MODULE 5

WATER AUDITING

The topics covered in this module are:

☐ Water audit

☐ Virtual water

☐ Water foot print

OBJECTIVE (S) OF THE MODULE

The trainer informs the following module objectives to participants:

☐ Understand the terms: water audit, virtual water and water footprint.

☐ Learn the methods and calculations of personal water foot print.

☐ Suggest ways of reducing water footprint.

WATER AUDIT

A Water Audit is a `systematic approach of identifying, measuring, monitoring and reducing the water consumption by various activities in the industry'. A water audit identifies the quantities, characteristics, and use of all the water delivered on the site and is the foundation of water resource management. Water audit is an effective management tool for reducing consumption, minimizing losses, optimizing various uses and enabling considerable conservation of water across various sectors of water use. The purpose of a water audit is to estimate the average quantity of water used and lost everyday with the ultimate objective of using water wisely. An offshoot of this kind of audit can also be to educate the end users about achieving water efficiency in their homes, offices, manufacturing, and other industrial and agricultural sectors for which water is the basic requirement for sustainability.

A comprehensive water audit gives a detailed profile of the distribution system and water uses. Water audits done on a regular basis would lead to better water management because only when something is measured, it can be managed. It also helps in understanding the present water efficiency and the solutions needed to enhance it.

Water audit studies have been done by many developed and developing nations but it is a new concept in the Indian context. This is all the more surprising because in June 2003, the Prime Minister had declared water conservation to be a national mission and suggested conducting water audit for all sectors of water use. However seven years later, water audits in any sector is still a novelty than a regular practice. Some studies have been carried out by the government and private agencies but they are few and far between and yet to acquire the seriousness needed in a water scarce country like India.

Some of the agencies that have done work on water audit include CII, FICCI and some private organizations. CII Delhi facilitated a preliminary study on water audit for nine hotels and restaurants of Delhi to understand their usage pattern in view of the increased demand for water envisaged during the upcoming Commonwealth Games 2010. A water audit was also done for the Delhi Jal Board building and the report submitted to the CEO, Delhi Jal Board along with recommendations. The Delhi Government is also exploring the possibility of Singapore's assistance in areas like detection and curbing of leakages, water meter testing and validation, and skill-based training in the area of plumbing. Two private companies are engaged in conducting studies on energy and water efficiency for a few corporate entities, but such cases are few and far between while actually such studies need to be done for every building and household so that consumers are sensitized on how they expend such scarce resources and what they can do to conserve them.

> For our purposes, electrical energy is also to be regarded as a product.

Did You KNOW

A human being consumes about 61000 litre water in his life cycle.

DATA NEEDS

Primary Data- through a well structured data sheet and onsite observation of usage patterns. The meter reading (wherever available) would be spread over several days and at different times of the day. The results would then be correlated

with the data obtained from the utility for the same billing cycle. In absence of metered supply data, consumption of water would be estimated from the time of pumping of tube well and discharge capacity of pump installed.

Secondary Data- through the data available with the utility and the consuming organization.

The data collection consists of making an inventory of information pertaining to where and how much water is being used throughout the location, information obtained from meters and sub meters, the average consumption of water for each water dispensing unit so that an estimate can be made for the average quantity of water consumed per day. Information is also required regarding the `leakages'. The detailed evaluation reveals the measures to be adopted for better water management and water conservation.

VIRTUAL WATER

The world's water supply is finite, while its population is ever-growing. Finding better ways to protect and manage this limited resource is a constant challenge. On the consumer level, there has been an increased awareness of ways to reduce water use at home - turning off the faucet while brushing teeth, installing water-saving fixtures and watering the lawn less often, for instance. But direct water use accounts for only a small part of the water consumed. A far greater amount is consumed in the production of food and other products. Agriculture, in fact, accounts for as much as 85 percent of worldwide water use.

To create sustainable solutions to the growing global scarcity of freshwater, the bigger picture must be considered: indirect water use, also known as "virtual water."

Virtual water can be defined as the water that is required for manufacturing a product or for rendering a service. Virtual water also contains the actual amount of water that exists in a certain product, particularly since this water was also necessary for the production of this good. For example, it is estimated that 1700 litres of water are required to create 500g of rice.
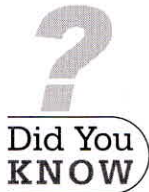
WATER FOOTPRINT

In line with the concept of virtual water, the concept of the water footprint has been introduced to create a consumption-based indicator of water use. The water footprint is defined as the volume of water needed for the production of the goods and services consumed by the inhabitants of a country.

The water footprint can be divided into an internal and an external water footprint. The internal component covers the use of domestic water resources and the external component covers the use of water resources elsewhere.

Furthermore, an agricultural, an industrial and a domestic component of the water footprint can be assessed. Here, the agricultural component corresponds with the

water use in the agricultural sector (i.e. in the form of crop evapotranspiration or water pollution), the industrial component corresponds with the water use in the industrial sector and the domestic component with the water use in the domestic sector.

Finally, the water footprint can be divided into a blue, a green and a gray water footprint. The blue component covers the use of groundwater and surface water during the production of a commodity, the green component covers the use of rain water for crop growth, and the gray component covers the water required to dilute the water that is polluted during the production of the commodity.

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Did You KNOW

Water requirement for production of cotton is approx 18,000 litres/Kg.

CATEGORIES

As water increasingly becomes a scarce resource, consumers and individuals are turning toward looking at the 'water footprint' in order to live in a more responsible way.

Personal water footprint generally includes three categories of information:

1. **Food.** This includes the water cost of growing, processing, transporting, and preparing various foods.

2. **Other household water uses.** This includes sanitation, bathing, laundry, dishwashing, as well as yard irrigation and maintenance.

3. **Water costs of manufactured goods.** This is the most difficult to quantify because the large number of uncertainties in the production, transportation, and marketing cycles of goods.

WHY REDUCE FOOT PRINT?

Lack of water impacts the ability to grow economically and sustain population growth. We can't make or produce new water, so it is necessary to conserve and manage water. Treat it as a valuable resource.
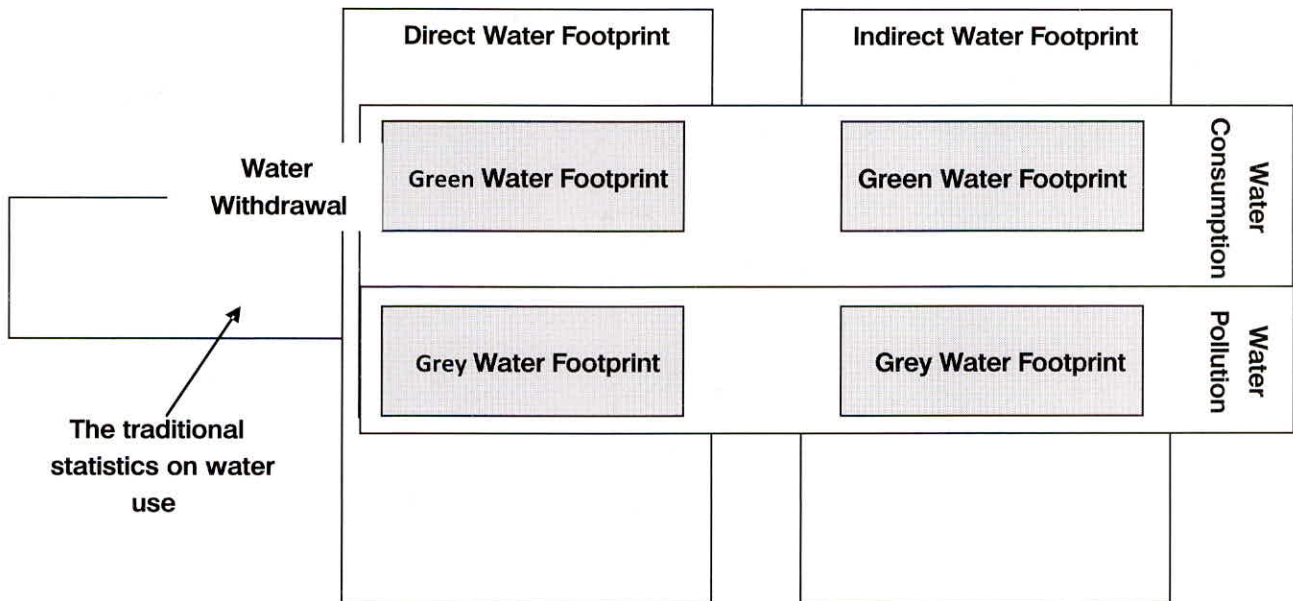
WHAT MAKES A BLUE, GREEN OR GREY WATER FOOTPRINT?

Water use is measured in terms of the volume of water consumed or evaporated and/or polluted, per unit of time. A water footprint can be split into three elements:

Blue Water Footprint: refers to the volume of surface water and ground water consumed (i.e. evaporated or incorporated into the product) during production processes;

Green Water Footprint: refers to the volume of rainwater consumed (i.e. evaporated or incorporated into the product) by the product; and

Grey Water Footprint: refers to the amount of freshwater required to mix pollutants and maintain water quality according to agreed water quality standards.

Direct Water Footprint	Indirect Water Footprint	
Green Water Footprint	Green Water Footprint	Water Consumption
Grey Water Footprint	Grey Water Footprint	Water Pollution

Water Withdrawal

The traditional statistics on water use

ONLINE CALCULATION (CALCULATORS AVAILABLE ON INTERNET)

There is not as many water footprint calculators as there are carbon dioxide but the number is increasing.

It is educational to compare the results of your water footprint for several different calculators. Because of differences in assumptions, the results may be quite different (the author got results that differed by more than a factor of ten); the most useful comparison is your own water footprint with the average for your own state/region.

Facebook: Siemens Water Calculator

Available at - http://apps.facebook.com/watercalculator/

This widely-used water footprint calculator was developed by the Siemens company and is available on Facebook. It is the simplest and most accessible of the calculator, but it is also the least detailed. It includes only food and other household contributions; no account is taken of the water cost of manufactured goods. There are several good questions about household water consumption (low-flush toilets, for example). Beyond a general question about eating habits, (vegan vs. vegetarian vs. meat eater) there is no accounting for personal variations in dietary habits.

Water Footprint Network

Available at - http://www.waterfootprint.org/?page=files/home

The Water Footprint Network has been a leader in developing the water footprint concept and in implementing a set of norms for doing both personal and business calculations of water footprints. The calculator is particularly useful because it considers a variety of details about diet that are absent from other calculators (e.g., consumption of cereal products, meat products, dairy products, etc.). It also tries to individualize other household uses of water (dishwashing, laundry, garden, swimming pool, etc.). It is the only calculator that attempts to assess the water cost of manufactured goods you use (for an affluent consumer, this is more than 75% of the total water footprint). This is done on the basis of personal income (admittedly, an inexact measure, but it is the best thing available at present).

Kemira Water Footprint Calculator

Available at - http://www.waterfootprintkemira.com/

Kemira is a Finnish chemical company with a particular focus on water. Their water footprint calculator does a good job on individual food and household issues, but then takes an average for the water cost of manufactured goods (with no accounting for income or lifestyle).

WHY REDUCE WATER FOOTPRINT

There are places on earth where human demand for water is greater than the amount of clean water that is available. As human populations grow, water scarcity and water pollution will continue to become more common. Our consumer choices in India do affect others around the world, and we can become better global citizens by reducing our personal water footprints.

REDUCING WATER FOOTPRINT

- Fix leaks - Small drips add up to a lot of water.

- Use a water-efficient washing machine and run it full - You'll also save energy, use less detergent, and reduce fabric wear.

- Replace toilets with low-flow models - We use tremendous volumes of treated drinking water-and copious amounts of energy-to flush.

- Use a water-efficient dishwasher rather than hand washing, and run it full - Upgrading to a water-efficient dishwasher is another easy way to save water.

- Slow the flow at home by installing low flow devices where possible.

- To reduce your indirect water use, look for food that is in season, comes in less packaging, is locally produced or is grown in areas that are not water-stressed.

- When buying new clothing or

goods, stop and think: do I need to buy this item?

- Try to buy fair-trade, eco-friendly or secondhand products more often.

- Reduce, Reuse and Recycle more, and choose gas-free transportation more often.

LESSONS LEARNED
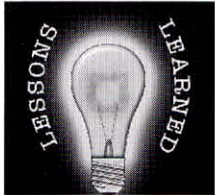
- The world's water supply is finite, while its population is ever-growing.

- Virtual water can be defined as the water that is required for manufacturing a product or for rendering a service.

- Personal water footprint includes three categories of information: food, other household water uses and water costs of manufactured goods.

- Lack of water impacts the ability to grow economically and sustain population growth.

- Water footprint is of three types - blue water, green water and grey water.

- Water footprint can be calculated using online calculators or working with a simple worksheet.

- There are places on earth where human demand for water is greater than the amount of clean water that is available.

- There are simple steps which you can follow to reduce your water footprint.

NOTES

The trainer can note down important notes below and discuss them towards the end of the training programme.