

# USE THE RECYCLE WATER IN CYPRUS



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# WATER BALANCE

Cyprus land surface 9251 Km<sup>2</sup>

Yearly mean precipitation 500 mm

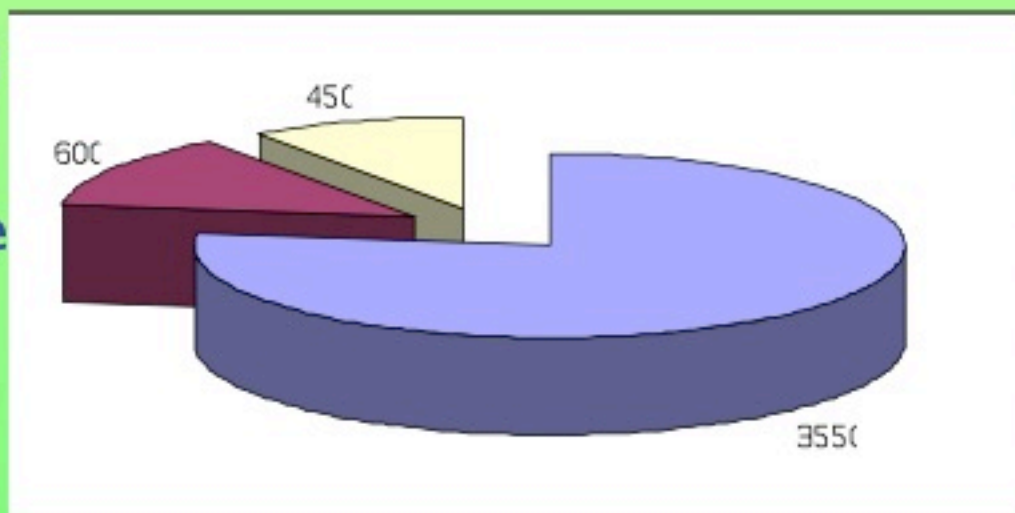
- Total annual volume water : 4600 Mm<sup>3</sup>

Evapotranspiration 75% :  
3550 Mm<sup>3</sup>

- Water Quantity Available  
1050 Mm<sup>3</sup>

- Surface water :  
600 Mm<sup>3</sup>

- Groundwater :  
450 Mm<sup>3</sup>



# Cyprus water consumption

**Agriculture in Cyprus depends on irrigation**

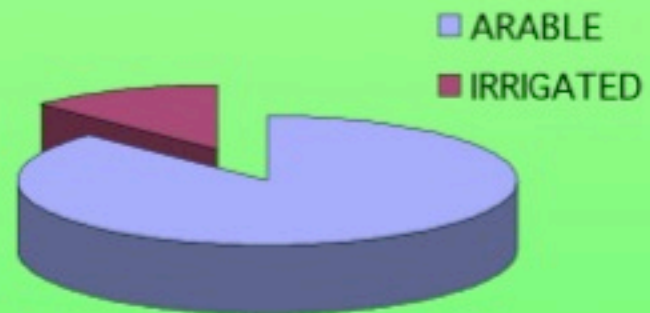
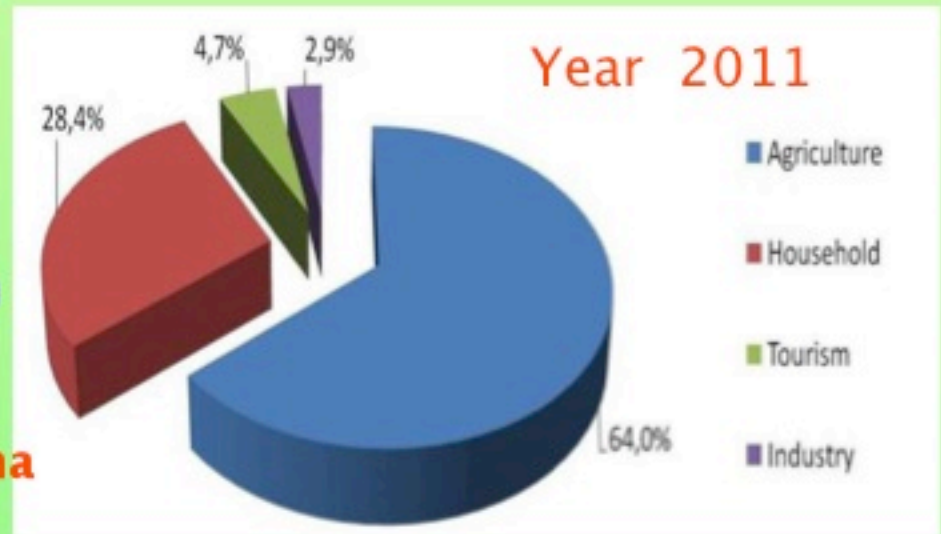
**Agricultural Land:**

**141 700 ha**

**Irrigated agricultural area:**

**30 000 ha**

**20% of agricultural land is irrigated, and contribute as 70% to the value of all agricultural products.**

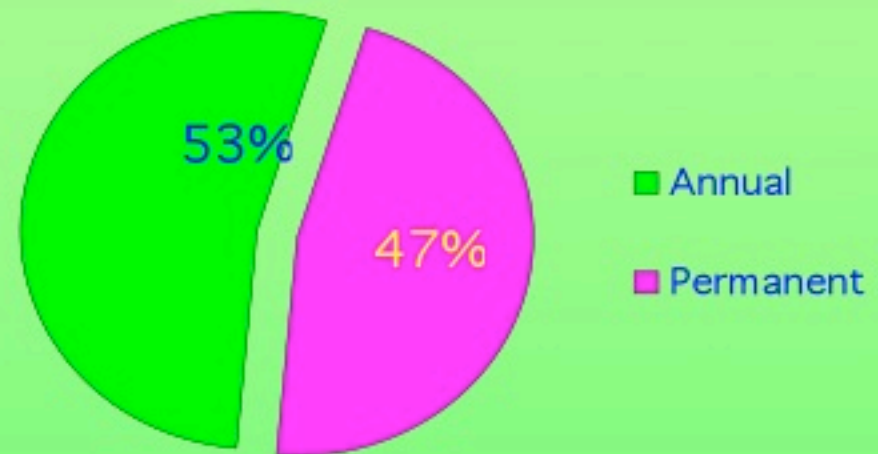


## Irrigation area of total cultivated

YEAR	area %
1960	10
1970	13
1975	9,5
1985	12
1990	14
1997	15
2000	26,5
2006	23,5
2010	23.0

## Area under intensive irrigation

Permanent crops	14 000 ha
Annual crops	16 000 ha



# Actions on Water Protection in Agriculture

Since 1965 the Water Use Improvement Project was initiated by the Department of Agriculture to provide the farmers with technical and financial assistance for the installation of low to medium-pressure irrigation systems and the application of proper irrigation schedules

## Technical assistance

- ▶ preparation of topographic maps
- ▶ estimation of costing
- ▶ inspection of systems installed

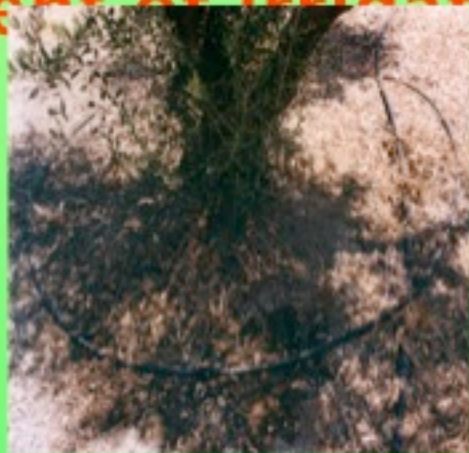
## Financial assistance

- ▶ long-term low-interest loan
- ▶ subsidy



## Project's economic results

- The total cost of the improved irrigation systems from the beginning of the project up to the end was €37 millions.
- € 3,2 millions was spend as subsidies and € 11 millions as loans.
- **75 millions m<sup>3</sup> of water is saved every year due to the installation and proper management of irrigation systems**



# The problem of water shortage in Cyprus

- **Semi-arid climate**
- **Unevenly distributed rainfall**
- **Frequently occurring and prolonged droughts**

**Climate Change after 1970 contributed to :**

- **15% less precipitation**
- **40% reduction of the basins in reduce the performance of dams (181 Mm<sup>3</sup> to 128 Mm<sup>3</sup>)**



- **reducing the replacement of aquifers with water**
- **surface and groundwater quality (aquifer salinization)**



# Measures taken to mitigate drought conditions

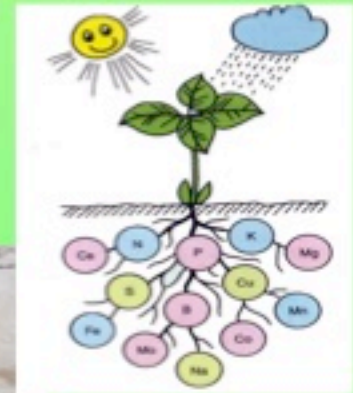
- **Avoid to plant new permanent plantations**
- **Promotion of less water demanding cultivations**
- **Application of quota system for water allocation**
- **Advise the farmers on irrigation**
- **Awareness campaigns**
- **Avoid to irrigate during windy and warm conditions**
- **Application of penalty charges for over consumption**
- **Irrigation with low quality water**
- **Water harvesting from greenhouses**
- **Use of the recycle water**





# RECYCLE WATER

- **Stable source of water**
- **Avoid contamination of the environment**
- **Contains nutrients**



## Reuse of recycle water

- **Irrigation**

agricultural land: 75–80%

landscape : 20%

- **Used for groundwater recharge**

After the enrichment they pump  
water into the Pafos

Government Water Work – irrigation  
network

# MAIN CROPS IRRIGATED WITH RECYCLE WATER

- CITRUS
- OLIVES
- OTHER TREES
- VEGETABLES  
(e.g. POTATOES TOMATOS, WATERMELONS)
- FLOWERS (e.g. CARNATIONS)
- CORN
- ALFA ALFA
- LOLLIUM



# Code of practice

Regulation No. 263/2007

**The goal is the proper use of recycled water in agriculture to protect public health and the environment**



## Code of practice

- The use is prohibited by unauthorized persons
- Marking pipes with red line
- Clear signaling to alert the public that the water is undrinkable
- Hydrants and distribution system should have protection
- You must not irrigated leafy vegetables, bulbs and tubers which are eaten raw

# Code of practice

## *Irrigation conditions for grass green areas with limited use and forage crops*



### Methods of irrigation

groundwater irrigation,  
drippers,  
low capacity sprinklers,  
surface irrigation,  
high capacity sprinklers – with 300 m buffer  
zone

### In areas where:

- ▼ cultivated forage, irrigation stops at least one week before harvest
- ▼ cultivated forage for grazing, dairy animals are not permitted.



# Code of practice

*Irrigation conditions for grass,  
green spaces with free use*

## Methods of irrigation :

subsurface drip irrigation,

low angle Pop-up sprinklers (150)

irrigation during night  
(no wind)



- **Vineyard**

**drip irrigation, microsprinkler**

Where irrigations drops comes with contact with fruit, irrigation must stopped two weeks before harvest

Furthermore is prohibited to collect fruit from the ground



- **Tree crops**

**drip irrigation, microsprinkler**

The collection of fruit from the ground is prohibits except in cases of nuts

Where irrigations drops comes with contact with fruit irrigation must stopped a week before harvest.





## Vegetables (tomatoes...)

- Sup surface drip irrigation
- Drip irrigation
- The fruit should not come into contact with recycled water

## Vegetables that are cooked before consumption (potatoes...)

- sup surface drip irrigation,
- sprinkler irrigation
- drip irrigation



# Irrigation experimental with recycle water in Limassol area

- 30 ha
- The aim of the experimetal was to convince the farmers on the safe use of recycle water
- Planted sorghum, alfaalfa, cor

BOD <sub>5</sub>	mg/l	5,0
COD	mg/l	35,0
S.S	mg/l	0
NH <sub>4</sub> <sup>+</sup> -N	mg/l	0,7
NO <sub>3</sub> <sup>-</sup> N	mg/l	4,0
Total N	mg/l	6,0
PO <sub>4</sub> <sup>3-</sup> -P	mg/l	3,0
Total P	mg/l	5,0
Cl	mg/l	232
HSO <sub>4</sub>	mg/l	(xvη
CO <sub>3</sub>	mg/l	-
HCO <sub>3</sub>	mg/l	576,0
Na	mg/l	165,0
Ca	mg/l	96,0
Mg	mg/l	43,0
K	mg/l	22,0
B	mg/l	0,2
EC	dS/m	1,5
PH		7,7

<b>Sorghum</b>	
<b>Plantation</b>	<b>June until September</b>
<b>Amount of Recycle Water</b>	<b>9850 m<sup>3</sup>/ha</b>
<b>Fertilizers</b>	<b>400 Kg 20-20-0 300 Kg 34.5-0-0</b>
<b>Total production - silage</b>	<b>135000 Kg/ha</b>



<b>Corn</b>	
<b>Plantation</b>	<b>May until July</b>
<b>Amount of Recycle Water</b>	<b>3500 m<sup>3</sup>/ha</b>
<b>Fertilizers</b>	<b>400 Kg 20-20-0 250 Kg 14-22-9</b>
<b>Total production - silage</b>	<b>95000 Kg/ha</b>



alfalfa	
Plantation	September
Amount of Recycle Water	12000 m <sup>3</sup> /ha
Fertilizers Manure	600 Kg 20-20-0 10000 kg
Total production for the first year-alfalfa hay	95000 Kg/ha



# Problems faced in the use of recycled water

- q **Overcoming the psychological factor with a serious, scientific and accurate information**
- q **The demand for water exists only in the summer => Problem storage or disposal in winter time**
- q **Quality and filtering problems**

**The water pressure is increasing and  
all our efforts should be in the  
rational use of water to meet our  
current needs, and also to ensure  
stable and good quality water for  
future generations**

**THANK YOU**