Société Nationale d'Exploitation et de Distribution des Eaux

'National Water Distribution Utility'

Strategy of Water Saving in Tunisia

Presentation of case studies

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Steering Committee

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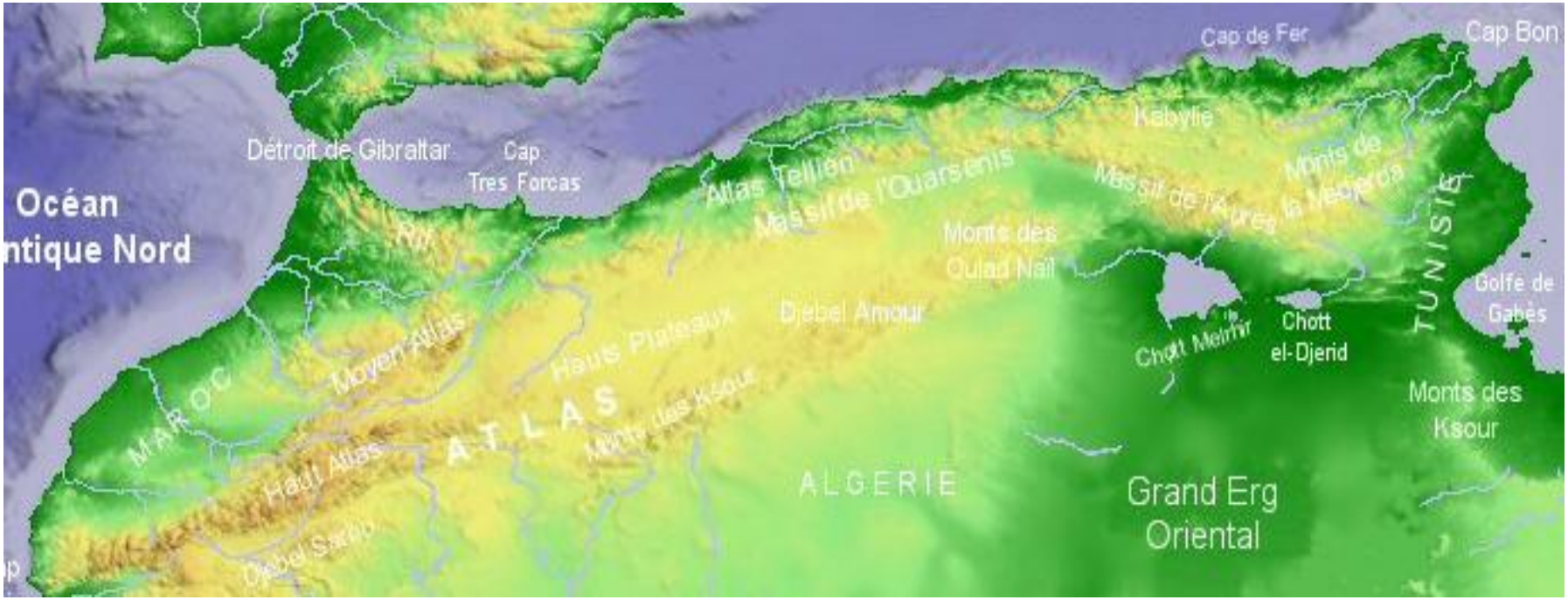
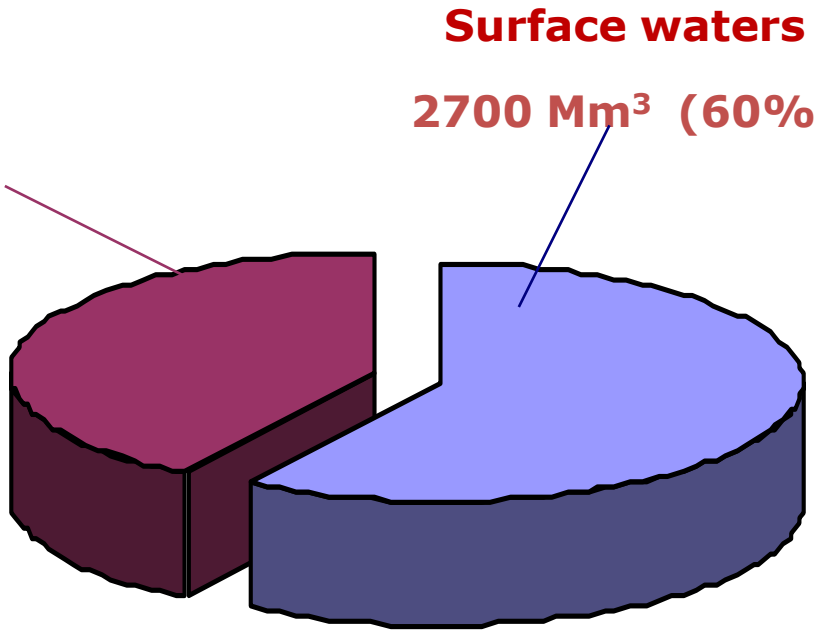
I.1- Main characteristics of water resources in Tunisia



- **The water resources of Tunisia are limited and unevenly distributed in the time and in the space.**
- **The annual average rainfall varies between less than 100 mm in the South and more than 1500 mm in the North.**

I- Water in Tunisia

I.2- The potential of water resources



I- Water in Tunisia

I.3- Use and Quality of the water

The use of the water in Tunisia is distributed as follows:

- **83% of resources are used for the Agriculture.**
- **17% of resources are used as potable water for : domestic, industrial, touristic …**

The quality of the water is variable, and the salinity admitted for the drinking water is in approximately 1,5g / l:

- **70% of water surface (Salinity ≤ 1,5 g/l).**
- **25% of groundwater (Salinity ≤ 1,5 g/l).**
- **50% groundwater (Salinity is between 1,5 and 5,0 g/l).**
- **25% groundwater (Salinity >5,0 g/l).**

I- Water in Tunisia

I.4- Main causes of water scarcity

- **The erosion :** the lack of vegetation facilitate the streaming of the water and at the same time loss of fertile soils and limit the infiltration of waters.
- **The climate :** the semi-arid climate of Tunisia, where the cyclical shortages of water are always possible, is the most important factor of water scarcity.
- **The increase of the demand in water :** direct consequence of the urban and economic development in particular agriculture, industrial and tourist sectors

I- Water in Tunisia

I.5- Cost of the water

- **The mobilization of the resources:** the cost of the infrastructures of mobilization of water surfaces is more and more high (difficult sites and the volume more and more reduced by dams). For groundwaters, their exploitation become more and more expensive, as water tables are more and more deep.

- **The transport of the water :** long adductions of the water from the North towards the Center and the South. The North of Tunisia is better provided in good water quality, this water is often mixed with the lower-quality local water resources to be able to satisfy needs.

- **The treatment and the desalination :** process necessary to assure clean, healthy and good quality of water (energy, expensive equipments and chemicals).

I- Water in Tunisia

I.6- Organization of the water sector in Tunisia

The water is a public good (property), The Ministry in charge of Agriculture and water Resources manages the water resources in Tunisia.

Two actors for potable water supply:

- **The General Direction of Rural Engineering and Exploitation of waters (DGGREE, Ministry of Agriculture) is responsible for water management and supplying the population by potable water in rural areas.**

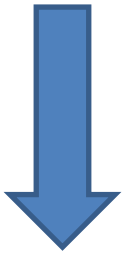
- **The SONEDE provides the potable water in urban areas , and the rural agglomerations.**

II- Water Strategy in Tunisia

II.1- Problems of water resources

Water demand increases due to the demographic growth, the improvement of the quality of life and the economic and social development.

The offer of the water will reach its limits at the end of the program of mobilization of water resources.



The demand in water will exercise a more and more important pressure on water resources.

II- Water Strategy in Tunisia

II.2- Main orientations

What are the solutions adopted to assure a sustainable balance between the offer and the demand?

1. **Maintain the mobilization of water resources for the development of the hydraulic infrastructure: the rate of mobilization will reach 95 % in 2016.**

2. **Master the water consumption of the economical sectors by efficient management of water demand: Development of incentive tools for water saving in the different sectors of industry and to facilitate their applications.**

3. **Develop the not conventional resources (desalination of brackish water and sea water and reuse of treated wastewater).**

II- Water Strategy in Tunisia

II.2- Main orientations

The water saving: reduce the difference between the consumption and the real need (demand) in the economical sectors.

1. Reduce the losses of the water on the public and private water distribution networks, and develop to use of unconventional resources.

2. Act on the behavior of the water users :

Develop the awareness of the population on the scarcity of the water and the obligation to protect the resources for the future generations.

II- Water Strategy in Tunisia

II.3- Adopted programs

The Water Strategy in Tunisia is based on two programs:

- **Mobilization of the quasi-totality of the conventional water resources on the horizon of 2016 (95 %).**
- **National program of water saving on horizon 2030.**

II- Water Strategy in Tunisia

II.4- National program of the water saving

The long-term program of water saving is based on:

- **The water saving (reduction of 30 % of the consumption before the year 2030).**
- **The development of unconventional resources (by desalination of waters and use of treated waste water).**
- **The protection of the resources against the pollution and overexploitation of tablecloths.**

II- Water Strategy in Tunisia

II.5- Main measures of the national program of saving water

- **Implementation of the awareness and training programs :**
  - ✓ **The intensification of the awareness of the users.**
  - ✓ **The annual organization of a National Day of Savings of Water.**
  - ✓ **The implementation of the programs of training and recycling.**
- **Adoption of the principle of the audit of the internal water systems.**

II- Water Strategy in Tunisia

II.5- Main measures of the national program of saving water

- **Specific grant for audit operations :**
  - ✓ **The realization of the operations of audit: 50 %, with a maximum of 2 500 DT.**
  - ✓ **The investments which ensue from the realization of the operations of audit: 20 %, with a maximum of 15 000 DT.**
- **Participation of the private sector in the production and the use of the unconventional water (industrial and tourist parks).**

III- Program of SONEDE regarding economy of water

III.1- Presentation of SONEDE

The SONEDE is a public company created July 2nd, 1968.

✓Serve all the subscribers in potable water for the various uses,

✓ Build the infrastructures of the water supply,

✓ Insure the management, the exploitation and the maintenance of networks.

III- Program of the SONEDE regarding economy of water

III.2- Main indicators of the SONEDE

Name	Figures of year 2011
Sold volume of water	389,7 Million m3
Turnover	210.0 Million DT (110 Million Euros)
Number of subscribers	2386 Mille
Length of networks	47 454 km
Supply rate	97,9 % 100% urbain 93,8% rural (SONEDE+DGGRE)*
Staff	7358

* SONEDE assures water supply of the agglomerated rural (49,4 %), the Rural Genius assures water supply of scattered rural (44,4 %). The supply rate (rural) of global country for Tunisia is 93,8 %.

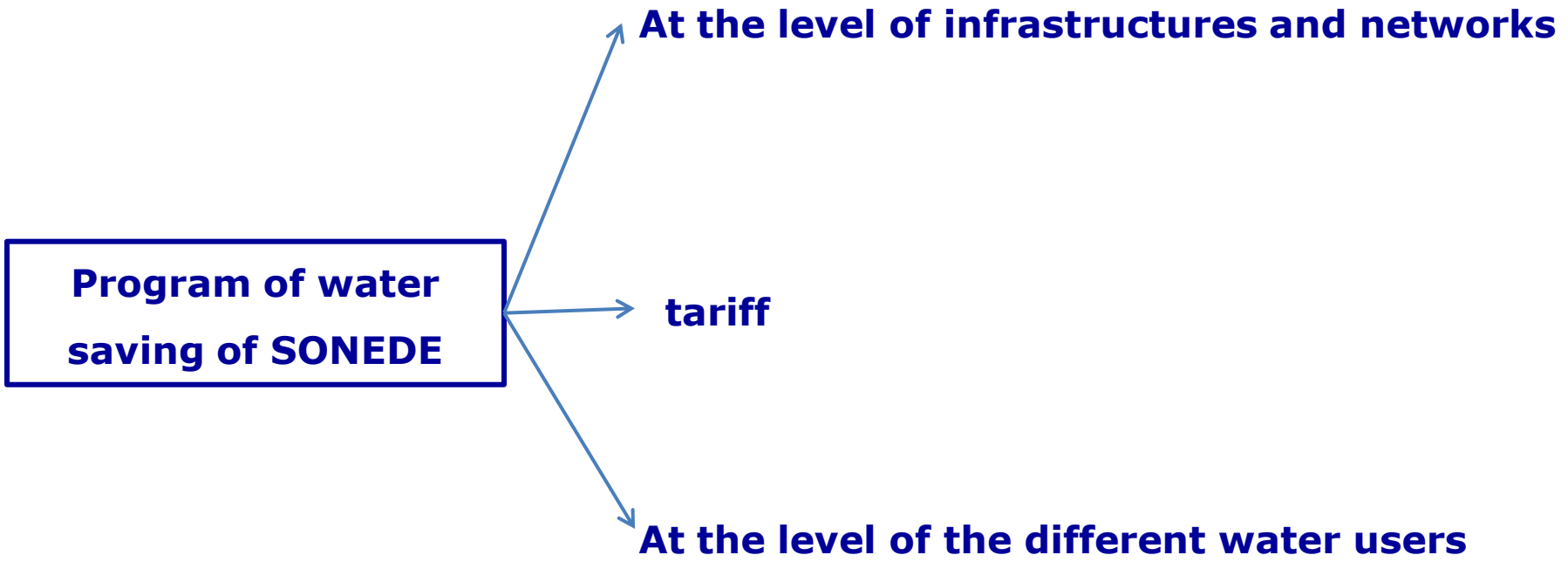
III- Program of the SONEDE regarding economy of water

III.3- Distribution of the consumed water volume and the number of subscribers (year 2011)

Use	Consumed Volume		Subscriber numbers	
	Mm^3	%	Nombre	%
Domestic	289,0	74,2	2 269 247	95,1
Collective	45,3	11,6	99 192	4,2
Industry	29,0	7,4	14 132	0,6
Tourism	13,5	3,5	1 466	0,1
Domestic without subcriber	10,5	2,7	908	0,0
Divers	2,4	0,6	1 373	0,1
Total	389,7	100,0	2 386 318	100,0

III- Program of the SONEDE regarding economy of water

III.4- Program of economy of water in the SONEDE



III- Program of the SONEDE regarding economy of water

III.5- The participants in the economy of water in the SONEDE

✓ **Central direction of Water saving**

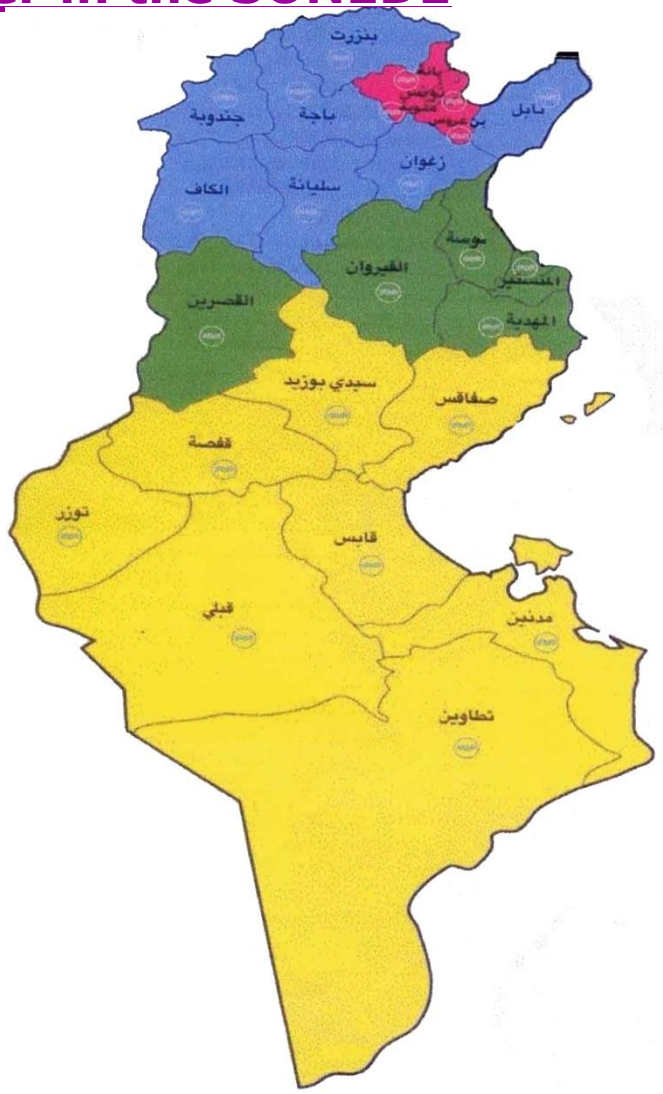
• **Elaboration of the programs of water saving**

• **Evaluation and monitoring the realization of these programs.**

✓ **38 regional structures**

•**Realization of the actions of water saving on all the networks**

•**Intervention in time for the repair of the damages and leaks.**



Water saving at the level of infrastructures and networks

Actions of improvements of the technical performances	Training initiatives	Actions of control and evaluation
• Renovation of the pipes(200 km / year). • Improvement of the accounting tools of (80 000 / YEAR). • Change of the lead (Pb) connections (30 000 subscriber/ year). • Search and repair the leaks)(7000 km / year). • Regulation of the pressure. • Continuous control of the distributed volumes.	• Better use and exploitation of equipments installed on the distribution networks (pressure regulators and equipments of detection of the leaks).	• Annual evaluation and control of the performances of networks. • Follow-up of villages with low yields. • Establishment of the plans of annual actions.

III- Program of the SONEDE regarding economy of water

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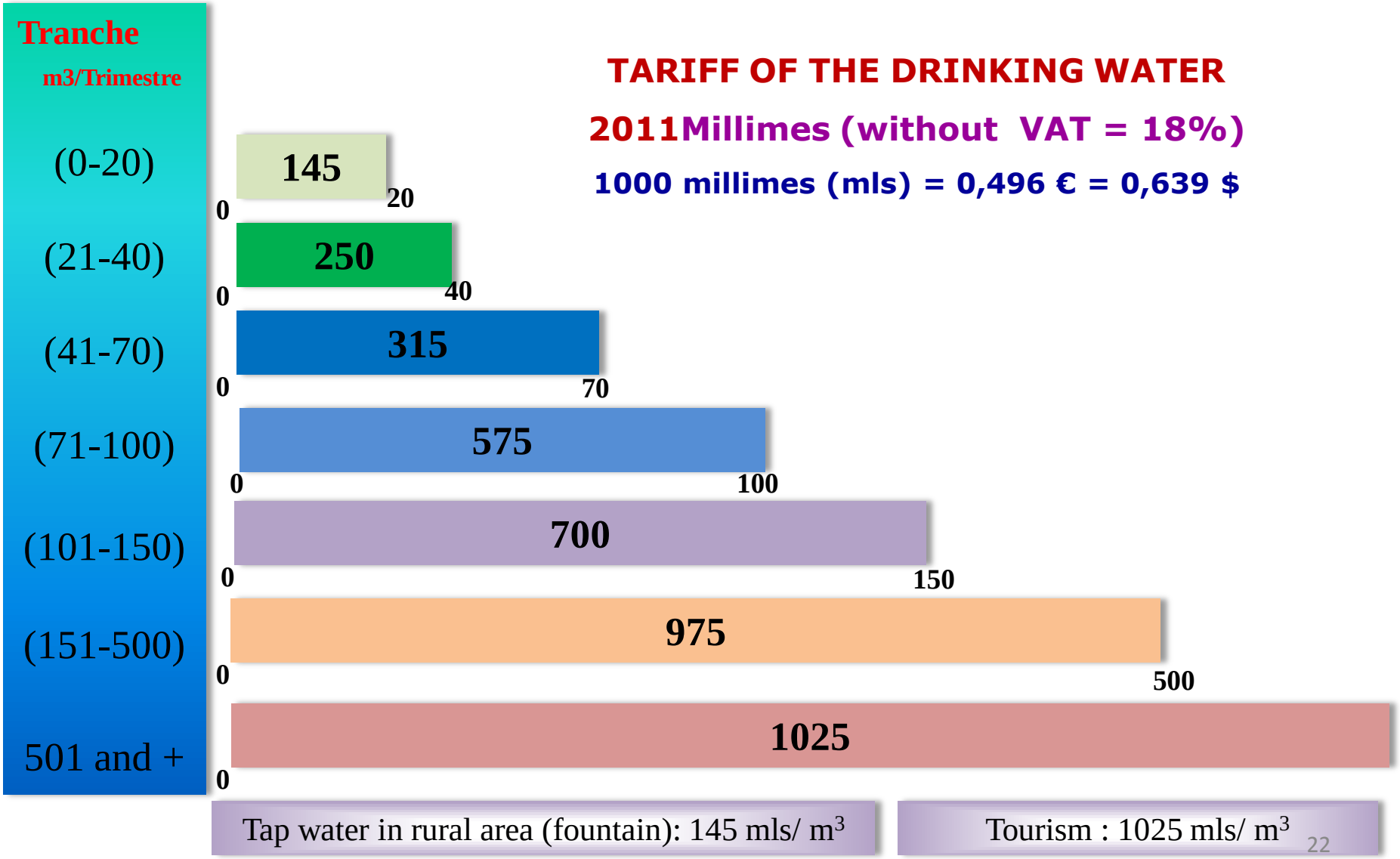


III- Program of the SONEDE regarding economy of water

This tariff has three objectives:

- ✓ **Social objective: offer the possibility to the modest socioeconomic population category to have access to potable water at low price.**
- ✓ **Financial objective: assure the financial equilibrium of SONEDE and allow her to finance the exploitation, renovation and development projects.**
- ✓ **Objective of water saving: this mode of progressive pricing is used as management tool of the demand because it incites the consumers to optimize and to rationalize the use of the water and to avoid the wasting.**

3- Rationalization of the consumption of the users

Audit of water systems for high water consumers	Awareness actions
• <u>High consumers of water</u> - Number : 5670 (0,23% of consumers) - consumption volume: 66,8 Mm^3 (16 % of VTC) - The distribution by use (collective (63%), Industry(27%) ,Tourism (10%)). • <u>Training of auditors:</u> - 399 trained engineers (166 of the public service and 233 of the private sector) -72 auditors, approved at the end of 2011 -<u>Control of the auditing (2011)</u> 482 Audited establishments (collective (204), Industry(186) Tourism(92)).	• Conception of awareness publication (more than a million leaflets and posters were distributed since 2002). • Realization and broadcasting of TV spots related to water saving. • Organization of seminars : study days and March 22nd days. Promote the use of the equipments of water. saving • Animations in schools (primary secondary levels)/ youth clubs.

IV- Case study n°1:

Optimisation of water consumption

for high water consumers:

IV- Presentation of the Case study n°1:

IV.1- Aim of the case study:

This study consists in the evaluation of the consumption of water and of the specific consumption in three public establishments before and after the realization of a set of actions of water saving.

These actions consisted in:

-Installation of equipments of water saving,

-Rehabilitation of the internal networks of water distribution,

-Installation of divisional water meters,

-Use of alternatives resources (well, rainwater harvesting).

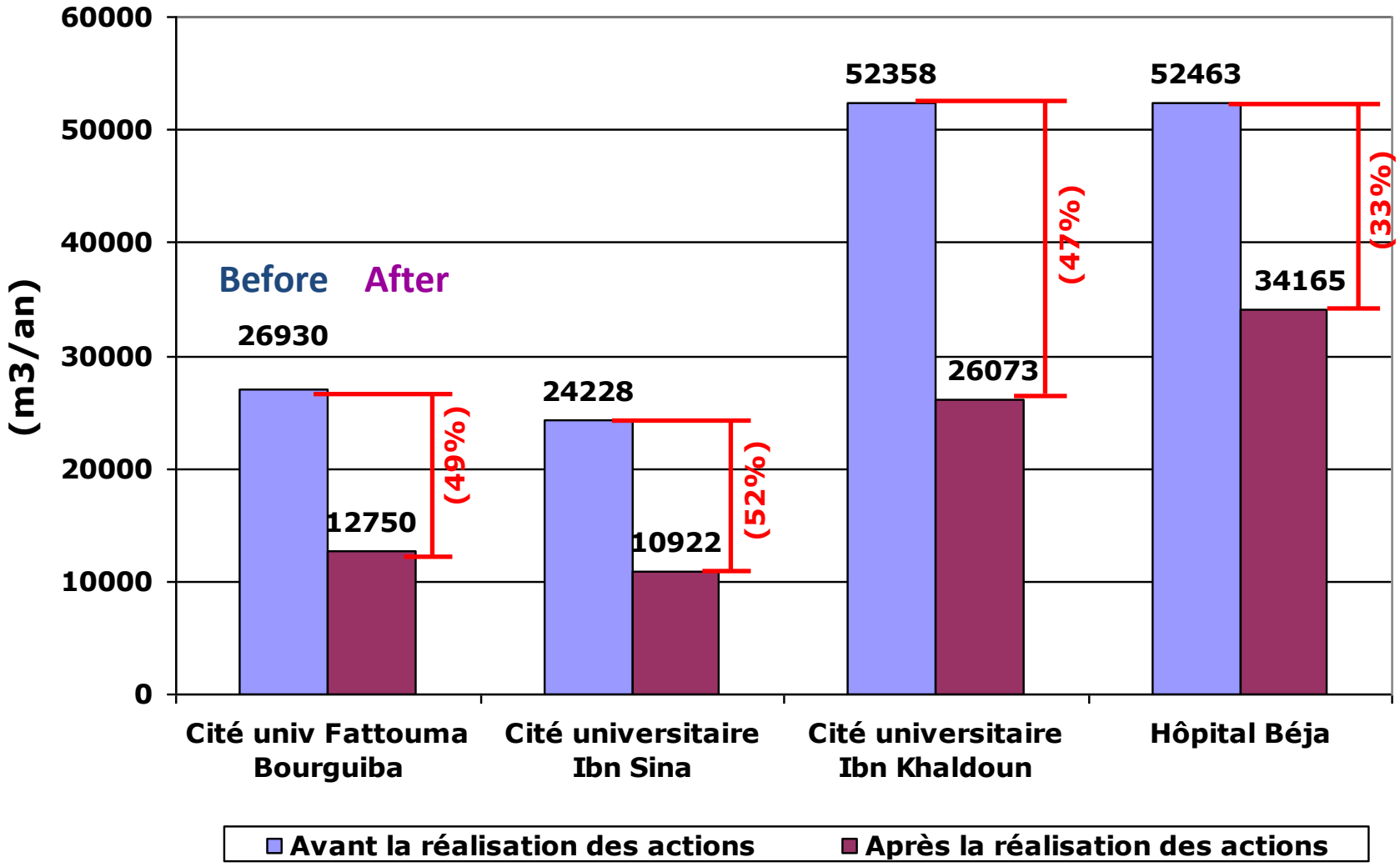
IV- Presentation of the Case study n°1

IV.2- Presentation of Institutions and realized actions

Establishments	Description of Establishment	Main actions of economy of water
University city Fattouma Bourguiba (Monastir)	Student building + canteen: Number of students= 455 Number of rooms= 224	Renovation + rehabilitation of pipes (185 m en PE) Implementation of water saving equipments (504 U) Renovation of WC : Flush push button
University city Ibn Sina (Sousse)	Student building + canteen Number of students= 552 Number of rooms = 230	Renovation + rehabilitation of pipes Implementation of water saving equipments Renovation of WC : Flush push button Implementation of divisional water meters
University city Ibn Khaldoun (Sousse)	Student building + canteen Number of students = 940 Number of rooms= 345	Renovation + rehabilitation of pipes Renovation of the water tank
Regional hospital Béja	staff= 482 employees Capacity of accommodation= 352 beds	Renovation + rehabilitation of pipes (300 m en PE) Implementation of water saving equipments (86 U) Renovation of WC : Flush push button Implementation of (4) divisional water meters Realization of a well + rainwater harvesting

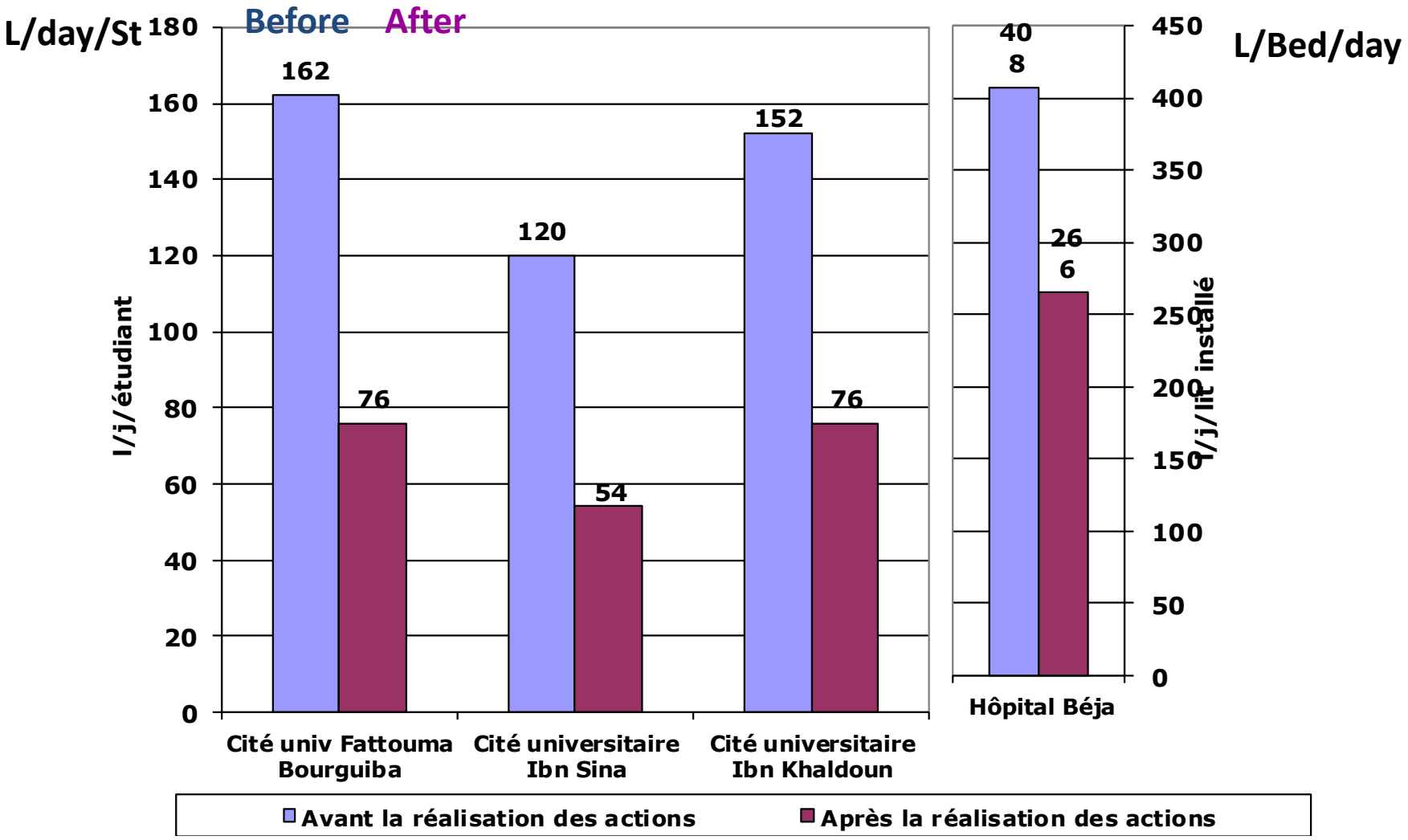
IV- Presentation of the Case study n°1

IV.3- Evolution of water consumption (m^3/year)



IV- Présentation de l'étude de cas n°1

IV.4- Evolution of specific water consumption



IV- Presentation of the Case study n°1

IV.5- Main obtained results and conclusion

- **Reduction of the specific water consumption of 50 % as average for the student buildings and of 35 % for the regional hospital of Beja.**
- **An important reduction of the amounts of the water invoices of these establishments.**

⟹ **longer use, bathing, daily household (cleaning of premises).**

The realization of auditing operations and related water saving actions contribute effectively to rational and judicious use of the water.

V- Case study n°2 :

Evaluation of implemented water saving equipments

V- Presentation of the Case study n°2

V.1- Objective of the case study

Evaluation of the use of equipments by a sample of subscribers and their impacts on the water consumption.

- ✓**Number of subscribers of sample: 62 (44 in great Tunis, 12 in the sahel and 6 in Kébili).**

Concerned uses: (34 subscribers domestic, 09 administrative establishments, 8 educational establishments, 05 mosques, 4 commercial shops and 2 hospitals).

V- Presentation of the Case study n°2

V.2- Presentation of water saving equipments installed

Aerators

Flow reducer

Shower stop

water saving Shower heads

water TOILETS Stop

V- Presentation of the Case study n°2

V.3- Number and distribution of the set up equipments

Use	Aerator	The flow reducers	Shower Stop	Water Stop	Total	Number/subscribers
Domestic	**170**	**88**	**98**	**55**	**411 (24%)**	**12**
Administrative	190	120	8	93	**411** (24%)	46
Education	248	35	53	52	**388** (22%)	49
Hospitals	207	49	32	69	**357** (20%)	179
Mosque	90	6	1	9	**106** (6%)	21
commercial	40	13	7	15	**75** (4%)	19
Collective	**775**	**223**	**101**	**238**	**1337 (76%)**	**48**
Total	**945 (54%)**	**311** (18%)	**199** (11%)	**293** (17%)	**1748 (100%)**	**28**

V- Presentation of the Case study n°2

V.4- Cost of water saving equipments installed

Designation	Unit cost DT (TTC)	Number	Total cost DT (TTC)
Aerators	10	945	10 000
Flow reducers	12	311	5 000
Water saving Shower heads	25	199	5 000
Stop water TOILETS	12	293	5 000
Total		1748	25 000

The acquisition and implementation of these equipments was supported by SONEDE.

V- Presentation of the Case study n°2

V.5- Approach adopted for the evaluation

- ✓ **Step 1: survey with the subscribers:**

-verification of water metring,

-verification of water leaks,

-Change of subscribers conditions

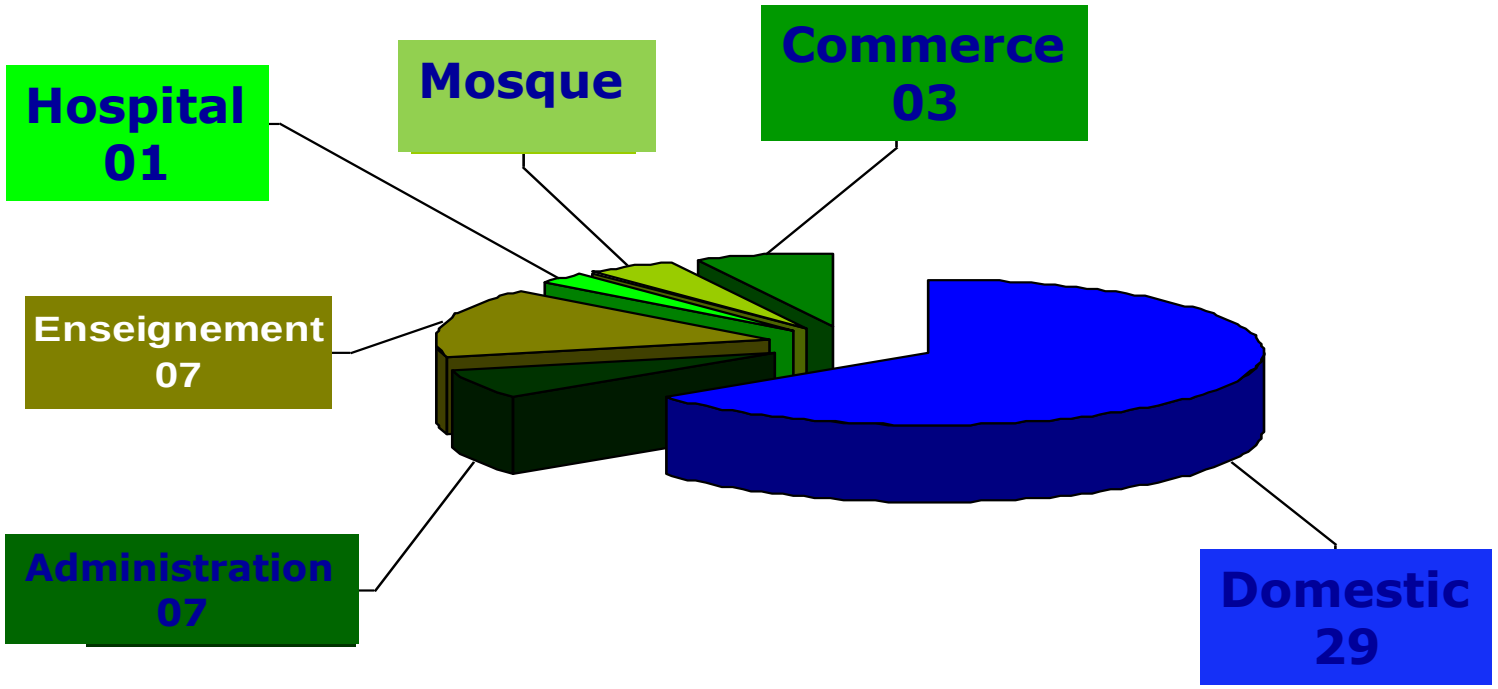
-Check of the existence of accessories,

- ✓ **Step 2: comparison of the water consumption volumes before and after water saving action (VC one year before / VC one year later)**

V- Presentation of the Case study n°2

V.6- Survey results

- ✓ **17/62 Subscribers cannot be taken into account in the evaluation (leaks in networks, extension of buildings, etc.)**



V- Presentation of the Case study n°2

V.7- Summary table of results evaluation

Use	Number of Subscribers	Rate of reduction (%)	Rate of existence(*) (%)
Domestic	18	**21%**	**98%**
Education	07	23%	40%
Hospitals	01	16%	76%
Administrative	02	15%	93%
commercial	02	04%	63%
Mosquee	01	02%	85%
Collective	13	**19%**	**63%**
Total Subscribers	31	**20%**	**67%**

(*) Rate of existence of equipments after one year of implementation

V- Presentation of the Case study n°2

V.8- Opinion of the subscribers concerned by the operation

- ✓ **General satisfaction for the majority of the subscribers: reduction of the consumption in water for an equivalent comfort.**
- ✓ **Some inconveniences for the domestic subscribers situated in the low zones or at the end of networks: sealing of the membranes of equipments by the impurities.**
- ✓ **Recording of an increase of the water consumption for some domestic subscribers, justified by the watering of their green spaces.**

V- Presentation of the Case study n°2

V.9- Main obtained results and conclusion

1- The rate of reduction (20 %) (the implemented action) is widely lower than the rate of flow reduction 50 % (experiments made on water saving equipments)

2-water saving equipments are a small material with short depreciation period

3-The systematic maintenance of equipments is necessary (risk of sealing).

V- General conclusion

- **The realization of water saving strategy will allow Tunisia to postpone the imbalance between water supply and demand and to assure its sustainable socioeconomic development.**

- **During the history, Tunisia had contributed to the universal experience in the field of the management of water resources:**

1. **Punic Period → water cisterns (rainwater harvesting).**

2. **Roman Period → aqueduct (132 Km).**

3. **Arab-Muslim Period→ Water reservoirs + Aglabides reservoir at Kairouan + hydraulic work development.**

Temple des eaux Zaghouan

Romain aqueducs (Tunisia)

Rainwater Harvesting (Bassin des Aglabides, Kairouan)

Thank you for your attention