

**Sustainable Water
Integrated Management (SWIM) -
Support Mechanism**



Project funded by
the European Union

Water is too precious to waste

**Cost Assessment of Water Resources Degradation (CAWRD)
Comparative Results**

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Why the Comparative Results

- **Present the similarities and differences of Cost Assessment of Water Resources (CAWRD) Degradation of Four Watersheds**
- **Propose indicators to estimate the CAWRD (if appropriate) to other basins in the country**
- **Propose the policy implications resulting from the CAWRD**

Why the Comparative Results

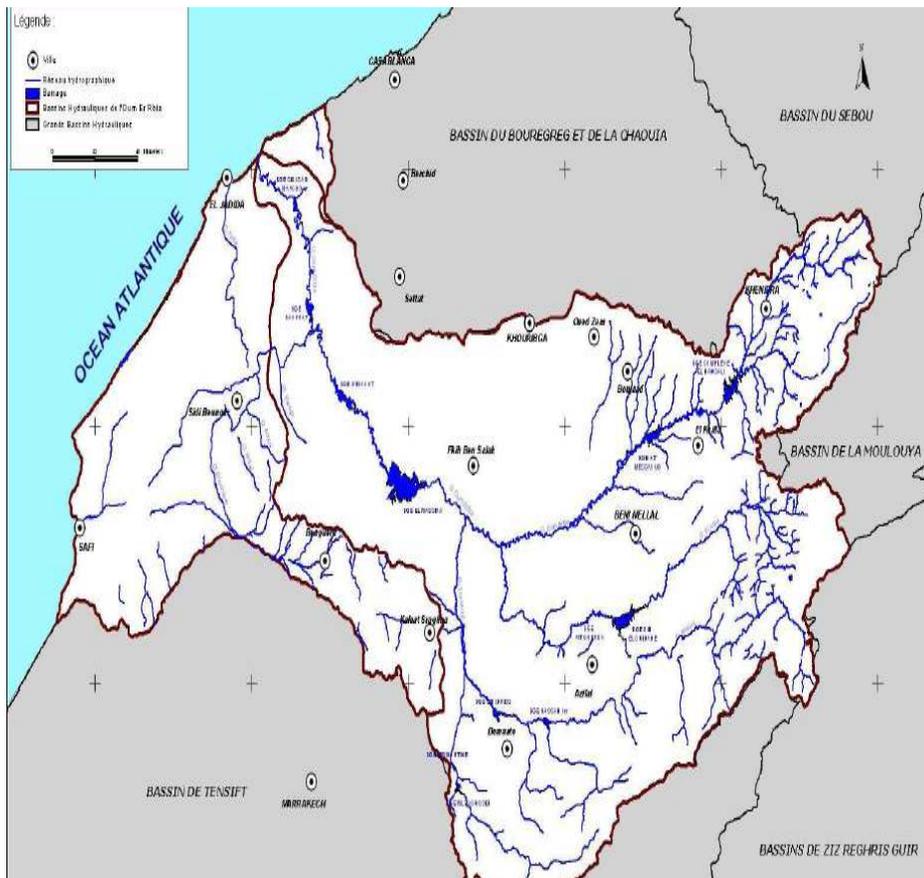
- **The objective is not to compare watersheds to determine the winners and losers**
- **The watersheds can be compared to better understand the problems and the possible solutions**

The Four Selected Basins

- **There are the following:**
 - **Oum Er Rbia in Morocco**
 - **The Seybouse in Algéria**
 - **The Medjerda in Tunisia**
 - **Le Litani in Lebanon**

The Watersheds Assessed

Oum Er Rbia: 34735 km² (7 % of the total surface area of Morocco)



The Seybouse 6471 km² (0.26% of the total surface area of Algeria)



Similar Policies and Strategies

Morocco (Water Strategy , 2009)	The Water Policy is based on the integrated management of the water demand. The Integrated Management of Water Resources
Algeria (Water Law 2005)	Adoption of the Integrated Management of Water Ressources
Tunisia Water Strategy (2001-2011)	Mobilisation of water resources and demand management: The Integrated M and Conservation of Water Resources
Lebanon (National Water Strategy , 2012)	To ensure the provision of water services, irrigation and sanitation across Lebanon on an ongoing basis and to provide optimal levels of services with a commitment to environmental, economic and social sustainability

Similar Socio-Economic Characteristics of the Watersheds.

<p>Oum Er Rbia</p>	<p>Cover 16 provinces : Béni-Mellal et Azilal. Rural Population : 59.6% Agricultural and Industrial Region Source of potable water for the two provinces as well as for Casablanca, Settat, Berrechid et Marrakech</p>
<p>The Seybouse</p>	<p>Cover 7 Governorates. Rural Population 70% Agricultural and Industrial Region Source of Potable Water for the Wilaya of Guelma 150,000 h (0.4% of the total population)</p>
<p>The Medjerda</p>	<p>Cover 6 Governorates, Rural population (72%). Cover 25% of the agricultural sector Agricultural and Industrial Région Contribute 50% of the cereal production Source of potable water for 2,5 million habitants (23.6%of the total population)</p>
<p>The Litani</p>	<p>Cover 3 Governorates. Rural Population 77% Cover 87% of the irrigated agricultural sector. Source of potable water for 1.04 million</p>

Similar Characteristics of pollution with different degrees in magnitude and severity

In summary, the quality of the water resources is largely affected by sources of water and air pollution of anthropogenic origin and can be summarized as follows:

- discharges of untreated industrial wastewater;**
- discharges of treated wastewater from the WWTP;**
- discharges of untreated urban wastewater;**
- drainage rural untreated sewage;**
- drainage of pesticides, nitrates and phosphates used in agricultural activities;**
- drainage of wastewater due to farming activities;**
- drainage of slaughterhouses;**
- contamination of soil, surface water and groundwater with heavy metals;**
- especially the industrial air emissions and their transfer to soil, lakes, dams, small dams and groundwater due to runoff following the passage of rain;**
- drainage from solid waste and leachate especially during the rainy season;**

Different Organizational and Institutional Framework

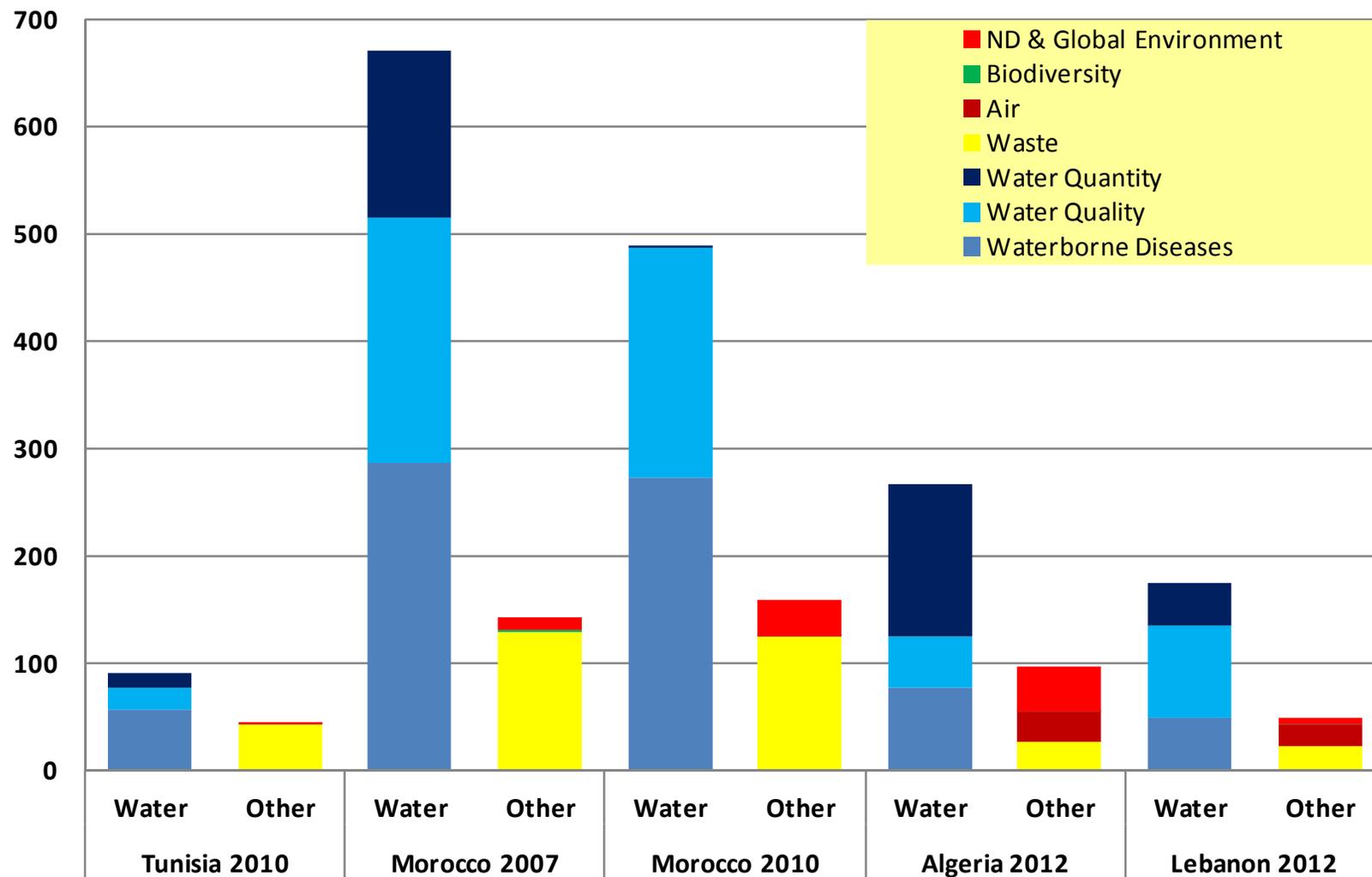
Watershed	Ministries and national institutions	Local Administration
Oum Er Rbia	<ul style="list-style-type: none"> -High Council for Water and Climate --Ministry of Energy, Water and Environment 	The Hydraulic Basin Agency of Oum Er-Rbia (ABHOER)
The Seybouse	<ul style="list-style-type: none"> -Consultative Council of Water Resources The Ministry of Water Resources and its General Directorates -The National Agency of Hydraulic Ressources I(ANRH) 	<ul style="list-style-type: none"> The Hydraulic Basin Agency Constantinois-Seybouse-Melléque. The Water Resources Directorates covering the Seybouse watershed.
The Medjerda	<ul style="list-style-type: none"> Ministry of Agriculture and its General Directorates Ministry of Public Works, Land Use and Sustainable Development and its agencies : ANPE, ONAS, ANGed 	<ul style="list-style-type: none"> The Regional Commissions of Agricultural Development (CDRA) The Office of Silvo-Pastoral Development of the North West Region (ODESYPANO) The Municipalities
The Litani	<ul style="list-style-type: none"> Ministry of Energy and Water Ministry of the Environment Council of Development and Reconstruction (CDR) 	<ul style="list-style-type: none"> Litani River Authority Regional Water Establishments The Local Committees .

Assessment of the Cost Water Resources Degradation

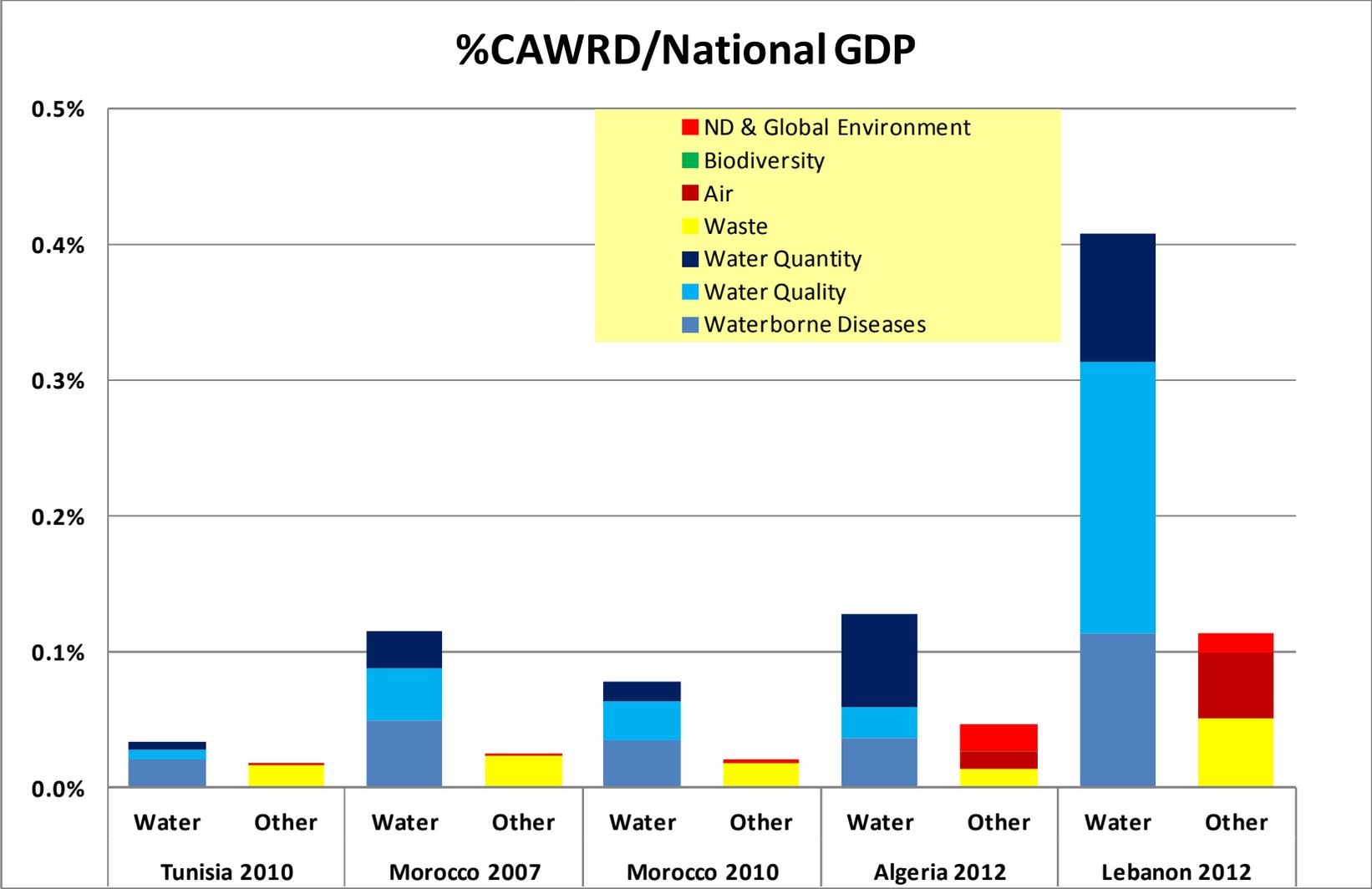
- **By segmentation**
- **By function of :**
 - **Cost of Degradation at the watershed level**
 - **National GDP**
 - **Waterhsed GDP**
 - **Km 2 of the watershed**
 - **Per capita**
 - **Per M3 of water resources.**

Comparative Results: Cost of Water resources Degradation

US\$ Million CAWRD/Basin

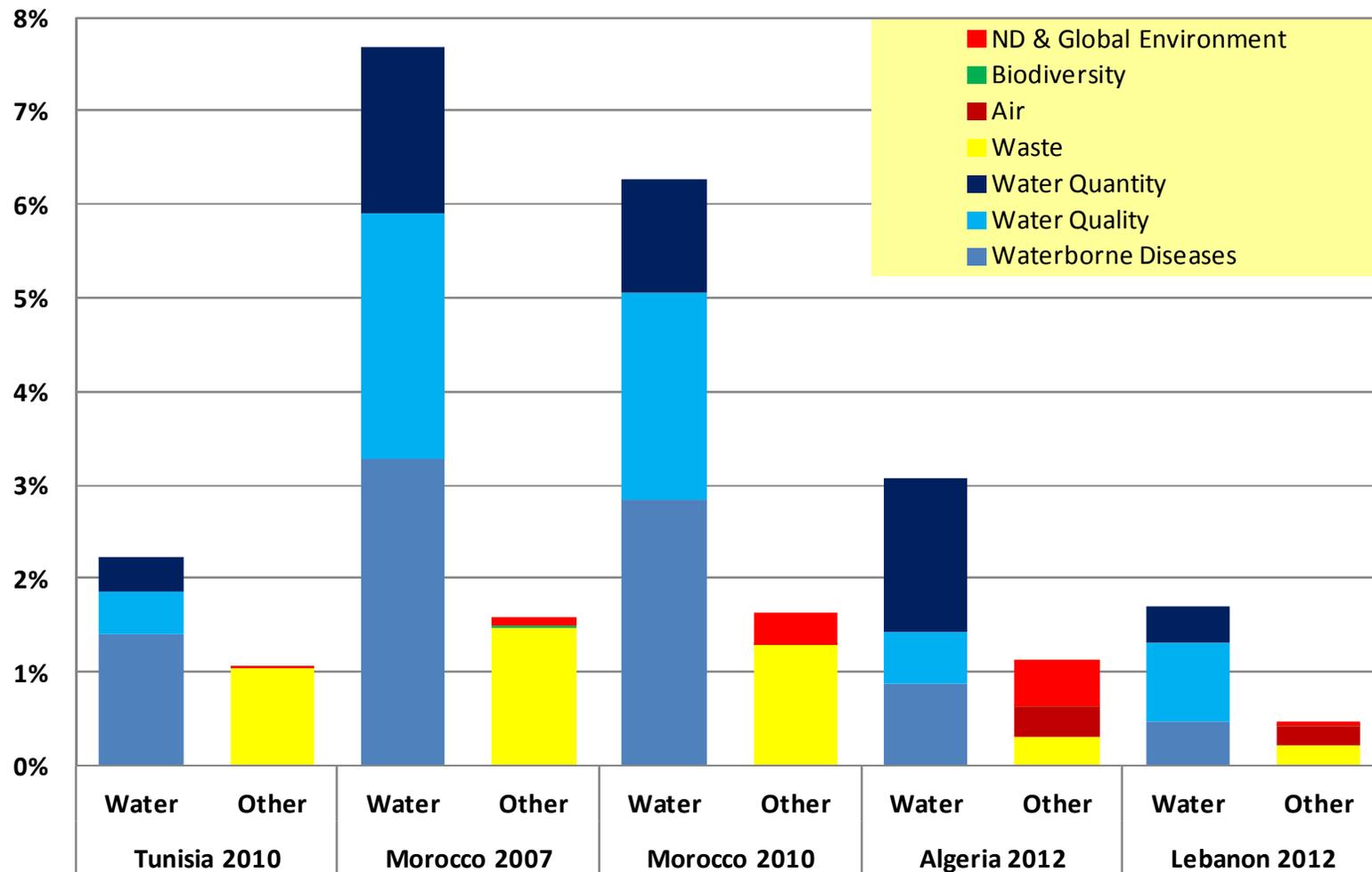


Comparative results: CAWRD/National GDP

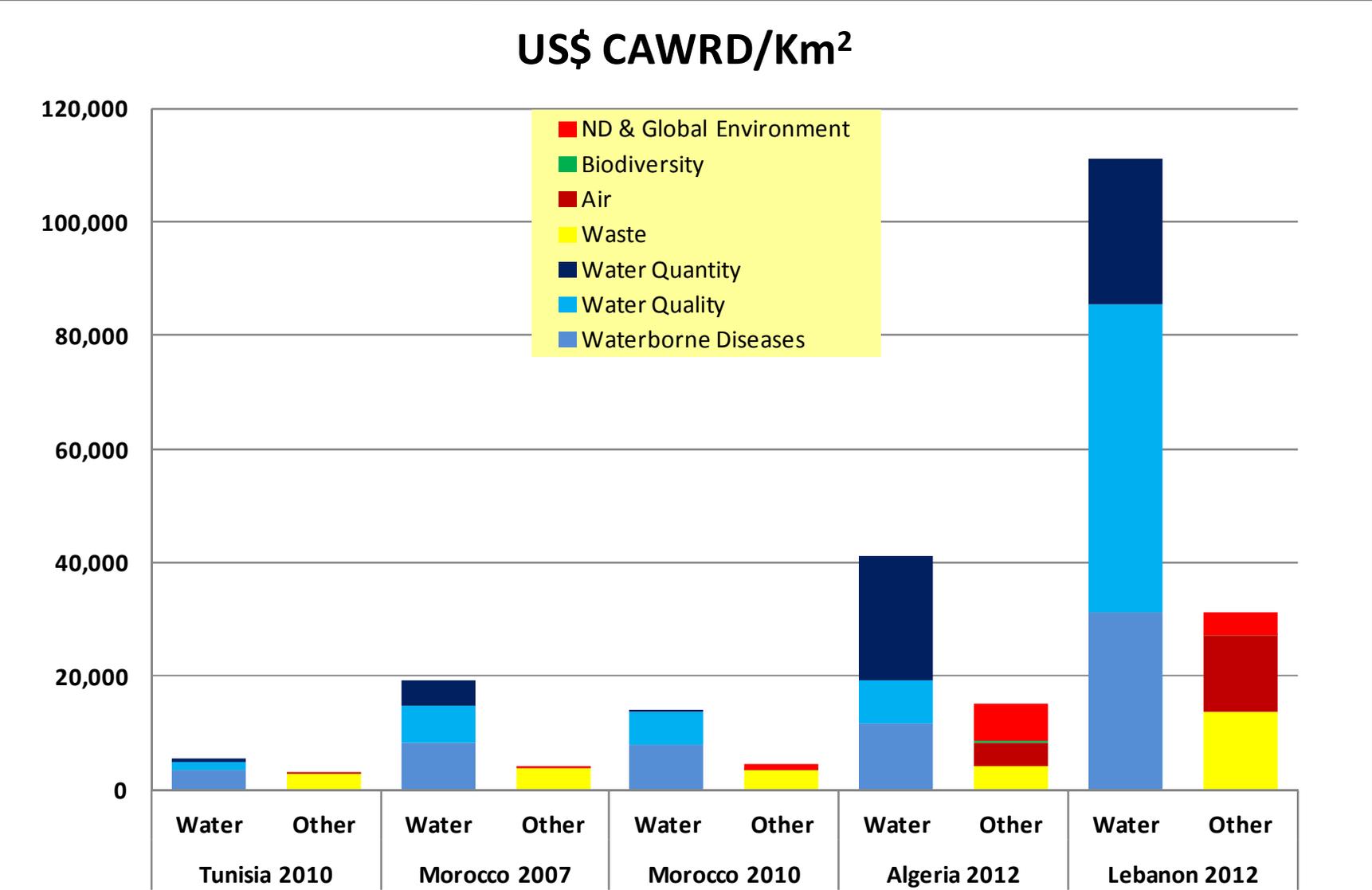


Comparative Results: CAWRD per Watershed GDP

%CAWRD/Basin GDP

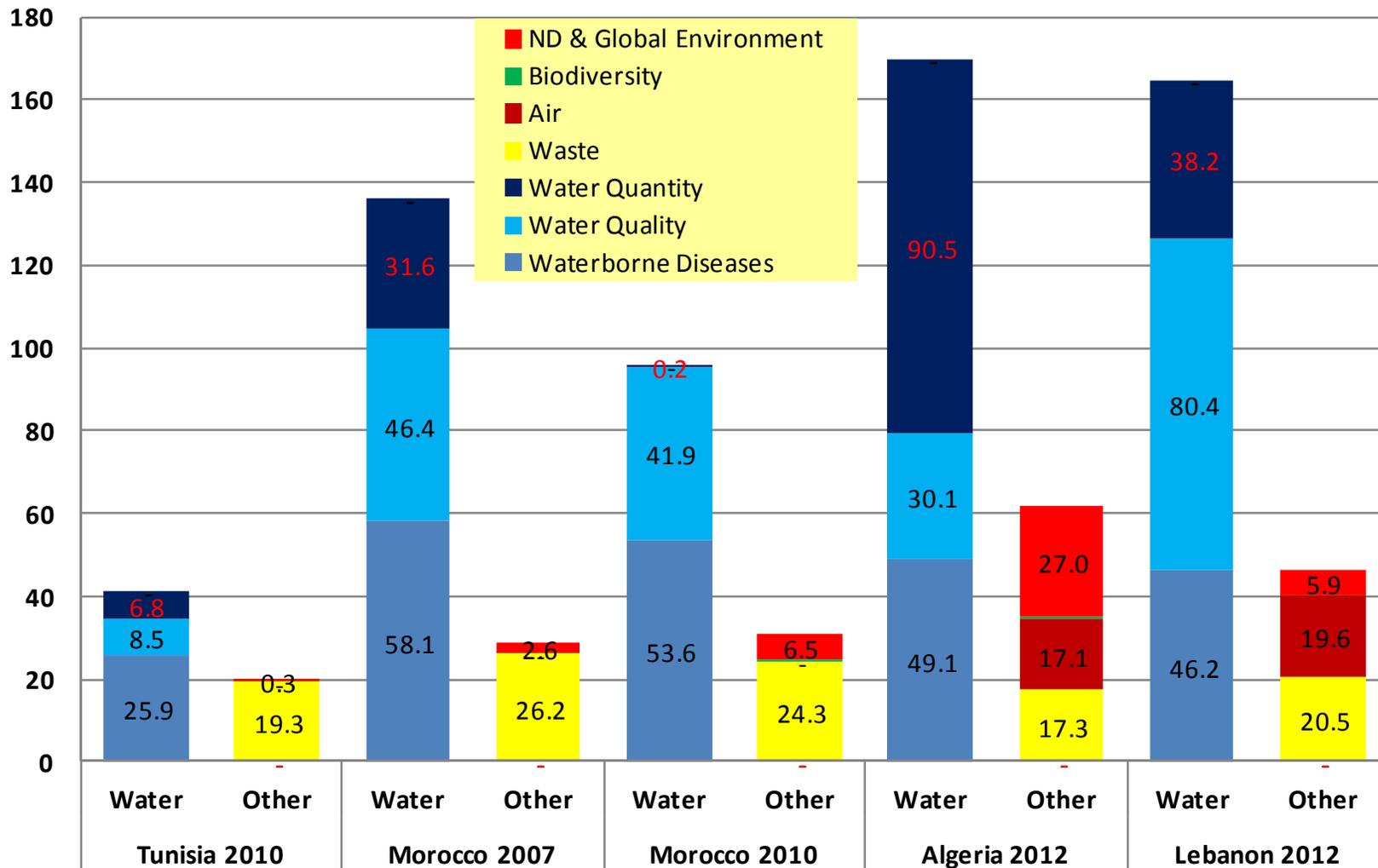


Comparative Results :CAWRD Per Km2 of the Watershed

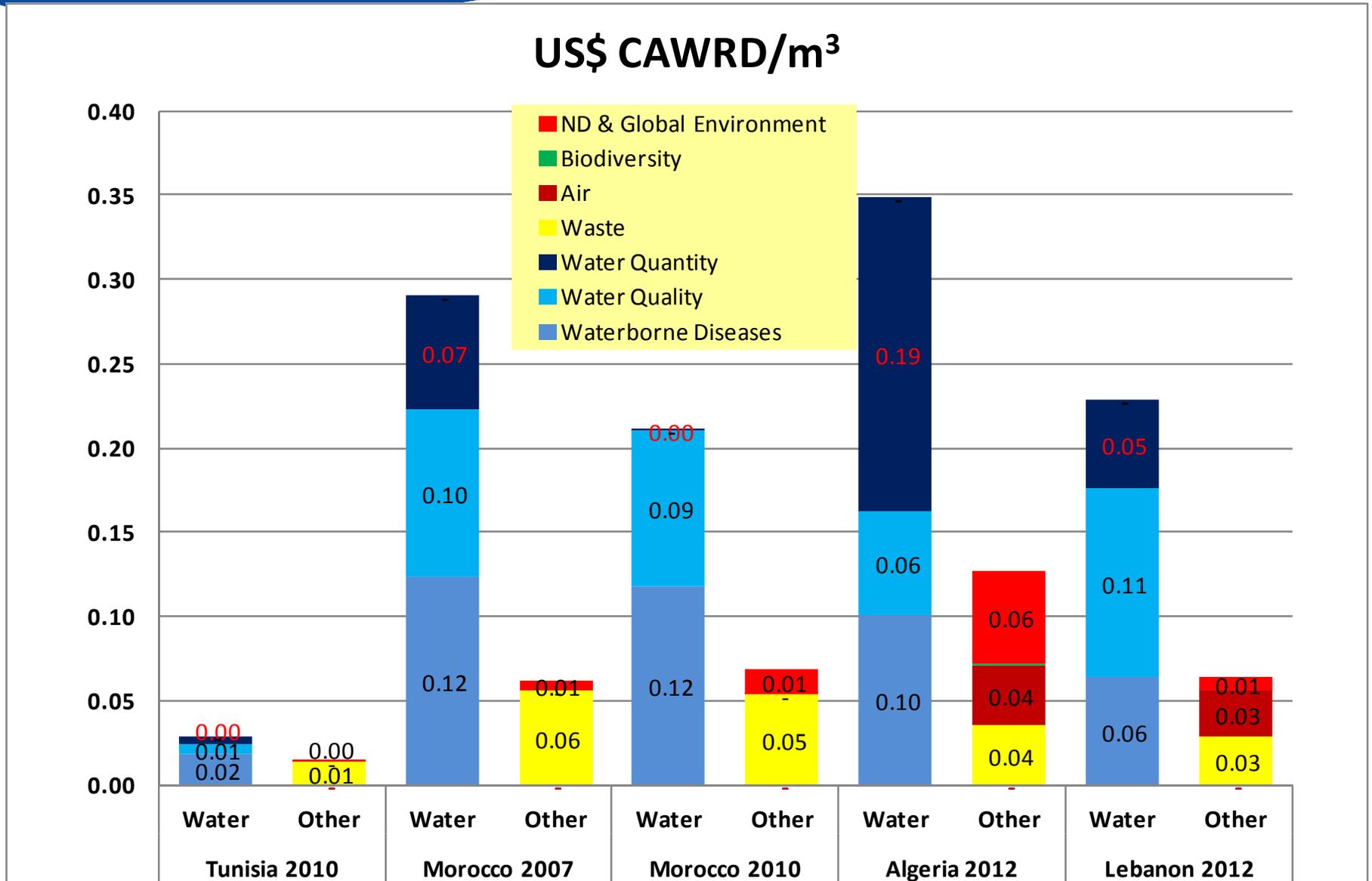


Comparative Results : CAWRD per capita

US\$ CAWRD/Capita



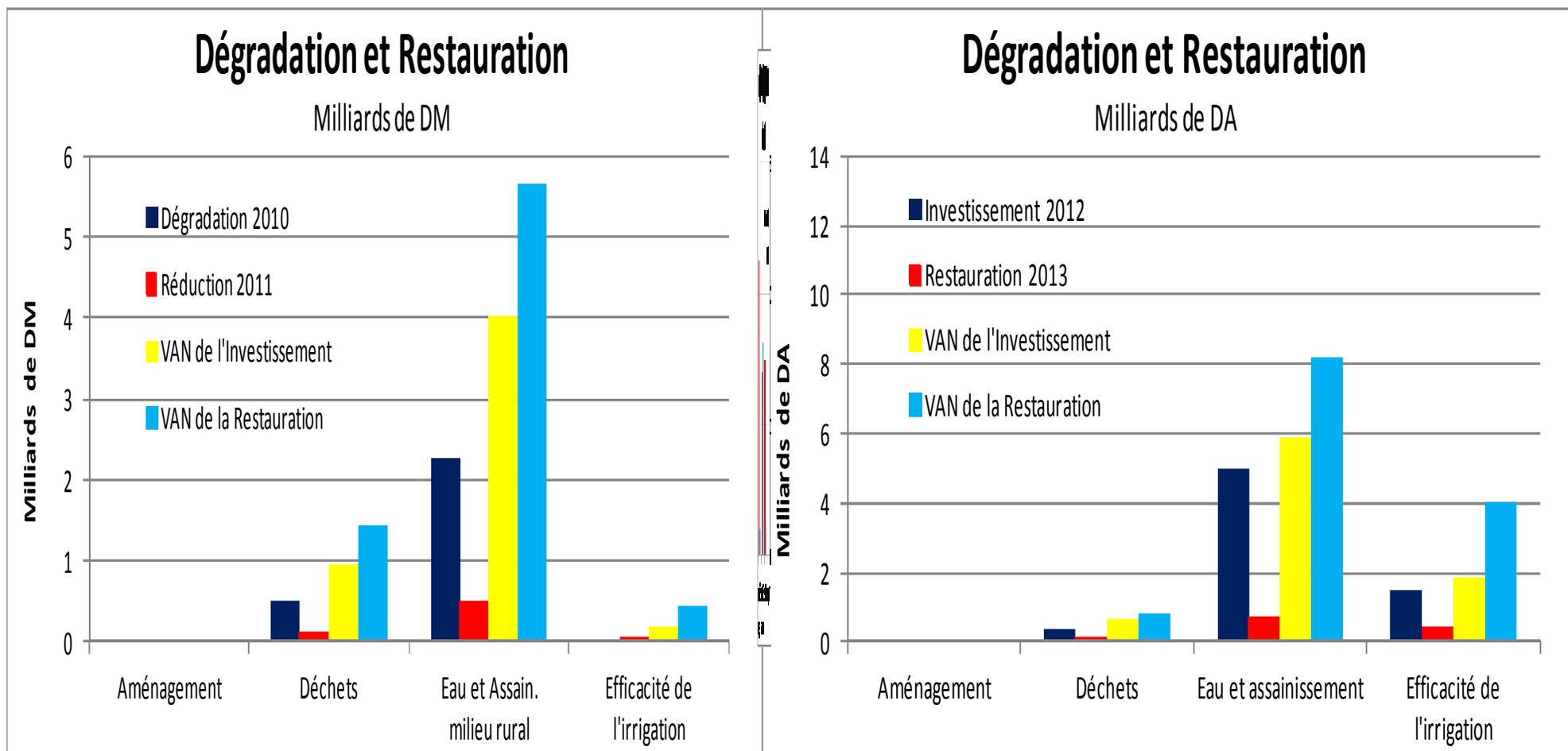
Comparative Results : CAWRD per m³ of Water Resources



Cost of Partial Remediation and Investment

Oum Er Rbia
640 million of DH (2011)
Euro 58 million

The Seybouse:
1.2 Billion DA(2012)
Euro: 108.8 million

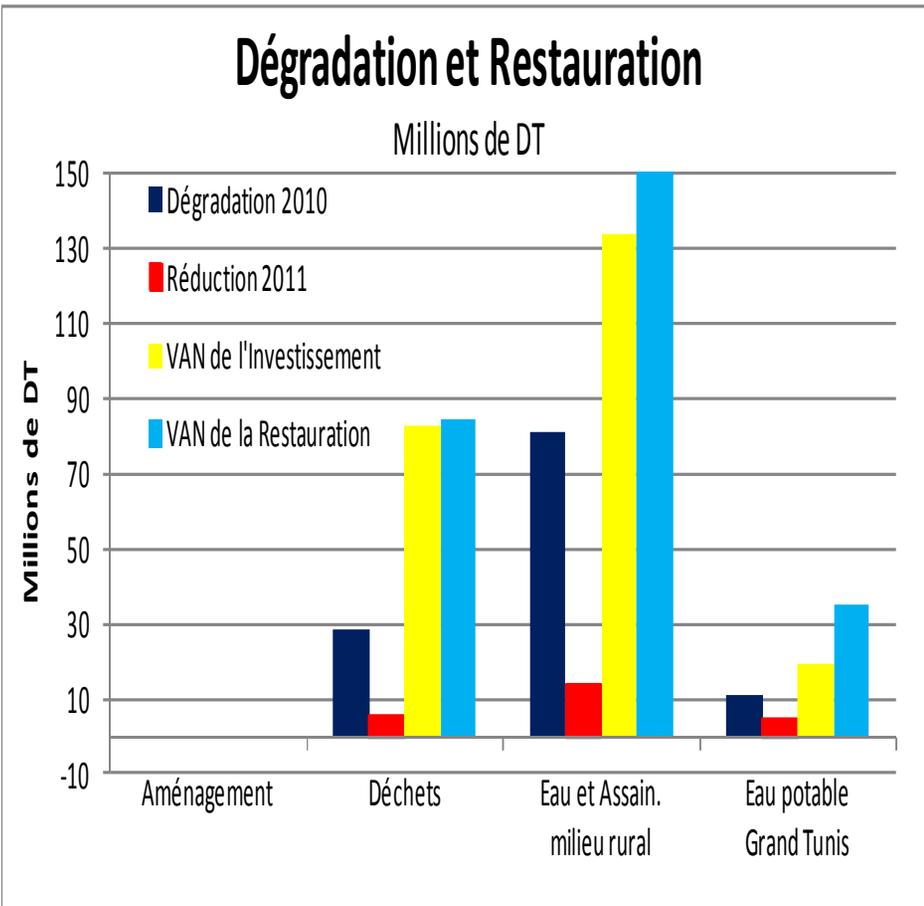


Cost of Partial Remediation

The Medjerda

23.8 million DT

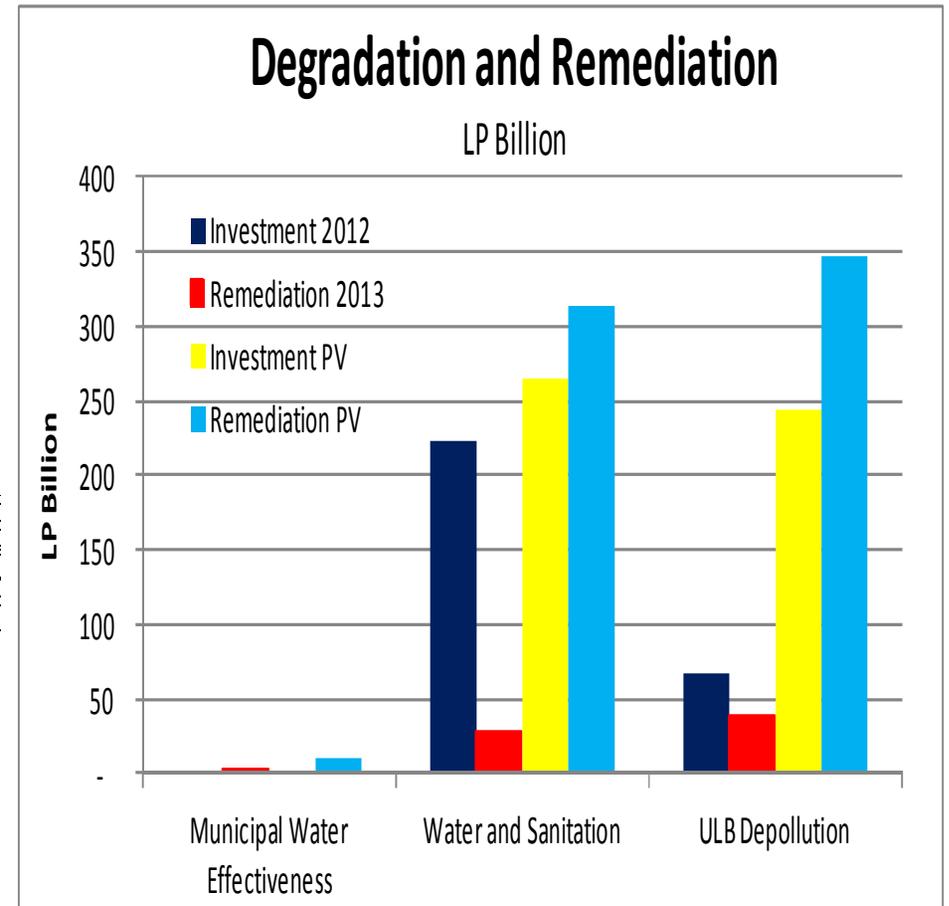
Euro: 11.9 million



The Litani

134 Billion LL

Euro 65 million



Summary of the Cost of Water Resources Degradation for the Four Basins

	Morocco Oum Er Rbia length: 600 Kms Watershed Surface : 34735Km2	Tunisia The Medjerda Length: 350 kms Watershed Surface 15,930 Km2	Algéria The Seybouse Length : 240 Kms Watershed Surface: 6,471 Km2	Lebanon Upper Litani Length: 170 kms Watershed surface: 2.168 Km2
Cost of Water Resources Degradation	6.35 billion DhM 577 million Euro	191.5 million DT 101 million Euro	28.4 billion DA 276 million Euro	342 billion LBP 171 million Euro
Percentage of GDP at the basin level and at the National Level	7.9% (Basin) 0.8% (National)	3.3% (Basin) 0.2% (National)	4.2% (Basin) 0.2% (National)	2.2% (Basin) 0.5% (National)
Percentage of degradation due to water and waste water	79.3%	68%	73%	78%
cost of remediation over 20 years	640 million DhM 58 million Euro	23.8 million DT 11.9 million Euro	11.2 billion DA 108 million Euro	134 billion LBP 65 million Euro
Percentage of cost of remediation for water and waste water	76%	55.7%	63%	46/5%

In order to compare the Cost of Water Resources Degradation, The Purchase Power Parity (PPP) should be used

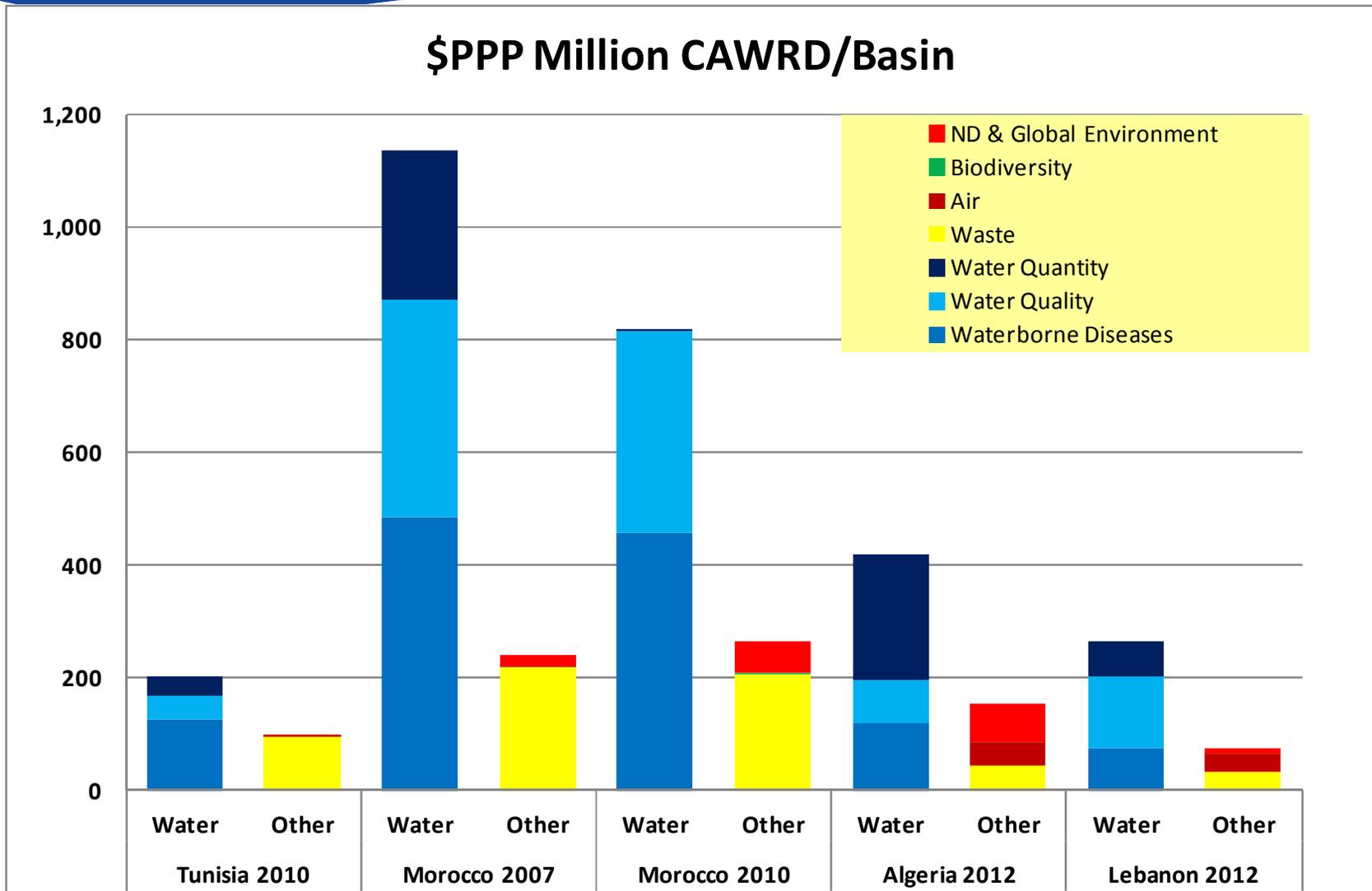
- **The concept of purchasing power parity allows one to estimate what the [exchange rate](#) between two currencies would have to be in order for the exchange to be at par with the [purchasing power](#) of the two countries' currencies**
- **The purchasing power parity exchange rate serves two main functions. PPP exchange rates can be useful for making comparisons between countries because they stay fairly constant from day to day or week to week and only change modestly, if at all, from year to year.**
- **PPPs are simply price relatives that show the ratio of the prices in national currencies of the same good or service in different countries**

En utilisant l'indice de PPA on peut développer des indicateurs pour le coût de la dégradation des Ressources en Eau

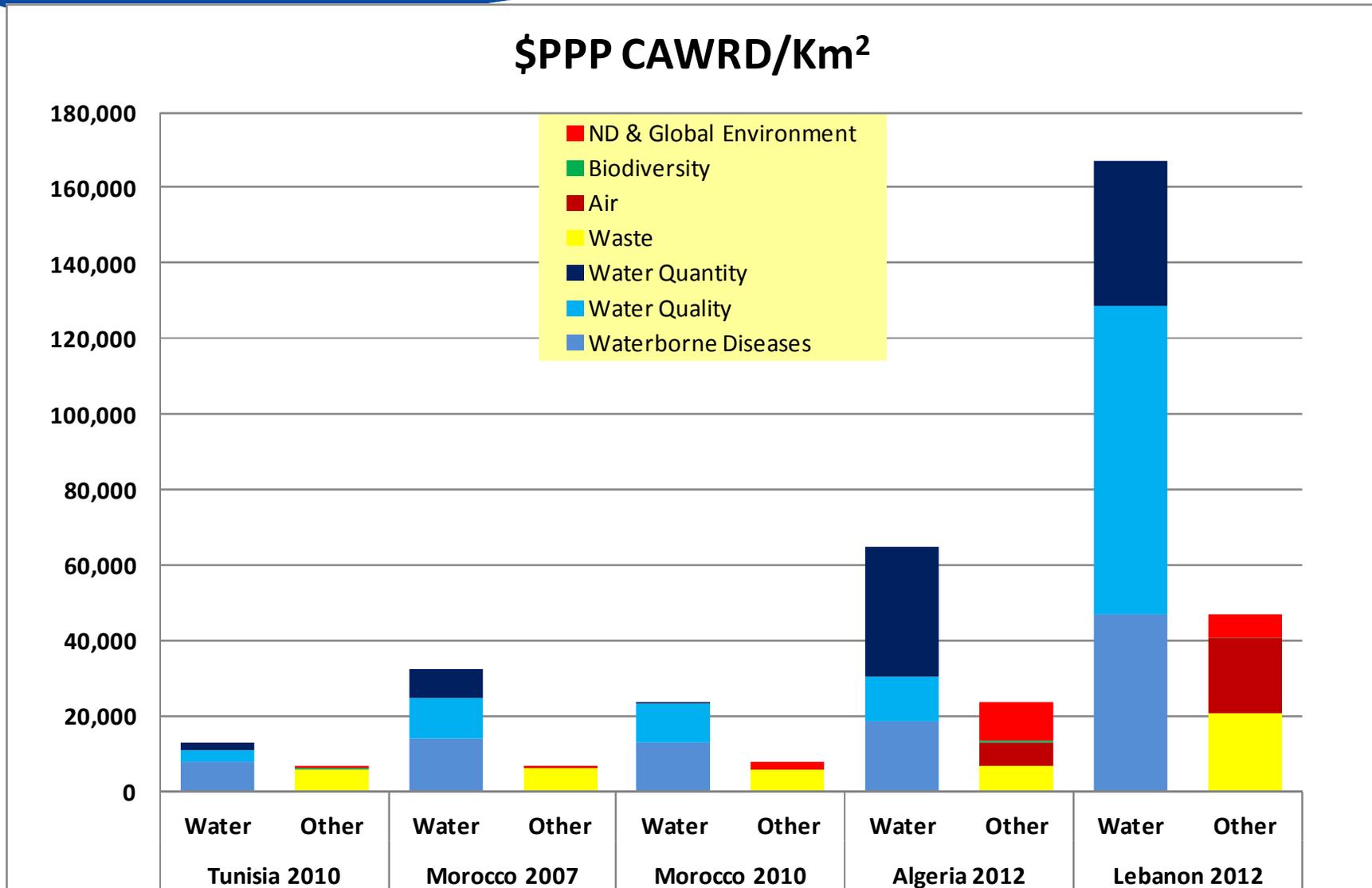
- **Par ventilation**
- **En fonction du :**
 - **Coût de la Dégradation au niveau du Bassin**
 - **Du Km 2 du bassin**
 - **Par habitant**
 - **Per M3 des ressources en Eau**

Comparative results : Cost of Water Resources Degradation using PPP

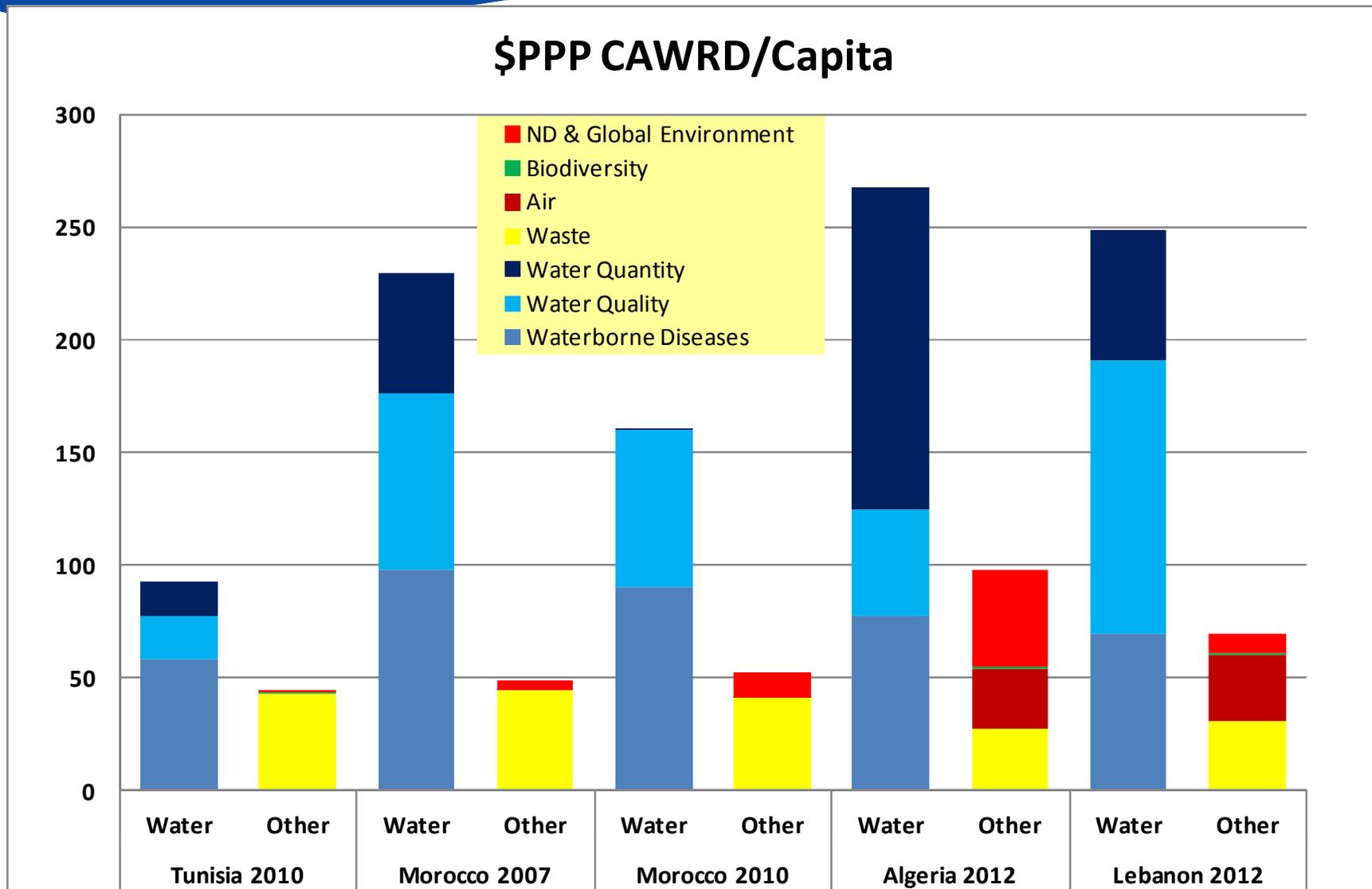
\$PPP Million CAWRD/Basin



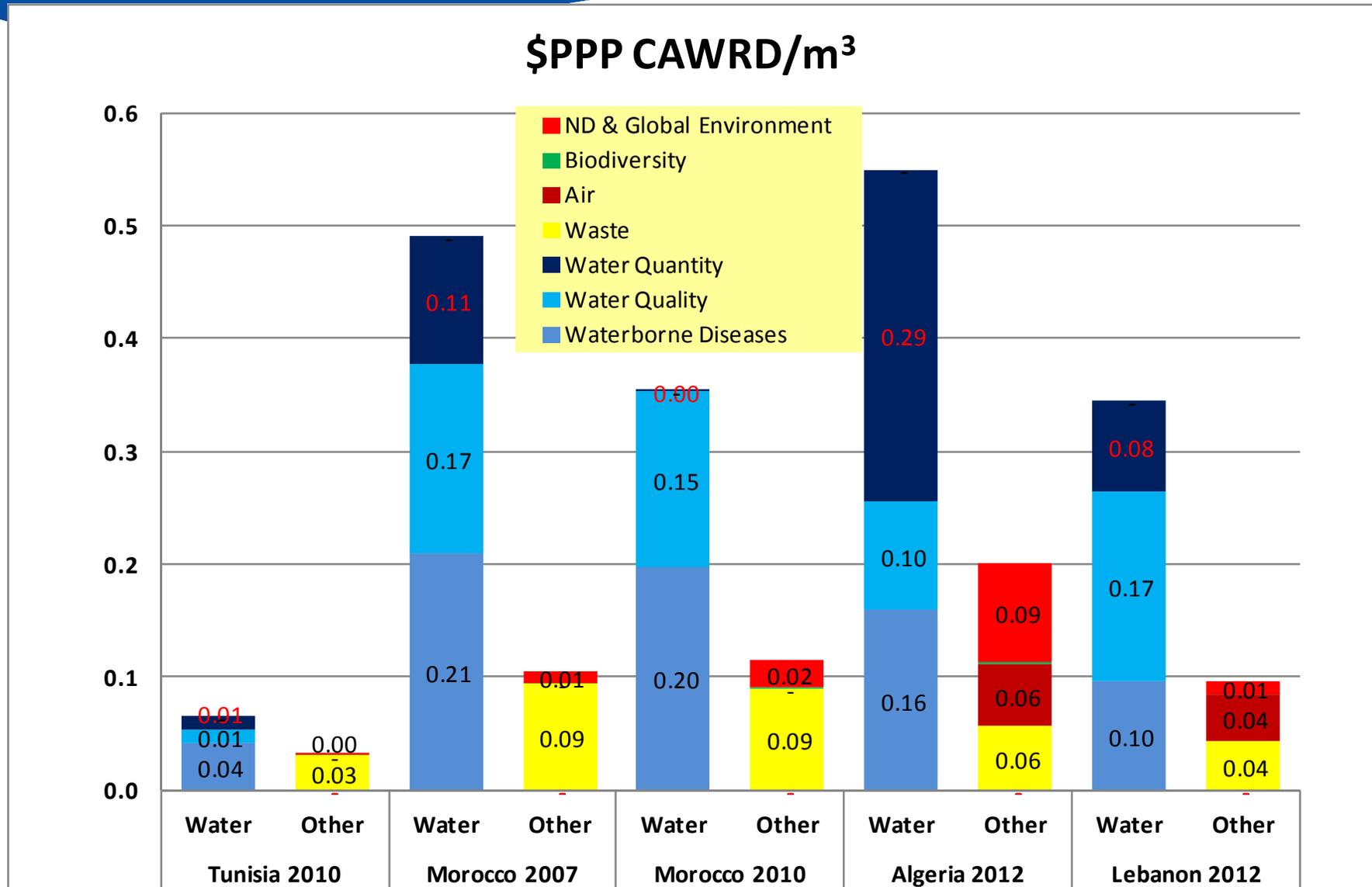
Comparative Results : PPP Cost of Water Resources Degradation per Km²



Comparative Results : PPP Cost of water Resources Degradation per capita



Comparative Results :PPP ofCAWRD per m³ of water resources



What can we deduct

- **The four watershed are degraded due to the lack of sanitation or wastewater treatment and municipal waste. This degradation is particularly significant for the Basin of Oum Er Rbia**
- **Medjerda has the lowest cost of water resources degradation for all calculated parameters (by basin, m², m³ per capita water) although the watershed surface and the length of the river are more than those of the Seybouse and the Litani**
- **Oum Er Rbia has the highest cost of water resources degradation during the draught and humid periods This is due to the large surface area of the basin, the length of the river, large industrial and agricultural activities in the basin**
- **The Upper Litani has the highest cost of degradation of Km² . This is due to an overwhelming concentration of industrial, agricultural activities around the cities of the Upper Litani River and the lack of industrial waste treatment and waste**
- **However, the cost of the degradation of the three basins per capita of Oum Er Rbia , the Seybouse and the Litani and ranges from \$ 220-270 per capita, despite the difference in quality and quantity of water resources and the diversity of agricultural and industrial activities**

General Conclusions

- **Environmental and water management issues constitute a heavy burden on the economy**
- **The lack of access to safe drinking water and sanitation in peri-urban and rural areas reflects the highest cost of degradation**
- **While drinking water is available and accessible to the majority of the population, this water may contain pathogens or chemicals that can harm the health and create false perceptions among citizens. The resort to buying bottled water reflect this perception not by comfort but for a drinking water free of pollution.**
- **Utilities for drinking water, sanitation and municipal waste in rural areas are relatively marginalized, although in these areas, are the highest contamination of water. The situation of municipal waste is even more worrying since it is almost all of the service that is borne of municipalities without the necessary means.**
- **Coordination between the institutions of the water is limited to a "top-down" approach to planning for development and management of water and little attention is given to integrated resource management and in particular the "soft" side .**

مع خالص شكري
وامتناني

Thank you
for your attention

Merci pour
votre attention



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