Key Findings – Task 4

Innovative Wastewater Treatment Technologies and Systems

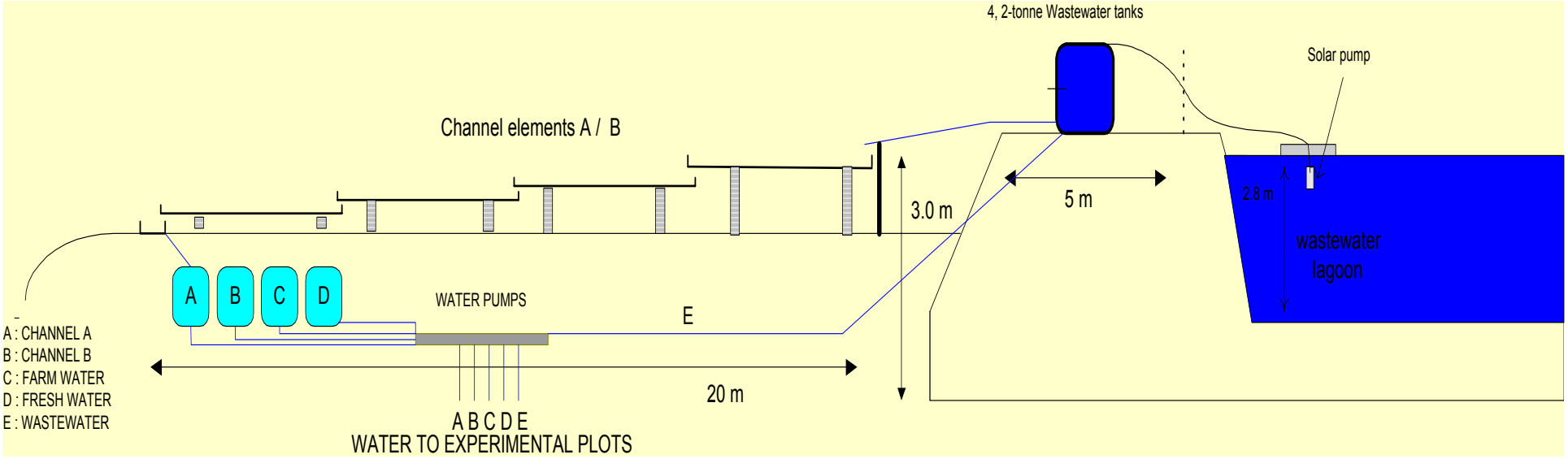
Agricultural Research Institute

INCO- DC

Sustainability and Optimization of Treatments and Use of Wastewater in Agriculture

Epuvalisation system

The system consists of 2 channels, each 20 m long made from four 5m long galvanized channels



Test different plants to be used in channels

Plants tested

Festuga grass
Mentha
Mint
Peppermint
Basil
Alfalfa
Sudax
Salvia

AGRICULTURAL RESEARCH INSTITUTE, CYPRUS

- Epuvalisation system
- Optimization of use of nitrogen in the wastewater
  - a) Sudax
  - b) Eggplants
  - c) Sweet pepper
- Optimization of irrigation with treated wastewater
  - a) Gerbera jasmesonii
  - b) Hydroponic culture of cut flowers

MEDAWARE PROJECT
Training

Training and workshops will be organized in each participating country where all actors involved will be invited to attend seminar lectures on various issues related to urban wastewater treatment technologies and systems. (During Task 5)

All the deliverables of the project are disseminated among the actors involved in the field of wastewater treatment and reuse in each country

MEDAWARE PROJECT
Expected Achievements

- The project will document that the safe wastewater reuse is a feasible option with respect to environment, health, technology, organization and economics.
- The project will inform and train all competent operators/authorities on the benefits and optimum use of recycled wastewater with special focus on the agriculture irrigation.
- All actors involved in the wastewater management and water planning sectors will acquire useful and easy to use tools and methods, as well as training material and guidelines, which shall enable them to become familiar with sustainable wastewater treatment tailored to the specific needs of each country and also with the safe reuse practices and realize the benefits and advantages from the application of combined (treatment/reuse) schemes.

WATER IS A VALUABLE COMMODITY

Respect and save water

- FINITE
- FRAGILE
- RARE
- HIGH ECONOMICAL VALUE

PRODUCE THE OPTIMUM

This would help to alleviate desertification due to water

MEDAWARE PROJECT

Contribution to International Initiatives

- Mediterranean Water Chapter (Rome in 1992) → new resources of water

- Declaration of the Euro-Mediterranean Ministerial Conference (Turin)
  - integrating water resources management into sustainable development policies
    - participation of the civil society, water users, organizations at local, regional and national level
  - mobilization of non-conventional water resources

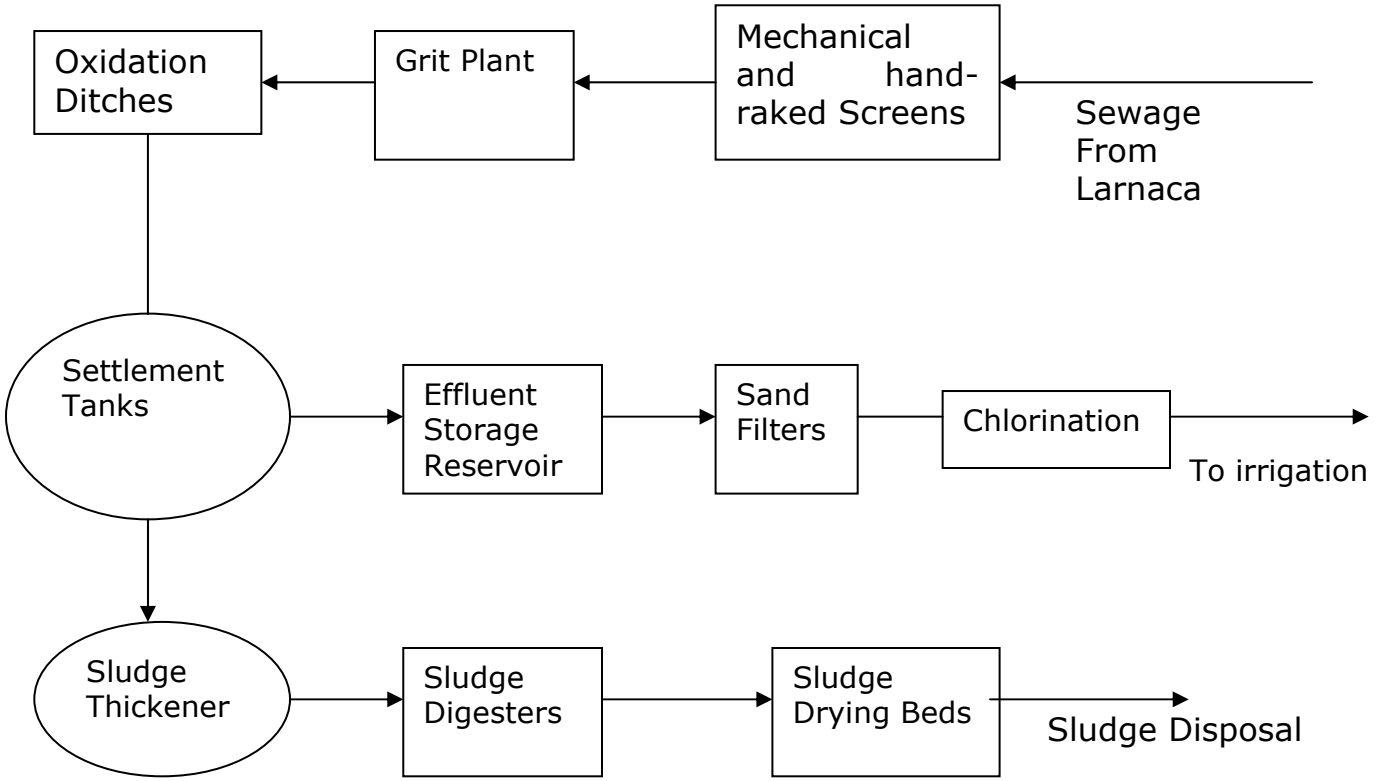
- **Barcelona Declaration**
  - the Mediterranean cities that do not belong to EU and that have a population of more than 100,000 inhabitants must have installed adequate water treatment systems to treat their sewage by the year 2005, while those having a population of more than 50,000 inhabitants must do so by the year 2010. Therefore technical specifications for the treatment methods will contribute to the Declaration

Strategy to protect human health and the environment

- Restriction of crops
- Waste treatment
- Irrigation systems
- Human exposure

Key Findings - Task 3: Success Stories

Case Study 1: Larnaca WWTP



Key Findings - Task 3: Success Stories

Case Study 1: Larnaca WWTP

Reclaimed water quality

Effluent Quality		Removal efficiency
Parameter	Value (mg/l)	
BOD_5	2.6	99.37
COD	56	93.10
SS	1.7	99.46
pH	7.5	-
Total N	8.5	90.22
NH_3-N	2.4	96.76
NO_3-N	6.9	-
N	17.8	-
Conductivity	3.4 (mS/cm)	-
Total E.Coli/100ml	5	-
Intestinal E.Coli/100ml	0	-
Residual Cl	0.2	-

Key Findings - Task 3: Success Stories

Case Study 1: Larnaca WWTP

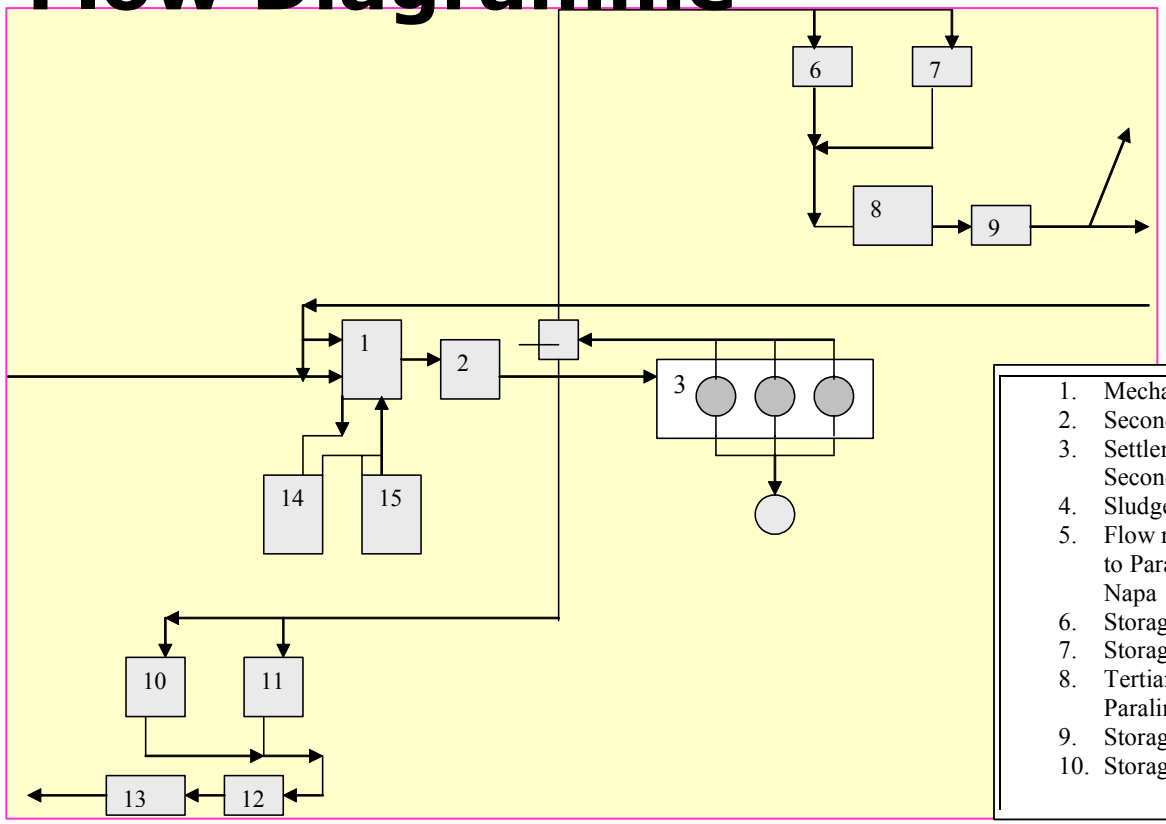
Water reuse application

- Agricultural land, 150 ha at Dromolaxia Village (fodder crops i.e. corn, alfalfa)
- Hotels
- International Airport
- Larnaca Municipality (gardens, parks and fields)

Key Findings - Task 3: Success Stories

Case Study 2: Ayia Napa-Paralimni WWTP

Flow Diagramme



1. Mechanical Pre-Treatment
2. Secondary Treatment
3. Settlement Tanks of Secondary Treatment
4. Sludge Separation
5. Flow regulators/distributors to Paralimni and Ayia Napa
6. Storage Tank 100,000m^3
7. Storage Tank 100,000m^3
8. Tertiary Treatment Paralimni Municipality
9. Storage Tank 6,000m^3
10. Storage Tank 75,000m^3
11. Storage Tank 75,000m^3
12. Tertiary Treatment of Ayia Napa
13. Storage Tank 5,000m^3
14. , 15. Emergency Storage Tank 25,000m^3
16. Pipeline to Paralimni lake
17. Irrigation Pipe to Paralimni
18. Irrigation Pipe to Ayia Napa
19. Sewage from Ayia Napa
20. Sewage from Paralimn

Key Findings - Task 3: Success Stories

Case Study 2: Ayia Napa-Paralimni WWTP

Reclaimed water quality

Paralimni			Ayia_Napa		
Parameter	**Value (mg/l)**	**Removal efficiency**	**Parameter**	**Value (mg/l)**	**Removal efficiency**
COD	52.5	92.50	**COD**	55	92.14
BOD	1.48	99.62	**BOD**	1.6	99.59
SS	2.65	98.93	**SS**	3.1	98.74
Total N	15.1	75.45	**Total N**	15.1	75.45
NH_4^+	0.95	97.29	**NH_4^+**	0.84	97.60
NO_3^-	52.3	-	**NO_3^-**	58	-
Total P	6.65	34.16	**Total P**	6.81	32.57
pH	6.8	-	**pH**	6.71	-
Conductivity	1.8	10.00	**Conductivity**	1.81	9.50
Free Cl	0.81	-	**Free Cl**	1.11	-
Total E.Coli	0	-	**Total E.Coli**	0	-
Intestinal E.Coli	7	-	**Intestinal E.Coli**	7	-

Key Findings - Task 3: Success Stories

Case Study 2: Ayia Napa-Paralimni WWTP

Water reuse application

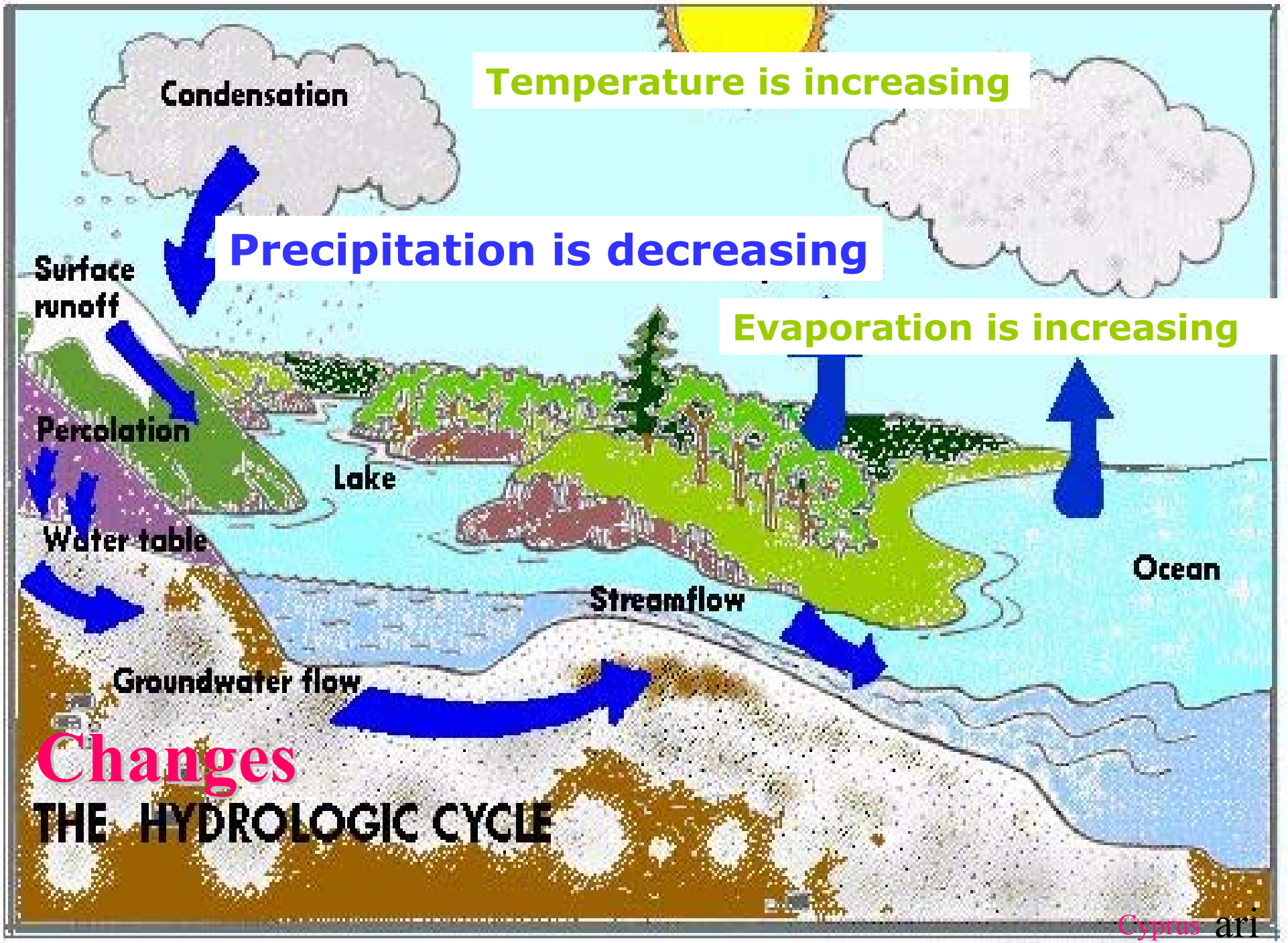
- **Irrigation of 100 ha at Paralimni (Potatoes)**
- **Hotels**
- **Larnaca Municipality (gardens, parks and fields)**

Desertification

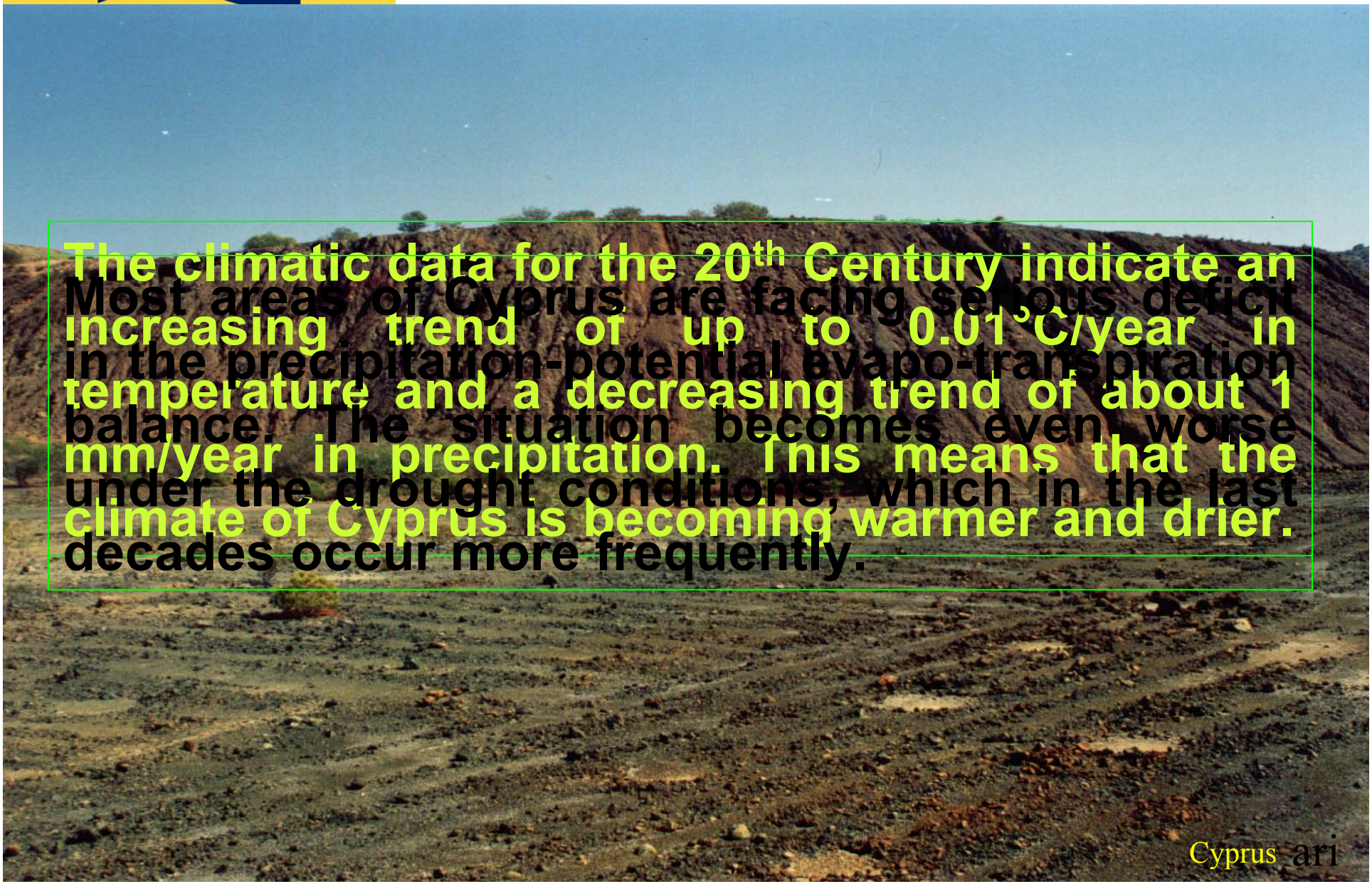
Is defined as land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic conditions and human activities

Agenda 21, Rio 1992

CAUSES OF DESERTIFICATION


Condensation
Temperature is increasing
Precipitation is decreasing
Surface runoff
Evaporation is increasing
Percolation
Lake
Water table
Ocean
Streamflow
Groundwater flow
Changes
THE HYDROLOGIC CYCLE

CLIMATE



The climatic data for the 20th Century indicate an increasing trend of up to 0.01°C/year in temperature and a decreasing trend of about 1 mm/year in precipitation. This means that the climate of Cyprus is becoming warmer and drier.

Most areas of Cyprus are facing serious deficit in the precipitation-potential evapo-transpiration balance. The situation becomes even worse under the drought conditions, which in the last decades occur more frequently.

Key Findings - Task 1
Determination of the Countries Profile

Annual Water Demand by Sector for the Year 2000

Demand Sector	MCM	%
AGRICULTURE	182.4	69
Domestic	67.5	25
Industry	3.5	**1**
Environment	12.5	5
TOTAL	**265.9**	**100**