WATER MANAGEMENT AND TRANSFER SYSTEMS IN TUNISIA

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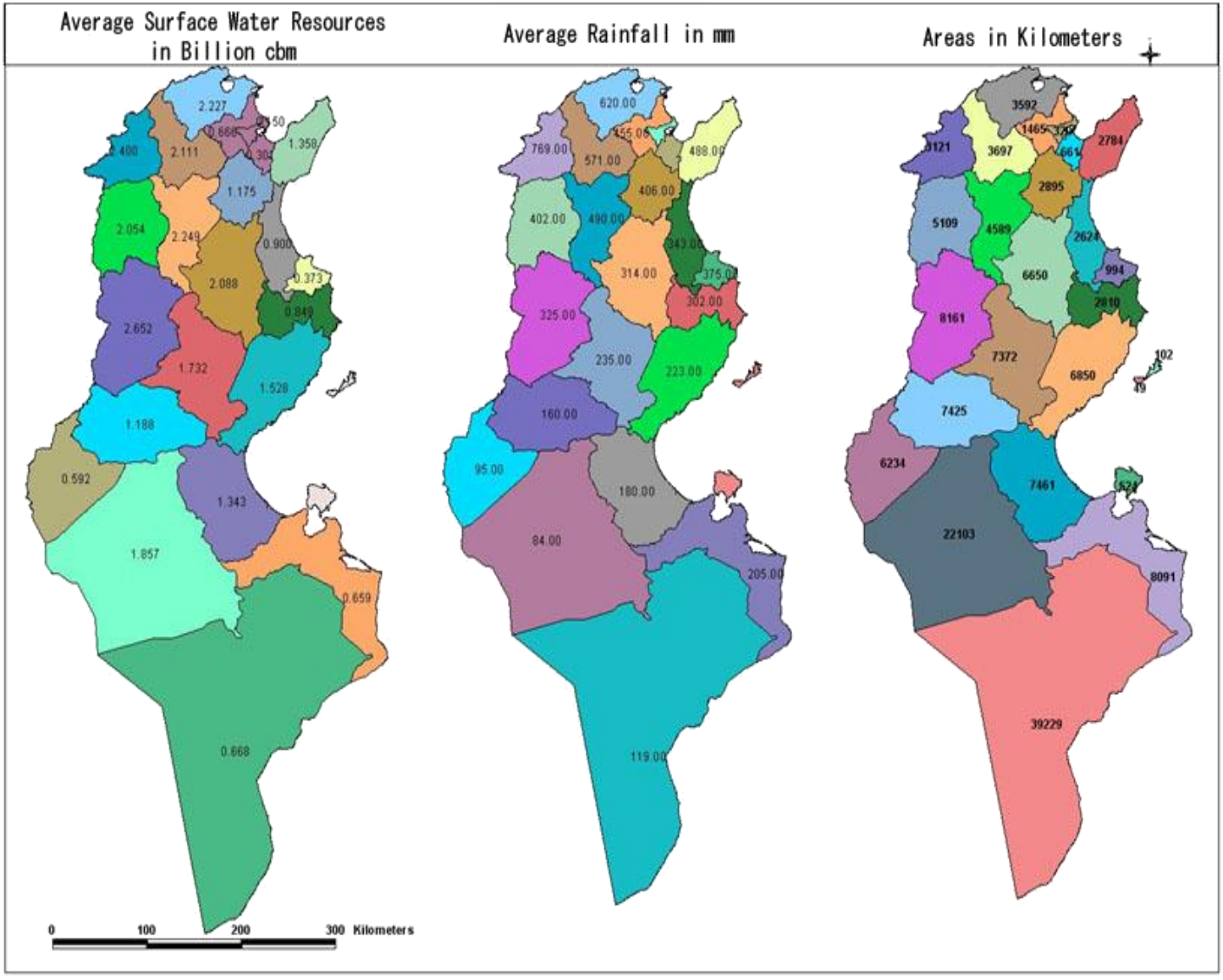
Steering Committee, 27 september 2012


Average Surface Water Resources in Billion cbm
2.227
0.150
1.358
2.111
1.175
2.054
2.249
0.900
2.088
0.373
0.849
2.652
1.732
1.528
1.188
0.592
1.343
1.857
0.659
0.668
0
100
200
300 Kilometers
Average Rainfall in mm
620.00
769.00
571.00
488.00
406.00
402.00
490.00
343.00
314.00
375.00
302.00
325.00
235.00
223.00
160.00
95.00
180.00
84.00
205.00
119.00
Areas in Kilometers
3592
3697
2784
2895
5109
4589
6650
994
2810
8161
7372
6850
102
7425
6234
7461
22103
8091
39229

The annual rainfall is variable in time and in space.

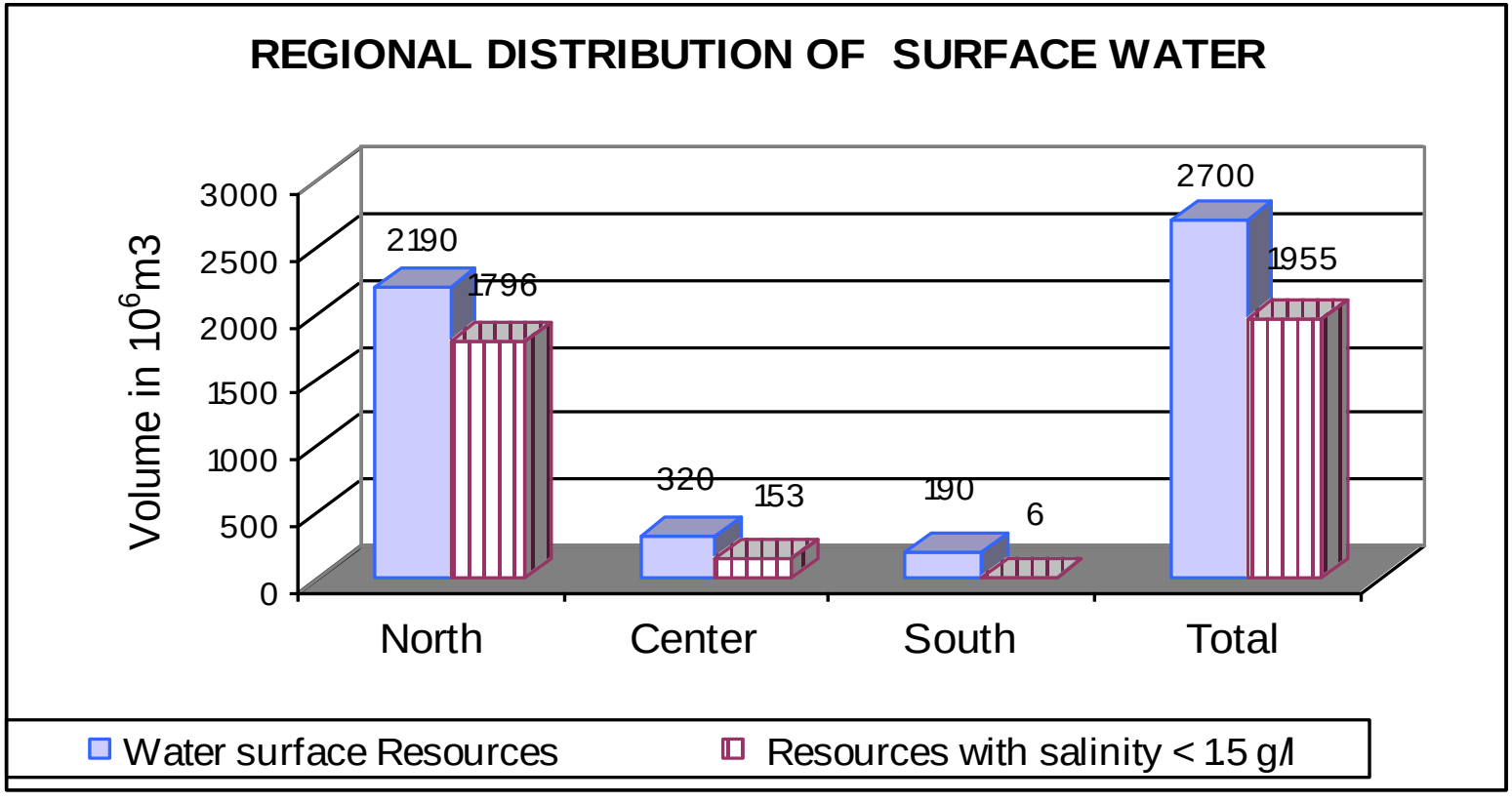
Globally, the average is about 594 mm in the north, 289 in the center and only 156 mm in the south of the country.

The ratio between the minimum rainfall and the maximum is 4.4 in the north and reach 15.8 in the south, confirming the variability between the regions.

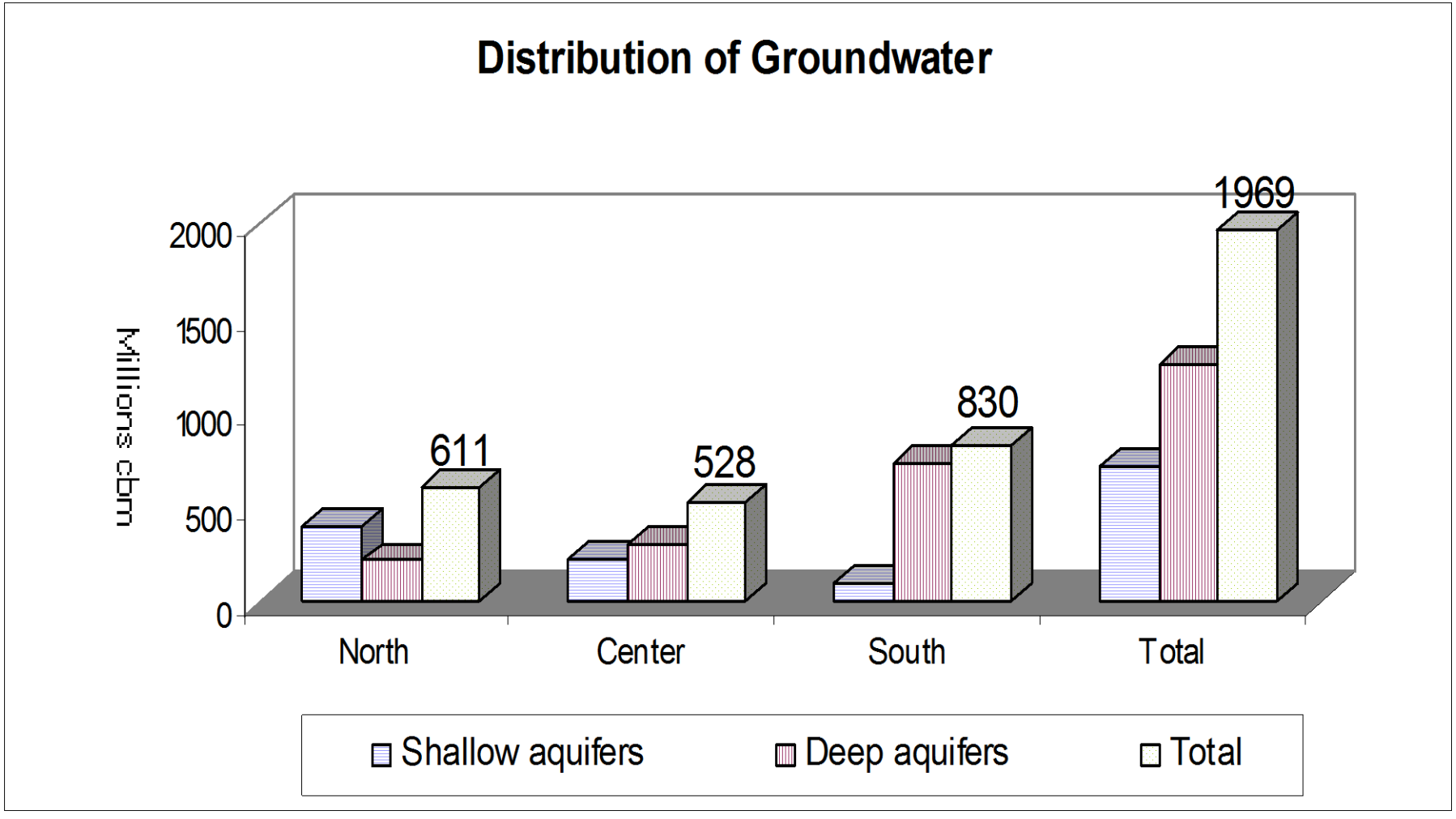
Tunisia receives meanly 230 mm/year of rain fall equal to 36 billions cbm/year.

This volume is limited to 11 billions cbm/year during a generalized drought year and can reach 90 billions cbm during a wet year.

Surface Water



Groundwater



MASTER PLANS OF WATER USES

1- NORTH

Major water resources = Surface water , Shallow aquifers

Allocations : Drinking water – Irrigation (100,000 ha)

2- CENTRE

Major water resources = surface water, renewable aquifers

Allocations : Protection against floods, Irrigation and transfer for drinking water to (Sahel and Sfax areas)

3- SOUTH

Major water resources : Mainly deep aquifers

Allocations : Irrigation and industry

?

Integrated water management

Water management issues in Tunisia

- Scarcity of water . Drought periods are more and more frequent
- Inter-annual regularisation is a major concept

The abundance of water could also appear .

How to safeguard it?

1

- Water demands are increasing:

(Demographic growth , Economic development, improvement of life standards)

3 How to manage water without ration ?

- No matching between water production areas and water uses

4 ⇒ Water transfer

- Looking for means and procedures to satisfy the water demand in each location and to guarantee an acceptable water quality

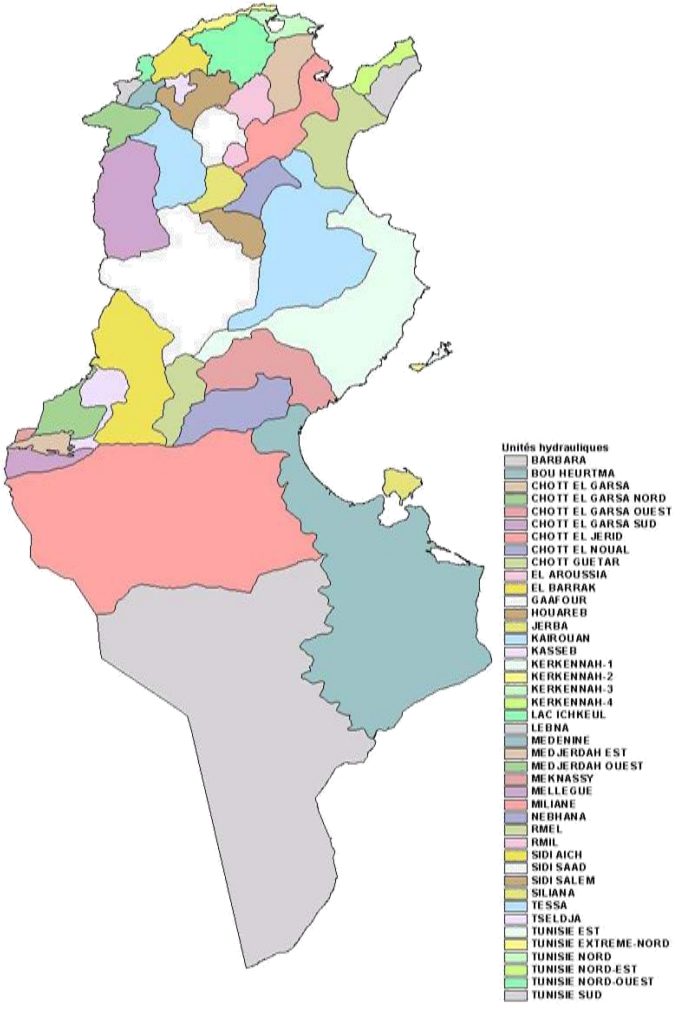
5

- Management of conflict uses – Social and economic good – according to certain regulations

6 • Long-term prediction (at least for one generation)

Administrative units

Hydraulic units

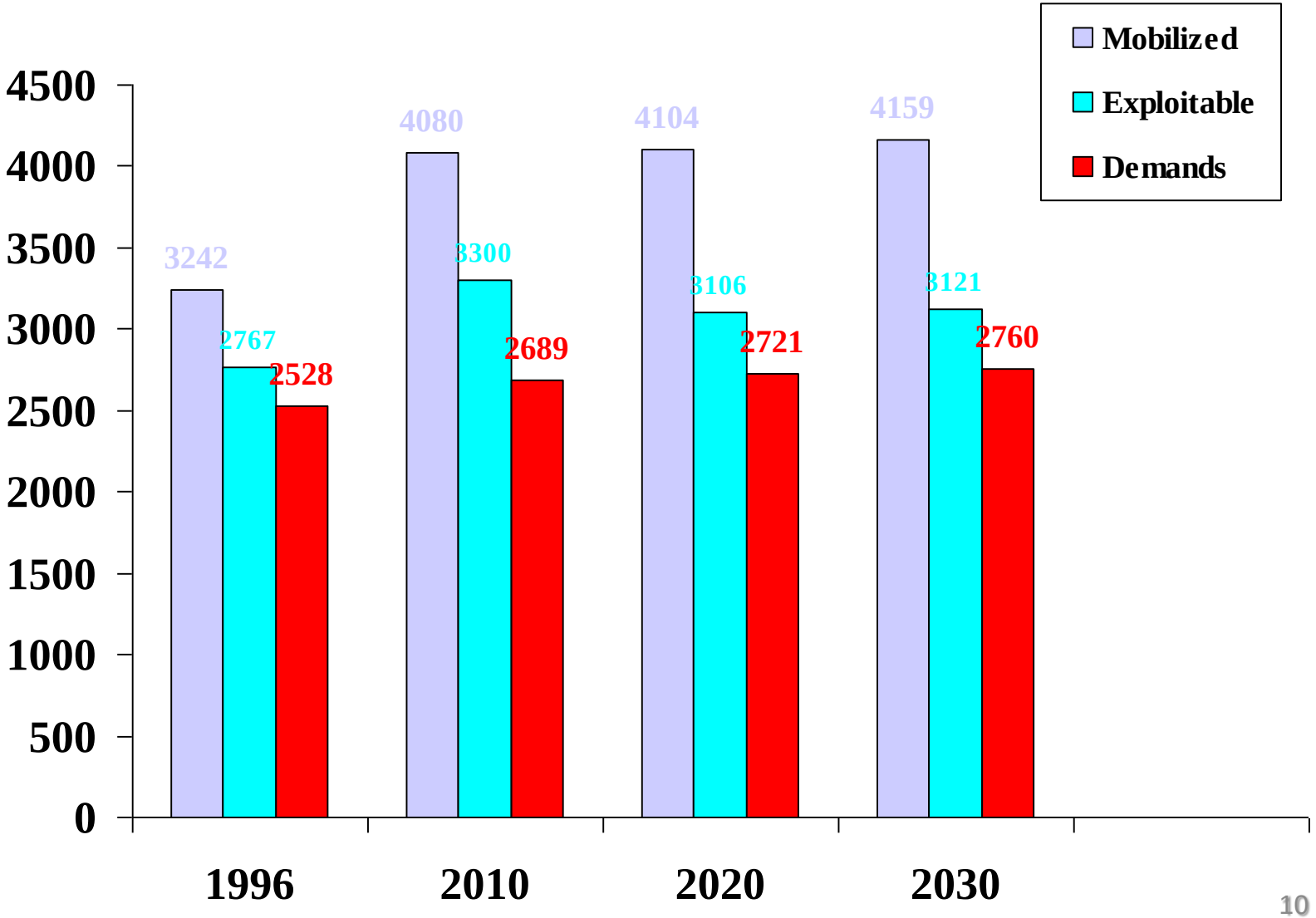


Creation of minor scale hydraulic systems was the main idea of the national development strategy for mobilization of water by the construction of hill-side dams (storage capacity less than 5 million m3 and height less than 10 m).

These reduced scale structures contribute to increase the life span of the large hydraulic structures and create a core of local development.

Total number of these structures is 230 units to mobilize about 220 million m3 of water.

WATER BALANCE EVOLUTION



The future orientations

1) – Follow up of the water resources mobilization program

2) - Integrated water resources management

3) - Demand management.

4)-Non conventional water resources development.

5) –Water resources protection and saving

In order to respond to different usage priorities on one hand, and to enable the flexible management of this group of this network of facilities group on the other hand they were designed based on three guiding principles, namely:

a) the possibility of storing up the maximum stocks of water in each of these facilities to enable supplies to be regularized from year to year, taking into account the frequency of occurrence of drought years;

b- The possibility of interconnected dams located in the same catchment areas to avoid pointless cyclical spilling;

c) The possibility of transferring water from one catchment area to another in order to balance stock levels in period of regional drought and to improve water quality in particular reservoirs.

The initial design of the detailed Northern Water Plan was based, from a hydrological point of view, on a series of monthly inflows observation carried out over a period of 34 years.

After these water facilities had been in operation for a number of years, several complementary steps were revealed potentially useful in making the improving the viability and the performance of the system put in place.

These actions focus on three key points:

- In order to minimize the effect of cyclical droughts, and to take advantage of years of excess rainfall, 11 other sites for medium-sized dams have been identified for construction in the mid-term.

- Although the water supply from these dams has already been taken into account when the original dams were designed, these facilities will fill up primarily during rainy years.

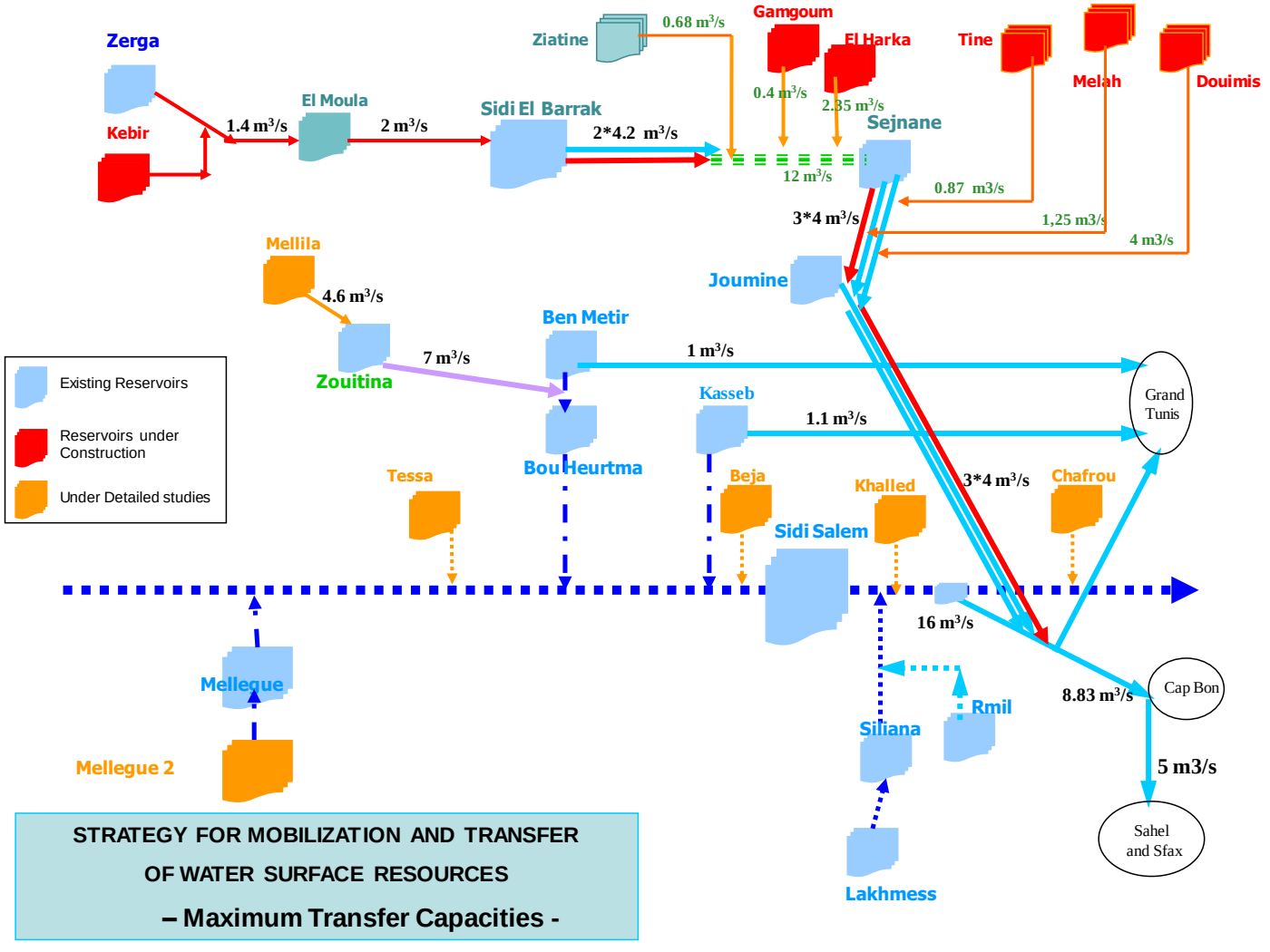
These medium-sized structures will also serve to safeguard the large dams from excessive silting

•Raising the height of some existing facilities to increase their storage capacity and offset the effects of progressive silting.

The network of interconnected dams includes (at the final stage) 27 dams of various sizes in total, linked either in series or in parallel.

INTERCONNECTED RESERVOIRS

Strategic Program
(2010-2016)



STRATEGY FOR MOBILIZATION AND TRANSFER OF WATER SURFACE RESOURCES

– Maximum Transfer Capacities -

It is clear that meeting this kind of demand from one or several dams requires paths of water transfer.

Name of structure	Length	Flow	Diameter
Pipelines from Sidi El Barrak - Seinane	18 km over 2 lines	4 to 4.6 m3/s per line	1800 mm
Pipelines from Seinane to the Taref station	13 km over 2 lines	12 m3/s	1800 mm
Pipelines from the Taref station to Sidi M'barek	23 km over 3 lines	12 m3/s	1800 mm
Piplelines Mbarek - Bejaoua	47 km over 3 lines	12 m3/s	1800 mm
Mejerda Cap Bon canal	120 Km	16 to 8.8 m3/s	
Ben Metir pipeline	135 km	1.3 – 1.1 m3/s	1250 mm
Kasseb pipeline	121 km	1.1 – 09 m3/s	1190 – 1250 mm
Belly-Sahel pipeline:			
- Belly- Sousse	96 km (2 files)	1.5 – 2.3 m3/s (1st file) 3.6 m3/s (2nd file)	1400 – 1200 mm 1600 mm
- Sousse- Sfax	118 km	1.35 m3/s	1400 – 1000 mm
Jilma – Sfax pipeline	151 km	0.73 m3/s	1100 – 600 mm
Sbeitla – Sfax pipeline	148 km	0.3 m3/s	600 – 325 mm
Pipelines from Kairouanais			
- Sidi Saad dam	18 km right bank 10 km left bank	1.935 – 1.5m3/s 0.5 – 0.335m3/s	1600 – 1250 mm 600 – 400 mm
- El Haoureb dam	12 km	1.0 m3/s	1000 – 300 mm
- El Houareb -S.Saad (projected)	24.8 km	1.0 m3/s	1100 mm
Nebhana pipeline	126 km	2.1 – 0.350	1400 – 600 mm

CONCLUSION

Tunisia faces an inevitable future challenge which is the need to develop its capacity to preserve and generate maximum benefit from its limited resources, rather than looking for ways to secure new ones.

The substantial economies which will be required in the future will have to come basically from the major water-using sectors, among them agriculture, which consumes almost 80% of the available resources.

CONCLUSION

Given a future outlook which foresees water shortages exacerbated by a more frequent incidence of droughts, on the one hand, and by climate changes, on the other hand, water supply management will increasingly need to include measures aiming at improving the operation of the hydraulic infrastructure and at harnessing technology in order to make optimal use of existing resources.

CONCLUSION

Regardless of the technical considerations, the implementation of a demand-based water management strategy will advance the case for an adequate readjustment of the institutional instruments in the water sector.

The political tendency is currently towards participatory management and great efforts have been made at all levels of the administration to help the AICs taking control of water distribution facilities operation and maintenance.

It is therefore compulsory that regulatory texts reflect this tendency.

Aknowledgment and recognition

For all those who worked in the field of Water Management and Planning in Tunisia; and were the initiators of different regulations and laws of transfer Systems.

Ben Osmane, Horchani, Mouelhi, Khazen, Zebidi, Frih, & Dalloua

Thank you for your attention