major environmental issue in India especially due to population growth. For example, the population of Mumbai grew from around 8.2 million in 1981 to 12.3 million in 1991, registering a growth of around 49% (Pandey 2000). As a result, the MSW generated in the city increased from 3 200 tons per day to 5 355 tons per day in the same period registering a growth of around 67%

(Pandey 2000). This trend can be ascribed to our changing lifestyles, food habits, and change in living standards. By many standards India is still considered to be a "developing nation." Modernization often results in increased levels of pollution as India has shown. In India transportation and disposal of solid waste is "unscientific and chaotic" (Gupta 2001). Another reason for poorly kept disposal sites are the limited revenues marked for the municipalities. These limitations make them ill-equipped to provide for high costs involved in the collection, storage, treatment, and proper disposal of MSW (Pandey 2000). As a result, a substantial part of the MSW generated remains unattended and grows in the heaps at poorly maintained collection centers.

Uncontrolled dumping of wastes on the outskirts of towns and cities has created overflowing landfills and very polluted rivers. This irresponsible strategy of dumping is not only dangerous for the communities surrounding the rivers, but it also has serious environmental implications in terms of ground water pollution and contribution to global warming. The poorly maintained landfill sites are prone to groundwater contamination because of Leachate production. Open dumping of garbage facilitates the breeding for disease vectors such as flies, mosquitoes, cockroaches, rats, and other pests (Pandey 2000). Another issue India faces when it comes to waste disposal is land availability. India simply does not have enough open land to account for the rising levels of waste it has to make room for (Pandey 2000). Many rural communities still practice unsafe and unsanitary methods of waste disposal, the most common method being burning. "Burning of waste leads to air pollution in terms of increased TSP and PM sub (10) emissions, which is equivalent to vehicular emissions at times" (Gupta 2001). Without proper waste disposal practices, recycling has been very difficult to implement. For many traditional societies existing in India, the idea of recycling is far too complex, or in some

cases impossible, to implement because of lack of resources or information about proper techniques. However, though recycling is a fairly recent phenomenon, programs, especially NGO based ones, are bringing recycling and waste disposal programs to rural people. Paper and plastic recycling have been especially growing "due to continuously increasing consumption levels of both the commodities" (Gupta). However, India needs more guidance in terms of policy and guidelines to enable the municipal corporations to run the waste services efficiently.

Water pollution

Pollution of ground water has been reported for a number of urban aquifers throughout the world. Madras is home to about 3.7 million Indians, many of which are dependent on the basic well system that was established in 1866. This system however, was only meant to sustain about half a million people (Ravindran 2001). This is the issue with many of the cities in India. Failure to adapt to the growing population has allowed for continual pollution of the Indian River system. In three of India's major rivers "a very wide range of pollutants has been recognized, including N species, heavy metals, chlorinated hydrocarbons, phenols, cyanide, pesticides, major inorganic species, and bacteria" (Ravindran 2001). Water pollution is the single most pressing issue regarding India's environmental stability.

The Yamuna River is the largest tributary river of the Ganges in Northern India. It crosses several states, Uttarakhand, Haryana and Uttar Pradesh, passing by Himachal Pradesh and later Delhi. Throughout history, this river has provided transportation as well as cultural significance to the people of India. Ancient Hindu mythology depicts Yamuna as the daughter of the Sun God and the river has been historically worshiped for thousands of years. However, according to a recent CNN article, this river can almost no longer support life. According to

Sunita Narain, director of the Centre for Science and Environment, “Garbage cascades down its banks, giving off a fetid stench. And half of the city's raw sewage flows into its waters. "The river is dead, it just has not been officially cremated" (Ravindran 2001).

The government has spent nearly $500 million trying to clean up the river, most of it going to waste-treatment stations, yet pollution levels more than doubled from 1993 to 2005 and they continue to rise (Pepper 2002). The problem is that 11 of the city's 17 sewage-treatment plants are underutilized; a quarter of them run at less than 30 percent capacity. New Delhi is currently home to 15 million people who use the river for many means of waste disposal, the majority of which are unfiltered and unmonitored. A majority of the waste pouring into the river comes from “unplanned communities” along the river. These communities are slum towns that have slowly been built on unstable and underdeveloped plots of land. The Centre for Science and Environment says that nearly 80 percent of the river's pollution is the result of raw sewage and this same 80 percent flows directly into the rivers (Pepper 2002). As India’s population grows so do its slum towns. This comes with the inability to deal with the need for infrastructure improvement projects.

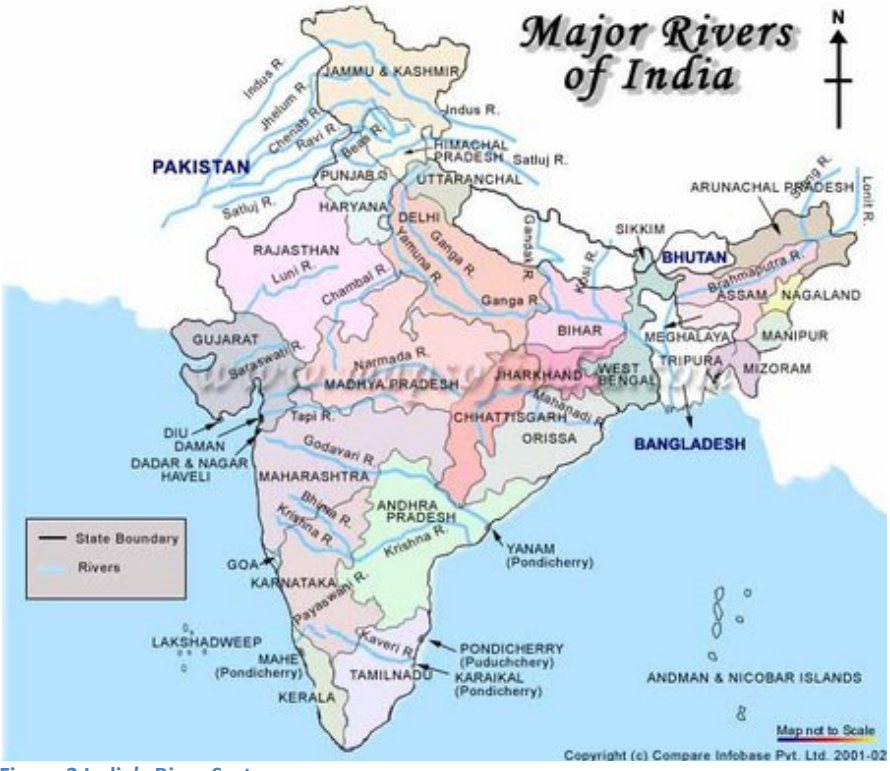


Figure 2 India’s River Systems

Also according to CNN estimates, waterborne diseases are India's leading cause of child mortality. Shreekant Gupta, a professor at the Delhi School of Economics who specializes in the environment, "estimates that lost productivity from death and disease resulting from river pollution and other environmental damage is equivalent to about 4 percent of gross domestic product" (Pepper). Similarly the chief minister of New Delhi believes that the government is following the recommendations of "outside consultants who encouraged the building of expensive sewage-treatment plants" (Pepper). However, the government did not anticipate the surge in migration of rural poor to New Delhi. The government is growing tired of spending money with sub par results. New Delhi's population growth rate of 9% a year is no match for the current infrastructure. As of right now eight federal agencies oversee the clean-up process of the Yamuna. One of the largest obstacles facing these agencies is the lack of accountability and cohesive information sharing according to the chief minister. Right now a competition for funds and a lack of agency collaboration is the largest issue facing the clean-up of the Yamuna River (Peter).

However, some scientists and civil engineers believe that India's water pollution can be controlled. Indian Architect Manit Rastogi, believes that "age-old drains can be transformed into scenic lakes with walkways and cycle tracks alongside" (Singh). He believes that technological interventions can revamp India's astonishingly polluted river system. Outdated systems called "Nullahs" were constructed hundreds of years ago to carry rainwater to the river. Now the nullahs act mainly as a waste transportation system (Singh). His plan is to create sewage blocks that will stop the waste flow before it enters the Nullahs. His plans have been proposed to authorities and he plans to finish at least three models by the end of 2010.

The Indian Government has also taken cultural and religious action to keep the Ganges clean. Signs that read: "Avoid using pollutants such as detergents and soaps in the holy Ganga" are located in many popular bathing spots along the river. Also according to the Indian Government, "the Ganges is the centerpiece of India's multi-million dollar conservation effort" (Singh 2001).

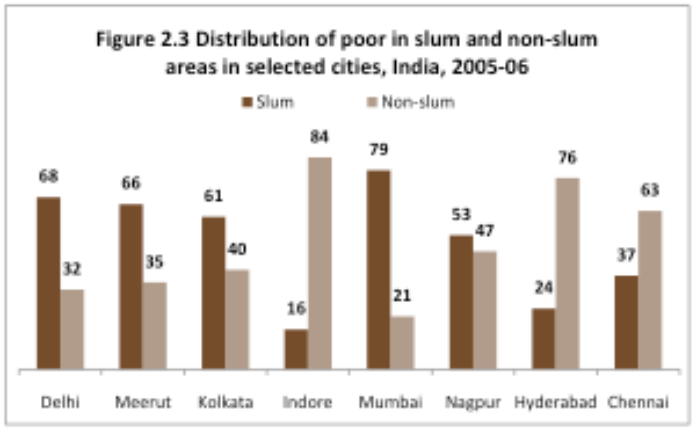
Slum conditions

According to the Ministry of Family Health and Welfare, from 1991 to 2001, India's annual urban population grew at a rate of 3%, however, India's slum population increased annually at a rate of 5%. (National Family Health Survey, 2006) Slums have existed in India and around the world for years however the definition of what epitomizes a slum is fiercely contested. What is a slum? According to the UN Habitat's official operational definition, a slum is,

"An area that combines, to varying extents, the following characteristics restricted to the physical and legal characteristics of the settlement: inadequate access to safe water, inadequate access to sanitation and other infrastructures; poor structural quality of housing, over-crowding and insecure residential status."

Under section 3 of the Slum Area and Improvement Act (Improvement and Clearance Act)(Act No.96, 1956) an area is legally considered a slum if competent authority reports that any areas are: "a) In any respect unfit for human habitation; or b) are by reason of dilapidation, overcrowding, faulty arrangement and design of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light, sanitation facilities or any combination of these factors which are detrimental to safety, health and morals." Therefore, for an area to be formally

designated by the government of India as a slum, it must meet these particular criteria. However, India's slum population does not account for the millions of impoverished, unrecognized squatter settlements and other populations residing in inner-city areas, on construction sites and within urban fringe areas. Research across many cities has even shown that there are often more poor "unaccounted" for outside slum areas than within them (UN Settlements Program 2003). Informal settlements not recognized as legal slums under the government definition of "slum" do not receive various government services such as access to clean water, trash collection and do not qualify for redevelopment schemes.

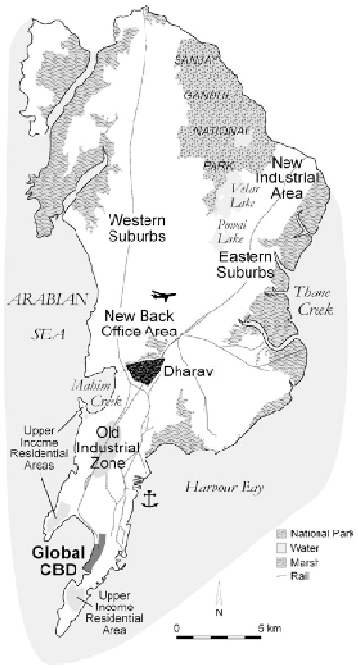


Socioeconomic aspects of urban housing

There are many overarching, similar demographic characteristics in the settlers of slums and non-slums. Firstly, due to rural-urban migration patterns, cities generally have more males than females. Additionally, in most slums and poor, urban areas the vast majority of the population is considered to be part of the working age group 15-59. (NFHS-3) Furthermore, the slum offers slum- dwellers a specific identity and concrete sense of community. Even in urban settings, the Caste system continues to play an important role where, "Positions in the caste hierarchy are closely associated with professional status. For example, the Kumbars (potters), are a 'caste', a neatly defined cultural ethnic group, and an industry all at once." (Nijman 2003)

Mumbai's Slums and the Dharvai Redevelopment Program

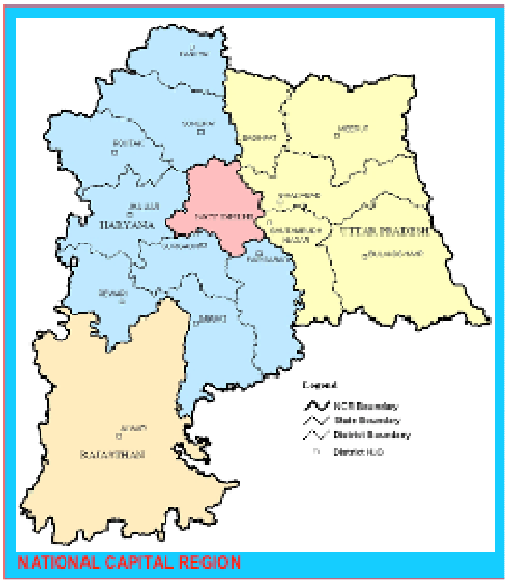
As India's most populous city and financial center, Mumbai is a center for culture and commerce. However, it is also home to India's largest proportion of slum-dwellers. Mumbai's slums now house at least half of the population of Greater Mumbai. It is estimated that Mumbai's slum population lives on only 16% of the land area depicting the existing inequities and socio-economic disparity of the region (SPARC). In January of 1975, the Mumbai Metropolitan Region Development Authority (MMRDA) was established as a body for the planning and co-ordination of development activities in the region. Between 1985-94, the MMRDA coordinated and oversaw the Mumbai Urban Development Project (MUDP). Additionally, the MMRDA implemented the Land Infrastructure Servicing Program (LISP), which developed 88,000 service sites in Greater Mumbai. Furthermore, under the Slum Upgradation Program (SUP) over 35,000 Slum households in greater Mumbai were upgraded. As depicted in the map below, Dharvai's central location has led to the slums becoming the focus of a multi-billion dollar government redevelopment program known as the Dharavi Redevelopment Project (DRP). The project included dividing Dharvai's central high value land area into five sectors to be developed by domestic and international firms. The project further stipulates that firms must provide, "eligible, slum-dwellers with free flats and small commercial spaces in multi-story buildings and construct needed infrastructure at no cost to the government."



National capital region

Due to urbanization, India's second largest city, Delhi has experienced an exponential increase in population density from 1176 persons per sq km in 1951 to 9,294 persons per sq km in 2001(Economic Survey of Delhi). The Delhi National Capital Region spans a total area of 33,578 sq km making it the world's largest urban agglomeration. The National Capital Region (NCR) includes not only the National Capital Territory of Delhi, but also the territories of the neighboring states of Haryana, Utter Pradesh and Rajasthan. The Delhi Development Authority (DDA) was established in 1957 with a master development plan following in 1962, which called for the development of 44,770 hectares of urban area by 1981. Subsequently, development of an additional 4000 hectares of urban area at Patpar Ganj, Sarita Vihar and Vasant Kunj was added in the target of the first Master Plan.

The first Master Plan for Delhi (1961-81) was reviewed and amended for its extension for another twenty years by DDA and published in 1990. This amended Master Plan (Second Master Plan 2001) envisioned the acquisition of 20000 hectares of land for urban area extension of Delhi by 2001 with a target for development of 68,770 hectares of urban area. In 1985, The National Capital Region (NCR) Planning Board under Section 10 of the NCR Planning Board Act, prepared draft Regional Plan-2021 for NCR. The plan aims to," Promote growth and balanced development of the whole region by providing an economic base in the identified major settlements (Metro Centres/Regional Centres) for absorbing economic development impulse of Delhi, efficient transport network, development of physical infrastructure, rational land use pattern, improved environment and quality of life."(Ministry of Urban Development 2003)



Furthermore, the plan attempts to,

- Develop model industrial Estates/Special Economic Zones (SEZs) outside NCT-Delhi
- Adopt investment strategies to restrict less desirable economic activities by not allowing new industrial areas, wholesale trade areas and office spaces in NCT-Delhi.
- Facilitate value-added high-0tech service sector in Delhi in the context of its emergence as a global city in the world economy

In addition to providing shelter the plan calls for:

• Public agencies to act as facilitators.

• Reforms for easier acquisition of land.

• Housing stock to be increased through Foreign Direct Investment (FDI).

• Joint approach/venture between DDA/GNCTD with the development authorities/agencies of the towns in NCR for provision of housing.

By creating industry, job opportunities, transportation systems, suitable water, waste management program and shelter provisions etc, the Regional Plan-2021 attempts to develop

NCR as an integrated spatial system of urban and rural settlements to accommodate economic activities and to provide socio-economic opportunities and infrastructure for all, including the economically poor sections of society. The government of India hopes the development of the NCR will result in migration from the National Capital Territory of Delhi (NCT) to the greater National Capital Region.

Urban Transportation

Urban transportation in India's cities, including private and public transportation is extremely lacking. The area of land in India occupied for streets and roads is substantially less than in much of the developing world. (Singh 2003) Additionally, urban rail services are extremely limited. However, as evident in the NCR regional plan 2021 the efforts and initiatives aim to better public transportation. In terms of transportation the NCR regional plan 2021, attempts to provide:

•Better integrated connectivity and accessibility in the region through development of Peripheral Expressways and Mass Rapid Transit System (RRTS).

•Unrestricted movement of buses, taxis and auto-rickshaws in NCR.

•Rail link between Rewari-Bhiwadi and Rohtak-Hansi

Furthermore, the Bombay Urban Transport Project began in March 1977 to improve the bus transport system in Mumbai. The projects achievements include:

- Procurement of 700 buses for BEST
- Construction of five fly-overs on the main arteries of Mumbai

- Construction / improvement of five bus depots and part of major workshop for BEST
- Installation of new micro processor based integrated traffic signals at 77 junctions
- Construction of pedestrian bridges and underpasses at important junctions, road/bridge widening/extensions and channels
- Provision of new bus shelters and terminal.

In a sequel to the BUTP, the MMRDA developed the Mumbai Urban Transport Program (MUTP) to develop suburban railway projects, local bus transport, new roads, bridges, pedestrian subways and traffic management activities. The Mumbai Rail Vikas Corporation was set up as a joint venture of Railways and government of Maharasta to implement all Railway projects in the Mumbai Metropolitan Region (MMRDA)

Urban poverty alleviation

While the number of environmental concerns that plague India's urban areas today are numerous, efforts are being made to decrease the severity of such issues are equally as numerous. The government of India has taken part in a number of international agreements, and implemented a variety of programs, that have helped curb some negative effects of urbanization, climate change and population growth.

One such program has been successful in Chennai , India where Rain water harvesting (RWH) has found new success. The traditional wells in Chennai dried up years ago because of overuse from the ever growing urban population; people are now forced to drill wells that can do up to 200 feet deep and will not sustain the demand for water in the future. (Krishnan 2002) In addition water that is received from these wells is often unfit for drinking. (NDTV 2010)

This program, backed by a number of grass roots initiatives such as Akash Ganga have created a number of RWH campaigns. The program uses a simple design to collect rainwater from the roofs of houses and then filters it through a chamber of bricks and sand. (Krishnan 2002) If this program continues to be implemented on a larger scale RWH has the ability to capture 90% of the annual rainfall in the region and could be used to supply families who would otherwise have slim access to water during the dry season. (Krishnan 2002) Giving people access to water can have tremendous social, and environmental effects on urban communities.

It is no secret that the quality and maintenance of services in urban India have significantly declined however infrastructure programs can help curb some of the negative effects in many areas. Some areas have had success through private investment in service provisions. In 2004 Tamil Nadu, one of India's highly populated urban areas was able to mobilize private investments that totaled $261 million in urban service provisions.

As a result of these programs the state brought in $220 million in private investments to fund their joint endeavor to bring water and sanitation to Tamil Nadu. According to the World Bank 70 percent of health problems are water related in urban areas; consequently the lack of adequate housing, infrastructure and services for poor residents is a major contributor to these water related issues. (World Bank 2000: 141) In addition to water borne diseases, environmental issues and poverty reduction are also dependant on the quality of the infrastructure sector. (Vyas 2007; 327)

Role of NGOs

In the past, slum improvement has been broadly implemented through the following channels:

• Central Government Policies for Slum Improvement and Poverty Alleviation.

• Slum Improvement in selected cities through international and bilateral aid.

• Slum Improvement & Tenure regularization through State Legislation/ State Government Programs

• Slum Improvement/Redevelopment projects with private sector participation.

• City specific initiatives

However, in recent years NGOs in accordance with the state have achieved great success in poverty alleviation programs within India's cities. NGOs face many opportunities and constraints in collaborating with public and private sector organizations to develop and deliver housing, water and sanitation programs for low income urban families living in the slums. Despite the state's growing willingness to work with NGOs and deliver infrastructure to urban areas, the entry of NGOs into shelter-related activities in South Asia has been slow and erratic. In comparison, NGOs level of participation in other endevors such as health, education and microcredit has been more expansive. Furthermore, the lack of substantial and technical expertise has also served as a barrier to the entry of NGOs into shelter related activities. Charities such as World Vision and other Christian organizations impede NGOs capability to motivate slum -dwellers financial capability and upgrading possibilities because the charities offer the slum dwellers the same services free of charge. (Baruah 2002) In 1995, the Ahmedabad Slum Networking Program was conceived as a large-scale slum-upgrading project with participation by a local government agency, a private sector partner, as well as NGOs and slum residents. It has been sustained for the past decade and now mainstreamed as a major activity of the Ahmedabad City Corporation. (Gautam 2001)The overall objective of the SNP is the empowerment of slum residents of Ahmedabad through physical and social development:

Specific Objectives of SNP

1. To improve the basic physical infrastructure with settlement level and household level services, through partnership of city government, NGO, and community.
2. To enhance community ownership through community participation/ contribution and provision of social services by community members, and maintenance of the infrastructure provided through the resident's association.
3. To promote environmental up-gradation in the city.

CBOs (community based organizations) in each community formed with the help of the NGOs play a central role in mobilizing households and securing their financial contributions. The CBOs actively participate in resolving disputes involving proposed demolitions, site surveys, and infrastructure and also help maintain services after the completion of the project. In implementing the SNP, the various players attempted to create a system of 'decentralized governance' with institutional stakeholders from the public, private and non-governmental sectors. (Das 2003) An example of NGOs ability to truly understand the struggles of the poor is depicted in the Society for the Promotion of Area Resource Centers (SPARC) who created an alliance with the CBO, the National Slum Dwellers Federation (NSDF) and the Mahila Milan CBO. Together the alliance has been successful in mobilizing communities of the urban poor to take a leading role in citywide initiatives for safe and secure housing and infrastructure. The alliance has been actively involved with The Mumbai Urban Transport Project, the Mumbai Urban Infrastructure Project, the Slum Redevelopment/Pavement Dwellers Projects, and the Slum Sanitation Program (SPARC). NGOs have been fundamental in forming face-to-face

interactions with slum settlers and thus are able to understand grassroots realities and constraints better than other actors involved in "multiple stakeholder projects."

Jawaharlal Nehru National Urban Renewal Mission

In 2005, the government of India launched the JNNURM, which aims to encourage reforms, and fast track planned development focused on efficiency in urban infrastructure, service delivery mechanisms and community participation. Through City Development plans (CDP), preparing projects, allocating funds and working together with the private sector through Public Private Partnerships (PPP), the mission hopes to achieve its goals including planned development of identified cities including peripheral-urban areas, outgrowths and urban corridors leading to dispersed urbanization, improved housing and shifting industrial and commercial establishments to conforming areas (Ministry of Urban Development)

Most recently, in the UN HABITAT'S state of the world's cities 2010/2011, Bridging the Urban Divide Address, India is recognized with having India lifted 59.7 million people out of slum conditions since 2000. Slum prevalence fell from 41.5% in 1990 to 28.1% in 2010. This is a relative decrease of 32% demonstrating the fact that India's efforts in slum alleviation have been greatly successful in the last twenty years.

Environmental sustainability

Caught between the persona of a developing nation and an "Asian Giant" India struggles to find a balance between economic development and environmental sustainability. Pressure to reduce emissions and create more sustainable cities however can be greatly beneficial in the fight

against poverty as well as for economic progress. In the last fifteen years India has heavily responded to environmental concerns.

India first signed the Montreal protocol in 1993, marking worldwide commitment and attention to the reduction of CFC and other harmful chemical pollutants that has been known to cause holes in the Ozone layer. The protocol required that all nations who signed the document pledged to phase out harmful chemicals known to deplete ozone. As of August of 2008 India has completely phased out CFC's. Since then India has been awarded the Montreal protocol best implements award and pledged their commitment to decreasing environmental pollutants with a number of policies. Including phase-out projects of ODS (Ozone depleting substances) and investment in non-ODS technologies. (ENVIS 2008) The government of India has also implemented Ozone Depleting Substances (Regulation and Control) Rules, as well as regulations on the production, consumption and trade of ODS in 2000. (ENVIS 2008) Compliance and implementation have carried out under the Environmental Protection
Act of 1986 which began regulating behavior in July of 2000. (ENVIS 2008)

As a result of their participation in the Montreal protocol the government of India has become more aware of environmental challenges and has since implemented a number of successful programs to increase the sustainability of its urban centers. For example in June of 2008, Prime Minister Manmohan Singh released India's first National Action Plan on Climate Change (NAPCC).

New Delhi in particular has had of lot of success implementing environmental programs. (NDTV 2010) Due to efforts of the Department of Environment in partnership with the Delhi Government, the forest and tree cover in Delhi has actually increased due to planting programs in the last ten years. (The Hindu 2010) Tree cover in India's capital city increased from 16 square

kilometers to 123 square kilometers from 2003 to 2005. Forest and tree cover in Delhi now extends more than 300 Sq km and is now considered India's Greenest city. With so many efforts being made to create sustainable cities the success of New Delhi gives hope for the successful implementation of governmental policy in urban areas.

The government of India is also looking to expand their conservation and clean-up efforts to the international community. A few of their proposed waste reduction and clean-up solutions include: "Market actions for waste reduction" (Pandey 2001). This will help keep track of the industries that are principally responsible for the emission of CFCs and water damaging waste. Also, "Mandatory standards for waste reduction" will create an equal atmosphere where all producers are held to the same standards.

India is looking to Germany for this type of model (Pandey). Germany is currently implementing a program in which its people are given incentives for returning packaging to the producer of consumer goods. This also allows India's regulatory industries to take the lead and set a good example for its growing public (Pandey 2001). Another step the government has taken is "education and voluntary compliance" (Pandey 2001). Educational programs will offer consumer education to both the rural and urban areas of India. The adoption of an Environmental Management System will allow for voluntary participation in the countrywide clean-up effort. And lastly "Waste Collection" is high on the government's list of ways to clean-up India. This will allow the country to revamp the existing collection service structure to provide community waste bins that are conveniently placed for the people to deposit domestic waste in both rural and urban areas. This program will also focus on waste separation and recycling (Pandey 2001).

Recommendations for regional integration

- Regional environmental policy that limits pollution and protects forest cover
- Regional laws on the pollution and clean-up of rivers that flow across state-boundaries
- Sustainable urban planning laws that focus on:
    - Disaster preparation
    - Stable building materials and stable foundations
- Regional RWH (Rain water harvesting) programs to ensure potable water, and sustainable agriculture during the dry season
- Further communication and monitored accountability

Conclusion

Today urban India struggles to balance rapid urbanization, environmental responsibilities and economic growth. To say that this task has been and will continue to be difficult is a vast understatement. To correctly form governmental policy in these three areas, it is therefore imperative to aim at improvement through policy rather than looking for one magical solution. For a policy to be effective it must employ compliance and implementation, if not policies will do little to venerate change.

The successes that India has seen in with certain government policies proves that change can me made however in order to accomplish the Millennium Development goals, set forth in 2000, the nations of SAARC must work together to implement policies and programs to mitigate cross-boundary issues. It is only through collaboration and accountability that SAARC and its countries can accomplish their goals.

Works Cited:

Bhagat, R.B, Mohua Guha, and Aparajita Chattopadhyay. *Comitee for International Cooperation in National Research and Demograpgy*. Working paper. 2007. Web. 5 May 2010. <http://www.cicred.org/Eng/Seminars/Details/Seminars/PDE2007/Papers/Mohua-Guha_paperNairobi2007-1.pdf>.

Baruah, Birpasha. "Assessment of Public-private-NGO Partnerships:water and Sanitation Services in Slums." *United Nations Sustainable Development Journal* 31.3 (2007). *Natural Resources Forum*. Web. 2 May 2010. <http://www3.interscience.wiley.com/cgi-bin/fulltext/117987117/main.html,ftx_abs>.

"Delhi Third Greenest City." *NDTVâ™s Greenathon- An Environment Initiative*. Web. 10 May 2010. <http://green.ndtv.com/ecowatch_read.aspx?id=NEWEN20100123943∩=Delhi%20%27third%20greenest%27%20city>.

Das, Ashok K. "Evolving Institutional Arrangements, Scaling Up and Sustainability." *Journal of Planning Education and Research* 213th ser. 29 (2009). *SAGE*. Web

Environmental Information System (ENVIS) Ministry of Environment and Forests Government of India New Delhi Http://envfor.nic.in. "Enviro News." *NEWSLETTER ON ENVIRONMENT & FOREST POLICIES, PROGRAMMES AND ACTIVITIES* 14 (July-Aug. 2008): 1-16. http://www.envfor.nic.in/news/julsep08/environews_jul_sep08.pdf#page=4

Epidemiological Fact Sheet on HIV and AIDS. Tech. World Health Organization, 2008. Web. 07 May 2010. <http://apps.who.int/globalatlas/dataQuery/default.asp>.

Gautam. *Mixing Financial Sources for Slum Upgrading/ Prevention*. Rep. Ahmedabad Slum Networking Programme, 2001. Web. 03 May 2010. <www.egovamc.com>.

India. Ministry of Health and Family Welfare. *Major Schemes and Programmes*. 20 Nov. 2000. Web. 05 May 2010. <http://mohfw.nic.in>.

India. Ministry of Health and Family Welfare. *National Family Health Survey*. International Institute for Population Studies, 2006. Web. 03 May 2010. <www.nfhsindia.org/Manuals/Supervisor_manual.pdf>.

India. Ministry of Urban Development. National Capital Regional Planning Board. *Http://www.spaenvis.nic.in/pdfs/RP-2021.pdf*. Web. 23 Apr. 2010.

India. Ministry of Urban Employment and Poverty Alleviation. *JAWAHARLAL NEHRU NATIONAL URBAN RENEWAL MISSION*. Government of India, 2009. Web. 03 May 2010. <manipur.nic.in/IMC/JNNURM_MoA.pd>.

"India Promises to Slow Carbon Emissions Rise." *BBC News*. 3 Dec. 2009. Web. 25 Apr. 2010. <http://news.bbc.co.uk/2/hi/8393538.stm>.

India:Urban Poverty Report 2009. Rep. United Nations Development Program, 2009. Web. 08 May 2010. <http://data.undp.org.in/poverty_reduction/IUPR_Summary.pdf>.

Gandhi, Indira. "Indira Gandhi, UN Conference on Human Environment." *India: Pollution Control Policy and Programmes O.P DWTVEDI. Indian Department of Political Studies*. Web. 17 Sept. 1972.

Ganj, Malka. "Institute of Economic Growth, University Enclave." *India: Economic Growth* (2000). Web. 17 May 2010.

Jain, C.K, and M.K. Sharma. "Distribution of Trace Metals in the Hindon River System, India." *Journal of Hydrology* (1998). Web. 15 May 2010.

Karn, Sunil K., and S. Gupta. "Solid Waste Management in India: Options and Opportunities." *Department of Environmental Systems Engineering* (2004). Web. 17 May 2010.

Kumar, Rakesh, Shalini Tandon, and Parag Jawale. *Economic Impact of Climate Change on Mumbai, India*. Rep. 1st ed. Vol. 12. WHO: Regional Health Forum, 2008. Web. 3 May 2010. http://http://www.searo.who.int/LinkFiles/Regional_Health_Forum_Volume_12_No_1_Economic_impact_of.pdf

"Krishnan, Ram. Rainwater Harvesting - Model Home in Chennai." *India Together: The News in Proportion - Home Page,* July 2002. Web. 10 May 2010. <http://www.indiatogether.org/environment/water/model.htm>.

Mandal, BK, G. Samanta, and D. Das. "Arsenic in Groundwater in Seven Districts of West Bengal, India - the Biggest Arsenic Calamity in the World." *World Health Organization* (1996). Web. 17 May 2010.

Narayan, Deepa and Elena Glinskaya (eds.) *Ending Poverty in South Asia: Ideas that Work* World Bank Publications, 2006

Nijman, Jan. "A Study of Space." *SAGE* (2009): 1-14. Web.

Patel, Sheela, Jockin Arputham, Sundar Burra, and Katia Savchuk. "Getting the Information. Base Fro Dharavi's Redevelopment." *Environment and Urbanization* 241st ser. 21 (2009). *SAGE*. Web. 03 May 2010. <http://eau.sagepub.com>.

Revi, Aromar. "Climate Change Risk: an Adaptation and Mitigation Agenda for Indian Cities." *Enviornment and Urbanization* (2008). *Sage Publications*. Web. 23 Apr. 2010. <http://http://eau.sagepub.com/cgi/reprint/20/1/207>.

Shah Singh, Harmeet. "Sewage Streams into Scenic Parks? One Man's Goal." *CNN Magazine* (2001). Web. 15 May 2010.

Singhal, Shaleen, and Suneel Pandey. "Solid Waste Management in India: Status and Future Directions." *Environmental Science* (2001). Web. 17 May 2010.

Smith, Kirk R. "AIR POLLUTION AND RURAL BIOMASS FUELS IN DEVELOPING COUNTRIES: A PILOT VILLAGE STUDY IN INDIA AND IMPLICATIONS FOR RESEARCH AND POLICY." *Resource Systems Institute, National Institute of Occupational Health* (2000). Web. 15 May 2010.

Smith, Krik R. "National Burden of Disease in India from Indoor Air Pollution." *CNN Magazine* (2001). Web. 17 May 2010.

Singh. *Urban Development*. Rep. Delhi: Economic Survey of Delhi, 2002. Print.

SPARC, comp. *CITIES ALLIANCE PROJECT ON PRO-POOR SLUM UPGRADING FRAMEWORK FOR MUMBAI, INDIA*. Rep. UN HABITAT, Jan. 2004. Web. 03 May 2010. <www.unhabitat.org/.../2169_12305_Pro-Poor%20Slum%20Upgrading.doc>.

State of the World's Cities-Bridging the Urban Divide. Issue brief. UN HABITAT, 18

Somasundaram, M.V., and G. Ravindran. "Ground Water Pollution of the Madras Urban Aquifer." *India Health & Science: University of Hyderabad* (1996). Web. 14 May 2010.

Pepper, Daniel. "India's Rivers Are Drowning in Pollution." *Fortune Magazine* Mar. 2003. Web. 16 May 2010.

"Tamil Nadus Water Revolution." *NDTVâ™s Greenathon- An Environment Initiative*. 2010. Web. 10 May 2010. <http://green.ndtv.com/ecowatch_read.aspx?id=NEWEN20090110096∩=Tamil%20Nadu%27s%20wat

"The Hindu : New Delhi News : Delhi's Green Cover Goes Up: Report." *The Hindu : Front Page News : Tuesday, May 18, 2010*. Web. 10 May 2010. <http://www.thehindu.com/2008/02/23/stories/2008022353310400.htm>.

"UN Millenium Project." *Millenium Project*. UN Secretary General and the UNDP, 2006. Web. 25 Apr. 2010.

World Bank, 2000, *World development Report 1999/2000: Entering the 21st Century, New York: Oxford University Press. Print.*