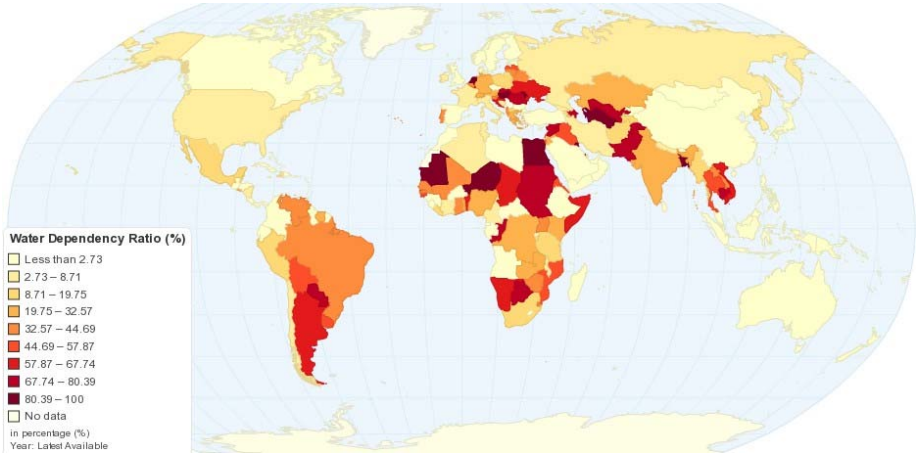
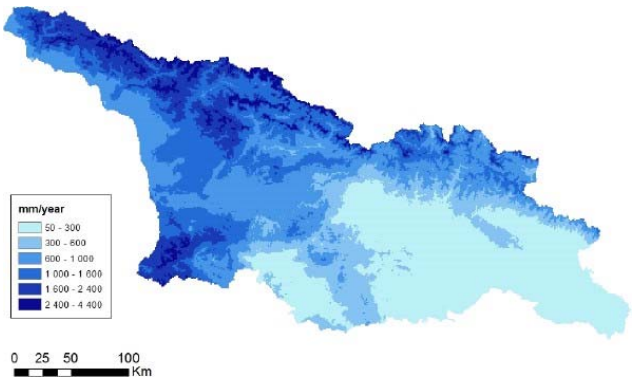
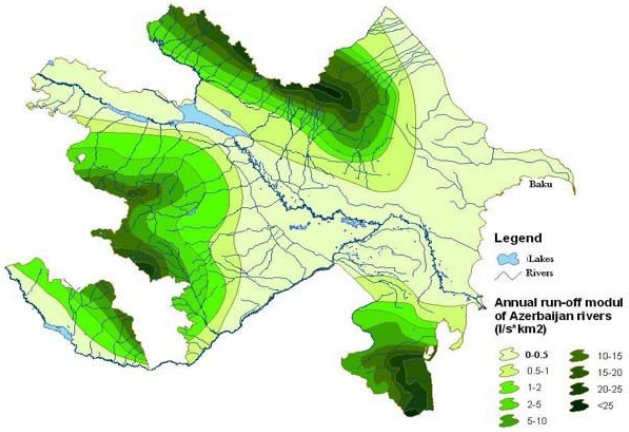
DROUGHTS AND SOLUTIONS IN AZERBAIJAN

Naturally dry with arid soils, the Kura Basin, is vulnerable to droughts and climate change impacts.



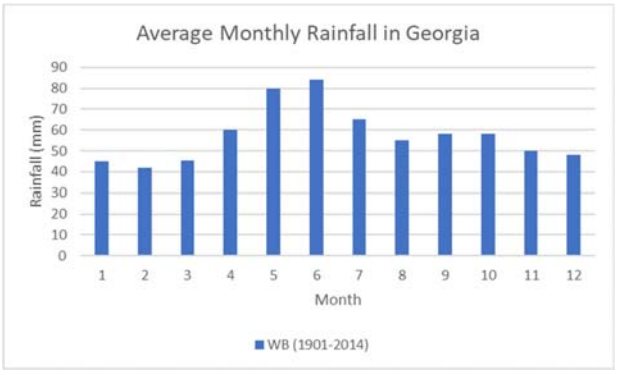
• Total annual water resources of the Kura and Aras Rivers in Azerbaijan account for 30,01 km3 per year
• The water resources formed in Azerbaijan are 10,31 km3
• 58% or 5,96 km3 is surface water
• 42 % or 4,35 km3 is underground water
• Azerbaijan ranks 16 in the world regarding the water dependency ratio

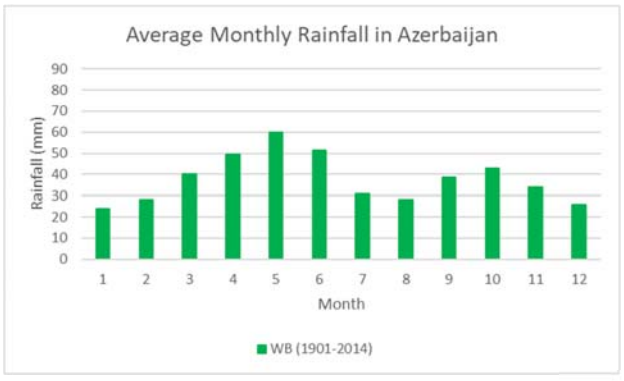


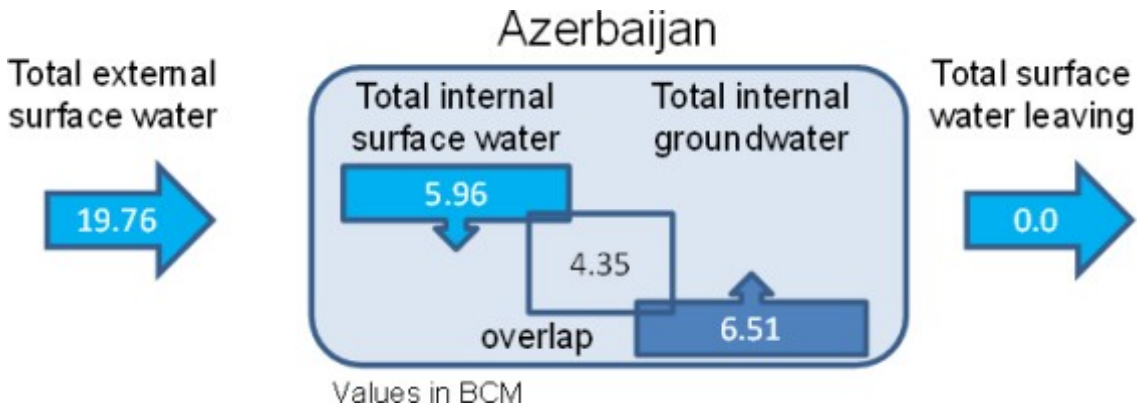


The water that comes to Azerbaijan flows from Georgia in the Kura Basin and the Aras to the south. The Kura basin is arid in both Azerbaijan and Georgia.

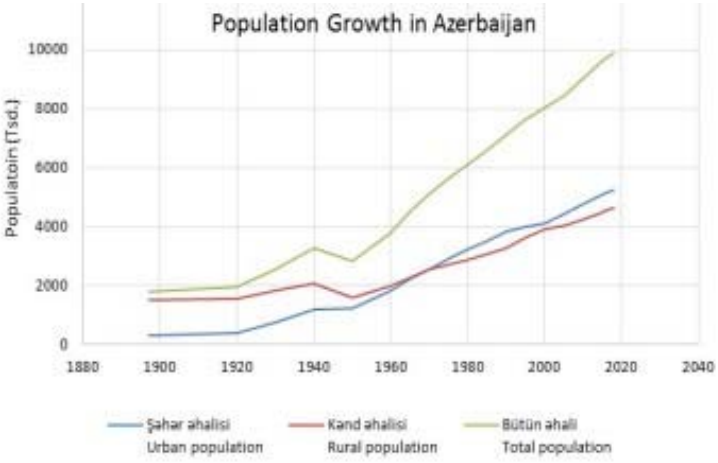
The water in the Kura River comes through Georgia. Georgia is at a higher elevation and annually receives 50% more precipitation than Azerbaijan does.





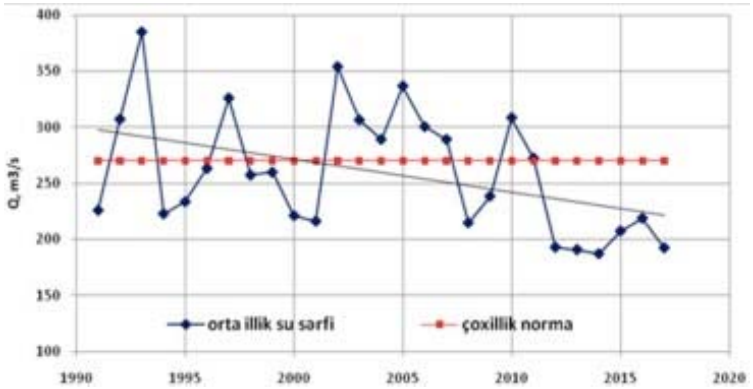


Studies show that of all the water coming into Azerbaijan from the neighboring countries, plus all that generated in Azerbaijan, there is less going out than coming in from Georgia. So where does that water go?



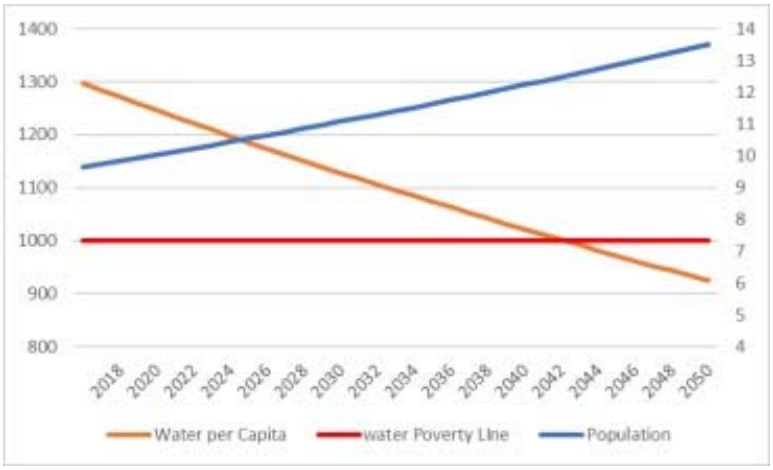
First, we need to realize that people use the water. Human have made it possible to survive in Azerbaijan because of the way we manage water here. Since the 1950's the population has increased by 1% per year.

But we also know that water levels are decreasing as you can see from the Girag Kasaman Station in upstream Azerbaijan Kura Basin. There is a downward trend since 1990 that shows less and less water flowing in to Azerbaijan from upstream. We see that downstream in Azerbaijan the same trend is found across the country that there is less water in the river on average now than there was even 30 years ago. We must take this into account when we decide how to manage the water resources we have.

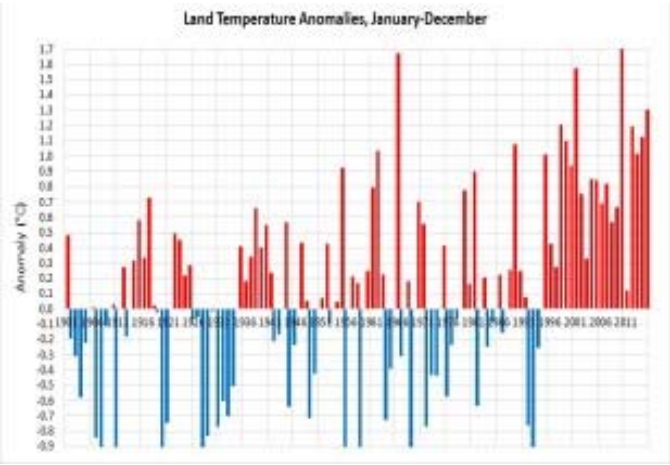


The Impact of Population Growth on Water Availability

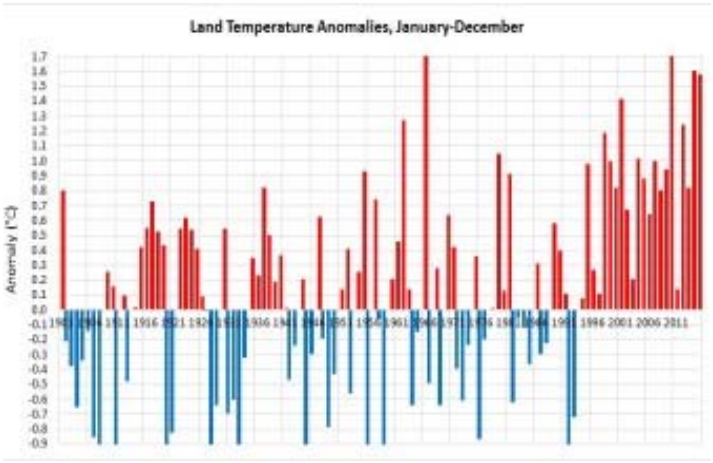
If Population Growth will continue with 1% per year, with the same amount of water resources, the country will reach the water stress point in 2042. This may be even earlier due to climate change.



So if we look at climate change across the basin, in Georgia and in Azerbaijan we see it is getting hotter and hotter, and that increases evaporation, meaning we have less water available to use.



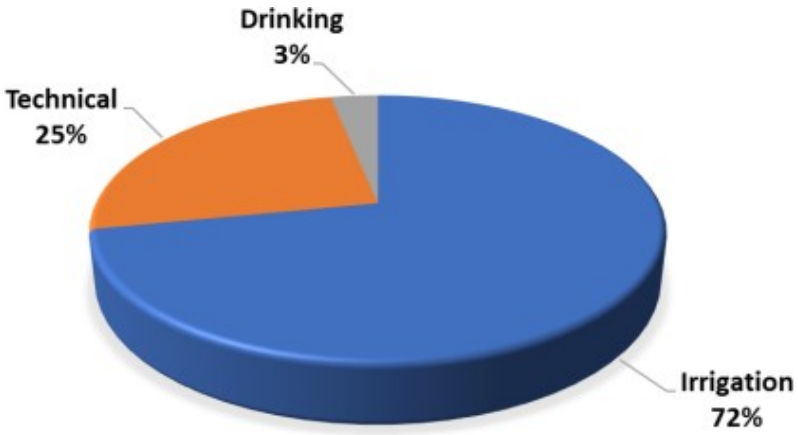
Georgia



Azerbaijan

As temperatures are expected to continue to rise across the region based on expert climate change models, it is important to take steps now to make sure that the water we have in Azerbaijan is used as efficiently as possible. This includes the water that is in our homes and cities, to grow the food we eat, and for industry. Also we need to leave enough water in the rivers so that the natural environment which cleans and protects our water resources will be healthy too.

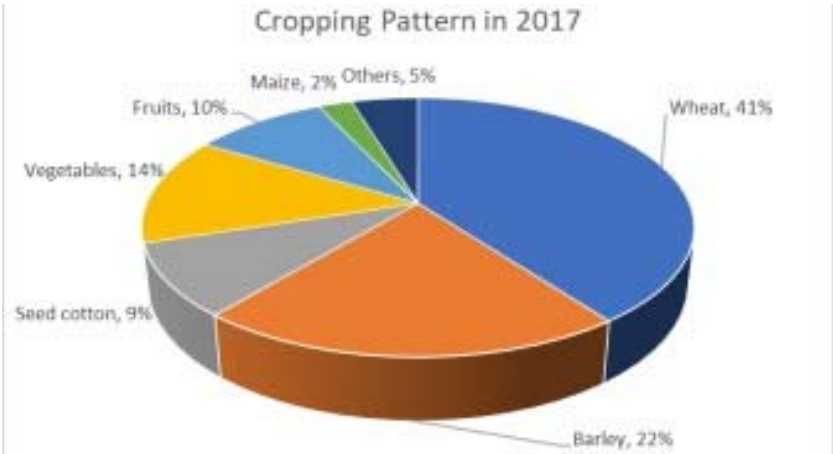
Let's look at how we are using water across the main water using sectors in Azerbaijan. We see that agriculture is the largest consumer of water in the basin. This is normal, since we need water to grow our food and around the world irrigation for agricutlure in arid climates usually accounts for 60-85% of water consumption.



So we will go through these by sector to explain the situation and then offer solutions that will improve our water use efficiency.
Some solutions are faster and easier and others will take more time and more money.

AGRICULTURE:

As we said before, Agriculture is the largest water consumption sector in Azerbaijan with total volume of 6.34 BCM/year



The different types of crops we grow require different amounts of water. Some crops like sugar beets, cotton and alfalfa need much more water to grow healthy crops. Others like grapes or barley and wheat need much less water.

Solutions:

Improvement of the Cropping Pattern

- Encourage crops that need less water
- Select the cropping pattern that fits with the available water budget
- Put higher tariff on high water consumption crops.

Annual irrigation requirements per crop

Name of Crop	Recommended Number of Irrigations Per Season	Irrigation Requirement m3/ha*
1. Barley & wheat	4	3,000 – 3,500
2. Beets	6 – 7	5,000 – 6,000
3. Corn	4 – 5	4,000 – 4,500
4. Cotton	4 - 5	4,500 – 5,000
5. Lucerne (= Alfalfa)	7 – 8	7,000 – 8,000
6. Grapes	2 – 3	2,000 – 2,500
7. Tobacco	4 – 5	4,000 – 4,500
8. Vegetables (Tomato)	4 – 5	4,000 – 5,000

Irrigation Methods:

Azerbaijan has a long history of irrigation technology. Irrigation has made it possible for humans to thrive here, and the irrigation networks are a complex web across the country moving water to farmers fields, so that they can grow our food and crops needed for economic development.

•The total irrigated area in Azerbaijan increased from 550,000 ha in 1913 to 1.437 million ha by 2017.

•Most of this land irrigated from surface water, only 148,000 ha are irrigated from sub-artesian wells

Also, if the water is flowing through irrigation canals it can also be lost due to evaporation and seepage. If the canals are dirt (earthen), a lot of water in the canal soaks into the ground and does not get to thirsty crops.

Irrigation networks

•The country has over 53,905 km of irrigation canals

•39,336 km are earthen canals (73%)

•14,569 Km are lined canals (27%)

•Drainage is facilitated through 33,015 km of collector-drainage networks covers only 45% of irrigated lands.

•Approximately 20% of all irrigation and drainage infrastructure is in a state of deterioration and is in urgent need of rehabilitation and/or modernization

•Creation of the Water Users Associations (WUA) was completed and 479 WUAs have been created

Main canals (water flow higher than 10 m3/s)	km	2353
Interfarm canals (water flow between 1-10 m3/s)	km	8935
Intrafarm canals (water flow between 0.3-1 m3/s)	km	12677
Field canals (water flow lower than 0.3 m3/s)	km	29130

Irrigation water losses occur at two levels:

• Water transport in the main and distribution canals (2 - 2.2 BCM), represents about 25% of total diverted water for Agriculture sector.

• On-Farm field distribution system which is not quantified.

For example, the volume of water losses of Yukhari Shirvan canal, which takes water from the Mingachevir Reservoir, was accounted for about 323 MCM per year

To make sure there is water for agriculture at the time it is needed, and to control floods, waters reservoirs have been built across the country.

- There are 138 reservoirs with a total volume of 22 BCM in Azerbaijan
- The active storage volume is estimated to 12.4 km³.
- The total water surface area of 974 km²
- Mean annual evaporation of 1200 mm,
- Mean annual evaporation losses is estimated to 1.2 BCM

The Main challenges for the water use in the agricultural sector in Azerbaijan are:

• Approximately 20% of all irrigation and drainage infrastructure is in a state ofdeterioration
• 73% of the water distribution network are earthen canals
• The use of modern irrigation technique is still limited
• Losses in the distribution network and on-farm systems 25-30%
• The decision what to plant, when and how is solely determined by the WUA
• Collector-drainage networks covers only 45% of irrigated lands that increases the risk of occurring salinization problems

Recommendations and Interventions for Solutions Rational water use in the Agriculture Sector

- Rehabilitation of irrigation system

- Lining the earthen canals with priority to the main canals
- Maintaining and calibrating the control gates
- Encourage Public Private Partnerships

- Provide economic incentives for rational water use
- Use Modern Field Irrigation Technologies
- Use of Sprinkler and Drip irrigation systems

- Use of soil moisture content monitoring Sensors
- Laser leveling of agriculture lands

- Develop GIS asset management system for a Complete Inventory of the irrigation system components:
- **Canals:** Length, cross-section, lining status, area served, water budget, water levels, Schedule of cleaning and maintenance
- **Control Structures:** Dimension, water levels, Schedule of maintenance
- **Pumping stations:** Location, Area served, pumping rate, Schedule of maintenance
- **Drainage collectors:** Length, cross-section, area served, flow rate

Municipal water supply is also an important challenge, especially since supplies of clean fresh water are limited and very vulnerable to droughts too.

According to AZERSU, over 81% of Baku's population is continuously provided with drinking-water. Ten years ago, the centralized water supply system in the capital covered only 1.56 million people, but now it is used by 2.366 million people.
The volume of water supplied in Baku and the Absheron Peninsula increased by 23% on the past 10 years – from 564 to 696 million cubic meters. The unaccounted for water losses decreased from 66% to 35%

The main constrains in the municipal water sector are high rate of leakage from the distribution network, lack of metering system in many areas, and tariffs and billing structures for Cost-recovery of the services seem to be insufficient.

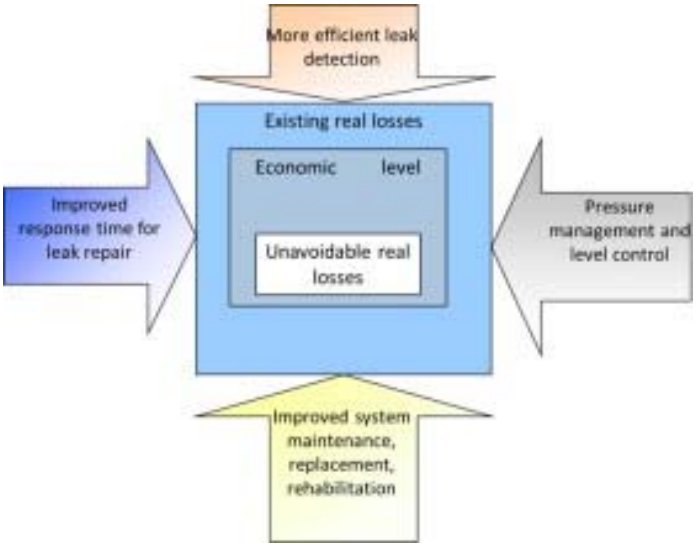
Also, the deteriorating the water quality of the surface water resources leads to a high cost of treatment

The municipal water sector solutions:

Rehabilitation and expansion of the distribution network

And improved public awareness not to waste water resources

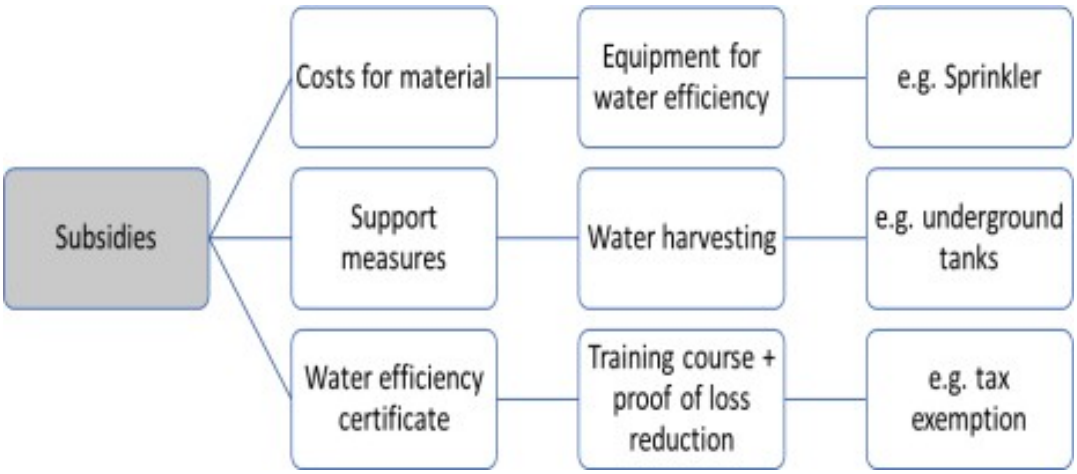
There are four components of an active Municipal water loss management program that have to be coupled with an awareness raising campaign for rational use of municipal water. Done together will be the solution to manage municipal water efficiently.



• Cheap natural resources are no incentive for saving them

• If subsidies are necessary (income structure, not enough economic strength) subsidies the business components

• Link water tariff with level of consumption



If these steps are not taken we will see:

• Decreasing per-capita availability

• Degrading water quality

• Increasing competition/conflict within sectors and within society

• Increasing competition/conflict with the environment

And we need to use economic incentives to encourage rational water use in all sectors

But if we work together to do manage our human demand on our water resources we will see:

• Increased efficiency of water use (Produce More with Less water)

• Reduced water demands (30% - 50%) with no deterioration in life style or service level.

• Significantly reduced capital requirements for expansion of water supply

• Lowered operating costs

• Reduced generation of pollutants

• Facilitated expansion of the coverage of available fund

• Enhanced development and adoption of new technologies.

And that is a very good thing.