Women's Needs, Women's Action: Toilet Development in Urban and Rural

Communities of India

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Dedication

This thesis is dedicated to my Mataji whose strength, courage, dedication, determination, and unconditional love inspired me to tell the following story of the Devis of India.

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I would like to acknowledge my thesis supervisor, Amy Slaton. Thank you so much for all of your wisdom, guidance, patience, and support.

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The desire for the toilet, one of the most basic of facilities, is expressed by many throughout India, especially women. Sixty-six percent of the urban population either do not have access to a toilet at all or must rely on bucket latrines (Pathak, p. 5). Ninety percent of the rural villages of India have no access to a toilet (Pathak, p. 4). The lack of availability of proper toilet amenities hits women the hardest in both the urban and rural sectors of India. In urban cities, workplaces, schools, and recreational areas are inadequately supplied with toilet facilities for women. Often, women must walk for kilometers before they can find proper amenities. This situation is even worse in rural areas where not only is supply limited but women, as the care-takers of the latrines, must transport water from long distances to clean facilities or dispose of waste where no toilets exist.

However, there is another side to the toilet situation in India. It is one that is drastically different from the images above. It is the story of female empowerment and control of a technology to better their social positions and to build healthier communities for themselves and their families. Ironically, this empowerment stems from traditional gender roles that delineate the practices mentioned above. For example, since the women are the main caretakers of water and sanitation facilities, their role and participation assumes great significance in revolutionizing the construction, engineering, and overall availability of toilets in their societies. The women of India have turned a major obstacle,

the lack of toilets, into a means of community and political empowerment. They have proven to the government of India and multinational organizations, such as the World Bank, that their expertise in toilet management is invaluable. Without their input, agencies, both governmental and non-governmental, would spend valuable resources building ineffective and unusable facilities; as proof of this three percent of latrines constructed by the government, World Bank projects, or foreign non-governmental organizations without these women's consultation are actually usable as toilets (Paramasivan, p. 2).

Specific cultural attitudes intertwined with religious beliefs and a history of colonialism and failed aid attempts have created a unique developmental discourse prevalent throughout India. This is exemplified by the technology of the toilets. These women's humble plight to build toilets to serve their communities is challenging established western discourses defining who can be labeled a scientist or an engineer. Through their control of the toilet technology in their communities, these Indian women are showing how lay people of many cultures have valuable ideas and skills to offer the fields of science and technology.

Introduction

"The day every one of us gets a toilet to use, I shall know that our country has reached the pinnacle of progress." Jawaharlal Nehru

I must begrudgingly admit that as a product of the west, it is not easy for me to conceive of the toilet as an item of great luxury to be harbored, treasured, and valued. However, this is exactly what the toilet means to hundreds of millions of Indians whose access is limited to one toilet per every 1500 people at best, and at worst, who are denied access to this basic technology because no infrastructure exists in their villages. Consider a story that is prevalent throughout India. The way the story goes is that a young man gets a job in one of the major urban centers in India. He leaves his young bride at home while he commutes during the week to his job. Many times he is forced to spend weeks in the city without being able to return to the village to see his wife. During this time, they correspond with each other via letters. In her letters, she often writes of the many goods that she wishes he would bring home, items that are not available in the village stores. However, her number one desire is not for silk saris, cashmere pashmina shawls, or for fancy jewelry; her number one wish is for him to bring home enough money so that they may build a toilet in their home. This anecdote was repeated often throughout the many rural villages I visited in India's Uttar Pradesh state. To the women of these rural

areas, the toilet is the number one status symbol; and like the Gateway to India, the toilet is the gateway to a life of luxury, wealth, and opulence.

The same is true of India's urban centers where slum communities comprise the vast majority of the urban population without access to a toilet. Once again, being born and raised in the west, it is not my first inclination to see areas of urban slums and think of it as indicative of a majority of urban life. My initial tendency is to think of it as a pocket of society neatly tucked away from mainstream city living. This was sadly my first reaction to slums I visited throughout the city of Mumbai. Although I could see that the slum area was vast in scope, I didn't think it was representative of a majority of urban society in India. After all, this is the city of glamorous Bollywood, with its beautiful stars and starlets dancing among the opulent mansions of Malabar Hills, picnicking in the lushness of the Victoria Gardens, or frolicking in the exotic waves, where the Indian Ocean meets the Bay of Bengal and the Arabian Sea. However, even though slums are rarely depicted in Bollywood storytelling, they are anything but a pocket of Mumbai's society. Slum dwellings are the mainstream of India's urban centers; juxtaposed between the gardens and mansions of great wealth, these slum societies are not tucked away out of sight of the rest of the population as they so easily are in the west. Instead, slum communities are an integral part of the social fabric of Indian cities.

The picture portrayed throughout this paper through the statistics regarding those who do and do not have access to a toilet is a vivid representation of urban and rural life throughout India; they create a portrait of immense urban sprawl and an impoverished universe within which personal health and hygiene is a tremendous challenge. The toilet plays a critical role in this challenge either because of its unavailability to the masses

through disparate numbers or because of its total absence in these areas. But before we can turn to the specific case examples of rural and urban women's relationship to the technology of the toilet, we must first grasp the history, as well as the many different physical and cultural characteristics of the Indian toilet. This is especially important for those of us who rarely give our western-style porcelain, flush-toilets more that a passing thought.

Because of the uniqueness of the Indian toilet in physical design and character, it is important to take a moment to look at and distinctly describe the various types of toilets found in India. This concrete description of what is classified as a toilet in India is crucial to our story and the impact the toilet has had on Indian society, especially the women of India. Those that do have access to toilets in India have traditionally relied upon some variation of either the pit or dry latrines. These latrines are usually contained within a small room, several meters away from the main house. The technology consists of no more than a hole in the ground that opens into a container that is situated within a compartment below the hole. In pit latrines, the waste empties into a jute bag. There is no seat to the toilet. To use the facility, one squats over the hole. As we will see in Chapter Three, this is of importance because a main concern for toilet design among women is the fact that children can easily fall through the hole; the size of this hole is one of the main differences between the toilets designed by Indian women and those designed by western NGOs. The fact that the women designed a toilet with a "child-friendly" hole size has played a huge role in why their toilets have been more readily acceptable than western-designed toilets made for the Indian market.

Those that do not have access to pit or dry flush latrines often rely upon the bucket privy rather than defecating in public. This small amenity is exactly what the name suggests. People that have a bucket privy excrete their waste into the bucket and then, when the bucket is full, take it to dumping grounds to empty. Western-style flush toilets are a luxury only available to the wealthiest in the country. Options to convert dry flush into flushable toilets containing a septic tank also exist, but only for those whom can afford it and in areas that have adequate sewage and sanitation facilities, which would again be the rich areas of India. Therefore, less than twenty percent of the houses have septic tank toilets. After using the latrine of any type described above, water, not toilet paper, is used to clean oneself; so there is generally a spigot (where available) or bucket (where running water is not available) with a ladle to rinse soiled areas. Toilet paper is not an amenity that is widely used as traditionally there has been no water to flush it down with and it creates extra waste. To clean these toilets, a person must crawl into the compartment and empty the receptacle, a job traditionally assigned to the Dalits, or the untouchable class

While the physical description of the Indian toilets is important in showing the technology choices available to Indian society, the cultural history of the toilet technology defines how those choices came about and illustrates the uniqueness of adapting a technology to the society it serves. To those of us in the west it may be difficult to comprehend how toilets can be intertwined in all aspects of a culture. The history of the toilet in India exemplifies how a seemingly neutral technology like the toilet both helps to define and is defined by the culture it serves. The culture of the toilets in India can be said to have its roots in the Aryan Code of Toilets written in the historic

Vedas of 1500BC that describe the ritualistic rules of defecation, toilet constructions, and daily ablutions. This code outlines various chants to be said before, during, and after defecation. It outlines the rituals to be performed before and after going to the bathroom, such as rolling the sacred thread, that Hindu males wear across their chests, and putting it behind the right ear; covering one's head by a cloth; and using the left hand for cleaning of the body after urination or defecation. It also explicitly describes where defecation should take place and where toilets should be constructed; one should not urinate within 10 cubits from a source of water or defecate within 100 cubits from a water source. The distance is increased if one is in proximity to a river, temple, or other holy site; in these areas, one should not urinate within 40 cubits of a river or temple nor should they defecate within 400 cubits of such a site.

It is ironic that a nation that has records of the first known toilets in existence, suffers such a problem as lack of toilets in the modern day. In 2500 BC the Harappa Civilization is said to have had water borne toilets in each house that was linked with drains covered with burnt clay bricks. This sophisticated sewage system was even equipped with manhole covers and sewage draining chambers. With such a well equipped sanitation system, as seen in the Harappa Civilization, such ritualistic rules were easy to abide. However, with the decline of the Indus valley civilization and the subsequent histories of outside rule and colonialism, the science of sanitary engineering disappeared from India. In 1556 AD, Muslim rulers transformed ideas about the toilets. King Jehangir built a public toilet at Alwar about 70 miles from Delhi. This became the first community toilet in India and the Mughul rulers were quick to build them throughout the empire. However, the idea was not so well received by the majority of the

population. Because the community toilet facilities were not properly cleaned and maintained, most of the Indian people preferred open defecation to the dilapidated and dirty toilet blocks. It was also about this time that open air defecation became the norm in agricultural societies because it was a means to fertilize the soil and increase crop yields (Bindeshwar, Aryan Code of Toilets, p. 1). Luxurious bathing facilities were established for Mughal rulers only and became common primarily in palaces and homes of the very wealthy. As a result, those that had a toilet and those that did not became a way of separating the rich colonizers from the poor colonized population (ibid, p. 3).

During this empire, the Mughals established practices that would become cultural standards within Indian society up to the present day. For example, the ruling Mughals established notions of hiding female bodies, such is exemplified by burguas (today called burkas) to cover women's faces. From this cultural practice, it became a cultural norm that women should remain modest and covered in public. This established that women would not be able to defecate in public, as could the men; to do so would cause public humiliation and deep shame. Such was the advent of the bucket latrines, which are designed to allow women to be able to defecate in public. The Mughals also predominantly depended upon captives to clean the latrines and bucket privies. These captives were also forced to transport the human excreta to distant places for waste removal. Once these prisoners were done with their years of service, they were no longer accepted by their Hindu castes because they were seen as unclean according to Hindu standards of cleanliness, as established in the Vedas. As such, they were forced to form a separate class, known as the Dalits, or "untouchable" caste. This is the beginning of the scavenger class whose hereditary duties are to clean and remove waste from the dry

latrines and transport it to separate dumping areas. These hereditary duties, initiated by the Mughal rulers, have fixed their role and status in society to that of the lowest on the caste hierarchy.

Under British colonial rule in the 19th and early 20th century, the trend continued to keep the toilet as an amenity accessible only to the rich rulers. When sanitation improvements were made in India by the British rulers, they were done only when they would be beneficial to the economic resources of England. The first priority of the British Empire was to protect its investments by protecting its military and trading companies. Thus, resources for sewage and improved sanitation were reserved exclusively for the homes of English serviceman and merchants who peddled English goods to the native population. Initially, Britain did not want the extra cost of providing amenities to their colonized subjects; only when more and more British civilians were forced to interact with the native population, which increased the British likelihood of coming into contact with such diseases as cholera or smallpox, were improved sanitation initiatives brought to the Indian masses. However, the British elite proposed innovations that were too capital intensive for the majority of Indians. As a result, the infrastructure that was put in place by Britain could not be afforded by Indian civilians and could not be maintained by the new Indian government once India won independence in 1947.

The story of the toilet today in India is a vastly different tale from the one of the Harrappa Civilization of yesteryear. Today only thirty-five percent of the urban population and fourteen percent of the rural populace have access to a toilet; this means that nearly two-thirds of all Indians do not have access to a toilet (Krishnakumar, p. 3). Without access to a toilet, this population has no choice but to defecate in the open, on

the sidewalks, streets, and rural fields of India's cities and villages. It is estimated that

more than seven hundred million people defecate in the open throughout India (United

Nations Report, p. 1). Like the Harrappa civilization, the contemporary government of

India has tried to build toilets and sewage systems, but most of these endeavors have

failed because they were forced to rely on assistance from foreign investors. Because

they controlled the capital resources, these foreign investors were able to impose their

own western-designed toilets and to contract their own companies to build them; the

Indian government had no input into what kind of toilets would be built to serve the

Indian population. The resulting toilets that were built by the western companies were

not conducive to India's unique cultural needs. Without this outside "aid", the Indian

government simply lacked the funds necessary to initiate toilet-building projects on their

own. US$500 billion is needed to provide all of India's population with a conventional

water supply and sewerage system. At this expense, it would take two hundred years for

every Indian to have access to a toilet (Krishnakumar, p.3).

Given this fact, it is easy to understand why toilet building projects are a standard

platform in political election campaigns and have remained a top political priority since

India won its independence in 1947. When scanning the local Indian newspapers and

political news magazines, it is not uncommon to see toilets referred to by many

politicians seeking election. Sarpanch's, the head of the state governments, and election

into the local gramsabhas are won or lost on their ability to recognize toilets as an issue;

seats in these governmental institutions are then retained or lost on the elected official's

ability to bring the toilet technology to fruition in their village. The country's forefathers,

Gandhi and Nehru, recognized the importance of this simple technology on the political,

economic, social, and civil progress of their newborn country. Nehru famous quote, "the day every one of us gets a toilet to use, I shall know our country has reached the pinnacle of progress," is often referred to in campaign speeches today.

Throughout his life, Gandhi believed that, "in our approach to private and public sanitation lies our commitment to true freedom and dignity." He recognized completely that "toilets govern a lot of human issues: Personal hygiene, public health, street behavior, crime rate and above all dignity and self-esteem. Gandhi was not naïve when he harped on the centrality of sanitation in development." (Pratima and Sen, p. 5) As such, he was an avid advocate of doing away with the traditional caste custom of having Dalits clean the dry latrines. In his communal ashram which embraced all members of society regardless of race, nationality, caste, or religion, Gandhi deliberately did not permit toilets in the private homes of the compound. This ensured that everyone had to use the row of public toilets at the end of the ashram and, as a rule, every person, regardless of caste or social status, would be rotated on toilet-cleaning duties. In this way, he ensured that all members of the community were equal. "Gandhi's reasoning was that cleaning public toilets was the contentious issue on which the caste oppression was based. So, the best way of getting rid of the prejudices, equalizing society and teaching people a lesson in humility was to make them do the work they so despised," (Gandhi, p. 2)

Caste oppression has always been contentious throughout India's history. In 1993, toilets entered the political arena in the form of laws that govern toilet construction, design, and maintenance, specifically in regards to the dry latrine, in the form of the Employment of Manual Scavengers and Construction of Dry Latrines Prohibition Act.

This law stated that anyone who constructed a dry latrine or employed a Dalit to clean or empty it would be subject to imprisonment of up to a year or a fine of Rs2000 (about US$40). Despite this Act, there are still nearly 7.5 million dry latrines in India. This is because the law was enacted, but no alternative was supplied. In some cases, the municipalities made new water toilets, but because there was no water available in these areas, they still needed to be dry-cleaned by a dalit. This is a prime example of the local government, through the encouragement of World Bank sponsors, choosing a technology that was completely unsuitable to the terrain, geography, and society that the toilet serves. More examples will be given in later chapters. (Malekar, p. 3)

The Manual Scavengers and Construction of Dry Latrines Prohibition Act directly enforced what types of toilets can be built and how those toilets are to be maintained and cleaned. However, even those laws that do not specifically refer to toilets have had tremendous ramifications on the technological development of sanitation facilities throughout the country. Chapter Three will discuss the 73rd Amendment to the Indian Constitution in greater detail and its ramifications upon the women of the rural villages and their relationship with the toilet technology in their communities. This law states that thirty-three percent of all village government local seats must be reserved for women. While this amendment states nothing directly about toilets and their construction, it has had a huge impact on bringing this technology to the rural countryside. This is because women, as the main caretakers of water, have a vested interest in bringing toilets to their community. Whereas before toilets were not an issue in the local village governments, or gramsabhas, because women participation in these local council meetings were minimal

at best, now they are able to raise their voice, and thus, raise the funds, to begin designing and constructing toilets in their villages.

These women have brought the political aspect of the toilet to the forefront of their gramsabha meetings because the lack of proper toilet amenities, as well as the design of those toilets that are available, most adversely affects the women of India in both the urban centers and rural villages of the country. For example, because in India water chores, which include toilet duties, are within the domain of the women, the untouchable worker that cleans the ubiquitous dry latrines is inevitably a woman. To clean these latrines, the woman Dalit physically removes the jute bag containing human waste and takes it to a waste disposal site. Not only is this type of work degrading, but it is extremely detrimental to her health, as well. All of the women Dalits interviewed for this paper stated that they suffered from extreme nausea after a day spent cleaning the hundreds of dry latrines in their community. One woman actually stated that, "the men are lucky, [because] they can drown it all in liquor," another escape that is strictly taboo for women.

In rural areas, where open-air defecation by men is rampant, cultural norms make it unacceptable for women to defecate in the open. Women are not permitted to defecate within the confines of the village parameters. If they did so, they would feel extreme shame, be shunned by their society, or face harassment from men. The only answer that many of these women can find to the problem of lacking amenities is to severely limit their consumption of food and drink. This ensures that they will only have to relieve themselves once or twice a day. But this practice also leaves the women susceptible to many health risks. Primary among these risks is malnutrition because the women simply

cannot consume enough caloric value to get the daily dose of vitamins and minerals; to do so would mean going to the bathroom more often during the day. Many women also suffer from gastroenteritis almost all of the time because they refuse to drink water even when thirsty or to eat even when hungry (Narasimhan, p. 1).

The women of India's urban cities suffer many of these same health-related issues. Even though access to a toilet is slightly increased in the cities of India, workplaces, schools and recreational areas still remain inadequately equipped with women's toilets. In these urban environments, as in the rural countryside, women must often walk for kilometers before they can find proper amenities; a fact that is hard to believe given the amount of public buildings in any given block of an Indian city. In many ways, the women of the urban cities are not as controlled by traditional, cultural customs and mores that dictate the domains of men and women. Women of the cities frequently hold jobs in all areas of business and girls are encouraged to be educated to the fullest extent. However, the lack of toilet amenities impedes women and girls' progress so that they are not able to compete with their male counterparts in both workplaces and schools (Dayal, p. 2).

For example, one woman interviewed described being greatly hindered because of the lack of toilets in her workplace. She said she and the other women in her office "must rely on a friendly neighborhood hotel or master ancient yogic retentive techniques," (Dutta, Personal Interview). Another woman recalls having to meet with potential clients throughout the day. Each meeting means another cup of chai and other refreshments. The office did not have a bathroom, so she had to learn to time her trips to when she would be able to leave the office and walk kilometers away to the nearest women's toilet.

If she couldn't time the trips properly, she had to refuse the refreshments, which had ramifications on her professional performance because it was not socially acceptable (Zinta, Personal Interview).

Beyond the workplace, the lack of toilet facilities in schools greatly hinders a girl's ability to get the same education as a boy. India strives to ensure that it provides an equal education to all regardless of caste and gender; but to do so the government is beginning to realize how important the provision of a toilet is to ensuring an equal opportunity for both boys and girls. Currently, 82% of schools lack toilets. Of those that do have toilets, 89% do not have a separate toilet for girls (Rao, p.1). Another headline reads, "Why girls drop out of school". The answer is because they do not have access to a toilet (Ved, p.1). The article goes on to state that in terms of providing an equal education to all a, "Lavatory is more important than laboratory" the Planning Commission concluded. The lack of availability of a separate toilet for girls is a, "major impediment in the way of girls' entry into schools," concludes the article. This is because parents refuse to send their daughters to a school were amenities are not separate. To do so would risk the girls honor, decency, and purity. One local woman interviewed for this paper was asked why she sent her sons but not her daughters to school. Her response was, "I cannot because the local school does not have a toilet."

These examples have not been used to make the western reader gasp with surprise or to make Indian society sound uncivilized, pre-modern, or bizarre, but to make the point that toilets, as a technology, can have tremendous social ramifications. The illustrations above establish that a technology that is seemingly gender neutral can actually play an important role on the status of women in all societies, not just throughout

India. In the instances above, the lack of a toilet is inhibiting a fair education and

equality in the workplace. But it also shows us a society that is in transition between its

traditional customs of a male-dominated workplace and institutes of education to one that

is on the cusp of accepting women in these arenas.

  The same was true for my alma mater, Drexel University. Drexel bears the

remnants of what was once a traditional and cultural standard in America at the time—the

fact that women simply did not become engineers. As a predominantly technological

institute (Drexel Institute of Technology changed its name to Drexel University only in

1970), Drexel focused mainly on its engineering school to build its reputation. The proof

that women were not traditionally accepted into these engineering schools is marked by

the absence of women's bathrooms in many of its buildings. To this day in Matheson

Hall, there are only women's bathrooms on the first and fourth floors, while all five

floors provide a men's bathroom. There is also a broom closet that was converted to a

one-toilet-seat women's bathroom in the basement; the conversion is so crude that it is

easy to see that this women's bathroom was installed as an afterthought to the building

design and it occurred much later than the original construction to meet the growing

population of women enrolling and working at the university (Drexel University

Archives). This demonstration of a society extending boundaries to admit women where

once before they were not traditionally accepted is a key element to the story of these

Indian women. In the following chapters we will see how the toilet as a social

technology is permitting these women to transition into areas that were never possible

before and to improve their lives in ways that many in the west never get the opportunity

to do. These opportunities stem from the transition from traditional gender roles that

identify women as the "main caretakers of water and sanitation facilities,"(Barot, p. 34)

to their modern roles in revolutionizing the construction, engineering, and availability of

toilets in their communities. So, there is another side to the toilet situation in India. It is

one that is drastically different from the images of hardship and neglect depicted above.

It is the story of female empowerment and control of a technology to better their social

positions and to build healthier communities for themselves and their families.

As these women transition to their new roles in Indian society, they are teaching

us in the west many lessons. Primarily these women are proving that citizens can be

more involved in scientific and technological development. For example, as will be

discussed in Chapter Five, Robert Hiskes, in his book Democracy, Risk, and Community,

discusses how western society can effectively alter scientific research and technological

development through community action. The community action that Hiskes describes in

an ideal democratic society is the banding together of citizens to become more educated,

and thus, more involved in the policymaking of the scientific and technological issues

facing society. To Hiskes, this is how western society should strive to shape science and

technology discourse. This does represent one method of society effectively influencing

scientific and technological development; but Hiskes' method still clearly delineates the

scientists from the rest of society. According to this theory, society cannot enter the

scientific arena and shape policy from within, but must remain outside the fringes of

science and technology and create policy from outside of this boundary. The women of

India are not only living up to Hiskes' model of a responsible and active community

involved in shaping the policies of what toilet technologies are available to them, these

women are going a step further than what would be viable to them in the west. They are

entering the scientific and technological fringes and becoming what we in the west

cannot become without the years of training that our western society has made necessary

to qualify one as a scientist or engineer.

These women have the opportunity to not only address a technological issue that

concerns them, but to participate actively in the designing and construction of a new

technology that will improve their lives. This does not happen readily in the west where

it is not so easy to cross those boundaries from policy making to hands-on

implementation. So, even though our western society may have a women's bathroom in

each building, it may also be limiting our scope of technological and scientific

alternatives available to us. We must rely on the scientist to give us alternatives to

choose from instead of creating them ourselves as the women in India are doing with

their toilets.

The next few chapters will show how women are transforming their roles in

Indian society by taking control of a technology that has been neglected by their

government, rendered ineffectual by foreign companies and ventures, and remained

elusive throughout most of their lives. So called illiterate women of the cities and

villages are starting enterprises, ventures with financial institutions, and serving in their

local governments; all because of the toilet. These very same women are taking their

control of the toilet technology beyond western notions of policy-making and are proving

themselves to be actual practitioners of science, engineering and technology. In this way,

they have defied western notions of licensing, accreditation and standardization and have

expanded the boundaries of applicable science and technology. They are showing us in

the west that we, too, are a society in transition and through their example we may be

able to develop a more sustainable global discourse.

Chapter Two: History of Failed Aid, Past and Present

Imperialism, both past and present, has had a tremendous impact on the practice, administration, professionalization, and sovereignty of India's scientific and technological development. Imperialism in the past, throughout the eighteenth and into the early twentieth century, is a well known and often studied phenomenon; but, imperialism still exists under the new guise of global market rules and structural adjustment by the major international financial institutions, which will be discussed later in this chapter. Both of these stages of imperialism have influenced the way in which traditional science has been perceived and practiced. As will be seen, British colonizers sought to discredit indigenous science as an unprofessional and unstandardized practice of "witchcraft" when it was economically advantageous to discredit the native healing practices. However, the perception of indigenous science would gain more credence when it was economically more advantageous for the colonizers to exploit the natural resources associated with fabrication of medicines or when it was more profitable for the British to tout indigenous scientific practices. Not only does this economic determinism still occur in the new form of imperialism, but under the new global market, today's imperialists seek to control both the industry and the intellectual property of India's endeavors in the realm of science and technology and to define who can be classified as qualified practitioners in both of these fields.

This chapter will take a look at imperialism, both in the past and in the present, to provide a framework for India's skepticism in accepting foreign aid. Part One will focus on the rise of science and technology in Indian culture and show how advanced its

scientific fields were in comparison with much of the rest of the world. This chapter will

further explore how British economic motivations sought to discredit India's accumulated

knowledge in order to advance the west's burgeoning industrial trade within its colonial

empire. Part Two will address modern-day economic loans and sanctions and their

existence as a façade for the perpetuation of western economic dominance. Rather than

helping developing countries utilize indigenous scientific and technological resources,

modern-day colonialism, in the form of structural adjustment loans, keep developing

nations dependent upon the west by establishing the rules of development. Under the

laws of capitalism, the west continues to suppress native industries, steal their resources,

and discredit their science and technology so developing countries have limited ability to

equally compete in today's global economy.

The first occurrence of established Indian science practices can be traced to the 3rd

millennium B.C. and then followed through two major phases, the Vedic and post-Vedic,

occurring in 1500 B.C. and 600 B.C. respectively (Bala, pg. 23). During these periods,

the Indian scientific system was completely intertwined with the rise of the Hindu

religion in India because medicine was codified and documented in the sacred writings of

the Vedas. To see how completely religion and science were intertwined it is necessary

to refer to the different books of the Vedas and what they represented. The *Rgveda* and

Samaveda "formed the backbone of India's religious life for over three thousand years

and still represent the most important canonic books of Hinduism;" (Bala, pg. 24) the

Atharvaveda contained the beginnings of the practical knowledge of science as practiced

in ancient times. The Vedas show that India had established a medicine system that

contained, "anatomical, physiological and pathological views which were neither magical

nor religious and of treatments that were rational," (ibid). Religion became interwined with these scientific and medical practices because the Brahman priests were the custodians of all knowledge; they were also the custodians of the Vedas. As such, the Brahmans were in charge of codifying and appropriating the developed practices of Atharvaveda and, in doing so, gave them a religious origin. The *Atharvaveda* would become the dominant indigenous medicine system in India, Ayurveda.

Ayurveda, through its elaborate texts describing the application and collection of drugs in ancient medieval times, thrived throughout Indian society. With the advent of Buddhism in India in the 6th century B.C., medicine, science, and religion became further enmeshed. The Buddha codified his rules of medicine in the religious texts of the *Vinaya pitaka* and the *Mahavagga,* which described various therapeutic measures (Bala p. 31). Also at this time, both the Brahmans and Buddhists established medical training for practitioners which were also very deeply rooted in the religious training of priests for both sects. The reinforcing of this religious foundation of science in India had several important effects for the development of science at this time. First, as followers of Buddhism traveled throughout the sub-continent to spread the religious beliefs, they also took with them their practice of Ayurveda. This helped Ayurveda spread throughout Southeast Asia and even to influence many of the Greek practices of medicine during the 6th century B.C. The strong influence that Ayurveda had on scientific practices throughout Asia and into Europe is important because this is what eventually brought native medicine to the attention of India's future colonizers as a viable science with economic potential. However, when the economic potential became too great that it interfered with the profits garnered by new practices of western science, Indian science

would have to be discredited. This leads to the second important effect of the religious

foundation of Indian science and its worldwide development. The intersection of

religious and scientific practices is important when discussing the effects of colonialism

on Indian science because it provides a fundamental basis for the misunderstandings of

the British colonists towards the indigenous population and it also helps to explain the

deep rooted convictions of Indians toward their practice of medicine. This point directly

correlates to the example of toilet construction in India, as will be seen in Chapters Three

and Four.

The medieval age ushered in India's first experience of colonialism and

imperialism by Muhammedan conquerors (Bala p. 33). Once again, the intersection of

religion and science in Ayurveda caused initial conflict between the new Muslim rulers

and Ayurvedic practitioners. But, unlike the British, the Mughal rulers did not try to

discredit or suppress native scientific practices. In fact, the Mughal rulers of this time

encouraged the practice of both the Unani and Ayurvedic forms of medicine and allowed

each to practice within the palace, showing Mughal tolerance for native medicine. In

addition to native practices, the new Mughal Empire also brought its own form of

science, the Unani system, which was based on "the significant medical concepts of

Egypt and Greece, and developed in Arabia and Persia under the aegis of the Khalifas of

Baghdad," (ibid). Both the vaids, practitioners of Ayurveda, and the hakeems,

practitioners of Unani, were encouraged to compile their systems of practice into large

compendiums of knowledge. In the same way that the Mughal rulers overcame their

initial reluctance to Ayurveda's religious foundation, India recognized that the Mughals

also had a great wealth of science to share, but they could not fully accept that system

because it did not fit into India's culture and its certain taboos. However, the Brahmans

priests practicing Ayurveda were willing to allow some concessions in the practice of

Ayurveda in order to facilitate and incorporate the scientific essentials of a new system of

scientific practices. As a result, Ayurveda was able to incorporate some of the

systemizing standards of the Unani systems, particularly in respect to surgery[1]; and the

Unani system incorporated the vast medical knowledge of Ayurvedic pharmacopoeia into

its medical repertoire, resulting in two systems that eventually became fully integrated

(Bala, p. 37).

This example of integration is a very important characteristic of Indian society as

a whole. Indian culture has always been open to new ideas from the outside and if these

ideas seemed conducive to developing knowledge and enlightenment according to Hindu

philosophies, they were easily absorbed into the fabric of Indian society. What is

important about this integration, though, is that these new philosophies were not seen as

coming from outside of India, they are accepted by Indian society and then remolded into

something distinctly India in nature and culture. "Thus, with each new form of

government in India, indigenous science came to acquire a new form of medical system,"

(Bala, p. 40) because it would be accepting of other practices of science and take these

ideas until it easily fused with Indian society. This was demonstrated in the case of the

Mughal Unani system in the case above.

This strong native integration characteristic of Indian science is the crucial quality

that helped to define India's history with its British colonizers. While Britain's main

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[1] Surgery was considered an anathema to the Brahman priests, as it was seen as unclean. As a result, Ayurveda focused primarily of the dispensing of remedies to cure and balance the four humors, but stagnated when it came to surgical medicine. It was not until the hakeems of the Unani system brought their knowledge of surgery with them to India that the practice was fully incorporated in India.

motivations were economic, India sought to further the pursuit of pure science by

integrating those scientific ideas and practices that worked, even though they came from

outside their system of beliefs. These two qualities were able to merge harmoniously

during the early years of the British's arrival in India, when what is referred to as a

"peaceful assimilation" endured throughout society. During this time, it was

economically more advantageous for Britain to employ native knowledge and medicines,

because they had yet to develop their own pharmaceutical trade. Also, during this time,

Indians were able to learn from British scientific developments, while still practicing

their Ayurvedic cures. As such, the peaceful assimilation continued into the early years of

Britain's arrival in India.

However, as will be discussed later in this section, this assimilation would not be

tolerated when Britain needed India as a market for its mass produced pharmaceuticals.

From the period of British control in Bengal, 1757, until about 1835 "there was a

peaceful co-existence and incorporation of the indigenous forms of medicine," (ibid).

One reason for this is because both the European and Indian scientific systems were very

closely related. From the first contacts of European travelers to India, in the late 15th

century and becoming more common in the 16th and 17th centuries, scientific technologies

were on a par with those practiced in Europe. "European science drew heavily on Islamic

knowledge, but this in turn had been influenced by the Hindu achievements," (Pearson, p.

148). Because of this influence, European travelers perceived Indian science as being

homogenous with their own practices. Both systems relied on the notion of the four

humours (bodily fluids) as a foundation for their humoral pathology. According to these

systems, "disease was a result of an imbalance or impurity of one of the four cardinal

humours, which in turn, affected one's temperament," (Pearson, p. 147). In those instances where science was not homogenous between the two cultures, the British actually saw advancements in the Indian system, which they could learn from. Among these advancements were the use of urinalysis in testing for disease and the rise of rhinoplasty as a treatment of nasal congestion (Pearson, p. 162). During this period, the British seemed to have had respect for the vast amounts of knowledge that the Ayurvedic practice had accumulated because it was economically advantageous to the British empire. The British had no flourishing scientific and medical fields of their own to force Indians to accept. At this time, Britain was seeking to gain this knowledge to better position themselves economically in the fields of science and technology that they used Indian research to help build this foundation. As a result, Britain used this knowledge as just another resource extracted from their Indian colony.

But, beyond the knowledge gained during these years of strategic "peaceful co-existence," economic motivation still remained the determining factor of strategically appeasing the natives. The Europeans chose to acknowledge that Indian medicines were better suited to treat Indian diseases or other European forms of diseases that occurred in the Indian climate and that Indian doctors were much better equipped to analyze, treat, and cure these diseases. To not acknowledge this would be to antagonize Indian scientists and to lose access to valuable knowledge that had been accumulated. The British saw indigenous science as an area of opportunity suitable for research into the investigation of indigenous drugs and saw production of these drugs as a profitable import/export venture. In the early years of the British East Indian Company, the British were eager to find local alternatives to medicines that were often expensive to import,

such as the Peruvian bark, cinchona, used to treat malaria. "Given the cost and scarcity of imported drugs, there were strong financial as well as therapeutic incentives to find local substitutes," (Arnold, p. 66). As a result, several indigenous remedies were cultivated and used by the British living in India as an import substitution to the highly priced pharmaceuticals of Europe. In turn, these locally produced medicines were then exported to Europe as valuable remedies for various ailments (Bala, p. 49).

Not only does this example lay the foundation for the economic motivations that would influence British rule over India, but it also gives us glimpses of colonial intentions from the early years of Britain's first arrival to Indian shores. Even though these instances show that the Europeans acknowledged the efficacy of Indian cures and doctors for Indian diseases, it also shows that they thought of the people and the diseases and cures as different from their own. By personifying these sicknesses as "Indian" and qualifying the medicines that treated them as "Indian," the British were able to retain their own identity as English and not be assimilated by Indian society as had happened to other rulers. Through this labeling and ability to retain their identity, the English were able to position themselves to truly rule and conquer India. Pearson argues that the true distinguishing point that separates European rulers from others colonizers, like the Mughals described earlier, is European dominant authority and perceived superiority; they actually perceive their subjects as being completely different from their British ruling class. Pearson sees these Europeans, in this case the British, who are classifying the people and diseases as different, as "harbingers of a future intolerance and overt assumption of superiority," (Pearson, p. 165). These differences are only exacerbated when economic influences, such as the Industrial Revolution, come into effect.

Economic incentives increase the motivation for separating the ruling class from the colonized and to perpetuate not only the differences, but the superiority, of western modes of practicing medicine. This shows that the conquering, colonial mindset was already instilled in the British and that they had every intention of controlling the knowledge and resources that India had to offer because theses resources would generate more wealth for Britain. These European mentalities of superiority were motivating factors of colonization from the inception of trade with India. As shown above, the "harmonious" and magnanimous acceptance of native medicine was primarily self-serving and economically motivated. During the eighteenth and early nineteenth centuries, this acceptance came easily for the Europeans because of the similar humoral pathologies of both systems of science and even more, because there was much to be profited from the accumulation of Indian "materia medica, accumulated over centuries of empirical trial and observation" (Arnold, p. 66).

But with the start of the Industrial Revolution, Britain generated greater wealth through the mass production of items such as books, clothes, tools, and medicines. As a result, Britain was able to accelerate their scientific research fields and, through industrialization, was able to make chemical cures that could be mass produced cheaply and sold at a much higher price than natural therapies. Therefore, it became economically disadvantageous for the British to validate any form of Indian science because in doing so they would be discrediting their own manufactured goods and eliminating a vast market for their finished end products. Thus, the onset of the Industrial Revolution marks the time period that the harmonious co-existence ceased and Britain began to claim

superiority in all areas, ranging from religion, sanitation, customs, and fashions to education, medicine, science, and technology.

To make their own medical services and products more marketable in India, the British had to first discredit native practices of science and medicine. As a result, Britain began to describe Indian science as "mystical, stagnant, and complacent and to tout the scientific superiority of Western medicine," (Arnold, p. 67). It is at this point, that the British began to label Indian science as "traditional" and to perpetuate the perception that it was not on a par with Western, "modern", science. Now, for Indians to be deemed qualified scientists by the British Raj, they had to be trained, practiced, and skilled in the British manner. Only this would qualify them for positions in the institutes and universities where only western systems were allowed to be taught. Indian scientific texts were only proven authoritative when they had been published and "scientifically" proven by British physicians. Indigenous research was strictly forbidden in British institutions and its practice outlawed throughout Indian society.

It is also at this point, when integration was not allowed, that British and Indian cultures began to clash as India was not able to absorb British practices and mold them to meet their needs. This clash of cultures is exemplified by the smallpox treatment in India and the native variolation techniques of treating the Indian population versus the European vaccinations. The treatment of smallpox in India was initiated by the British to protect civilians and army personnel who were employed within the service of the Crown. "From the British perspective smallpox was too dangerous a disease to be ignored, and the lives of European soldiers and civilians would continue to be threatened unless effective measures of control were introduced," (Arnold, p. 74). Proof of this

economic determinism comes in the fact that it wasn't until Britain had the ability to manufacture, and more importantly to sell, its cure for smallpox in the form of a British made vaccine that vaccination began to rival the native cure of variolation. In fact, Indian variolation was initially used by the British in 1767 as proof that inoculations were a successful means of disease prevention. Tikadars, who were primarily Brahmin priests, would travel from village to village shortly before the beginning of the smallpox season in January or February. In a festival devoted to Sitala, the Hindu goddess whose presence was manifested in the disease's fevers and eruptions, the tikadars would perform their inoculation on the members of the village. In this manner, it is estimated that up to sixty percent of the population was protected from the disease (Arnold, p. 72). In the late eighteenth century, the British themselves took up the practice in order to protect themselves from the deadly Indian disease (Arnold, p. 73).

As shown above, when the smallpox vaccine was created in Britain in 1796, it became economically necessary that British vaccination conquer its native rival, variolation, because of the chemical and pharmaceutical industry that was newly forming in Europe in the mid-nineteenth century which would manufacture and sell the cure to smallpox in the form of a British vaccine. But, to make this possible, the tikadars first had to be discredited by the British as quacks who were involved in "a murderous trade," (ibid). However, the general native public was not to be swayed from their religious festivals and in their confidence in their native practitioners. Furthermore, they were distrustful of the vaccine introduced by their colonizers and were not welcoming of a medicine that used the lymph of their sacred cow. As a result, there was much cultural resistance to colonial medical intervention (Arnold, p. 74). To overcome this resistance,

the British rulers simply made vaccinations mandatory and outlawed the practices of the tikadars. "Ultimately, by outlawing the tikadars' trade, by making vaccination more widely available and overcoming initial resistance to it, the British were able by the close of the nineteenth century to effectively suppress a once widespread practice," (Arnold, p. 73) and to reap the economic benefits from the monopoly they created.

In their increased efforts to discredit native scientific practices, Britain began to enforce standardization and licensing in scientific and technological fields of study. As a result more and more Indian practitioners of science and medicine were deemed unprofessional because they did not meet these British standards, eastern medicine was not within the realm of science that could be licensed, and they were not 'educated' according to western texts and manuals. In scientific fields, Indians no longer met British qualifications of being called true scientists, doctors, or engineers. Instead, much of the Indian population was merely trained to be menial and cheap laborers which would be more cost efficient to serving the needs of the British army than bringing manual labor over from England. This directly resonates in the modern day with the case of the toilet in India. Outsourcing of construction of toilets in India is encouraged by western institutions, who claim that western companies have more experience and training as licensed engineers than their Indian counterparts. In many toilet construction projects initiated by the World Bank, India is encouraged to give building rights to western construction companies, while employing Indian people to do the menial work. Indian designs are discouraged by these western institutions as not being as acceptable to western standards.

While the smallpox case establishes the historical precedence of a dominant group demeaning native forms of science and medicine to promote western made products and services, the next example of the cholera epidemic establishes India's precedence of distrust to foreign "aid" initiatives. The cholera epidemic has its roots in the devastating poverty that was induced in India mainly as a result of British colonialism. Because many resources that were indigenous to India or produced in India were shipped back to England to generate greater income for the colonizer, the majority of the Indian population became poverty-stricken. This poverty and India's status as a colony meant that economic resources were not available to the native population to create proper sanitation facilities and it is at this point that sanitation becomes a major issue within India. The poor sanitary conditions only added to the perceived superiority of the British colonizers and the further discrediting of all native practices of science and technology. The British began to tout the natives as unclean and, therefore, uncivilized. Because India is an uncivilized nation, the British would argue, native scientific practices must also be primitive and unclean, why else would they live in these conditions? According to the British, this argument was proven by the severe cholera outbreaks that were now rampant in the villages and cities of India. The British were not motivated to do anything about these outbreaks initially because it was only the Indian population that was at risk for contracting the disease. The British citizens' encampments were afforded all of the luxuries that England's opulence could offer, including functional privies and safe drinking water. They were effectively kept segregated from the unclean masses so British civilians were not in danger of coming into contact with cholera.

These conditions of economic oppression by the colonizers that led to the poverty and conditions described above sparked the Indian National Movement of 1857 which was India's first attempt to "Quit India" of British rule. Ironically, this movement was officially initiated after yet another incidence of cultural technological insensitivity by the British towards two major populations in India, the Hindus and the Muslims. While training natives for the British army serving in India, the British introduced a new gun whose shell was encased in the grease of both the pig and the cow; the first is taboo to the Muslim, the latter is sacred to the Hindu. The casing of the bullet shell had to be ripped open with teeth, thus causing contact with the taboo and defilement of the sacred. To do this meant that both the Hindus and Muslims would become outcastes of their respective societies. When they learned of this new technology, a "Quit India" movement led by Mangel Pandey ensued that quickly incited the entire country. After this incidence, the British raised their army presence in India by sixty percent. Because the British population was so drastically increased, the odds were now in favor that some of its citizens may have to come into contact with the natives and, thus, the risks were increased of coming into contact with cholera. It is only at this point that the Royal Commissions were assigned to look into the sanitary conditions of the army barracks in India. The number one priority of the Royal Commissions in improving sanitary conditions and controlling the cholera outbreak at this time remained the health of the British Army. The army would not be able to serve and protect the economic interests of the British Empire without first controlling sanitation and cholera.

This economic motivating force is exemplified through a comparison of how public health initiatives grew in Britain compared to that of India. Two popular works

spurred the advent of public health measures in Britain in the mid-nineteenth century. These were the investigations of Edwin Chadwick, who established the relationship between poverty and the rise of cholera, and Robert Koch, who identified the cholera organism as the cause of the epidemics (Bala, p. 97). Before this time, the British widely believed that "cholera was sent by the Lord in punishment of sins, individual and collective," (Bala, p. 94) -a theory that is ironic given that these ideas are what led the British to discount indigenous Indian medicine mystical and religious. With the introduction of a concrete cause of cholera and the push made by Chadwick to create measures to alleviate those conditions of poverty (i.e. overcrowding, unhygienic conditions and polluted water supplies) that increased the spread of cholera, Britain quickly established public health acts that reduced the occurrence of the disease within England, but these measures did not come so quickly to the British colonies.

For example, the first governmental public welfare act, the Poor Law Commission, was established in Britain in 1834 to study the causes of destitution in London. Similar acts were not passed in India until 1859, even though the first cholera outbreak occurred in 1817. The British did not enforce measures to eradicate cholera during this first outbreak in India because the Europeans seemed to have "had a greater immunity from the disease than the bulk of the Indian population," (Bala, p. 100) which the British understood had a direct correlation to their better state of sanitary conditions. Because cholera rarely affected the English population in India at this time, the British government was not economically motivated in solving the cholera problem. As stated above, it was only when increased numbers of English army personnel were sent to India to maintain order and to ensure that another nationalist uprising would not destabilize the

colony that the British government establish measures to research and eliminate the cause

of cholera in India. But, even then, these measures were targeted to improving only those

areas where British personnel were stationed. The prime concern of the British

government in establishing these acts was "to assist in all matters relating to the health of

the army and to supervise the gradual introduction of sanitary improvements in barracks,

hospitals, and stations on a continuing basis," (Bala, p. 102). Maintaining a healthy army

community was economically in Britain's best interests as it was the army's

responsibility to maintain authority over the native civilians. It would have been too

much of a financial drain of Britain's economic resources to initiate such public welfare

endeavors in the native population.

Instead of improving sanitary living conditions by increasing social welfare

among the Indian population, the British treatment of the cholera epidemic in the native

population was restricted to hospitals and dispensaries. Unlike the preventative measures

of alleviating poverty and poverty-related conditions that took place in Britain and in the

British-habited sections of India, no such acts were established in India to observe

"patients in their social and environmental surroundings," (Bala, p. 103) because

comprehensive preventative care for the Indian population seemed to costly to the British

Raj; according to the British, the cost of taking care of the Indian population was simply

not worth the costs of providing it. The length of time it took to enact public health

measures in India demonstrates how much the British government valued commercial

interests over the medical interests of their colonies. Economically, according to the

prevailing western principle of laissez-faire, it was best for the State to refrain from

creating social services that would alleviate these unhealthy conditions. However, this

principle was more easily modified when it came to the mortality of the mother country

than when it came to that of its Indian citizens; and was only changed when it began to

afflict greater numbers of English civilians living in India. Once again, as dictated by the

laws of laissez-faire, the English regarded their Indian colonists as merely cheap labor.

Any intervention would undermine the efficiency of manufacturing goods as cheaply as

possible, and, thus be counterproductive to capital accumulation (Bala, p. 103).

This exploitation of Indians as cheap labor carried over into the realm of science,

education, and medical training. For example, Arnold explains the acceptance of Indians

into the Indian Medical Service, a predominantly European medical institution, and the

rise of Native Medical Institutions as a means of achieving the "practical goal of

providing cheap but reliable medical aid for Company servants," of the British East

Indian Company (Arnold, p. 62). From the onset, training European doctors for service

in India was often a costly venture with little cost benefit for the Company. European

practitioners often demanded higher salaries for living and practicing medicine in the

Indian sub-tropical environment and medical duties were often combined with a wide

range of colonial bureaucratic administrative responsibilities. Sickness and mortality

rates were high which led to a paucity of European doctors to attend to the needs of the

ever-growing British population in India. Furthermore, because the British considered it

unsafe to "entrust the lives of Company servants to indigenous practitioners who had no

training in Western medicine" (ibid), it was necessary for the Company to train Indian

subordinates to perform menial duties and for these native subordinates to have some

appropriate form of western medical education. Thus, the British established the Calcutta

Native Medical Institution to provide a regular supply of native doctors, trained in

Western medicine, to the British East Indian Company. These institutions made it acceptable for natives to be educated only if they provided training in western knowledge; native institutions that taught native sciences were not worthy of the term "education," and were demeaned by the British.

This educational 'reform' was becoming the predominant philosophy of the British colonizers throughout India at this time. A major proponent of introducing this type of educational "reform" that stressed western-only lessons and philosophies was Thomas Babington Macaulay. Macaulay served as Supreme Council to India between 1834 and 1838. He was an outspoken essayist on the need for educational reform among the Indian population until his death in 1859. Macaulay was a "convinced colonialist and a believer in European, especially British, superiority over all things Oriental." (Modern-History Sourcebook, p. 721). His now infamous "Minute on Education" stressed this need for educational reform among the Indian masses and expressly stated that this "assistance" to that native population was needed in order to ensure a bountiful market of British produced goods and manufactures. To prove that educational reform needed to occur, he first had to denigrate the Indian population as being crude, unrefined, and uncivilized. He did this by stating that, "The dialects commonly spoken among the natives of this part of India, contain neither literary nor scientific information, and are, moreover, so poor and rude that, until they are enriched from some other quarter, it will not be easy to translate any valuable work into them." He went on to tout the superiority of the British educational system by completely dismissing all native literature by saying, "It is, I believe, no exaggeration to say, that all the historical information which has been collected from all the books written in the Sanskrit language is less valuable than what

may be found in the most paltry abridgements used at preparatory schools in England," (ibid).

Macaulay's goal in initiating this educational "assistance" to the masses was to produce a population that was, "Indian in blood and colour, but English in taste, in opinions, in morals, and in intellect." It was necessary to make the Indian population have the same "civilities" as the English, so they would have the same wants and desires for material comforts. As Macaulay states, "It would be far better for us that the people of India were ruled by their own kings, but wearing our broadcloth, and working with our cutlery, than that they were performing their salams [sic] to English collectors and English magistrates, but were too ignorant to value, or too poor to buy, English manufactures." And he ends by simply saying, "To trade with civilised men is infinitely more profitable than to govern savages," (ibid). As a member of Parliament and primary orator of the ruling Whig party, Macaulay's words reverberated the thoughts of most Englishmen of the time. He was seen by the English to be an authority on Indian affairs because of his position as member of the supreme council on the East India Company. As such, his "Minute on Education" was representative of British colonial thought on how to tame the savage native.

This speech is often referred to as a primary instigator of the 'Quit India' movement through which India eventually gained independence in 1947. During this period, an Indian who chose to adopt a Western culture as a lifestyle was spitefully referred to as "Macaulay's Child." This was meant as a derogatory term for someone who was disloyal to India and the Indian heritage and was a direct reference to Macaulay's statement being "Indian in color, but English in taste." This speech was

often used to incite and rally Indian nationalists so that one of the key factors in winning

Indian independence was the rejection of the mass manufactured goods of England.

Instead, Indian nationalists urged fellow Indians to locally produce the goods that India

would consume.   Cutting England off from the huge Indian market was crucial to the

nonviolent strategy of defeating Britain. Gandhi urged Indians to make salt themselves

with his famous 1930 March to Dandi on the Indian coast to make natural seasalt; thus,

defying the British law that stated only the British could produce salt and garner the

income generated from salt taxes. Images of Gandhi creating his own broadcloth at a

spinning wheel in order not to wear English fashions are indelible in the minds of all

Indians as he encouraged his fellow compatriots to embargo English textiles and instead

buy or make homespun themselves. When Jawaharlal Nehru became the first Prime

Minister of India, he quickly undid the "reforms" of Macaulay's times and peers. Instead

of focusing on British literature and poetry, he mandated that science and technology

would become a priority. No longer would India be subject to the importations of other

countries when it came to high-tech goods, but they would position themselves to be a

prime competitor of such items in the global market. Everyday, when they look at their

national flag that has at its center the spinning wheel, Indians are reminded of this ideal

of creating for themselves what they consume in the markets, of not being beholden to

others, which causes dependency, but instead, to be self-sustaining and self-sufficient.

This, Nehru urged, is the ultimate path to freedom.

Indian politicians believed that functioning as a sovereign nation, they would be

able to ordain their own course of development. Even though they knew they required

aid, they believed they controlled where this aid came from and that they had autonomy

over how it should be used within their country. They quickly realized this was not the

case as certain sectors, like the example of the toilet as discussed in chapters three and

four, remained under a new form of colonialism in the form of the old guise of "aid" and

"assistance" programs. One such example is the SITE satellite that India strove to

develop in the early years after its independence. As India entered the global political

arena as an independent sovereign nation in the 1950s and 1960s, it began to explore

areas where it could compete technologically with other nations. As a newly independent

country, it was necessary for India to request aid from other countries for technological

initiatives they sought to develop. And, as a politician applying for this aid, Nehru

basically applied the Hindu principle of Advaita, that "all are one" in his strategy of

political non-alignment. As such, aid was sought from all sides of the political spectrum,

from the United States and Russia. The prevailing thought was that these countries

would freely give "alms" to India and that their mendicancy was justified because it

would be good for these countries' karma. But the SITE satellite development quickly

showed India that with the "politics of foreign aid…nothing comes free," (Srinivasan p.

145). They soon began to realize that with western "aid" of developing the tools to

support the technological infrastructure of the SITE satellite, the United States was

merely supporting its own political agenda in the Cold War against Russia by setting up

military posts and spy surveillances through the satellite in India. As a result, the

"archaic Hindu notions of philanthropy, coupled with political Vedanta cast partially as

non-alignment prevented India from establishing a comfortable working relationship with

the United States," and the West (Srinivasan p. 144). This was yet another realization for

India that colonialism still existed in the new global system, even though in theory they were an autonomous nation.

Examples like this were happening all over the globe as many countries throughout Latin American and Asia vied for their independence during the mid-twentieth century. India, like other newly independent countries of the time, found itself struggling to compete with markets that had had centuries to establish and gain a firm foothold in global economics. Furthermore, these developed markets had extracted or ravaged all the viable resources from their former colonies; this left these newly independent countries with little to offer the global market place which, in turn, led them to realize that the age of imperialism had not yet fully ended for them. To be able to survive in the new global market, they would be forced to accept loans from the western countries. With the loans, came developing contingencies, called Structural Adjustment Policies (SAPs) that ensured that these new countries developed according to the West's standards (Janes p. 1809). To understand how these structural adjustment policies represent a modern form of economic imperialism on the part of the west towards the lesser-developed countries of the Third World, it is necessary to first understand exactly what they are and what they mandate. As the major contributors to the IMF and World Bank, the G-8, especially the United States, control the conditions for these loans. Countries that accept loans from the IMF and World Bank must go through a variety of these structural adjustment programs which usually involve forcing the loan-accepting country to rapidly remove its trade barriers, increase its exports to earn hard currency for debt service, and promote foreign investment through privatization and deregulation of its labor and environmental laws. Export promotion policies such as tax breaks and

subsidies, bargain basement privatization sales, and lowering of wages are encouraged to help attract investments from multinational corporations. The IMF's cure in a nutshell is: cut government spending, reduce economic growth with high interest rates, and liberalize the rules for foreign investment and trade through free trade. "Privatizing state enterprises is a key element of structural adjustment; World Bank policy is essentially a device to shift the larger burden of curative services to the private sector, where it is thereby accessible to foreign investment," (Janes, p. 1809). Under these SAPs, the third world countries were forced to privatize certain sectors of their economy, such as initiatives in medicine, science, and technology.

As a result of this "liberalizing" of the global market, it is often the indigenous technologies that are jeopardized because they simply cannot compete with the large, corporate manufacturers. Such is the case in Tibet where it is often the Tibetan monks who practice and administer indigenous remedies to the local population. Because they are not-for-profit, they often rely on government subsidies and protection to maintain their trade. Structural adjustment policies will force the Tibetan governments to remove the subsidies given to the monks and force the monks' health-aiding charities to compete with foreign, private corporations seeking to sell their manufactured pharmaceuticals abroad. Furthermore, the Tibetan monks do not retain global patent rights for their local medicinals. Because they are not protected by these western laws and systems, the very same foreign corporations can steal the monks' ancestral knowledge of indigenous medicines and make a substantial profit off of the expanding alternative medicine craze. There is no way that the local, native practitioners of indigenous medicine who "will find themselves transformed in the competitive atmosphere of the private sector, where they

must compete for patient fees, sell medicines and support clinical facilities," (Janes, p. 1810) will be able to withstand the multinational forces unless they are subsidized by government agencies. However, the government agencies cannot subsidize such local ventures because they would be going against the loan conditions of their structural adjustment policies and, hence, would have to forfeit their much needed loans.

The structural adjustment policies that are placed as loan conditions by the West are meant to be facilitators of free trade and an opening of global markets. However, the logic of this sort of forced free trade seems to increase the economic advantage of those that already have it, namely the West. The rule of the free market is that countries should specialize and trade according to their comparative advantage, what they can produce most efficiently. Much of the Third World, therefore, has a comparative advantage in mainly agricultural products, while the First World would specialize in technological goods. "An average of about 30 percent of the economic output of low-income developing countries comes from agriculture; in the industrialized world, this value is about 3 percent," (Sarewitz, p. 130). And, according to the economic principle of a product's life cycle, agricultural goods yield a low market price because they have already reached the mature stage of the product life cycle, when demand has leveled off and prices have stabilized; meanwhile, technological goods are continuously being updated and reintroduced into the market. Therefore, these technical goods are subject to the entire product life cycle of a new product. This means that during the early stages of the life cycle, a country that specializes in technological goods can take advantage of the increased demand for this good, which generates revenue for these countries. From this revenue, these countries now have the capital to create new products, once the old

products have matured, continuing the cycle of another product's new life on the market

(Husted, p 138-139). Instead of helping these developing nations move away from a

reliance on an agriculture-dependent economy and fostering new technological

developments, the west's structural adjust policies focus primarily on keeping the Third

World mired in the agricultural realm. Many of the structural adjustment programs focus

only on those technologies that will bolster crop yields or "modernize" traditional

methods of farming (even though in many cases this modernizations leads to a heavy

dependence of foreign-produced chemical fertilizers that have been proven to cause

desertification in many areas were the World Bank promoted its use).

　　　　Some of the most devastating effects of SAPs have been incurred by the women

of Third world countries. Structural adjustment initiatives that have encouraged the

adoption of western technologies and the privatization of native industries have led to the

steady, systematic disempowerment of women in the globalization process. Prior to

western 'assistance' programs in many areas of the Third World, women had established

dominions were they were able to control decisions made within that realm, as well as the

technologies that feel within their domain. Chapter Four of this paper discusses how the

technology of the toilet was controlled by the women because it was a part of their

traditional gender role of controlling all water resources. As a result, they are able to

achieve a sort of independence by controlling the means of the toilet technology and

bringing it to their villages. In other areas of the Third World, women cultivated the

fields, distributed the harvests among their village, and disposed of any surplus through

trade with other villages and nearby urban centers. Out of these activities, trading

networks controlled exclusively by women emerged, as surplus grain would be traded for

livestock and the latest in farming technology. This direct involvement in trade and owning the technological means of production gave women a considerable degree of autonomy (Scully, p. 1).

However, when international development agencies enter Third World countries and impose structural adjustment programs, they systematically channel new technologies of efficiency mainly towards men. In those rural areas where women were able to establish dominion over a technology and then their governments accepted western loan programs, women's productivity was reduced and any progress they had generated for themselves was stunted. For example, the Land Resettlement Programme in Zimbabwe, which was initiated by the Zimbabwe government to show compliance to the structural adjustment contingencies of its loans from the World Bank, redistributed land only to individual males and new technologies of farming were taught exclusively to males. The Ministries of Agriculture, under directives from the World Bank, introduced ploughs and hybrid seeds and promoted the cultivation of cash crops solely by men. By shifting control of the means of technology, these agencies ensured that women were relegated to the home and their autonomy over crop production was lost to their husbands; instead, women were encouraged by these western institutions to take up home science initiatives and handicraft projects. For example, the Ministry for Community Development and Women's Affairs developed programs for women that "concentrated on home economics and small-scale craft and related projects," (Public Citizen, p.1). Thus, land rights, ownership, and the technological means of production were placed solely in the hands of men.

The same is true for those women in the industrial sector who were successfully able to carve a niche for themselves prior to the arrival of western assistance programs in the Third World. Several women groups in West Africa, for example, had become extremely successful in trading indigenous cloths and textiles throughout the 1950's and 1960's. However, when foreign lending institutions began to push Africa to enter the free trade agreements and to modernize through privatization, cheap imported textiles from the West took over their once thriving industry and they were forced out of business, (Cammack, p. 217). In Zambia, three fourths of all textile factories had to close because they simply could not compete with these cheap imports from foreign companies (Thompson, p. 205). For women in industry, this had disastrous effects. As a result of having the means of technological development withheld from them, many women are forced to seek refuge in the industrial workplace. The women of the Mexican maquiladoras and Chilean microempresas are examples of this in action. Because these women were taken from their land and livelihood, they had a dire need for money immediately. Thus, they entered the industrial workplace but with few industrial skills. With no skills and no power to unionize, they are forced to accept the harsh conditions and low wages that are so lucrative to foreign investing companies developing in these areas. Their salaries are barely above subsistence and they are subject to irregular hours, unstable employment, and malnutrition (Welch, p. 1).

To return our focus to India, structural adjustment programs through World Bank sponsorships have led to the same disempowerment of Indian women as seen in the examples before. Vandana Shiva explores in *"Stealing Wisdom, Stealing Seeds,"* how women, who are primarily the native healers and keepers of the Ayurvedic medical

system in India may lose their traditional authority over the Ayurvedic practices to multinational corporations because of the promotion of free trade encouraged by SAPs. In India, women farmers are the seed keepers, custodians, and knowledge providers of plant based medicine, known as Ayurvedics. Seventy percent of health care needs in India are based on this traditional system using medicinal plants, with eighty percent of the seeds coming from the women farmers. This time immemorial relationship between people and plants is now being ruptured through patent regimes imposed by structural adjustment programs that are being expanded to cover plants, animals, and microorganisms. Through the World Bank's push to open these markets up to foreign investment and private competition, the women are no longer able to control the seeds of their craft because they do not have the capital resources that western corporations have. As a result, control of the seeds are given to the corporations who are then able to patent the "knowledge" of how to cultivate and use these seeds. To bring our examples full circle, this mirrors what is happening in Tibet as monks are losing their sovereignty over their medicinal remedies and cures. For these women seed keepers, Intellectual Property Rights of herbal remedies would be taken away from these longtime Ayurvedics and given to the multinational corporations, thus taking away these women's livelihood. Not only is the concept of Intellectual Property Rights unfamiliar to many in the Third World, it represents another tool used by the free market to take control over native technologies and to implement another form of economic imperialism.

Toilets, while not obviously a technology which promises great profits to those who implement it, nonetheless follow the same course of development under western initiatives as though described above. When the World Bank decided to "help" India

build toilets for the multitudes of the Indian population without access to a toilet, the World Bank once again imposed contingencies for lending their capital and aid. World Bank initiatives forced the government of India to privatize the toilet-building sector and to open up contracting to the competitive market. When this occurred, western contractors vied with local Indian endeavors and won the opportunity to construct toilets in India. However, the World Bank models were not conducive to nor were they sensitive to the cultural norms of an acceptable toilet system in India. For example, the World Bank's model toilet had women and men's stalls facing each other, meaning that men and women would have to interact while waiting in line and there would be no privacy between the sexes when performing their ablutions inside of the stalls. This is an idea that is anathema to Indian culture. The World Bank did not choose to consult with the people the toilets would be serving and, as a result, the World Bank had no concept of what would actually be used by the people, what locations were the most desirable, and what would be sustainable for the environment they were building for. The toilets built by these western initiatives were often constructed in isolated dirty spaces, with septic tanks that cannot be sustained by India's population of urban pavement dwellers and could never be used in India's rural areas, and they were made out of flimsy materials that deteriorated rapidly. Because local materials and contractors are not used (only foreign companies can win through the "competitive" bidding process), and because upkeep and maintenance are not a priority on the World's Banks agenda, the toilet blocks cannot be maintained by the poor population they serve. As a result, eighty percent of all World Bank sponsored toilets in the urban areas of India lay in disuse and disrepair.

This is why the women of India have decided to take the technology of the toilet into their own hands, literally. They have learned what foreign 'aid' will bring them and they do not want the kind of help the west is offering. Their experience of denigration at the hands of colonizers, both historically and presently have made them very skeptical of any form of outside aid, especially those with strings attached. Furthermore, their cultural/religious standards have engrained in them that it is better for them to do for themselves rather than increase another's karma by allowing outsiders to help them. Historically, they were taught that to be a strong nation, individuals have to make and sustain their own goods. By doing so, they can overcome any kind of colonialism. As a result, these women strive to develop the technologies of the toilet according to their cultural standards. The following examples drawn from urban and rural sectors reveal what happened when they did.

Chapter Three: Urban Sector

To the millions of people living in the urban slums of India, a toilet would be a Bollywood dream come true. Twenty-six percent of India's population lives in over 4700 urban towns and cities. Out of these 4700 cities and towns, barely three hundred have a proper, working sewage system (Pathak, 2003, p.3). The toilet technology that the citizens of these urban centers do have access to varies tremendously within the urban centers. The wealthy elite have access to opulent, luxurious western-style flush toilets. These elite comprise about thirty-four percent of the urban population. Another thirty-three percent of the population has access to latrines in the form of bucket-style privies. They literally defecate in a bucket that serves as a latrine which then gets emptied in a makeshift sewage dump outside of the neighborhood compound. The remaining thirty-three percent of the population living in urban areas do not have any type of latrine system, bucket or flush, within their household (Pathak, 2003 p. 2). These latter thirty-three percent are the slum dwellers of urban societies. Ninety-five percent of these slum dwellers must rely on public toilets. However, there simply are not enough of these public toilets to meet their demand. In Mumbai, there are only 3,433 municipal toilets. Of those toilets that have been physically constructed, only about one-fifth of these are actually functioning. This leaves the average ratio of people per toilet seat at 1488 people per functioning toilet seat (Homeless International Report, 2003 p.1). As a result, these individuals are forced to use the pavements that also serve as their home as their sites for defecation.

Figure 1: Pavement dwellers on the sidewalks of Mumbai. (*Both photos from personal archives*

Of the latter sixty-six percent described above, a majority represent the people of the slums. Sixty-five percent of Mumbai's total land area is comprised of sidewalk slums. Within Mumbai, there are currently over 37,000 slum communities, with a total population of over 7.5 million people. This means that nearly sixty percent of Mumbai's total population lives in these slum areas (Homeless International Report, 2003 p. 1). The population density in these areas is immense. Nearly forty percent of the city's population live in 3.5 percent of its area. This means that Mumbai's slum developments have a population density of 400,000 persons per square kilometer (Mahila Milan Report, 2003 p. 1). With a population density this great, it is only natural that those slum dwellers living in the same area band together to form functioning communities. The resulting communities are vital to the survival of all the slum dwellers because they form a social and economic support system for those who would otherwise have none. By

forming a group identity known as the pavement dwellers, rather than remaining anonymous homeless individuals, they are able to network within the municipal systems to ensure that their basic needs are met. Because of this group identity and functioning community network, the slums that develop on the streets of Mumbai are very different from the connotation one conjures when thinking of slums in the west. The slum developments of Mumbai are "hutments actually built on the pavements of the city streets, utilizing the walls or fences which separate building compounds from the pavement and street outside." In this way, the urban infrastructure of the city itself is used to provide homes for millions.
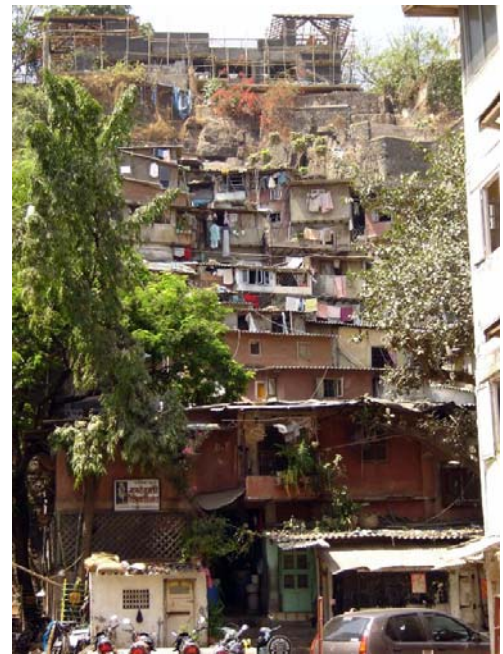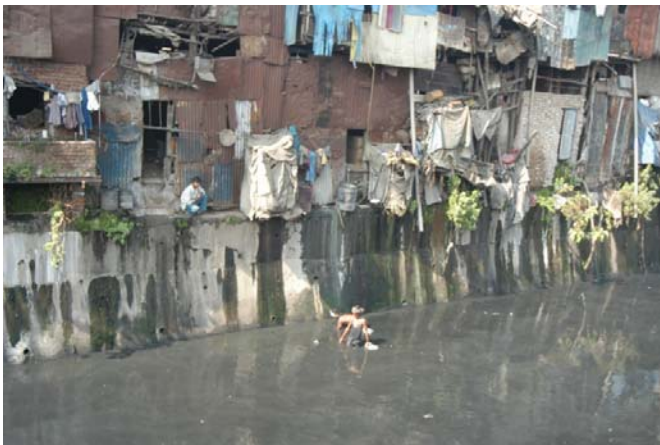

Figure 2: Examples of slum communities in Mumbai. *(Photos from personal archives.)*

Pavement dwellings arise as families flock to the big city in search of better jobs and improving their economic situation. These families often make the trek to the city with minimal to no resources or capital at their disposal. When they arrive, they do not have the means to buy or rent housing and, as a result, begin living in one of the many slum communities. They survive by living on pavements near their work so they do not incur any travel expenses. The cycle of living in the slums perpetuates itself as over seventy percent of the pavement dwellers have no fixed, steady source of income. They are forced to get by taking odd jobs, which can vary from day to day, and literally doing "whatever comes their way," to earn a few rupees (Adhikari, 2004). So, while on good days, they can earn up to one hundred rupees (about $2.30), there may be many days when no money is earned (ibid). It is even harder for the women of the pavements to obtain work as most of the work that is obtained on a daily basis is very physically demanding manual labor. Even when and where the women would be physically able to perform these jobs, it is socially unacceptable for them to perform what is defined as men's labor. By this definition, women cannot compete for these physically demanding jobs because they fall outside of their traditional domain and there is always an ample supply of men waiting to take these positions. Those that are able to find odd jobs more socially suitable to women such as hawking goods, rag picking, or doing menial "wadi" work (dhaba laborers), often earn an average of Rs80 per day, this is equivalent to about $1.85 (Adhikari, 2004).

By banding together, pavement communities are able to pool their income and provide support for one another. In this way they are able to afford some of the basic

amenities, such as electricity and water, for their slum developments. However, these are not by any means secure connections to services. Because only the facades of the buildings are used as shelter for the pavement dwellers, these "hutments" have no legal sources of electricity or running water. This makes the pavement dwellers highly vulnerable to extortion. Not only do "local musclemen" extract "rent" from the pavement dwellers for the approximately six-foot stretch of sidewalk that serves as a pavement dwellers' home, but they also force the pavement dwellers to pay in cash or kind for basic amenities such as water, electricity, and toilet use (Mahila Milan Report, 2003 p. 2-3).

Extortion is a lucrative business for these "private" water vendors as public, municipal sources of water are highly unreliable. Not only would the women pavement dwellers have to travel lengthy distances to the municipal pump, which in itself is often an insurmountable feat, but once there they would have to wait for hours on end for the truck with the water to arrive (refer to picture on next page). Furthermore, because ninety-five percent of the slum dwellers must rely on public toilets for their daily ablutions, these musclemen can make a fortune from charging per toilet use and per bucket of water needed. To enter the public toilet one time, the pavement dwellers must pay Rs1; for one bucket of water, the charge can be as high as Rs5. This means that the average family spends between Rs 15-25 a day on buying water. This illegal, unchecked extortion uses up all of what could possibly go into a savings account and help to take a pavement dweller off of the streets (Ibid).

Figure 3: Women pavement dwellers waiting for the municipal water trucks to arrive. *(Photo from personal archives.)*

There have been municipal attempts, through the sponsorship of international organizations, at solving the problem and scarcity of community toilet blocks for the pavement dwellers. In 1994, the World Bank initiated the Bombay Sewerage Disposal Project (BDSP). The goal of the project was to establish toilets for at least one million people, particularly the pavement dwellers, throughout the streets and sidewalks of Mumbai. The World Bank set up a competitive bidding process "which pitted one community against another," to vie and compete for the contracting rights to build all of these municipal toilets. However, these communities did not understand the western spirit of competitiveness that the World Bank prescribed; and, as a result, they lost the competitive bidding to outside, foreign contractors from the west. These contractors came in with a "one model fits all" approach to construction, instead of working directly with the communities they served (Homeless International Report, 2003 p. 2). Not surprisingly, the one model the contractors chose was a western designed toilet that is completely unacceptable to Indians in design and utility.

Figure 4: World Bank toilet block as it stands today. *(Photo courtesy of Toilet Talk.)*

Because of their lack of sensitivity to the cultural preferences of what the

communities needed in a toilet block, the World Bank's toilets failed. The toilets built by

foreign contractors and organizations between the periods of 1994 and 1997 are

completely unusable by the local communities. They are an anathema in design as to

what would be socially acceptable; the materials used are flimsy and cheap and are

susceptible to erosion; as a result, they are too expensive to maintain and repair and

cannot be sustained by the meager resources of the pavement communities. Out of 3500

World Bank, municipal sponsored toilet block seats, only one-fifth are functioning; the

rest lay in disuse and disrepair. Because of these disastrous attempts at "aid," the World

Bank has stopped its toilet building projects in Mumbai and as of 1997, no toilets have

been built by the World Bank or by World Bank sponsored organizations (Ibid).
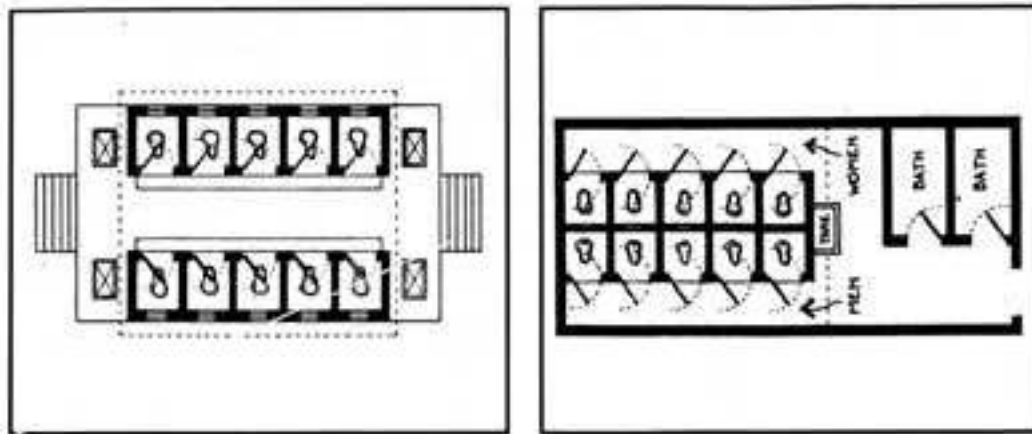
Figure 5: World Bank toilet block design verses Indian women design. *(Diagram from Toilet Talk, p. 3.)*

The above diagram gives a pictorial example of how the World Bank sponsored toilets failed to meet the needs of the Indian community they were serving. The draft on the left shows the design that the World Bank used when constructing the community toilet blocks. The diagram on the right shows the design that the women of the community are now using as their construction model in current projects. While the differences between the two diagrams may look subtle, they actually make a tremendous difference on which toilet blocks are used by the communities they to serve (Toilet Talk, 2004, p. 3).

As can be seen above, the World Bank model has both women and men entering the facility from the same point, the center entrance. The stalls to both the women and men's sides face each other. This means that there would be no privacy between the sexes, both in waiting in line for the facilities and also, once each had entered. Because the toilet can be accessed from both ends, the narrow passageway easily becomes

congested and competition becomes very fierce during high traffic periods of the day.

"This leads to hassling of women, lack of privacy, and arguments about cleanliness,"

(Shankar, interview). Not only is there a lack of privacy from within the World Bank

model, but this extends to the streets surrounding the toilet blocks, as well. Because there

are not exterior walls surrounding the toilet facilities, the enclosures can be viewed from

passers-by when the stall walls begin to erode and deteriorate, which they inevitably do

from use and time. Furthermore, the exterior walls of the World Bank's toilets serve as

the back of the toilet stalls themselves. Because of this, they are prone to rusty, leaky

plumbing and suffer the natural dirtiness of serving 1500 people per seat. Given this

dirtiness, one would want to touch the walls of the stalls as little as necessary when using

the facilities. However, the doors of this model open inward, forcing the occupant to

press against the inside walls just to open the door and exit. No provisions have been

made to ventilate the toilet block. Again, with the multitude of people that use each toilet

within the block, this can quickly lead to a stifling environment rank with foul odors.

With all of the dirt and grime that can build up in the stalls, and the long wait just to

reach an available toilet, women often prefer to send their children outside to squat on the

sidewalks and pavements of their dwellings. This also serves as a much safer choice for

them, as the World Bank models do not have traps over the aqua privies and it is not rare

that children fall into the tanks and drown (ibid).

 With all of the pitfalls and even dangers to the World Bank toilet block, it is not

hard to see why they are not being used by the communities they serve. Because women

are usually the most victimized by harassment suffered in these toilet blocks and because

their children are actually put in harm's way, it is also not difficult to understand why

they are taking up the designing and construction of toilets in their communities. Simply put, the World Bank imposed a design that did not fit is users' cultural expectations. It is in the community's own, women-designed alternative, the result of a concerted grass-roots initiative that will be discussed below that we see just how poor a fit the World Bank's model is. The model on the right shows the women's design and how it meets their societies' needs much more effectively than the World Bank model.

To begin with, all models of urban toilets will be prone to erosion because of the fact that they are all exposed to the elements. Because the pavement dwellers live outside or against hutments, their toilet structures, too, are built outside, not sheltered within another building. Even without having to face the elements, erosion would occur at a far more rapid speed than in the west because of the sheer numbers using each toilet seat. The difference between the World Bank and Indian women's model is that the World Bank does not make provisions for this erosion either in design or material used for construction. In contrast, the women's model has exterior walls that are built around the stalls themselves. When the stall doors begin to erode, passers-by still will be unable to see into the toilet block because of these walls. Furthermore, these exterior walls have no plumbing attachments; therefore, they are not subject to rust and leakages like the World Bank's toilets. The hard-wearing stone slabs that the women have chosen for construction over the ceramic floor tiles, makes the toilet blocks more enduring and, thus, more sustainable to their communities (ibid).

Sustainability over time also means the ability to keep the toilet areas clean and, therefore, usable. Because they are separate from the stalls, the exterior walls mentioned above stay clean, so the toilet block keeps a clean exterior face. This makes the toilet

blocks more acceptable to crowded communities where owners of other buildings could complain about the construction of such facilities. The doors of this model swing outward, which eliminates contact with the stall's walls and also makes it easier to navigate when carrying buckets of water. Each stall is ventilated on all four sides, allowing the odors to dissipate.

The women's design also takes into consideration the safety of themselves and their children. By simply having both the men and women enter from two separate lines behind their respective stalls, the congestion and bottleneck effect are reduced; also, the stalls waiting area is women or men only, which eliminates the harassment. This serves to ensure privacy and also to act as an effective crowd organizer and creates a much safer environment for children to enter and use the facilities safely. Before the children could hardly wait in the long lines until a toilet was available so they were forced out of necessity to squat in the streets. Now they are able to benefit from the more efficient organization by entering the latrine areas quicker with their mother. Once inside the latrine area, the women have specially designed shallow latrines for children's use only. These "baby channels" allow the children to squat within their mother's enclosures keeping them safely within site and off of the streets. By designing such toilets where men, women, and children can use the toilet blocks safely, cleanly, and effectively, these women are improving the health of the entire urban area because they are keeping much of the slum dwelling population from defecating in the streets.

Having an effective design for the toilet is one thing, but actually being able to implement the conception into a physical reality is quite another issue. Obviously, the women are able to articulate a design for a toilet that would be suitable and compatible to

their society's unique culture, morals, and mores. However, as pavement dwellers, their access to resources is more than limited, it is non-existent. To be able to construct the toilets of their dreams, they would need the assistance of outside organizations. But, they knew from their past experience with the World Bank toilet, that foreigners would not understand their needs and would not allow them to build their toilet design without political and/or economic ramifications. As a result, these women turned to local, Indian non-governmental organizations; in this way, they knew they were not dealing or being influenced by foreign investments. In contrast, if they would have asked their municipalities for aid, much of the assistance would be linked to foreign funds as the World Bank controls the projects that get funded through loan contingencies. Indian non-governmental organizations (NGOs) do not have this sort of affiliation with the World Bank, other international financial institutions, or the local municipalities because they fully fund and sponsor themselves.

As a result of this past experience and arising out of an imminent need for the construction of community toilets, an alliance was formed between an Indian local NGO, the Society for the Promotion of Area Resource Centres (SPARC) and two community-based organizations, the National Slum Dwellers Federations and Mahila Milan. In order to ensure that the women would not lose their autonomy over the construction of their toilets to these organizations, they established a precedence that these NGOs would only formalize and "technically finesse" the women's design ideas when necessary. This federation of organizations focused on providing women of the slum communities with a means of obtaining the resources necessary for toilet construction, as well as giving them

the proper technical training and educational assistance to commence construction of the

toilet blocks themselves (Chaudhuri, 2004 p. 208).

It is the goal of the organizations to give the technical expertise and training to the

women, so that they can build, own, operate, and sustain the toilets through their own

means, thus giving them complete sovereignty over the technology of the toilets in their

communities. It is important to note that these organizations are closely intertwined with

each other and other organizations throughout the slum dwelling communities. They

often share resources and work off of projects that the other has completed. For example,

it is the women of SPARC who conducted the census to get an accurate count of

functioning toilet seats, then the National Slum Dwellers Federations and Mahila Milan

helped to organized these women in toilet committees and give them the tools to

absolutely control the toilet technology and to use this tool to the extent that they did. As

stated in the mission of SPARC regarding this partnership with the other organizations,

"Rather than waiting for the governments to do something about the poor, the

communities of the poor in these countries have got together and formed national

federations and begun to save money, collect information about themselves and create

solutions to their problems. (Adhikari, 2004)" Each of these organizations have at its

core the principle that women are the "most vital aspect" and "center of all activity" of

each of these communities and enabling them to "drive the process builds their

confidence to manage money, construction and negotiation with government and

municipal authorities. (Adhikari, 2004)"

The Society for the Promotion of Area Resource Centres (SPARC) was founded

in 1984. SPARC currently works with approximately 4050 slum dwelling communities,

which consist of over 30,120 individuals. SPARC works predominantly with the women

of these communities, stating as one of its four basic aims, "to ensure that women have

equal rights to participate in the decision making process," (Patel, 2004) of running their

communities and controlling the technologies that are brought to their communities. This

aim is achieved by focusing on knowledge gathering and having accurate information of

resources available rather than relying on statistics gathered and reported by outside

agencies. The top resource of concern for SPARC, as well as the other organizations, is

the toilet.

When SPARC took over maintenance, care, and construction of community

toilets from the World Bank, one of their first tasks was to compile an accurate report of

toilet statistics within the slum communities. The women of the community conducted a

census and found that numbers that were being reported by the international agencies as

proof of international aid organizations' successes were actually misrepresented. Among

some of the discrepancies found by these women were World Bank reports stating that

they had constructed so many toilet blocks that there now were only 83 people per toilet

seat (Anantula, interview). Further, World Bank reports indicated that these toilets were

being cleaned and maintained by organizational workers. In actuality, many of the

reported "functioning" toilet seats in the statistic above were not in use or functional at

all. The "real situation varies between 170 and 222 people per toilet seat, depending on

the sector," (ibid). The women reported that the toilets were not being maintained and

cleaned and nobody had a feeling of accountability for keeping them maintained. The

women also conducted a survey of the other pavement dwellers in their communities as

to what resources were most important to the slum developments. "Of all the basic

needs, toilets and access to sanitation outranked all other resources," (ibid). The census confirmed that women and children spend and average of 3-4 hours a day in water collection for sanitation uses (Patel, Personal Interview). Most of these hours are spent in travel time and mere waiting for the water to arrive. The average common water post that slum dwellers use for their water is located about 1 kilometer away; usually the municipal trucks delivering the day's water supply only arrives in the evening, making the trek even more perilous as women and children must cross a series of train tracks to get to the posts (Sen, 2002 p.2).

With this information at hand, the women were able to accurately report the dire urgency for toilets in their communities to their municipalities and local governments. In reporting these numbers to the authorities, they were not asking these organizations to build toilets for them, they were asking for the opportunity to design and build toilets for their communities themselves. SPARC, together with the National Slum Dwellers Federation helped the women of these slum dwellings to form toilet committees, locally known as "baandhinis" that were responsible for each set of toilet blocks within their dwellings. The women-led baandhinis not only accept the responsibility for managing and cleaning the toilet blocks, they are also responsible for researching, holding counsels, planning, building, administering and maintaining the community toilet blocks. The baandhinis work together with local architects to discuss their needs and the architects, in turn, design plans for the toilet blocks according to these specifications. Even though the architects may be drafting the design of the toilet block, the women always have supervisory veto power to change or modify the designs according to their specifications. The toilet committees also serve to manage and maintain the toilet blocks within their

jurisdiction. Through continual supervision and management skills, these women are

able to restrict toilet block users to about 45-60 people per seat, which makes

maintenance a much easier task and prolongs the life of the toilet block (Sen, 2002 p.3).

Once these women toilet committees were established and given a voice within

their communities, Mahila Milan took over the role of establishing them as a workers'

union of sorts where they would be able to practice their trade and create a sustainable

profession and existence as toilet designers and constructors. One of the key elements of

Mahila Milan's mission statement is that "sustainable development can only be achieved

through a people-driven process where the poor communities themselves are exposed and

empowered to conduct their own negotiations. (Mahila Milan Report, 2003 p.4)" This

goal can only be achieved by "obtaining recognition for the role of women in these

communities and involving them more actively in community development." As a result,

Mahila Milan, which translates into "women together," developed an all-women

centralized 'Builders' Guild' of masons, construction workers, plumbers, and

electricians. Each of these women has been fully trained in designing and building low-

cost houses and toilets.

The organization of Mahila Milan began in 1986 with a membership of only 500

homeless women (Sen, 2002 p.2). These women came together with the express concern

of the lack of toilets in their communities and an eagerness to do something about the

problem. They began by initiating contracts with local and municipal governments to

build toilets. Their initiatives spread to other communities where more toilet committees

were formed as a result. These toilet committees gained easy acceptance from the slum

communities as the women proved that they were not only able to design and construct

fully functional toilet blocks that met the cultural specifications of their developments,
but also because these women combatted the middlemen who were extorting higher
prices for amenities. The middleman is eliminated because Mahila Milan members
perform the tasks that previously could only be done by the extortionists who knew that
they held valued information and skills and would charge an unfair price for these skills.
Now Mahila Milan members design their own on-site infrastructure for toilets and
sanitation amenities. By doing this, they have been able to reduce the cost previously
charged by middlemen by an average of thirty-five percent (Mahila Milan Report, p. 7).
These women contribute their own unskilled labor for upkeep, upgrading, and are fully
responsible for on-site maintenance of the toilet blocks, which reduces costs by a further
twenty percent because their communities no longer have to hire someone from the
municipality to complete these repairs (Shankar, 2004)

In addition to reducing the total overall costs of basic amenities for their
communities, the women have also proved themselves fully capable of managing the
toilet blocks and performing the upkeep and repairs. From these endeavors, the women
have not only reduced costs, but have begun to generate revenue for themselves and their
communities. Through the savings and loan program that developed out of Mahila
Milan's initiatives, the members are about to contribute ten percent of total capital cost
for basic infrastructural development of their communities (Mahila Milan Report, 2003
p.7). This enterprise initially started very modestly with the homeless women collecting
one to two rupees to have extra money on hand for when the toilet blocks needed
maintenance. When the Mahila Milan members realized that other members of the
community were willing and eager, if not always able, to donate to this fund, they began

an initiative to enhance the collection and create a crisis fund for women in need. Over time, this gradually turned into a fund that individual women of the slum communities could borrow from when in need. As a result, it is now a requirement for membership in Mahila Milan for each woman to have a minimum daily savings of one rupee contributed to the loan fund (Shankar, 2004).

The women of Mahila Milan were acutely aware and, thus skeptical, of what the word "loan" meant to their society and all of the ramifications that are tied into that one concept. For them, loans were something that were not given without "strings attached" (Shankar, 2004). From the extortionists who would charge compounded interest that was way beyond their means, to the international organizations that would only give money if projects were completed to their specifications, loans from the outside were something that did not aid the slum dwellers and were more than likely to incur debts and damages that could not be repaid or repaired in a lifetime. Furthermore, it is a source of religious duty for these women to aid themselves by aiding one another. By letting outside organizations, even those NGOs with the best of intentions, to do for them, they were decreasing their karmic returns and not performing the duties of their specific dharma (Ramani, 2004), concepts that will be explained in more detail in Chapter 5.

For this reason, it was very important to the women of Mahila Milan that the savings and loan committee be made up of the other women of the slum development, not of NGO organizers, municipal authorities, or any others outside of the community. This ensures that the determination of who would be eligible for loans would be made by a peer group of women who come from the same development, and thus face the same economic situations and hardships, as well as share the same motivations for financial

freedom. In addition to the loan process, the daily savings program is also supervised by the women of Mahila Milan. This close affiliation with one another forms closer-knit bonds between the community groups which not only helps each community to better its living environment through improvements made to the infrastructure of the slums, but makes it more viable as a political force through sheer numbers, as well. The peer association also encourages the discipline and fosters the life-long habit of saving money.

Thus, the savings and loan program is fully operated by the women of the slum communities, who must run the franchise on meager resources and are often considered illiterate in numbers and letters by outsiders of the community. However, these women have created a system that shows that even the term 'illiterate' is subjective. They have devised a process that uses colored slips of paper to designate the different denominations of currency that they are unable to read, thus showing how one symbol can be replaced by another. Through this system, all members are able to comprehend the currencies being exchanged. This process has enabled the women to begin liaisons with local banks and finance institutions, such as the Rashtriya Mahila Kosh, which is a women's credit and financial institution. Such liaisons developed as the women saw the need to have access to greater capital funds for the ultimate goal of building better shelters, which, in turn, is made possible through their enhanced ability to expand their toilet building business (Mahila Milan Report, 2003 p. 10).

Through the ever-expanding savings and loan/credit program, the women are now able to take out a maximum credit line of Rs5000 (US$110). A vast majority of the loans are for income-generating purposes, such as expanding the toilet building projects to other communities and development, and even contracting themselves out for private

home toilet construction jobs. The current rate of interest on these loans is two percent:

one percent is used to repay interest to the bank or lending institution; and the other one

percent is to meet the administrative expenses of Mahila Milan and to rebuild the group

credit fund. Once again, because of the intimate nature of the loans stemming from the

community structure of the program, and the fact that both the loaner and loanee are in

daily contact with one another as peers, neighbors, and business partners, the average

loan repayment rate is 100% (Mahila Milan Report, 2003 p.11).

These women-led organizations lead to a sense of pride and ownership within the

entire community, but particularly for the women who were previously unable to obtain

jobs as frequently as the men of the community. By having full autonomy over the

technology of the toilet, from the inception and design of the project to the contracting

and construction of the physical product, these women have established themselves as an

authority within and without of their communities. They are now seen as credible and

legitimate community organizers by others in their community as well as government

officials. Their role as community organizers is evident in the way they supervise the

construction and quality of the toilet blocks and in the way they manage the maintenance

and upkeep of the toilets once constructed. The women are responsible for collecting

minimal dues and fees from each user of the toilets. Each family traditionally pays abut

Rs20 per month, this is equivalent to about $.40 (Ramani, 2004). This money is used to

hire cleaners or for repairs, if needed, of the toilet blocks. This financial management of

the accounts and the discretion to use the funds as they deem necessary is a tremendous

source of responsibility that garners even more respect from members of the community.

Along with managing the collection of dues from members of their dwellings, the savings and loan program initiated by Mahila Milan has further given these women the confidence to handle external credits and financial accounts. For the first time, many of these women now have their own bank savings accounts. Those that have been saving the longest are now beginning to buy their own houses registered in their names, whereas before they were dependent upon a male to buy and sign the deed of any property. As a direct result, banks now consider the alliance forged with these women to be an important, viable, and mutually beneficial relationship. This sort of alliance is important not only to the women themselves, but to all of their community. Previously, pavement dwellers were seen as a scourge to urban society by their home-owning neighbors and local politicians. Because of the women's ability to breach divides between slum and non-slum communities and their association with local politics, they are now being regarded with more dignity from those outside their communities.

As these alliances permeate the boundaries of their developments and communities and their municipal governments, the women have the opportunity to begin to educate themselves more and to delve into larger contracting initiatives. They began to learn the art of negotiating and navigating through the notorious Indian bureaucracy. Not only did this solve the problem of the illegal 'middlemen' as seen above, but it enabled an affiliation with such organizations as the Bombay Electrical Companies and the Water and Sanitation Services. Through such connections, they have worked with local business and government organizations to create legislature to protect their toilets, such as winning the right to lock their toilet blocks. This simple act of being able to lock the toilet blocks at their own discretion places the technology that much more within their

control. In this way, the women serve as effective liaisons with administrators in charge

of sanitation to ensure that toilet construction continues and maintenance of these toilet

blocks is at the forefront of local government policy (Patel, 2004).

The women have also established exchange processes with other communities to

share the information they have obtained through their own experiences. "Exchanges

between poor communities to share their experiences and learn 'best practices' from each

other are regularly organized" by the women (Sen, 2002 p. 5) The BOO model, which

stands for "Build, Own, Operate," is a program where the women of the slum

communities are able to take their expertise to other urban areas where similar models are

needed. Through this model, women of other communities, extending even into other

urban areas, are able to learn the technical expertise of construction new toilets, repairing

unused blocks, and general upgrading of all others. Beyond this, the women also share

their wisdom in dealing with administrative organizations and the legislative and political

savvy. This sharing of experiences has grown beyond the city of Mumbai, to encompass

other regions of India, both urban and rural. In the spirit of true globalization, these

women have shared their knowledge with slum communities internationally, such as

South Africa, Cambodia, and the Philippines. But the continuing story is how these

women have reached out to their rural sisters and helped them seize the opportunity to

develop toilets. As will be seen in Chapter 4, these interactions and mentoring of the

women of the rural villages has helped the rural women to lead their own toilet building

initiatives, which enhanced both the political status of the rural women as well as the

economic and environmental livelihood of their villages.

Figure 6: Pavement dweller managing the slum community's contracting headquarters.
(Photo from personal archives.)

Chapter Four: Rural Sector

In the rural areas of India, the statistics regarding who has access to a toilet differ drastically from the urban sector. The numbers are not about how many people use one toilet seat, as we saw in Mumbai, because in many cases not even one toilet seat can be found. Instead, ninety percent of the rural villages have no access to a toilet (Krishnakumar, p. 2). Given the population of these rural areas, this means that over seven hundred million people defecate in the open (Pathak, p. 3). In a typical rural area where a census was taken of 1,017 women, only five had a toilet at home; the others used fields and open spaces for defecation (Krishnakumar, p. 2). Traditional cultural customs and mores have determined women's control over the domain of the technology of the toilet. For this reason, the statistics associated with the rural sector also often focus on tasks that are considered part of a woman's traditional domain and show how women in these areas are defined by these traditional gender roles most often to their disadvantage. The customs dictate that women are primarily the caretakers of water and sanitation. This means that they are responsible for all tasks associated with water, from the collection to the management of this precious resource. It is their duty to draw, store, utilize, and manage water as per the daily requirements of their family; they are also responsible for the proper disposal of the family's excreta and other domestic wastes. These daily tasks consume most of a rural woman's day. Seventy-eight percent of women spend an average of four hours a day in fetching water. The women of these rural villages must walk on average a minimum of six kilometers to transport water from the local water sources. Fifty-three percent of women polled in the census above complained

that they were not able to transport enough water for personal hygiene use, especially during menstrual periods. What is striking about the case of the women of the rural sector is how this absence of toilets has shaped their communities and how the inception of the toilet that our story will chronicle is defined by a combination of traditional gender roles, current legal reforms, and future economic and environmental endeavors (Barot, p. 2).

The traditional gender roles and social attitudes that define women and their daily tasks and chores perpetuate a relatively low status for women in these areas. The main status indicators of the villages are education, ownership of property and resources, and control of new technologies. It is very difficult for women of the villages to have access to any of these resources. Because so much of a woman's life is spent in collection of water, girls are usually engaged in household activities from a very early age rather than being sent to school for an education. Long-standing family properties are rarely ever transferred to a woman's name; she is unable to gain landholdings through marriage or to buy her own piece of property if she remains single. Because they have no land as collateral, women are unable to have credit extended to them for any sort of economic endeavors. Also, new technologies are usually considered to be the domain of the men of the village; as such, technological initiatives are not taught to women or girls within the village communities, which, in turn, deprives these women of technological developments that could enhance their status and daily quality of life.

Figure 7: Women as the traditional caretakers of water. *(Photo from personal archives)*

These customs also dictate the day to day interactions that take place within the village community on several levels, such as between men and women, and also between women of differing castes. Due to the traditional, cultural taboo against menstrual blood (women must not be touched or interacted with during periods of menstruation), women and men are not allowed to defecate at the same place. Because defecation is done is the open, in fields usually outside of the villages perimeters, and not contained in sanitary containers, there is the possibility that menstruating women could taint others with their menstrual blood. There is also an extreme cultural sensitivity to the possibility that women will be exposed to the eyes of men, thus tainting the women's chastity, while they are in the compromising position of defecating in exposed fields. Both of these examples mean that women are deprived of basic services that are provided during the day in public areas. In addition, women of the "untouchable" caste are not allowed to use public

sources of water and sanitation neither during the day nor at night for fear that they will pollute the rest of the village. They must travel even farther distances than women of higher castes to transport their water and perform their daily ablutions.

Because of the lack of women-only public sanitation facilities, all women, regardless of caste, must wait until after dark to relieve themselves and defecate in the open. This has led to many health-related concerns such as bladder and urinary tract infections directly caused by prolonged periods of not being able to urinate and dispense with other bodily wastes. To reduce their need to excrete during the day, women drink and eat less. Not only do they not receive proper nutrition because of this, but they often suffer from dehydration because of the lack of fluids consumed. Being forced to travel long distances away from their village after dark, unaccompanied by men, also poses a personal threat to their safety. Assault and molestation are not rampant in the villages, but the odds of it occurring are increased when women must travel alone at night to isolated areas where they are exposing themselves in order to wash and go to the bathroom. Often their treks to these remote areas take them across train tracks that are notorious "hangouts for unsavory characters prone to drinking" (Bannerjee, Personal Interview). These train tracks are also hazardous to travel at night as the train conductors cannot see the women in their paths.

While the above cultures, customs, and traditions of the village directly affect the health and safety of the women of rural villages, the simple fact of scarcity of safe and adequate water affect the state of the entire village: men, women, and children. Because there are not wells, pumps, irrigation pits, or any other infrastructure to bring clean water to the villages, women are forced to rely upon unsanitary sources for their water supply.

This water is used to do the cooking, cleaning, and laundry, and is a main source for basic

consumption. These sources of water are so unclean and infected that jaundice, viral and

gastro-enteric diseases, and cholera outbreaks occur frequently in the rural villages of

India. Diseases that are less common and easily treated in the United States, such as

diarrhea and dehydration, result in the death of over 500,000 children every year

(Krishnakumar, p. 3). Basic productivity, which is the only resource that a village can

offer for its subsistence, is highly compromised due to sanitation-related diseases. Each

year, 180 million work-days per year are lost due to illnesses caused by unclean water.

This is equivalent to 12 billion rupees per year (Paramasivan, p. 1).

These harsh conditions not only exemplify the challenges that women face as the

main caretakers of their village water supply, but they also serve as indicators of the

important role that these rural women play in controlling the environmental hygiene of

their communities. This ability to control and choose water resources, limited as it may

be, is a source of autonomy and authority for these village women. This autonomy did

arise because water-related issues are not viewed by the village councils as critical to the

villages' needs. Men are not concerned with how the laundry got done, how the dishes

are washed, food is cooked, or where the water for their bathing comes from as long as it

is always accessible to them when they come home from the fields in the evenings. And

the women are sure that it always is accessible because it is their place within the

community to ensure that it is. The choices these women have for gathering water may

not seem ideal to western standards, but at least the choice is theirs. Women control what

water sources are used in their daily routines, whether it is the murky water hole used for

doing laundry that is located 6 kilometers away, or whether is the less murky rain-water

hole to be used only for precious consumption located 8 kilometers away. Women use their traditionally defined dharma, or duty, to influence the sanitation practices of the village. Part of their water duties entail teaching proper hygiene habits to the children of their community. As teachers, these women influence their family's sanitation habits and are consulted on the design of facilities to improve the cleanliness of the village.

Even though women do have control of the sanitation facilities within their village, their power remains quite limited in scope when it comes to initiating new technological improvements, such as toilets and sanitation systems. This is because women have never been given a forum in their local village meetings and governments to voice their concerns and their interests in bringing new water technologies to their communities. Traditionally, only men were allowed to participate in these local government meetings and to address the needs of the community. Toilets were rarely an issue under these male-dominated village meetings because sanitation, including toilets, was not considered vital to the village's needs. This is because it falls within the women's dominion; only those technologies that concerned men directly were considered issues worthy of discussion within the village gram sabhas. These primarily focused on bringing new farming technologies to the area in the form of machines and fertilizers. So women's drudgery in obtaining water continued and the village's sanitation and environmental health remained stagnant because women did not have a voice to propose new ideas for technological improvements in the water supply that would be beneficial to their villages.

To repeat, this may not exemplify an ideal autonomy over a technology. But it is this symbiotic relationship to water that women have been able to use as an impetus for

change through a new Indian law giving women a chance to discuss their issues within

the local village governments. This law is helping women to prove that not only are

toilets a valid technology, but also a technology that can improve the health, efficiency

and productivity of the entire village. The women are seizing the opportunity that this

new law gives them to completely control the toilet technology and to retain autonomy

over all realms of its creation. The autonomy that before was quite limiting in scope is

now giving these rural women the opportunity to show their village how important

sanitation is to overall productivity and, as a result, to bolster their status as women in

society—all through the technology of the toilet. In fact, what was previously considered

a hindrance, the lack of any sort of infrastructure for sewage and sanitation, is ironically

proving to give the women even more freedom. Unlike the urban sector where the

women had to work with the infrastructure that was already in place, be it improving

dilapidated toilet blocks or using the sidewalls and facades of the buildings where they

chose to build their sidewalk communities, the women of the rural sector are given the

freedom to choose a technology that will be the most beneficial to their village.

This new law being instituted throughout the rural states is a mandate from the

national government that women participate in the local village and state governments

through a reservation of elected seats. As seen above, it is these village meetings that

prioritize projects for the entire community. Even though, historically, these village gram

sabhas were always present to discuss the needs of the village, they functioned mainly as

informal, village council meetings among the men of the community. As part of the

independence movement, Gandhi envisioned making these meetings part of a recognized

local and state government. He often spoke of Gram Swaraj (village republics) in which

adult villagers would annually elect the government and which would have authority and jurisdiction in the fields of legislation, jurisdiction and executive decision-making without interference from the state government. Thus, by 1948, twenty native states had enacted Panchayati acts. However, even these covered few villages, were extremely limited in their functions, and did not include women participation (PRAGATI publication, p. 1).

In the period between of 1959-1964 the Panchayat Raj Institutions (PRIs) became the institutionalized three-tier model that it is today (this model will be described below) and were conceived as local bodies meant to ensure peoples' participation in development. This trend continued through the 60's and 70's. The three tier model was accepted by all states but neither sufficient powers nor sufficient finances were given to, thereby leaving the panchayats to languish to their fate. In such a scenario the importance of ensuring the participation of women took a backseat to having the PRIs institutionalized and recognized. The function of the PRIs was nowhere defined in the constitution and its meaning and scope were never authoritatively interpreted by the judicial guardians of the Constitution, the High courts and the Supreme Courts. Therefore, there was a growing realization that it was the lack of constitutional support that kept the PRIs from reaching their full potential. As a result, the government of India wrote the three-tier panchayati raj institutions into the constitution of India with the enactment of the 73rd Constitutional Amendment passed in 1992 (RLEK, Amendment 73 publication, p. 5).

It was at this time that the 73rd Amendment also incorporated the political participation of women into state and national law. Previous gram sabhas and panchayati

initiatives did propose women representation in the forums; however, participation was

not mandated and, therefore, never fully accepted by the states. Because participation

was voluntary, most women did not participate in the local governments; they feared

speaking out in the village forum because they were regarded as illiterate and

unimportant simply because of the fact that they are women. The men of the village

certainly did not force the women to take part in the councils because they were happy to

keep that distinction for themselves. In those states where the provision for women to be

able to optionally participate in the village gram sabhas was proposed, the panchayati raj

system of government was accepted, but the provision for including women was rejected.

Without this provision in the previous government, less than 7 percent of parliamentary

seats were won by women (RLEK publications, p. 6). Therefore, a mandate reserving

seats for the "poor, marginalized, and the oppressed," (Sharma, RLEK interview) was

needed to ensure their representation in local governments. The state of India realized

that if development initiatives and poverty alleviation programs were to succeed at the

rural level, they needed the local involvement and participation of women. To ensure an

effective presence of women in these institutions, the amendment stated that 33 percent

of the local government seats are now to be reserved specifically for women of the rural

districts. This Amendment that was passed in 1992 was enacted for the first time in the

1993-1994 state elections (Vyasulu, p. 12).

Figure 8: Women leading movement for toilets in their village and participating in gram sabha meeting. *(Right, personal photograph. Left, from RLEK publication, p.3).*

Before looking at the impact that this law has had on the women of the villages, it is important to understand the structure of the local governments and the areas where women are becoming prominent due to the amendment. This description shows the vast web of bureaucracy that is Indian local government. As will be seen by all of the villages, districts, jurisdictions, blocks and official, ex-officio, non-official levels, elected, non-elected, and appointed posts and positions and the division of labors and controlling of funds for development, working within the system can be very confusing to say the least. It is very hard for members who have studied politics at universities and institutions to know the proper channels to get a project funded. The task can be overwhelming if you are a woman from a rural village that has never attended school, village meetings, and never before had a voice of your own.

These local governments are known as the Panchayati Raj Institutions (PRIs). Below is a diagram that shows the basic pyramid structure of the PRIs. The PRIs are comprised of a 3-tier organizational structure of elected posts and positions. The elected

tiers of the PRI are the gram panchayat, the panchayat samiti, and the zilla parishad.

These can have slightly different variations of name according to the dialect of the rural

district they serve. No matter what the name, the pyramid structure remains the same as

does the function of each tier. "The provision of a three-tier structure, except in states

with less than a population of Twenty Lakh, is designed to bring uniformity in the

structure and pattern throughout the country which in time will strengthen planning

processes at the grass roots level." (RLEK, Amendment 73 publication, p. 2). The main

goal of the PRIs, which provides for electing all members of Panchayats at every level

directly by the people, will also contribute to accelerating democratic processes at the

grass roots levels. Thus, it will "boost local people's initiatives and enhance their

involvement in the system, through the electoral process," (Sharma, RLEK interview).
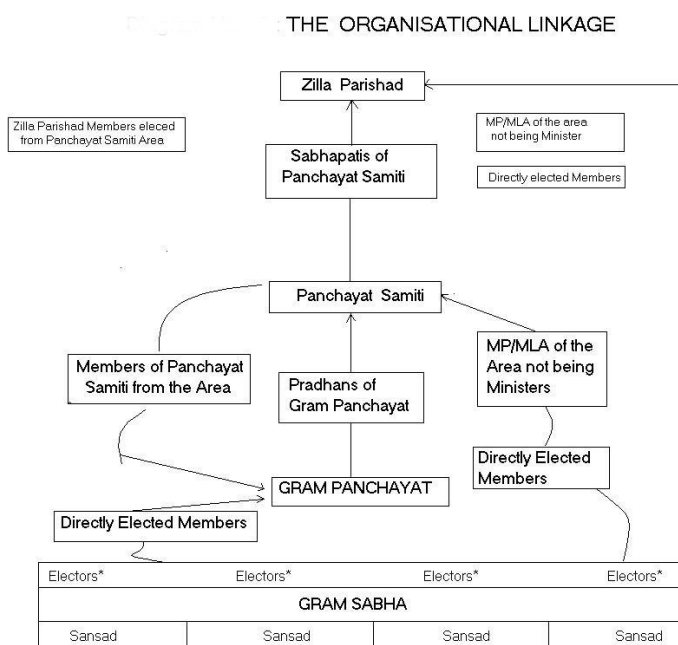

Figure 9: Panchayati Raj Institutional structure. *(Diagram from Johnson, p. 22.)*

At the base of the PRI structure is the gram sabha. The gram sabha is not an elected branch of the local government. Instead, it is comprised of the entire body of citizens that are eligible to vote in a village. Eligibility is based only upon age; anyone 18 years of age or older is eligible to be a part of the gram sabha. Each village has its own gram sabha that is expected to meet twice a year to discuss improvements that are necessary to the functioning of the village, important issues relative to the community, and to act as a watch dog of the elected Gram Panchayat tier. It is also designed to be the place where "villagers will discuss development issues, begin the planning process to initiate development programmes and select beneficiaries for these schemes," (Sharma, RLEK, interview).

Located just above the gram sabha on the pyramid structure is the Gram Panchayat. This is the basic unit of village democracy as it is the first elected body of the panchayati raj institution and has jurisdiction over a village or a group of villages. It consists of five to thirty-one members elected by the Gram Sabha through a secret ballot; each elected member serves for a period of three to five years. The elected officials of this tier are chosen by the voters of the gram sabha usually because they are prominent members from this base structure. This means that they have already served the gram sabha by being proactive members of their village and have already effectively been able to bring many developmental projects to their communities. The members of the Gram Panchayat are called Panchas and the President of the Gram Panchayat is the Sarpanch. The Sarpanch is directly elected by the gram sabha members (Johnson, p. 57).

The intermediate tier of the Panchayati Raj Institutions is the Panchayat Samiti. This is a vital link between the village served by the Gram Panchayat and the district level of the Zilla Panchayat; the Panchayat Samiti serves as an intermediary between these two tiers in terms of planning and administration. This level of government is known as the 'Block' level; a Block is consisted of all of the Gram Panchayat districts and the villages it serves; they all come together to form a Block at the Samiti level. Each Panchayat Samiti consists of official and non-official members. "The official members are the Block Development Officer and the Officers of various State Government departments ordinarily stationed at the Block level, such as the Chairman of Primary Co-Operative Agricultural Development Bank, Director of District Co-operative Central Bank, and the President of Primary Co-operative Marketing Society," (Sharma, RLEK interview). The non-official members include the Panchayat Samiti members and the Sarpanchs of the Gram Panchayats. The Panchayat Samiti members elect a Chairman to head this body of government. The main functions of the Panchayat Samitis are "planning, execution, and supervision of all development programmes in the Block," (ibid). It also supervises the works of Gram Panchayats within its jurisdiction.

The Zilla Parishad is the apex of the PRI structure. All tiers of government below and the villages encompassed by these tiers comprise the jurisdiction of the Zilla Parishad. This district-level tier is the direct link to the state governments of India. The various Rural Development Works being done at the Villages, Gram Panchayats, Block and District levels are planned, implemented, monitored and maintained by the Zilla Parishad. The Zilla Parishad supervises the works of Panchayat Samities as well as Gram Panchayats within its Jurisdiction (Johnson, p. 55).

This completes the pyramid structure of the Panchayati Raj Institutions. The enactment of the 73rd Amendment to the Indian Constitution is now permitting these women an opportunity to beintegrated into the political system. With a mandatory reservation of 33 percent of the seats being held for women in every tier of the Panchayati Raj Institutions, rural women are now being politically empowered to bring their issues to the forefront of their local governments. "The political empowerment of women by providing this reservation means that about seven to eight lakh (seven to eight hundred thousand) women will be participating in and contributing directly to the development process. About fifteen to twenty lakh (1.5 to 2 million) women will be office bearers at all levels of Panchayats," (Srinivas, PRAGATI interview). Not only is this reservation mandatory for the elected tiers of the PRIs, but it is also mandatory to have this 33% representation in the gram sabhas, as well. A gram sabha meeting cannot take place unless this requirement for women's participation is met. Because it is the gram sabha that basically sets the agenda for the developmental needs of the village, women's participation is fundamental in addressing their issues and needs for reform.

Below is a table that outlines the specific areas that gram sabhas have addressed as key developmental issues. These 29 areas were commonly indicated as important areas for development by India's 638, 365 villages (Integrated Rural Assessment Planning, p. 28). The "areas marked in bold are areas where independent observers have indicated that women bear primary responsibility," (South Asia Initiatives, p. 8). This is primarily because these bold areas lie within the traditional domain of a woman's responsibility to her village.

Panchayat responsibilities. The "Eleventh Schedule" of the 73rd amendment specifies 29 areas of responsibility that states may devolve to the panchayats. *Note: areas marked in **bold** are areas where independent observers have indicated that women bear primary responsibility.*		
• **Agriculture, including agricultural extension** • Land improvement, implementation of land reforms, land consolidation and soil conservation • **Minor irrigation, water management and watershed development** • **Animal husbandry, dairy and poultry** • **Fisheries** • **Social forestry and farm forestry** • **Minor forest produce** • Small scale industries, including food processing industries • Khadi (homespun cloth), village and cottage industries	• Rural housing • **Drinking water** • **Fuel and fodder** • Roads, culverts, bridges, ferries, waterways and other means of communication • Rural electrification, including distribution of electricity • Non-conventional energy sources • **Poverty alleviation programmes** • **Education including primary and secondary schools** • Technical training and vocational education • **Adult and non-formal education**	• Libraries • Cultural activities • Markets and fairs • **Health and sanitation, including hospitals, primary health centres and dispensaries** • **Family welfare** • **Women and child development** • **Social welfare, including welfare of the handicapped and mentally retarded** • Welfare of the weaker sections, and in particular, of the scheduled castes and the scheduled tribes • Public distribution system • **Maintenance of community assets**

Figure 10: Chart depicting Panchayat responsibilities. *(Diagram from South Asia Initiative, p. 8)*

As can be seen from the list, about one-fourth of the areas falling under women's responsibilities have to do with water directly. However, what is not obvious is that all of the areas in bold are indirectly related to water in one way or another. Health and sanitation, means not only providing hospital resources, but also mean that clean sources of water and effective means of dispensing of wastes need to be available within the

village. Furthermore, healthcare is a primary concern because women are traditionally

responsible for the overall welfare of the family unit, but also because so many deaths

and illnesses are caused by unsafe water. Agriculture, animal husbandry, fisheries, and

minor forest produce are possible only with convenient sources of water nearby.

Education, including primary, secondary, and adult and non-formal, is directly

intertwined with the need for toilet facilities. The number one reason why girls drop out

of school, women do not teach in rural villages, and women cannot go back for an

education, is the lack of toilets in village schools (Ved, p. 1).

Poverty alleviation programs, maintenance of community assets, and women and

child development are directly related to women's control and autonomy over the

technology of the toilet. As a result of their active participation in the local governments,

these women are now able to wield quite a bit of power and influence through their

increased participation in the PRIs. The women elected into the PRIs are able to set their

agendas and have their concerns heard by all in the village; they are taken seriously by

their male counterparts and are not seen as merely figureheads as was feared when the

law was initiated. Direct proof of their influence comes in the re-election campaigns that

have taken place since 1993. In these elections, women are surpassing the thirty-three

percent reservation of seats held for them. In some states, as many as forty-three percent

are being elected to the PRIs (Jan Priya Sewa Report, p. 4). Currently, there are over a

million women elected to local governments; overall women's participation in local

governments is three times this number, with increased women voting in these elections

and helping to run campaigns. It is not unusual for many women that have been elected

to the PRIs in 1993, have now become the Sarpanch of their gram panchayat (ibid).

As a result of their increased numbers and positions within the PRI system, women are finally able to bring toilet building projects and sanitation endeavors to fruition. They have established 'pani panchayats,' which literally translates into 'water committees,' within the their respective gram sabhas and gram panchayats to ensure that water issues become part of and remain on the agenda for their villages. These pani panchayats are usually comprised of all of the participating women of the gram sabha. Through the pani panchayats, women's traditional gender role as custodians of water and sanitation has led to modern-day business ventures in which they are firmly in charge of all stages of the development process (Bai, interview).

The first step of development is getting toilet blocks and toilet initiatives on the agendas of the gram sabhas and gram Panchayats. Once the women are able to convince their gram panchayat to bring toilets to their village, the next step, the Initial Project Stage, begins. In this stage, the pani panchayats meet with local engineers and organizations to decide what sort of toilet would be right for their village. Once this has been decided, the women are then responsible for selecting the actual source and location of the toilet and beginning the implementation of the construction process. When construction has been completed, the pani panchayats educate the village on proper use of the toilet facility and ensure satisfactory operation and maintenance of the toilets (Devi, Jagrani, interview). By having this sort of control over a technology, women are improving their status within the villages, bringing outside business initiatives, which brings wealth and prestige, to their communities, and maintaining one of the most vital assets that their community has to offer.
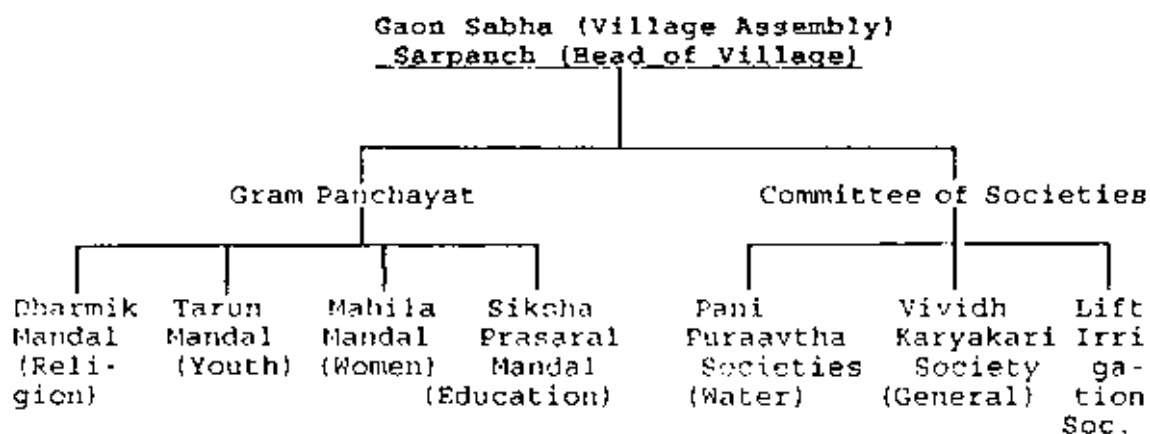
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            Gaon Sabha (Village Assembly)
            _Sarpanch (Head_of_Village)
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Figure 11: Typical gram sabha structure showing institutionalization of the pani panchayats. *(Diagram from Devi, Nalini, interview, personal materials.)*

The results that the pani panchayats have brought to their communities in terms of toilets, water, business, and increased quality of life have made them an institutionalized part of the panchayati raj governmental system. The diagram above is one example of many in which water committees have become a fixed structure of the local system. Because of the different dialect of this village, the water committee is called 'pani puraavtha,' in this instance, but the roles that are assigned to them and the mission they take on is the same as pani panchayats across the many villages of India. Because the pani panchayats have become a formalized part of the panchayati raj institutions, they are now able to provide a wide array of technology choices of toilets for their respective villages. This is extremely important to the rural areas of India as their complete lack of infrastructure makes it necessary to choose the right sanitation system for their needs. Obviously, without any sort of infrastructure, a western-style flush toilet would not be appropriate for these villages. The materials needed for construction are too cost

intensive; the time needed to build sewage systems is too time intensive; and the water

needed to flush them are too resource intensive. Therefore, the pani panchayat must take

into account their villages' unique set of conditions ranging from temperature, climate,

and water supply to village population and fiscal economy. This has enabled the villages

to choose a viable alternative to the "one model fits all" approach to toilets offered by the

government through World Bank sponsored programs.

Figure 12: Pani panchayat committee in action. *(Photo from personal archives.)*

Prior to women's participation in the local governments and the establishment of

pani panchayats, this "one model fits all" was the only toilet choice, if any, offered to the

village. In many cases, this choice was not offered so much as thrust upon the villages

through "good will" ventures sponsored by the World Bank and initiated by a

government run program known as the Central Rural Sanitation Programme (CRSP).

The design that was promoted by the government was a twin pit, pour-flush latrine with a

brick superstructure. The cost of this design is 2500 rupees, which is equivalent to about

$57.50; a cost that is not so exorbitant by western standards, but is well beyond the means

of most villages in India (Krishnakumar, p. 3). This meant that the government would have to provide a subsidy to the cost of the toilets in order to move ahead with the World Bank program. The subsidy they provided was Rs2000 per toilet (ibid). The high subsidy price being paid by the Indian government meant that the government could only then afford to provide one or two latrines per village. As a result, only the most prominent members of the village would likely be the recipient of the toilet subsidy because they could afford the remaining Rs500 and because they had access to 'favors' from the local governments (Krishnakumar, p. 4). Instead of sharing the latrines with the rest of the village, the lucky few that owned toilets flaunted their obvious wealth and used the toilets as an emblem of their prominence.

Like the toilets in the urban sector, a vast majority of the toilets that were built through the CRSP are not being used for the purposes intended. A recent government study revealed that "only 3 percent of these latrines were used for the purposes for which they were built," (Devi, Nalini, interview). In many cases, people have converted the latrines into storerooms or kitchens. This occurred because the one model promoted by the government was not conducive to the great variety of terrain, environment, and economies found in villages throughout the rural areas. The toilets were designed with the "total absence of people's participation. Local village masons were not even contracted to undertake the construction of the latrines," (Bai, interview). Instead of utilizing local materials, labor, and skills, construction was done by outsiders or volunteers from the west who either took toilets for granted or were not vested in the outcome of the project. As a result, the construction quality was so poor that many

latrines remained incomplete or damaged. Repairs could not be made the damaged

latrines, because bricks and other out-sourced materials were not available to the villages.

When women began to form the pani panchayats, they evaluated these World

Bank sponsored toilets and realized that they obviously would not meet the needs of their

village. The immediate need for toilets could not endure the length of time it would take

to build the infrastructure for these toilets. At the current rate of government sponsored

construction and population growth in the rural areas, it would take "over 200 years for

every Indian to have access to a toilet," (Krishnakumar, p. 5)). Furthermore, it would

cost over $500 billion to provide India's rural population with a conventional water

supply and sewerage system, so traditional western-flush toilets were definitely not an

option. Many rural areas do not have enough water available to meet daily needs for

drinking, bathing, and cleaning, let alone to flush a toilet. A western-style flush toilet

uses at least 100,000 liters of water a year for flushing (ibid). This is simply

unsustainable for the rural villages of India.

As such, a primary role for the pani panchayats became exploring alternatives and

affiliations with organizations that would suit the varying needs of their villages. They

explored the option of have other western non-governmental organizations give training

seminars and discuss options for toilets. However, the women felt that a majority of

these foreign NGO training meetings were "useless" (Bai, interview) and "impractical"

(Devi, Jagrani). Non-Indians simply could not understand the cultural sensitivities of the

women and their villages. Based on these inadequacies that they experienced first-hand

from outside, foreign organizations, it became very important to the water committees

that the toilet technology should remain within the domain and control of the local

women. From the creation of the pani panchayats themselves to local efficacy groups

involved in supporting women's new found political careers, the organizations that were

most effective were the ones that sprang up internally. In fact, pani panchayats are one of

the most successful of these groups. They grew internally from the village women's

singing groups which would gather to sing at weddings and festivals. From this

connection, a natural committee with the same concern for toilets was formed (Vettivel,

p. 2). Internal did not necessarily mean from within the village itself but from among

other Indian women who shared the same culture, concerns, and hardships and

understood the basic need for toilets. Another source of inspiration as well as a proven

valuable resource for the women of the rural areas are the women's toilet organizations of

the urban sector. These women understood their rural sisters' plight and need for the

toilet technology. They also understood the political process through their own situation

in the urban cities, and were able to help organize, educate, and encourage the village

women to participate in the government seats that were now reserved for them. These

urban women created non-profit organizations specifically to educate the rural women in

how to effectively participate in the panchayati raj institutions. They taught the rural

women how to overcome the traditional stigmas of interacting with men and women from

other castes, how to revive defunct gram sabhas, and how to set up self-help groups (Jan

Priya Sewa Report, p. 11).

As a result, the internal organizations that the women chose to consult with on the

toilet building projects were ones in which local women were given opportunities for

employment as masons and block makers, either independently or attached to production

centers and that allowed them to retain control over the project. Working with such

organizations provides the women with the forum they need to discuss their needs in designing the toilets for their villages. Through this they are able to specifically meet their villages' cultural specifications as well as to take into account their village's unique geography and environment. Furthermore, by collaborating with such organizations, as opposed to relinquishing control to an outside company, the women are able to control the project after the initial design stage into the building and construction process. These endeavors have resulted in lasting employment opportunities for the village women.

Through the knowledge gained by consulting and collaborating with these organizations, most of the pani panchayats chose a toilet system that was far different from the one the World Bank program wanted to impose upon them. The most common model chosen was a lower-cost single pit pour-flush latrine. This system uses less water than the other options, about 1.5 – 2 litres per flush (Gadkari, p. 4); this was a high priority for the women considering they must travel such long distances, many times a day, for water to flush the toilets. The design is conducive to use by up to ten users and it usually take four to five years for the pit to fill before it must be emptied. This means that the toilet can be shared by multiple households within the village (ibid).

However, just as the World Bank's one model could not fit all varied situations in India, even this type of toilet could not serve the varied topographies and climates that make up India. Furthermore, with their new-found voice in the village gram sabhas, their training and expertise from their counter-parts in the urban sector, and their desire to create a better environment for themselves, their families, and their village, the women of the rural villages have created an opportunity to be at the fore-front of implementing an environmentally sustainable technology. In some instances, the pani panchayats are

determined to find an "environmentally-friendly" alternative to meet the needs of their

village. They have learned through experience that some forms of pit latrines and other

waterless toilet models can be detrimental to both the environment and their health (Bai,

interview). Traditional pit-latrines, where excreta is dropped and stored in a deep pit, can

contaminate the ground water, which can threaten the entire water supply of the village.

They also attract flies and other insects, which can increase the risk of air-borne

infections. Another big deterrent to these models is simply the smell they emit; this can

make them unbearable to many villages. Ecologically, both models avert the natural

fertilizers found in human waste from making its way back into the depleted soil. Thus,

chemical fertilizers are often used in these villages, which cause further environmental

damage in the form of desertification and soil erosion, which virtually halts crop

production (Anderson and Hannan, p 5).

Beyond these very persuasive reasons for seeking an alternative toilet design to

the traditional pit-latrines, the pani panchayats are exploring environmentally-friendly

compost toilets for a variety of other reasons. Many villages do not have access to

electricity and it would take many years and most of their capital resources to complete

the infrastructure required to bring electricity to them. These toilets do not require

electricity or a great amount of capital to build, operate, and maintain. The

environmentally-friendly design of the toilets protects the surface and ground water from

sewage pollution as they do not produce any sewage at all. This fact alone combats the

problem of disease outbreak and infant and child mortality due to diarrhea. Another big

benefit of this toilet design is that they do not smell or create foul odors of any kind. And

perhaps most importantly, the end result of the toilets is that soils are steadily improved

by the regular addition of good compost returned to the earth. This has helped to boost crop production in quantity and quality and diminishes the dependence on fertilizers that can only be obtained from foreign exports and damages the earth (Jan Priya Sewa Report, p. 10).

One such example of the ecologically friendly toilet is the compost toilets that are currently being used in the many villages in the state of Kerala. These toilets have many advantages over the flush and pit pour-flush toilets in that compost toilets are low-cost, can be modified to meet the needs of many different geography types, and can easily be located anywhere in the village because they are not dependent on sewage lines. Compost toilets can be used by a single family or it can be established for community use. Each compost toilet contains two chambers, built above ground and plastered with cement internally to prevent soil seepage of the excreta. Waste is collected in one chamber at a time. When one chamber becomes full (this takes about nine months), it is sealed off, and the other chamber is used. The waste in the full chamber is allowed to go through composting, which again takes about nine months. The compost produced is "an almost dry, crumbly, black product having a light, pleasant, earthy odor," (Anderson and Hannan, p. 7)

The compost produced can then be sold or used by the village for household food production. Many women have become local entrepreneurs by using this compost in home gardens and using the sale of the produce to increase personal incomes and also by contracting out their knowledge of these toilets to neighboring villages. The village as a whole also improves as scarce water resources are used to drink or water crops, instead of being wasted on flushing toilets. Also, once endangered biodiversity is protected from

the harmful effects of detrimental fertilizers. This crossover of the technology of the toilet and its effects into the technological realm of farming brings more status and power to the women as they are crossing boundary lines into a traditionally male dominated realm. In some instances the men may feel threatened, but mostly this is squelched by the fact that through these endeavors the women are bringing more wealth and status to the village as a whole. These "sustainable" forms of the toilet not only give the women more leverage within their society, but serve future generations by improving the environmental and economic health of their villages.

The once unheard, unsought-after voices of the women are now speaking out with confidence through their village gram sabhas and gram panchayats. They now demand copies of the village budget and are proactive in affiliating themselves or creating themselves into organizations that allow them to retain control over the technology of the toilet. They do not hesitate to speak out against foreign organizations that do not fully serve the cultural, environmental and fiscal nuances of their village or to deem as ineffectual a toilet construction project that would never meet their communities' needs. Where, once before women were sequestered to the boundaries of their village, they have now been able to expand into areas that were once completely unattainable to them-- socially, culturally, politically, and technologically. These women are now able to transcend these boundaries and form a community network of women interconnected the many villages of India. Those that have been initiated into the process of participating in grassroots democracy are able to now educate and mentor women of other villages of their legal right to participation in the raj panchayati institutions, how to speak effectively

in the governing bodies, and how to have their agendas realized and materialized, thus

continuing this circular continuity of the rural women's journey of empowerment.

Figure 13: Two local gram panchayat members bringing their toilet construction project to fruition. *(photo from personal archives)*

Chapter Five: Conclusion

The women of the rural and urban sectors of India have shown that there are more

viable alternatives to the western model of development, progress, and growth. They

serve as a reminder to the west that other countries have varying cultures and different

ideals and methods of development than their own. As such, the prevailing discourses of

some Third World countries may not be conducive to the principles of capitalism and

may actually lead to a more sustainable global discourse than what has been created in

the west. The women of India and their mastery over the technology of the toilet are

creating new discourses in the realms of cultural perspectives relating to global order,

sustainability and environmental development, and are changing the dialogues of who is

qualified to practice science and technology. Academic scholars have, "for decades been

teaching a complex comparative approach that showed how differences in traditions,

institutions, and in the balance of political and social forces almost always prevent the

same causes, even economic causes, from producing the same effect," (Dirks, p. 124).

Even though this comparative approach to development has been taught in the areas of

politics and economics, this point is often overlooked when it comes to analyzing the

development of science and technology in various cultures. Simply put, similar problems

rarely call for identical responses. Even when an actual comparative approach is being

taught or studied in academia, developments made in the Third World are often compared

to the developments of the west; in other words, the west is treated as the one constant in

the comparative experiment. In these cases, the U.S. model for development and the

policies, cultures, and dialogues that were created from this development are seen as a

"given," not challenged and approached as a study of cultural and social perspectives in itself. As a result, these "comparative studies" have perpetuated the established western-dominated global discourse.

In addition to dominating global developmental discourses, western comparative approaches have also led to misunderstandings in scholarly studies. Even as ethnocentric studies gave way to universalism and its concepts, academics were still comparing other nations with the ideals and values of the west; countries worldwide were still being measured with an American yardstick. As a result, universalism, with its acceptance that we are all a common race of human beings, proved to be just as dangerous an ideal as ethnocentric studies. Where ethnocentrism focused on the dominance of European ideals, universalism seemed to continue this dominance. But, instead of saying outright that one race was superior to another; universalism spread western dominance through the abstract ideals of "truth, justice, and spiritual perfection," (Hollinger, p. 15). In this thesis, this is demonstrated in the case of the toilets by western NGOs and the World Bank forcing the local population to accept their model of the toilet as the one and only, best model.

By perpetuating western ideals, universalists and other proponents of a western-based dialogue missed key elements of why certain policies and procedures are created and adopted by local governments and why others imposed from outside countries fail. For example, a major component of western discourse and capitalism is the "taming of time" phenomenon. Through western dialogue, time was transformed from an abstract concept into an automated, standardized measurement. As Gabriela Kutting describes in her book, Environment, Society and International Relations, time changed from a cyclical

perception to linear in concept. No longer were citizens of capitalism in tune with the cyclical, seasonal verves of nature because no longer were they dependent on the earth and agricultural seasons of growth and replenishment. With this shift towards industrialization and mechanization, time was viewed as linear in nature. This meant that there was no specified time for rejuvenation of resources as everything progressed in a forward fashion. Replenishment and rejuvenation may occur, but since they did not occur in a cyclical, but linear fashion, they may not occur for extended periods of time. As a result, resources become depleted and overextended because there is no "giving back" to the environment. A good example that Kutting uses, and one that is extremely relevant to the toilet story, is her example of machines versus organic materials. As Kutting describes, machines progress in a linear mode--they continuously create output to be consumed. Once the machine breaks down or can no longer be used (and, also while it is creating output), it gives back nothing but waste to the environment. In contrast, the organic material is cyclical in nature; it is used for consumption and its "waste" gives back and replenishes the environment from whence it came. This latter thought on organic matter is consonant with Hindu philosophies of the cyclical nature of time and the correlating respect for the environment.

Western dialogues also establish who exactly is qualified to practice science, develop a technology, or be labeled an engineer. Richard Hiskes explores in his book Democracy, Risk and Community: Technological Hazards and the Evolution of Liberalism, the definition of who in society is able to be labeled a "true authority" of science according to western scholars. Hiskes states that scientists are the only true authority; and by scientists, Hiskes is referring to those that have been formally trained in

the sciences by bona fide universities and institutions. This means that to be called

scientists, these individuals must have been validated by licenses and degrees stating that

they have met the standards through accreditation from recognized institutions. Even the

terms accreditation, standardization, licenses, and degrees are all distinctly western in

origin, attitude, and practice. For example, as shown in Chapter Two, the British

established these standardization practices in India to determine which natives would be

allowed into the Indian Medical Institutions and allowed to practice "western" medicine;

only these were validated by the British authorities. All other methods of science and

medicine were not recognized as such. Instead, they were labeled by the British as

witchcraft or superstitious. Hiskes goes on to state that these scientists are the only ones

capable of being deemed "an" authority in society regarding all scientific issues. This is

because they are seen as having an elite set of knowledge that distinguishes them from

the rest of the population. As a result, they are "the" authority on their subject matter and

the rest of society must look to them for accurate information on emerging technology

and research, and, further, to accurately access the risks associated with new technologies

and scientific practices.

According to Hiskes, the rest of society can not be deemed as having an authority

in science and technology because these members of society do not have the proper

education and degrees. Therefore, they only have the power to effectively shape and alter

the discursive politics of science and technology from outside the circle of authority.

The only way that these "laypeople" can alter or shift scientific discourses is to become

more educated and, thus, more involved in not only the policymaking, but also the

scientific and technological issues facing modern society. Even though they can

effectively alter scientific policies by coming together as citizens in a community to voice

their concerns in a public forum, they still remain "laypeople," not true practitioners of

science. In this world of discourse, the women of India would never have authority to

control the technology of the toilet as they do in both the rural and urban sectors.

Another danger in using the western ideals of "truth, justice and spiritual

perfection" described above is that western scholars run the risk of alienating all other

dialogues for development that either are emerging or have been sustained for centuries

in other parts of the world. For example, Hinduism as a philosophy was and still is to a

large extent misunderstood by many of these scholars who only looked at it through a

western lens of conceptualization. Anthropologist Mary Douglas, in Purity and Danger

gives examples of "Hindoo" rituals and practices that she believed proved her theories

concerning the social structure of taboo. However, the Hindu practices that she writes

about are very often taken out of context and analyzed only for their strictly concrete

meaning. As a scholar of the west, she fails to see the symbolism of the ritual and fails to

grasp the higher philosophies of Hinduism in form and action. She can see the many

gods and the idolatry of the Indians, but she cannot see the manifestation of these deities

as representations of forms within the Indian psyche; she sees Indians praying to an

elephant head for their prosperity but does not realize that this form is used only as a

physical symbol to remove the obstacles to success from within. One that is even

vaguely familiar with Hinduism would have a hard time justifying Douglas' arguments

because of this mischaracterization of the Hindu philosophies.   As a result, her primary

motivations to show how the social structure of India created their modern sense of taboo

and rituals (Douglas, pp.123-125) did not correlate with my experiences and fieldwork in

India. According to Douglas' model, I would have expected to the women of India and

their toilets to be treated as a threat to the internal order of their society. Not only are

these women physically dealing with bodily waste and excrement which should be taboo

to their Hindu beliefs, but these women are also socially challenging internal systems by

being on the interstices of society. Their participation in the gram panchayat governments

threatens the male domination of these institutions, all women of both lower and upper

castes are united to perform the work and duties usually performed by the lower castes;

this breaking of the caste barriers would appear to be a threat to the internal social system

and I would have expected there to be moral pollution taboos within their societies

(Douglas, p. 102). But there is not backlash within Indian society. The backlash and the

conflicts are arising from without, from other nations imposing their views and

structuring models upon India.

        However, when I stepped outside of Mary Douglas' microcosm and revisited her

theories from a global perspective, her theses provided a valuable introspective on how

western dominance is possible even when it comes to the technology of the toilet. By

looking at Douglas' models in a more relative sense rather than as a comparative study

with the West as a constant, I could see how these women and the technology of their

toilets are a threat to the prevailing global system. Chapter Eight of Purity and Danger,

talks specifically of the use of pollution taboos imposed upon societies for the purpose of,

"marshalling moral disapproval when it lags," (Douglas, 132). Douglas directly states

that, "pollution beliefs…supplement the lack of other sanctions," (Douglas, p. 135). The

fact that there is no moral repercussion imposed upon these women from within Indian

society is a threat to the established global order. Because repercussions are not coming

from within the established global order, the west must impose their own taboos and beliefs from without. For our example, the west believes it must make these women and the Indian society believe that western toilets are more functional and sanitary than Indian-style toilets. By trying to use the World Bank and other western NGOs to convince women of the superior quality of sanitation control of the western toilet, the west is using, "pollution beliefs to provide a means of supporting the accepted system of morality," (p. 133). Indian models of the rural environmentally-friendly version and the urban community toilet blocks challenge western concepts of a socially acceptable toilet because these alternatives were not conceptualized by western engineers. As such, Indian toilets provide a very pronounced threat to the established western global system of morals and ethics, and as a result to the established western institutions of economics, technology and development; and by threatening western establishments, these women threaten western established dialogues.

To truly understand these international conflicts to methods of development, one must first understand the differences in culture and philosophies which help to explain how societies choose to develop. While I was doing my field work for this thesis, I was struggling to understand just how deeply the cultural influence of Hinduism was intertwined in basically every aspect of Indian life, whether consciously or sub-consciously. Being born and raised in the West myself, it was very difficult for me to bend my own mindset so that it would be able to encompass another. In my struggle to comprehend this, one of the field workers gave me an anthology of Swami Vivekananda to provide me with a foundation of Hindu's basic philosophies, especially those that are unique but critical to understanding Indian society. These works became instrumental to

my research in understanding how important philosophies that have been ingrained in a

society for thousands of years are critical to understanding methods of development and

even toilet construction. They also serve as a foundation to show how the women of

India are emerging globally with alternative dialogues for development and, as a result,

pose a challenge to the western discursive dominance demonstrated above. The women

and their toilets, in comparison to those built by the World Bank, also represent what can

occur when two vastly different discourses to development clash in the global

marketplace.

The World Bank model for development focused on the current, prevailing

western dialogues which state that the "capitalistic economic system requires growth in

order to survive" (Patterson, p.46). The main component associated with this growth

pattern and a necessary condition to perpetuating capitalism is accumulation. This means

accumulation of goods, resources, money, labor, etc. And as Paterson points out this

"accumulation process depends on exploiting and intensifying global differentials in

income, generating incentives for the poor to rely on particularly resource-intensive

forms of development in an attempt to 'catch up'" (Patterson, p. 50). As a result of this

overexploitation of capitalism, modern discourse is changing "nature to become natural

resources," (Patterson, p. 47). According to this current discourse then, nature has been

reduced to something to be controlled and dominated by humans, which has led to many

of the current international environmental problems. None of these philosophies are

conducive to the philosophies of Vedanta Hinduism, which is the prevailing discourse for

India's society. The Vedanta principles that are in direct contrast to capitalistic

development and will be discussed in more detail below are reincarnation, which explains

cyclical time in action, karma-yoga and the principle of Ishta, which helps us to

understand why local, Indian NGO aid is more readily accepted and outside help is

disdained, and the concept of Dharma, which explains these women's commitment their

traditional water roles and to stead-fast determination in bringing toilets to their

communities.

To summarize how this discourse is antithetical to western capitalism, it is

necessary to analyze a few quotes from Swami Vivekananda's anthology. To sum up

Vedanta Philosophy, Swami states that:

> "In the lowest worm as well as in the highest human being, the same divine nature
> is present." "Behind everything the same divinity is existing, and out of this
> comes the basis of morality. Do not injure another. Love everyone as your own
> self, because the whole universe is one." (Vivekananda, v1, p. 364). There is no
> personalized or individual self, but only how it relates to the whole.

He goes on to further explain this prevailing idea of non-attachment as "The easiest way

for everyone is to do his or her work and not take the results. It is our desire that binds

us," (Vivekananda, v1, p.443). Both of these philosophies are very antithetical to the

western ideals of development as put forth through structural adjustment programs by

institutes like the World Bank by eliminating the drive for capital accumulation. The

Indian mindset is to strive and pursue this non-attachment to material resources; and

instead of competing with others in the community, these principles encourage working

together because all are part of the same whole. These principles clashed directly with

World Bank principles in areas where the World Bank instructed NGOs, local

communities, and businesses on development of toilet blocks and sanitation

infrastructure. World Bank sponsored toilets failed because they instructed and had as a

contingency on their loan obligations, that toilets must be constructed as part of a

competitive bidding system. This system failed and led to no toilets being built in a 5-year period because the communities were not interested in profit-driven motives and competition. It was not until the World Bank pulled out and local NGOs worked within the communities that successful community toilets were built; these communities were successful because they were driven by communal profits to foster savings and loan programs for women in crisis.

The principle of Reincarnation is also one that factors into every facet of India society. From the personal ads that publicize that if estranged lovers cannot be together in this life they will await their reunion in the next to choosing a toilet system for a rural village, reincarnation is omnipresent in the national fabric and collective conscience of India. Simply put, the principle of reincarnation states that, "There are many lifetimes to realize and attain this pursuit of perfection," (Vivekananda, v1, p. 437). This is the ultimate in sustainable development—both personally and nationally. In fact, the Swami would say that because this development is personal, it is necessarily manifested in the external world. As such, there is a unique concept of time among Indian society. Because there are many lifetimes to accomplish goals, there is not a rush to implement policy and develop systems in this lifetime. Also, the realization of one's personal goals does not need to be met in the few years that constitute a lifetime. Instead, there is time to focus on the needs of the poor and those that are unable to help themselves and to really analyze systems, technologies, and other methods of development to make sure that they are truly good for the collective society and sustainable for many lifetimes to come.

In this way, reincarnation represents the ultimate in cyclical time as described previously by Gabriela Kutting. Not only are technologies and machines cyclical or linear in time in the way it gives back to the earth, but so are people's relationship with the earth, the environment, and the communities they inhabit. The environmentally-friendly toilets being sponsored by the women in the rural societies are a physical example of this philosophy in action and are also a challenge to the western concept of linear time. The toilets being presented by western organizations to the women of India represented a product that progressed linearly, not cyclically. These western toilets were not durable, they could not be maintained, and they created more waste than that it was meant to dispose. This definitely did not meet the needs of the women who were committed to creating a sustainable technology both in durability and environmentally. These women strive to bring toilets to their villages that are representative of reincarnation in the cyclical way that it gave back to their society. It may be advantageous to large corporations to have products that only serve consumer needs for a few years, thus ensuring that the consumer is forced to replace it and generate more income for the same corporation. But, to these women, that is not acceptable. They needed, demanded, and created a product that would be able to be used and maintained for generations to come. The environmentally-friendly toilets are truly cyclical in nature because they more than give back to the environment what they are taking to maintain. For example, these toilets are creating a whole new source of livelihood for the villages by replacing harmful fertilizers and yielding higher crop productions. There is no better opportunity for these women to be able to enhance their karma than through the many

benefits that these toilets offer to so many in their communities. To these women, this is the true definition of profit-generation.

The philosophy of Karma-Yoga deals specifically with "realization through work" (Vivekananda, v2, p. 111). In India it is believed that enlightenment (selflessness) is achieved through one's own daily work. Therefore, while aid is accepted occasionally as a way of letting others do good for themselves, long-term aid is disdained as an obstruction to self-realization. I observed this concept in action daily in my work with organizations within India. It was extremely important to the women in both the rural and urban sectors that the organizations that offered them aid and support are Indian grassroots organizations, not organizations stemming from the outside. To be true Indian organizations, this meant that the organizations are managed by Indians and the employees are predominantly Indian. These women ensured that any work that was done by non-Indians was not in a supervisory role; they were there to learn the Indian way of running a non-profit. If non-Indians are consulted, their advice is taken, but then assimilated to meet the needs of the Indian community. The aid that they prefer from non-Indians is in the form of much needed capital (goods that may be hard to find in India) and especially money. They see this as an easy way for others to increase their own wealth of karma without hindering the karmic works of others. This money in no way establishes a dependence on those providing money, like what is usually seen in the west. This was exemplified in SITE satellite initiatives of the 1950's discussed in Chapter Two, where Nehru believed that the United States would willingly give money for the satellite's development without expecting or demanding a return on its investment.

A few of the important principles of Karma-Yoga are that:

"No permanent or everlasting good can be done to the world, (Vivekananda, v2, p. 111). We cannot add happiness to this world; similarly, we cannot add pain to it either. The sum total of the energies of pleasure and pain displayed here on earth will be the same throughout." (Vivekananda, v2, p. 112). "The moment you think you are "helping", you undo the whole thing and degrade yourself," (Vivekananda, v2, p. 442).

These two principles of Karma-Yoga show the basic differences in approach to social work between India and the west. In India, doing "good" for others is not necessarily the way to enlightenment and may actually be more harmful, because it hinders others from realizing their true self. All work should be done for this realization of the self. The idea of a transitory world is prevalent throughout all of India society and was demonstrated in practice by all of the organizations that I visited throughout India. It is a very important principle to both the organizations giving help and the women receiving help, that the aid be temporal and transitory. The aid is to give advice on economics (money-lending, savings and loans programs), to inform and instruct (as in the case of the women entering governmental roles in the gram panchayats, and technological tutoring of the actual construction of the toilet. This aid is meant to provide and support and once the women are organized and informed, the organization will pull out. It is not meant to be a permanent crutch or to create a long-term dependency as some could argue the World Bank is designed to do.

Furthermore, the Sanskrit idea of "ishta" directly states that there is not one path to development and that what is considered aid from foreign institutions may actually be harmful to other countries accepting that aid. Very simply, istha states that, "your ways is good for you but not for me. My way is good for me but not for you." In Swami's own words, this principle has a direct correlation to India's path and policies of

development. "We each have our own ishta. But when we see men coming and saying, 'This is the only way,' and trying to force in on us in India, we have a word to say, we laugh at them," (Vivekananda, v3, p. 137). "Your way is very good, no doubt; but it may be dangerous for me. I know from my own experience what path is good for me," (ibid). Swami goes on and develops the theme of Ishta further in regards to other societies giving advice on development to India:

> A child of but yesterday, destined to die day after tomorrow, comes to me and asks me to change all my plans; and if I hear the advice of that baby and change all my surroundings according to his ideas, I myself should be a fool, and no one else. Much of the advice that is coming to us from different countries is similar to this. To these countries, "I will hear you when you have made a stable society yourselves. You cannot hold on to one idea," (Vivekananda, v3, 142).

This idea is in direct correlation with the above example. It reflects the attitude of intense pride that Indian NGOs have in their society and their country. It is expressed in every aspect of these organizations that the west does not have the answers for development in India. It was directly stated to me that when these western countries have persevered as long as India, then they will be able to be advisors.

The principles of reincarnation, karma-yoga, and ishta are all entwined in an individual's dharma, or duty in life. How you perform this duty relates to how you will be reincarnated in the next life, what specific works you should be doing with karma-yoga, and defines your personal development, or ishta. As traditional caretakers of water, part of an Indian women's dharma lies in her responsibility in bringing and supplying water to her community. In both the rural and urban sectors, the women interviewed directly stated that it was their dharma to bring toilets to their communities. Just as dharma defines these women's relationship to water, it also helps to explain how they chose to develop the toilet technology and why they are dedicated to helping other

women bring this technology to fruition. "In dharma, one's first duty is towards oneself. Every individual has to first fulfill duties towards the self," (Prabhu, p. 9) Even though this sounds very similar to the fundamental principle of individualism in a capitalistic society, dharma actually runs counter to the profit-accumulating principles of that theory. Dharma goes on define this self fulfillment by indicating that "the most important of these duties is to always remain in a balanced state of mind," (ibid). This is achieved by following the dharma hierarchy of duties, which listed in order, are towards oneself, to the family, society, community, and state. So, while the capitalistic individual stands alone in his motivation to make a profit, this hierarchy of duties keeps the individual firmly rooted in their society and ensures that their dharma is comprised of giving back to that structural hierarchy by "contributing to make your area a better place," by doing anything that "shares your talents" with those surrounding you (ibid).

Each of these principles also helps to explain what a westerner may view as the social inequities among the various castes and genders in India. For example, it helps to answer the questions of why a Dalit, as described in the introduction, would subject herself to cleaning the dry pit latrines of those of the higher castes; or why the women in the rural communities seem so complacent in their role as the traditional water caretakers of their villages even if this means they endure harsh and unsanitary conditions. The answers begin with dharma, because it is their obligation in the social hierarchy as women and members of their respective castes to perform such duties. It would not occur to the women of India to question their repression because they are taught that each person is in their current, reincarnated role on this earth because of their karma from their past lives. Instead of bemoaning their current situation, these women are taught to

increase their good deeds in the present life through their karma-yoga. To bring these concepts full circle, this life work must specifically fall within their assigned dharma, why these women are invested in finding an ecologically sustainable toilet and why they have made it their mission to bring toilets to their communities as well as to go forth and teach other women to achieve the same goals.

Scholars are emerging who are embracing new developmental philosophies like the Hindu principles described by Swami and, as a result, are challenging engrained western mindsets. The historicist perspective is one school of thought that attempts to create a new discursive theory that shifts away from developmental comparisons with the west. In contrast to universalism, historicism defines what a society considers moral, acceptable, or even what is characterized as science and technology by the "contingent, temporally, and socially situated character of our beliefs and values, of our institutions and practices." By this perspective, one society or "tribe" cannot accurately access the values of another society because of the differences in social norms and institutions. One can only accurately evaluate their own "exclusive club." The historicist perspective explores in depth the social mores of a culture and explores how science and technology is uniquely defined by that culture. Because it is not comparative, it is possible to give an enriched description of how science and technology develops as a cultural phenomenon.

But there is still a danger in using the historicist perspective. It is neither comparative, which frees it from western standards, but nor is it relative which excludes it from being part of a global discourse. By isolating itself to only looking at the tribe under study, historicism is not relating the experience of the tribe to global developmental patterns and showing how uniquely these tribes can relate to the global experience. The

goal is to find a balance between perspectives that will retain the unique, individual identity of the nation as it merges both economically and culturally into the global society. By beginning at the local level, from a historicist perspective, and truly understanding these differences between cultures and development, and then relaying them to a global society, new discursive shifts can begin to be felt on a global level.

Raman Srinivasan is extremely adept at combining the unique elements of Indian society and culture into the technological developments of a post-colonial India and showing their relationship to the global society; he is able to microscopically view the innovations developed by the "tribe" and then macroscopically relate them to the universalistic system. In the examples he uses, he discusses how tradition is a very important element to Indian technologies and engineering and how "tradition evokes different connotations in India than in the West," (Srinivasan, p. 189). Like the Swami quotes above, he uses examples and quotations from Raja Rao, a leading 20th Century Hindu scholar, poet, and philosopher to demonstrate these differences in connotations. As Rao states,

> "tradition is a method, a compendium of laws, laws of solving equations, and that there is no way to the answer, to the Truth, but through that inherent method by which we humans have recognized…the way of finding proper solutions to a problem…To jump across laws is to fall into a ravine…Traditions, the accumulated wisdom of a race, and part of our DNA," (Srinivasan, p. 189).

Srinivasan further uses the traditional texts of the Baghavad Gita to sum up the uniqueness of Indian technological developments, much like the examples given with the women and their toilets. He directly states that "Sanskrit provides a useful model for thinking about technology in post-traditional India," (p. 294) and uses these examples from the ancient texts to demonstrate how the Indian mindset to progress is contrary to

the profit-seeking motivations of the West. The Gita states that "There are rights only to work, not to the fruits of that work." Srinivasan goes on to speak of the Indian detachment to view work as a profit-motivated endeavor, instead it should be used as an exercise to enhance the individual in spirit and to create a oneness with the outside world. It is very important to be "one with the world as opposed to distinguishing oneself as an individual," (Srinivasan p. 285). This example shows how even a concept like individuality varies across cultures.

Srinivasan then shows that those technologies that fully thrived in India were those that were allowed to develop and progress according the unique social conditions of India.

Like the case of the women and their toilets, the Jaipur foot is an innovation that remains true to Indian concepts and philosophies regarding consumption. Unlike western global philosophies strive to produce one homogenous culture through the mass marketing of goods and standardization of products; the Jaipur foot and the women and their toilets show that this is not always the path to development. These innovations show us in the west that that there is an alternate path of development in which you produce what you consume and vice versa, instead of relying on one standard model to fit every need. From the conception of the product to the end result of the finished good, the life cycle of the Jaipur foot is a reminder of these alternative methods of development. Further, like the toilet, the Jaipur Foot is another example of how the philosophical underpinnings of Indian culture run counter to the western expectations about material and social matters. A brief explanation will show how its development mirrors that of the

toilet in India and exemplifies many of the culturally specific traits that made it more successful over its foreign-made counterparts.

The Jaipur foot is an Indian-made prosthetic meant to serve the millions of Indians that have lost a limb due to poverty, war, terrorism, and daily accidents. Research on the Jaipur foot and the development of the clinic that would produce the prosthesis were funded by Arjun Argarwaala. Argarwaala is a devout Jain who organized the prosthetic research center in anonymity as part of his belief to do something good for society and to of "reducing the burden of his karmic load," (Srinivasan p. 202). His deeds remained anonymous for many years because of the Jain philosophy of "reducing oneself to zero," (Srinivasan p. 201) and not accepting acclaim for one's actions. Once the research center was ready to move into production mode, the Jaipur foot remained a totally Indian innovation. It was made out of all Indian materials, including recycled rubber, paper, and what others would probably label rubbish. By making the Jaipur foot out of these materials and not using expensive imported plastics, the makers ensured that the foot would be available to most Indians. Without use of these recycled, cheaper materials most amputees could not otherwise afford a prosthesis; the finished product actually cost less than a pair of shoes. Unlike the standardized prostheses that are mass produced in America and shipped to other parts of the world for use, these prosthetics are made to match the Indian skin color. Also unlike its western counterpart, the Indian prosthesis accommodates uniquely Indian situations like having to squat to use a pit-style toilet (Srinivasan p. 207).

Both the technologies of the Jaipur Foot and the toilets being built by Indian women challenge the western notion of who can practice and be "the" authority of

science and technology and show how the development of this technology has progressed

outside of a global modernistic view of how science should be practiced. Western

science and technology strives to be on the cutting edge of satisfying a need to the

wealthy elite of western society. And by supplying this demand to people with monetary

influence, and therefore power, western scientists and technocrats are able to increase

their power in society. According to Hiskes and other western scholars, this is how

change in science and technology historically has come about. However, neither the

Jaipur Foot nor the women's toilets can be said to be on the cutting edge of technology.

Both of these innovations are low-tech, could be considered crude, base, and mundane

according to western standards, and are developed by people of relatively no influence

within their societies. None of these conditions alone would make either the Jaipur Foot

or the women's toilets a very attractive investment according to the western product life

cycle described in Chapter Two. Yet, both the Jaipur Foot and the toilets are bringing

about a significant material change to the societies they serve. But because they do not

fit into western standards of engineering, innovations like the Jaipur Foot and the

women's toilets would most likely not thrive in a western discourse dominated society.

As Srinivasan points out, "tolerance in technological systems is driven out by this

mechanizations and its accompaniment, standardization. Tolerance in engineering design

is a way of keeping the door open to individuality. Modernism in engineering cannot

tolerate such tolerance." Srinivasan goes on to say that "the modern is a fanatical

fundamentalist that demands absolute obedience to the book, the book of standards and

specifications," (Srivivasan p. 292). In this modern condition, Indian innovations such as

the Jaipur foot and the toilets that belong to the women of India would not be able to

thrive. Like Hiskes' analysis above, modernism uses the western standards of formal training, standardization, and licensing to define those "authorities" that are allowed to permeate the boundaries of science and technology.

These standards primarily are initiated by the west because they serve to maintain the status quo of the western scientific establishment. But in its efforts to preserve their dominant discourse, western establishments fail to recognize that "western science is itself an ethnoscience marked by specific conventions, boundary techniques, and values," (Franklin p. 166). It fails to ask the questions of western society of why the west has built a system that maintains these boundaries of who can practice science and technology and to acknowledge how much the western scientific agenda created by marketing and consumerization, for example. Historically, western scientific discourse has declared itself an authority in science and technology and chose to make western ideals of how one can become a scientist or engineer the given for the rest of the world. By creating these givens, western science now fails to acknowledge and question how this dialogue arose to be the dominant discourse in our western society. Instead of taking these western dialogues as a given model for development, an analysis of western development as an ethnoscience would help to explain and answer some of the questions of how the United States developed its western establishments and discourses. For example, like India's scientific and technological development is intertwined with its long established Hindu religion, the United States path of modernism can be said to be steeped in its beginnings as a Protestant haven. The Protestant work ethic that many early colonists adhered to stated that God's love was shown through a person's material wealth on earth. The harder one worked and the more wealth they accumulated the

greater was God's love for that person. This type of culture and belief system was extremely conducive with the profit accumulating principles of capitalism. It provided the foundation that humans could control, utilize, and exploit the land for their own profit-making motives as well as to establish western connotations of individuality (Dirks, p. 254) which are so contrasting in nature to the "oneness" of Hindu philosophy.

This extremely simplified example of the relative approach, as opposed to strict comparisons with the west, opens the door to knowledge and development that would otherwise not be considered. By removing all of the givens of an established western discourse in science studies and observing other nations' scientific establishments not in a comparative analysis but as individual entities relating to a global whole, science stands to enrich its foundation. It is definitely possible, and perhaps even likely, that this new way of approaching science studies will lead to some confusion as standards in one nation are not defined the same in another nation and that science will be seen "as the site of conflicting world views," (Franklin p. 176).   But this is not necessarily bad; even these discursive miscommunications and conflicting views can be helpful to a truly global society. Through realizing that systems are different only, not superior or inferior or comparative, one is acknowledging that there are different methods of practicing science and technology. It is eventually these **"explorations of scientific culture in a transnational frame [that will] illuminate the global, national, regional, and local dimensions of scientific practice," (Franklin p. 169) and this is what will eventually lead to new, more balanced scientific discourse in society instead of one based on the presumption of western superiority.

Global scholars and academics are exploring scientific culture through an emerging field known as science studies. These scholars recognize that, "Science studies is part of a wider set of shifts, geopolitical, cultural, economic, and intellectual—that pose a challenge to the status quo of the western scientific establishment," (Franklin p. 165) by redefining what is classified as science and technology in society. Science studies and its acceptance of technologies like the Jaipur foot and the women and their toilets do pose a threat to western scientific global dominance because it is offering alternatives to western development and because it views western science as a cultural and geopolitical phenomenon. But more than threatening western discourse, science studies also stands to offer western science a whole new source of scientific and technological information that currently is unavailable to science and, as a result, society because it is not within the realm of scientific authority, to use Hiskes' term. Science studies' scholars point out that, "were Western science to be reassessed as a cultural practice, in the narrowest and widest senses, it arguably stands to gain, in both resources and on its own terms, as an effective, predictive, useful, and interested account of its objects" (Franklin p. 179-180). By limiting itself to those that are trained and schooled "properly", science cuts of a vast compendium of knowledge that would otherwise be available to them. These new scholars are changing the discourse of who can be classified as a scientist or engineer and are broadening the concept of technological practitioners. By doing so, they are beginning to include others that may traditionally lie outside of the boundary of science and technology.

In the case of the Jaipur foot, it is the wearers of the prosthesis that become the makers of the foot. These "largely non-literate, but highly skilled workers," (Srinivasan

p. 290) become bona fide orthotists simply by being amputees in need, learning how to satisfy that need, than having the desire to reduce their karmic load by passing on the technology to others. This is how technology progresses in India. India values its highly ranked Institutes of Technology that would rival the top ranked engineering schools in the west, but it also realizes and values its other forms of 'education", mainly that "workmanship can be and is picked up on the streets ," (ibid). This is the epitome of "the colonized mind set free," (Srinivasan p. 204) and is demonstrated by the women of India who are designing, constructing, and contracting toilets in their communities. Under western directives, these women would not have been given the opportunity to engineer such projects.

David Hollinger uses the term the "circle of we" to introduce a new post-ethnic philosophy that embraces science studies and builds upon the historicist perspective by asking the question "how wide the circle of we?" How wide do we extend the circle of the "club" or "tribe" boundaries that the historicists propose? Post-ethnicism recognizes that "communities are various in their structure and function." However, it also recognizes that many members of society fit into overlapping communities that can sometimes be in conflict with each other. The difference between the post-ethnic and the ethnocentrist is that the post-ethnic "treats ethnic identity as a problem rather than a given. A post-ethnic perspective recognizes the psychological value and political function of groups and affiliation, but it resists the rigidification of exactly those ascribed distinctions between persons that various universalists and cosmopolitans have so long sought to diminish," (Hollinger, 16). In other words, groups and affiliations matter in defining the socially acceptable "circle of we." Groups outside the circle at one point and

time can alter and extend the circle by permeating the fringes and thus becoming viable and active within the circle.

This is exemplified by the women in India that have become active within the gram sabhas, are defining their local agendas, and are creating better societies for themselves. Through this manner they have effectively extended the "circle of we." The women of the rural and urban sectors of India have effectively extended this circle to include them as authorities within science and technology, defying Hiskes statement that only formally trained members of an elite scientific community can be deemed true authorities. These women have established themselves as political and social leaders by breaking into the boundaries of science, technology, and engineering fields and could only have done so because of the unique set of cultural and social experiences that melded in the Indian environment to make their development of toilets possible. The new post-ethnic perspective allows for a profound, "approach to integrating the analysis of scientific culture with the established ways of being, seeing, and doing in diverse national traditions," (Franklin p. 176).

From these new scientific cultural dialogues, "there is an emerging belief that any technology represents a cultural invention, in the sense that it brings forth a world; it emerges out of particular cultural conditions and in turn helps to create new ones," (Franklin p. 175-176). This statement sums up so accurately the experience of the women of India and their relationship to and development of the toilet. Even though these Indian women have probably never heard of the term "science studies" or of its proponents like Sarah Franklin, David Hollinger, and Raman Srinivasan, they are exemplifying the principles of science studies in their everyday actions. These women

are not touting themselves, nor do they realize that they represent a new form of scientist and engineer, but their actions are getting them noticed by science studies scholars as such. They are offering these emerging scholars and their new discourses with real life examples to traditional history of science and traditional science in practice. Through their control of the toilet technology in their communities, these Indian women are showing how lay people of many cultures have valuable ideas and skills to offer the fields of science and technology.

Women that are in the same organizations as the toilet committees of Mahila Milan are branching out to start new endeavors for themselves that are uniquely India in their origin, but global in their ramifications. The very same women that are taking control of the toilets are leading environmental revolutions, standing up to international organizations that threaten their homes and life as they know it and creating a variety of business initiatives for themselves and future generations. Women that are homeless, impoverished, and illiterate by western standards are changing predominant global discourses simply by performing the same daily tasks that have been assigned to them for generations. They embody the spirit of a new discourse and this makes them pioneers in the fields of business, economics, politics, engineering, science, and technology. To end this thesis, I would like to pay homage to just a few of these women:

Ela Bhatt has started one of the largest labor unions in the world exclusively for women, SEWA. SEWA, the Self-employed Women's Association, was started in 1975 to "safeguard the interests of impoverished self-employed women," (Hughes, p. 1). Through their union, these women have successfully negotiated with employers to

establish health, dental, and maternity benefits, set up over 70 cooperatives (each with over 1000 members of various trades to share expertise), and has developed new designs for joint marketing. In addition, SEWA has established a micro-credit bank that has over 70,000 active accounts. This alone has allowed many women to accumulate land, assets, and means of production (ibid.). These loans help women start native businesses that are not dependent on subsistence from foreign institutions. These businesses lead to an increase in wages that circulate throughout the local economy, which leads to an increase in social spending. This permits greater access to the poor to food, education, health care, and housing. "They continue to fight for women's rights, from grassroots to international level, but they are also in business, from the home worker to global exports," (Hughes, p. 2).

The legendary, Poppadum Queen, Jaswanti Ben and seven other out-of-work women took a loan of $2 from the micro-credit bank to start a poppadum, the local bread of India, industry to supplement their families' incomes. Today, the business employs more than 40,000 women and has an annual turnover of nearly $50 million. Most of these women are illiterate and poor, but know the technology of creating poppadums. Even though each women worker receives only $2-$5 a day, they are financially taken care of through additional benefits that accrue from each women being a partner in the business. Each woman starts out at the bottom of the company and works their way up according to the co-operative system, which rotates executive members from the pool of the labor force. The driving force of the company is the "empowerment of Indian women by making them literate and financially independent," (Srivastava, p.3).

The Chipko movement in the upper-Himalayas region of Northern India was led and founded by Chandi Prasad Bhat, a prominent female environmental activist. Their mission was to stop the felling of trees by foreign timber industries. Women, "who are the worst sufferers of environmental degradation in this area," (Shiva, p. 1) became the voices of Chipko. Their voices were so reverent and resonant that the local government was forced to ban the logging of trees in the high slopes of the mountain range. They also pushed the Central Government to form new laws on forest felling, which ultimately led to the creation of the Department of Environment. (India Today, p.24)

Each of these endeavors was made possible by the humble origins of women uniting together over a technology as unglamorous as the toilet. They embody the true spirit of all that is India and are physical representations of the many forms of the Goddess Vaishnu Ma. To them we say, "Vande Mataram!"

Figure 14: Happy women and their toilets, happily ever after.

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