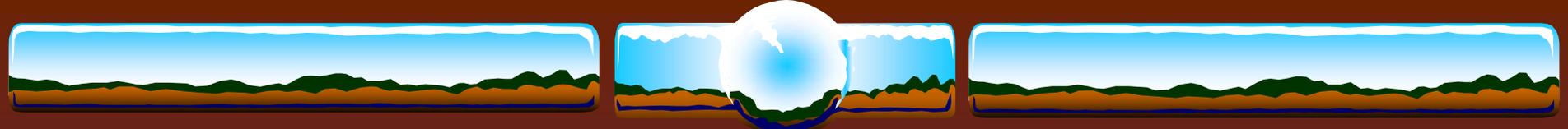


The Saudi-Arabian Regulations for Reuse of Treated Wastewater Effluents

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Contents

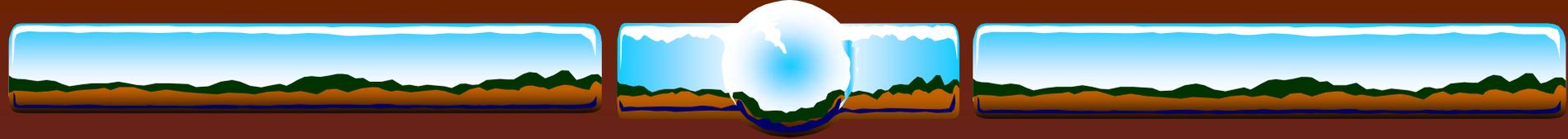
I-Principles of regulating wastewater reuse

- ❖ **Introduction**
- ❖ **Regulation formulation**
- ❖ **Significance of the Regulations**

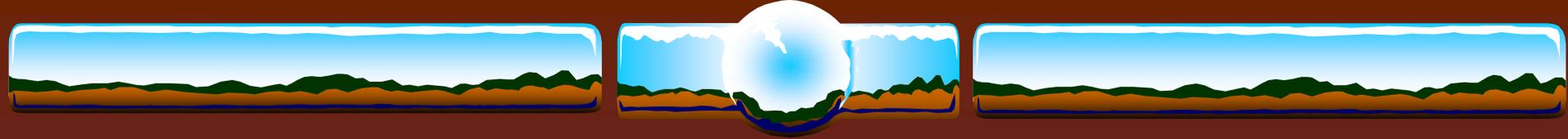
II- Saudi Arabian Regulation

Background

Content of the bylaw



- ❖ Regulations are based on:
 - ❖ Health Risks: based on hazard identification, exposure assessment, dose-response, and risk characterization.
 - ❖ Environmental Risks: soil deterioration and groundwater pollution.



❖ Methodology of developing human health-related guidelines

a- Prevention of Pollutant Accumulation

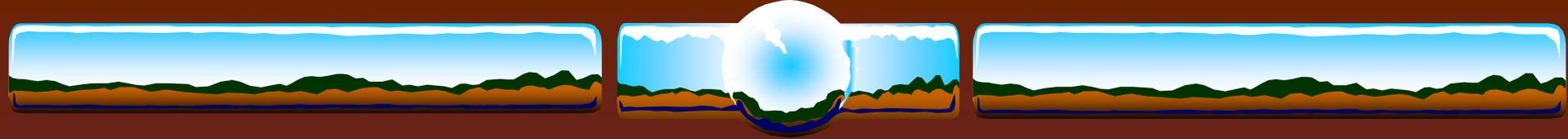
very stringent

b- Maximizing system capacity

based on maximum permissible loading

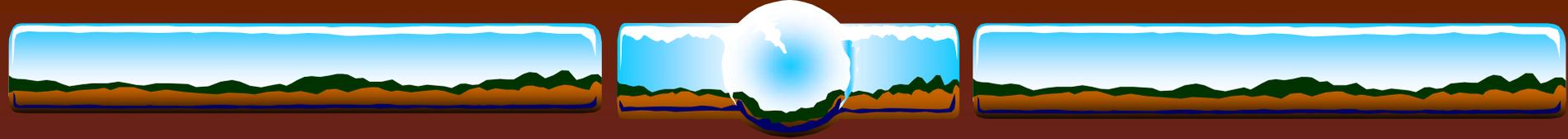
exploiting mechanisms such as attenuation, detoxification, and assimilation

more relaxed



❖ Factors Affecting Standards Formulation:

- ❖ Past Reuse Experience
- ❖ Technical feasibility
- ❖ Public policy
- ❖ Economic

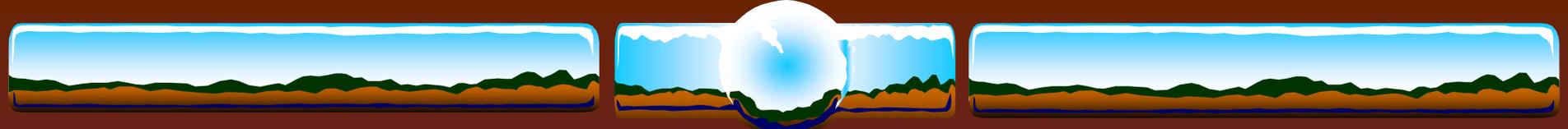


Existing regulations; globally classified into three categories:

- ❖ -WHO 1989
- ❖ USA: EPA 1992 and California standards Title 22
- ❖ Others; Australia, Mexico..

- ❖ Arabic Countries Tunis and Jordan

- ❖ **Existing Saudi standards: PME 1989**
NGOs Saudi Aramco and Royal commission

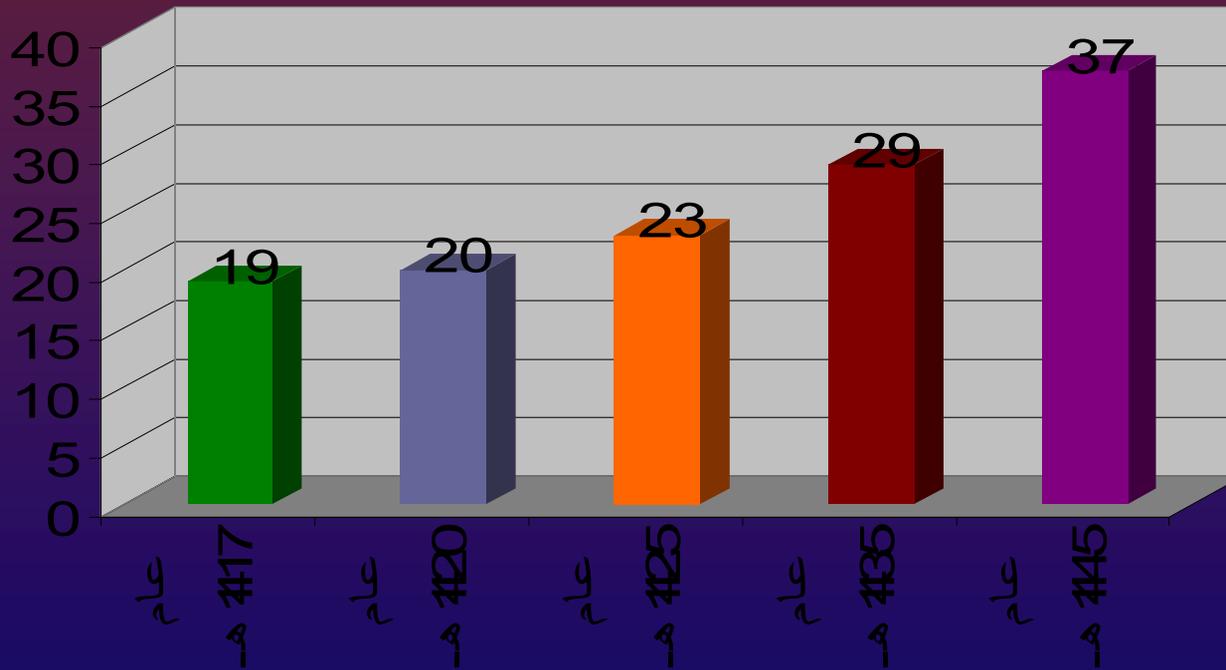


II- Saudi Arabian Regulations

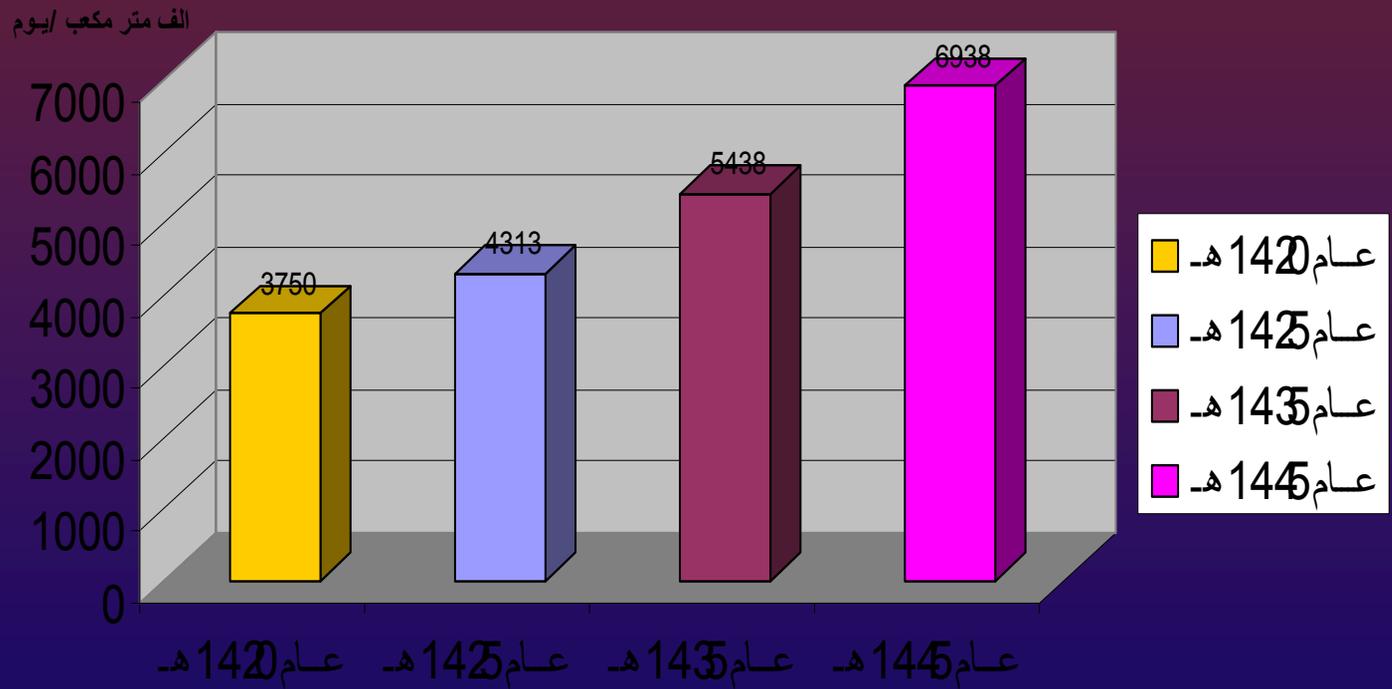
Background

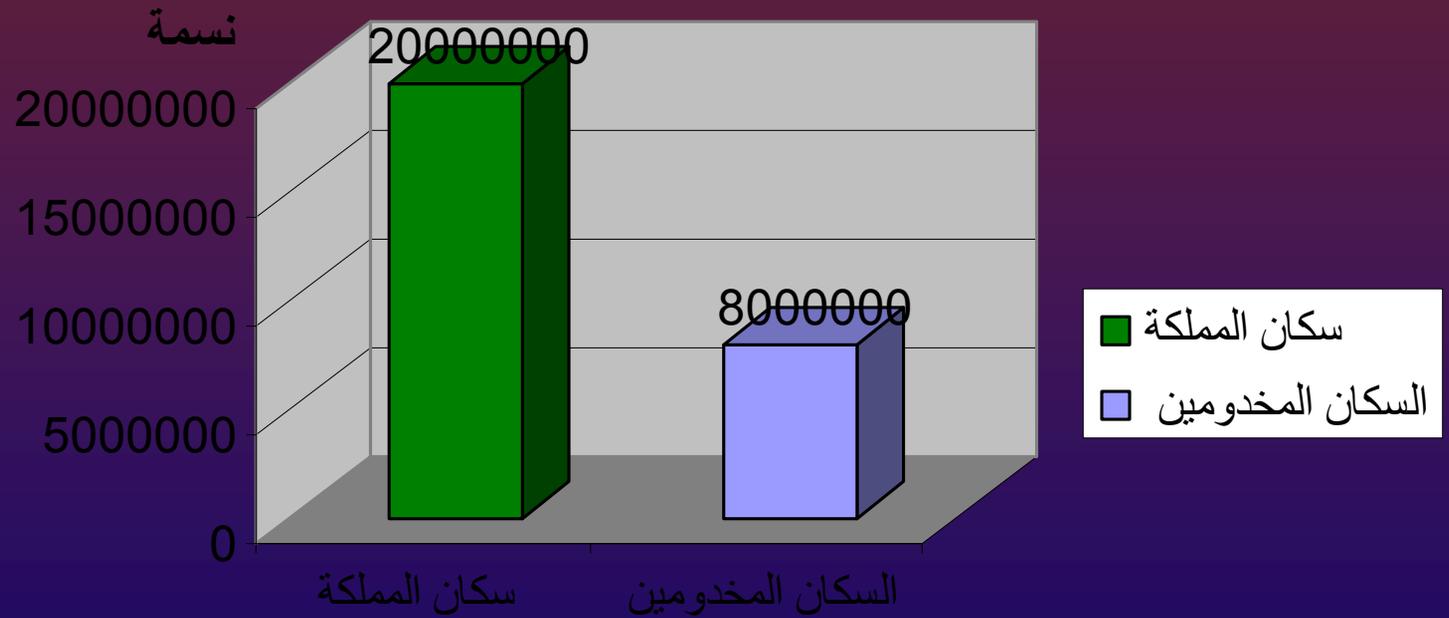
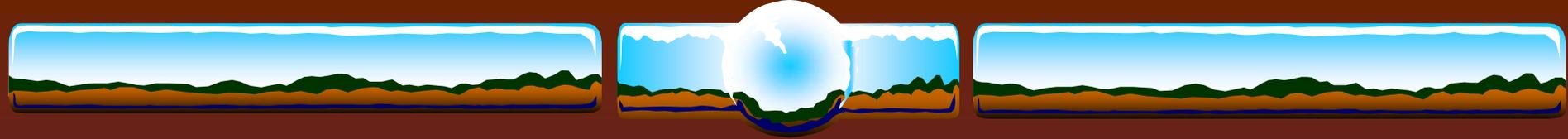
- **KSA has a limited water resources**
 - **No running surface water**
 - **Scanty rainfall 100mm/yr.**
 - **High evaporation rate 3500mm/yr**
- **Increased population**
 - **annual growth rate 3.2%**

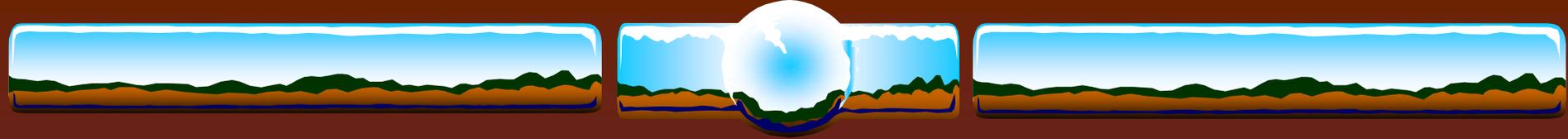
Population Projection for KSA



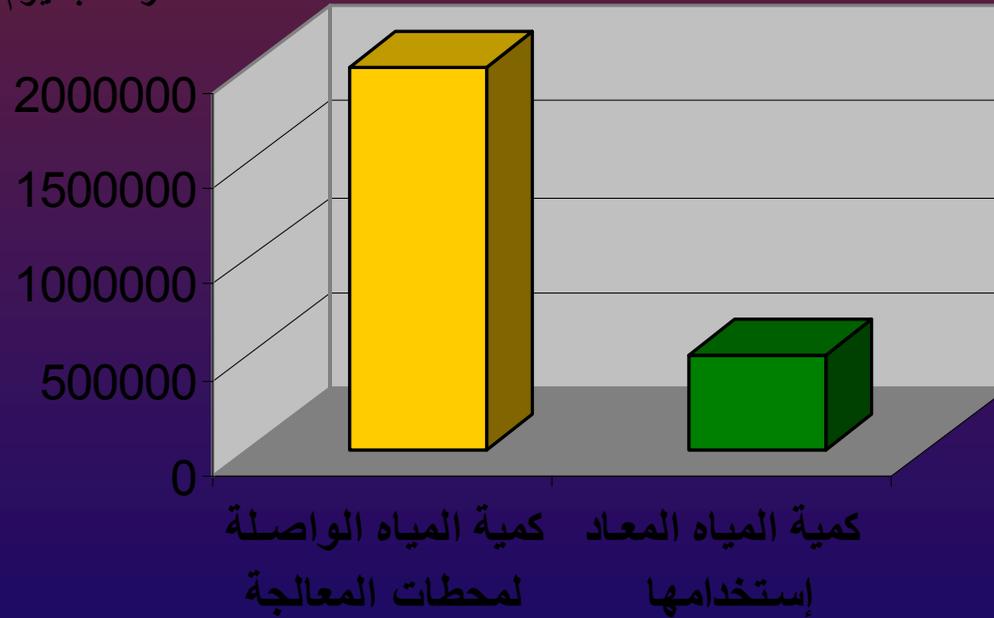
Wastewater Projection for KSA

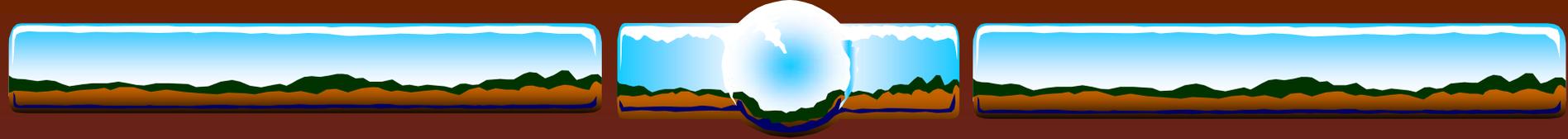




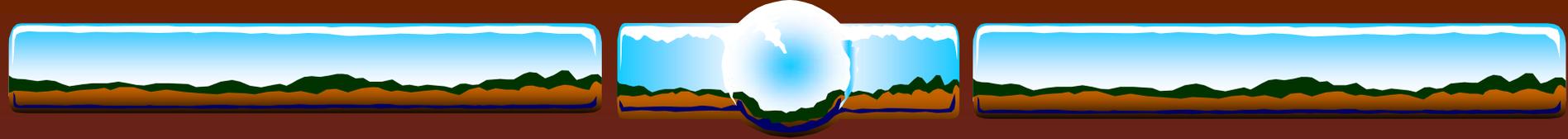


متر مكعب ليوم



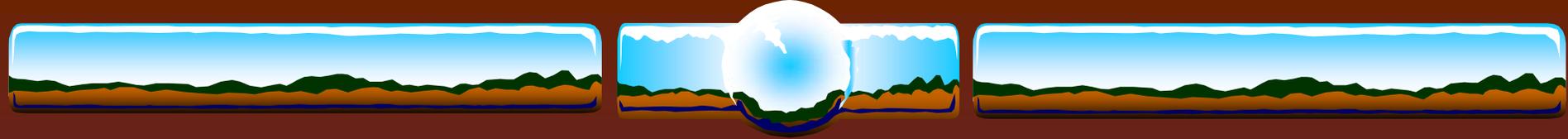


Country	Aver. Usage l/cap.d
KSA	250
Sweden	200
France	150
Germany	135
Netherlands	104

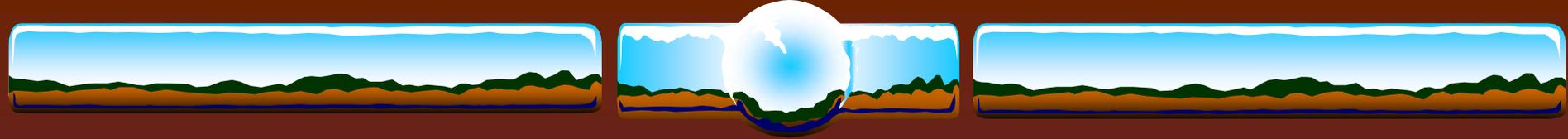


❖ Important Facts:

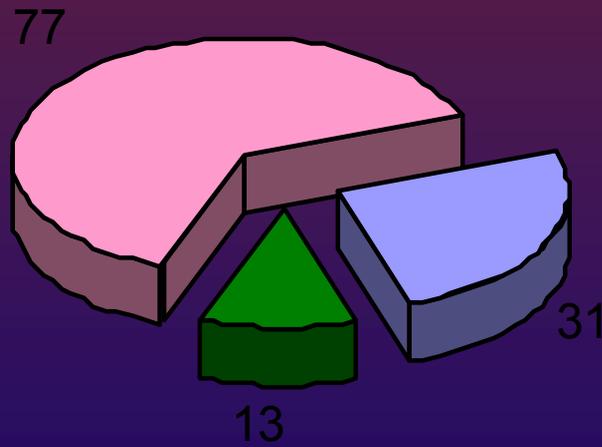
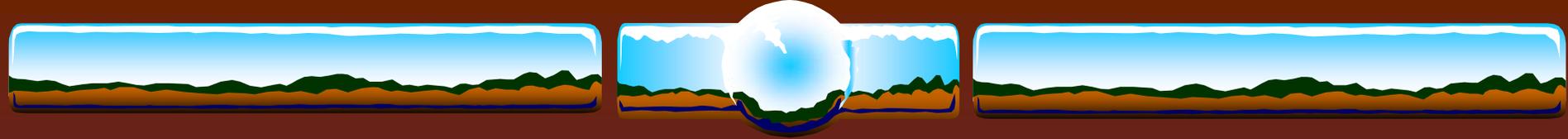
- 1. In the past few decades KSA gave higher allocations to water supply than to wastewater projects. Main reasons for that old policy is the high cost of wastewater projects and the prevalent belief that septic tanks could serve as long-term solution for sanitation demand without major problems.**



2. Today, wastewater services with safe disposal of wastewater is considered one of top priorities in the country. This fact was generated by the increased environmental awareness which calls for the protection of man and his environment; in particular to safe guard the public health, recycle of the treated effluents as water resource, and mitigate environmental pollution.

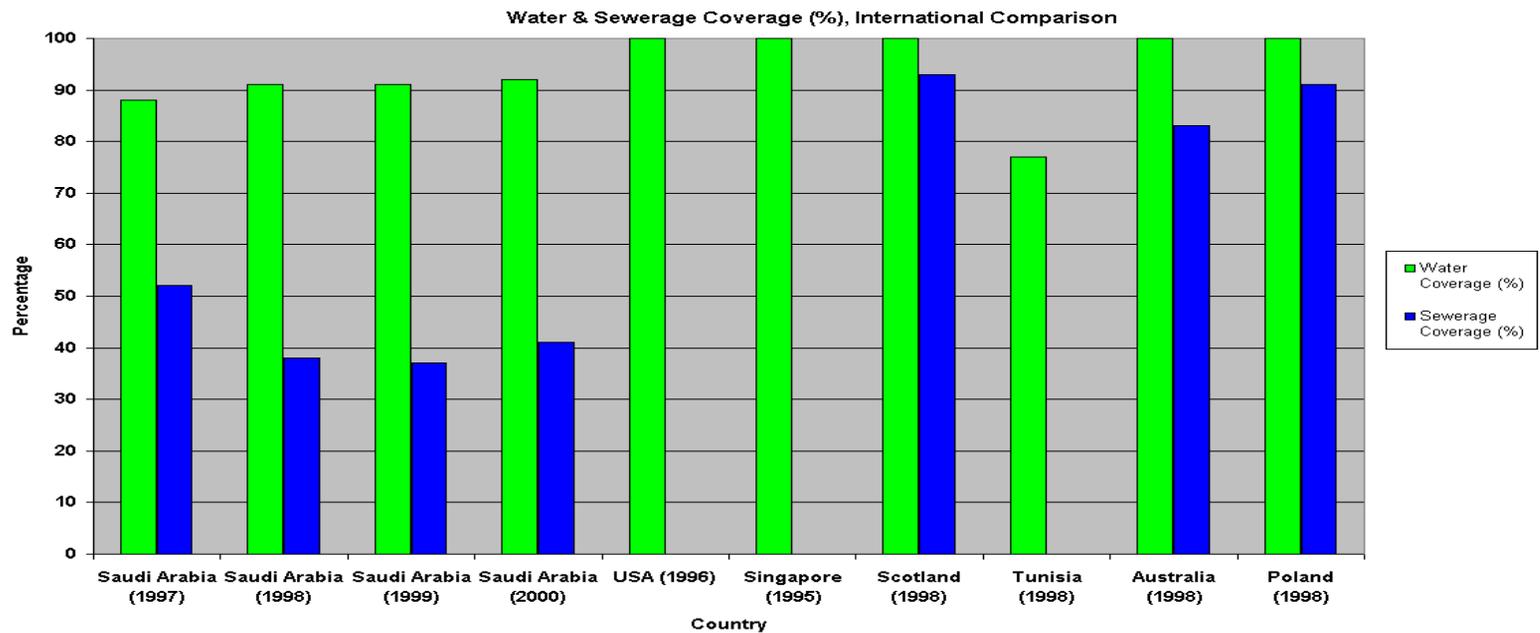


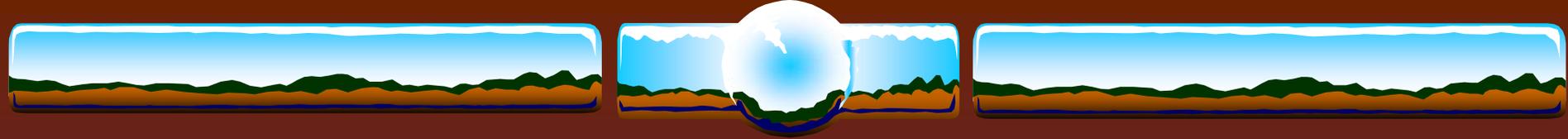
3. KSA have only witnesses, up-to-date, limited number of wastewater plants as compared to the required number. The sewerage services only cover 40 percent of the population



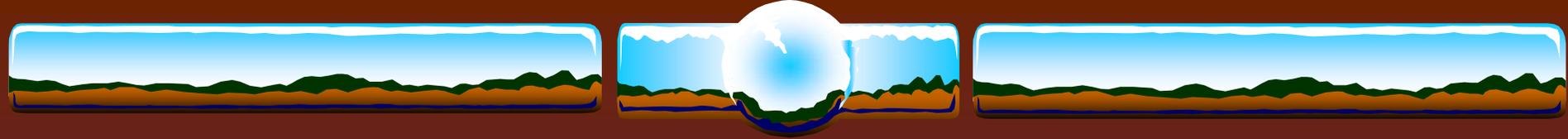
- المدن المخدومة بالصرف الصحي
- المدن الجاري بها تنفيذ مشاريع الصرف الصحي
- المدن الغيرمخدومة بالصرف الصحي

Service Coverage

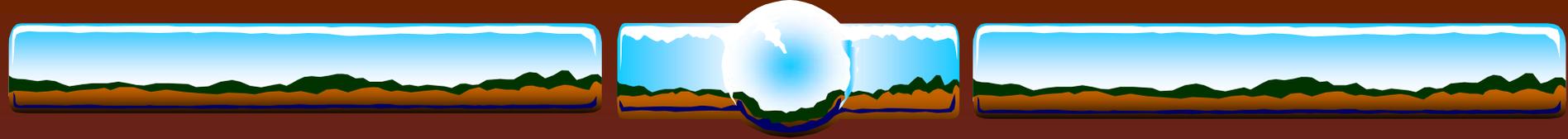




- ❖ In an effort to conserve limited water resources in Saudi Arabia, a royal decree (M/6-1421H) approved proposed regulations for treated wastewater reuse. According to this new policy, the reuse of wastewater effluents in irrigation is expected to increase dramatically for the next five years. Therefore, the health and environmental aspects of this practice are of a major concern

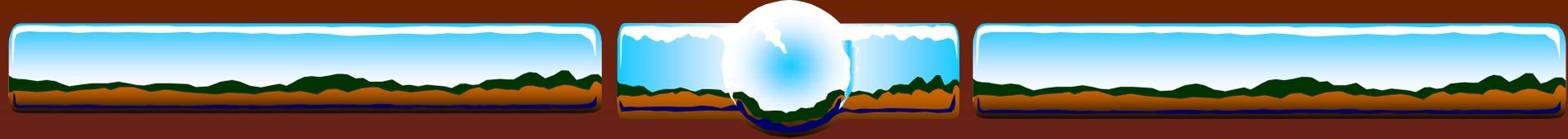


- ❖ The Regulation consisted from 34 articles circulated to all governmental bodies .



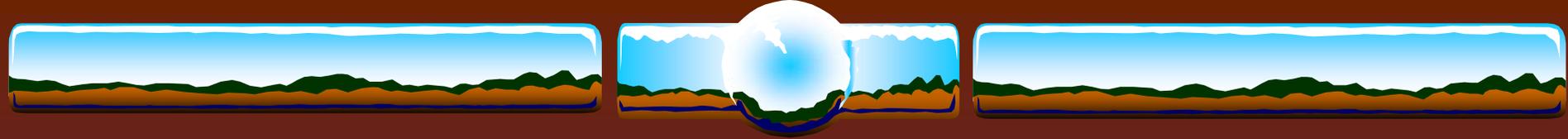
❖ Work plan

- ❖ Formation of Committee including members from all water authorities in KSA
- ❖ Formation of specialists teams
 - ❖ Data and information collection
 - ❖ Field visits
 - ❖ Analysis of data

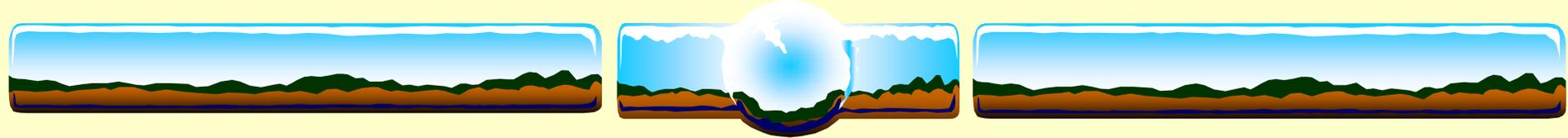


❖ **The compiled bylaw consists of the following parts:**

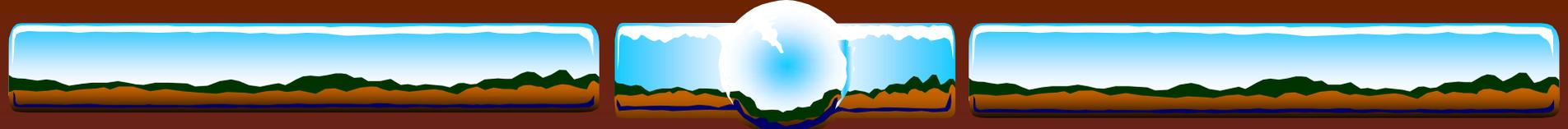
- ❖ 1. Objectives, Extent, and definitions
- ❖ 2. Permits, general and special conditions
- ❖ 3. Effluent quality (raw, secondary, tertiary)
- ❖ 4. Control
- ❖ 5. Penalties and fines
- ❖ 6. General terms



- ❖ The bylaw deals reflects the following,
- ❖ 1. Disposal of Wastewater to public sewer
- ❖ 2 Reuse of TWW for irrigation
- ❖ 3 Privately owned Small treatment plants in private or government compounds



PMEPA				Parameters
Disposal to water course		RR		
75	NTU	----	----	العكارة
10	mg/l	40	10	الأوكسيجين الحيوي BOD
	mg/l	----	50	الأوكسيجين الكيميائي COD
10		40	10	المواد العالقة SS
----	=	----	----	نيتروجين TKN
----	=	----	5	الأمونيا NH3
10	=	10	10	النترات NO3
----		----	10	الفوسفات PO4
----	----	----	100	كلوريدات CL
0.5	----	0.5	0.5	الكلور المتبقي CL2
2.2		2.2	1000	بكتريا القولون
1	----	1	----	بويضات الديدان



Conclusions

- ❖ **1. A bylaw has been established for reuse of domestic effluents in irrigation for the KSA.**
- ❖ **2 The bylaw identifies two levels of treatments. This will enable WWTPs owners/operators to meet health and environmental requirements whilst not being forced into advanced treatment and its associated costs**
- ❖ **3.The compliance by different government as well as NGOs will contribute to sustainability of wastewater reuse projects in the entire KSA**
- ❖ **4 Existence of standards is an important step in implementation of safe reuse practices**