

EN-ADC-240

**The culture society for**

**Youth & childhood**

**“CSYC”**

**WEPIA Program**

**“Materials”**

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# W elcome To Water Conservation Training Guide:

## **T**he Water Efficiency & Public Information for Action Program

The Water Efficiency and Public Information for Action program (WEPIA) is a three-year program implemented by the Academy for Educational Development (AED) in collaboration with the Ministry of Water and Irrigation, and funded by USAID.

The overall objective of the program is to promote the efficient use of water through utilization of water saving technologies.

WEPIA seeks to achieve this goal through various strategies. One of which is the interactive water education program. Under this activity, WEPIA utilizes both the formal and informal education programs to reach a large sector of the population through their children. It is the latter program that this manual is designed for. WEPIA acknowledges the support and assistance of friends of the environment Society for the initial copy of the manual. WEPIA is also grateful to all its WEPIA staff who helped modify and update this manual to be used in the summer camps organized in 2001 by the Ministry of Youth.

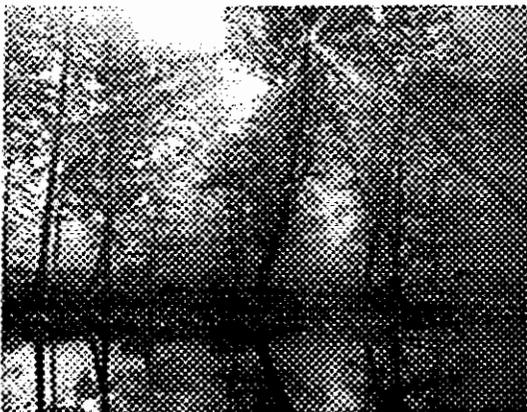




# Training Guide Sections

## *Module I*

### Environmental Problems:



1. Water pollution
2. Acid rain
3. Global warming
4. Ozone depletion
5. Drought and flood

### Water Cycle:



1. Surface water
2. Ground water
3. Evaporation
4. Transpiration

## *Module II*

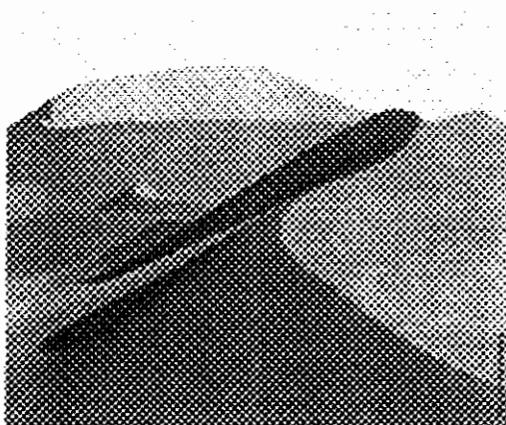


### **Water Games:**

1. Water Quiz
2. Water Card

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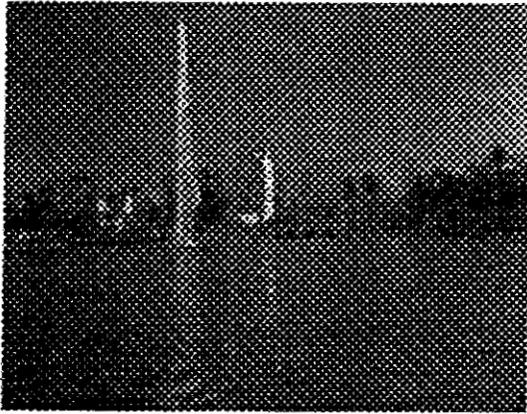
## *Module III*



### **Water Situation in Jordan:**

1. Water Resources
2. Supply and demand sectors
3. Water shortage in Jordan

## *Module IV*



### **Water Conservation:**

1. **Water Efficiency and Demand Management**

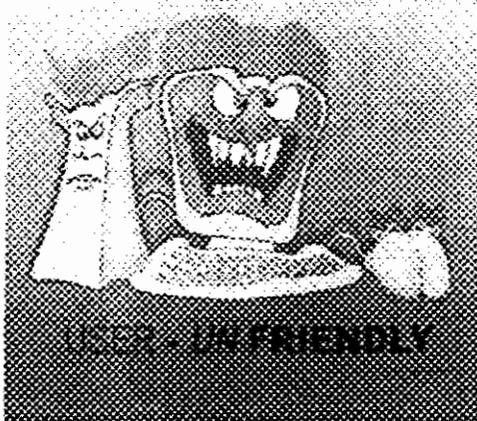
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## *Module V*



### **Conducting Water Audit and Leak Detection**

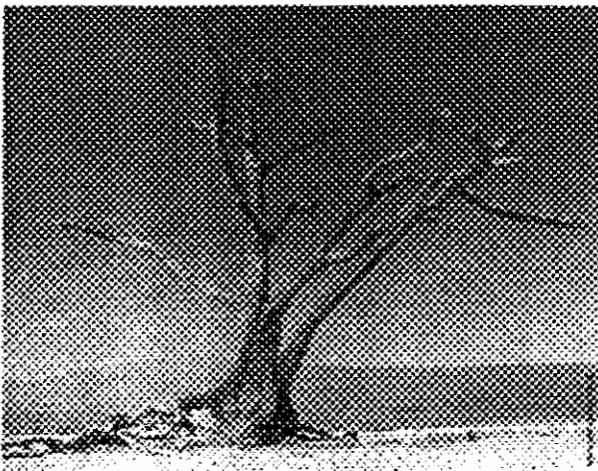
## *Module VI*



### **Demonstration Machine Presentation**

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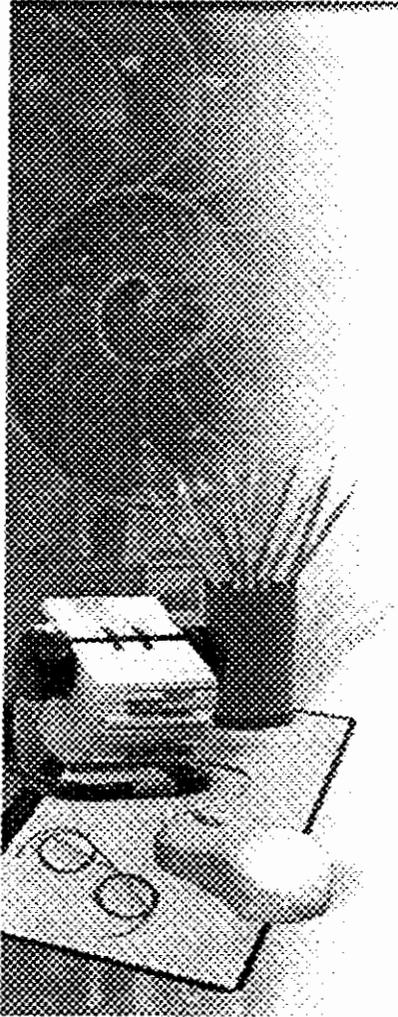
## *Module VII*



### **Simple Projects in Water Efficiency:**

1. Irrigation technique.
2. Home water audit and leak calculation.
3. Water collecting projects (rainwater harvesting)

## *Module VIII*



### **Evaluation Sheet:**

1. Three major questions about the main concepts of the workshop.
2. Three major questions participants add to the workshop principals.
3. Personal question about the trainer performance during the workshop.

## **How To Use This Guide!**

This training guide is developed to be an aiding tool for trainees as a non-formal way of education of water conservation in Jordan. The guide is targeting youth during summer camps with an age group between 12-28. Although the guide provides trainers with a step by step training, yet it is designed in a way to offer flexibility incase of time and age limitations. The training guide is divided into independent modules with similar formats to make it easy to use. Each module lists the objective of the module, duration, target group, aiding tools, guiding questions, and trainers notes. Trainees can choose to ignore any modules except those marked main

We hope that this training guide would provide trainees with skills and knowledge on water conservation methods and training methods as well.

We also hope to receive any feedback on the training guide after using it during training so that we can modify it and upgrade it according to require needs

## Pre-Training Arrangements

Prior to any field visit the following arrangements must be made to insure the smooth running of the camp program

### Check List For Camp/Site

- General set-up of the site.
- Age group.
- Technology available at the camp.
- The infrastructure at the site.
- The exact time of the camp and presentation.
- The program should be conducted at the start / beginning of any camp to prevent mental fatigue that the attendants might be experiencing
- The telephone + electrical-out lets available for use

**Check List for the Training**

- Stationary (flip charts, papers, markers, pens, notepads, etc.)
- Handouts (agenda, case studies, WEPIA brochures, forms, etc.)
- AV Materials (TV, VCR, OHP, White screen, Data show, lap-top, etc.)
- Games Material
- Participants list
- Aiding tools specified in the training guide

## General Instructions:

**You can select the introductory module according to the following criteria:**

**1. Age range**

- If the majority of the participants are within the age 12-16 , you can start with the introduction, followed by the game, then proceeding according to modules sequence in the guide.
- If the majority of the participants are within the age 16-28, you would preferably start with the first module: environmental problems and continue according to the module sequence in the guide
- If the majority of participants are within the age 12-28, then you are forced to balance between participants' needs. Select appropriate game, simplify the scientific information as much as you can, and start the training according to modules sequence in the guide

**2. Time limitation**

This manual is designed in a way to offer flexibility according to time limitations

You can decide to ignore any modules except those marked "Main" if time does not allow.

## **How to Start Training**

1. Introduce yourself. Provide your name and a briefing on your background.
2. State the objective of the training;
3. Introduce WEPIA. Do not forget to mention that it is implemented by the Academy of Educational Development, in collaboration with the Ministry of Water and Irrigation, and funded by USAID.
4. Ask participants to introduce themselves;
5. Share the agenda of the training with the participants

## **Module I: Environmental Problems & Water Cycle**

### **How To Start**

- Start this module by asking general question about environment problem.  
Such as water pollution, global warming, drought, floods, ozone depletion and acid rain...
- Then trainer introduces water cycle.
- you can use helping tools during this module
- 

### **Objectives Of Module:**

- Test participants knowledge of environmental problems.
- Introduce the Water Cycle

**Note:** This module is divided into two sections, each section has its own target group, duration, and questions descriptions

## **A. Environmental Problems:**

**Target Group:** 16-18

**Duration:** 25-30 min

### **Questions**

- What are the reasons of these problems?
- What are the effects of these problems in the daily life?
- What are the effects these problems on Jordan?
- How we can solve these problems locally?

### **Aiding Tools**

- A Transparency on "The Earths Water Supply"
- A Transparency on "Acid Precipitation"

### **Key Words**

- Water pollution
- Acid rain
- Global warming
- Ozone depletion
- Water shortage
- Drought
- Green house effect

## **B. Water Cycle**

**Target Group:** 12-16

**Duration:** 10-15 min

## Questions

- What is the percentage of the fresh water on earth?
- What are the major parts of water circulation on earth?
- What makes water circulated?
- Where does the water you use come from?
- What might limit the supply of water available for you to use?

## Aiding Tools

- A Transparency of the "Water Cycle"

## Key Words

- Surface water
- Ground water
- Evaporation
- Transpiration

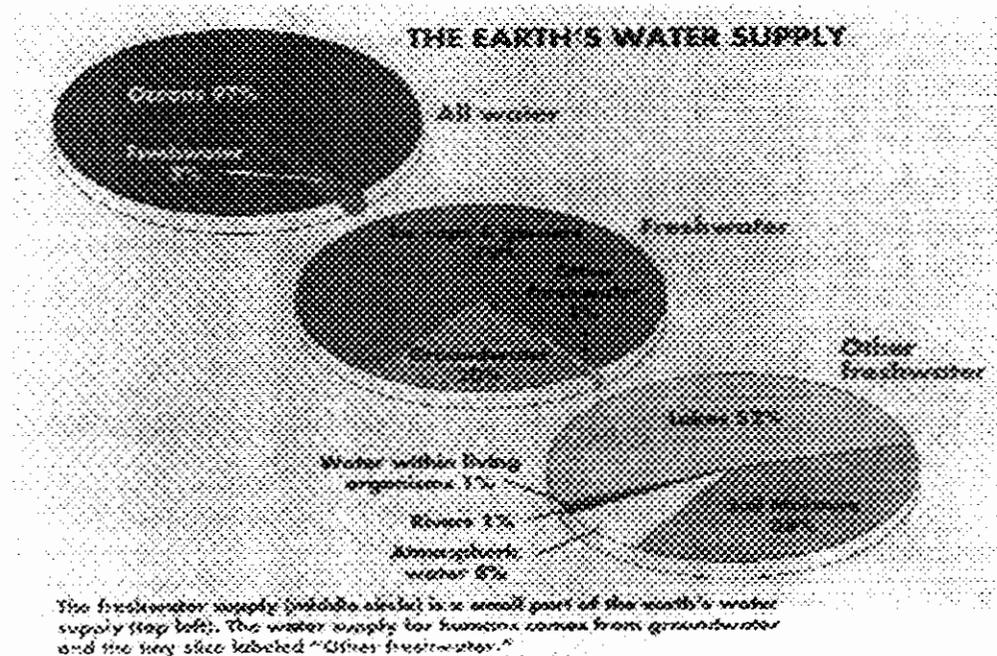
## Trainers Notes

### Introduction

Water is one of the most important compounds for the living things. It is a valuable resource for every human daily activity such as Domestic, agricultural, industrial use. Not only is water valuable for human consumption, it is also considered as a source of attraction for tourists. Indeed, it plays a very important role for recreational purposes. Nowadays, water has become a very scarce resource for many countries, and therefore, conserving it becomes a must.

### How much clean water is there?

- ❖ Most of the Earth's water (97 %) is saline water, and less than 3 % is fresh water.
- ❖ ¾ of the fresh water is found in the polar ice caps and glaciers.
- ❖ About ¼ of the fresh water or less is ground water.
- ❖ Only 0.5 % is found in lakes, rivers, streams, and atmosphere.



### **Water pollution**

Any material that causes changes to the physical or chemical characteristics of water is considered water pollutants.

The physical characteristics of the water are:

- ❖ Color.
- ❖ Taste
- ❖ Smell

The chemical characteristics of water are:

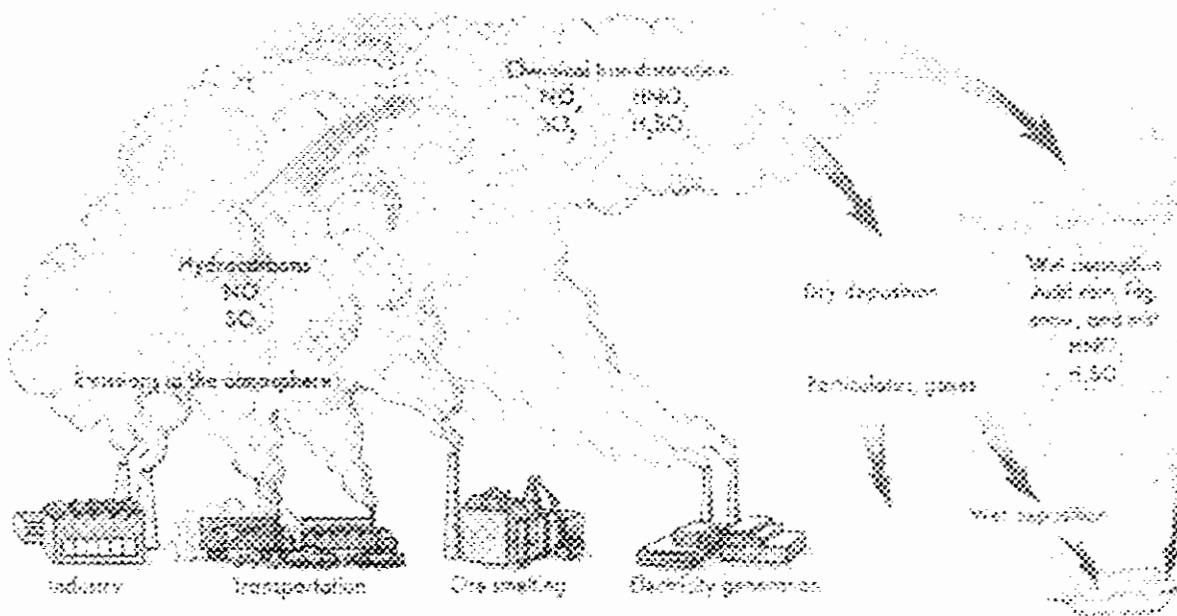
- ❖ PH (degree of acidity)
- ❖ Microorganisms (virus, bacteria, ... )

There are certain levels of acceptance for any substances that can be found or added to water according to the international or local standards

### **What is acid Perspiration?**

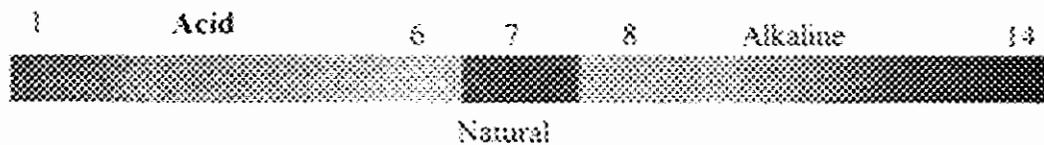
Acid Precipitation is rain, snow, fog, mist, or dust hat containing enough sulfuric acid, nitric acid, or their precursors to raise the acidity of the precipitation above normal.

## How is acid precipitation formed?



## How do you measure acidity?

To measure level of acidity, we use a PH scale of 1 to 14. Substances with a PH from 1 to 6 are called acid, from 8 to 14 alkaline, and 7 neutral.



## Acid rain affects

- ❖ Buildings
- ❖ Lakes streams
- ❖ Vegetation cover
- ❖ Aquatic ecosystems

The following map shows the distribution of acid precipitation around the world

Jordan appears not to have a high level of acid rain, which makes it safe to use

rainwater for human consumption with no problems.



### What is Global Warming?

While green house gases play a vital role in maintaining the necessary conditions for life on earth, too high concentration of these gases can cause heat trap and lead to global warming. Carbon dioxide is responsible for about 50% of global warming.

Chlorofluorocarbons (CFCs) for about 20%, methane is about 16 %, Ozone about 8%, and nitrous oxide about 6 %.

The green house Index compiled by World Resource 1994-95 lists top five contributors to global warming as United state (19.14%), former Soviet Union (13.63%), China (9.92), Japan (5.05%), and Brazil (4.33%)

Green house effect increase in four major ways:

1. The combustion of fossil fuels producing carbon dioxide, and nitrogen oxides
2. The clearing burning of forests releasing both carbon monoxide and dioxide  
When vegetation is cleared, burned or left to decay, carbon is released to the atmosphere.
3. The decomposition of organic matter releasing carbon dioxide and methane
4. The activity of ruminants (cows, Sheep) increasing methane release

By the year 2075 the amount of carbon dioxide will double which will lead to 5 C degree increase in the average world temperature.

### **Ozone depletion**

There are certain chemicals capable of destroying the ozone such as Chlorofluorocarbons (CFCs), which accumulate on the upper atmosphere. These chemicals reduce the concentration of ozone, resulting in a phenomenon known as stratospheric ozone depletion (not ozone hole)

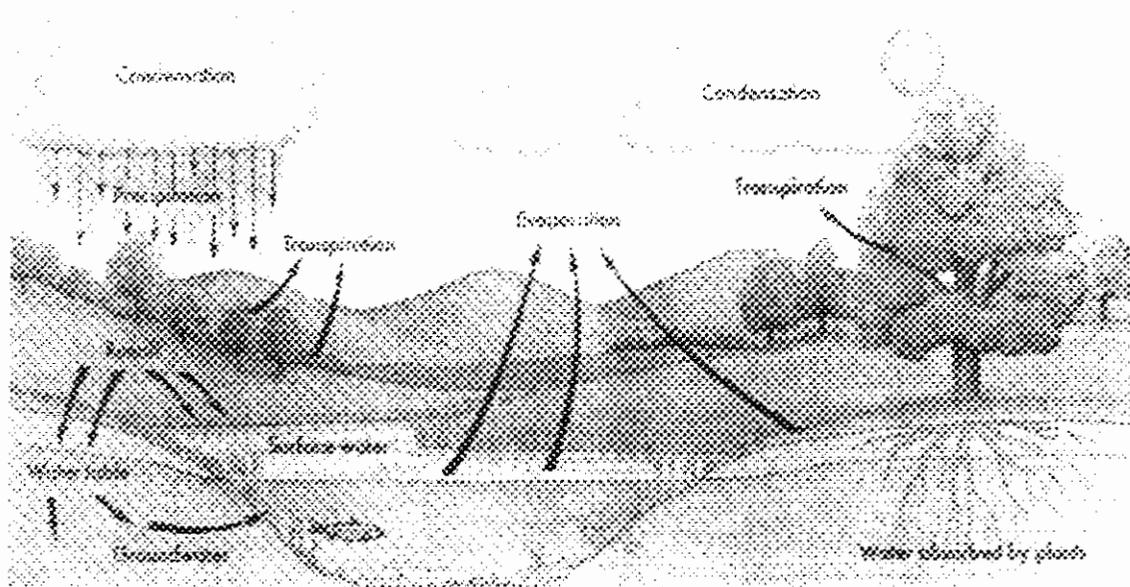
This layer protects the earth from Ultraviolet radiation. Ozone depletion increases the amount of UV radiation reaching the earth this leading to skin cancer, sunburn, slow plant growth, and delay seed germination...

### **Drought and Flood**

Due to the unbalanced global conditions, part of the earth suffers from floods and storms. On the other hand, drought and desertification attack a lot of lands. Both phenomenon lead to human and resources loses. During the last three to four years

Jordan faced the most severe drought, which affected the economical, recreational, agricultural and general human activities

## Water Cycle



How does water leave and return to the surface of the earth?

In nature, water changes from liquid to vapor, and this process is called **Evaporation**. As the sun heats the earth, water evaporates into the air from the surface of the lakes, rivers, oceans, and soil. Plants also add water vapor to the air. During the process of **Transpiration**, water stored in the plant cells is released as water vapor.

Evaporation and transpiration add moisture to the atmosphere, and winds carry this moisture all over the earth. Remember that temperature of the atmosphere decreases with altitude.

Therefore, when vapor rises or is blown higher into the atmosphere, it cools and condensates forming clouds.

Precipitation occurs when clouds hit a cold surface. Some of the Precipitation form as surface or subsurface runoff, and some go down into the soil through a process called infiltration. Water which forms as surface runoff is called surface water (such as: lakes, streams...) and that which infiltrates to the ground will form the ground water.

## Module II: Water Games

### Suggested Games

Water Card Game

Quiz

### Objectives:

#### A. Water Card Game:

- Teach the students that each part of the eco system parts are connected closely with each other. That is if one part suffers, the others suffer with it, if one part is damaged, the other parts are affected as well or even damaged.
- Break the ice and warm up the students encouraging them to participate in the program and become motivated.
- Examine the level of environmental base knowledge that the youth have.

## B. Quiz

- liven up the atmosphere, and at the same time present the students with short and precise information that will be discussed in details later on during the program.
- This segment is intended also to introduce the next part of the program.

## Target Group:

Water Card Game: 8-16

Quiz: 16-28

**Duration:** 30 min

## Questions For Trainers

- What are the main concepts of these games?
- How can conduct these games?
- How do you finish these games?

*Additional games can be added to this part according to the trainer experience*

## **Trainer's Notes**

### **Introduction**

Games have an important role in the educational process. More over the effect of games on youth should not be underestimated, students learn more when they are having fun.

### **The Water Card Game**

#### **Recommendations:**

- Due to our experience with the various camps, it is recommend that no more than twelve students should participate in this game.
- The duration should not exceed 10 minutes for the smaller groups and 10-15 minutes if you have a lager group.

#### **Steps:**

- each student pins a paper on the front of his or her shirt. On this paper a part of the eco system is written, for example: tree, lake, fish, birds, animals, river, soil,... etc.
- The trainer starts with one student, who is given a ball of yarn and asked to pass it on to the other participant that has the strongest eco connection. For example, a tree is connected to the birds, the insects to the soil and the rain water to the water source and so on

- Keep passing the ball of yarn around until at the end the string forms something similar to a spider's web.
- The game starts now, you ask one person to take two steps back and to describe what happens to the pattern , then to take four steps forward and also describe to the players what has happened.
- Once it is obvious to all participants that a definite and strong eco connection exists with the other players i.e the ecosystem, the trainer asks one of the participants to release the yarn signifying the loss or extinction of a certain part of the eco system.
- After this the participants are asked to observe and describe the accompanying chain of events that takes place as more and more players release the yarn, meanwhile noticing what happens to the tension in the yarn as more and more participants release it until the yarn is totally useless and relaxed.

### The Quiz

#### **Recommendations:**

- It is recommended that more time be taken to play this particular game for it is a lively game and thus increases the motivation of the participants.

- Do not underestimate the role games have in any educational process on the youth, students learn more when they are having fun.
- Do not cancel this game under any circumstance. If the time of your program has been cut back, proceed with the quiz game but decrease the number of questions. In any case it is recommended to cancel the card game all together and concentrate on the quiz game if the time allocated for the program is not sufficient.

**Steps:**

The quiz is about the water situation in Jordan and in the world.

1. Split the participants into two teams, A and B.
2. Ask each team to identify a team leader who is responsible for getting the final answers from their team.
3. Start asking the prepared questions
4. Assign someone to write the scores.
5. Whichever team answers the most questions correctly, scores more points, and thus the team with the highest points wins a prize

(Main)

## Module III: Water Situation in Jordan

### Objective

- Localize the water shortage problem;
- Increase participant's knowledge on water resources in Jordan;
- Involve participants in finding solutions to water shortage problems

**Target Group:** 12-28

**Duration:** 15min-25min

### Questions

- Where does water come from in Jordan?
- What are the major consuming water sectors in Jordan?
- What are the reasons for Jordan's water problem?
- How could people in Jordan be protected from water shortages?
- How can we solve these problems locally?
- What are the strategic solutions for the coming generation?

### Aiding Tools

- A transparency of "Sectors In Jordan consuming water"
- A transparency representing the graph of "Demand, available, and deficit"

## **Key Words**

- Supply side (ground, surface and waste water)
- Consuming sectors: Agricultural, Domestic and Industrial sectors
- Water deficit

## **Trainer's Notes**

### **Introduction**

Year by year water resources in Jordan are decreasing. The Global-warming phenomenon increased the drought severity in this region for the last four years. In addition, the rapid increase of population in Jordan is one of the most important reasons for water shortages. The unstable political situation in the region makes Jordan face sudden unexpected migrations, which increase the water situation problems.

### **Water Resources in Jordan**

Water resources in Jordan are limited due to its arid and semi-arid climate. The amount of renewable water is estimated to be 780 MCM, of which 505 MCM is surface water, 275 MCM is ground water. In addition, 140 MCM is nonrenewable water, which is mostly found in Disi ground water basin.

The consumption of water in the year 2000 is 817 MCM, 728 comes from conventional resources such as surface and ground water and the

remaining amount comes from unconventional water resources such as waste water treatment.

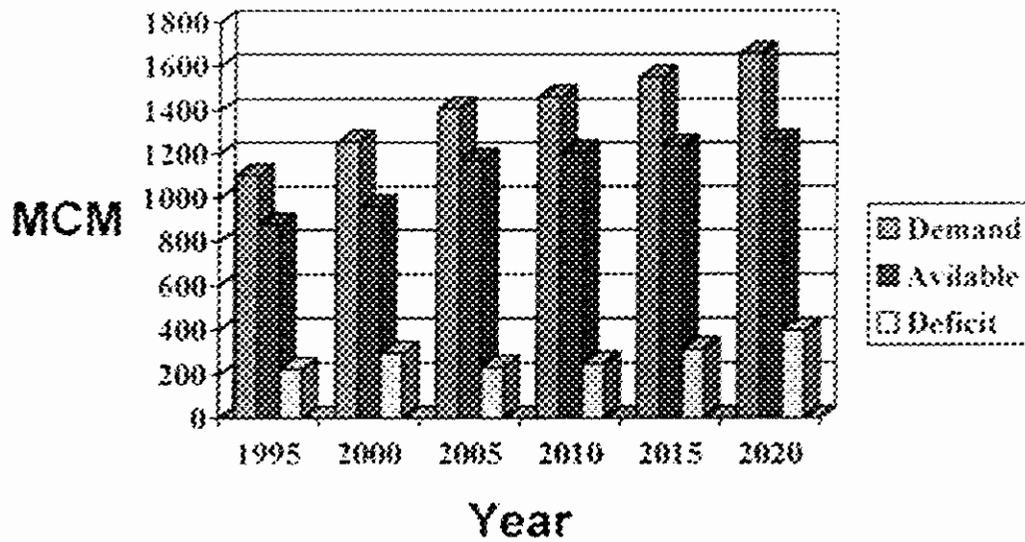
Water demand in different sectors:

Sector	1985	1999
Agriculture	78 %	69 %
Municipality	18 %	27 %
Industry	3 %	4 %

Water deficit

1995                      22%  
 2000                      30%

**Total Demand, Available, Deficit**



### Why will demand increase?

(1) Demand is influenced by the population growth, and this is expected to increase

	1985	1999
Total population	2,665,000	4,800,000
Population growth rate	4.4 %	3.3 %

Average daily supply per person per day was 157.1 L in 1995, and it is 139L/ Cap/day (1998), and will continue to go down. People must take measures to stretch the available supply.

(2) Demand is also influenced by the need to improve economy and industrial output. For example, factories require water, as do road buildings and other construction works. Tourism is also a major economic benefit so we need to protect our biodiversity in areas like Azraq and Dana. Finally, increased demand on agriculture to feed the increasing population will affect our water resources. It's one connected system where each part affects the other.

## Module IV: Water Conservation Module

### Objective:

- Introduce the concepts of water conservation and water demand management.
- Increase participant's knowledge of the different integrated ways of applying water demand management

**Target Group:** 16-28

**Duration:** 15min-30min

### A note!

*You can introduce the general definition of water conservation and its categories to the participants.*

### Questions

- What is the meaning of efficient use of water?
- What are the different categories of water conservation?
- What do we mean by water demand management?
- How can water demand management be used as a new water source?

## **Aiding Tools**

1. A transparency representing diagram of water demand management aspects

## **Key Words**

- Water conservation
- Demand management
- Water saving device
- Water harvesting
- Water reuse
- Water polices
- Methods of irrigation

## **Trainer's Notes**

### **Introduction**

Water conservation is part of water demand management and it is a very wide and complicated concept. However, it could be defined as the efficient use of water resources with reducing the amount of wasted water. This concept combines both water resources and environmental subjects. So, conducting a water demand management program needs to deal with water treatment and pollution monitoring, water resources policy and planning, drought management and arid landscaping. Accordingly, new potable water source will be available without the construction of dams or canals that will cost millions of US Dollar. For example, each million cubic meter reservoir capacity needs around 1 million US Dollar as money for construction. Water conservation might save water ranges between 10-18 percent. This depends on the raising percentages of the efficiency in the different sectors (irrigation, domestic and industrial).

## **Water demand and supply management**

Demand for water has continuously increased over time. There are two reasons for this. The first is that the populations have increased. More and more water is needed for domestic, agricultural, industrial and other purposes. The second reason is that the average standards of living have also tended to increase. As standards of living increase, so do per capita water demand.

Demand management addresses ways in which water is used and various methods available to promote more desirable levels and patterns of use. Water conservation measures and water pricing policies are two instruments of water demand management. Effective demands as well as supply management are equally important tools for any sustainability water supply and distribution system.

Water demand management consist of the following defined procedure

### ❖ Management procedures

1. Instructions and laws for water saving.
2. Building codes specification and standards.
3. New methods in irrigation
4. Environmental impact assessment.
5. Organization of the agricultural uses

### ❖ Economic Procedures

1. Water pricing
2. Reducing or removing the subsidies on the price of water
3. Incentives for people to save water.
4. Fines and taxes for large consumer

### ❖ Technical procedures

1. Using water saving devices in all water outlets

7/6/2001 Summer camps training manual

2. Finding and maintaining leaks.
3. Controlling the pressure and the amount of the pumped water to the network.
4. Using new technology for monitoring and controlling the water network piping.

❖ Educational procedures

1. Awareness campaign, workshops, and lectures
2. Press releases in the Media, TV, radio, newspaper.
3. Brochures, posters, Booklets
4. Developing school curriculums
5. Exhibitions

## **Module V: Conducting Water audit and Leak Detection**

### **Objective:**

- Develop participants skills in conducting a water audit and a leak detection.
- Enhance participants responsibility to apply what they have learned at home

**Target Group:** 16-28

**Duration:** 15min-30min

### **Questions**

- How to conduct a water audit inside homes?
- What are the tools needed for conducting a water audit?
- How can auditing water consumption help you identify waste?
- How much water is lost due to leaks or waste?
- What are the components of water bill?

### **Aiding Tools**

1. Water audit forms.
2. Water Containers
3. A stopwatch.
4. Colored tablets

5. Water bill.

## **Key Words**

- Water audit
- Leak
- Flow rate
- Efficiency

## **Trainers Notes**

### **Introduction**

Water audit is one of the most important methods that can define the amount of water consumed or which could be saved through a building. The information that will be gathered from the home or building could help the auditor to conduct an economic analysis

#### **What is a water audit form?**

The form of the water audit consists of the following items:

**First section:** general information about the auditor, and the building that will be audited. For example, name of the auditor, date, place of the building

**Second section:** different water outlets in side the building flow rate, and number of items

**Third section:** general information about the type of water outlets and if it leaks

#### **How to measure flow rate through water outlets (faucets, showers)?**

- 1) Prepare a known volume bottle to collect a specific water volume
- 2) Bring a stopwatch
- 3) Turn your faucet or shower on, all the way
- 4) Put the bottle directly under the running water

- 5) At the same time you put the bottle under the running water, start calculating the time
- 6) Do this procedure again to all faucets at home.

**You can measure the toilet volume as following:**

- Mark the level of water in the tank with a marker
- Flush your toilet and close the supply faucet
- Refill your toilet with a known volume bottle to the mark .
- Calculate the volume of your toilet tank (No of bottles X the volume of the bottle)

## Leak detection

Water outlets like any equipments in the house need to be checked once every year from its installation date.

**Causes of leaks can be due to the following reasons:**

1. Rubber “o” ring might be ruined. The cost of repair range between 0 02-0 1 JD
2. The core of the faucet, which cost 1 JD.
3. Faucet handle, which cost around 1.25 JD

Toilets (gravity tank) may have different reason for leaks

1. Water controller device, which cost between 5-14 JD
2. The rubber of the core of the tank

**How to detect the water leakage in your home?**

**1) Shut off all water inside and outside**, don't forget irrigation systems, evaporative coolers and automatic pool filters. Make sure everyone knows not to use any water during the test period.

**2) Find your water meter.** The water meter is where all water enters the service line into your property. The municipality checks for meters to determine your monthly water usage. The reading is an accumulative total of water that has passed through the meter since it was installed. All water used on your property flows through the meter.

**3) Locate and read the Meter.** After closing all the outlets in the house, open the water meter box, which will be located somewhere around the house in the garden, read the water meter and record the reading, then wait one hour and read the meter again, and report the reading.

$$\textit{Second reading} - \textit{first reading} = \textit{water loss per hour}$$

If the reading you got is the same as the first one then you have no leaks in your home, other wise you have a leak some where and you have to detect this leak and fix it

**Meter Checklist**

1. Shut off water.
2. Find your water meter
3. Record the first reading for the meter
4. Wait one hour
5. Record another rereading

6. Find the difference between the two readings and this will be the loss in your house due to leaks.

If no water is wasted, the two reads should be the same. If the reading has changed then someone is using the water or if not you probably have a leak, it can simply a drippy faucet, running toilet, or some times more complex as a leak in your water pipes or irrigation systems.

### **Check leaks Indoor**

This section will describe how to investigate leaks and offer suggestion retrofitting and repairing a variety of fixtures. If you're not experienced in minor plumbing repair, it may be more cost effective

### **Toilets**

Toilets are the most likely place for leaks, yet the least noticeable. Most toilets installed after 1980 in Jordan are using between 12 to 15 liters per flush and sometimes even more, the new studied showed the a 6 liter tank can do the flushing job successively and in this way we can save from 6 to 9 liters each time we use the bathroom and sometimes even more.

### **Toilet Check list**

1. Remove tank lid
2. Remove in tank cleaners
3. Check overflows tube.
4. Flush and wait for tank to refill
5. Drop in dye tablets
6. Wait 15 minutes

If color appears in bowl you have a leak.

Instead of using a dye test you can easily use a baby powder

1. Put some powder in the bowl all around
2. Wait for 15 minutes

If there is any leak in the toilet you will see the water path in the bowl clearly

**NOTE:** its been proven that chlorine products placed in the tank may decrease the life of your flapper.

**TIP:** it recommended that flappers be replaced every 3 to 5 years Most flappers operate efficiently for a few years before they become warped and leak-prone

## Module VI: Demonstration Machine

### Objectives:

- To allow participants to test the water saving devices, and compare savings before and after installation of water saving devices.

**Target Group:** 12-28

**Duration:** 15min-30min

### Questions:

- What are the benefits of using the demo machine during the training?
- How Can the demomachine help us invistigate water saving inside buildings?
- How can we select the appropriate water saving device by using Demo machine?
- What is the diffrence between the effeicient and ineffecient water outlet fixures?

**Aiding Tools**

- Demonstration machine
- Water Saving Devices

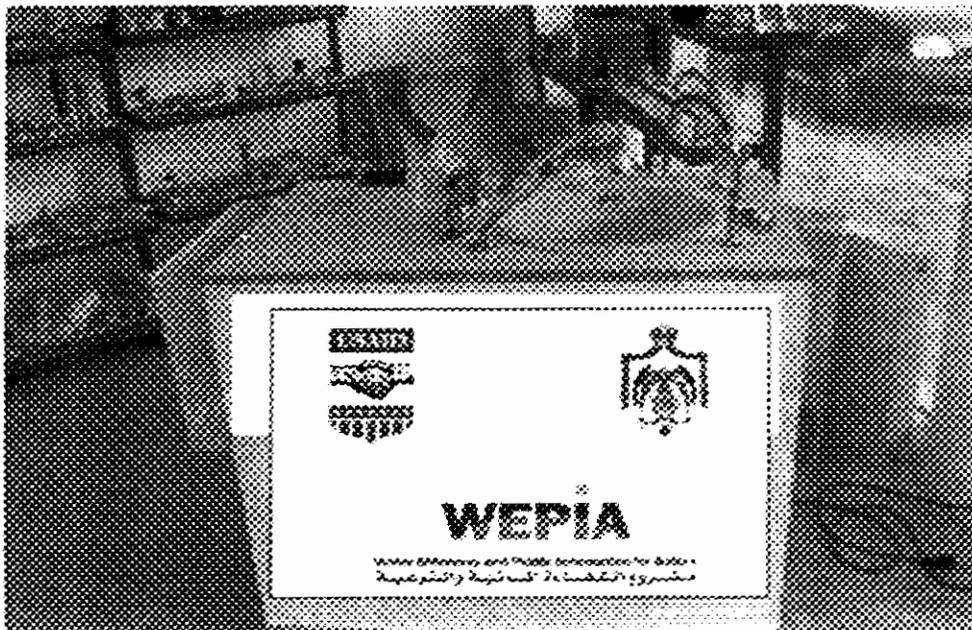
## Key Words

- Water saving Device
- Pressure.
- Flow rate (specification and standard)
- Efficient use of water.

## Trainer's Notes

### Introduction

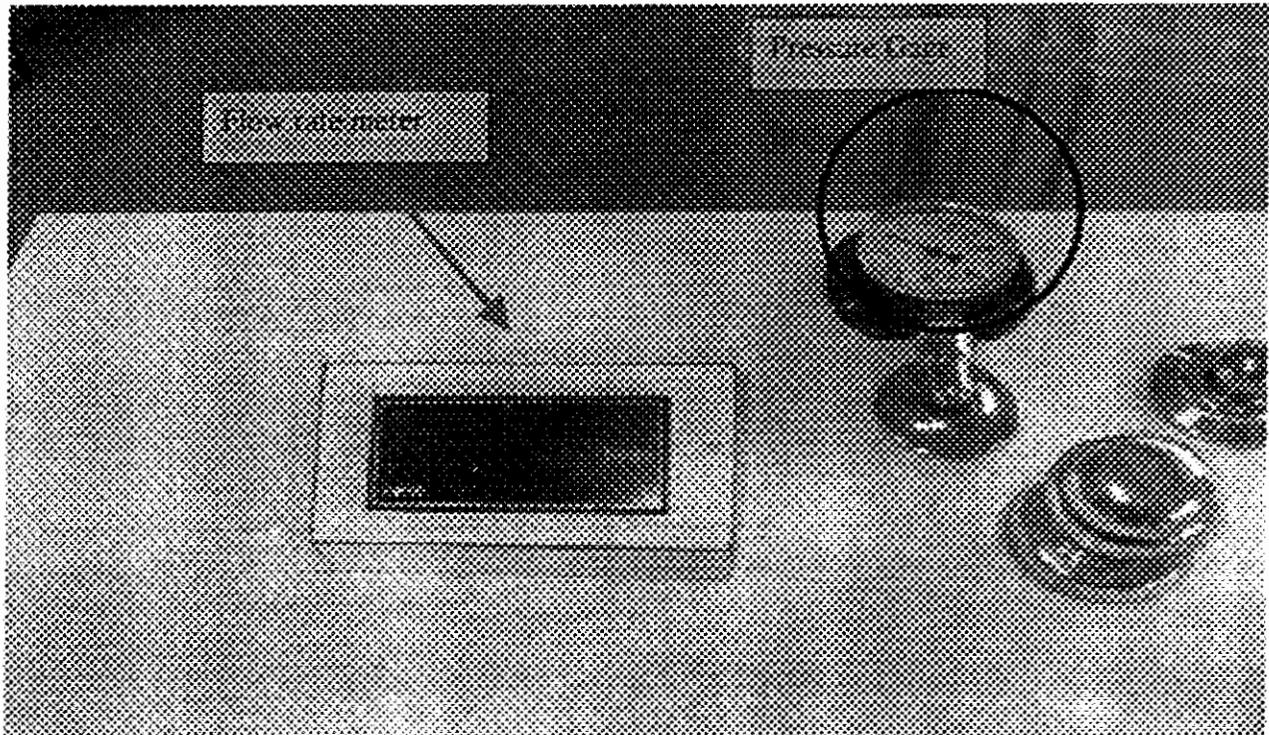
The *demonstration machine* is an important part of the summer camp program, by which the participant could examine the water saving devices. Through visual experiment, participants could also compare the amount of saving at different pressures with and without the water saving devices. This test would prove easily two main issues. The first one is the satisfaction of the users of water outlets with water saving devices. The second issue is the reduction of the water flow rate that is due to the function of WSD such as aerators, which mix water with air.



### How to operate the Demonstration Machine?

There are two main gages in this machine, and reading them is a must. The first one is the pressure gage, and the other one is flow meter. Pressure gage gives you the reading of the pressure in bar (each 1 bar = 10 meter of water column). The flow rate meter is digital and easy to read, providing the reading in L/min.

Inside the cabinet of this machine there will be a pump, which can be calibrated easily using a small handle.



### Water saving Device:

#### 1. FAUCETS and AERATORS



- Conservation recommendations are to provide 4 liter / minute pressure compensating aerator for faucet used for washing and rinsing hands.

But for faucets that serve multiple functions, such as kitchen faucets, 8 liter / minute aerators are recommended.

- Since its difficult to determine thread size, any retrofit project should stock all the variable thread sizes aerators and be prepared to determine the needs of the building, while on site, by trying the various sized of aerators for fit.
- Taps at wash basin and Turkish toilets stalls of public restrooms should have faucets replaced with self-closing faucets.
- Any strategy that includes aerators must also include proper maintenance and cleaning of aerators.
- There is no advantage of attaching aerators to faucets installed in Turkish toilet stalls.
- All aerators should include a domed screen to prevent sediment from clogging the small holes in the aeration disk.

## 2. SHOWER HEADS

ATOMIZING SHOWERHEAD

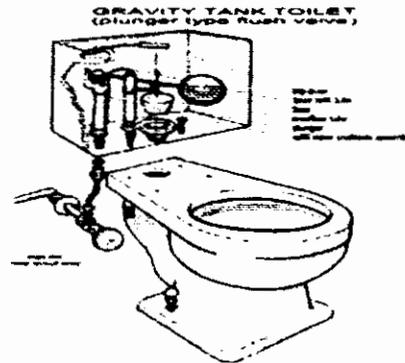


- For the shower heads, the most suitable type to be used is the stream type shower head with a capacity of 9 liters/minute, which gives the

highest level of consumers satisfaction, and most appropriate for the low water pressure in Jordan.

- **Shower shut-off valve** attached to the showerheads are recommended. Its estimated that half of the typical (10 minute) shower involves the application of soap and shampoo, thus half of the water used for a shower can be saved by the use of shut-off valve, which keeps the water temperature constant while the bather temporarily stops the water flow during soaping.

### 3. TOILETS



1. **Gravity tank type**, it should be changed with a 6-liter flush toilet. The tank of a 6-L toilet will hold a 10 liters of water, but the trim will close the flush valve after only 6 liters of water has passed through to the bowl.
  - **Flush-o-meter type**, replace the flush valve with a piston type flush-o-meter valve, and install a screen to filter out sediments in the water. This screen needs to be cleaned on a regular basis, depending on water quality.
  - **Displacement bags** provide only a temporary means to save a minimal amount of water and are not nearly as effective as replacing the toilet. They are not recommended for toilets that are currently using less than 15 liters per flush. Displacement Bags are estimated to save one or

two liters per flush, depending on the size of the bag, and its quality. If purchased, it is better to buy a heavy gauge plastic bags designed for this purpose.

- Purchase toilets with a Water Sentry refill valve. This type valve will not refill a toilet tank unless activated by flushing the toilet, thus, preventing the waste of more than a single tank capacity of water if the flush valve fails. It also gives you an indication when a flush valve begins to leak.
- When purchasing the toilets, it would be wise to require the highest quality flush valves be included, so that the valves do not require replacement for at least 5 years.

## Module VII: Behavioral Change

### **Objective:**

To show how individual behavior can make a difference and that the water shortage is every citizen's responsibility

**Target Group:** 12-28

**Duration:** 15min-30min

### **A note!**

Behavioral change is one of the most difficult to achieve, as people do not admit that their individual behavior would have an effect. Also, studies conducted by WEPIA showed that most people do not consider that water shortage in Jordan is their problem. They believe that it is the government problem, and that it is the responsibility of the government to look for new water resources

### **Questions:**

- How much water do we consume when we wash our cars with the hose?
- Describe some of the inefficient ways of using water?
- How can we use water efficiently at home?

## **Trainer's Notes**

What can you do to save water?

### **In the Bathroom**

- ❖ Check inside faucets showers and toilet for leaks. Even a faucet with a small drip can waste a lot of water. For example, faucet leak 1 drip per second will loose approximately 43 Litter per day. Also when a toilet leak a lot of water will be lost so toilet should be checked continuously
- ❖ Install water saving device on your all water outlets
- ❖ Turn off the water while brushing your teeth

### **In the Kitchen**

- ❖ If you have automatic dishwasher use it on its full load.
- ❖ Rinse vegetables in a sink or pan of water rather than running the water

### **In the Laundry**

- ❖ Use your washing machine for full loads only.
- ❖ If you must wash smaller load of clothes, wash it by hand

### **Outer Doors**

- ❖ Check the control valve on the roof's tanks for leaks avoiding water come out from the tank
- ❖ Use a bucket of water to wash your car not a hose
- ❖ Choose plants that require a minimum amount of water
- ❖ Direct roof top rain drainage into plant beds that retain water
- ❖ Reuse water from rinsing vegetables to irrigate plants
- ❖ Install drip irrigation system where possible
- ❖ Irrigate plants early in the morning or late in the afternoon to avoid excessive evaporation

## **Module VIII: Simple Projects in Water Efficiency**

### **Objective:**

- To allow participants to apply what they have learned during the training

**Target Group:** 16-28

**Duration:** 15min-30min

### **A note!**

- The participant should select one of the identified projects.
- You divide them into groups to discuss the way to implement these projects.
- Provide them with the instructions for each project
- Participants should implement the projects in their homes. after which they should provide the instructor a report describing their projects

## Questions:

- What are the different kinds of irrigation techniques that can be conducted easily inside the houses?
- How could you conduct a water audit inside homes?
- How could you collect rainwater inside your home and school?
- What is the simplest way to do Gray Water reuse?

## Aiding Tools

- A transparency on "rainwater harvesting"
- A transparency on "water seepage"

## Key Words

- Water Harvesting.
- Gray water reuse.
- Irrigation technique.

## Trainer's Notes

### Introduction

This part could develop the skills of participants towards simple and applicable ways of water conservation.

Irrigation methods, water reuse, water harvesting, and water audit could be considered as major implementing projects

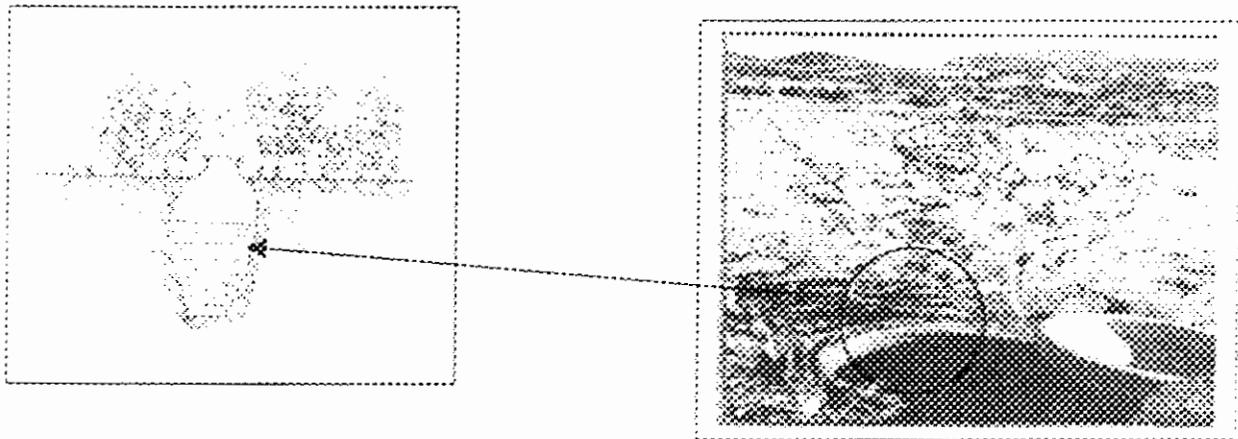
## Simple irrigation technique:

### Water seepage through Jar:

This project is not costly and easy to implement in the small-scale gardens.

This method is an old irrigation method; it needs a clay jar only.

You can put the jar beside the root of the plants as it is justified in this diagram.



After implementing the jar, don't forget to cover it to avoid evaporation.

### Conducting water audit:

This project was discussed in details in the module (V), but in this part trainer should distribute the recommended water audit form and give the participant the way of tracking system that will prove water saving in side participant home. After that the participant should provide the coordinator of the camp report for his home water audit and tracking system.

### Rain Water Harvesting:

Rain Water Harvesting is technique of rainwater or water runoff collections.

It can be applied in side houses, farms and any places, which has watershed (area at which water is gathered flows into streams) characteristics.

Wells for rainwater collection should be cleaned. Water from the well should be taken from the upper 2/3 since the bottom of the well is full of sediments. Also you

can collect the rainwater from the roof of your building in tanks. However you should release the first amount of water at the beginning of the winter season to clean all the dust and sediments.

How can you estimate the amount of water from rainwater harvesting?

Step one: Estimate the area that suppose to gather rainwater ----- (m<sup>2</sup>)

(For example, if the collection area is your house's roof then estimate it's area)

Step two: Define the area of rainwater collection from metrological point of view. To find the amount of rainfall in (mm), and evaporation in (mm) or percentages from the rainfall.

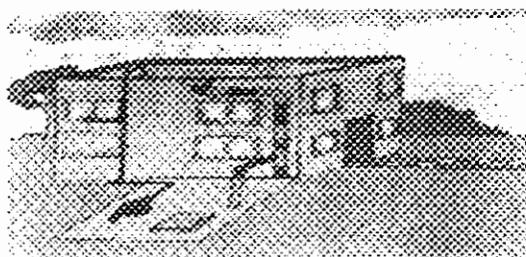
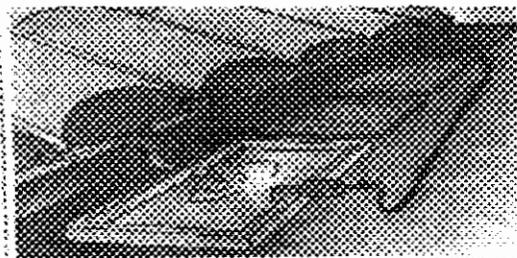
Step three. calculate the amount of water that can be collected during the winter season by using the following equation:

Harvested water = rainfall depth mm X area \* 1000 - Evaporation depth X area \* 1000

Harvested water = rainfall depth mm X area X 1000 -(evaporation % X rainfall depth mm X Aea X 1000)

Step four: The amount of harvested water determines the volume of the container.

Volume of the container = harvested water \* 2 (safety factor)



## **Post-Training Evaluation**

### **Objectives:**

- To find out how much information has the students learned;
- To know how they think and their comprehension by reading their suggestions;
- To get feed back on your performance;

**Duration:** 15-30 minutes

### **A note!**

The evaluation is the last part of the program.

The participants are given a typed evaluation sheet to evaluate the lecture, trainer, and training methods.

The participants are also asked to write down three things they learned from the lecture, and write down what they learned from each part of the program, for example:

The water audit, the games....

Then the participants are asked to draw a picture about what they learned that day, on the back of the sheet.

### **Aiding Tools**

- 1 Evaluation Sheet

**"The Role of Mayors in Water Demand Management" Workshop**

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