

**CHALLENGE OF CHANGE FROM A WASTEFUL  
CULTURE  
TO A  
CONSERVING NATURE**

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## **Executive Summary**

The availability of fresh water suitable for human consumption is diminishing day by day. Therefore providing the basic needs for drinking and washing is becoming a challenge. This is emphasized even in Agenda 21, the outcome of Earth Summit 92.

In Sri Lanka the end usage and consumption of the water is very high. The sectors selected for this study are high water consuming sectors. The findings indicate tremendous potential for conservation. Yet the commitment to conserve is not found in end users.

A close look at the change of life style indicates the change of attitude on water by Sri Lankans. Sri Lankans from ancient times considered water as sacred and as a gift of the nature to mankind. Today for Sri Lankan water is only a commodity to be bought at a price. This contributed to the deterioration of service even at national level and water supply and distribution has reached a stage of neglect. Among children, adults, industrialists, managers and every segment of Sri Lanka population, the awareness of importance of water for life & development is lacking. Also we lack the skills and technical expertise to design, instal and maintain effective distribution systems.

It is proposed to approach the problem at three different levels, National, Institutional and individual. A high powered presidential task force to formulate and implement an integrated national policy on water. Objectives and targets at institutional and individual levels. A start for conservation and efficient end usage will at least ensure a safe and fresh drinking water supply to our future generation. A change of wasteful culture to a conserving culture.

This is the challenge we have to face today.

## **Challenge of Change from a Wasteful Culture to a Conserving Culture**

### **Introduction: -**

Water is a resource, which is in abundance in the biosphere, but in many different forms. Out of the full supply only .003 percent is available for consumption by all living beings. Even this small fraction is unevenly distributed and as a result every human being does not get an equal share. Today, The water has become an acute problem all over the world. In the midst of abundance people suffer due to lack of availability of good quality water for consumption. Sri Lanka is not different. Our population too, suffers in one way or another due to problems of scarcity of good quality water.

Sri Lanka is blessed with more than sufficient annual rainfall and abundance of surface and ground water. A few decades ago, the water was of wholesome quality, but by our own activities, we have spoilt our own, good water resources. Of the entire country, only a very small percentage of population is fed by central pipe borne water supply schemes. A majority is still dependent on dug wells and tube wells. A large area of the dry zone is still fed by tube wells/hand pump water schemes. There is a percentage of population in the dry zone who still carries pots and pans on their heads, to get their supply of drinking water. While a section of the population undergo hardships in procuring their basic requirement of drinking water, Sri Lanka is among the nations at the top of the table, who has a very high percentage of Unaccounted for water ( UFW). For Sri Lanka UFW is 58%. We are only behind Bangladesh with UFW at 61%. This figure stands at 3% for Germany and 8% for Singapore. What this means is that we are unable to account for 58% of the water fed into our central water systems. This figure does not include the wasted amount of water at each consumption point. Therefore we are guilty for an unforgivable crime of wasting a scarce resource while some of our brothers and sisters struggle to get a portion of it.

### **Historical Perspective and Changing of Values**

Sri Lankans proudly boast about an ancient heritage of prosperity centered on a hydro-based culture. Our ancestors perfected science and art of harnessing the maximum use of rain water and river water. They built large reservoirs and trapped rain and river water for agriculture. They made this country the "Granary of the East".

King Parakrama Bahu The Great proclaimed that " Not a drop of water to be allowed to flow into the sea without getting the full benefit from it."

King Datusena showed the large reservoir built by him to his son Kassapa and said, " This is my whole wealth".

How much value our forefathers placed on water is well demonstrated in the above sayings. Today, we do not have a similar respect for water. With the transformation of our economy from a " self sustained agricultural economy" to a " export oriented export industrial economy", we have chosen to neglect the value of water to our life. It has become another " commodity" to be bought at a price, instead of considering water as a precious gift of the nature to the mankind.

### **The Crisis and the Study Focus**

The National water supply and Drainage Board (Water Board), the state institution responsible for the supply and distribution projects in the country, recently cautioned all concerned, that by 2003, Sri Lanka will have an acute water shortage. Unless we adopt rigid conservation and control measures immediately, we are destined to face a very serious problem of no water leading to many other problems like starvation, illness etc. Do we have to be reminded of Ethiopia and Somalia, repeatedly.

The management of end use of water resources was given a high priority even at the Earth Summit held in Rio De Janeiro in 1992 as shown by the following extracts of chapter 18 of Agenda 21.

" Water is needed in all aspects of life. The general objective is to make certain that adequate supplies of water of good quality are maintained for the entire population of this planet....."

"Rational water utilization schemes for the development of surface and underground water supply sources and other potential sources have to be supported by concurrent water conservation and waste minimization measures....."

"Promotion of water conservation through improved water use efficiency and wastage minimization schemes for all users, including the development of water saving devices....."

"Treatment and safe reuse of domestic and industrial wastewaters in urban and rural areas...."

" Better management of urban water resources, including the elimination of unsustainable consumption patterns, can make a substantial contribution to the alleviation of poverty and improvement of the health and quality of life of the urban and rural poor....."

Though Sri Lanka does not have an integrated water policy yet, the importance of such a policy cannot be belittled. This preliminary study focuses on consumption patterns and possibilities for reduction of wasteful consumption through variety of measures, which can be implemented, in the author's opinion, only by instilling a conserving culture among its population. The author therefore wishes that relevant authorities will consider this study as a start and move towards formulating an integrated water policy to fall in line with the aspirations of Agenda 21.

### **Consumption Patterns and Waste Streams**

Patterns of consumption of water differ from urban to rural, rich to poor and industrial to domestic. Though there is a great variation of volumes and qualities for each sector, due to constraint of resources and time, 3 sectors were selected to carry out this study.

The sectors selected were

Domestic

Textile Industry (Dyeing, Finishing)

Hotels (Tourist)

#### **Domestic Sector**

In the domestic sector a sample of 325 households were selected and information gathered. The findings are tabulated in Table 1. (Page 9)

In the domestic sector, the urban households had at least one domestic servant in addition to the family members. The following observations and findings on the usage of water were interesting to note.

- a) The total water consumption was always known through the bill as all the houses had central pipe borne water supply
- b) There were at least 3 taps leaking or dripping.
- c) Never attempted to control or curtail water consumption.
- d) All urban houses had washing machines for clothes washing.

- e) All urban houses had two or more vehicles and a garden. The water consumption under "others" column represent the usage in car washing and watering of garden.
- f) Majority of the semi urban houses did not have washing machines.
- g) Some semi urban houses had a vehicle and a garden.
- h) All rural households had individual water supplies: piped water through a dug well and pressure pump combination. None had any washing machines or vehicles.
- i) All urban and semi urban houses had washrooms within the houses with commode/cistern toilets and bath/ shower facilities. All cisterns were as installed and set at the maximum water level.
- j) All rural houses had the external toilets with squatting pans: no cisterns. The washing faucets and shower also located externally.

It was very difficult task to convince the adult members of urban houses on the over consumption of water. All were aware of global attention paid on water, the possible droughts and water scarcity. Yet, they were not ready to change their life styles. Their attitude was, as long as we pay for it we can use the way we want. Their children could well understand our objective and were very enthusiastic in proposing measure to reduce water consumption. In the semi urban and rural sectors majority of adults and children were ready to accept our observations and were prepared to start a water reduction program immediately.

### **Textile sector**

Textile sector was selected because of the high volume use of water in this industry and due to the impact of effluent from textile mills to the immediate neighbourhood. We selected 05 dyeing and finishing plants to study and none of the factories had effluent treatment plants and waste water was discharged to the public water ways in the vicinity. All factories were using water through a network of deep wells dug in their premises.

The tables 2 & 3 show a summary their water consumption details. (Page 10 & 11)

All the combined machines in the factories had following main water consuming operations and specific water consumptions.

It was unfortunate that none of the factories were equipped with any water meters, main or sub. The water consumption data were partly measured and partly estimated. In addition following observations were made.

- a) At least 20% of the fittings were leaking.
- b) Only one continuous machine worked as a counter flow machine to reduce the consumption.
- c) None of the factories had a program for water re use or recycle.
- d) The process control, at all factories was fully manual and procedures were inadequate, resulting in use of large volumes of water.
- e) All effluents were discharged to public waterways without any sort of treatment.
- f) There was no proper maintenance plan for any machine. They believed in running the machine until it fails and then repair it.
- g) They believed textile market is very unstable, therefore, time and money spent on conservation of water will not bring any benefits to them.

In every mill we studied, the estimated over consumption was in excess of 35% and therefore the potential for saving water was enormous. The benefits in saving chemicals, energy and other utilities shall accrue so much benefits, the cost of production could be brought down at least by 8-12 %, only through conservation of water.

### **Water Consumption in Hotel Sector**

Tourism is given a high priority in the economic activities of the country. At present Sri Lanka has about 12,000 rooms to accommodate about 500,000 tourists annually. These tourist hotels employ about 20,000 persons directly and the indirect employment generated exceeds 50,000 persons. Also, these hotels/resorts use a large quantity of cleaning chemicals / laundry detergents and many other resources. Generation of wastewater because of the activities of the hotels contributes drastically to the environmental degradation, if proper care is not taken at the disposal stage. Therefore, our attention was focussed on the hotel sector too.

The table 4 below shows our observations at the hotels we selected. (Page 12)

The total number of rooms within this study was 2150 and total annual consumption 1.3 million cubic metres, which works out to 600 metre cubes per annum per room. When this figure is taken as the average consumption per room, in Sri Lanka annual consumption of water in Tourist hotel sector (12,000 rooms) amounts to 7.2 million cubic metres.

The study was directed to find the consumption patterns within the hotels and the main areas of consumption were:

- 1) Rooms
- 2) Public Areas & Gardening
- 3) Kitchen
- 4) Laundry

The summary of our observations on the consumption in different areas shown in the following table 5. (Page 13)

The following observations were also made:

- a) Every hotel at least 10% of the water fittings were leaking or dripping.
- b) In all the kitchens we found at least 2 to 3 hours, the wash taps were open unnecessarily.
- c) Most of the washings in the laundries of the hotels were running at a partial load.
- d) Almost all washing machines had to be filled to a unnecessarily high, minimum level.
- e) All cisterns were set at the highest water levels.
- f) Only two hotels had flow restricting fittings in rooms and kitchens.
- g) For gardening, all the hotels were using good quality water.
- h) None of the hotels had any facilities for reuse or recycle water from the operations.
- i) None of the hotels had any laid down plan to reduce the daily usage of water.
- j) Employee training and awareness level on water conservation was at a low level in all hotels.

The managers and employees at most of the hotels were receptive to the proposals and were prepared to carry out improvements to reduce excessive consumption.

Through brain storming, discussions, informal training sessions we were successful in obtaining employee proposals to cut down consumption. Some of the actions suggested were

- a) Setting cisterns at the lowest levels and also inserting a water filled plastic bottles to reduce flush volume
- b) To have regular maintenance and to stop leaks.
- c) To keep kitchen wash taps closed and also to use a bowl filled with water for washing
- d) To operate laundry washing machines at full load.
- e) To store water from different cycles of the washing machines and to reuse as appropriate.
- f) To use treated wastewater for gardening.

Through these measures, we managed to reduce water consumption in a few hotels by 28-32% during our short term exercise.

### **The Cause Analysis**

In the three sectors we studied, the consumption was in excess of 30-40% more than required. Our next question was why is the consumption high? What are the causes for this over consumption.? We could summarize our observations to a few main headings.

- a) Values and Attitudes
- b) Technical and Technological reasons.
- c) Educational and Training

### **Values and Attitudes**

Our ancestors considered water as precious. When a new couple is married their hands were tied with a thread and the bond was made sacred by pouring water on it. Even today, we have this as a ritual but many do not understand the reason behind it. Also, on the Sinhala New Year day in April, the housewife does the first transaction of the year with the well. This age old ritual is still practised in rural Sri Lanka . In the urban and semi urban areas these minor rituals are not practised. For them water comes through a pipe and why care. On the other hand, the urban population is immersed in a plethora of activities to make money. With money, they can buy any thing and every thing. Therefore, water is another commodity in the market. When a price is fixed on anything, it loses its intrinsic value.

With the changes of economy, our life styles also have changed. A new set of values has entered our lives. The place water occupied in our lives is pushed to a corner. Water no longer plays a major role: It can be bought over the counter or available at the mouth of a tap. In the past our ancestors laboured to bring good water home. Today it is available in a buried pipe. Those days saving a few gallons helped to the neighbourhood. Today, what benefit I get by saving it for the neighbourhood. Our shift of values with this change of life styles has had a tremendous impact on water consumption. With this shift of values, our attitudes have changed from 'caring for others' to "myself' only attitude and therefore we tend to value all our actions through benefits I accrue.

This was evident at domestic level especially among urban population and to a lesser degree among semi urban people. Even among the rural people glimpses of this change was noticeable .In the daily practises of water consumption we could notice this change of attitudes. We must learn to incorporate the age old good practises to our new life styles with out discarding them as obsolete, Otherwise our future generations shall face the possibility of extinction.

## **b) Technical and Technological Reasons**

A main factor contributed to wastage water at institutional levels was the inferior distribution networks. In every place we visited, we found pipes, taps and other fittings leaking. In many instances, we noticed the inappropriate fittings used or wrong installation techniques used. The losses due these inferior material and technology amounted to over 12%.

Many organizations complained that plumbers/pipe fitters in Sri Lanka were not skilled to perform even a simple job. Sri Lanka has spent many billions to improve the supply of fresh water to citizens of the country but it has not spent a cent to train/re train the plumbers and pipe fitters who carry out the domestic and industry level distribution systems. The colossal amount of water wasted due to wrong workmanship has lost many millions for the country.

In a recent visit to dry zone with a politician I observed many tube wells dug in the dry zone for supply of water. Most of these wells were in disuse because the pumps were in operation. The repair or replacement of the defective pumps was nobodies' responsibility. Lack of proper maintenance resulted in the disuse of these wells and it was the dry zone people who suffered. They, without making a big noise reverted to their familiar routine, walk to the nearby tank with the pot and pans on their heads.

A very pertinent requirement to ensure proper operation of a distribution system is the pre inspection by a statutory body. In Sri Lanka, such a system is not in operation and therefore even low quality work can go undetected.

## **Educational and Training**

There are no official programs to educate and train the school children, youth and adults on the impact of water to our future and the globe. Fortunately, there is an awakening on the problems of environment and water is considered as one aspect. School children are involved in campaigns to protect birds, wild animals and trees. The campaigns to save water are less than the count of fingers on the hands.

Unless youth is awakened from the deep sleep they are in about our water usage, they will not have a healthy life to boast about to their children. Children at schools, youth at universities, technical colleges and even new entrants to jobs should be taught to conserve water within their scope of activities and inculcating this habit in the minds of the children is going to be the single most factor which is going to make all our efforts on water conservation, a success or a failure

Water treatment and wastewater treatment is given a very prominent place in university curricula but there is little emphasis placed on water conservation, probably due to small financial benefits it offers compared to water and wastewater treatment. Unless the intellectuals change their stance on water conservation and give due consideration to reduce wastes we shall end up with no fresh water even to meet our basic needs.

## **An action plan to succeed in water conservation**

We have a huge responsibility to preserve our fresh water resources and to conserve the water without wasting it. To achieve this, action should be taken at three different levels.

National Level  
Institutional Level  
Individual Level

At national level a comprehensive water management and usage action plan should be formulated, preferably through a high powered Presidential Task Force, who will be the controlling authority for all water related activities. Some responsibilities to be assigned to the task force are



- a) Frame work to protect all fresh water resources
- b) Ensure supply of basic requirement of fresh water for every citizen of the island.
- c) Coordinate with ministry of housing and infrastructure to achieve the above.
- d) Coordinate with the ministry of industries to supply industrial water to all industries.
- e) Coordinate with ministry of environment & CEA to ensure fresh water resources are not contaminated through discharge of effluents.
- f) Coordinate with ministry of education to teach school children the importance of the protection of limited fresh water resources, reducing wasteful consumption and instill the culture of conservation and to be responsible for their actions in water usage.
- g) Encourage institutions and individuals through economic benefits for use of conserving equipment, processes and measures.
- h) Communicate through printed and electronic media the message of conserving water.
- i) Coordinate with the ministry of vocational training to train a batch of skilled plumbers /pipe fitters and to re-train /certify all plumbers/pipe fitters.
- j) To function as the national body to achieve the aspirations, goals and objectives of Agenda 21.

At institutional level, we have to set up an activity plan to achieve higher efficiency in water usage in all operations. A general plan of activity shall include

- a) To arrest all leaks in storage and distribution system.
- b) To introduce water efficient processing technologies.
- c) To carry out a water waste audit to evaluate actual consumption and to assess options to reduce waste.
- d) To modify, improve machinery & equipment for re use or recycle.
- e) To categorize water needs and to use appropriate quality for each activity.
- f) Discharge wastewater at appropriate standards.
- g) Communicate to all employees, contractors, visitors and concerned groups through posters, leaflets to protect water.
- h) Replace all water faucets and other fittings with low water consumption fittings.
- i) To create a culture of water conservation in its premises.

#### **At individual level**

- a) To have a target to reduce 10% of water usage at homes.
- b) Arrest all leaks on storage and distribution systems.
- c) To use gray water from toilets and kitchen for gardening.
- d) Educate all children at schools and at home on how to minimize water waste as well as consumption.
- e) To inculcate habits of water conservation in toilets, wash rooms, kitchen and other activities like car washing.

- f) To recreate a culture of respect for water as a nature's gift to human being.
- g) Replace wherever possible with low water consuming fittings and even resort to innovative water saving devices and techniques.

### **Conclusion**

Our study of water consumption patterns of selected sectors for efficient end usage reveals that at least 30-40% of water is wasted by the users. This is mainly due to attitudes of people, technological set backs and lack of awareness. The waste is more among urban population. The waste in industries was colossal. Irrespective of the organization visited a large volume of water was wasted by them, which could be totally eliminated at no extra cost. Such action would have brought them many benefits including cost savings. The pattern was common everywhere, whether the organizations were manufacturing, commercial, service or any other.

This paper suggests an integrated action plan at 3 levels to stop the ever increasing waste generation and to reverse the trend. This is the only approach we have to change from a wasteful culture to a conserving culture.

That is the challenge we have to face today.

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**Table 1**

Category	No of Households	Avg No in family	usage(Avg) per capita			Total
			Washing	Kitchen	Others	
Urban	167	4+1	245	65	45	355
semi Urban	94	5	185	40	25	250
Rural	64	7	100	35	25	160

Water consumption patterns in the domestic sector

**Table2**

Textile mill	Avg Manufacturing Capacity Kilograms/day	Water consumption cubic metres
A	6000	1,670
B	3000	795
C	4500	1,215
D	3000	910
E	1200	310

Water consumption in the Textile Sector

**Table 3**

Operation	Machine group	No of machines	Avg Specific Consumption	
			actual	Std
Dyeing	Jiggers	72	121	77
	Jet	16	110	90
	Winch	12	180	180
Washing	Jiggers	72	65	50
	Continuous	4	55	20
Scouring	Jiggers	72	20	18
	Continuous	3	40	30

Water consumption patterns by machine and by operations in the Textile Sector.

**Table4**

Hotel	No of Rooms	Water Consumption	Distance from Colombo
A	358	2205	COL
B	360	2315	COL
C	150	1816	190 km
D	140	1297	100 km
E	162	1541	60km
F	320	1406	COL
G	100	1135	115 km
H	158	1100	55 km
I	150	1362	35 km
J	90	1110	65 km
K	84	1081	65km
L	78	0873	200km

Water consumption in the Hotel Sector

**Table 5**

Area	Usage	% Consumption
Rooms	Bath	6%
	Faucets	53%
	Toilet Flushing	8%
Shower	7%	
Kitchen	Cooling	5%
	Washing (pot, plates)	16%
Laundry	Washing	21%
Public Areas	Swimming Pool	4%
	Gardening	10%
	House Keeping	3%
Employee Areas	Washing	8%
	Losses	75%

Water consumption pattern by operations and by divisions in the hotels.