CHAPTER – V

WATER MARKETS VS. REAL ECONOMY: CRITICAL ISSUES

Water, now everybody's business, is under stress due to its dwindling supply and increasing demand. Worldwide, water related conflicts, struggles and wars among provinces (trans-boundary water transaction), people (against MNCs, privatization and commoditisation of water) and Nation States[1] (transnational natural resource conflicts) are developing as a global security threat. Nation States have recognized water as a development/growth agent and a strategic economic good thus investing increasingly more capital to solve the water demand–supply gap with constructive models with the support of UNO, World Bank, WTO, IMF and other international bilateral organizations. However the demand and struggles for drinking water and irrigation water from the bottom-most socio-economic stratum are intensifying more than ever before. Worldwide, water privatization could be a multi-trillion dollar industry in future and the UN Millennium Development Goals (MDG), World Bank, WTO and other international organizations are focusing on water as a development agent and a strategic economic good. Where, 'whose voices' and 'whose choices' are becoming important questions for discussion. At a micro level water may be a family matter, but at the macro level it is a conflict between states or nations; and now we are at the threshold of water wars (Shiva 2002). Still, water is treated as an economic good beyond its humanitarian and ecological functions such that the multiple-use nature of water sources is under threat. The human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses and the UNO has declared 2005-15 as the international decade for action with the motto 'Water for Life' with greater focus on water-associated issues. Therefore, it is necessary to bring insightful and

innovative discussions on water in order to highlight the problems with the corporate control over water.

5.1 GLOBAL WATER STOCKS

Availability of water on earth today is no different in quantity from what was available a thousand years ago. Three quarters of planet earth's area is covered with water. The 1,400 million cubic kilometres (km^3) of water so present, which is around 97 per cent, is in the oceans. Only about 3 percent is fresh water; of this 75 per cent lies frozen in the polar regions; 22.6 per cent is present as ground water, some of which lies too deep; only a small portion of fresh water is available in lakes, rivers, soil, atmosphere and exploitable underground aquifers (Iyer 2003) (see Table 5.1 and Figure 5.1).

Table 5.1 Global Water Stocks

Inland Waters (Fresh Water)	**Volume (1000 BCM)**	**% of total water**	**% of total fresh water**
Glaciers, Permanent snow cover	24064	1.74	68.7
Fresh Groundwater	10530	0.76	30.06
Ground ice, permafrost	300	0.022	0.86
Fresh water lakes	91	0.007	0.26
Soil moisture	16.5	0.001	0.05
Atmospheric water vapour	12.9	0.001	0.04
Marshes, wetlands	11.5	0.001	0.03
Rivers	2.12	0.0002	0.006
Incorporated in biota	1.12	0.0001	0.003
Total Water Stocks	**1 386 000**		
Total Fresh Water Stocks	**35 029**		
Source: *UNEP 2003*			

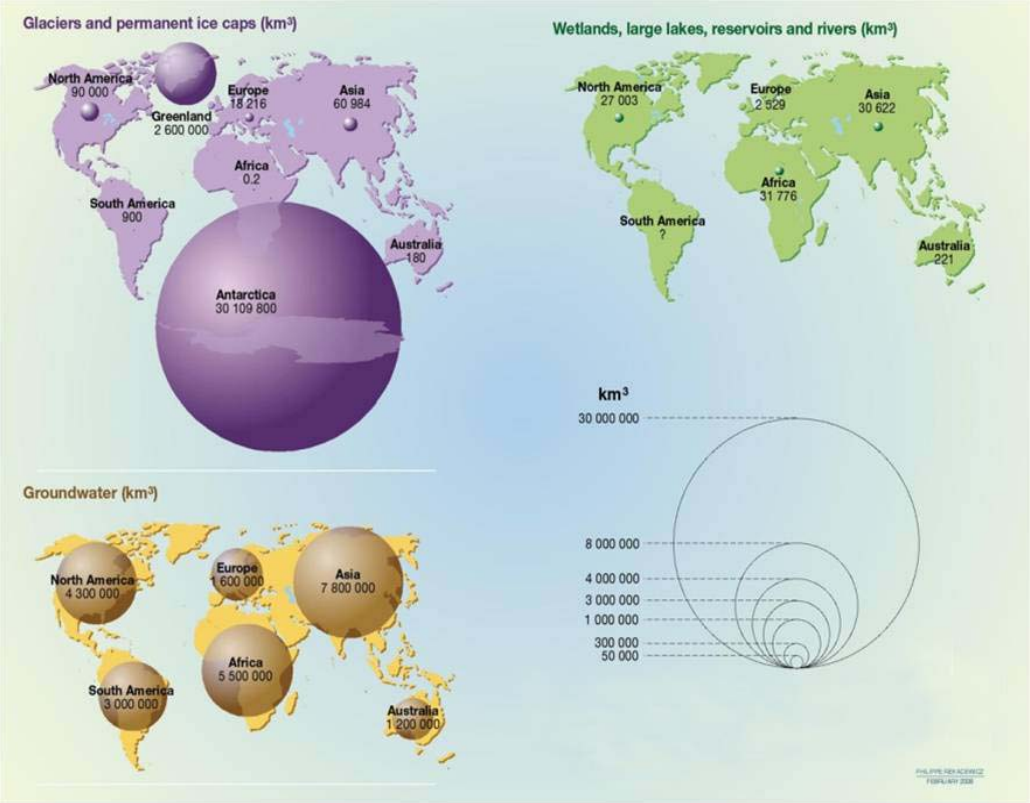

Fig. 5.1 Global Water Stocks

Source: *Shiklomanov 1999*

The replenishment of freshwater depends on evaporation from the surface of the oceans. About 505,000 km³, or a layer 1.4 metre, evaporates from the oceans annually. Another 72,000 km³ evaporates from the land. About 80 per cent of all precipitation, or about 458 000 km³/year, falls on the oceans and the remaining 119 000 km³/year on land. The difference between precipitation on land surfaces and evaporation from those surfaces (119 000 km³ minus 72 000 km³) is the annual run-off and groundwater recharge approximately 47 000 km³ annually (UNEP 2003). Figure 5.2 shows the region-wise precipitation, evaporation and run-off of water.

Evidently, the demographic pressures, rapid growth of industrialization and urbanization in developing countries and subsequent pollution of water sources, increasing demand for food stuffs by the growing population and unethical use

and water mining[2] by the newly emerged bottled/aerated water industries have been causing such a global water stress[3] and perhaps a water scarcity[4] in several countries of South.

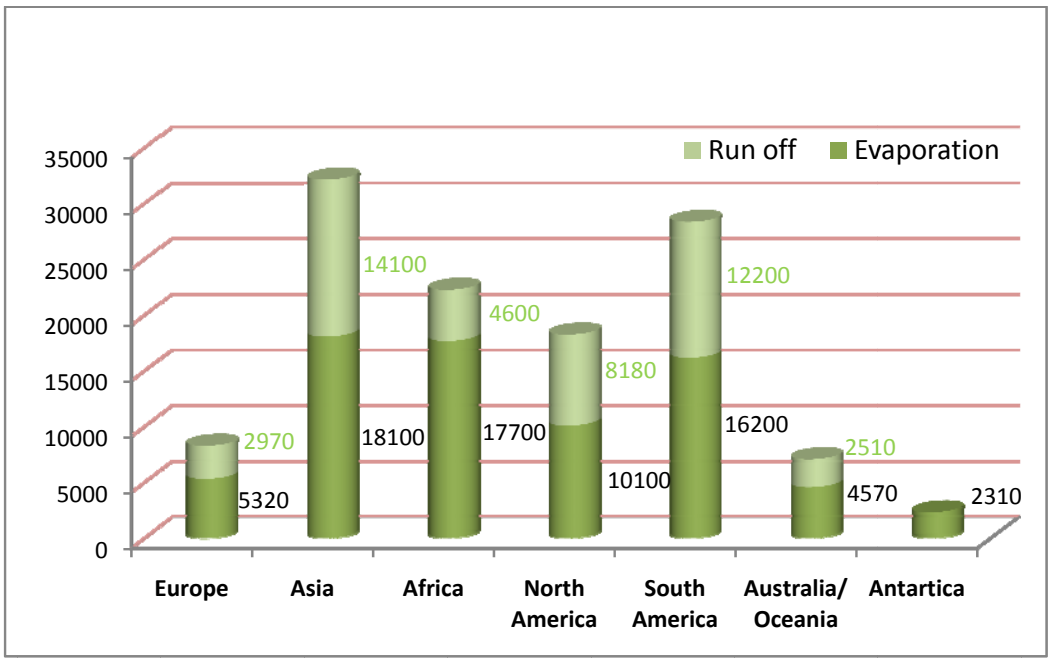

Fig. 5.2 Region-wise Precipitation, Evaporation and Run-off of Water

Source: *UNEP 2003*

5.2 GLOBAL FRESH WATER CONSUMPTION

The fact files[5] of UNDP, UNEP, WHO, UNESCO, WRI and UN show that in future, annual global water withdrawal is expected to grow by about 10-12% every 10 years, reaching approximately 5,240 BCM (or an increase of 1.38 times since 1995) by 2025. Water consumption is expected to grow at a slower rate of 1.33 times (see Figure 5.3). It observes that the freshwater consumption depends on several socio-economic development factors viz. population, physiographic, and climatic characteristics of continents. Annual global freshwater withdrawal has grown from 3,790 BCM (of which consumption accounted for 2,070 BCM or 61%) in 1995, to 4,430 BCM (of which consumption accounted for 2,304 BCM or 52%) in 2000; about 57% of the world's freshwater withdrawal, and 70% of its consumption, took place in Asia, where the world's major irrigated lands are

located. In the coming decades, the most intensive rate of water withdrawal is expected to occur in Africa and South America (increasing by 1.5-1.6 times), while the least will take place in Europe and North America (1.2 times). In 1950, the world's population was about 2.5 billion people. By 2000, global population had reached just over 6 billion. During this time, population growth in urban areas increased from 29 to 47%. By 2010, more than 50% of the global population will be urban dwellers. This increase has numerous implications for water planning and management. Provision of water and sanitation services in urban areas has expanded much more slowly than the population growth in most low-income and many middle-income nations. Better water and sanitation services in urban and rural areas could improve the lives of hundreds of millions of people – and could serve to make rural areas more liveable.

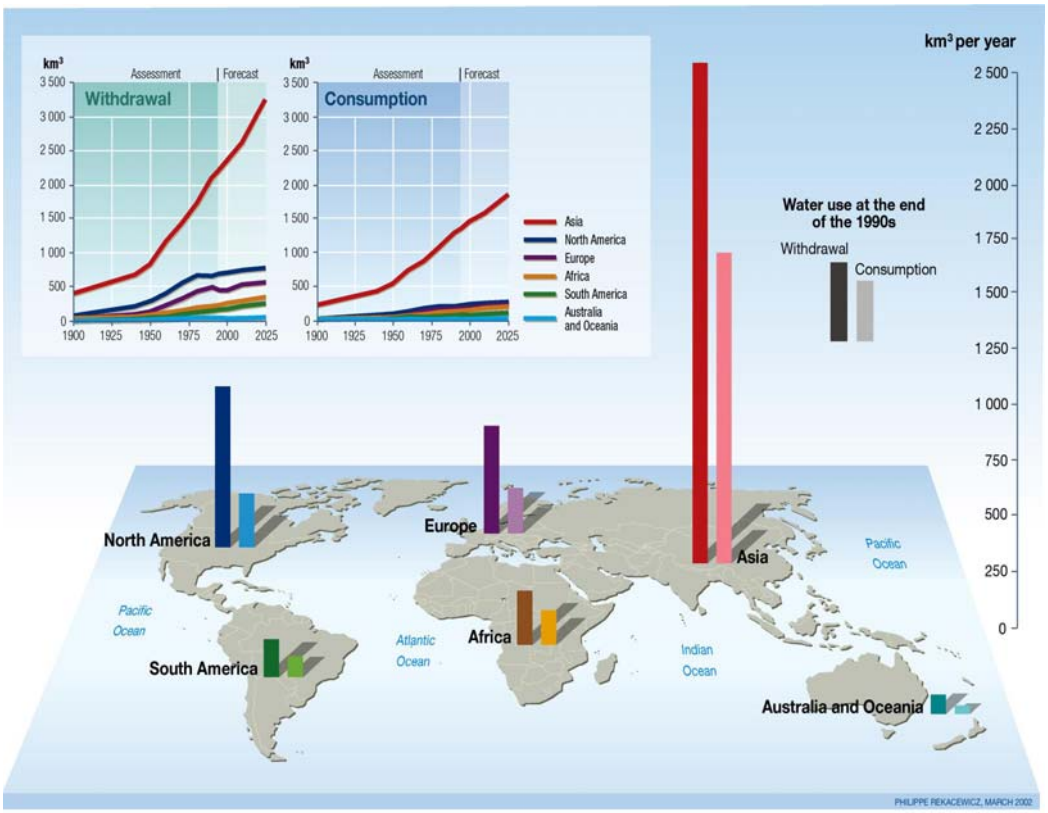

Fig. 5.3 Global Fresh Water Withdrawal and Consumption

Source: *Shiklomanov 1999*

5.2.1 Agriculture: The Big Water Consumer

Sector-wise water utilization data proves that agriculture is the largest water consumer in the world, with irrigation now claiming close to 70% of all freshwater appropriated for human use (see Table 5.2 and Figure 5.4). Any water crisis will therefore also create a food crisis. Currently, approximately 777 million people in developing countries do not have access to enough food to live healthy and productive lives.

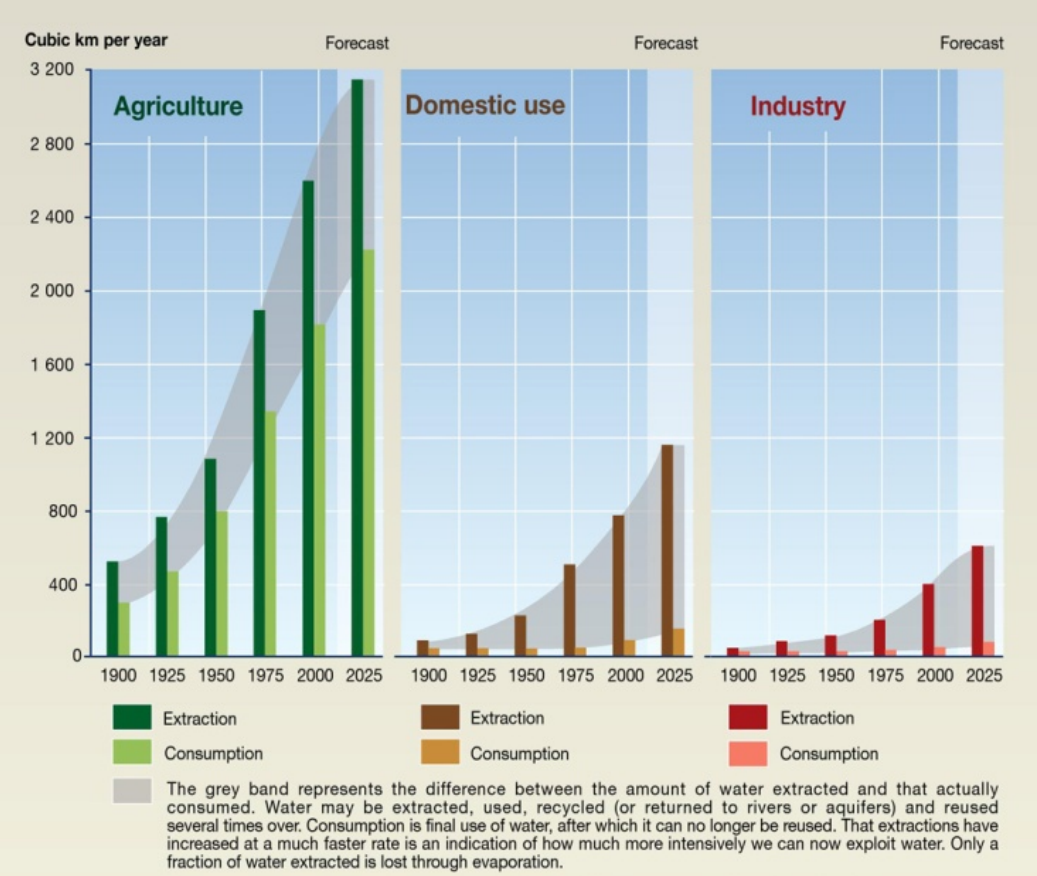

Fig. 5.4 Sector-wise Global Fresh Water Consumption

Source: *Shiklomanov 1999*

About 13% of the world's population remains undernourished, most of them live in rural areas of developing countries, which are likely to produce the bulk of the world's population. So while progress has been made in fighting hunger, the

agriculture sector's water use will have to become more efficient in order to meet the food needs of everyone in the world (UN-WWAP 2006).

Table 5.2 Sector-wise Water Consumption Since 1900

	1900	1950	1980	1990	2000	2025	2050
Population (million)	2000	2542	4410	5285	6181	8000	9200
Irrigated areas M ha	47.3	101	198	243	264	307	331
Withdrawal for agriculture BCM/yr	513	1080	2112	2425	2605	3053	3283
Consumption in Agriculture BCM/yr	321	722	1445	1691	1834	2143	2309
Ratio- Consumption/withdrawal	63%	67%	68%	70%	70%	70%	70%
Withdrawal for domestic Use BCM/yr	21.5	86.7	219	305	384	522	618
Domestic consumption BCM/yr	4.6	16.7	38.3	45	52.8	73.6	86.4
Ratio- Consumption/withdrawal	21%	19%	17%	15%	14%	14%	14%
Withdrawal for Industry BCM/yr	44	204	713	735	776	834	875
Consumption in Industry BCM/yr	5	19	71	79	88	104	116
Ratio- Consumption/withdrawal	11%	9%	10%	11%	11%	13%	13%
Reservoir Evaporation BCM/yr	0.3	11.1	131	167	208	302	362
Total Withdrawals BCM/yr	579	1382	3175	3632	3973	4710	5238
Total Consumption BCM/yr	330	758	1554	1815	1975	2321	2511

Source: *www.worldwatercouncil.org/ (Shiklomanov-1999 and Future projections by D. Zimmer, ttp://webworld.unesco.org/water/ihp/db/shiklomanov/index.shtml)*

In Africa and Asia, an estimated 85-90% of all freshwater used is for agriculture According to estimates for the year 2000, agriculture accounted for 67% of the world's total freshwater withdrawal and 86% of its consumption (UNESCO 2000). By 2025, agriculture is expected to increase its water requirements by 1.3 times, industry by 1.5 times, and domestic consumption by 1.8 times. The world's irrigation areas totalled approximately 253 million hectares in 1995. By 2010, they are expected to reach about 290 million hectares, and by 2025 about 330 million hectares. By the year 2000, an estimated 15% of the world's cultivated lands had been irrigated for food crops, accounting for almost half the value of global crop production (UNESCO 1999).

5.2.2 Industry: Making Consumption Different

If we compare industry's water use to use by other sectors, namely agriculture and domestic use, it is clear that globally industry uses only a fraction of the amount of water used by agriculture (see Table 5.2 and Figure 5.4). However, in East Asia and the Pacific, industrial water use has grown to a significant proportion of total use, in line with its significance to the economies of those countries. In sub-Saharan Africa, although overall water use is low, the water used by industry is a larger proportion of the total, because most agriculture in the region uses rainwater instead of irrigation (UN-WWAP 2006). Industrial uses account for about 20% of global freshwater withdrawals. Of this, 57-69% is used for hydropower and nuclear power generation, 30-40% for industrial processes, and 0.5-3% for thermal power generation. Hydro energy is one of the cleanest ways to generate electricity for different uses. Currently, hydroelectric power provides an estimated 19% of total electricity production. Canada is currently the largest producer of hydroelectricity followed by the US and Brazil. Hydropower will remain an important source of energy for the future, with two-thirds of its potential not yet utilized or underdeveloped, particularly in Latin America, Central Africa, India

and China. It is important, however, that hydraulic work be implemented using the basic principles of sustainable development.

The other side of the picture, looming large, is one of industrial effluents polluting the water sources, especially rivers that support the rural life of the developing nations. Water consumption by the industrial sector has to account the polluted water quantity and its spiralling effects too; that means misuse is higher than direct use of water in industrial sector. The waste-bearing water, or effluent, is discharged into streams, lakes, or oceans, which in turn disperse the polluting substances, which is merely not a third world ecological issue. In its *National Water Quality Inventory,* reported to Congress in 1996, the U.S. Environmental Protection Agency concluded that approximately 40% of the nation's lakes, rivers, and estuaries surveyed were too polluted for such basic uses as drinking supply, fishing, and swimming. The pollutants include grit, asbestos, phosphates and nitrates, mercury, lead, caustic soda and other sodium compounds, sulfur and sulphuric acids, oils, and petrochemicals (www.encyclopedia.com/topic/water_ pollution.aspx).

Polluted water is estimated to affect the health of more than 1.2 billion people, and to contribute to the death of an average 15 million children every year. In 1994, WHO estimated the number of people without access to clean drinking water as 1.3 billion. By 2000, nearly 1.2 billion people lacked access to clean water, while 2.4 billion lacked access to adequate sanitation services.

Furthermore, the bottled water industry and water exports are making conditions worse. The emergence of privatization of water industry is already a 400 billion dollar a year business globally - one third larger than global pharmaceuticals. In the U.S. alone, private water corporations generate revenues of more than a billion US dollars a year - four times the annual sales of Microsoft. Ten corporate giants are vying for control of water. The top three are French companies, a US, a

German and five of UK origin. Four of the top ten water companies are ranked among the 100 largest corporations in the world by the Global Fortune 500.

5.2.3 Domestic Consumption of Water: Need for More Concern

Over 1 billion people do not have access to safe drinking water. By adopting the MDGs, the world has pledged to halve this number. So far, the results have been better than those for meeting the sanitation goal. While much of the world is on track for the clean drinking water MDG target, the sub-Saharan Africa still has a long way to go(see Figure 5.5). To halve the proportion of people without improved sanitation, global coverage needs to grow to 75% by 2015, from a starting point of 49% in 1990. However, if the 1990-2002 trend continues, the world will fall short of the sanitation target by more than half a billion people (see Table 5.3).

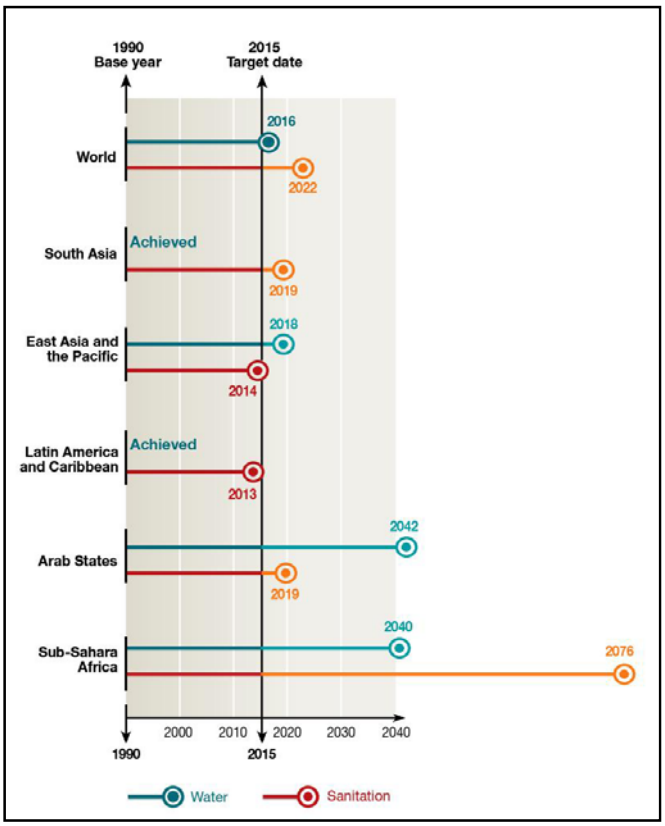

Fig. 5.5 MDGs' Water Sanitation Target: Region-wise

Source: *UN-WWAP 2006*

Table 5.3 Region-wise Urban and Rural Water Supply and Sanitation (pp. 181-85)

	1990 Population (millions)				2002 Population (millions)			
Region	**Total Population**	**Population Served**	**Population Unserved**	**Percent Served**	**Total Population**	**Population Served**	**Population Unserved**	**Percent Served**
GLOBAL								
Urban water supply	2,263	2,150	113	95%	2,988	2,839	149	95%
Rural water supply	3,000	1,890	1,110	63%	3,237	2,331	906	72%
Total water supply	5,263	4,053	1,211	77%	6,225	5,167	1,058	83%
Urban sanitation	2,263	1,788	475	79%	2,988	2,420	568	81%
Rural sanitation	3,000	750	2,250	25%	3,237	1,198	2,039	37%
Total sanitation	5,263	2,579	2,684	49%	6,225	3,610	2,614	58%
DEVELOPED REGIONS								
Urban water supply	672	672	0	100%	745	745	0	100%
Rural water supply	262	259	3	99%	248	233	15	94%
Total water supply	934	934	0	100%	993	973	20	98%
Urban sanitation	672	672	0	100%	745	745	0	100%
Rural sanitation	262	259	3	99%	248	228	20	92%
Total sanitation	934	934	0	100%	993	973	20	98%

EURASIA								
Urban water supply	183	178	5	97%	180	178	2	99%
Rural water supply	99	82	17	83%	101	83	18	82%
Total water supply	282	259	23	92%	281	261	20	93%
Urban sanitation	183	170	13	93%	180	165	14	92%
Rural sanitation	99	67	32	68%	101	66	35	65%
Total sanitation	282	237	45	84%	281	233	48	83%
NORTHERN AFRICA								
Urban water supply	58	55	3	95%	77	74	3	96%
Rural water supply	60	49	11	82%	71	59	11	84%
Total water supply	118	104	14	88%	147	133	15	90%
Urban sanitation	58	49	9	84%	77	68	8	89%
Rural sanitation	60	28	32	47%	71	40	30	57%
Total sanitation	118	77	41	65%	147	108	40	73%
SUB-SAHARAN AFRICA								
Urban water supply	141	116	25	82%	240	197	43	82%
Rural water supply	363	131	232	36%	445	200	245	45%

Total water supply	504	247	257	49%	685	397	288	58%
Urban sanitation	141	76	65	54%	240	132	108	55%
Rural sanitation	363	87	276	24%	445	116	329	26%
Total sanitation	504	161	343	32%	685	247	438	36%
LATIN AMERICA AND THE CARIBBEAN								
Urban water supply	313	292	22	93%	407	387	20	95%
Rural water supply	128	74	54	58%	129	89	40	69%
Total water supply	442	366	75	83%	536	477	59	89%
Urban sanitation	313	257	56	82%	407	342	65	84%
Rural sanitation	128	45	83	35%	129	57	72	44%
Total sanitation	442	305	137	69%	536	402	134	75%
EASTERN ASIA								
Urban water supply	368	364	4	99%	550	511	38	93%
Rural water supply	858	515	343	60%	825	561	264	68%
Total water supply	1,226	883	343	72%	1,375	1,072	302	78%
Urban sanitation	368	235	132	64%	550	379	170	69%
Rural sanitation	858	60	798	7%	825	247	577	30%
Total sanitation	1,226	294	932	24%	1,375	619	756	45%

SOUTH ASIA								
Urban water supply	317	285	32	90%	444	417	27	94%
Rural water supply	857	549	309	64%	1,036	829	207	80%
Total water supply	1,175	834	341	71%	1,480	1,243	237	84%
Urban sanitation	317	171	146	54%	444	293	151	66%
Rural sanitation	857	60	797	7%	1,036	249	788	24%
Total sanitation	1,175	235	940	20%	1,480	548	933	37%
SOUTH-EASTERN ASIA								
Urban water supply	141	128	13	91%	220	200	20	91%
Rural water supply	299	194	105	65%	316	221	95	70%
Total water supply	440	321	119	73%	536	423	112	79%
Urban sanitation	141	94	46	67%	220	173	46	79%
Rural sanitation	299	117	182	39%	316	155	161	49%
Total sanitation	440	211	229	48%	536	327	209	61%
WESTERN ASIA								
Urban water supply	85	80	5	94%	121	115	6	95%
Rural water supply	52	34	18	65%	63	46	16	74%

Total water supply	136	113	23	83%	184	162	22	88%
Urban sanitation	85	81	3	96%	121	115	6	95%
Rural sanitation	52	27	25	52%	63	31	32	49%
Total sanitation	136	108	29	79%	184	145	39	79%
OCEANIA								
Urban water supply	1	1	0	92%	2	2	0	91%
Rural water supply	5	2	3	39%	6	3	4	40%
Total water supply	6	3	3	51%	8	4	4	52%
Urban sanitation	1	1	0	83%	2	2	0	84%
Rural sanitation	5	2	2	50%	6	3	3	46%
Total sanitation	6	4	3	58%	8	5	4	55%
Source: *WHO/UNICEF 2004*								

People in developed countries on average consume about 10 times more water daily than those in developing countries. It is estimated that the average person in developed countries uses 500-800 litres per day (300 m^3 per year), compared to 60-150 litres per day (20 m^3 per year) in developing countries. In developing countries in Asia, Africa and Latin America, public water withdrawal represents just 50-100 litres per person per day. In regions with insufficient water resources, this figure may be as low as 20-60 litres per day (UNESCO, 2000).

While more than a billion people lack access to safe drinking water, more than 2.4 billion people lack adequate sanitation. More than five million people, most of them children, die each year from illnesses caused from drinking unsafe water. Global consumption of water is doubling every 20 years, more than twice the rate of human population growth. If current trends persist, by 2025 the demand for freshwater is expected to rise to 56 percent above the amount that is currently available - which will result in as much as 2/3 of the world population without access to clean water. Two out of every five Africans lack access to an improved water supply. Throughout Africa, rural water services lag far behind urban services. During the 1990s, rural water supply percentage coverage increased, while urban coverage decreased - although the number of people who lack access to water supplies remained about the same. In Africa, Asia, Latin America and the Caribbean, nearly 1 billion people in rural areas have no access to improved water supplies. To achieve the 2015 targets in Africa, Asia, Latin America and the Caribbean, water supplies will have to reach an additional 1.5 billion people. The proportion of people with access to excreta disposal facilities increased from 55% (2.9 billion people) in 1990 to 60% (3.6 billion) in 2000. Between 1990 and 2000, approximately 747 million additional people gained access to sanitation facilities - although the number of people who lack access to sanitation services remained roughly the same. Table 5.3 illustrate the region-wise global urban and rural water supply and sanitation scenario. At the beginning of 2000, two-fifths of the world's population (2.4 billion people) lacked access to improved sanitation facilities. The

majority of these people live in Asia and Africa, where fewer than half of all Asians have access to improved sanitation. Sanitation coverage in rural areas is less than half of that in urban locations, even though 80% of those lacking adequate sanitation (2 billion people) live in rural areas - some 1.3 billion in China and India alone. In Africa, Asia, Latin America and the Caribbean, nearly 2 billion people in rural areas have no access to improved sanitation facilities. To achieve 2015 sanitation targets (millennium development goals) in Africa, Asia, Latin America and the Caribbean, an additional 2.2 billion people will have to be provided with sanitation facilities.

The supply of safe drinking water and the provision of sanitation are management issues that raise concerns about inequitable service provision, particularly in developing countries. Although several successful initiatives have been launched to supply safe drinking water to urban populations, efforts still fall short of the required targets for sustainable development. In developing countries, water delivery systems are plagued by leakages, illegal connections and vandalism, while precious water resources are squandered through greed and mismanagement. The World Bank recently estimated that US$600 billion is required to repair and improve the world's water delivery systems (UNCSD, 1999).

Water overuse is damaging the environment in many major basins. High overuse tends to occur in regions heavily dependent on irrigated agriculture, such as the Indo-Gangetic Plain in south Asia, the North China Plain and the high Plains of North America, and in areas undergoing rapid urbanization and industrial development. An estimated 1.4 billion people now live in river basin areas that are 'closed' (in that water use exceeds minimum recharge levels) or near closure. As millions of people in water-stressed areas are discovering, the environment is foreclosing on unsustainable water debts on an extensive scale. For example, farmers near Sana'a in Yemen have deepened their wells by 50 meters over the past 12 years, while the amount of water they can extract has dropped by two-

thirds. Some people in water-stressed areas have the economic resources, skills and opportunities to overcome their water problem, while many millions, such as small farmers, agricultural labourers and pastoralists in poor countries, do not (HDR 2006).

5.3 THE INDIAN WATER SCENARIO

India has 2.45 per cent of the world's land resources and 4 percent of its water resources serve 16 percent of the world's population. It is estimated that 4000 BCM land mass water (average annual precipitation by rain and snow) is available in India. However as per National Commission for Integrated Water Resources Development (NCIWRD)[6] records, total available surface water of the country is approximately 1953 km^3. Besides, India has also a 432 km^3 ground water potential (Iyer-2003) though the total utilizable water resource is assessed as 1123 BCM (Bird et. al. 2009).

India is blessed with many rivers and 12 of them are classified as major rivers whose total catchment area is 25.3 lakh sq. km. The Ganga - Brahmaputra - Meghna system is the largest with catchment area of about 11.0 lakh sq. km, which is more than 43 % of the catchment area of all the major rivers in the country. The other major rivers are Indus (3.21 lakh sq. km), Godavari (3.13 lakh sq. km), Krishna (2.59 lakh sq. km) and Mahanadi (1.42 lakh sq. km). The total catchment area of medium rivers is about 2.5 lakh sq. km. However, the picture gets complicated by other constraints. Of the present water usage in India, 92 per cent is devoted to agriculture; around 3 per cent is used by industries and only 5 percent for domestic purposes like drinking water and sanitation. 40 million hectares of land in the country is flood prone and an average flood affects an area of around 7.5 million hectare per year. One-sixth area of the country is drought prone. Water pollution is a serious problem with 70 per cent of India's surface water resources and an increasing number of its ground water reserves stand contaminated by biological, toxic organic and inorganic pollutants. The per capita

availability of water at national level has been reduced from about 5177 cubic meters in 1951 to an estimated level of 1,820 cubic meters in 2001 with variation in water availability in different river basins. Given the projected increase in population by the year 2025, the per capita availability is likely to drop to below 1,000 cubic metres, which could be labelled as a situation of water scarcity (GOI, 2006; Muralidhar-2006). In 1998, surface water requirements for India was 399 BCM, out of which 318 BCM was used for irrigation, 17 BCM by industry and 17 BCM by households. The remaining water constituted evaporation (36 BCM) and power generation (7 BCM) (Alex 2006). Out of 432 BCM of groundwater, 362 BCM/year of the resource is estimated to be available for irrigation. The net draft of groundwater for irrigation is around 150 BCM/year. India has a highly seasonal pattern of rainfall, with 50% of precipitation falling in just 15 days and over 90% of river flows occurring in just four months. A total storage capacity of 212.78 BCM has been created in the country through major and medium projects. The projects under construction will contribute to an additional 76.26 BCM, while the contribution expected from projects under consideration is 107.54 BCM. The total availability of water in the 76 major reservoirs was 109.77 BCM at the end of the monsoon of 2005 (GOI, 2006).

The irrigation potential of the country has been estimated at around 139.9 mha without inter-basin sharing of water and 175 mha with inter-basin sharing. However, it is observed that groundwater has become the main source of growth in irrigated areas over the past three decades, and it now accounts for over 60 percent of the irrigated area in the country (see Table 5.4). It is estimated that now over 70 percent of India's food grain production comes from irrigated agriculture (Gandhi and Namboodiri 2009). The Central Ground Water Board (CGWB) has estimated that it is possible to increase the groundwater availability by about 36 BCM, by taking up rainwater harvesting and artificial recharge over an area of 45 mha through surplus monsoon runoff. Thus, the groundwater availability may correspondingly increase. Table 5.5 illustrate the Indian ground water scenario.

Table 5.4 State-wise Irrigation Potential, Flood Control, Ground Water, Distribution of Large Dams and Hydro Potential Status- India (pp.190-92)

No.	State/UTs	Total Irrigation Potential* till end of X Plan ('000ha)		Flood Area Benefited till March 2006 (M ha)	Hydro Potential Status**			Ground Water Status (Blocks)		Large Dams (Nos.)	
					Identified Capacity(MV)	Capacity (MW)					
		C	U			Developed	Sanctioned/ Ongoing	Total No.	Over Exploited	Completed	Under Const.
1	Andhra Pradesh	6,692.63	6,088.55	1.31	4,424.00	2,017.50	404.00	1,231	219	161	24
2	Arunachal Pradesh	115.57	87.39	0.06	50,328.00	423.50	2,600.00	13	0	1	0
3	Assam	934.67	719.50	1.64	680.00	375.00	0.00	23	0	2	1
4	Bihar	7,637.78	5,608.26	2.95	70.00	44.90	0.00	515	0	24	5
5	Chattisgarh	1,226.90	1,474.57	0.00	2,242.00	137.00	0.00	146	0	247	7
6	Goa	55.08	45.11	0.00	55.00	0.00	0.00	11	0	6	1

7	Gujarat	4,249.92	3,727.90	0.48	619.00	555.00	0.00	223	31	470	97
8	Haryana	3,831.37	3,476.75	2.00	64.00	62.40	0.00	113	55	-	-
9	Himachal Pradesh	186.54	153.00	0.01	18,820.00	6,085.50	4,471.00	5	0	6	0
10	Jammu and Kashmir	677.66	580.61	0.22	14,146.00	1,864.20	899.00	8	0	8	2
11	Jharkhand	3,722.03	1,782.90	0.00	753.00	237.20	0.00	208	0	48	28
12	Karnataka	1,822.95	2,773.94	0.01	6,602.00	3,415.30	230.00	175	65	203	28
13	Kerala	3,750.03	2,766.45	0.35	3,514.00	1,838.50	323.00	151	5	53	1
14	Madhya Pradesh	2,039.95	1,564.00	0.00	2,243.00	1,983.50	855.00	312	24	793	10
15	Maharashtra	6,549.75	4,961.21	0.00	3,769.00	2,653.30	0.00	318	7	1,453	198
16	Manipur	199.24	154.71	0.13	1,784.00	105.00	0.00	7	0	2	3
17	Meghalaya	61.57	53.89	0.00	2,394.00	185.20	84.00	7	0	6	-
18	Mizoram	21.26	14.95	0.00	2,196.00	0.00	60.00	22	0	-	-
19	Nagaland	93.17	72.20	0.63	1,574.00	99.00	0.00	7	0	-	-
20	Orissa	3,623.27	3,320.69	0.63	2,999.00	1,861.50	210.00	314	0	145	14

21	Punjab	6,004.75	5,878.72	3.19	971.00	1,297.70	0.00	137	103	11	1
22	Rajasthan	5,329.48	4,900.53	0.08	496.00	430.00	0.00	237	140	180	8
23	Sikkim	34.47	25.62	0.02	4,286.00	84.00	2,309.00	1	0	1	0
24	Tamil Nadu	3,699.89	3,685.33	0.12	1,918.00	1,757.50	60.00	385	142	98	2
25	Tripura	149.03	126.80	0.03	15.00	15.00	0.00	38	0	1	
26	Uttar Pradesh	32,385.64	25,680.68	1.70	723.00	510.20	0.00	803	37	113	17
27	Uttranchal	807.73	599.90	0.00	18,175.00	2,752.10	2,154.00	17	2	11	6
28	West Bengal	5,777.49	4,855.86	2.57	2,841.00	156.50	292.00	269	0	28	0
29	Union Territories	57.63	42.20	0.08	-	-	-	27	9	1	-
	Total	**101,737.45**	**85,222.21**	**18.22**	**148,701.00**	**30,946.50**	**14,951.00**	**5,723**	**839**	**4,072**	**453**

Source : Central Board of Irrigation & Power

** Anticipated MMI - Major Medium Irrigation, MI - Minor Irrigation, C- Created, U - Utilised ** Status as on 20.03.2008*

Table 5.5 Ground Water Resources of India, 1998
(in Million Hectare-Meters per Year)

Total Replenishable Ground Water Resources	43.57
Provision for Domestic, Industrial and Other Uses	7.15
Available Ground Water Resources for Irrigation in Net Terms	36.42
(3) as percent of (1)	83.56
Utilizable Ground Water Resources for Irrigation in Net Terms	32.77
Gross Draft Estimated on prorate basis	19.29
Net Draft	13.50
Balance Ground Water Resources for future use in net terms	22.89
Level of Ground Water Development	37.08
Source: *Gandhi and Namboodiri 2009*	

The recent estimates (GOI, 2006) on water demand are made by a) Standing Sub-Committee of the Ministry of Water Resources (MoWR) and b) NCIWRD; their estimates (see Table 5.6) are made till the year 2050. Both of them have triggered warning bells on the intensity of the problem.

Table 5.6 Water Demand (in BCM) for Various Sectors

Sector	Standing Sub-Committee of MoWR			NCIWRD		
Year	2010	2025	2050	2010	2025	2050
Irrigation	688	910	1072	557	611	807
Drinking Water	56	73	102	43	62	111
Industry	12	23	63	37	67	81
Energy	5	15	130	19	33	70
Others	52	72	80	54	70	111
Total	**813**	**1093**	**1447**	**710**	**843**	**1180**
Source: *Government of India, 2006*						

The estimates by MoWR indicate that, by year 2050, India needs to increase by 5 times more water supplies to industries, and 16 times more for energy production, while its drinking water demand will double, and irrigation demand will rise by 50 percent. To address the water-related issues and thereby launch a massive awareness programme all over the country, the Government of India has declared year 2007 as "Water Year" (Bird et.al. 2009).

Moreover, the unequal distribution of water (in quality and quantity) in rural and urban India is fomenting the entire troubled scenario. Rural India has more than 700 million people residing in about 1.42 million habitations spread over 15 diverse ecological regions. Meeting the drinking water needs of such a large population can be a daunting mission. The non-uniformity in level of awareness, socio-economic development, education, poverty, practices and rituals and water availability add to the complexity of the task. Still, as per 2001 Census, 94.2 per cent of the rural inhabitants have access to potable water with a norm of 40 litres per capita per day. While, around 37.7 million Indians are affected by waterborne diseases annually, 1.5 million children are estimated to die of diarrhoea alone and 73 million working days are lost due to waterborne disease each year. The resulting economic burden is estimated at $ 600 million a year. While 'traditional diseases' such as diarrhoea continue to take a heavy toll, 66 million Indians are at risk due to excess fluoride and 10 million due to excess arsenic in groundwater. In all, 1,958,13 habitations in the country are affected by poor water quality. It is clear that the large investments have not yielded comparable improvements in health and other socio-economic indicators. While on the one hand, the pressures of development are changing the distribution of water in the country, access to adequate water has been cited as the primary factor responsible for limiting development (Khurana and Sen 2008; www.wateraid.org).

Table 5.7 shows that in year 2000 just 15% of the rural population was covered by rural sanitation facilities. This level needs to rise to 53% by 2015 to meet the MDG

target and would require some 21 million people per year gaining access to and utilizing basic, hygienic, sanitation between 2000-15 (around 7.5 mn people per year gained access to a latrine between 1990-2000). The sanitation coverage situation in rural areas is alarmingly poor.

Table 5.7 Sanitation Coverage of India: People Served/ to be Served in 2015

	1990	2000	2015 MDG	No. of People to Reach Each Year
Rural Water	41%	94%	70.5%	13 mn
	260 mn	-	583 mn	-
Rural Sanitation	6%	15%	53%	21mn
	38 mn	-	438 mn	-
Urban Water	55%	95%	77.5%	6mn
	155 mn	-	309 mn	-
Urban Sanitation	44%	61%	72%	8 mn
	94 mn	-	287 mn	-
Source: *Water Aid India 2005*				

Meeting the MDG target will definitely pose a huge challenge. Progress has been so slow over the last ten years and coverage remains so poor, that it looks extremely unlikely that India will reach the MDG target in 2015 (Water Aid India 2005).

5.3.1 Salient Trends of Indian Water

1. Water is not a national resource. Water is a state subject, and the schemes for providing drinking water facilities are implemented by the states.

2. The National Commission of Water pays little attention to environmental sanitation and ecological needs and implicitly assumes that the quantum of available water would be constant.

3. A long stretch of rivers in India is becoming polluted by urban and industrial effluents.

4. Quality of water in an increasing number of aquifers is being similarly degraded by human use and saline intrusion.

5. There are strong indications that climate change is likely to affect India in a number of ways. As global temperatures continue to rise, this will affect the "water banks" (glaciers) which are a prominent part of the Himalayan water systems. While there is clear evidence of de-glaciations across the whole of the Himalayas, the effect on river flows is likely to be substantially different in different areas.

6. Large investments in surface water projects were undertaken to provide an assured water supply to larger number of farmers. The Central Government supplements the efforts of the states by providing financial and technical support. The Tenth Five Year Plan (2002–7) envisaged provision of safe drinking water to all rural habitations.

7. Electricity supply expanded in rural areas (often linked to water, since hydropower provided over 50% of installed capacity until the mid 1960s).

8. Water logging and salinity was a growing problem in parts of Punjab, Haryana, Gujarat, UP, Tamil Nadu. It was realized that encouragement of groundwater pumping provided an effective mechanism for lowering the groundwater table and reducing the severity of water logging and salinity.

9. Modest new modular well and pump technologies became widely available, as did subsidized credit.

10. Farmers realized that groundwater was abundant, especially in the large alluvial basins.

11. Farmers realized that they could apply water "just in time" from groundwater sources, something which was not possible in the institutionally-complex and increasingly corruption-ridden canal systems.

12. The average availability of water remains more or less fixed according to the natural hydrological cycle but the per capita availability has reduced steadily due to increasing population.

Therefore, the National Water Policy 2002 advocates a participatory approach to management of water resources and non-conventional methods for utilization of water like artificial recharge of ground water and traditional water conservation practices like rain water harvesting.

5.4 GLOBAL HYDRO-POLITICS

Over recent years, water conflicts and struggles are growing as an international political issue all over the world. In 1980s it was an unbelievable prophecy but now 'water wars' are intermittently becoming a reality. At the micro level, it might be a family's struggle for collecting water from its neighbourhood public well - clearly rural dwellers are pitted against other rural dwellers, fomenting water haves and have-nots - while at the macro level, rights and demand over water sources are appeals disputes and wars among provinces and Nations States, because water resources, surface and ground waters do not respect political boundaries as one-third of all river basins are shared by more than two countries. The shrinking supply and mounting demand compel the countries to with hold their water resources and keep an eye on others. The international funding agencies run into the scenario with their global politico-economic changes, especially liberalization and privatization of goods and services, which exacerbate

the stress over the natural resource base of Planet Earth. World waters are facing a global threat from filthy actions of MNCs, funding agencies, global water think tanks and world summits on water, thus creating a vicious circle of water business (Shiva-1991; Barlow and Clarke 2003; Dwivedi et.al. 2007; Holland-2006).

Worldwide, there are 263 international river basins (59 in Africa, 52 in Asia, 73 in Europe, 61 in Latin America and the Caribbean, 17 in North America, 1 in Oceania). Overall, 145 countries have territories that include at least one shared basin. During 1948-1999, there have been 1,831 international interactions recorded including 507 conflicts, 96 neutral or non-significant events and, most importantly, 1,228 instances of cooperation (UN-WWAP-2006). Meekong River among Thailand, Cambodia, Lavas and Burma, is an example of international water disputes over the share of water. Middle East nations, besides fighting political issues, have the Jordan River playing sensitive resource politics among nations. Israel, Jordan, Lebanon and Syria are the four countries claiming rights over Jordan River. Tigris and Euphrates are the other two rivers that have created conflict among Iran, Iraq, Turkey and Syria from the beginning of 1960s. Africa, Europe and American continents are also not free from such disputes and conflicts (Alex 2006).

At the international level, even though it has water disputes with neighbouring countries, India has been a party to several water treaties which are widely considered as good practice. The Indus Treaty of 1960, most notable, allocates the waters of the Indus, Jhelum and Chenab to Pakistan (while allowing run-of-the-river hydro on the headwaters before the rivers enter Pakistan), and the waters of the Ravi, Beas and Sutlej to India. Similarly important is the Ganga Water Treaty between India and Bangladesh of 1986, which has once again been able to find an acceptable solution for both parties. A somewhat different but equally interesting case is that of "benefit sharing" arrangements for development of the hydropower resources of Bhutan, which has shown the way for mutually beneficial

development between India and its smaller Himalayan neighbours (Briscoe and Malik 2006; Condon et. al. 2009).

At the next level down, among the States of the Indian Union, the situation is much less satisfactory. The issue is pervasive, since 90% of the land area of India is drained by inter-state rivers. Cauvery River dispute is an example in Indian interstate water experience. Three states in the country intervene in this dispute but the issue is not yet resolved. Siruvani and Mullaperiyar are the other two water challenges between Kerala and Tamilnadu. The interstate water disputes put more economic and development pressures on related States. Time, money and other opportunity wastes occur that delay the win-win projects and development momentum between states (Iyer 2003, 2007; Briscoe and Malik 2006).

MNCs and international funding agencies also have their own share of water allocation issues. Plachimada peoples' struggle against Coca-Cola, Narmada Bachao Andolan, Bhagirathi-Tehri Dam project, activities of Enron Energy Corporation ADB funding in Jalanidhi Projects are notable examples. Privatization and other trade liberalization policies are accentuating these issues. The Bolivian experience, Cochabamba River privatization, is noted as a great people's struggle against privatization of river water resources (Alex 2006).

Sheonath River, in Chhattisgarh, India has been privatized and sold to Radius Water Ltd in 2001, a local private company. The company had given a concession to build a dam across Sheonath River, for supplying water to the industrial estate of Borai, near Durg city in Chhattisgarh on Build-Own-Operate basis. Once the contract was signed, the owner asserted his rights to the 23.6 km water reservoir, banned the locals from using the waters, with support from the state. Villages Rasmara, Molahi Siloda, Mahmara and Peepal Chhedi have lost their rights over water. The very people who used to fish in the river, who used the river ghats for bathing, who took water from the river for growing vegetables and small crops

and depended on the river for other needs, lost access to the river. Intense local struggles, supported by nation-wide campaigns challenged this loss. The company has forcibly shutdown even wells within a radius of 1km from the river. Later, the Public Accounts Committee-2006-07 of the Chhattisgarh Assembly, in its 64th Report, tabled on 16th March 2007, recommended that the Agreement and Lease Deed between Chhattisgarh Rajya Audhyogik Vikas Nigam (CRAVN) and Radius Water Limited for the Sheonath Water Supply BOT project be cancelled within one week, and that all the assets and the ownership of the water supply project must be taken back by CRAVN (Alex 2006; www.manthan-india.org).

Water privatization and subsequent problems have been more visible in the Indian water economy and some of them have been defeated by people's struggles. Despite these potential problems, history has demonstrated that cooperation, rather than conflict, is likely to bring faster solutions in shared basins. However, with struggle for water and life escalating worldwide, what Michael Gorbechev appealed in Kyoto, becomes a potentially significant: "water must become a powerful vehicle for peace".

5.5 WATER COMMERCIALIZATION: A PERPLEX QUESTION

Water trade, privatisation, commoditisation, commercialization, management, governance etc. are the new terminologies that have been a part of international environmental discussions since 1972 when the first World Conference on Environment was held in Stockholm. It was the foremost venture, which recognized that the international community is facing serious survival dilemma and human activities are making an unprecedented impact on the natural environment and on the global systems which sustain life on Earth, as is demonstrated by air and water pollution, the massive degradation of land resources, the destruction of landscapes, climate changes induced by the wasteful use of energy, the rapid disappearance of animal and plant species, and the depletion of the ozone layer. The subsequent summits and conferences over these

concerns seriously handled and guided these ecological issues with practical know how. Consequently, the national and international debates over water have taken conscious steps to eliminate/manage demand–supply gap of water that proposes huge investment, policy options, organizational skill building and pooling of funds for good governance of the water sector. International summits and agencies on water and environment opt for private players and MNCs for a better management of water with a well-perpetuated assumption that the private parties are least corrupted and most efficient than any government agencies and departments. But, to these private players - corporate, banks, funding agencies and operators- intervention with huge investment means a good opening for profit making. Meanwhile, globalization opens opportunities for private players in newly independent resource abundant regions; investing in water, or/and manipulating the scarcity of water, makes increasingly good business for corporations. What does the term 'commercialization' exactly mean? What are the invisible international strings that shape a corporate water market and commercialization process in water sector? These are the prominent questions in this scenario. Therefore, this study tries to re-address the socio-economic consequences of water trade and to find out the misguided international financial and legal framework of water trade.

Commercialization is a pure market-centric term, conceived and clubbed with dynamic market features like efficient production, pricing, distribution, advertisement, packaging, marketing and promotion of goods and services. Often, the commercialization practices surpass the natural demand-supply equilibrium of the market. The privatised production and distribution along with a liberalized market usually support the commercialization momentum. Briefly, the term *commercialization* indicates production and selling of goods through well-defined market links; even though the political economy often uses the terms privatization, liberalization, commercialization, free trade etc interchangeably.

According to the political and cultural logic differences (e.g. eastern values, green politics and feminist ideologies), it seems that the term *commercialization* is pessimistically hired in the vistas of sociology, economics and ecological studies of South; and significantly noticed as 'chronic market disequilibria'. The term 'private' designates individual production as well as possession of goods and services, and owner's also have a right to exchange those with fair market prices. Thus the term 'privatization' indicates the extension of private properties, production units, distribution links and diversification of goods and services within market laws. However, the monopolies and other imperfect markets habitually violate the natural demand-supply equilibrium and price mechanism. Contrarily, 'commercialization' either implies a monopolistic situation or a more intensive or integrated consumerist culture by its well equipped market tools such as promotional packages and advertisements. This promotes a supply-side market with over-(dis) utilization of natural resources (raw materials) - the livelihood of rural and urban poor. Therefore, the natural resource debates are always guided by green politics, feminism, environmentalism and Marxist and socialist ideologies that disown 'commercialization' as an efficiency stigma over material welfare.

Commercialization occurs only in the case of movable resources whereas privatization encompasses immovable assets. That means privatization of economy provides a place and chance for commercialization of goods and services. And the commercialization process develops through the following inevitable conditions and features.

- A privatized raw material (natural resource) base
- Availability of cheap labour
- Creation of artificial scarcity of resources
- Globalized free market economy
- Huge investment and large scale production of economic goods
- Large scale product/service promotional tools

- Monopolistic price fixing opportunity
- National and international political support
- Production of a movable commodity
- Aiming maximum profit

However, commercialization of natural resources is a recent development with the emergence of World Trade Organization and Globalization. Herein, water has a greater commercial likelihood than other environmental domains (air, land, forest), with its decreasing availability (scarce) and accessibility by privatization, international funding and marketable opportunities as perishable/consumer goods. Here, water commercialization is not synonymous with water privatization or water trade. The term refers to a broader set of linked transformation related to governance, management and employment of water for socio-economic development with a pre-conditioned national and international politico-economic arena. Therefore, the ongoing discussion calls on the following significant questions:

- Is water a commercial economic good or public good?
- Can any government privatise water?

If water is a commercial/private economic good, then –

- How can we price water?
- How can we estimate the social, economic and ecological cost/value of water?
- How can we ensure an equitable distribution among social needs and ecological needs?

These questions give rise to a water rights discourse about who is the real custodian of water resources, and what human rights need to be placed on water, and how it differs from ecological right on water. Accordingly, the water discourse

-commercialization, water rights, stewardship and distribution among various players - is a riddle inside an enigma with promising solutions.

5.6 WATER PRIVATIZATION - WTO, WORLD BANK AND MNCS

Before getting into answering the above questions, it is important to disclose the national and international nexus on water privatization and commercialization. Water trade may be a recent development though the foundation for commoditisation of water was laid much earlier by GATT agreements in 1947 with a definition of tradable goods that clearly lists "*waters, including natural and artificial waters and aerated waters"*. To make it possible, Article XI of the GATT rules pinpoints "*No country is allowed to prohibit the export of the tradable good".* When North America Free Trade Agreement (NAFTA) came into existence, the same definition to water as specified under GATT was retained. WTO came into being on 1st January 1995 as a result of Uruguay Round trade negotiations that started in 1986 and it adopted the same rules and provisions on water. Article XI of WTO legislation specifically places water in a vulnerable position. This article exclusively prohibits the placement of export control (by national laws) for any purpose and thereby eliminates quantitative restrictions on imports and exports. In any event, even if it is arguable that water in its natural state is not a "good" and therefore falls outside of the scope of Article XI, any domestic commoditization on water may be sufficient to bring it within the ambit of Article XI (Singh 2004). In this case, it is essential to refer to the NAFTA provision of September 1993, which states that "*unless water, in any form, has entered into commerce and become a good or product, it is not covered by the provisions of any trade agreement including the NAFTA. And nothing in the NAFTA would oblige any NAFTA Party to either exploit its water for commercial use, or to begin exporting water in any form*"(Mann 2003). This provision is the result of a debate based on fresh water exports of Canada that became so serious in 1992-93, that Canada demanded an interpretive note from its NAFTA partners ensuring that it could not be

compelled to export freshwater. Nevertheless, when water is sold in a package, it becomes a good in commerce and all the rules of trade come into play. There are no constraints under NAFTA and WTO rules to export water in such forms. While the GATT agreements made some exceptions to water in its natural state, under WTO regime, all goods and services get a commercial treatment with totally imbalanced decision-making by the developed industrialized nations and 'North-leading financial legal legislations' of WTO. In this, the WB and corporate firms are playing a significant role in the global environs and penetrating global "economic growth". The inclusion of water services in the General Agreement on Trade in Services (GATS) prompts water privatization and trade under the leadership of MNCs. In the GATS under WTO water would be merely a tradable service. Ecological needs and agricultural essentialities of water are outside the GATS. The European Union's (EU) and United States' vested interests along with foreign financial investment agencies' and MNCs' profit thirst are pushing out the grave issue of devastating implications of water for fragile eco-systems and the poor communities from international dialogues. During 2002, the EU presented formal 'requests' to 29 countries, including India, for opening up of water supply and the World Bank estimates the global market for water to be worth $800 billion annually (Navdanya 2005).

How have international trade and financial institutions become the tools of the transnational water companies? Water sector assumes a pivotal role in WB policy. In the nineties, around 16 percent of all bank loans were granted for water resource development and management. In the 2001 business year, WB credited 20 billion US dollar, with 5.4 billion to irrigation, 3 billion for environmental protection, 1.7 billion to rural water supply and another 4.8 billion to urban water supply (Schneider and Hoering-2005). The WB has initiated the setting up of several organizations that have had key role in the water policy drafting and implementation and gradually developed a WB-WTO-MNCs global nexus; these are happening through the researches and scientific studies by global "think-

tanks". In 1992, two events laid the foundation for the formation of a network of international water agencies: the International Conference on Water and the Environment (ICWE) in Dublin and the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro (Barlow and Clarke-2002). These conferences were followed by the establishment of various international agencies like World Water Council (WWC)-1996, Global Water Partnership (GWP)-1996, World Commission on Water (WCW)-1998, International Private Water Association (IPWA)- 1999, Business Partners for Development (BPD), Water Aid etc. These agencies and MNCs finance studies, researches and international conferences as well as formulate a favourable theoretical, philosophical and physical (financial and political) tone for global natural resource trade and privatization. The Structural Adjustment Programmes (SAP) forced by the World Bank in various developing nations and the "Dublin principles" highlight the dissipated financial and legal trafficking of these "think-tanks". One of the four Dublin principles recognized that "water has an economic value in all its competing uses and should be recognized as an economic good...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"[7].

A lesser known reality about WB is that it has four divisions viz. IBRD, IDA, IFC and MIGA. International Financial Corporation (IFC) provides capital directly to MNCs including ones dealing with water and the Multilateral Investment Guarantee Agency (MIGA) encourages foreign investments and guarantees to investors and granters of loans. Over the past two decades, loans and guarantees from the IFC and MIGA have increased seven fold, from 3.3 per cent in 1980 to 25 percent in 2000. In 2000 MIGA paid $15 million to Enron for an energy project in Indonesia and was cancelled half way. MIGA then insisted Indonesian authorities should repay the money (Holland 2006).

Similar is the case of European Bank (EB) and the ADB. These are the largest financiers of water projects. MNCs are the beneficiaries of these banks, especially the "Big 10". These Big 10 Include: Vivendi, Suez, Bouygues, Enron, Anglican Water, the Kelda Group, Severn Treat, Thames, United Utilities and Bottled Water producers like Coca-Cola and Pepsi etc. The relationship among Big 10 themselves as well as their relationship with the Banks are closely inter-linked and the secrecy of these water corporations is another matter of concern. None of the corporation's water policies are publically available. Most water corporations have a poor record of financial management. Salaries of executives and workers are deeply guarded secrets. Above all, the record of health and safety standards of the water corporations is most disturbing. For e.g. Enron was fined US $ 355,000 by Occupational Safety and Health Administration in USA and the explosion at Puerto Rico plant killed 33 workers and injured 69 others.

The MNCs are targeting four areas within the water sector: water and waste, water services, water treatment as well as water-related construction and engineering and innovating technologies. In a nutshell, MNCs, WB, WTO and the 'think-tanks' along with the vested interests of the 'North' have succeeded in artificially creating a global water market. The WTO has built the legal ground and the World Bank applies pressure on nations seeking loans, for handing over water services to private parties and finally MNCs enter and operate in the water sector.

5.6.1 The Indian Scenario

In the 1970s and 80s, bottled drinking water in India was unheard of. Now, everyone in the country, it seems, is drinking water from plastic bottles. At least that is how it seems at first glance. Bottled water, controlled by the likes of Nestle, Pepsi and Coca Cola, is mostly out of reach for most Indians, given its prohibitive price. Most Indians carrying a plastic water bottle are reusing the empty, non-recyclable plastic for carrying tap water rather than consuming bottled water on a

regular basis. The corporate control of water and water distribution in India is increasing.

In India, water has been treated as a private good since a long time. The person, who owns the land, owns the water below the land[8]. People have the freedom of water extraction for agricultural purposes and domestic uses. However, water scarcity in housing areas was seen coping with individually designed bullock carts and tractors, having a carrying capacity of 500 to 1000 litre water (Singh 2004). In this 'water market'[9], people were well conscious about their water sources and its sustainability. Therefore, conservation and management of water resources were voluntarily maintained. But that scenario changed drastically during late 1980s and early 1990s. Rapidly growing industries and multiplex shopping centres and urban housing colonies in the developing cities of India demanded more water. The government authorities could not manage such demand stress situation. Thus, new water markets came into existence in the Indian economy.

Since water is a state subject, major part of the reforms are undertaken at the state level. However, the Central Government has also taken several measures to promote privatization and commercialization in the water sector. This process started in 1991 with power sector privatization followed by the new national water policy (2002). In 2004, Government of India issued guidelines for urban water and sanitation sector reforms, where Public Private Partnership was the core theme. 2005 was a critical year in the Indian water scenario, because Government of India introduced Jawaharlal Nehru National Urban Renewal Mission (JNNURM)[10] and initiated financial support to private projects to bridge the 'viability gap'[11] followed by the launching of India Infrastructure Finance Corporation Limited (IIFCL). Parallel to these financial and legal frames, bilateral funding agencies like United States Agency for International Development (USAID), Department of Finance for International Development (DFID) and Australian Agency for International Development (Aus AID) are also active in

providing funding support to water privatization and reforms (Dwivedi et.al. 2007; Singh 2004).

Water privatisation, known as Water Supply and Sanitation (WSS) at the administrative level, can be at various levels and of various types such as service contracts[12], Lease/ Management contract[13], BOOT Contracts[14], Concessions[15] and Divestures[16]. Thus, the more general terms PPP (Public-Private-Partnership) or PSP (Private Sector Participation) can include any of the above features. The Indian water privatization is taking place through two modes viz. Outright Privatization of Water Services like BOOT and Water Sector Reforms (WSR) like policy shifts in power generation and water supply (Dwivedi et.al. 2007). There are more than 100 private sector water and sanitation projects that serve the industrial and domestic water supply as well as sewerage and solid waste processing in urban and rural India, besides approximately 25 hydropower projects under private sector participation. Water sector reforms in various stages in many states are approaching privatization.

In brief, the undermined logic of water privatization process is that 'water sector reforms in water supply & sanitation and power generation in a liberalized/globalized economy allows (by rules, laws and policies) the private players to commoditise water and serve it by any mode like pipe, bottle, tanks, canals, dams etc. with a reasonable market price/service charges/tariffs. 'Privatised-water' is to be supplied to those who can't afford the full cost via two mechanisms viz. cross-subsidy and direct subsidy. Under cross-subsidy, where industries have the capacity to pay more for water, private companies are reluctant to overcharge the industries-the best consumers. Logically it is appropriate since an overcharge on industries (bulk consumers) increases the production cost of goods which will reflect across the entire economy. Indeed, bulk consumers being charged less is a viable market ethics. On the other hand, governments are against direct subsidy claiming that they do not have the resources for the same. Amid

these issues, the private companies are reluctant to serve the slums, low-density urban outskirts, spread out rural population due to low paying capacity. Hence, phasing out cross subsidy, washing off direct subsidy, exclusion of poor consumers, increasing tariffs and prices and commoditisation are the logical consequences of water privatisation or corporatisation. The WB, WTO, ADB, USAID etc. are the major players in the Indian water market which helps the water corporates to enter and operate the sector and hence bottled water has become a reality in India. In India, the per capita bottled-water consumption is still quite low-less than five litres a year - as compared to the global average of 24 litres. But India is the tenth largest bottled-water consumer in the world with more than 100 companies, has a turnover of about US$ 70 million and growing at an average rate of 50% every year. The rise of the Indian bottled-water industry began with the economic liberalization process in 1991. Consumption of bottled water in India is linked to the level of prosperity in the different regions. The western region accounts for 40 percent of the market and the eastern region just 10 percent. However, the bottling plants are concentrated in the southern region- of the approximately 1200 bottling water plants in India, 600 are in Tamilnadu. Commoditization of water claims new stress on water resources and profit-seeking corporate giants are entering into soft drink market along with bottled-water production.

The bottled-water industry is dependent on groundwater, creating huge water stress situation in the Indian agrarian and domestic sectors. In India, groundwater is only one source of water in many states and the existing law says that “the person who owns the land owns the ground water beneath”. So one person can buy one square metre of land and extract the ground water of the surrounding areas. Therefore, this law is archaic and not in tune with the realities of a modern free market economy thereby creating conflicts between dependent communities and companies. The bottled water industry is highly lucrative in that company gets water almost free except a tiny pollution cess. Take for instance, Coca-Cola’s Kala Dera plant that extracts half a million litres of water every day at a cost of 14

paise per 1,000 litres. So, the material cost for 1litre Kinley bottled water is less than 0.03 paise, but in market its price is Rs.10 per litre. Albeit, water is not this cheap in other countries; it was in US Rs.21/1000 litre, in UK Rs. 90/1000 litre and in Canada Rs. 76/1000 litre in the late 1990s (Bhushan- 2006).

In short, along with the deplorable condition of surface water, the over-extraction of ground water creats socio-economic and ecological tensions as well as international political chaos. As an agrarian economy, Indian people are more dependent on water for their livelihoods. As a fast growing economy, India also faces too much water governance and management problems. The growing demand and dwindling supply of water makes it an economic good, increasing the price and denying water to poor; over-extraction denies water to the ecology; water-source dependent communities are excluded from their livelihood and the 'public-ness' of the water sources are under threat. Water is beyond price and the corporate loot of this life-good by any international financial-legal and free market dictum is a human rights violation. Of late, the poor, downtrodden, tribes and the people suffering the negative effects from water trade are resisting the MNCs and financial agencies as well as the unethical global water trade nexus all over the world. Plachimada in Kerala, Gangaikondan in Tamilnadu, Khammam in Andhra Pradesh, Thane in Maharashtra, Medhiganj in Uttar Pradesh, Sheonath River in Chhattisgarh, Kaladera in Rajastan, and Sardar Sarovar projects are the national examples in this regard.

5.7 WATER: ECONOMIC (PRIVATE) VS. FREE (PUBLIC) GOOD

Since the preparatory meeting of Rio Summit 1992, water has been considered an economic good in the international resource debates. However, it was brought to the forefront and discussed extensively at Dublin Conference 1992 and became the fourth Dublin principle that says "water has an economic value in all its competing uses and should be recognised as an economic good, taking into account affordability and equity criteria". The perception, "water as an economic

good" causes an international debate and confusion over utility, significance and nature of water and raises subsequent questions such as - whether water is a private good or public good; economic good or social good; can we price water or what is the real value of water; who is the custodian of this life-good; how to distribute and exchange water among various needs and increasing demands; how can equity, affordability and accessibility be ensured among various socio-economic strata of society etc.

According to Zaag and Savenije, international debates on the economic good nature of water have been distinguished by two schools of thought. The first school, the market proponents, maintains that water should be priced through the market. The second school interprets the concept to mean the process of integrated decision-making on the allocation of scarce resources, which does not necessarily involve financial transactions. A further extended concept on water (third school of thought) is that 'water is a free good and gift of nature', so that at least public resource allocation rules should be applied in the water sector. This school of thought is more normative, enriched with human rights and ecological ethics. Besides, Zaag and Savenije recognize water as a special economic good in that water is essential[17], non-substitutable[18], finite[19], fugitive[20], bulky[21] and has a complex system[22] (Zaag and Savenije -2006).

The Dublin principles, the key ideology behind water-commercialisation, along with world trade negotiations, funding agencies, global water policy-setting summits, resource research institutes, MNCs and national and international water service providers/organisations/agencies, compellingly treated water as an economic good with fair market prices. The last decade has shown a growing presence of MNCs in drinking water sector as service providers and bottled water producers turning water from a public resource into a commercial commodity with global players (Hoekstra 2006). The empirical studies over water services and sanitation as well as global water privatisation/merchandise experiments indicate

that market-pricing on water entails massive socio-economic-ecological problems which devastate the 'community good-nature' and equitable distribution of water and exclusion of have-nots from its consumption, over-exploitation, extraction and pollution of water bodies. Over the past five years, municipal water rates have increased by an average of 27 percent in the United States, 32 percent in the United Kingdom, 45 percent in Australia, 50 percent in South Africa and 58 percent in Canada. In India, there is no formal water market; water scarcity has prompted some farmers to pump from their wells and truck to nearby cities to sell and make money instead of farming (Clark 2007).

Worldwide water privatisation projects have been confronting crucial setbacks due to **unjustified water price increase/severe tariff hike** (Azurix-Argentina-2002; Suez-Argentina-2005; Vivendi-Argentina-1998; Bechtel-Bolivia-2000; Sino-French Water-China-1999; Suez-Germany-2000; Biwater-India-2001; Vivendi-Keniya-2001; Maynilad Water, Suez-Philippines-2003; Suez-South Africa-2002; United Water-USA-2003; All privatization projects- Uruguay-2004), **bribery scandal and disputes over contract terms** (Thames-Canada-2004; Sino-French Water-China-1999; Cheung Kong Infrastructure- China-2002; Suez- France-2001; United Utilities- Malaysia-1997; Maynilad Water, Suez-Philippines-2003; Vivendi-Puerto Rico-2003; United Utilities- Thailand-1997; Suez-Vietnam-2003), **violation of environmental laws** (Suez- Canada-2003; Vivendi-Puerto Rico-2003; Veolia Environment-USA-2002), **deteriorating quality and poor services** (Azurix-Argentina-2002; Thames Water- Malaysia-1999; United Water-USA-2003) and **intense public protests** (Vivendi-Argentina-1998; Bechtel-Bolivia-2000; Suez-France-2001; Honduras water projects/policies 1995; Sonia Vihar project and Delhi water privatization-India-2006) (Dwivedi et.al. 2007; Holland-2006; Barlow and Clarke 2002; Navdanya 2005; Shiva 2005).

Therefore, the economic/public good debate over water should be re-constructed with 'community-ecosystem logic'; where water is not always treated as either a

market commodity or a public/free good due to its 'least-economic' and 'non-public' good characteristics, and rather is treated as different. Hence, it is much more important to distinguish between public/free goods and economic goods. A public/free good is a gift of nature, supplied without labour and without limit. Economic goods, on the other hand, are characterized by their scarcity as compared to the demand for them. The best examples of public/free goods are air and sunlight, though in exceptional cases these may become economic goods. Water in a brook or spring may also be considered as free, despite the fact that some effort is always necessary to secure and utilize it. Public/free goods are extremely important in the life of human beings (Thompson-1919).

The following demarcations on economic and public/free goods help to understand the inappropriate market-logic that surrounds the sophisticated water-market debates.

Economic Good	-	**Public/Free Good**
Have Production Efforts	-	Gift of Nature
Excludability	-	Non- excludability
Rival Consumption	-	Non Rival consumption
Private Consumption	-	Collective/Joint Consumption
Scarce in Supply	-	Abundant supply
Can command a Market price	-	Free of Cost or administered charges/tariffs
No chance of free riding	-	Chance for free riding

The international water debate can neither place water in the 'economic good' frame nor in 'public/free good' frame, unanimously due to the following reasons:

1. Water is a free good in its natural form (nature's gift). However it has operational costs like pumping, collecting, distributing by pipelines, tanks etc. for domestic purpose (distribution, exchange and technological costs).

2. Nobody can deny water (exclude the person from water consumption) to anyone because of its essentiality as a life good. Water accessibility can be protected by national and international laws and with ethical rights.

3. Water has a rival consumption, which means over-exploitation and extraction of water by one party will reduce its availability to the neighbour/ second party for a short period (some cases it makes a long term impact on ecology).

4. A single person or territory cannot restrict water for private consumption since water has an ecological cycle and flows downstream. So joint/collective consumption of water is an ecological ethics.

5. Present national and international water panorama confronts a water scarcity (comparative demand-supply gap) due to population explosion, industrial and urban pollution and rapid economic growth. Logically, this can't support the economic good argument of water; hence, the scarcity is more inclined with natural resource/ecosystem management failure.

6. Water cannot command a market price in its natural form (which denies the economic good argument); however the service providers can extract their operational costs.

7. Free riding over free/public goods is against ecological ethics. Therefore, the unnecessary human action over natural resources should either be restricted by environmental laws or by selective economic tools like green tax, polluter pays principle, service taxes etc.

Above all, the basic truth behind 'water as a good (commodity)' is that the sophisticated man-made techniques cannot produce natural water. Everybody knows the chemical composition of water. The great English poet D.H Lawrence has remarked that *water is H_2O, hydrogen two parts, oxygen one, but there is also*

a third thing, that makes it water, and nobody knows what that is. For that reason, a producer's price has been made necessary in water provisions; and reasonably, that which belongs to ecosystem and ecosystem services is generally kept out of all book-keeping methods. In this connection, Gary Woodard, University of Arizona has poses –

- "What is that "third thing" that fascinates poets, sparks heated political debate, and exempts users from normal rules of economics amid claims that it is "too precious to price"? Is it all just superstition and ancient history?

- Would we be better off ditching water's baffling array of special ownership types, subsidies, and restrictions, and treating it like an ordinary commodity?"

Water is so special that all known life depends on water-based biological processes. Chemically, water is the "ideal solvent," dissolving to some extent a staggering array of minerals, organic compounds, and virtually everything it touches. Major religions even use water to ritualistically wash away moral impurities. That is why water is different and social ecology needs to revitalize its multiple use nature in its competing uses.

5.8 PRICE AND COST OF WATER

If water is an economic/public good or commodity, can it be analyzed and priced using the conceptual tools and framework of economics in the same way as any other commodity?

Price of a commodity, under strict market economic theories, depends on its cost of production, demand, scarcity, consumer choices and availability of substitute goods etc. Besides, it concludes that water has no production cost in its natural form and there is no substitute too; therefore, price of water means 'cost recovery' of water services like installation of various water storage and distribution

apparatus, its operation and maintenance; those directly provided to the households, industrial units and for irrigation by state or by a private service firm. However, the economic good doctrine argues that market is more efficient than the public authority to determine the price of water and that it should be based on the demand for water and the cost of supply. Demand for water expresses the willingness to pay on the part of users and supply cost consists of direct and opportunity costs. In many cases, supply cost recovery of water is lower than the full cost, full economic cost, and even below the full supply cost (Alex 2006). This is often because social and political goals override the economic criteria. Otherwise the general principles for cost of water are undermined.

The full economic cost of water is the sum of the full supply cost including capital charges and operation and maintenance cost, economic externalities and opportunity cost. Full economic cost is an insufficient scale and full cost estimation could solve the problem. The full cost of consumption of water is the full economic cost plus the environmental externalities or additional costs of treatment to return the water to its original quality (Rogers et.al. 1998).

Nonetheless, the informal water market and water-based industries, all over the world, do not often take into account the externalities of operation in pricing or cost recovery. Therefore, the market price of water usually wishes away the environmental and economic externalities, whereas the opportunity cost of water helps water traders to enhance their profit since, opportunity cost is measured in terms of the value of water that could be used in alternative uses. The global food trade trends should be analysed on the ground that the virtual water trade (opportunity cost of water) has been escalating recently as also the irrigation water prices.

The following figure (Fig. 5.6) schematically shows the composition of the various components that add up to make the costs.

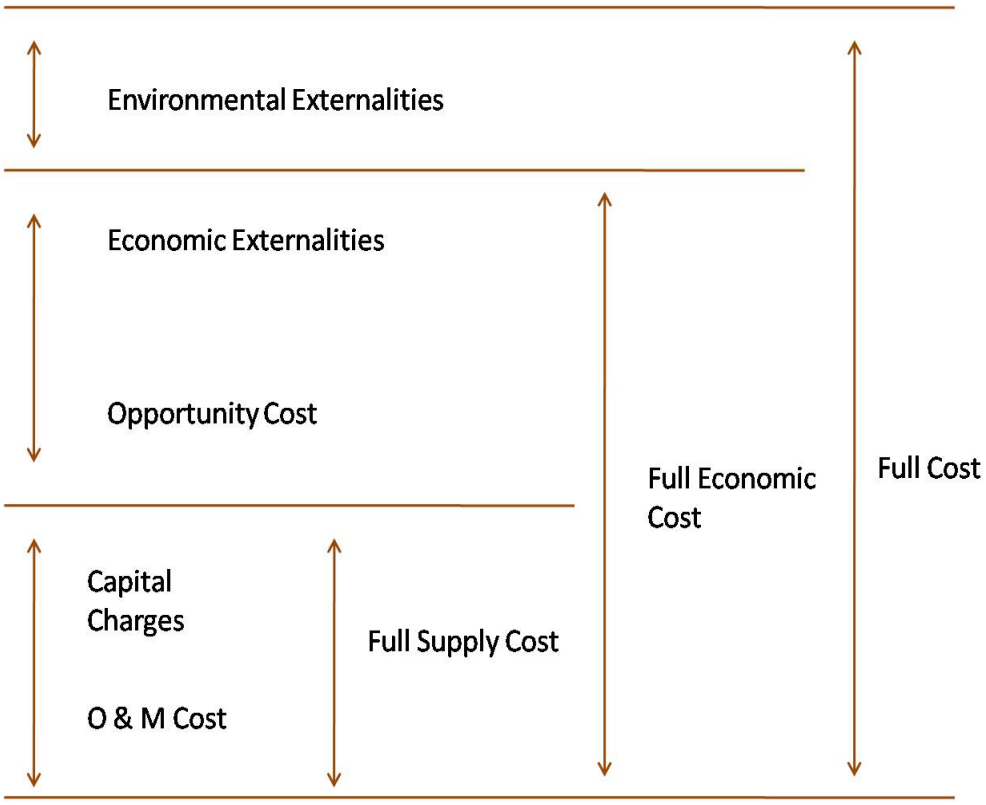

Fig. 5.6 General Principles of Cost of Water

According to the economic theories, economic equilibrium is only reached at the point where total cost equals total benefit. In this case the full value of water should just equal the full cost of water. The value of water depends both upon the user and to the use to which it is put. The full value of water is the sum of economic value and intrinsic value of water. The economic value of water is based on value to users of water, net benefits from return flows, net benefit from indirect uses and adjustment for societal objectives. 'The intrinsic value 'is to estimate "hedonic price indices" associated with the consumption of water' (Rogers et.al. 1998). The intrinsic value is based on the concerns such as stewardship, bequest values and pure existence values. While these are difficult to measure, they are, nevertheless, valid concepts and do reflect real value associated with water use. It is not easy to estimate the intrinsic value of water and its environmental externalities in monetary terms. These problems arise only while considering water as a commodity and giving more importance to its economic

value and economic cost (Alex 2006). The following Figure (5.7) shows schematically the above-discussed components of value in the use of water.

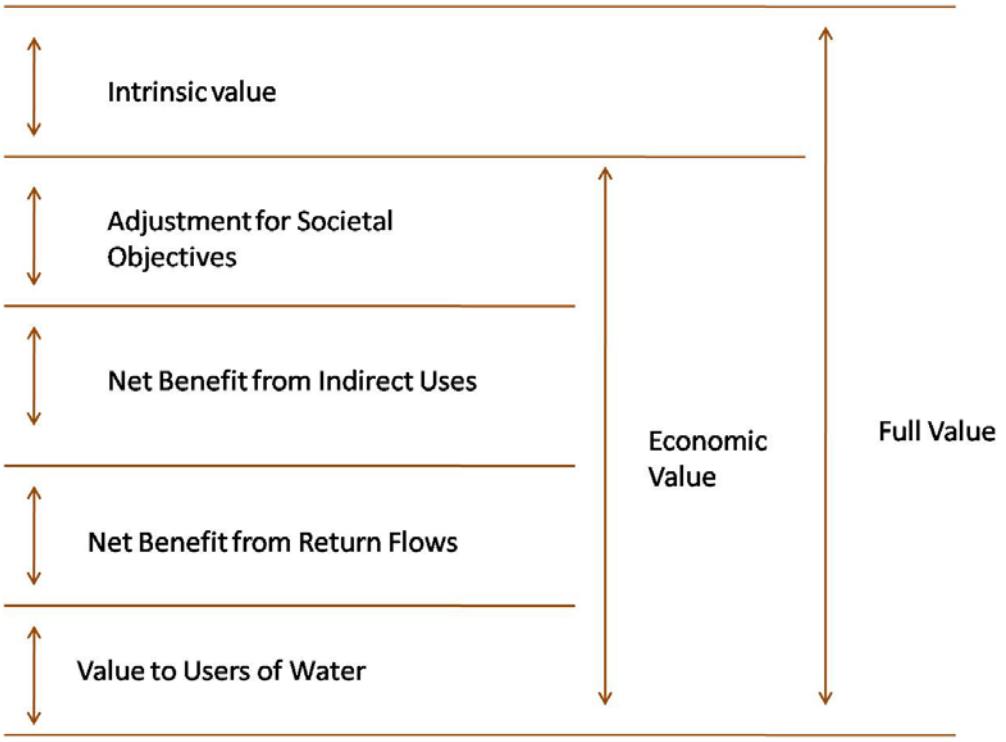

Fig. 5.7 General Principles of Value in Use

Water is scarce in many contexts - droughts, pollution, over extraction - so water pricing through market mechanism or by administered devices is becoming an acceptable instrument of public water policy. It envisages that water use-charges, pollution taxes, tradable permits etc. ensure more accessible, healthier and ecologically sustained water over the long term. However, types of water, availability of water, purpose of water, purchasing power of consumers, quantity and quality of water among various uses are the pre-requisites for a reasonable water pricing. But, conversely, water is inseparable into different kinds of water and is fugitive in nature. The water 'market' is heterogeneous in that different water consumers (domestic, agriculture, industry, transport, and flood and drought protection) have different characteristics and economic forecasts over water have seldom been important in the drastically changing climate. Moreover, water privatization, exploitation, extraction, pollution are ignoring the environmental

externalities (ecological cost) and economic externalities (social cost) of water commercialization.

External costs are the costs paid by the producer to counter and control the pollution and pay some compensation to the affected people through deterioration of the ecology. But the producers of the commodity and services ignore the consequences that are faced by the people living in the surroundings of the production unit over future time periods. The ecological imbalances lead to an imbalance in all the sectors of life. It questions the existence of human beings and other living beings and bio-organisms. This threatens the survival of the future generations also. Ecological imbalance pushes a society into poverty by ill health, erosion of productivity of land, scarcity of safe drinking water, low hygiene etc. and human under development. Thus the external cost realizes the problems from the perspective of the producer, but the argument is that social cost must become part of cost analysis from the perspective of society and should necessarily take into account the future generations also.

5.8.1 Other Costs of water

Social cost of water can be evaluated on two criteria. The first is the accessibility of water resources. 'If a woman or her children must track many miles to acquire water, one has to look at what other activities they are sacrificing. Are the kids missing school? Is the woman leaving an infant at home alone? Would she be otherwise making crafts, tending gardens or participating in community activities? What are the medical implications of drinking sallied water? (Elster 2003).

The second criterion is affordability, which includes social costs, monetary costs and opportunity costs. Social costs may be deflated social status by drinking dirty water, by not washing as much or the degradation of buying water from another's tap. Monetary costs would be how much one pays for water out of the back of a truck or for piped service. Opportunity costs are exemplified in a quote from a

South African Woman who was quoted as saying, "to pay for clean water is to deny my children food". The national cost of fetching water is 150 million woman days each year, causing a national loss of Rs. 10 billion per year. 90 million days are lost every year in India due to water borne diseases. 80% of the children of India suffer from water borne diseases and 7, 00,000 die each year. 44 million people suffer from problems related to water quality – the presence of fluoride, iron, nitrate, arsenic, heavy metals and salinity. These are the problems faced by the acute water scarce societies. Therefore, these losses have to be considered as the real social cost of water.

But the question before us is how to calculate these costs in monetary terms. There is an inequality gap of the society with sufficient water and without water or lack of water (scarcity dictum). The value of time, health, productivity of the land etc. can be calculated. The aggregate of these-especially what is actually scarified for collecting water and suffered by bad water etc. – constitutes the social cost of water. Total time cost of fetching water can be calculated by the following equation (Pushpangadan 2002):

$$T = (2D/1000\ S + 9/60 + V/60\ Q_d)\ (1000/v)$$

Where T = travel time for fetching water (hours/m^3)

S = walking speed (km/hour)

D = distance from home to source

Q = queuing time (minutes per trip)

Q_d = water delivery rate at source (litres/ minute)

V = volume collected (litres / trip)

Health Cost can be estimated as the total net expenditure a person spends for a reasonably healthy life due to lack of water or use of contaminated drinking water.

Agriculture Cost is the loss in revenue and loss of productivity of land due to insufficient/polluted water.

Employment Cost is the account of total loss of working days and corresponding loss of income due to drought and other water-related issues.

Ecological/ Replacement Cost should be measured as the financial investment to enable the ecosystem to regenerate and store water and also to provide a healthy ecology for the survival of all living beings.

Social opportunity cost of water must be accounted as the sacrifice of income and well-being of the affected people. This means that the people who are already engaged in local water service activities like soda making, water distribution to households by bullock carts or small vehicles, and small shops which provide instant soft drinks etc. are pushed to the periphery by the water exploitation of MNCs and mismanagement of water sources.

Aquatic Life Cost can be accounted as the loss of revenue from fishing and allied sectors by water contamination. This would not only deprive rich protein sources but also threaten millions of fishermen's livelihood. In India, it has been noticed that annual average yield of fish in the polluted zones and unpolluted zones of Hoogly River was about 719 and 125 tonnes respectively (Parikh et.al. 1993).

Infants Survival Cost is the total money expenditure inccured on an infant till the age of five to attain prescribed body-mass index due to water shortage.

Reproduction Cost: It is recognized that lack of safe drinking water leads to high abortion rate. Therefore, it is the cost paid by a family to protect the foetus and the health of the pregnant woman. This is also true in the case of animals and plants.

How can these external costs like remedial measures to check pollution, and a tax levied on the producer to check the ecological degradation, and compensation given to the displaced persons etc. be simplified? These are precisely the real costs paid by a society due to the lack of safe drinking water over a long period. Thus

social cost is the sum of time cost, health cost, infant survival cost, reproduction cost, ecological cost, agricultural costs, social opportunity costs, employment costs and other externalities in production.

According to Zaag and Savenije, market interpretation of "water as an economic good" leads to considerable misunderstanding in the debate, and would lead to market pricing of water, which would damage the interests of the poor and make irrigated agriculture virtually unfeasible. Even if water management and supply cost recovery are feasible with water users, 'water-production' for market is a myth. Therefore, as an ecological good, water must be managed for social needs and environmental sustainability rather than for short-term profit. When public necessities become private commodities, people who are already marginalized become more vulnerable to the whims of the market. 'Corporate control can entrench existing inequalities and endanger the quality of life and even survival of poor people, particularly women. Pollution degrades surface water more swiftly than nature can replenish it. The shrinking water supply makes privatization an even more continuous and urgent political issue' (Grossman 2003).

5.8.2 The Stakeholder's Point of View

Various methods have been developed by many economists, institutes and international organizations that help to express the value of water-related goods and services in quantitative, monetary units. The above discussion on price and cost of water, as well as the review of literature indicates that several water valuation frameworks are available to provide stakeholders with an explicit, transparent and scientifically sound valuation of water resources. These frameworks enable one to compare and integrate the different components that make up the value of water, building on concepts such as total and full economic value, water accounting and the water value flow concept. The advantage of these frameworks is that they offer a relatively straightforward procedure for aggregating different value components into one overarching value. However, the

social and environmental values/costs can be captured conceptually in these frameworks, the emphasis on their use in practice is on monetary expressions of producer and consumer values.

These valuation techniques are potentially very useful however complicated and demanding in terms of the expertise, time and data required for their application. Thus, the sustained water recharging, management and distribution techniques and practices are less apprehensive about opportunity cost and economic values of water. These always revolve around human right, accessibility and affordably dictum of water among rural stakeholders. It is observed that the widespread application of these valuation methods in developing countries are impractical owing to lack of expertise, data and resources for the execution of value assessments, so that their development in the field of water valuation has been mainly academic.

Thus, the ecological-good argument on water explores the link between analytical efforts to place a value on water resources and the actual water resource management processes to support water resources management and decision-making effectively. It is very clear that the people's efforts in water re-charging, management, governance and ecosystem restoration has been strengthened in the rural-agrarian ecology through the practices of various NGOs; however these are also reluctant to provide water to the urban-industrial ecology due to lack of funding, know-how and natural resource democracy. Therefore, a trade-off of water among rural-agrarian and urban industrial water stakeholders is more reliable under local/catchment/ecosystem level rather than an international virtual/real water trade.

When water passes through the marketing chain, prices will increase. Water delivered through vendors and carters is often 10–20 times more costly than water provided through a utility. In Barranquilla, Colombia, the average price of water is

$0.55 per m^3 from the utility and $5.50 per m^3 from truckers. Similarly, in the slums of Accra and Nairobi people buying water from vendors typically spend eight times as much per litre as households with piped water supplied by utilities (HDR 2006). So, segregation of various stakeholders has a significant role in water economics.

Where and who is an 'ecologically vigil stakeholder' is the foremost question under the 'new water-market regime'; with the perception that 'water is an ecological good and ecosystem is a water infrastructure'. Water economics, a normative science, deals with water pricing, water source management, water conservation, water distribution to various users such as households, agriculture and industry, equitable allocation of water to weaker sections, enriching the ecosystem through watersheds, water-related policy formulation and programmes (Alex 2004).

The term 'stakeholders' (in general water economics literature) implies water users such as households, farmers and industries and government agencies at different administrative levels that have an interest based on their official mandates. Potentially, everyone is a stakeholder in water resources management. *While not everyone may be able to participate in decision-making on water resources management, ongoing trends towards democratization, privatization and globalization are leading to expansion of the network of involved stakeholders to include local households, local and transnational companies, international organizations and a multitude of other stakeholders* (Hermans et.al. 2006) because they have multiple objectives. Therefore, the subject matter of water economics is diffused among various stakeholders and their goals. The multiple facets of policies, tools, programmes and valuation methods have repeatedly failed to analyse the water economy in a constructive way. The 'new water-market regime' for water action, hence, tries to classify the entire stakeholders into two broad group viz. Rural-Agrarian-Ecology and Urban-Industrial-Ecology.

The table 5.8 shows the basic features, differences, and interdependence as well as valuation potentialities of water for these two stakeholders. Rural-Agrarian-Ecology must be considered as a base for Urban-Industrial-Ecology due to its dependence, water demand and less potentiality of water re-charging. Both stakeholders have a totality in Social Ecology and bear the cause and consequences of water policies, pricing, privatization and commercialization. As per the geographical and topographical peculiarities, the 'new water-market regime' may link a Rural-Agrarian-Ecology to another Urban-Industrial-Ecology that ensures a comparative advantage on ordinary business of life, if water is considered exclusively as an ecological good and where Rural-Agrarian-Ecology is a water infrastructure.

Table 5.8 Rural-Agrarian and Urban-Industrial Ecologies: A Comparison

	Rural-Agrarian-Ecology	Urban-Industrial-Ecology
Feature of Water	Fresh least polluted water; Streams, Open wells, ponds are the main sources of water having a less supply cost and O &M	Potable water after treatments; bore wells, tube wells, other storage apparatus and pipelines serving water with higher supply cost and O & M.
Water Users	Domestic, Agriculture and Vacant and forest lands	Domestic, Industry and Urban open places and Gardens
Water Potential	Heavy potential for water re-charging and as a water supplier.	Heavy chances for rain water harvesting and waste water treatments.
Interdependency	Water supply, raw materials, food grains to urban industrial centres,	Demand of water from rural ecology and supplier finished goods

Under this stakeholder analysis, water is a local public good in its means and ends and an ecological good in its presence. Local people are the real custodians of water sources and their ecological as well as social rights and ethics play a vital role. The mindful, ecologically vigil stakeholders treat water as a life good and respect its 'uniqueness' and the 'x- factor' that actually produces water.

The new water-market regime is wholesomely responsible for good water governance. Good governance has many dimensions: creating a fair legal policy and regulatory framework in which the rights of people to access resources are secured; improving the effectiveness, accountability and transparency of government agencies; ensuring the participation of the poor in decision-making; enhancing the role of civil society; ensuring basic security; political freedom and others(HDR 2004). The stakeholders of the new water-market regime play a vital role to determine who gets what water, when and how. It is interesting to determine how to govern water resources - such as harvesting, extracting, reproducing, processing, transporting, utilizing and storing in a most economically productive way. Water is a weapon of power, and those who control the flow of water can exercise this power in various ways. Thus, the representation of people's interests in water decision-making and the role of politics are important components in addressing water governance dynamics.

However, many people around the world currently lack a voice in the decision-making over water use and the distribution of water supply and sanitation. As opportunities to expand water supplies decrease in many parts of the world, competition over current supplies escalates, creating the need for improved governance. The notion of water governance and its meanings are still evolving and there is no agreed definition. Even though, United Nations Development Programme defines water governance as the range of political, social, economic and administrative systems in place to develop and manage water resources and the delivery of water services, at different levels of society (WWDR 2003). Its

ethical implications and political dimensions are all under discussion. Different people use the notion differently, relating it to different cultural contexts. Therefore, the 'new water-market regime' puts forward the Rural-Agrarian-Ecology and Urban-Industrial-Ecology trade off of water between a common demand.

Governance of water is based on rights and ownership of water property. Simply, beyond doubt we can say water is a basic human right, but property laws often determine who owns or has the right to control, regulate and access water resources. Water rights are often complicated by the variable nature of the resource. Additionally, there are economic, social and environmental values attached to water rights, and any effective water governance structure will need to address this complexity (Conant 2005). Property rights on water must be addressed as a common property and state property under the 'new water-market regime' rather than open access or private property. When we consider the deprived people and ecology, the 'publicness' is inevitable in water sector. The United Nations Water Conference resolved unanimously inter alia, "all people, whatever their stage of development and their social and economic conditions have the right to have access to drinking water in quantum and of a quality equal to their basic needs"(Alex-2006).

According to the constitution of India, Article 21, no person shall be deprived of his life or personal liberty, except according to procedure established by law. Based on this article, the Supreme Court gives some explanations about ecology and its protection through the M.C. Mehta case - "The resources like air, sea, water and the forests have such great importance to the people as a whole, that it would be totally unjustified to make them a subject of private ownership. The concept 'environment' bears a very close relationship to the 'Public Trust Doctrine'. The doctrine enjoins upon the resources for the enjoyment of the general public, rather than to permit their use for private ownership or

commercial purposes" (M.C Mehta V. Union of India, (1987) Supp. SCC131 AIR1987 SC108). Water rights come from nature and creation. They flow by the laws of nature, and not by the rules of the market.

Governance and management are interdependent. Effective governance systems should enable more practical management tools to be applied correctly. "Public-private partnerships, public participation, economic, regulatory or other instruments will not be effective unless the political-will exists and broader administrative systems are in place (Conant 2005). Water management usually focuses on the protection, restoration and use of aquatic ecosystems, such as rivers and lakes, and their surrounding environment. But new water-economic policies, strategies and actions have increasingly recognized the role of forests, wetlands and other water-related ecosystems to ensure sustainable water management.

People's participation is playing a vital role in water management. The watershed development programmes, rain water harvesting, Pani Panchayat, Participatory Irrigation Management and River Basin Organisations are the best examples in this regard, that ensure local public good status to water. Democracy on the basis of natural resources provides more voice to the people on governance and management of water. Effective decentralization is defined by an inclusive local process under local authorities, empowered with discretionary decisions over resources that are relevant to local people. Along with them, a 'triple R' propaganda – Reap, Recharge, and Regulate - and ecological literacy are the most important tools to conserve water. Water is a part of ecology and the ecological interdependence, recycling, partnership, flexibility, diversity, and sustainability are inevitable measures to keep water at a safe, sound and sustainable level.

The governance of water is closely related to the political system of a country. In current times, market conditions determine the power politics and the voices of the natural-resource dependent communities are marginalised and suppressed. In

this context, the concept of 'water district' is a significant one. Water districts are places and agencies which have plenty of water and regulate water distribution with appropriate norms and conditions. In United States, special local governmental agencies called 'water districts' build dams and canals to supply water to agriculture and hydropower to local municipalities and companies. Revenue from the sale of electricity is then used to cross subsidise the price of water with a 'rate of return constraint' (profits always equal to zero). The features of water districts are:

1. Water is a local-public good.
2. Cheap water lowers the cost of agricultural production.
3. Lower prices of agro-products create an income effect in the economy.
4. Low water prices get senators votes from agriculture constituencies and
5. Making profit from the sale of water is against the Federal and State laws.

5.9 CATCHMENT AREA CONSTITUENCY MODEL

In India it is necessary to adopt a water district political system, because within 50 to 100 km there are flood-affected and drought-affected areas. So the study proposes the introduction of a Catchments Area Constituency (CAC) model, beyond water districts, that provides more power to the water-dependent communities in decision-making (see Figure 5.8). It may be an ecologically concerned geographical division of territory but; it is more rationale than the so called demography-based constituency pattern.

Eco-system governance is a complex exercise in the absence of sheer knowledge about ecology, participation of peoples and institutions, strengthening the capacities of concerned people and ecology, innovative economic tools and financing, national legislation and international agreements (UNECE 2005) that cannot be sustained. Along with these, market dilemma creates a problem for water governance that considers water as an economic good. The dilemma is a

multi-faceted one-how to allow limited and regulated water markets to function without inequality and injustice, without transferring rights and as also without a commercial approach to water in the domestic economy spectrum. Add to this, international level how to protect the rights of the poor and weaker countries over their own natural resources from predatory corporate giants (Iyer-2003).

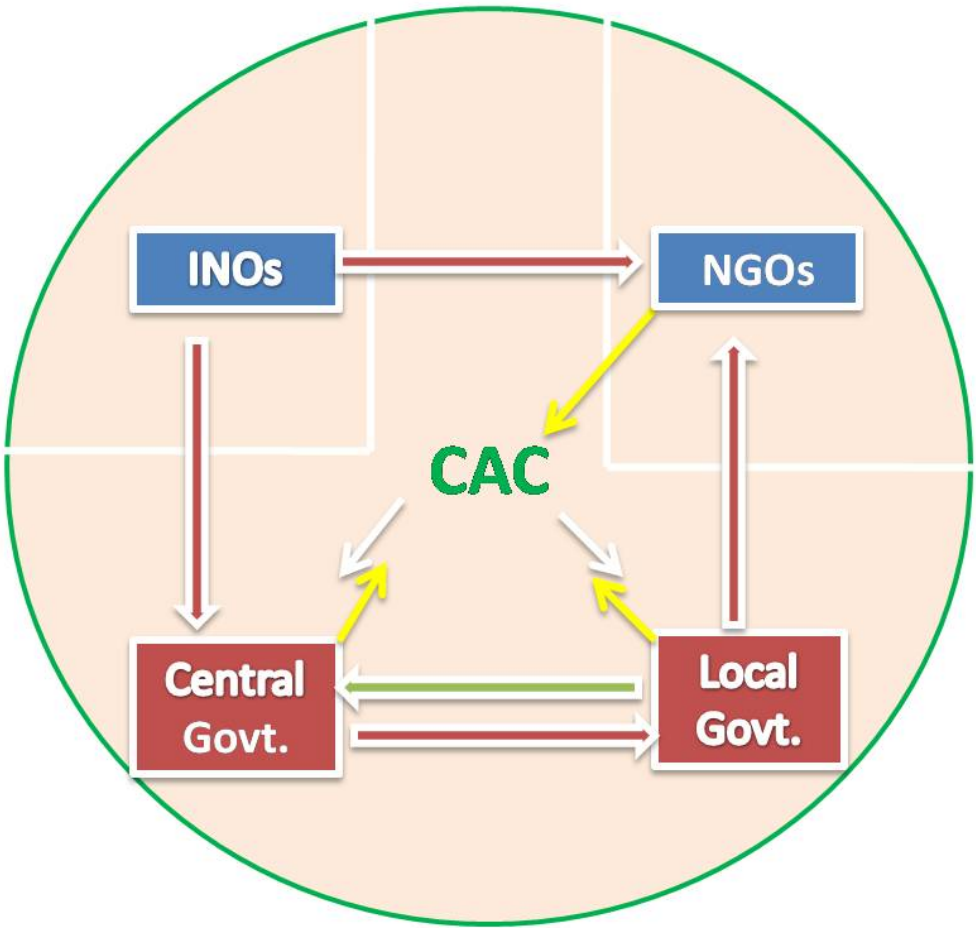

Fig.5.8 CAC Interactions for Water Governance

Rule of water is anchored in governance systems across four levels: government, civil society, non-governmental organizations and international organisations associated with water scarcity-driven vicious circle of poverty and natural resource democracy (see Figure 5.8). In CAC, civil society is the means and ecology is the subject; where people determine their socio-economic and ecological needs. If political determination and policies are incorrect in a CAC and

if they are against a sound ecology, people can overthrow the government through voting. Here, dependent people confirm and cross-check the ecological and economic viability of policies time to time and enjoy a decision-making power. NGOs are the capacity building agencies and provide experts, tools and innovative techniques for ecological management. They ensure peoples participation in constructive works. International Organisations are the financing sources and responsible for international agreements on ecological governance. Because natural resource management at the micro level has international implications, it enriches the global environment. Nation States are responsible for the formation of national legislation and its endorsement concerning ecological governance in CAC. Central and local governments are the monitoring and financing agencies. Here, local governments work as catalysts for ecosystem management and an agent for financing. They also enjoy production, distribution and allocation functions of natural resources for the socio-economic enhancement of the concerned civil society.

This discussion recognises that good governance of water is based on the voices of the dependent communities and the scarcity of water drives the rural economy into a deprivation trap and vicious circle of poverty. The natural resource democracy based on land, water and employment will ensure a good management of resources and the CAC is more significant than any other decentralisation model. Water governance covers a range of issues intimately connected to water, from health and food security, to economic development, land use and the preservation of the natural ecosystems on which our water resources depend (Conant 2005). Therefore, the 'new water-market regime' with Rural-Agrarian-Ecology and Urban-Industrial-Ecology as stakeholders can provide a water-balance among various demands.

As a Chinese saying succinctly concludes, "he, who controls the water, controls the country".

END NOTES

[1] Bearing political meaning- When a nation of people has a State or country of their own, it is called a nation-state. Places like France, Egypt, Germany, and Japan are excellent examples of nation-states. There are some States which have two nations, such as Canada and Belgium. Even with its multicultural society, the United States is also referred to as a nation-state because of the shared American "culture."

[2] Extraction of ground water exceeding the rate of recharge is known as water mining.

[3] An area is experiencing water stress when annual water supplies drop below 1 700 m3 per person.

[4] When annual water supplies drop below 1 000 m3 per person, the population faces water scarcity.

[5] These figures have been taken from various websites of UNDP, UNEP,WHO,UNESCO, WRI and UN.

[6] NCIWRDP estimates of available water resources of the country are measured in terms of the annual flows in the river systems.

[7] Refer the Dublin Principles for Water as Reflected in a Comparative Assessment of Institutional and Legal Arrangements for Integrated Water Resources Management / Global Water Partnership Technical Advisory Committee (TAC) By Miguel Solanes and Fernando Gonzalez-Villarreal, TAC Background Papers No. 3, the original version of this report has been presented and discussed at the Namibia Meeting (November 1996) of the Technical Advisory Committee of the Global Water Partnership. The present version includes the contents of the report presented in Namibia and, in addition, relevant recommendations of the Technical Advisory Committee, recent decisions of the Antimonopoly Authorities of Chile (impact of water law in facilitating monopolies), expanded references to stakeholders participation and indigenous water rights and interests, and broader development of subjects related to water utilities. The Dublin Principles for Water as Reflected in a Comparative Assessment of Institutional and Legal Arrangements for Integrated Water Resources Management.

[8] Dwivedi, Gourav etal. (2002) Water: Private, Limted-Issues in Privatisation, Corporatisation and commercialisation of water sector in India, Manthan Adhyayan Kendra.

[9] This water market is subsistent and locally operated one. The demand for and supply of water is managed by water sharing practices between neighbours.

[10] JNNURM is an initiative directed at substantial improvement in urban infrastructure launched with Rs 1,00,000 crore.

[11] A situation where the firm fail to recovers the full cost and will face a loss.

[12] Involves short term contracts for provision of specific services like meter reading and bill preparation. Normally there is no investment from the private company, no financial risks to it.

[13] Either the private company leases out the facility from the civic authority, or the latter appoints the company for managing the facility.

[14] Build Own Operate Transfer contracts in which the private company builds some part of the infrastructure- say the treatment plant or filtration plant-and runs it for a regular charge on the system. Normally, these would be long term contracts, with a purchase agreement that would guarantee a minimum demand.

[15] Long term contract in which the private company takes full charge of the system, takes responsibility for the provision of the service and is also responsible for expansion, new investments ,recovery of bills etc.

[16] Where, the government divests its equity in a utility that is then bought off by a private company. This may be a full or partial divesture.

[17] There is no life without water, no economic production, no environment. There is no human activity that does not depend on water. It is a vital resource. The same can be said about air, land, fuel and food.

[18] There is no alternative for water. Economic theory is based on the existence of choice. But what alternatives are there for water? There is no alternative, there is no choice. The only exception is coastal cities that could afford to produce fresh water from seawater through desalinization.

[19] The amount of water available is limited by the amount of water that circulates through the atmosphere on an annual basis. All the water stems from the rainfall. The amount of rainfall that falls on the continents is finite.

[20] Water flows under gravity. If we don't capture it it's gone. The availability of the water varies over time and so does the demand for water. It flows through our fingers unless we store it. Water is different from air and land, because these goods don't need to be stored: they are stocks, whereas water is essentially a flux. There are of course also stocks of water: groundwater aquifers and natural lakes. But these lakes and aquifers can be used sustainably only if they are replenished by the flux. We can store water artificially but then the stock is small compared to the flux. Annual recharge rates determine safe and sustainable yields, not the stocks.

[21] Although water is essential for almost any economic activity, there are not many examples of water being transported over any considerable distance, particularly not against the force of gravity. Where these transfers nevertheless occur, they concern water destined for high value uses (for the domestic and industrial sectors) and, in some exceptional cases, for highly subsidized agricultural purposes. Although normal commodities are shipped and wheeled throughout the globe, we do not send super tankers with water to drought stricken areas. We transport the produce instead: grains, textiles, dried fruit, etc.; commodities that house more than 1,000 times their weight in virtual water, the water required to produce it.

[22] The annual water cycle from rainfall to runoff is a complex system where several processes (infiltration, surface runoff, recharge, seepage, re-infiltration,

moisture recycling) are interconnected and interdependent with only one direction of flow: downstream. If the flow is interfered with upstream, downstream impacts result, and externalities and third party effects occur. Many downstream users depend on the return flows of (inefficient) upstream users; increasing the efficiency of those upstream uses will decrease return flows and impact downstream. If groundwater is abstracted from an aquifer, further down in the cycle at some later point in time less water will flow in the river. If waste is discharged at some point, damage is incurred somewhere downstream. A catchment is one single system and not the sum of a large number of subsystems that can be added-up or optimized in a regular economic model.

REFERENCES

Alex, Thomson K. (2004). *Water-Issues and Economics: Political Economy of Water in Kerala*. Unpublished Dissertation. Department of Economics. University of Kerala. Kariavattom. Thiruvananthapuram. Kerala.

Alex, Thomson K. (2006). *Social Cost of Water: A Case Study on Plachimada Water Issue.* Unpublished M.Phil. Thesis. Department of Rural Development and Management. Gandhigram Rural Institute. Gandhigram. Tamilnadu.

Barlow, Maude and Tony Clarke (2003). *Blue Gold*. Left ward Books. India.

Bhushan, Chandra (2006). *Bottled loot -The structure and economics of the Indian bottled water industry.* Fronline (India's National Magazine). Volume 23. Issue 07 Apr. 08-21. http://www.frontline.in/fl2307/stories/20060421006702300.html.

Bird ,Jeremy ;Wouter Lincklaen Arriens and Dennis Von Custodio (2009). *Water rights and water allocation: issues and challenges for Asia*. Asian Development Bank. Philippines.

Briscoe, John and R.P.S. Malik (2006). *India's Water Economy-Bracing for a Turbulent Future*. Oxford- World Bank. Oxford University Press. New Delhi. India.

Clark, Edwin H.II (2007). *Water Prices Rising Worldwide Plan B Updates*- No.64. Earth Policy Institute. Washington D.C. Available at http://www.earthpolicy.org/index.php?/plan_b_updates/2007/update64.

Conant, Jeff (2005). *Water for Life Community water security.* UNDP. Sida and Hesparian Foundation.

Conca, Ken. (2006). *Governing Water-Contentious Transnational Politics and Global Institution Building.* The MIT Press. Cambridge. Massachusetts. London. England.

Condon, Emma., Patrick Hillmann, Justin King, Katharine Lang and Alison Patz (2009). *Resource Disputes in South Asia: Water Scarcity and the Potential for Interstate conflict.* The Office of South Asia Analysis. U.S. Central Intelligence Agency. USA.

Dwivedi, Gaurav; Rehmat and Shripad Dharmadhikari (2007). *Water: Private, Limited: Issues in Privatisation, Corporatisation and commercialization of water Sector in India.* Mathan Adhyayan Kendra. Bhopal. India.

Gandhi, Vasant P. N.V. Namboodiri (2009). "Groundwater Irrigation in India: Gains, Costs and Risks," IIMA Working Papers 2009-03-08. Indian Institute of Management Ahmedabad. Research and Publication Department.

GOI (2006). Report of Sub-Committee on *More Crop and Income per Drop of Water* Advisory Council on Artificial Recharge of Ground Water Ministry of Water Resources Government of India. October 2006.

Grossman, Anna (ed.) (2003). *Untapped Connections: Gender, Water and Poverty: Key Issues, Government Commitments and Actions for Development.* WEDO Publications. NewYork.

HDR (2006). *Human Development Report 2006- Beyond scarcity: Power, poverty and the global water crisis.* United Nations Development Program. Oxford University Press. New York. USA.

Hermans, L. and Renault, D. and Emerton, L. and Perrot-Maitre, D. and Nguyen Khoa, S. and Smith, Laurence (2006). *Stakeholder-oriented valuation to*

support water resources management processes. Technical Report. FAO. Rome. ftp://ftp.fao.org/agl/aglw/docs/wr30_eng.pdf.

Holland, Ann- Christin Sjolander (2005). *The Water Business Corporations versus People.* Zed Book. London& New York and Books for Change. Bangalore.

Iyer, Ramaswamy R. (2003). *Water-Perspectives, Issues, Concerns.* Sage Publications. New Delhi.

Iyer, Ramaswamy R. (2007). *Towards Water Wisdom: Limits, Justice, Harmony*. Sage Publications Pvt.Ltd. New Delhi. India.

Khurana, Indira and Romit Sen (2008). *Access to Safe Drinking Water is Crucial for a Country's Socio-Economic Development.* A background paper by WaterAid titled: Drinking water quality in rural India: Issues and approaches. WaterAid India.

Mann, Howard (2003). *Who Owns Your Water? Reclaiming Water as a Public Good under International Trade and Investment Law.* Paper prepared for Inter-American Development Bank and UNs Economic Commission for Latin America and Caribean. Mexico.

Navdanya 2005. *Financing the water crises, World Bank, International Aid Agencies and Water Privatisation.* Water Sovereignty Series Report No. 7 by Navdanya/ Research Foundation for Science Technology and Ecology (RFSTE). New Delhi.

Parikh, Kirit., Jyoti Parikh, V. K. Sharma and J. P. Painuly (1993). *Natural Resource Accounting: A Framework for India*. Ministry of Environment. Government of India and UNDP. Nov.1993.

Pushpangadan, K (2002). *Social Returns from Drinking Water Sanitation and Hygiene Education : A Case Study of Two Coastal Villages in Kerala.* Centre for Development Studies. Working Paper Series No. 333. Thiruvananthapuram.

Rogers, P., Bhatia, R., and Huber, A. (1998). *'Water as a Social and Economic Good: How to Put the Principle into Practice'* TAC Background Papers No. 2. Global Water Partnership. Stockholm.

Schneider, Ann Kathrin and Uwe Hoering (2005). *King Customer? The World Bank's "new" Water Policy and its Implementation in India and Sri Lanka.* Vikas Adhyayan Kendra. Mubai. India.

Shiklomanov I. A. (1999). *World Water Resources: Modern Assessment and Outlook for the 21st Century.* Summary of World Water Resources at the Beginning of the 21st Century, prepared in the framework of the IHP UNESCO. Federal Service of Russia for Hydrometeorology & Environment Monitoring. State Hydrological Institute. St. Petersburg.

Shiva, Vandana (2002). *Water Wars; Privatization, Pollution, and Profit*. South End Press. Cambridge. Massachusetts.

Shiva, Vandana (2005). *Globalization's New Wars: Seed, Water and Life Forms*. Women Unlimited. New Delhi.

Singh, Arun Kumar (2004). *Privatization of Rivers in India.* Vikas Adhyayan Kendra. Mumbai.

Thompson, Charles Manfred (1919). *Elementary Economics.* Benj. H. Sanborn and Co. Chicago.

UNCSD (1999). *Comprehensive Assessment of the Freshwater Resources of the World*. United Nations Commission for Sustainable Development (UNCSD), UN Division for Sustainable Development, New York.

UNECE (2005). *Nature for Water – Protecting Water-related Ecosystems for Sustainable development*- A brochure of United Nations Economic Commission for Europe Convention on the Protection and Use of Transboundary Watercourses and International Lakes available at: http://www.unece.org/env/water/meetings/ ecosystem/Brochure_final.pdf.

UNESCO (1999). Summary of the Monograph *'World Water Resources at the beginning of the 21st Century.* IHP UNESCO. Viewed at www.espejo. unesco.org. uy/summary/html.

UNESCO (2000). *Water Use in the World: Present Situation/Future Needs*. at www.unesco.org/science/waterday2000/water_use_in_the_ world.html.

UNESCO (2009). The United Nations World Water Development Report 3 Published jointly by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Earth scan. Dunstan House. London. United Kingdom.

UNICEF (2000). *Global Water Supply and Sanitation Assessment 2000.* WHO/UNICEF Report. UNICEF, New York.

UN-WWAP (2006). *Water a Shared Responsibility.* United Nations World Water Development Report. The United Nations Educational, Scientific and Cultural Organization (UNESCO). Berghahn Books. 150 Broadway. Suite 812. New York. United States of America.

Water Aid India (2005). *Drinking Water and Sanitation Status in India, coverage Financing and Emerging Concerns* Published by Water Aid India. Country Programme. New Delhi.

WHO/UNICEF (2004). Meeting the MDG drinking water and sanitation target: A mid-term assessment of progress. World Health Organization/UNICEF. http://wssinfo.org/pdf/ JMP_04_tables.pdf.

WWDR (2003). *Water for People-Water for Life*.The United Nations World Water Development Report. A joint report by the twenty three UN agencies concerned with freshwater Published in 2003 jointly by the United Nations Educational, Scientific and Cultural Organization (UNESCO).Berghahn Books. 150 Broadway. Suite 812. New York. United States of America.

Zaag, P. van der and H. H. G. Savenije (2006). *Water as an Economic Good: The Value of Pricing and the Failure of Markets*. Value of Water Research Report Series No.19. UNESCO-IHE Institute of Water Education. Netherlands.