

WATER, HEALTH AND POVERTY LINKAGES: A Case Study from Sri Lanka

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Abstract

Water, health and poverty are closely linked to each other. Health and poverty have two-way relationship: good health brings prosperity, and prosperity brings improvements in health; or conversely poor health may create and perpetuate poverty and poverty may lead to poor health. Water is at the center and contributes to both health and poverty. Water influences health through direct consumption for drinking and for sanitation, and for its use in food and nutrition in the households. Water also contributes to livelihoods of the poor as a key input in the production process in agricultural and non-agricultural uses and in the environment in which poor people live and depend on. Good human health and environmental health contributes to poverty reduction, and vice versa, with water being key to both. Poverty causes natural resources degradation, influencing environmental health, which in turn creates more poverty. These linkages are examined in this paper using a simplified framework using available general data for Sri Lanka and cases extracted from other research outputs in the country. Key lessons are highlighted in relation to social safety nets, the importance of covering ground water resources in the development of the Water Policy, and the need for improved irrigation management, particularly noting the interaction between irrigation water and domestic water in the rural areas.

Introduction

It is now clearly recognized and accepted that there are strong linkages between Water and Poverty, and the literature elaborates on these aspects adequately. It is therefore not the intention of this paper to delve into the background and analysis of these linkages, but to emphasize the fact that these linkages more often than not operate through or are modified by the health aspects of the people. This premise to some extent is illustrated by the quote in the Ministerial Declaration of the 2001 Bonn Freshwater conference *“..combating poverty is the main challenge for achieving equitable and sustainable development, and water plays a vital role in relation to human health, livelihood, economic growth as well as sustaining ecosystems..”* (as quoted by John Sousson 2002) .

In defining poverty, one can draw from the large amount of literature on the subject. It is clear that poverty is not merely an issue /problem relating to a low level of income. It is related to non-income aspects as well. It is a phenomenon of many dimensions covering aspects such as social, economic, environmental, physical/infrastructural, institutional/political as well as cultural, ethnic and gender. The ‘voices of the poor’ recently collected by the World Bank from 60,000 poor from 60 countries describe poverty comprehensively as:

“Poverty is hunger; poverty is lack of shelter; poverty is being sick and not been able to see a doctor; poverty is not being able to go to school and not knowing how to read; poverty is not having a job; poverty is fear for the future; living one day at a time; poverty is loosing a child or illness brought by unclean water; poverty is powerlessness; lack of representation and freedom”

Water needs are intricately woven into the lives of the poor, four aspects are particularly important: (i) water for domestic purposes (ii) water for production (iii) water for environment and (iv) vulnerability to water related disasters (ADB thematic framework on the WPI, 2002). In addition to being a basic need for survival, water is a key resource for development. With a belief that water can drive socio-economic development, many developing countries have promoted water resources over the last five decades. Huge investments have been made in

water resources development to achieve several broader objectives such as economic growth, rural and agricultural development, national food security, protection against famines and intensification of land use. All these efforts are believed to have contributed to considerable reduction of absolute and chronic poverty and hunger in most developing countries.

However, a contradictory view is that while there has been considerable positive outcomes, water resources developments have also been environmentally destructive and unsustainable, which have directly or indirectly affected the lives of many people—mostly the poor.

While these are two extreme views, there is a general acceptance of the vital role of water resources in livelihoods of the poor. This makes water a socio-economic ‘good’, but it can also become a socio-economic “bad” when it leads to problems such as water borne diseases (malaria, schistosomiasis-also called Bilharzia), floods, and land degradation including water logging and salinity, water pollution and associated destruction of living beings and natural ecosystems. The poor and marginalized population, which with limited resources remain unable to adopt preventive or defensive measures, are most affected by consequences of water as a socio-economic ‘bad’. Improved management of water resources is therefore essential to enhance the benefits and to reduce the dis-benefits of water to the poor.

The paper uses available general data for Sri Lanka to illustrate trends and briefly examine the impact of the strategies followed. It develops a simplified conceptual framework to probe pathways and linkages between water, health and poverty and uses the data available in the public domain as well as results from different studies, particularly those from the International Water Management Institute, to illustrate the linkages.

Poverty in the Region with Focus on Sri Lanka

Almost half of the world’s 6 billion people live on US\$ 2 a day and one fifth live on less than US\$ 1 a day, with around 44 percent of the world’s poor people living in South Asia (World Bank 2000). Within South Asia, there is significant variation in the incidence of poverty across countries. Available data on the incidence of poverty indicate that it is highest in Bangladesh and Nepal, followed by Pakistan (table 1).

Table 1: Incidence of Poverty in South Asia

Country	Population in Poverty (%)			Year of Reference
	Rural	Urban	Total	
Bangladesh	44.9	43.3	44.7	1999
Nepal	44.0	23.0	42.0	1996
Pakistan	22.4	36.3	32.2	1998-1999
India	27.1	23.6	26.1	1999-2000
Sri Lanka	28.7	13.4	26.7	1995-1996

Source: Key Indicators of Developing Asian and Pacific Countries, ADB (2002)

Sri Lanka is amongst the lowest in the region, but indicates an anomaly between the rural and the urban sectors. While the urban incidence of poverty is far better than the rest of the region at 13%, rural incidence of poverty is not so and is comparable with other countries at about 29%. The figures however are not strictly comparable as reference years are different, but give an indication. Differences in definitions of incidence of poverty may also be a factor. A generally

accepted conclusion however is that about 25 percent of the population in Sri Lanka live in poverty (measured in terms of household income and consumption), and that abject poverty or destitution does exist in Sri Lanka, but in small pockets.

The population of Sri Lanka is largely rural with about 85.3 percent² living in rural areas (80 percent in rural villages, 5.3 percent in estates in the plantation sector) (World Bank, 2000). Thus poverty is largely a rural phenomenon (those in the estate sector are also considered as rural). The Table 2 below provides a measure of poverty in three sectors and the trend. (N. Gunatilleke, 2000)

Table 2: Incidence, Depth and Severity of Poverty in Sri Lanka by Sector: 1985/86, 1990/91, and 1995/96 – Lower Reference Poverty Line

Sector	Reference Poverty Line :								
	Rs 792 per person per month at 1995/1996 prices								
	1985/1986			1990/1991			1995/1996		
	IOP	DOP	SOP	IOP	DOP	SOP	IOP	DOP	SOP
Urban	18.4	4.4	1.6	15.0	3.4	1.2	14.7	3.0	0.9
Rural	35.6	8.9	3.2	22.0	4.5	1.4	27.1	5.8	1.9
Estate	20.5	3.9	1.3	12.4	2.1	0.6	24.9	4.9	1.6
<i>Sri Lanka</i>	<i>30.9</i>	<i>7.6</i>	<i>2.8</i>	<i>19.9</i>	<i>4.1</i>	<i>1.3</i>	<i>25.2</i>	<i>5.4</i>	<i>1.7</i>

Source: Department of Census and Statistics; and World Bank Sri Lanka Poverty Assessment 1995.

IOP - Incidence of Poverty (Head Count), DOP - Depth of Poverty (Poverty Gap), SOP - Severity of Poverty (Squared Poverty Gap) .

Table 2 which shows the poverty level using a lower reference poverty line, indicates that the incidence, depth and severity of poverty are high in rural areas. Poverty in rural villages and estates declined between 1986 and 1991, and increased between 1991 and 1996. The increase in poverty in rural areas between 1991 and 1996 is attributed to the drought that prevailed during this period (World Bank, 2000). The highest incidence of poverty was recorded in 1995/96 among households deriving their income from agriculture. Thus, slow per capita growth in agriculture (only 1 percent during 1990-96), major droughts, contraction in the paddy sector; slow growth in rubber and mining sub-sectors may have contributed to the high poverty levels in these sectors.

Poverty in urban areas has declined continually between 1985 and 1996. For the whole of Sri Lanka, poverty declined up to 1990 and then increased substantially in 1996, but was still below the level of 1986. Thus we can observe a cyclic pattern of decline, increase and decline in poverty. The current declining trend in poverty in Sri Lanka is continuing after 1997.

There is significant variation in the incidence of poverty across provinces in Sri Lanka. As shown in table 3, the incidence of poverty is high in Uva, followed by North western province. The incidence of poverty is almost similar in Sabaragamuwa and North Central regions, estimated at little over 31 percent. Western region has the least incidence of poverty, estimated at around 14 percent in 1995 (at lower poverty line), and followed by southern and central regions.

² Source: Extract from report of Census of Sri Lanka, 2001, Department of Census and Statistics.

Table 3: Incidence of Poverty in Sri Lanka by region

Province	Poverty Head count					
	Poverty line=Rs.791.67 per person per month			Poverty line=Rs. 950.00 per person per month		
	1985	1990	1995	1985	1990	1995
Western	19.49	15.23	13.61	30.04	25.92	23.35
Central	30.11	23.49	27.89	45.64	37.88	42.90
Southern	39.24	23.73	26.84	53.37	38.64	41.38
North western	33.78	18.03	33.87	48.50	31.00	52.38
North Central	33.05	18.16	31.16	50.76	34.12	46.67
Uva	40.45	23.71	37.04	55.56	39.81	55.17
Sabaragamuwa	40.96	23.07	31.59	54.74	35.65	46.77

Source: Gunatilleke, N (2000) Basic MIMAP Poverty Profile: Sri Lanka, Institute of Policy Studies, Colombo, Sri Lanka

The current declining trend in poverty is probably the result of structural changes and opening of the economy, which has sustained a reasonably high rate of economic growth over the last 15 years. However, there is still a large proportion of the population, who remain susceptible and vulnerable to economic changes and income fluctuations because they are clustered at the borderline of the poverty line. Poverty levels are particularly high among landless labourers, and among casual labourers employed in agriculture, mining, construction and the informal sector. Greater vulnerability and insecurity of the poor and those clustered above the poverty line may be due to poor targeting of poverty alleviation programs, large increases in temporary and casual employment, and insufficient attention to risk management in agriculture.

Some general characteristics of the poor can be derived from different studies on poverty undertaken in Sri Lanka. For example, poor households are larger in size and have a higher dependency ratio. They have limited access to outside resources and little or no productive assets. There is a higher incidence of female-headed households among the poor. Members of poor households have lower levels of educational attainment and a greater proportion of unskilled labor. The level of underemployment, seasonal employment and unemployment is higher among the poor. There appears to be no relationship between poverty and ethnicity, and the type of occupation. The poor can be found among many occupations, including semi-subsistence farmers, low income market oriented farmers, self-employed individuals, urban workers and self employed in tradable and non-tradable sectors (Tudawe, 2000)

Sri Lanka has been committed to a well-established social welfare program, providing free health and educational services, since the early 1900s. Public expenditures in health and education grew to 6 percent of the GDP in 1948-52 and remained at this level up to the 1970s (World Bank, 1990). As a result of improved health care and education, mortality rates declined rapidly and population increased at rates close to 3 percent, resulting in a large population increase in the 1950s. Improved education and other social welfare programs began to have an impact on population growth rates, which started to decline by the early 1980s and has been declining ever since. Apart from education and health services, the Government introduced a food subsidy program to reduce the impacts of World War II. This program, which was initiated in the 1940s and continued up to 1977, provided a fixed amount of rice and wheat flour at a subsidized price to all households in Sri Lanka (World Bank 1990).

With the opening up of the economy in 1977, an attempt was made by the government to target food subsidy programs to the actual poor and needy population. In 1978, the food subsidy program was restructured and redirected to the poorest of the population. Consequently, food subsidies were issued only to households with a monthly income of Rs 300 or less for five or more persons. The number of people receiving food subsidies was halved as a result. Toward the end of 1979, food subsidies in the form of a rationed quantity of food was eliminated and replaced by a food stamp program (FSP), for those earning below Rs 300 per month. An evaluation of the FSP showed that only 38 percent of the total food stamp payments reached the intended poorest 20 percent of the population (World Bank, 1990). The remainder of the subsidy went to higher income groups. The FSP is undergoing restructuring to increase the proportion of the subsidy actually reaching the poor from 38 to 80 percent. This would eliminate about half of the number of current beneficiaries of the subsidy scheme.

The food subsidy program provided free or subsidized food to all households, but the first real attempt at poverty alleviation was the "Janasaviya" Program (JP) initiated by the Government in 1989. The program intended to transfer Rs 2500 per month to each poor household for a period of two years. In addition, JP included components for credit based entrepreneurial development. An evaluation of the Janasaviya Program (World Bank, 1990) identified its many shortcomings. In addition to the program being too costly to be sustainable, the selection criteria were not defined precisely and the benefits not related to incomes, leading to inequities and the inclusion of non-poor within the program. The benefits were high compared to prevailing income levels, leading to disincentives to work. Poverty, being a long-term problem, cannot be resolved within the two-year limitation of the JP. There was no provision for the inclusion of families falling into poverty after the selection process was completed.

In addition to the JP, another program, the Mid Day Meal Program (MDMP) targeted towards children was started in 1989. A total of US\$ 50 million was spent annually in providing one meal a day to all children in primary and secondary schools under the Mid-Day Meal Program. This program failed because it was too costly to sustain and did not reach the group which was nutritionally most at risk, i.e. the pre-school children. The Janasaviya Program was scrapped, after the formation of the new Government in 1994.

After the scrapping of the JP, a more ambitious poverty alleviation program "Samurdhi" program, was put into operation by the new government in 1995. This program, which is basically an income transfer program, provides direct cash grants to more than 2 million poor families (55 percent of the population). In addition to cash grants, several other subsidiary activities were being implemented through this program to alleviate poverty. These included community and infrastructure development projects, savings programs, banking and credit programs, social insurance programs, training and entrepreneur programs, and self-employment schemes. About 80 percent of the funds allocated to the program were utilized for income transfers, intended to provide as a consumption supplement. In this case, the amount of transfer was related to the income of the household and ranged from Rs. 100 to Rs. 1000 per month per family, depending on the household size. The other components of the program were intended to expand the productive asset base of the poor and to create employment and income through community infrastructure development (S. Kelegama, 2001). As per the World Bank (2000) evaluations, both the design and implementation of the Janasaviya and Samurdhi programs have been flawed and their effectiveness in creating opportunities or empowering the poor to overcome economic and social barriers minimized as a result. Political bias of administrators/mobilizers of poverty programs, poor targeting of the programs to the poor, lack of participation of the poor in the development process have been identified as some of the

flaws in these programs. The costly poverty programs (up to 1 percent of GDP) have not created sufficient opportunities for the poor. Large expenditures on poorly targeted transfers, lack of sustained rural works programs, long-term administrative costs of hiring poverty workers (over 30,000 workers in the Samudhri Program), and weak exit mechanisms are some of the issues that have to be addressed.

Based on these experiences and current knowledge, Sri Lanka through its National Planning Department and relevant line ministries have finalized a Poverty Reduction Strategy. This is based on three key elements:

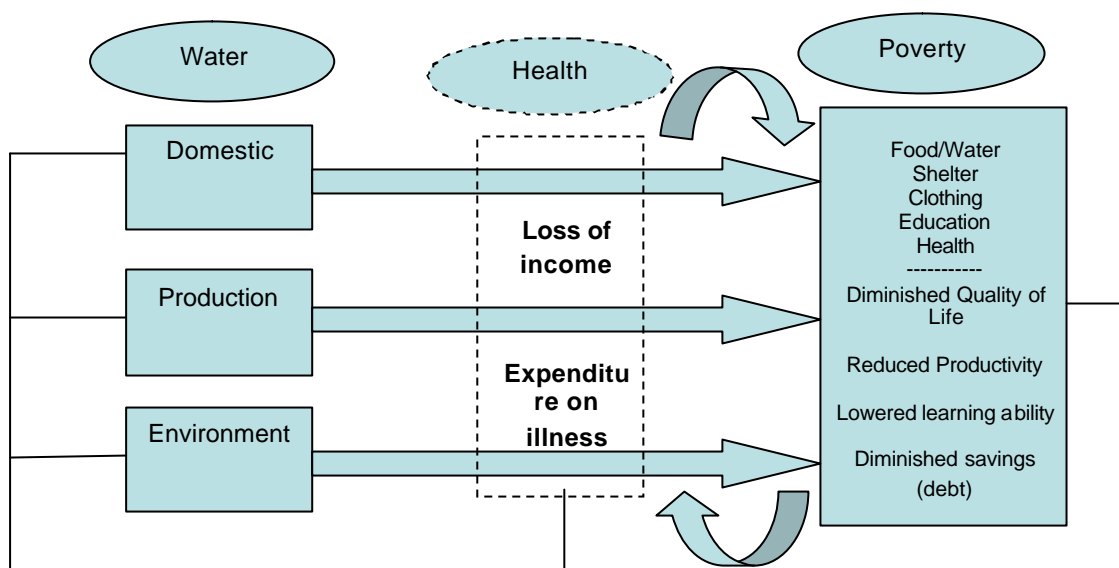
- Creating opportunities for the poor to participate in economic growth: It is expected to harness engines of pro-poor growth to enhance livelihoods, increase incomes, and ensure essential services to the poor.
- Strengthening the social protection system: The major thrust of the social protection system will be proper targeting of real beneficiaries and integration of the poor into the mainstream economic development without inspiring dependency and eroding community initiatives. Where the Samurdhi programme is concerned, it will be converted into a social insurance programme in place of cash grants.
- Empowering the poor and strengthening governance: The view that poor groups must operate in partnership with local government, decentralized public service agencies, and CBOs, to demand quality service and to mount appropriate community development initiatives, is accepted. For this the poor need to be empowered and given a voice in the decision making process.

Strategy developed on this basis is now in force and naturally the practice of the theory and the success of it are yet to be proven.

Water, Health and Poverty Linkages

Around 10,000 people die every day from water and sanitation related diseases and illnesses, majority of them are poor from the developing world.

Figure 1: Water, Health and Poverty Linkages - a simplified framework



Health and poverty have a two-way relationship i.e. poverty is both a cause as well as a consequence of poor health. Poor people remain unable to secure even the basic necessities of life – adequate food, adequate safe water, clothing, shelter and health care. Poverty restricts or deprives access to healthy living conditions, access to nutrition, access to preventive measures, and effective treatment, therefore poor are more likely to suffer from adverse health effects, and more often.

Conversely, poor health and illnesses have a negative effect on the livelihoods. Unhealthy people are much less productive. To escape from poor health and to treat sudden illnesses one requires money which the poor can ill afford. The loss of income and the inability to pay for the cost of treatment can push a family further into debt plunging them into the cycle of poverty.

It is evident from the linkages framework shown above that any positives towards reducing poverty will have a cyclic effect resulting in improved productive output and health and consequently a further reduction in poverty; hence an upward spiral improvement. Similarly adverse effects can make it spiral downwards.

In order to understand pathways and linkages between water, health and poverty clearly, water use is classified into three broad categories; water for domestic consumption, water for production purposes and water use for environmental sustainability.

Water for Domestic Consumption: Water is a basic human need and essential for survival. Access to basic minimum quantity of safe water (roughly around 20 liters per person per day) is every one's right. Unlike all other goods, the utility and value of a glass of water for an extremely thirsty person is infinity. Similarly the value of water for other domestic uses such as food preparation, hygiene and sanitation is also very high. These uses of water are directly related to health. A large number of diseases, including, diarrhoea, dysentery, and cholera are caused by these direct uses of insufficient or unsafe water, leading to impacts in both short term as well as in the long term.

Lack of availability of adequate safe water for domestic uses forces the poor to extract water from alternate sources: (a) often fetching water, generally of poor quality, from long distances with much drain on time and energy, particularly of women and children, sometimes preventing them from spending time on income generating activities and on schooling respectively or (b) incurring higher financial costs by buying water from informal vendors.

Water for Production - Irrigation/Agriculture: Water for production, especially in agricultural sector, has been regarded as a powerful factor for providing food security, protection against adverse drought conditions, increased opportunities for more employment and stable income, and for offering opportunities for multiple cropping and crop diversification. Access to reliable irrigation enables farmers to adopt new technologies and intensify cultivation, which lead to increased productivity, overall higher production, and greater returns from farming. This, in turn, opens up new employment opportunities, both on-farm and off-farm, improves income and livelihoods, and the quality of life in rural areas, and reduces the vulnerability caused by seasonality of agricultural production and external shocks. All these factors contribute to alleviation of poverty. However, there are also negative impacts of irrigation (mostly associated with poor management of irrigation) that tend to increase poverty. Water logging of land and increased salinity, land degradation, depletion of ground water and changes to biodiversity are some of these, also resulting in the development of unfavourable conditions in relation to health in terms of vector breeding, pathogen transmission etc.

Water for Environmental Sustainability: Water is essential for environmental health/ecological balance, just as safe water is essential for human survival and good health. In addition to its role in maintaining ecological balance, water use for environment has the five key dimensions similar to those for water use in the production process particularly in agriculture - production, income/consumption, employment, vulnerability/food (in)security, and overall welfare. Therefore, water use for environment has direct linkages with poverty, as is clear from the following statement:

“the poorest often suffer most from the consequences of environmental degradation because of their immediate dependence on the natural resource base for their basic necessities (food, energy, water and housing). Much of the income of the rural poor is derived from natural resources and environment-dependent agricultural activities. Surveys from 13 developing countries show that the rural poor depend for 40-85 percent of their income from agriculture” (Pinstrup-Andersen and Pandya-lorch, 1994)

Many poor rural communities depend on sensitive ecosystems such as forests and lakes, but are often forced to overexploit these natural resources in order to meet their basic needs and survive, causing severe degradation of the systems. Ground water resources are particularly vulnerable in this regard. In too many cases they are abused to such an extent that they no longer can provide for any productive agricultural needs or for the community's basic needs and ends up posing serious health risks, adding to the poverty equation. Poor management of natural water bodies also can result in providing habitats for disease vectors.

An environmental aspect related to domestic and productive water consumption is the generation of wastewater. Wastewater can impose negative impacts including the incidence of wastewater borne diseases as well as degradation of both land and water resources, including groundwater resources. To the extent that wastewater and its nutrient contents can be used for crop production, it can provide benefits to the communities.

The main source of hazards in wastewater from the domestic sector comprises pathogenic microorganisms (bacteria, viruses, protozoa and helminthes), with the major source of water pollution from industrial sector being heavy metals. The heavy metals can accumulate to the level of concentrations that can cause toxicity to humans. While the affected groups also include the populations consuming vegetables irrigated with wastewater, the most affected groups are the poor small holder farmers and labourers. For a global review of the impacts of wastewater re-use in agriculture see Hussain *et al.* (2002).

Domestic Water in Sri Lanka

A full analysis of the domestic water scenario in Sri Lanka is not attempted here, but rather to highlight some salient and interesting aspects.

As given in Table 4 below, the piped water coverage for Sri Lanka as a whole is only 32%, but the coverage for the rural population is only 14%. However, access to safe drinking water is higher but limited to 57% of the rural population. The Government of Sri Lanka has a National goal for water supply with a target of safe water for all by 2010. The data also indicate that almost 70% of the present rural population (about 60% on a total population basis) obtains their domestic water from shallow ground water using wells; some of them are protected against surface water run-off while others are not. Figure 2 indicates this breakdown where it is seen that 43% are protected shallow wells while 29% are unprotected. (Jayasiriwardena, 2002).

Table 4: Water Supply situation in Sri Lanka - 1998

	Urban	Rural	Total
Population 1998 (M)	5.61	13.04	18.65
Piped water	75%	14%	32%
Tube wells	10%	11%	11%
Protected shallow wells	10%	40%	24%
Other	5%	35%	33%
Access to safe water	90%	57%	67%

Source: C.H. de Tissera 1999 Urbanisation and Water

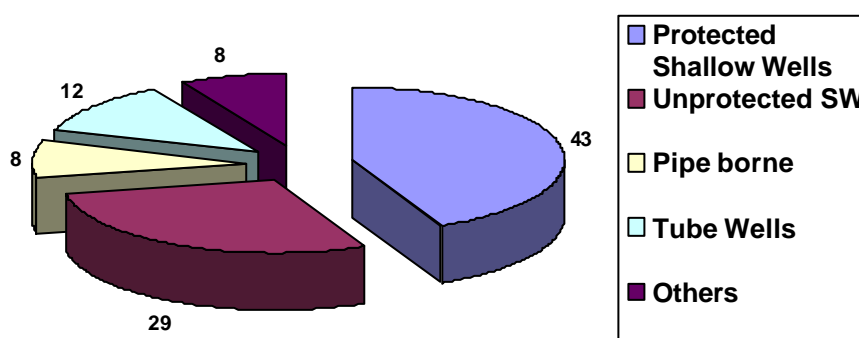


Figure 2: Rural Water Supply by Facility
Source: NWSDB 1994

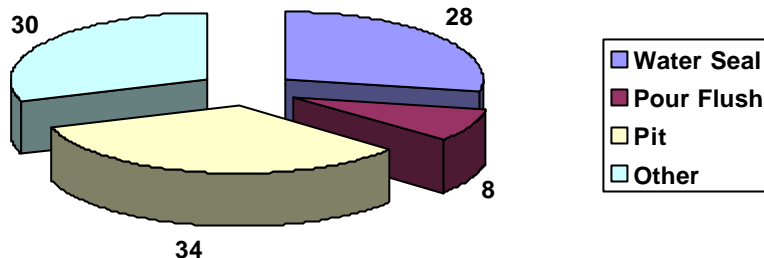


Figure 3: Rural Housing Units by Type of Toilet - 1994
Source: NWSDB 1994

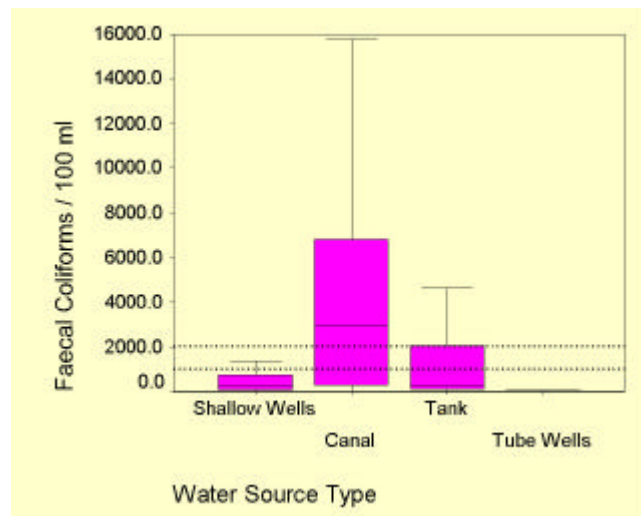
As shown in Figure 3, almost all the households use some type of pit latrine to dispose of their excreta to the ground, except septic tank users which is a very small percentage in the rural areas. With the rapid urbanization expected over the coming years, the load of sewage will increase which use the shallow overburden as the soakage area. With the cost of providing infrastructure such as piped water and sewerage being exorbitantly high, mass scale contamination of shallow ground water, particularly in the peri-urban areas is quite high.

Ground water aquifers depend mainly on surface water for recharge and as such, indiscriminate withdrawal of ground water causes a serious threat to its sustainable use. Competing use of ground water for agricultural purposes through agro-wells has also created pressure on the domestic water users. Ground water resources are not well regulated in Sri Lanka through policies or institutions, considering the importance of this in the domestic water sector. It is very important to adequately cover this in the emerging water policy initiatives in Sri Lanka, as well as in many other countries in the region.

Another interesting phenomenon is the multiple use of irrigation water in the rural agricultural areas. In the Walawe river basin in Sri Lanka, irrigation water is directly used for household use but is also found to be a direct means of recharging ground water (Boelee and Van der Hoek, 2002). The conclusion is that irrigation water management without taking note of its other uses can be counterproductive in a holistic sense, depriving the community of one of its essentials, well water for domestic use (Meijer et al, in preparation). In terms of biological water quality surface waters are unsafe and deep ground water is safe, but the quality in shallow wells is better than in the reservoirs and canals (Figure 4). It concludes that protected shallow wells show a considerable improvement in quality compared to unprotected shallow wells (Shortt et al, forthcoming).

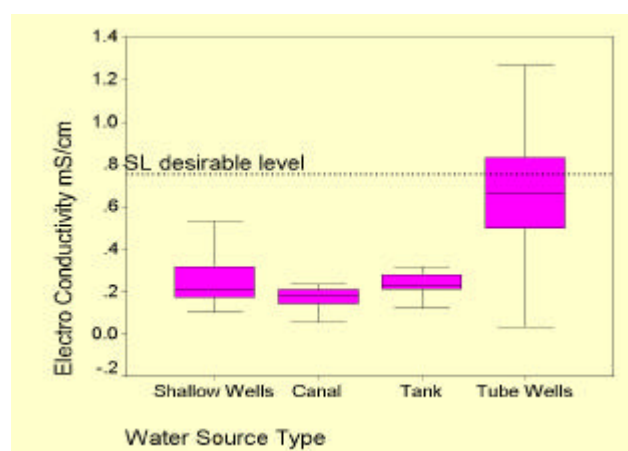
Sources of bacteriological contamination of surface and ground waters are generally from human settlements and livestock. Contamination from on-site sanitation as discussed earlier is considerable (Shortt et al, forthcoming). Use of such water leads to the transmission of waterborne diseases such as diarrhoea, typhoid, cholera, viral hepatitis A, dysentery etc.

Figure 4: Walawe basin: Biological water quality. Source: Shortt et al, forthcoming.



Although deep ground water will generally provide microbiologically safe water, it will not necessarily provide a water source that is free from chemical constituents that are harmful to health. Most of these arise from naturally occurring chemicals such as Arsenic, Chlorides, Fluorides, Iron and a host of other possible contaminants. Chemicals from Agricultural activities such as nitrites/nitrates and pesticides mainly contaminate the surface water sources but also gets transported into groundwater depending on a number of factors such as the soil condition, and the depth of the water table etc., as illustrated in Figure 5 below.

Figure 5: Walawe basin: Salts in water



All in all, the effects arising from drinking water contamination, either bacteriological or chemical are considerable as shown in the box below.

SOME HEALTH FACTS

- Intestinal infectious diseases caused 831.7 cases of hospitalization per 100,000 population in year 1999. A total of 158,379 cases.
- Intestinal infectious diseases caused 1.2 deaths per 100,000 population in year 1999. A total of 226 deaths
(Source: Sri Lanka Annual Health Bulletin – 1999)
- Over 50% of the population affected with Fluorosis in the study area
(Source: Van der Hoek et al, in preparation).

Irrigation, Poverty and Health

It is clear that in general irrigation improves economic prosperity, leading to improved health and reduced poverty. It however has also has an anti-poor element in it in that poor management of irrigation systems can lead to a number of adverse conditions not conducive to alleviating poverty. Some of these are:

- Water logging and salinity
- Land degradation due to intensive agriculture
- Depletion of ground water
- Change in biodiversity

In terms of health aspects, these factors may lead to increased disease conditions due to a number of reasons; increase of vector-borne disease habitats and increased transmission of pathogens are some of these. A recent IWMI study (Klinkenberg et al, forthcoming 2002) carried out a risk mapping exercise for malaria in the Uda-Walawe irrigation system in Sri Lanka producing some very interesting results shown in Figure 6. The results showed that an increased malaria risk was found in areas with more than average rainfall or large areas under forest cover or in chena cultivation (i.e. slash and burn cultivation) areas. Irrigated areas had a low risk for malaria. Furthermore, the presence of abandoned tanks and poorer socio-economic status was associated with a higher risk. People in the irrigated areas had a higher socio-economic status than those in the chena areas and were therefore likely to live in better constructed houses, make more use of bednets and medication, and have a generally higher nutritional (health) status. The study showed that the malaria risk is higher outside the irrigated areas and is associated with lower socio-economic status, chena cultivation and presence of abandoned tanks. This is a good case illustrating the interactions and links between health and poverty with water being the common denominator.

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A similar IWMI study (Konradsen et al. 1997b) covering a different region of Sri Lanka attempted to determine the economic costs of malaria, and investigate household incomes and its impact on poverty. Table 5 below summarizes

Figure 6: Malaria Incidence Maps 1991-2000 (Uda-Walawe, Sri Lanka)

Table 5: Household expenditure per episode of malaria - Evidence from

Item	Expenditure per episode (SLR.)
Transport	31.8 (0-300)
Blood examination	1.8 (0-95)
Treatment	19.5 (0-530)
Meals at health facility	29.6 (0-600)
Special diet at home	47.6 (0-350)
Other (such as hiring labor)	18.7 (0-625)
Sub-total	149.0 (0-1029)
Loss of working day and school days	+ The number of average days lost per episode of malaria was 7.8 days of the patient and 2.9 days of the person accompanying the patient to the health facility. At an average wage rate of SLR 75, the economic cost of productive time lost amounts to SLR 802.

Based on Konradsen *et al.* (1997a)

With a median annual net income of SLR 12,900, some families spent up to 10% of their annual income per episode, and experienced several episodes per family per year. The working days lost by the economically active age group (14-60yr) were 1.8% due to malaria and 5.6 % due to all other illnesses. The economic costs, including the opportunity cost of productive time lost, are estimated to be SLR 802 for malaria and SLR 2,400 for all other illnesses – a substantial component of annual income no doubt having a significant effect on their poverty status. The importance of controlling these disease conditions is further borne out by the fact that a survey amongst these villagers which asked them to identify and rank the three biggest problems, malaria was ranked as the third biggest problem, following inadequate water for cultivation and poverty. Also, malaria was considered to be their major health problem, followed by diarrhoea and eye diseases. Among 216 households included in the study, there were 178 self-reported episodes of malaria. The number of episodes ranged from 0 to 5 per individual and from 0 to 11 per household (Konradsen et al 1997a).

Key Lessons

- Sri Lanka has experimented with a range of social welfare programmes targeted at the poor, some more effective than others but all with many deficiencies in absolute terms. A close analysis of these experiences will enable identification of the weaknesses and eliminating them from developing more effective targeted schemes for Sri Lanka as well as other countries of the region.
- The emerging water policy initiatives must take note of the need to well regulate ground water, as it is important for different countries from different perspectives.

- Irrigation water is often a direct source of drinking water as well a means of recharging ground water. An integrated view needs to be taken in planning these systems as well as managing them.
- Proper management of irrigation systems is very important from a point of view of minimizing degradation of natural resources which affect people's livelihoods, but also from the perspective of minimizing and controlling associated disease causing mechanisms.

Research to Lessons and to Action – Role of Partnerships

It is noteworthy to highlight the role of partnerships in carrying these lessons from research to the stakeholders, and towards practical implementation. This is the approach adopted by the Global Water Partnership (GWP) and in the region by the GWP-SASTAC (Technical Advisory Committee) and in Sri Lanka by the Sri Lanka National Water Partnership (SLNWP – named “Lanka Jalani”). These partnerships believe strongly that optimal realisation of research is possible only through cooperative activity by Governments, Civil Society organizations, and the private sector. The partnership organizes, facilitates and assists in bringing these sector together and developing activity aimed towards implementation. Development of the regional activities on poverty described below, with regard to the Water and Poverty Initiative of the ADB and WWF3 is a good example of how these partnerships achieve this.

GWP-SASTAC at its meeting in June 2002 in Colombo discussed the methodology to be adopted for poverty studies and allocated different aspects to different countries in the region for detailed studies. International Water Management Institute (IWMI), in its role as the GWP Colombo resource centre, agreed to provide the initial finding for these studies. Lanka Jalani's component was the study of Water, Health and Poverty linkages. It's first step was the recruitment of a consultant for the detailed study, followed by a National Consultation Workshop of all stakeholders held on August 21. Participants consisted of representatives of the relevant Government authorities including the National Planning Department responsible for the country's Poverty Reduction Strategy as well as irrigation, agriculture and water supply departments. A number of NGOs, research institutions and universities and the private sector was represented. Outputs from this workshop and a comprehensive paper presented by Hussain, Intizar et. al. (2002) form the basis of this paper. Work will continue to identify the gaps and carry out detailed studies for specific outputs to be made available in time for the South Asia Water Forum II (SAWAF II) in December 2002. Similar parallel processes have been initiated in the other countries of the region.

Continuing work by Lanka Jalani, to have an ongoing dialogue with a multi-sector country CEO panel on the one hand, and to develop Area Water Partnerships at basin level for full involvement of the users, will ensure on-the-ground realisation of these outputs.

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