Discussion Paper

ADB

Strategic Thinking to Achieve Water MDGs

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Abstract

The Millennium Development Goals (MDGs) have set the global agenda for fighting poverty, and have put water and sanitation at the center of that discussion. Target 10 of the MDGs calls for halving, by 2015, the proportion of people without sustainable access to safe drinking water and sanitation.

The Asian Development Bank is committed to helping establish the enabling environment needed to achieve the MDGs. Part of its efforts is to harness and promote critical knowledge that enables its developing member countries to make decisions, formulate policies, and undertake actions. In September 2005, ADB helped prepare the MDG II report entitled "A Future Within Reach," which was presented at the UN General Assembly in New York. In February 2006, ADB—together with partners UNESCAP, UNDP, and WHO—completed a study on the progress and price tag of achieving Target 10 among the different countries in the Asia and Pacific region, dubbed "Asia Water Watch 2015."

ADB has again embarked on a study focusing on the water supply and sanitation costs and pricing practices that influence the attainment of the MDG Target 10. Development economist Bhanoji Rao, Professor Emeritus at GITAM Institute of Foreign Trade in Visakhapatnam, India, was commissioned to undertake this study.

This report is the outcome of the study. It shows the importance of water and sanitation provision for delivery of MDGs using simple cross-country correlations. It outlines the investment requirements for water and sanitation targets, and argues for a two-pronged strategy toward sustainable human development that includes the provision of drinking water and sanitation:

- least cost and quick-fix solutions for the medium term, especially regarding the supply of the minimum needed quantity of water for drinking
- for the longer term, integrated development of housing and water and sanitation, within the framework of an urban development strategy

The report was peer reviewed by ADB staff and discussed in a seminar last 16 February 2006. Inputs from the seminar and peer reviewers have been incorporated into the report.

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1. BACKGROUND AND OBJECTIVES

The Asian Development Bank's Water Policy sees water as a socially vital economic good that needs careful management to sustain equitable economic growth and reduce poverty (ADB, 2001). Similarly, the Human Poverty Index developed by the United Nations Development Programme (UNDP) in 1997 identifies access to safe water as a key indicator of poverty.

On 22 March 2005, World Water Day, the UN General Assembly proclaimed the decade 2005–2015 as the International Decade for Action. In a recent publication entitled Water for Life, WHO and UNICEF call for a coordinated response from the whole United Nations system. The end year of the decade is the date by which the proportions of people without safe drinking water and proper sanitation have to be cut to half from what they were in the year 2000.

Just a few decades ago in most developing countries, and even now in some, vast proportions of people have suffered and are suffering from all sorts of diseases due to lack of access to safe drinking water and use of unsafe water. Water and sanitation, more than any other resources, should have been at the centre stage of the discourses on poverty alleviation, a movement that has not been as visible as after the launching of the millennium development goals (MDGs).

Against the background briefly enunciated above, this paper is an attempt to (1) explore the importance of access to safe drinking water and proper sanitation for the achievement of most other millennium developmental goals; (2) evaluate the investment requirements of achieving water and sanitation goals; and (3) argue that least cost and quick-fix solutions for the medium term need to be dovetailed with the longer term goal of integrated development of housing and water and sanitation.

The rest of the paper is organized as follows: section 2 is a brief narrative on MDGs, with particular reference to those relating to water and those that could be related closely. Section 3 has an exploration of the cross-country patterns and analysis of the relationships between MDGs for water and sanitation with health and other MDG indicators. Section 4 is about the assessment of costs of and investments for providing water and sanitation on a sustainable basis and aspects of cost recovery. Section 5 elucidates the long-term target of integrating water and sanitation as part of housing development. The final and concluding section has a few recommendations.

2. THE MILLENNIUM DEVELOPMENT GOALS

2.1 MDG Overview

Via a landmark resolution adopted by the General Assembly, the United Nations Millennium Declaration was issued on 8 September 2000. The heads of State and Government, gathered at the UN Headquarters in New York from 6 to 8 September 2000, at the dawn of a new millennium, have affirmed that they "recognize that, in addition to … separate responsibilities to … individual societies," they "have a collective responsibility to uphold the principles of human dignity, equality, and equity at the global level."

The Declaration recognizes that the central challenge is to ensure that globalization becomes a positive force for all the people of the world. The various goals and targets of the Declaration are grouped under the following heads:

- Peace, security, and disarmament
- Development and poverty eradication
- Protecting our common environment
- Human rights, democracy, and good governance
- Protecting the vulnerable
- Meeting the special needs of Africa
- Strengthening the United Nations

The most widely known Millennium Development Goals or MDGs are given under the head of "Development and Poverty Alleviation." Of the eight MDGs under this head, as many as seven (see Table 1) could have direct and strong links with provision of safe drinking water, itself one of the targets under the 7th goal of ensuring sustainable environment.[3] The linkages are explored further in the next section.

[3] Goal 8 of the Millennium Development Goals is to develop a global partnership for development, and has the following targets: develop further an open trading and

2.2 Need to Move Fast

The Development Assistance Committee of the Organisation for Economic Co-operations and Development (OECD) is encouraging donors to increase aid and also to reallocate it in favor of the poor countries in order to enhance the pace of movement towards the achievement of MDGs. This is particularly important in view of the finding that, to date, the only goal likely to be met is that of halving the proportion of people living on less than $1/day by 2015, and then only in much of Asia and North Africa.[4] Special attention, therefore, should be accorded to move fast towards achieving all the MDGs in general, and water and sanitation MDGs in particular.[5]

2.3 Magnitude of the Task in Asia

The WHO-UNICEF report entitled Global Water Supply and Sanitation Assessment 2000 (GWSS-2000) is a landmark study making estimates of the magnitude of the task ahead, and qualitatively assessing the value and importance of providing the water and sanitation services. The salient data for Asia from the report are placed in Table 2. The percentage of people with no access to water and sanitation continues to be relatively high in the rural areas, with an exceptionally high proportion in respect of sanitation.

In the year 2000, of the 3,683 million people of Asia, 81% have access to water and only 48% to sanitation. The population in 2015 is estimated to be 4,347 million. To achieve a 50% reduction in the proportion not served with water, the served proportion should rise from the present 81% to some 90 to 91%, and it would mean providing safe drinking water to an additional 980 million people. Similarly, in respect to sanitation, percent served should go up from the present 48% to around 75 to 76%, and the provision of sanitation to an additional 1,532 million people.

The longer term target should be to have excellent water and best sanitation facilities for one and all in the world as a whole. The closest target to such an idea is the one formulated by the Water and Sanitation Collaborative Council in terms of Vision 21, in which the goal of universal coverage is targeted for 2025.[6]

financial system that is rule-based, predictable and nondiscriminatory; address the least developed countries' special needs; address the special needs of landlocked and small island developing states; deal comprehensively with developing countries' debt problems through national and international measures to make debt sustainable in the long term; in cooperation with the developing countries, develop decent and productive work for youth; in cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries; and, in cooperation with the private sector, make available the benefits of new technologies—especially information and communications technologies.

[4] "OECD Calls for More Aid, Used More Effectively, to Bring Safer, Healthier Lives," available at http://www.oecd.org/document/22/0,2340,en_2649_201185_34285782_1_1_1_1,00.html

[5] The centrality of water and sanitation goals is shown in the next section.

[6] "In the year 2000, we start with a new perspective. … Vision 21 envisages that the number of people without access to improved water and sanitation services will be halved by 2015, and universal coverage will be achieved by 2025." – Excerpt from the Foreword to GWSSA-2000 by the Chairperson, Water Supply and Sanitation Collaborative Council.

Table 1: Selected Millennium Development Goals and Targets and Comments on Possible Links with Access to Water and Sanitation MDGs (Target 10) and Others
(Health-Related Goals and Targets are in italics)

MDG and Targets	Comments	Strength of Relationship
1. Eradicate extreme poverty and hunger Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger	Though water and sanitation are integral to decent living, formal poverty ratios based on a monetary cutoff may not exhibit a strong statistical relation with the former.	Not likely to be very strong
2. Achieve universal primary education Target 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	Nonavailability of safe drinking water and toilet facility could hinder children's school participation, especially those of girls.	Relationship is worth exploration
3. Promote gender equality and empower women Target 4: Eliminate gender disparity in primary and secondary education preferably by 2005, and in all levels of education no later than 2015	Comment above applies even more strongly here.	Relationship is worth exploration
4. Reduce child mortality *Target 5: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate*	Water and sanitation facilities will have a direct bearing on mortality.	Relatively strong relationship expected
5. *Improve maternal health* *Target 6: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio*	No direct and specific relationship with water and sanitation expected.	Not likely to be very strong
6. *Combat HIV/AIDS, malaria, and other diseases* *Target 7: Have halted by 2015 and begun to reverse the spread of HIV/AIDS* *Target 8: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases*	Some of the diseases are expected to have a relatively strong relationship with water and sanitation indicators.	Strong relationship could be expected
7. Ensure environmental sustainability Target 9: Integrate the principles of sustainable development into country policies and programs, and reverse the loss of environmental resources Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation Target 11: Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers	Target 9 is rather general. Target 10 is directly in the area of water and sanitation. Target 11 and 10 are closely related.	

Table 2: Salient Statistics* for Asia from GWSSA 2000

Indicator	1990			2000		
	Rural	Urban	Total	Rural	Urban	Total
Total population in million	2,151	1,029	3,180	2,331	1,352	3,683
WATER						
—have access to water (million)	1,433	972	2,405	1,736	1,254	2,990
—have no access to water (million)	718	57	775	595	98	693
—% with access to water	67	94	76	74	93	81
—% with household connection			43			49
—% with other access			33			32
—% with no access	33	6	24	26	7	19
SANITATION						
—have access to sanitation (million)	496	690	1,186	712	1,055	1,767
—have no access to sanitation (million)	1,655	339	1,994	1,619	297	1,916
—% with access to sanitation	23	67	37	31	78	48

—% with sewerage connection			13			18
—% with other access			24			30
—% with no access	77	33	63	56	22	52

* Additional information is in Annex 1

3. WATER, SANITATION, AND OTHER HUMAN DEVELOPMENT INDICATORS: CORRELATIONS AND IMPLICATIONS

3.1 Significance of Water and Sanitation

Even if one is not able to conclusively and experimentally prove, the fact remains that there are many positive benefits from sustained supply of drinking water and sanitation, such as averting diseases and promoting health. They have a lot more value to the poor not only in terms of enhanced capacity for earning, but also saving on medical expenses,[7] with positive spin-offs for consumption, saving, and investment, together contributing to relatively higher levels of long-term economic growth.

Providing water and sanitation, like provision of security and safety, is an activity that should be treated as part and parcel of not only human development, but also enlightened governance at national and international levels. Water is a basic need. Fortunately for the poor and underserved, it has now been recognized as a human right.

Components of human development, such as food and nutrition, basic and decent living facilities, ten to twelve years of education, and minimum purchasing power, are integral to essential human development. It is clearly a matter of common sense that clean water and decent sanitation on a sustained basis has a wide variety of benefits encompassing several other MDG goals.[8] Beyond that common sense is the fact that the strength of the relationships could vary across and within countries. In this section, we explore the correlations between water and sanitation indicators on the one hand and education, health, and allied indicators on the other. Multicountry data from ADB, UNDP, and the World Bank, as well as state level data for India, are used in this exercise.

3.2 Correlations Based on UNDP-HDI Data

For comprehensive coverage in terms of both countries and indicators, there is hardly a parallel to the Human Development Indicators database. The 2005 database provides indicators for either 2002 or 2003 in most cases. Table 3 provides the number of economies covered and the values of the correlation coefficient between the percent with access to water/sanitation on the one hand, and the overall Human Development Index (HDI) on the other. The correlations are strong and imply the importance of delivering water and sanitation for human development.

The implications behind the correlations are further detailed in the tabulations on the joint distributions by ranges of HDI and ranges of access percentages. Thus, among the 150 economies with data on both HDI and the population percentage with access to water, HDI of 0.85 or higher is found in 23 economies, all of which have the highest access to water (Table 4). Moreover, where access to water is high, one does not come across a single economy with HDI less than 0.5. On the other extreme, economies with populations that have least access to water are most likely to achieve relatively low levels of HDI (less than 0.7).

[7] At times, the poor in developing countries, especially rural poor, mortgage or even sell assets such as gold and land for arranging treatment for diseases in the family.

[8] In its series of strategy papers for achieving the Millennium Development Goals (MDGs), the UK Department for International Development (DFID) documented the links between water and sanitation with health and education in particular. Examples are *Addressing the Water Crisis* (DFID March 2001), *Better health for poor people* (DFID November 2000), and *The challenge of universal primary education* (DFID January 2001). It is also noteworthy that in assessing the financing needs for achieving the MDGs, the UN Millennium Project is including the need for sanitation provision of one toilet per 40 pupils within the educational institutions and assuming that achievement of the health MDG to reduce infant mortality by two-thirds will be underpinned by delivery of the water and sanitation MDG targets. (See Millennium Development Goals Needs Assessments draft paper available at http://www.unmillenniumproject.org/documents/mp_ccs paper_jan1704.pdf.)

As the numbers in Table 5 show, among the 140 economies with data on both HDI and percent of population with access to sanitation, HDI of over 0.85 is found in economies with at least 90% of people having access to sanitation. Moreover, where access to sanitation is high, one does not come across a single economy with HDI less than 0.5. On the other extreme, economies with populations with least access to water are most likely to achieve relatively low levels of HDI (less than 0.7).

In addition to the relatively high correlations between HDI and access to water/sanitation, the correlations with other social indicators of relevance to MDG (Table 6) affirm the importance of water and sanitation. The correlations are fairly high in terms of gender and health-related MDGs, which are central to the very life of a nation, and which constitute the foundations for economic and social evolution.

3.3 In Sum

The implications of the interrelationships are straightforward. First, it is difficult to obtain significant gains on Human Development unless access to water and sanitation is accomplished. Second, gender-related and health-related MDG indicators have fairly high links with access to water and sanitation. These strong relations are enough of a justification to place the provision of water and sanitation at the center stage of MDGs.[9]

[9] Good health and longer life arising from water and sanitation provision would naturally mean economic benefits for the individual and the society. For examples of formal analyses of benefits and costs and their limitations, see Annex 2.

Table 3: Correlations based on UNDP-HDI for 2003
Between HDI and Percent of Population with Access to water/sanitation

	With access to Water	With access to Sanitation
Correlation coefficient [Number of Economies]	0.78 [150]	0.85 [140]

Table 4: Number of Economies by Different Ranges of
HDI and Extent of Access to Water

HDI Range	Percent of population with access to water					
	100	90-100	70-90	50-70	Less than 50	Total
0.85 or higher	20	3	0	0	0	23
0.7-0.85	5	27	27	1	0	60
0.5-0.7	0	7	16	10	6	39
Less than 0.5	0	0	9	13	6	28
Total	25	37	52	24	12	150

Table 5: Number of Economies by Different Ranges of
HDI and Extent of Access to Sanitation

HDI Range	Percent of population with access to sanitation					
	100	90-100	70-90	50-70	Less than 50	Total
0.85 or higher	13	3	0	0	0	16
0.7-0.85	4	18	22	10	4	58
0.5-0.7	0	0	2	14	18	34
Less than 0.5	0	0	0	4	28	32
	17	21	24	28	50	140

Table 6: Correlations between Population with Access to Water/Sanitation and Other
MDG-Related Indicators

Indicator	Number of economies	Correlation with Water Provision	Number of economies	Correlation with Sanitation Provision
Gender equality: female to male ratios in				
Primary school enrolment	132	0.52	122	0.56
Secondary school enrolment	114	0.59	104	0.56
Tertiary level enrolment	127	0.59	118	0.67
Health-related				
Infant mortality	150	0.76	140	0.78
Under 5 mortality	150	0.76	140	0.77
Maternal mortality	142	0.66	133	0.68
Under nourished population	121	0.65	113	0.68

4. COSTS, PRICING, AND INVESTMENT NEEDS

4.1 Projected Needs and Targets

We believe that the first order of priority is to supply drinking water to those not served so far, on the assumption that those who have been stated as covered are indeed covered and will continue to receive water of adequate quality and quantity. A similar comment applies to sanitation needs as well. Table 7 has the projected needs for the Asian region as given in GWSSA-2000. It is easy to see that what is aimed for is the halving of the proportions with no access in 2000.

In addition to the MDG targets, we propose two more sets, one on the basis of providing 'improved' water/sanitation to all, to be achieved, say anywhere between 2015 and 2020, if in fact more time (beyond 2015) is needed. The third and final set of targets are based on the premise that simple and decent housing is a must in order to provide sustained water and sanitation in line with acceptable norms of privacy and freedom. That would call for integrating housing and urban development strategies with providing house connections to all, which might take a lot more time than perhaps even 2020. The three sets of targets are given in Table 8.

4.2 Cost Estimates: Water

As one could expect, cost estimates vary depending on the distance of the water source from the supply point, extent of purification needed, water losses due to unaccounted for water, and the complexity of distribution. What follows is a set of cost estimates based on different case studies.

Estimates for Dehradun, India

Hariharan (2005) provides the following costs for the city of Dehradun in Northern India—O&M Cost per Kilo Litre (KL): Rs1.35; treatment: Rs0.20; and electricity cost: Rs1.7. The total cost per KL thus works out to around Rs3.5 ($0.08).[10] This estimate seems to be on the low side in comparison to other cases that follow. In particular, the estimate does not take into account the capital costs.

[10] Rs45 per $.

Estimates for Visakhapatnam, India

To augment the existing supplies of water, the Visakhapatnam Municipal Corporation (VMC) has embarked on a project to bring water from the Godavari River, some 150 kilometer (km) away (see Annex 4). The water is to be brought via canals and pipelines to the city. Allowing for likely wastage en route, an additional 45 MGD is to be realized from the project for the investment of Rs3,000 million.[11] The debt service obligation on this would be, on a conservative basis, Rs300 million. An additional Rs1,000 million per annum is the total cost of electricity, O&M, and depreciation. Total annual cost of bringing 45 MGD, thus, is Rs1,300 million; and the cost per day per gallon works out to Rs0.08, or Rs7.6 per kilo liter (of which the capital cost is Rs4.02 or 23% of total). In US$ terms, the cost per KL is $0.39. The project has not been completed as yet and costs could escalate.

Estimates Based on ADB Projects

Annex 5 has the data on project cost and output parameters for 10 projects carried out by ADB in various countries. The cost per KL varies across the projects (covering rural/urban regions in different countries) from a minimum of $0.04 per KL to $0.56 per KL. This is such a wide variation that one must not jump at macro level computations based on such diversity. The average cost per KL for all projects put together[12] works out to $0.11. If capital costs are assumed to be about a quarter of total costs, the overall cost could be estimated as $0.11 times 4 or $0.44.

House Connection: GWSSA Cost Estimates

The cost estimates given in GWSSA-2000 are for the various types of interventions such as tap connection, stand post, bore well, protected well,

[11] It is expected that VMC will take 17 MGD of water out of the new supplies, leaving the balance to VSP

[12] The data for all 10 projects put together is as follows.

Direct Cost ($ Million)	682.78	Annual Cost ($ Million)	68.28
Supply KL/day	1,695,828	Beneficiary Number	11280256
Per capita supply/day(Lt)	150	Supply Mill KL/Yr	618.98

Cost Per KL: $0.11

and so on. Investment and operational costs are given on a per capita basis and not on a per liter basis. However, capital costs on a per capita basis (Table 9) can be used. Thus, for the purpose of computing investment needs, taking into account the need to maintain the facilities, we use $3 per capita per annum as the average investment cost per house connection.

Bangalore, India: Costs and Prices

STEM,[13] an NGO cum consulting organization with considerable expertise in evaluating water and sanitation projects has provided the following information for the city of Bangalore. The city's metropolitan water body spent Rs3,738.3 million in 2002 and produced 274,876 million liters in that year (or 753 MLD). With 35% of water unaccounted for, the stated revenue expenditure was incurred to supply 65% of production or 178,669 ML. Average cost of supply of a thousand litres (KL) comes to Rs21. When the price is scaled up for inflation at 5% per annum for 2003, 2004, and 2005, the supply cost per KL for early 2006 would be Rs24. (Note: The water authority's revenue receipts of Rs3,687 million in 2002 was 98.6% of revenue expenditure.)

STEM has data on current capital costs also and are for installing a facility with the following features: distance of source from the city is around 100 km; height of storage in the city is 500 meters; capacity of the facility is 500 MLD, which translates to 182,500 MLY ; and the cost of construction of the facilities is estimated at Rs16,000 million. On the basis of loan servicing at 10%, annual cost of the project is Rs1,600 million and cost per KL works out to Rs8.8.

Total capital, operation and maintenance cost could thus be placed at around Rs33 per KL (24 plus 8.8) or $0.73. As against this, the tariff rates applied in Bangalore are summarized in Table 15, which clearly indicates differential pricing and cross-subsidization. Industry and large scale nondomestic users pay a relatively high price while most consumers are assisted with lower charges.

The Singapore Case: Prices and Costs

In Singapore, the Public Utilities Board (PUB) is the water authority. Fresh potable water—drinkable straight from the tap—is supplied by PUB. The water is moderately soft and treated to a quality well within the World Health Organization's Guidelines for Drinking Water Quality, and is fluoridated.

For consumption of 1–40 cubic meter (cu m), domestic consumers pay S$1.17 per cu m (US$0.65)[14] plus a 30% water conservancy tax; for consumption above 40 cu m, the charge is S$1.40 per cu m plus a 45% tax; and all nondomestic consumers pay a flat S$1.17 per cu m and the 30% tax. As against the price charged by PUB, cost of production was the equivalent of US$ 0.55 per KL.

The following points are of note in the context of the Singapore experience: (1.) PUB does not charge an exorbitant price to nondomestic consumers. Also, beyond the first slab, domestic consumers pay relatively high prices, a way to discourage them from misuse of precious water. (2.) Even at the base price, PUB makes a handsome profit. These practices are in sharp contrast to those in most developing countries.

4.3 Investment and Expenditure Requirements: Water

The total annual costs of providing drinking water are estimated for the three alternative targets (Table 8): 980 million to be served with improved water; 1,357 million with improved water; or 2,542 million to have house connections. Based on the totality of the cost experiences in the earlier section, we take an average investment and operational cost of $0.5 per KL. On the basis of a minimum acceptable consumption level of 100 liters per head per day, the costs of production per capita per annum will be $0.05 times 365, or $18.25. Based on this per capita annual cost, we compute the following ultimate annual cost estimates for each of the three targets (Box 1).

[13] STEM stands for Symbiosis of Technology, Environment and Management and it is located at Bangalore.

[14] Average exchange rate in 2001 was S$1.8 per US$.

Box 1: Investments for Water Supply

1. Ultimate annual cost to meet MDG in Asia (Supply drinking water of 100 liters to additional 980 million): $17,885 million (Rounded to $18 billion)
2. Ultimate annual cost of provision for all by 2015 or soon thereafter: $24,765 million (Rounded to $25 billion)
3. Cost of providing tap connection at home for additional 2,542 million people at $3 per head: $7,626 million (Rounded to $8 billion)

An Important Comment:
The projected expenditures are using year 2000 base data. The above numbers, thus, do not take into account what might have been accomplished during 2000–2005. Expenditure projections, thus, should be taken as the upper limits. Suppose the rate of progress in terms of coverage during 2001 through 2005 has been even and uniform, some 330 million out of 980 million would have received water by the end of 2005 in which case the incremental cost by 2015 will be $12 billon since the balance of $6 billion would have been spent during 2000–2005. We just do not have coverage data for 2005, hence, the need to keep the projections in the right perspective.

Note: Average annual investment in Asia during 1990–2000 was an estimated $6 billion (GWSSA, 2000, p.17).

Annual Costs

In regard to achieving MDG in Asia, over the 10-year period from 2006 through 2015, the coverage addition could be evenly distributed, thus adding each year the provision of water for an additional 98 million people. Thus, the annual additional expenditure will be $1.8 billion in 2006, $3.6 billion in 2007, etc., as shown in Table 11 below.

Cost Recovery

Principle number 4 of the Dublin Statement[15] on Water and Sustainable Development thus reads: "Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources."

There is room for well-designed and targeted subsidies in any national endeavor towards achieving improved levels of human development. In respect of water supply, for instance, the subsidized rates could be applied to the first 100 liters per day per family (see Box 2 below). Targeting becomes convenient if each and every family has a tap connection, such as when the subsidized rate is applied to all those who live in one-room homes in well-planned housing clusters (see section 5 below).

Box 2: Minimum Free Water: It Can Be Done

The Cities Alliance in its 2005 Annual Report quotes a publication entitled Making City Strategy Come Alive: Experiences from eThekwini Municipality, Durban, South Africa, issued by eThekwini Municipality in 2004, listing several milestones in the implementation of the city development strategy. A significant milestone is the following: "The provision of the first six kilolitres of water per month at no cost to every household in the municipality that is connected to the municipal water supply system, with the result that 82% of the population now has access to safe water."

Note: The amount of 6 KL translates into 200 liters per day and for a 4-member family, it amounts to 50 liters per person per day.

[15] The statement was the outcome of the International Conference on Water and the Environment, organized by the UN and held at Dublin, Ireland in January 1992. See also Young (2005, Chapter 1) for an exhaustive treatment of the role of economic valuation in water management.

As for financing the government expenditure on water supply, the subsidized rate and normal rates can be so designed as to ensure full cost recovery in the aggregate. While doing so, the policy should not be to penalize the nondomestic consumer to pay for the domestic users, which will adversely affect investment and employment growth and, thus, hurt the people indirectly.

4.4 Cost Estimates and Investment Requirements: Sanitation

Sanitation costs, notably in terms of construction and maintenance of a home facility and the associated city-wide systems, are not available from case studies as in the case of water supply. Based on GWSSA-2000 and the study by Hutton and Haller (2004), an important tabulation has been compiled on the annual costs of sanitation facilities (Table 12). Sewer connection and septic tank may be taken as the preferred options with respective overall expenses of $154 and $104.

From data obtained from a few builders in the city of Visakhapatnam, India, it was found that the construction of a simple brick–walled, throw-type latrine connected to a septic tank would cost about Rs5,000 or close to the $104 reported in Table 12. We take this figure for septic tank and based on a full-loan recovery over 10 years, the investment cost is $10 annually. This cost is on a per facility basis; and, hence, the cost per head for a 4-member family when the facility is in-house will be $2.5 per annum [16] (ignoring the operational costs, which are relatively small and assumed to be taken care of by the households).

The three alternative targets for sanitation are framed in terms of realizing MDG for sanitation by 2015 (extra coverage of 1,532 million persons), sanitation for all (2,580 million) and a latrine in-house for all (3,684 million). Based on the cost estimate of $2.5 per person per annum, the three alternatives would call for an annual investment of $3,830 million, $6,450 million and $9,210 million, respectively. If the last and best option is chosen and the target is to be reached in 15 years, the coverage will raise each year by 245.6 million people and annual expenditure by 614 million. [See, however, the comment made in Box 1 in respect of water investments.]

4.5 Cost Perspectives

In Comparison to Government Spending on Health and Defense

The region referred to as developing Asia (ADB definition) in 2005 has an estimated Gross National Income (GNI) of $4,922 billion. [17] The region's government health expenditure is roughly 1% of GNI and defense expenditure about 2%.[18] Thus, the region is spending about $50 billion on health and $100 billion on defense. In comparison, the incremental expense for water is slated to be just about $2.5 billion in 2006. Similarly, incremental expenditure on sanitation is under $1 billion. These are miniscule in comparison to the health and defense expenses in the aggregate. Even the total investment of $8 billion for in-house water connections is by no means difficult to incur if only savings are affected in defense spending. What is more, government could very well save on health expenditures in course of time when the provision of water and sanitation leads to better health status for the population at large.

Donor Perspective

The projected expenditure magnitudes on water and sanitation are by no means astronomical in comparison to what Official Development Assistance can do. OECD development assistance, for example, is projected to reach a little over 88

[16] ADB projects data provide the sanitation costs ranging all the way from less than $1 per family to over $200 and, hence, do not provide much guidance. See also Section 7 on the recommendations.

[17] Gross National Income for Asia in 2000 was an estimated $3,210 million (see Annex 8). Data from various issues of the Asian Development Outlook provide the following gross domestic product (GDP) growth and consumer price index (CPI) inflation rates.

Year	2001	2002	2003	2004	2005
GDP Growth	4.3	5.8	6.7	7.4	6.5
CPI Growth	2.4	1.5	2.4	4.0	3.7

Applying the growth rates and inflation rates to the GNI of 2000, the estimated GNI for 2005 is $4922 billion.

[18] These are actual estimates for 2000 (see Annexes 6 and 7), which are assumed to remain more or less the same.

billion in 2006 (see Annex 9). Of this, if allocation to water and sanitation is raised to a little over 10% from the past 5 to 6%, a sum of $10 billion will be available for water and sanitation. At 40% devoted for water ($4 billion), and an allocation of, say, 60% for Asia, the assistance of $2.4 billion will almost match the annual additional expense of $2.5 billion projected for 2006 under the second alternative target of 'water for all.' Asia, similarly, should seek a sum of $3.6 billion for sanitation, which, in addition to meeting the entire incremental expense of less than a billion dollars, may also help in ushering in a relatively high pace of housing development, which is vital for the provision of sustained water and sanitation.

Table 7: Targets for Water and Sanitation for Asia, 2015 (From GWSSA-2000)

WATER	2000			2015		
	Rural	Urban	Total	Rural	Urban	Total
Total population (million)	2,331	1,352	3,683	2,404	1,943	4,347
Population served (million)	1,736	1,254	2,990	2,097	1,873	3,970
Percent of population served	74	93	81	87	96	91
Percent not served	*26*	*7*	*19*	*13*	*4*	*9*
Additional population to be served (million)				361	619	980
SANITATION						
Population served (million)	712	1,055	1,767	1,569	1,730	3,299
Percent of population served	31	78	48	65	89	76
Percent not served	*69*	*22*	*52*	*35*	*11*	*24*
Additional population to be served (million)				857	675	1,532

Note: There are slight differences between these numbers for Asia and the ones for Asia and Pacific region given in ADB's latest Technical Background Paper [ADB, 2005]. The following are the comparative figures based on UN population projections in thousands for 2015: rural 2,363; urban 2,002; and total 4,365 (see Annex 3 for country data). The total projected population in the above Table is, thus, lower by 0.4%, which is too small to affect the main thrust of the results and discussion of this section.

Table 8: Three sets of Targets for Water and Sanitation Based on the Population Estimates for 2000 and 2015

Alternative targets	Additional population in million to be served	
	Water	Sanitation
Target 1: MDG Goal	980	1532
Target 2: Improved access to all	1357	2580
Target 3: House connection for all	2542*	3684*

* Assuming an average household size of 4, new house connections needed are 636 and 921 for water and sanitation, respectively. Note that the future population estimate remains the same even if target achievements take longer than 2015.

Table 9: Per Capita Investment Costs of Interventions

	Life span of asset (Years)	Investment Cost $	Annual average investment Cost $
House connection	40	92	2.3
Stand post	20	64	3.2
Borehole	20	17	0.85
Dug well	20	22	1.1
Rainwater	20	34	1.7

Table 10: Water Tariffs Applied to Different Categories of Users:
The Bangalore Case

Domestic Users		Nondomestic Users		Industrial
Slab	Rate per KL in Rs	Slab	Rate per KL in Rs	Flat Rate Rs60 Per KL
0 to 15,000 litres	6	0 to 10,000 litres	36	
15,000 to 25,000 litres	8	10,000 to 20,000 litres	39	
25,000 to 50,000 litres	12	20,000 to 40,000 litres	44	
50,000 to 75,000 litres	30	40,000 to 60,000 litres	51	
Over 75,000 litres	36	60,000 to 100,000 litres	57	
		Over 100,000	60	

Table 11: Annual Incremental Expenditure for Water Supply in Asia

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Coverage Increase (Million)	98	196	294	392	490	588	686	784	882	980
Cost ($ billion)	1.8	3.6	5.4	7.2	9	10.8	12.6	14.4	16.2	18

Table 12: Investment Costs for Sanitation Facilities
(From GWSSA, 2000 and H-H, 2004)

	Life span of asset (Years)	Investment Cost US$	Annual Investment Cost US$	Operating Cost in total (%)	Total Cost US$
Sewer connection	40	154	3.85	35	11.95
Septic tank	30	104	3.47	15	9.10
Ventilated Improved Pit-latrine*	20	50	2.5	10	5.70
Simple pit latrine	20	26	1.3	10	3.92

5 WATER AND SANITATION PROVISION AS PART OF HOUSING DEVELOPMENT

The seminal and excellent GWSSA-2000 implies at many places, and even suggests on occasion, the optimality of providing a tap connection at home (Table 13) and having proper sanitation facilities at home and related infrastructure in the towns and cities. The longer term goal, thus, should be proper house connections and the option to have at least one tap per home within the house premises,[19] which also would call for the consideration of a house for each family as one important target, with which water and sanitation targets are integrated.

While water can indeed be supplied to groups of families, sanitation has to be treated differently. The case for one latrine per family/home is the strongest. It is sometimes alleged that men, especially—and women, too, at times—prefer open fields for the purposes of defecation. This is not true, and facts seem to suggest the contrary. GWSSA-2000 (p. 34), for instance, refers to a survey of rural households in the Philippines, which provides a listing in order of importance of the following reasons for preferring a proper toilet: lack of flies, cleaner surroundings, privacy, less embarrassment when friends visit, and reduced gastrointestinal disease. GWSSA affirms that these results are echoed in other parts of the world and the following is worth quoting: "Candid personal reflection, even by health sector professionals, often reveals that health is a less intense motivator for sanitation than dignity, convenience, and social status." This statement should not be misconstrued; if development is all about promoting and preserving human dignity, then the case for in-home latrines is the strongest.

There is the subtle and vicious circle of poverty leading to lack of house connections, or hand pumps for water supply and sewerage connections, or septic tanks for sanitation, which in turn leads to morbidity and mortality, both truncating productivity and productive life, respectively. It is no wonder, then, that poor die young (Hardoy, Cairncross, and Satterthwaite, 1990). Therefore, it is apt to say that "interventions in water supply and sanitation, through their impact on health and development, are powerful elements of efforts to enable the poor to escape poverty" (GWSSA, 2000, p.35). But, what does provision of sanitation really involve? A few pointers are summarized in the Box 3 below.

Box 3: What Does Sanitation Delivery Involve?

The drinking water target was included as a high priority issue in the Millennium Declaration, while the sanitation part of the target was added after much debate in the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002. The WSSD Plan of Implementation recognized that attaining improved sanitation to such a level as what Target 10 demands entailed more than just constructing new facilities for a given number of people. … The Plan of Implementation cited the following examples of activities that investments must support:

- ☐ Develop and implement efficient household sanitation systems
- ☐ Improve sanitation in public institutions, especially schools
- ☐ Promote safe hygiene practices
- ☐ Promote education and outreach focused on children, as agents of behavioral change
- ☐ Promote affordable and socially and culturally acceptable technologies and practices
- ☐ Develop innovative financing and partnership mechanisms

-From ADB (2005)

Note: Best delivery of sanitation is possible if housing units are in clusters rather than spread out.

[19] As noted in GWSSA 2000 (p. 24), essential actions to ensure that piped water supply remains safe and sustainable include preventing contamination and minimizing water loss. Contamination of distribution pipelines may arise from intermittent supply, low water pressure in the distribution network, leaking pipes and inadequate wastewater collection systems. Water loss (physical loss) often amounting to more than 50% of supplies, mainly arises from leaking pipes, joints and valves, overflowing service reservoirs, waste of water through illegal connections, and nonmetered house connections.

The Annual Report for 2005 of the Cities Alliance (p.14) quotes the Millennium Project's "clear set of objectives to make cities more productive, and create the environment in which all stakeholders, particularly the slum dwellers, can contribute to the creation of economic growth." These objectives are improving security of tenure for slum dwellers, upgrading slums and improving housing, expanding citywide infrastructure and effective service delivery, creating urban jobs through economic empowerment, and providing alternatives to slum formation.

Crudely put, the question is whether slums should remain as slums and, if so, for how long. Since by definition, slums are not planned via an urban development strategy, it is vital not to exaggerate the need for the slum dwellers to stay put and the importance of property rights for them by 'recognizing' the slums, approving them as legitimate, and so on. It will surely create the moral hazard of perpetual expansion of slums and slum dwellers.

The best option for improving the lives of slum dwellers is to have them relocated with as little disruption as possible to well-planned homes, preferably in mid-rise housing, a strategy that minimizes the use of land for housing and permits greenery for all and not some. It is a sad commentary on civilized evolution of nations and its peoples if slums are allowed to persist. The 'let us develop the slums' mindset and its practical surrogate of developed slums is not quite commensurate with ideas of human development and dignity. There are no children of a lesser God when it comes to the conceptualization of what constitutes development. National and international development policy makers, aid agencies, and international NGOs should appreciate the vital need for creating a stake for people in the nations they live in (see Box 4 below).

Box 4: Public Housing in Singapore: Statements by the Former Prime Minister

"My primary preoccupation was to give every citizen a stake in the country and its future. I wanted a home-owning society. I had seen the contrast between the blocks of low-cost rental flats, badly misused and poorly maintained, and those of house-proud owners, and was convinced that if every family owned its home, the country would be more stable." (p. 116)

"There were enormous problems, especially in the early stages when we resettled farmers and others from almost rent-free wooden squatter huts with no water, power, and modern sanitation—and therefore, no utility bills—into high-rise dwellings with all these amenities, but also a monthly bill to pay. It was a wrenching experience for them in personal, social, and economic terms." (p. 120)

"To prevent older estates from looking like slums, I suggested to the Minister for national development in 1989 that it was time to upgrade the old housing with public funds to make them approximate the quality of the new." (p.121)

Source: Third World to First, The Singapore Story: 1965-2000, Memoirs of Lee Kuan Yew, Singapore: Singapore Press Holdings, 2000.

In the specific case of India, the connection between the type of housing and the availability of water and sanitation facilities can be gauged from the data for 1998–1999 from the *Demographic and Health Survey(DHS)*[20]:

	Urban	Rural	Total
Percent of households with pucca house	66	19	32
Percent of households with piped water	74	25	39
Percent of households with flush toilet	64	9	24

Proper housing is critical for having a decent flush toilet (see also Boxes 5 and 6).

[20] The actual name of the survey, which is part of DHS, is *National Family Health Survey (NFHS-2), 1998–99,* Mumbai: International Institute of Population Studies, 2000.

Box 5: India's Challenging Sanitation Tasks

Proper drainage of dirty water, disposal of garbage, sewage, human and industrial wastes are pre-requisites for preventive health care. Census 2001 conveys that of the 200 million dwelling units across India, only some 40 million dwelling units have a toilet (sanitation facility) inside the house. … Even today, nearly 70% of the population across the country has no option other than open air defecation, and this directly contributes to the high incidence of waterborne and parasitic diseases. …The Total Sanitation Campaign aims to eliminate the practice of open defecation completely by 2012.

From the Mid-Term Appraisal of the Tenth Five-Year Plan (2002-07) of India, Chapter 2, pp. 111-112

Box 6: A Scheme for Model Towns and Villages: The Case of Andhra Pradesh, India

In October 2005, an ambitious scheme to create model villages and towns in the next four years at a cost of $5.1 billion (Rs230 billion) was announced by Chief Minister of the state of Andhra Pradesh, India. The scheme envisages that every family will have a shelter by 2009. It also envisages the provision of tap and power connections, wet latrines besides provision for nutrition and primary education to children, link roads and sanitation facilities for each village, and pension to the elderly.

Villages and municipal wards would be identified for implementation of the scheme by in charge ministers in consultation with people and officials. Individual beneficiaries would be identified through gram sabhas and all-party committees.

-Based on Hindu, October 20, 2005

Table 13: Service Level. Quantity of Water Collected and Other Information

Service level	Distance/Time	Likely volume of water collected	Health risk	Intervention priority and actions
No Access	More than 1 km, Over 30 minutes round trip	Very low 5 liters per capita per day	Very high	Very high
Basic Access	Less than 1 km and 30 minutes	About 20 liters per day	High	High
Intermediate Access	At least one tap in premises or close by	About 50 liters per capita per day	Low	Low
Optimal Access	*Water supply within house with more than one tap*	*100-200*	*Very Low*	*Very Low*

Source: WHO. 2004. Domestic water quantity, service level and health. Geneva: WHO (quoted in WHO-UNICEF, 2005). This is not a *verbatim* reproduction and has been modified a little bit by the authors.

6 A FEW RECOMMENDATIONS

6.1 Coverage Statistics

It is widely acknowledged that the statistics on the extent of population covered by water and sanitation services are collected from Demographic and Health Surveys. This is as it should be, since fairly reliable information is difficult to obtain from administrative arrangements. Censuses and intercensal surveys are the preferred source for data on households and their characteristics, including access to water and sanitation. For instance, the latest survey for India was the one referred to earlier and the data were for the year 1998¬¬–1999.

Under normal circumstances, we expect data from censuses and surveys to be provided with extrapolations, if any, explained properly. Care should be taken to ensure that the estimates are dovetailed properly in order not to create the slightest impression that international data are on a different footing despite the fact that they are but copies or amended versions of national data. Unfortunately, however, that is not quite the case at times. In the Indian case, for example, data from that survey and the estimates for 1990 and 2002 in the Joint Monitoring Programme (JMP) Report of WHO-UNICEF are provided in Table 14. There is considerable congruence between the DHS data and the urban water supply coverage estimates used in JMP. A similar comment is difficult to make in respect of rural water supply and urban and rural sanitation.

There are also some (though not major) inconsistencies in the time series data in the indicators put out by ADB on its database. For instance, the case of urban water supply coverage percentages presented in Annex 10. There are a few cases where phenomenal increases or decreases in coverage have been reported, which may or may not be reflecting the true ground realities.

An interagency task force on water and sanitation indicators may be constituted to look into the existing data and methods and their deficiencies and formulate and implement a possible action agenda.

6.2 Fine-tuning the Cost Estimates

As pointed out in the earlier sections on costs of providing water supply and sanitation, the unit costs differ significantly across locations and regions. At some times, the extent of variation is rather large. In addition, the estimation on a per capita basis is not easy to reconcile with the technical mode of service delivery and the output delivered. Ideally, the cost should be first ascertained in relation to the type of facility (water connection at home, flush toilet at home) and costs expressed per unit (per kilo liter of water, per toilet of given dimensions, etc.).

Cost estimates must have a sufficient detail, and should be obtained at least once in three to five years. Per capita costs should be derived from the unit costs. Such data should be compiled for each country. Needs, targets, and internationally comparable cost estimates are all important inputs of the Asia-wide or global determination and allocation of resources.

6.3 A Home for Each Family

A room with bath and kitchen in mid-rise housing is advocated as the real answer for sustained and good water supply and sanitation to the poor and other low-income families. It is also important not to allow the pretense of taking development to slums, which serves the politicians to maintain vote banks at relatively low cost and minimal disruption to the prevailing order of low-key sanitation and environmental degradation.

The longer term goal should be governed by the slogan ‘a home for each family’ and that alone would deliver development as now known in the industrialized world. It will promote stability and peace by reducing visible inequalities.

As a matter of policy, if each and every housing developer involved in building private apartment complexes is required to construct a one-room home for every ten others, it could go a long way in helping the poor to live in decent surroundings. Annex 11 has a rough and ready template for delivery of housing in the case of Visakhapatnam, India, and it could be properly modified and altered as long as there is a will to ensure that

every family has a home to call theirs. Furthermore, it is important for developing country governments to recognize that since urbanization is unstoppable, the best is to go for it and plan for it (see Box 7).

Box 7: PRC's Town-Based Urbanization Strategy

The Asian Development Bank (ADB), together with the China Center for Town Reform and Development (CCTRD), formulates the "Town-Based Urbanization Strategy Study" in 2004–2005.

The proposed strategy is articulated in the national and provincial sections of Volume 1 (Main Report) of the Draft Final Report of the study (see hyperlink below). Volume 2 presents Guidelines for Promoting Town Development, which provide provincial and town managers with step-by-step guidelines for building development partnerships, promoting economic growth, generating employment, managing land use, and facilitating the production of housing, urban infrastructure, and social services for the local population. The Guidelines present a number of specific analytical tools and implementation mechanisms, the application of which is highlighted in a series of case studies in Volume 3, Best Practices. Volume 4 presents outline strategic plans and packages of development proposals for six demonstration cities in Laioning and Shanxi Provinces. These plans are intended to serve as examples of how the strategy and guidelines can be used to prepare integrated, targeted, and realistic development plans for Chinese towns.

The contributions that cities and towns are making to the parallel processes of urbanization and economic development make it clear that PRC should grow cities and towns by facilitating the development of larger urban agglomerations made up of different types of urban settlements. Within that context, national and provincial governments should focus their efforts on towns with high potential for employment generation and economic growth.

Source: http://www.adb.org/Documents/Reports/PRC-Urbanization-Strategy/default.asp

ADB should pioneer, as part of its urban sector strategies and lending, a healthy and orderly development of housing, including public housing, as integral to water and sanitation provision. Single-room dwellers could well be exempted from paying user charges for a well-determined minimum consumption.

6.4 Transparency in Cost Recovery

It is easy to blame one development agency or the other for advocating full cost recovery in regard to the provision of water and sanitation. One must look at the matter from the stand point of how easy it is, or can be, in a developing country to incite the poor if there is some perception that they can escape from paying for a service. Information is power in such matters, and perceptions can be stronger than reality. Often, statistics that are not adequately publicized are comparative data on the lowest and highest charges applicable to the first and the last blocks of consumption, who is subsidizing whom, and how revenue from sales compares with costs.

It should be mandatory for government websites at central and local levels to routinely publish user charges for the low-end consumers and others. The practice of charging nondomestic users at high rates should be done away with, in the interests of investment promotion.

6.5 Official Development Assistance (ODA)

Efforts should be made to ensure that ODA from OECD for water and sanitation is pegged at $10 billion for 2006 of the projected total aid of close to $90 billion. Asia should get $6 billion. Part of the amount may have to be used to provide assistance for water and sanitation in terms of short-term measures and quick-fix solutions. A part, however, should be used for water and sanitation integrated with housing. As part of urban development strategies and city development plans, distinct road maps should be developed to achieve a home for each family by, say, 2020 or 2025. The plans should also include and integrate public and private housing.

ADB should take the initiative to provide targets and costs, and convince the donor community on the need for additional funding. Towards this end, the Asia-wide projections of costs and targets given in this paper should be articulated at country level. Such an exercise will also help the Bank in terms of firming up its own sector work, policy analyses and lending programs.

Table 14: DHS and JMP Estimates for Water and Sanitation Coverage for India

Source	Urban			Rural		
	1990	1998–99	2002	1990	1998–99	2002
Water						
Joint Monitoring Report	88		96	61		82
Demographic Household Survey						
—Piped		74.5			25.0	
—Piped plus hand pump		92.6			62.3	
Sanitation						
Joint Monitoring Report	43		58	1		18
Demographic Household Survey						
—Flush toilet		63.9			8.8	
—Flush toilet and pit latrine		80.7			18.8	

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Annex 1
TableA1-1: Additional Salient Information from GWSSA 2000
(Average annual for 1990–2000)

Median total investment in water and sanitation as % of total government investment (%)	3.6
Urban water supply: median unit production cost per $/M^3 —Cost recovery rate	0.20 70%
Median water tariff per M^3 ($)	0.22
Median sewerage tariff per M^3 ($)	0.14
Percentage of population in informal settlements	17.9
Mean percentage of unaccounted water in large cities	42

Table A1-2: Investment Costs from GWSSA 2000

GOVERNMENT INVESTMENT Water [Ave. Annual]	1990–2000 Rural	1990–2000 Urban
Spent from national resources ($ million)	1,817	2,002
Spent from external resources ($ million)	1,227	1,017
Total ($ million)	3,044	3,019
Additional persons covered (million)	303	282
Per person investment ($)	*10.0*	*10.7*
GOVERNMENT INVESTMENT Sanitation [Ave. Annual]		
Spent from national resources ($ million)	50	901
Spent from external resources ($ million)	32	120
Total ($ million)	82	1021
Additional persons covered (million)	216	365
Per person investment ($)	*0.4*	*2.8*

Table A1-3: Targets for Water and Sanitation for Asia, 2015
(From GWSSA 2000)

	2000			2015		
WATER	Rural	Urban	Total	Rural	Urban	Total
Total population (million)	2,331	1,352	3,683	2,404	1,943	4,347
Population served (million)	1,736	1,254	2,990	2,097	1,873	3,970
% Served	74	93	48	87	96	91
Additional population served (million)				361	619	980
SANITATION						
Population served (million)	712	1,055	1,767	1,569	1,730	3,299
% Served	31	78	48	65	89	76
Additional population served (million)				857	675	1,532

Annex 2
Costs and Benefits: Review of Two Recent Studies

The Hutton-Haller Study

1 The study by Guy Hutton and Laurence Haller (2004) aims at the estimation of the economic costs and benefits of (1) improvements required to meet the water supply MDG of halving, by 2015, the proportion of those without access to safe drinking water; (2) meet the water MDG plus halving, by 2015, the proportion of those without access to adequate sanitation; (3) increasing access to improved water and sanitation for everyone; (4) providing disinfection at point-of-use over and above increasing access to improved water supply and sanitation; and, finally, (5) providing regulated piped water supply and sanitation in house. Costs are estimated for these alternatives (see Table A2-1 below) and the various types of service provision identified as improved and unimproved.[1]

2 The major contribution of the H-H study is the quantification of the benefits of water and sanitation provision to those presently devoid of access. For direct health benefits, H-H consider five different routes of infection for water-related diseases: waterborne diseases (e.g. cholera, typhoid); water-washed diseases (e.g. trachoma); water-based diseases (e.g. schistosomiasis); water-related vectorborne diseases (e.g. malaria, filariasis, and dengue), and water-dispersed infections (e.g. legionellosis). Their study focuses on waterborne and water-washed diseases, which have a relatively strong link at the household level with poor water supply, poor sanitation, and poor hygiene. All these result in infectious diarrhea and cause such illnesses as cholera, salmonellas, shigellosis, amoebiasis, and other protozoal and viral intestinal infections. The impact of water and sanitation interventions is measured by reduction in incidence rates and reduction in mortality rates.[2] The indirect benefits stem from savings of time and expense, as well as improvements in productivity (Table A2-2 below).

3 In brief, the calculation of the total social economic benefit is the sum of (1) health sector benefit due to avoided illness, (2) patient expenses avoided due to avoided illness, (3) value of deaths avoided, (4) value of time savings due to access to water and sanitation, (5) value of productive days gained of those with avoided illness, (6) value of days of school attendance gained of those with avoided illness, and (7) value of child days gained of those with avoided illness.

[1] **Improved and Unimproved Intervention as quoted in the HH Study**

Improved	**Unimproved**
Water supply	
House connection, Stand post/pipe, Borehole, Protected spring or well, Collected rain water, Water disinfected at the point-of-use	Unprotected well, Unprotected spring, Vendor-provided water, Bottled water Water provided by tanker truck
Sanitation	
Sewer connection, Septic tank, Pour-flush, Simple pit latrine, Ventilated Improved Pit-latrine	Service or bucket latrines, Public latrines, Latrines with an open pit

Source: GWSS 2000. Service is considered unimproved not only when it is unsafe but also when it is 'unnecessarily costly, such as bottled water or water provided by truck.'

[2] A recently published study (Fewtrell, 2005) estimates the following impacts: improved water supply reduces diarrhea morbidity by 25%, if severe outcomes (such as cholera) are included. Improved sanitation reduces diarrhea morbidity by 32% on average. Hygiene interventions including hygiene education and promotion of hand washing leads to a reduction of diarrhea cases by 45%. Improvements in drinking water quality through household water treatment, such as chlorination at point of use and adequate domestic storage, leads to reduction of diarrhea episodes by 39%.

Table A2-1: Annual Costs per Capita for Supply of Improved Water and Sanitation Facilities for the Year 2000 (From H-H)

Investment Cost	Life Span of Asset (Years)	Investment Cost $	Annual Inv Cost (averaged over life of asset)	Operating Cost in Total Cost (%)	Total Investment and Operating Cost** $
WATER Improvement					
House connection	40	92	2.3	40	9.95
Stand post	20	64	3.2	15	4.95
Borehole	20	17	0.85	10	1.26
Dug well	20	22	1.1	10	1.63
Rainwater	20	34	1.7	10	2.66
SANITATION Improvement					
Sewer connection	40	154	3.85	35	11.95
Septic tank	30	104	3.47	15	9.10
Ventilated Improved Pit-latrine*	20	50	2.5	10	5.70
Simple pit latrine	20	26	1.3	10	3.92

*GWSSA 2000 has, in addition, the following (with the respective US$ costs): small bore sewer (60) and pour flush (50).

Other water costs are as follows: disinfection at point of use 0.094 and water **treatment costs (60 litres /person/day, at $0.20/m^3 treated and distributed). For other sewerage costs, partial sewerage is taken to cost $0.15/m^3. Sewage disposal is assumed to cost $2/person/year for VIP and simple pit latrine and $3/person/year for septic tanks.

Note: Investment costs include planning and supervision, hardware, construction and house alteration, protection of water sources, and education that accompanies an investment in hardware. Recurrent costs include operating materials to provide a service, maintenance of hardware and replacement of parts, emptying of septic tanks and latrines, regulation and control of water supply, ongoing protection and monitoring of water sources, water treatment and distribution, and continuous education activities. The costs table is pieced together from the Hutton-Haller Study.

Comment: The data on investment costs are from GWSS-2000. All other numbers are from H-H. It is not clear how one obtains the last column from the rest of the information.

Table A2-2: Economic Benefits Arising from Water and Sanitation Improvements as noted in H-H Study

BENEFICIARY	Direct economic benefits of avoiding diarrheal disease	Indirect economic benefits related to health improvement	Nonhealth benefits related to water and sanitation improvement
Health sector	Less expenditure on treatment	Value of less health workers falling sick	More efficiently managed water resources
Patients	Less expenditure on treatment Less time lost due to seeking treatment	Value of time saved (for work/school) Value of time saved from attending sick children Value of increase in life span	More efficiently managed water resources and effects on vector bionomics
Consumers			Time savings (from access to water and sanitation facilities) Use of labor-saving devices in household Switch away from more expensive water sources Property value rise Leisure activities and nonuse value
Agricultural and industrial sectors	Saving of health expenditure on employees	Less of productivity loss due to ill health of workers	Sector benefits from improved water supply

4 The detailed results presented for the five interventions for the world as a whole are given in the H-H study. Results for Asian region and subregions are shown below in Table A2-3. An important outcome of the study is that the benefit cost ratios, are indeed, above unity and one need not unduly worry on the social benefits of investing in water and sanitation provision to the under-served populations.

Table A2-3: Alternative Benefit/Cost Ratios for the Different Subregions of Asia from H-H Study and our Aggregations

Assumption on population growth and Benefits and costs	WHO Region	Benefit/Cost Ratios Under Different Interventions				
		1	2	3	4	5
Base Case Population growth between 2000 and 2015 taken into account. It increases from 3,386 million to 3,989 million	SEAR-B	6.32	7.67	7.34	10.19	3.28
	SEAR-D	7.81	3.16	7.88	9.41	2.90
	WPR-A	108.29	71.61	174.04	172.05	63.64
	WPR-B1	5.24	3.36	6.63	7.89	1.93
	WPR-B2	8.17	11.04	13.80	15.35	4.39
	WPR-B3	12.99	31.43	19.13	23.02	7.12
Total Asia: Six regions together		*8.4*	*5.2*	*10.7*	*12.1*	*3.4*
High costs and low benefits with population growing during 2000 through 2015 as above	SEAR-B	0.85	1.49	1.47	1.64	0.75
	SEAR-D	1.16	0.63	1.75	1.97	0.66
	WPR-A	17.86	16.21	40.16	40.43	16.61
	WPR-B1	0.57	0.56	1.34	1.35	0.33
	WPR-B2	1.21	2.21	2.89	3.04	1.03
	WPR-B3	2.08	6.39	3.76	4.19	1.68
Population does not change from the 2000 level of 3,386 million	SEAR-B	6.23	7.59	7.18	10.01	3.23
	SEAR-D	7.49	2.98	7.72	9.24	2.85
	WPR-A	107.90	71.35	173.86	171.27	63.29
	WPR-B1	5.24	3.36	6.64	7.90	1.94
	WPR-B2	8.02	10.86	13.66	15.22	4.35
	WPR-B3	13.06	31.39	19.16	23.05	7.14
High costs and low benefits population remaining at 3,386 million as in 2000	SEAR-B	0.84	1.47	1.43	1.60	0.74
	SEAR-D	1.11	0.59	1.72	1.94	0.65
	WPR-A	17.69	16.09	40.07	40.05	16.43
	WPR-B1	0.57	0.56	1.34	1.36	0.33
	WPR-B2	1.19	2.17	2.85	3.01	1.02
	WPR-B3	2.09	6.38	3.77	4.20	1.68

SEAR B Indonesia, Sri Lanka, Thailand
SEAR D Bangladesh, Bhutan, Democratic People's Republic Of Korea, India, Maldives, Myanmar, Nepal
WPR B1 China
WPR B2 Cambodia, China, Lao People's Democratic Republic, Malaysia, Mongolia, Philippines, Republic Of Korea, Viet Nam
WPR B3 Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States Of), Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

Critical Review of Hutton-Haller Study

5 The Hutton-Haller study has been the inspiration for a more recent report of WHO-UNICEF (2005), which has the following in its foreword: “At US$11.3 billion a year, the dollar costs of achieving the MDG drinking water and sanitation target are affordable; the human costs of failing to do so are not. The International Decade for Action Water for Life provides the incentive for coordinated efforts to prevent the daily disaster of unnecessary deaths.”

6 Notwithstanding the tremendous effort that has gone into the H-H study, one must look at the costs and benefits[3] rather critically. First and foremost, the benefit-cost ratios (BCR) vary highly across the six subregions a lot more than across interventions within the whole of Asia. For instance, in the base case scenario, at the aggregate level, the minimum BCR is 3.4 and the maximum is 12.1. However, BCR is extremely high for WPR-A in comparison with other regions. The explanation given in the H-H study is the possibility that the costs could have been underestimated. The comment reduces the credibility and usability of the results.

7 Where are the benefits coming from? Table A2-4 has the data for two regions SER-D and WPR-B1, respectively containing India and China. It turns out that close to two thirds of the benefit comes from "value of time gained from convenience," an item that is most difficult to justifiably and unambiguously quantify.

Table A2-3: Sources and Percentage Composition of Estimated Benefits for Two Major Regions

Benefits ($ million)	SER-D	%	WPR-B1	%
Health sector cost saved	262	11.9	636	26.1
Patient treatment costs	17	0.8	25	1.0
Value of productive days gained	26	1.2	74	3.0
Value of time gain from convenience	1,330	**60.4**	1,448	**59.4**
Value of avoided deaths [future earnings]	205	9.3	5	0.2
Other unspecified*	361	16.4	248	10.2
Total all benefits	2,201	100.0	2,436	100.0

* Derived as a residual from known items and the total given in the H-H study, pp 28–33

8 Overall, the H-H study is path breaking and has brought into sharp focus the following: the fact that there are great benefits from the provision of water and sanitation; there are low cost options, which might suit specific contexts; and the international community must act decisively and quickly to help achieve MDG in water and sanitation.

Study by Redhouse et al.: Summary of Findings and Review

9 Redhouse et. al. (2005) in the study brought out by WaterAid, the international NGO, opine that valuations can be made at national economy level but household-based calculations give a more immediate impression of the poverty reduction benefits for the poorest from water supply. In such a project-based exercise, it is found that between $2 and $52 are returned for every $1 invested.[4] This appears to be even a better showing compared to the Hutton-Haller estimated range of benefits of water and sanitation improvements at the global level worth $3 to $34 for $1 invested.

10 The WaterAid study provides, much like the Hutton-Haller paper, an exhaustive listing of the sorts of benefits that *can* be quantified and valued (see Annex 6). However, as

[3] H-H (p.37) do raise the issue of whether the BCRs remain above unity (1.0) when all the cost input data are given their upper bound and combining these with the lowest input values for all the benefit variables. The results of this analysis reveal that this operation reduces the BCR considerably compared to the base case results. The impact is particularly significant for Interventions 1, 2, and 5.

[4] The range reflects both variations in the nature of projects and their impacts and also the constraints of using pre-existing data.

the evidence in the following two tables (Tables A2-4 and A2-5) suggests, time saved and energy saved are the key benefits and all others are important, but to a lesser degree.

Table A2-4: Percentage of Benefits from Time and Energy Savings: Computations Based on Tanzanian Projects with Alternative Benefit to Cost Ratios

Ratio of Benefit to Cost	**2 to 1**	**3 to 1**	**14 to 1**	**20 to 1**
Time saving	74	85	66	62
Energy Saving	24	3	33	37
Time and energy	98	88	99	99
All other benefits	2	12	1	1

Table A2-5: Percentage of Benefits from Time and Energy Savings: Computations Based on Indian Projects with Alternative Benefit to Cost Ratios

Ratio of Benefit to Cost	**3 to 1**	**8 to 1**	**52 to 1**
Time saving	90	75	69
Energy Saving	10	25	31
Time and energy	100	100	100

For how benefits accrue and formulae for valuation see Table A2-5 below.

11 Notwithstanding the research and exploratory value of estimating benefits and costs, we would like to take the stand that where a certain provision is considered intrinsically valuable for human development, evaluation of market-based or shadow-priced benefits is of minimal relevance; though one must not forget within project contexts the evaluation of the costs of alternatives, if the alternatives are indeed equally efficient in terms of service provision.

12 In sum, we consider that clean piped water, preferably at one's dwelling, and a latrine with proper sewer connection in the premises should be seen as minimal ingredients of living with dignity.

Table A2-5: Valuation Methodologies for Different Impacts of Water and Sanitation Projects
(From Redhouse et al., 2005)

Impact	Principle	Formula	Tricky issues
V1 Water purchase savings	Price paid before the project higher than the price after the project.	**V1 = (P1 – P2) x Q1** P1 = Price before project P2 = Price after project Q1 = Quantity of water used before project	May not apply in many rural projects. Possible negative benefit of loss of water vendor employment.
V2 Time savings	Time used earlier for fetching water is now saved. It can be used for work or other activities.	**V2 = [(T1/Q1) – (T2/Q2)] x W x Q1** T1 = Time spent water hauling before project Q1 = Quantity of water used before project T2 = Time spent water hauling after project Q2 = Quantity of water used after project W = Wage rate (daily or hourly as appropriate)	Wage rates may vary and will not be applicable if children were doing much of the water hauling.
V3 Calorie energy savings	People save energy—and, therefore, associated food costs—by not having to work so hard to collect water.	**V3 = Z x S x (T2 – T1) x P** Z = Calories used per hour when hauling water S = Slope correction factor (for hilly areas) T1 = Time spent water-hauling before project T2 = Time spent water-hauling after project P = Food cost	If energy saved is used for additional agricultural work, there may be double counting, and this needs to be avoided.

		per calorie	
V4 Improved health	Diarrheal diseases in particular are reduced. There is, thus, saving of household medical expenses. Also, productive life span increases.	**V4 = I x CI** I = Number of illnesses avoided CI = Household treatment cost per illness or **V4 = DALY x Wa** DALY = Disability Adjusted Life Years Wa = Annual wage rate	Disability Adjusted Life Years reflect both early deaths and impaired ability to work. They are calculated from project-specific illness incident data and also from national life expectancy and international disease disability weights produced by the World Health Organization. The full formula is available in the ERM report.
V5 Increased agricultural production	Water supply could enable people to produce more crops or rear more animals, which they can then sell and increase incomes.	**V5 = (Q2 – Q1) x P** Q1 = Quantity produced before project Q2 = Quantity produced after project P = Price per unit of product sold	Need to be sure that the extra production does not reflect other factors— buying new land, using pesticides, etc.
V6 Avoided days lost from school	Children are more able to attend school if they do not have to spend time hauling water or are not sick so often.	**V6 = LSDA x TF** LSDA = Lost school days avoided TF = Tuition fees per day paid by households	With the spread of free Universal Primary Education, it may sometimes be better to use national Education Costs (EC) per pupil per day in place of TF. LSDA itself can be calculated simply as the product of I (see V4) and the proportion of school-age children in the community. Double counting with children's time-savings (V2) is a particular risk.
V7 Avoided days lost from school – girls	Girls' school attendance is particularly valuable	**V7 = (DALYI x Wa) – C** DALYI = Infant Disability Adjusted Life Years Wa = Annual wage rate C = Cost of	May be difficult to attribute benefits clearly. Formula derived from a study quoted in the 2002 World Development Report showing a 10% fall in infant mortality for a 10% increase in female

		bringing a girl to literacy	literacy. This was based on experience of 13 countries between 1975 and 1985 but only in Africa.
V8 Improved operation and maintenance and changed gender roles	Better operation and maintenance can be valued by considering the labor it has required.	**V8 = (DTC – DT) x VBL** DTC = Annual down time in control community DT = Annual down time in project community VBL = Annual value of benefits as calculated by other formulae or **V8 = T x Wa** T = Time spent annually on operation and maintenance Wa = Annual wage rate	The benefit can be calculated on a gender basis where appropriate by using DTCm for a control where men have operation and maintenance responsibility and DTw for a project where women have the operation and maintenance responsibility. This can equally be done with Tw and Waw.
V9 Increased community capital	After a successful water project, the community may be more able to act together for other projects as seen in the value of those projects or in the value of water system contributions.	**V9 = [(C2 + S2) – (C1 + S1)] / T** C1 = Value of community assets before project S1 = Total of community savings before project C2 = Value of community assets after project S2 = Total of community savings after project T = Time in years between 'before' and 'after'	Water contributions may be easy to identify (from accounts, etc.) but assessing other community assets may be more time-consuming. Could be a negative effect if money is misused.
V10 Psychological benefits	Especially women may	**No formula** – value to be	

	value increased security (from not walking to remote places for water or going out after dark to defecate) ,etc.	derived from surveys.	

Annex 3
United Nations Population Projections for Asia and Pacific Region 2015 (in 000)

	Urban	Rural	Total
Afghanistan	12,641	28,760	41,401
American Samoa	73	5	78
Armenia	1,906	1,064	2,970
Australia	21,105	1,145	22,250
Azerbaijan	4,663	4,420	9,083
Bangladesh	49,697	118,460	168,157
Bhutan	339	2,345	2,684
Brunei Darussalam	375	78	453
Cambodia	4,459	12,606	17,065
China	689,734	703,246	1,392,980
Cook Islands	14	3	17
Fiji	543	360	903
French Polynesia	155	136	291
Georgia	2,159	2,024	4,183
Guam	185	9	194
Hong Kong, China	7,764	0	7,764
India	406,418	853,949	1,260,367
Indonesia	142,535	104,279	246,814
Iran (Islamic Republic of)	59,031	20,885	79,916
Japan	86,679	41,314	127,993
Kazakhstan	8,654	6,223	14,877
Kiribati	73	45	118
Korea, Dem Peoples Rep of	15,318	7,981	23,299
Korea, Rep of	40,754	8,338	49,092
Kyrgyzstan	2,069	3,783	5,852
Lao Peoples Dem Republic	1,998	5,308	7,306
Macao, China	488	5	493
Malaysia	20,994	8,564	29,558
Maldives	146	270	416
Marshall Islands	58	25	83
Micronesia (Fed States of)	41	75	116
Mongolia	1,779	1,209	2,988
Myanmar	20,662	34,308	54,970
Nauru	15	0	15
Nepal	6,698	26,050	32,748
New Caledonia	179	98	277
New Zealand	3,741	561	4,302
Niue	1	1	2
Northern Mariana Is	94	4	98
Pakistan	76,489	116,929	193,418
Palau	14	7	21
Papua New Guinea	1,016	5,997	7,013
Philippines	67,005	29,834	96,839
Russian Federation	101,572	35,124	136,696
Samoa	47	143	190
Singapore	4,815	0	4,815
Solomon Is	124	472	596

Sri Lanka	5,025	17,267	22,292
Tajikistan	1,856	5,749	7,605
Thailand	25,380	43,685	69,065
Timor-Leste			0
Tokelau	0	2	2
Tonga	40	64	104
Turkey	59,408	23,233	82,641
Turkmenistan	2,749	2,748	5,497
Tuvalu	7	4	11
Uzbekistan	11,355	19,297	30,652
Vanuatu	72	180	252
Viet Nam	30,825	64,205	95030
Total Asia and Pacific Region	2,002,036	2,362,876	4,364,912

Source: UN Web site[GJS7]

Annex 4
Water Supply Plans for a Midsized Indian City: the Case of Visakhapatnam[1]

The city of Visakhapatnam has 1.3 million people. Presently, the number of domestic consumers with individual tap connections for water supplied by the Visakhapatnam Municipal Corporation (VMC) is around 35,000. Assuming that all those connections were for families and if one were to go by an average family size of five, the total number of families in the city with water connections works out to 260,000 indicating a reach of municipal water to the tune of only 13.5%.

If the reach is so low in terms of water connections, how is the population surviving? There are the private bore wells, with number unknown. VMC data indicates that there are, in addition, 3,200 public bore wells, 6,731 public taps, and 4,750 tap connections in slums.

In addition to domestic consumers, VMC supplies some 16 million gallons per day (MGD) to 53 bulk consumers, 165 semi-bulk consumers, and 675 commercial consumers.

To augment the existing supplies of water, VMC, in financial collaboration with the Visakhapatnam Steel Plant (VSP), has embarked on a project to bring water from the Godavari river and bring the water via canals and pipelines to the city. Allowing for likely wastage en route, an additional 45 MGD is to be realized from the project for the investment of Rs3,000 million.[2] An additional Rs1,000 million per annum is the total cost of electricity, O&M, and depreciation.

By 2020, two million people will be in Visakhapatnam City. Assuming a water requirement of 150 liters per head per day,[3] and assuming further that by 2020, the entire population of the city will depend on public water supply, the requirement is 300 MLD or 66 MGD.

A major nondomestic user of water is the Visakhapatnam Steel Plant or VSP. Presently, VSP is using some 35–40 MGD of water for an output level of 3.3 tonnes. For an expanded level of five million tonnes, a proportionate increase in water requirement would imply a total demand of 53 to 60 MGD. Eventual requirement for full expansion to 15 million tonnes is a mind-boggling quantum of 160 to 180 MGD.

For water supply to the city over the medium and longer terms, with *total* demand for water in the region of some 300 MGD (1,364 MLD), one must think of *plans and initiatives from now on a sustained basis*.

Present VMC pricing policy is one of cross subsidization—charging industry to pay for domestic consumers. Domestic consumers are charged Rs60/- per month per connection and the Bulk and Semi-Bulk consumers are charged as Rs25/- and Rs15/-, respectively for the use of 1,000 liters. To install a house tap or a private tap connection VMC charges Rs.10,000 /- on average as one-time installation fee. The total revenue from the bulk, commercial, and residential consumers is Rs460 million per annum. VMC obtains 90% of its revenue from the 10% of the bulk consumers, and 10% of revenue from the semi-bulk, commercial, and domestic consumers.

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[1] This note is an edited extract from *Visakhapatnam Development Report, 2003*, GITAM Institute of Foreign Trade, Visakhapatnam, 2003. The city of Visakhapatnam is a coastal town in the state of Andhra Pradesh.

[2] It is expected that VMC will take 17 MGD of water out of the new supplies, leaving the balance to VSP.

[3] Here is some pertinent statistics from Singapore. Total potable water sold in 2001: 1.247 cu m per day. Of this, domestic sector share: 55%. Population in mid-2001: 4,131,200. Conversion rate for cu m = 220 gallons. A gallon equals 4.545454 litres.

Annex 5: Tables Pertaining to Costs for Water Supply Based on ADB Projects Data

Loan Number	Country	Area	Board Approval Date	Cost ($ Million)	Annual Cost ($ Million)	Supply KL/day	Beneficiary Number	Per capita supply/day (Lt)	Supply Mill KL/Yr	Cost Per KL ($)
1993	SRI	Rural	16-Jan-03	52.56	5.26	27,600	977,300	28	10.07	0.52
1812	PNG	Urban	14-Dec-00	11.80	1.18	19,415	20,700	938	7.09	0.17
1842	UZB	Urban	27-Sep-01	45.40	4.54	200,800	436,500	460	73.29	0.06
1843	PHI	Urban	27-Sep-01	0.25	0.03	1,616	8,156	198	0.59	0.04
1880	VIE	Urban	13-Dec-01	53.27	5.33	88,714	641,600	138	32.38	0.16
1947	BAN	Urban	28-Nov-02	2.60	0.26	7,500	61,000*	123	2.74	0.09
1995	PRC	Urban	11-Mar-03	323.00	32.30	450,000	3,000,000	150	164.25	0.20
2046	IND	Urban	12-Dec-03	142.70	14.27	732,000	5,700000	128	267.18	0.05
2055	FIJ	Urban	18-Dec-03	34.39	3.44	160,000	288,000	556	58.40	0.06
2119/2120	AZE	Urban	7-Dec-04	16.82	1.68	8,183	147,000	56	2.99	0.56

Notes: Household number (12,200) multiplied by assumed average size of 5 per household. A 10% loan service is assumed per annum.

Annex 6
Gross National Income and Government Health Expenditure for All Economies with Data, 2000 (From Key Indicators, 2003)

Economy	Gross National Income $ Million	Government Health Expenditure $ Million
Cook Islands	78	3
Vanuatu	217	6
Kiribati	86	9
Samoa	242	9
Tonga	164	10
Tajikistan	1,113	10
Lao PDR	1,519	15
Maldives	568	22
Kyrgyz Republic	1,373	27
Cambodia	3,194	28
Fiji Islands	1,754	41
Azerbaijan	4,862	42
Mongolia	946	43
Nepal	5,587	51
Sri Lanka	16,408	270
Philippines	78,463	343
Indonesia	119,049	361
Bangladesh	47,864	448
Taipei,China	313,955	715
Singapore	93,833	918
Malaysia	75,650	1,195
Thailand	122,604	1,613
Hong Kong, China	176,040	4,475
Total	1065,570	10,654
Health expenditure as percent of GNI		**1.0**

Annex 7
Gross National Income and Government Expenditure on Defense for All Economies with Data, 2000 (From Key Indicators, 2003)

Cook Islands	78	2
Tonga	164	2
Samoa	242	4
Vanuatu	217	5
Kiribati	86	5
Tajikistan	1,113	13
Kyrgyz Republic	1,373	24
Mongolia	946	24
Lao PDR	1,519	25
Fiji Islands	1,754	30
Maldives	568	37
Nepal	5,587	51
Cambodia	3,194	105
Bangladesh	47,864	661
Sri Lanka	16,408	743
Philippines	78,463	847
Indonesia	119,049	1,078
Thailand	122,604	1,777
Malaysia	75,650	2,054
Singapore	93,833	4,582
Taipei, China	313,955	11,443
Korea, Rep. of	423,493	12,559
China, People's Rep. of	1,063,436	14,357
Total	2,371,597	50,426
Defense expenditure as percent of GNI		**2.1**

Annex 8
Population and Gross National Income, ADB Economies, 2000

Economy	Population (million)	Gross National Income ($ million)
Myanmar	50.1	Not Available
Afghanistan	21.0	Not Available
China, People's Rep. of	1,267.4	1,063,436
India	1,015.0	453,415
Korea, Rep. of	47.0	423,493
Taipei, China	22.3	313,955
Hong Kong, China	6.7	176,040
Thailand	62.2	122,604
Indonesia	205.8	119,049
Singapore	4.0	93,833
Philippines	76.9	78,463
Malaysia	23.5	75,650
Pakistan	137.5	61,807
Bangladesh	128.1	47,864
Viet Nam	77.6	30,290
Kazakhstan	14.9	18,807
Sri Lanka	18.5	16,408
Uzbekistan	24.8	15,429
Nepal	22.6	5,587
Azerbaijan	8.0	4,862
Turkmenistan	5.2	3,964
Papua New Guinea	5.190	3,434
Cambodia	12.6	3,194
Fiji Islands	0.810	1,754
Lao PDR	5.2	1,519
Kyrgyz Republic	4.9	1,373
Tajikistan	6.2	1,113
Mongolia	2.4	946
Maldives	0.3	568
Bhutan [c]	0.7	478
Timor-Leste	0.722	326
Solomon Islands	0.459	269
Micronesia, Fed.	0.107	245
Samoa	0.171	242
Vanuatu	0.192	217
Tonga	0.100	164
Marshall Islands	0.053	114
Kiribati	0.084	86
Cook Islands	0.018	78
Tuvalu	0.010	14
Total All	3,279	
Total less first two economies	3,208	3,141,089

Note: The economies with population and GNI data account for 98% of the total population of the ADB economies. They imply an average per capita GNI of $979 (say, 980). For all economies put together, on the basis of the population of 3,279 million and per capita GNI, the overall GNI is $3,210 billion.

Annex 9
OECD Development Assistance

OECD Member	Assistance in $ Million			Assistance as % of GNI		
	2002	2003	Projected 2006	2002	2003	Projected 2006
U S A	13,290	16,254	22,290	0.13	0.15	0.19
Japan	9,283	8,880	9,500	0.23	0.20	0.22
France	5,486	7,253	8,791	0.38	0.41	0.47
Germany	5,324	6,784	8,381	0.27	0.28	0.33
U K	4,924	6,282	8,455	0.31	0.34	0.42
Sub-total	38,307	45,453	57,417			
Total	**58,292**	**69,029**	**88,446**	0.23	0.25	0.3

Source: OECD Website[GJS8]
Notes:
(i) Data are not available for 2004 and 2005.
(ii) $29,482 million in 2006 will account for additional 0.1% of GNI.

Percent of Total Assistance for Water and Sanitation, 1986–1996

1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
3.4	3.7	4.2	3.8	3.2	3.2	4.2	5.5	5.1	5.6	6.6

Annex 10
Data on Water and Sanitation: Need for Review and Standardization

Percent of population with access to water in urban areas: ADB Database

COUNTRY	1980	1990	1999	2000	Comments
Afghanistan, Rep. of	28	40	43	19	% in 2000 lowest
Azerbaijan	...	...	...	93	
Bangladesh	26	99	99	99	Jump from 26 to 99 in just one decade. Close to cent percent coverage 25 years ago!!
Bhutan	50	60	86	86	
Cambodia	...	...	53	54	
Cook Islands	100	100	100	100	
Timor Leste	...	...	40.6	...	
Fiji Islands, Rep. of	94	96	43	43	Drastic reduction in recent years?
India	77	83.8	90	95	
Indonesia	35	92	53.4	46.27	Near full coverage in 1990, half of that after a decade
Kazakhstan	...	...	86.8	87.2	
Kyrgyz Republic	...	...	98	98	
Kiribati	86	91	82	82	
Korea, Rep. of	86	100	97	97	
Lao, PDR	...	47	59	75.5	
Malaysia	90	96	97	...	
Maldives	11	77	100	100	From 11 to 77 in one decade
Mongolia	...	...	77	91	
Myanmar	38	79	70	89	
Nepal	83	66	66	92.3	
Pakistan	72	96	95	95	
Philippines	65	93	91	91	
Palau	69	100	100	100	
Papua New Guinea	55	88	100	88	
China, Peoples Rep.	...	99	96	94	
Samoa	97	100	95	95	
Singapore	100	100	100	100	
Solomon Islands	91	82	94	94	
Sri Lanka	65	91	91	98	
Tajikistan	...	...	...	93	
Thailand	72.1	96	89	95	
Turkmenistan	...	...	91	...	
Tonga	86	92	100	100	
Tuvalu	...	...	100	100	
Uzbekistan	...	...	96	94	
Vanuatu	65	...	63	63	
Viet Nam, Soc.Rep	...	47	95	95.38	Doubling of access rate in one decade

As the evidence in the above table indicates, there are some untenable and out of line changes that have been recorded in relation to the percent of population with access to water supply.

Annex 11: An Extract from the Visakhapatnam Development Report, Chapter 4

Towards Removing Visible Inequality

The distinguishing feature of the country, the district, and the city is the visibility of inequality in terms of differentials in the levels of consumption of food, clothing, health status, educational attainment, conditions of sanitation, etc. Almost all these get hidden away once the gross inequalities in housing are removed.

Consider a situation where a vast majority live in apartments. They may differ in the number of rooms, interior decoration, and furniture and fixtures; yet, in terms of external appearance, they are all flats; and the visibility of inequality is minimized. That is what one observes in Singapore. There were a total of 863,552 public flats at the end of 2001 in Singapore. Population living in these flats was 3.4 million or 85% of the total population of four million.

Policies and Programmes

As noted in an earlier section, the total number of families in the city works out to 260,000. As against this number, the data supplied by the Deputy Commissioner (Revenue) of VMC indicate the following buildings—non-residential and residential.

Non-residential buildings:	2,555
Residential buildings:	138,823

The city has the widest variety of housing: small, large, thatched, one and two-floor, multi-story, units in layouts developed by housing and urban development bodies, and slums. Spread is too wide to serve this assortment. Inequality abounds in all respects.

House Building and Renewal Programme. Assuming that some 50,000 residential buildings in the city are still of the best quality, the city-housing programme could aim for building 200,000 apartments—in combinations of 3-, 2- and 1-bedroom types. If the flats are built in blocks of four story buildings (as at Prasanthi Nilayam, the abode of Sri Sathya Sai Baba), and if each floor has 10 flats, each block will have 40 flats, accommodating some 200 people. About 25 such blocks for 5,000 people could make one cluster with well-designed internal roads, citizen-service centers, shopping complexes, and community centers. The city will have 200 such clusters for the present population size. On the hope that all buildings will go through renewal over the next two decades and that apartments will replace them,[1] the eventual population of 2 million in the city will need a stabilized 400,000 apartments in 800 clusters.[2]

The How of It

The need is for a well-orchestrated public housing programme, futuristic and moderately high-rise, of which an integral part is the provision of citizens' one stop centers where one can pay all taxes and user charges for water, electricity and phones, draw cash from ATMs, obtain driving licenses, etc. Another component of the programme is the building up of auditoriums, parks, food courts, shopping complexes and so on.

[1] The issue will be raised on how it is possible for people to move from independent houses to apartments in a free country; the answer is by inducements via service provision.

[2] Like the city, the district should have, for it's close to four million people and 800,000 families, a total of 800 clusters. Some 600 of them will be outside Visakhapatnam city. By 2020, the district needs a million homes in 1,000 clusters.

Presently, apart from private builders, there are many organizations that are responsible for building or promoting the building of houses. These include the Visakhapatnam Urban Development Authority, AP State Housing Board, and AP State Housing Corporation Limited.

For the future, it is suggested that direct-building activity should be in the private sector, leaving government agencies to provide facilitating, promotional, and regulatory functions. The task of building the housing clusters could be broken down into:

- Provision of land (via state/national competitive bidding)
- Clearing of land
- Building the apartments
- Building infrastructure
- Provision of utilities and other services
- Maintenance

The task of urban authorities should be the provision of land as per a well-conceived land conservation and utilization plan, approval of building plans, and provision of utilities and other services. [A minor digression is not out of place. Land is one of the most precious resources. One must minimize its use and conserve as much of it as possible. In fact, all "urban development and planning" activity must be taken to mean "land conservation and utilization" activity.]

Strategy for Slums and Housing the Poor. At the outset, it must be stated that India is perhaps unique in not only having a National Slum Policy but also ensuring that the slums never disappear but get upgraded, helped, served, and so on (Box 6). In contrast to that policy, what is envisaged for the city and the district is reservation of flats in every development for the poor, with government subsidy in cash, plus cross-subsidization from the better-off segment of the community.

In the grand plan for the city of 200 clusters, of the 1,000 apartments in each cluster, around 100 should be for the poor. These should be in each and every block. Each of these units will be simple and will have a room, kitchen, and a toilet, with a total area of 240 sq ft (room 15X12, kitchen of 6X5 and toilet 6X5) that could cost about Rs72000 (with simplest floor and minimum of wood work). Since one such flat is built for every nine other flats, it is not difficult for those who are buying the nine to pay the meager sum of Rs8000 each (practically nothing for someone spending more than 3 or 4 lakhs for a regular 2 or 3 room flat).

Each builder who obtains the land in the land auction will have responsibility to collect the Rs8,000 from regular buyers and build the one-room flats for allotment by a designated authority to the poor. It is anticipated that the occupants of the special flats would, in fact, be employed in the clusters—both for maintaining the services for the cluster as a whole, and also for work in homes in the clusters.

The task ahead is neither simple nor easy. Mindset changes required are mammoth. Modalities need to be worked out for the complex tasks such as land auctions, designating an unbiased authority for allotment of the free flats to the poor, identifying the beneficiaries, ensuring that they live and not some others, ensuring transparency and accountability, and so on.