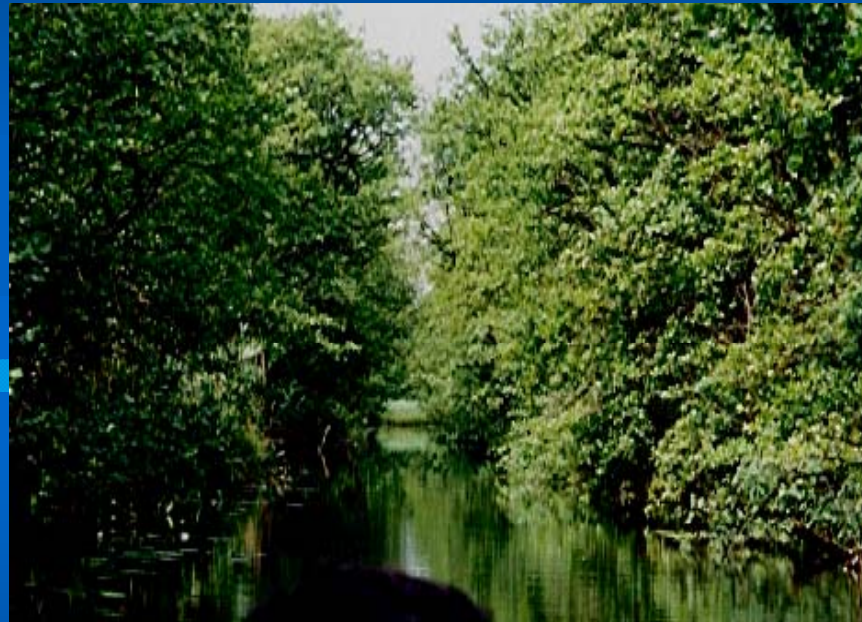


The Damour River Basin - Lebanon Case Study



Presented by

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“Conseil et Développement s.a.l.”

LEBANON

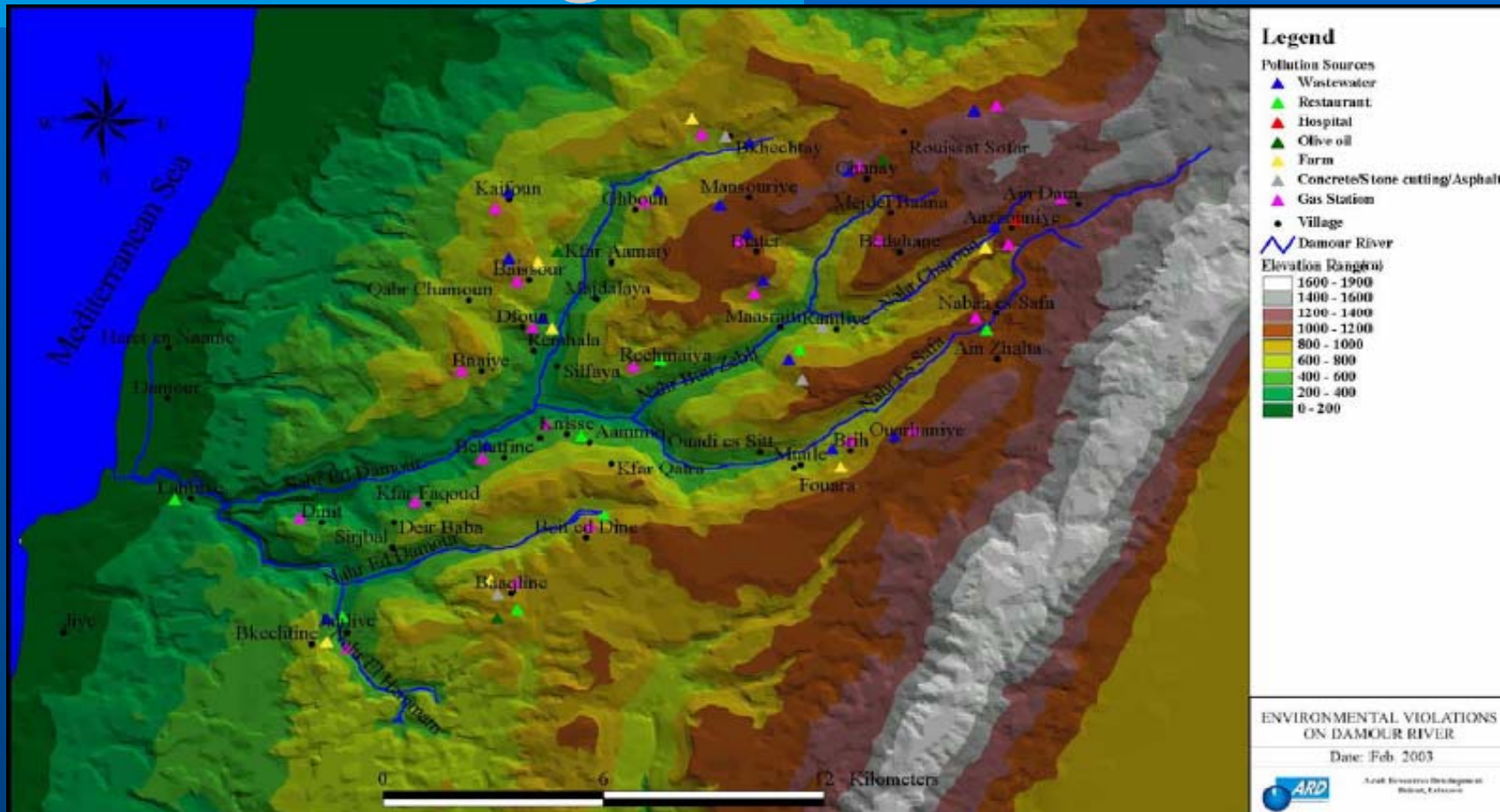
Overview of Damour River Basin

- The DAMOUR RIVER BASIN area (333 km²) enjoys abundant surface & ground water resources compared to other basins in Lebanon:
 - ✘ The Damour Perennial river has a length of 40 kms.
 - ✘ ES SAFA SPRING
 - ✘ BAROUK SPRING
 - ✘ 3 Minor rivers: Es Safa, Zeble, El Hamam
 - Damour has an agriculture profile
- } contribute to water discharge in winter

Overview of Damour River Basin Water Management Issue



Overview of Damour River Basin Water Management Issue



INECO Workshop - Tunisia - 15/7/08
"LEBANON Case Study"

Overview of Damour River Basin

Water Management Issue (cont.)

Description of WP Problem

Damour River Basin is facing a decrease in the total amount of surface & ground water of adequate quality necessary to serve the needs of its different domestic, agriculture & industrial users.

The major reasons behind decrease & inadequate quality can be summarized as follows:

- ✓ Drop in precipitation levels
- ✓ Over exploitation of ground water & surface water sources
- ✓ Uncontrolled discharge of waste from domestic & industrial sources
- ✓ Limited capacities of authority
- ✓ Limited financial resources
- ✓ Inter basin transfer of ground water
- ✓ Sea water intrusion to groundwater

Overview of Damour River Basin Water Management Issue (cont.)

Indicators relevant to the problem (cont.)

- **Poor cost recovery: difficulties for municipalities & water authorities to recover operational maintenance cost**
- **Inexistence of environmental supervision from tutorial institution**
- **Excessive quantity of water committed for inter basin transfer rendering Damour area more vulnerable: 340/400 l/capita/day. 80% of the 16 wells pertaining to BMW are delivered or driven to Beirut and Ain Delbeh**

Overview of Damour River Basin Water Management Issue (cont.)

Indicators relevant to the problem (cont.)

- The detected Chemical Oxygen Demand COD levels confirm possible release of industrial wastes (olive pressing, stone cutting, asphalt production)
- Tests carried out on water samples highlight the effect of pollution from sewage (presence of Fecal Coliforms exceeding standard values)
- Since 2001, the reduction in total discharge at the mouth of the river has reached 55% of total annual yield

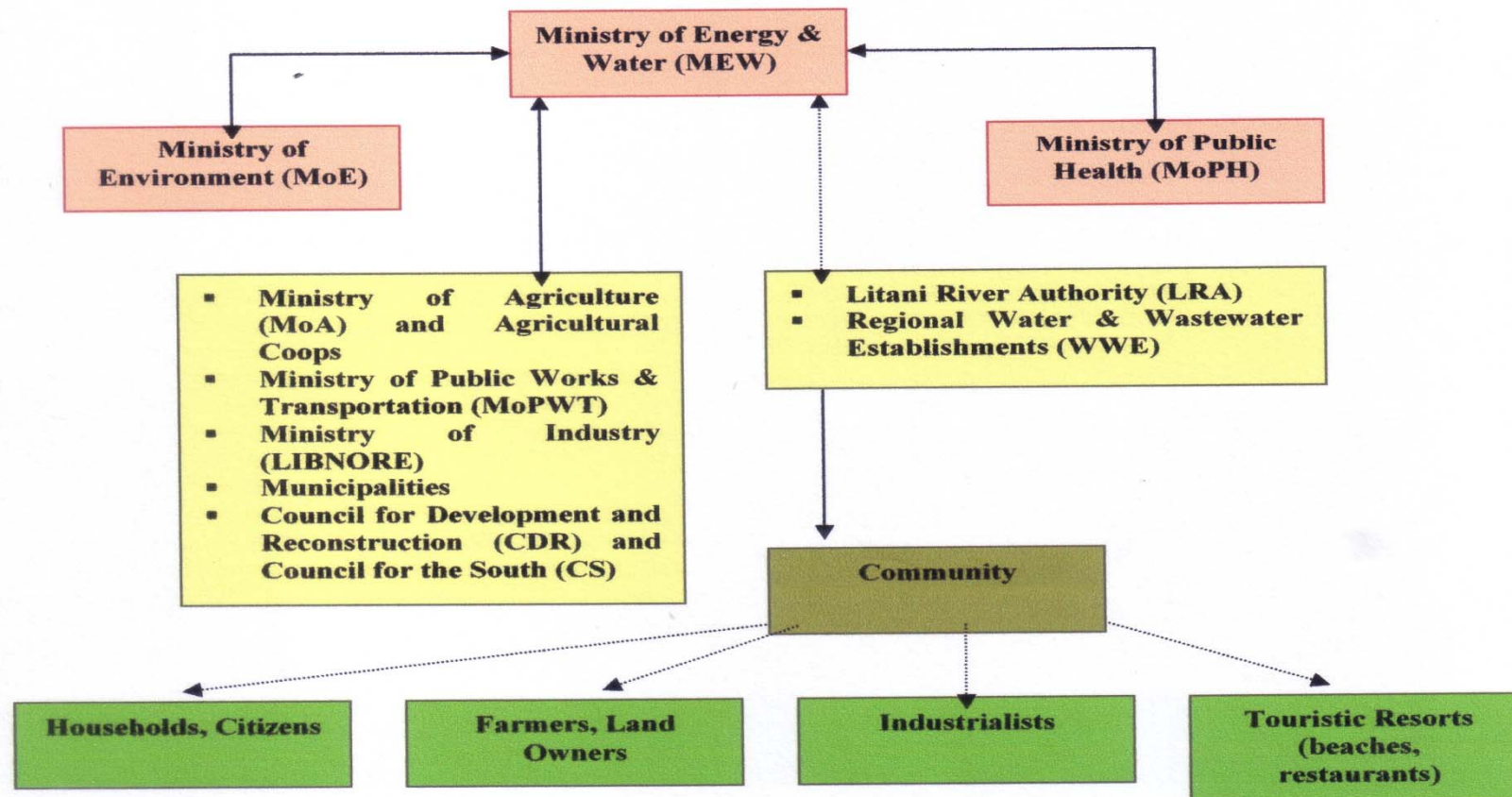
Overview of Damour River Basin Water Management Issue (cont.)

Stakeholders

- **Several categories of stakeholders are involved in the water management problems and have direct or indirect relation & impact and are affected by water problems:**

Overview of Damour River Basin Water Management Issue (cont.)

Stakeholders Chart



Overview of Damour River Basin

Water Management Issue (cont.)

The current legislation & governance of water sector:

A- Legislation

- The Lebanese law governing the water sector dates back to Ottoman & French regime. The significance of sustainable water management urged policy makers to develop new laws:
- Law # 221/2000 on management of water sector. This law aimed at inducing institutional changes, yet it is controversial & resulted in several draw backs (modification of laws, decrees & decisions often contradictory)
- Law #444/2002 on environmental protection & sustainable use of natural resources & prevention of environmental pollution

Overview of Damour River Basin

Water Management Issue (cont.)

B- Governance

- The main authority responsible for Damour management resources is the Ministry of Energy and Water:
 - × Setting planning framework for sustainable water management
 - × Building dams
- Beirut & Mount Lebanon water authority responsible for supplying potable water to its subscribe customers.
- MOE controls sources of pollution
- MOPH monitors safety of drinking water
- CDR plays the role of mobilizing resources for the execution of contemplated projects

Current Effort For Problem Mitigation

- Efforts are being done to mitigate the water problems not only in the Damour region but on national level

Currently applied measures by authorities :

- Creation of 4 new autonomous water boards to take over (within their respective areas):

- | | | | | |
|---|-------------|----|---|---------------------------|
| × | Management | of | { | * drinking water supplies |
| × | Operations | | | * sewage collection |
| × | Maintenance | | | * irrigation network |

Current Effort For Problem Mitigation (cont.)

- Damour River Basin operations were entrusted to Beirut & Mount Lebanon water authority
- Damour municipality & neighboring municipalities have started beginning 2008 to enforce subscription to water networks including annual fixed fee per m³/day
- Political, social & economical instability has dramatically impeded authorities to stop illegal wells
- Interbasin transfer activity is still increasing and quantities are threatening the Damour Basin aquifers

Current Effort For Problem Mitigation (cont.)

Currently applied institutional and economical responses

- In Damour River Basin, collection of charges is entrusted to municipalities whilst it is normally executed by Water Authority in other regions
- Water charges are collected separately
- Current base of metering water consumption: **1 cubic meter per day, i.e. 365m³/year**
- Volumetric components are defined by means of water gauges that calibrate outflow
- Tariff is unique in Lebanon
- Tariff in Damour region : 100.000 LBP (45 euro instead of 240.000 LBP/year) lumpsum per year as an exceptional economical alleviating measure

Current Effort For Problem Mitigation (cont.)

Currently applied institutional and economical responses (cont.)

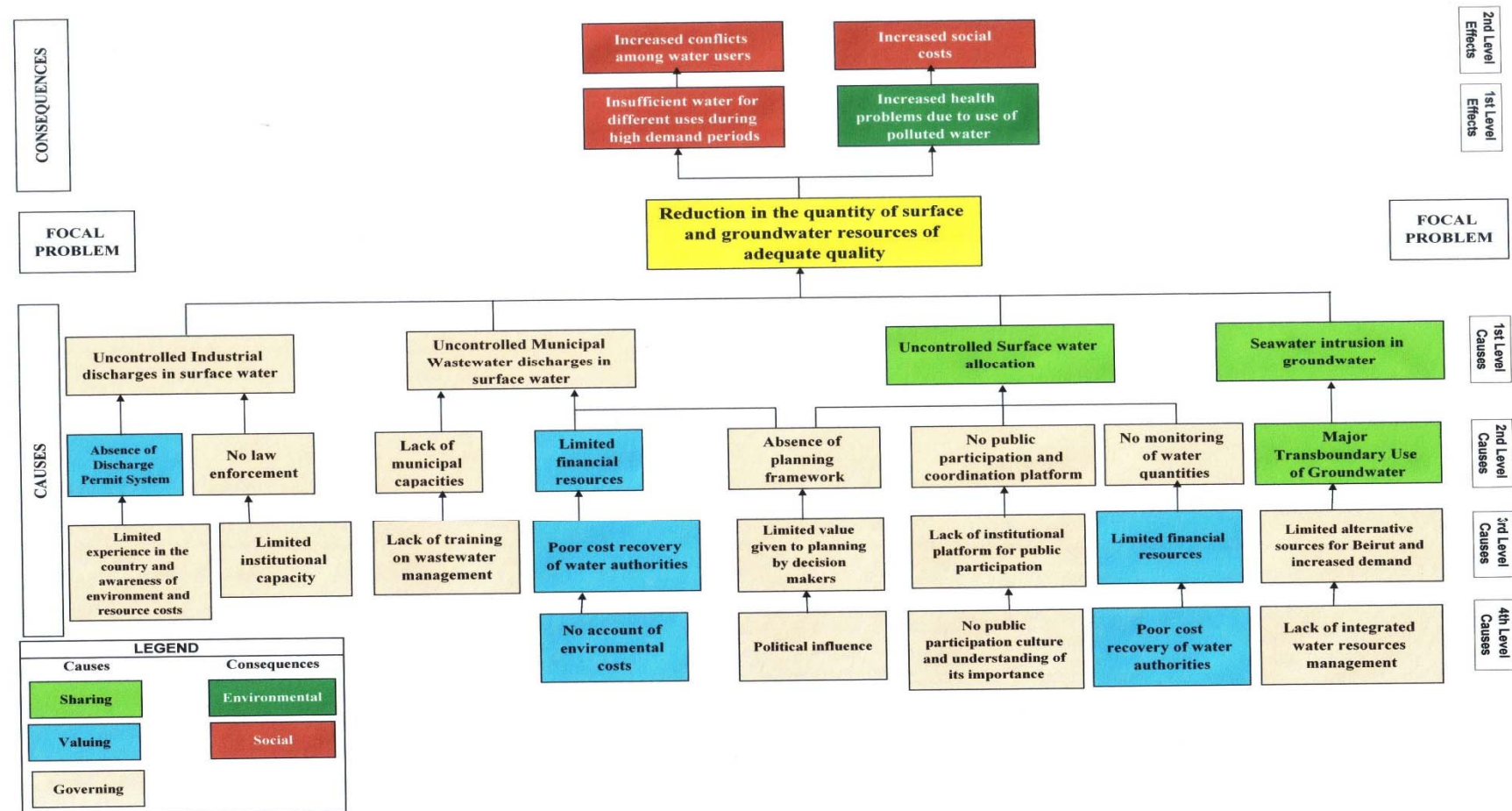
- Some zones of the studied area are declared protected upstream the Damour River & water wells are restricted in these zones
- However, economic consequence of this measure is the high cost of expropriation in the area
- Extraction permits are subject to drastic conditions & require republican order or decree except for those under 150 meters depth & not exceeding 100 m³/day
- Abstraction charges are fixed by a Ministerial decree that takes into consideration depth and flow

INECO Participatory Process

- **The workshop held on September 12th 2007 gathered a panel of different stakeholders who participated in the debate on water problems and alternative solutions**
- **A tentative analysis of the focal water management problem in the Damour River Basin had revealed different causes as displayed in the Focal Problem Tree:**

INECO Participatory Process (cont.)

Problem Tree



INECO Participatory Process (cont.)

During debates, **STAKEHOLDERS** focused on and pointed out the following problems:

- **Over exploitation of ground water resources by BWA**
- **Over exploitation by upstream water users of the Damour River (farmers, restaurants, etc...)**
- **The contamination of up stream water uses of the Damour River**
- **The increasing salinity of water because of excessive pumping**

INECO Participatory Process (cont.)

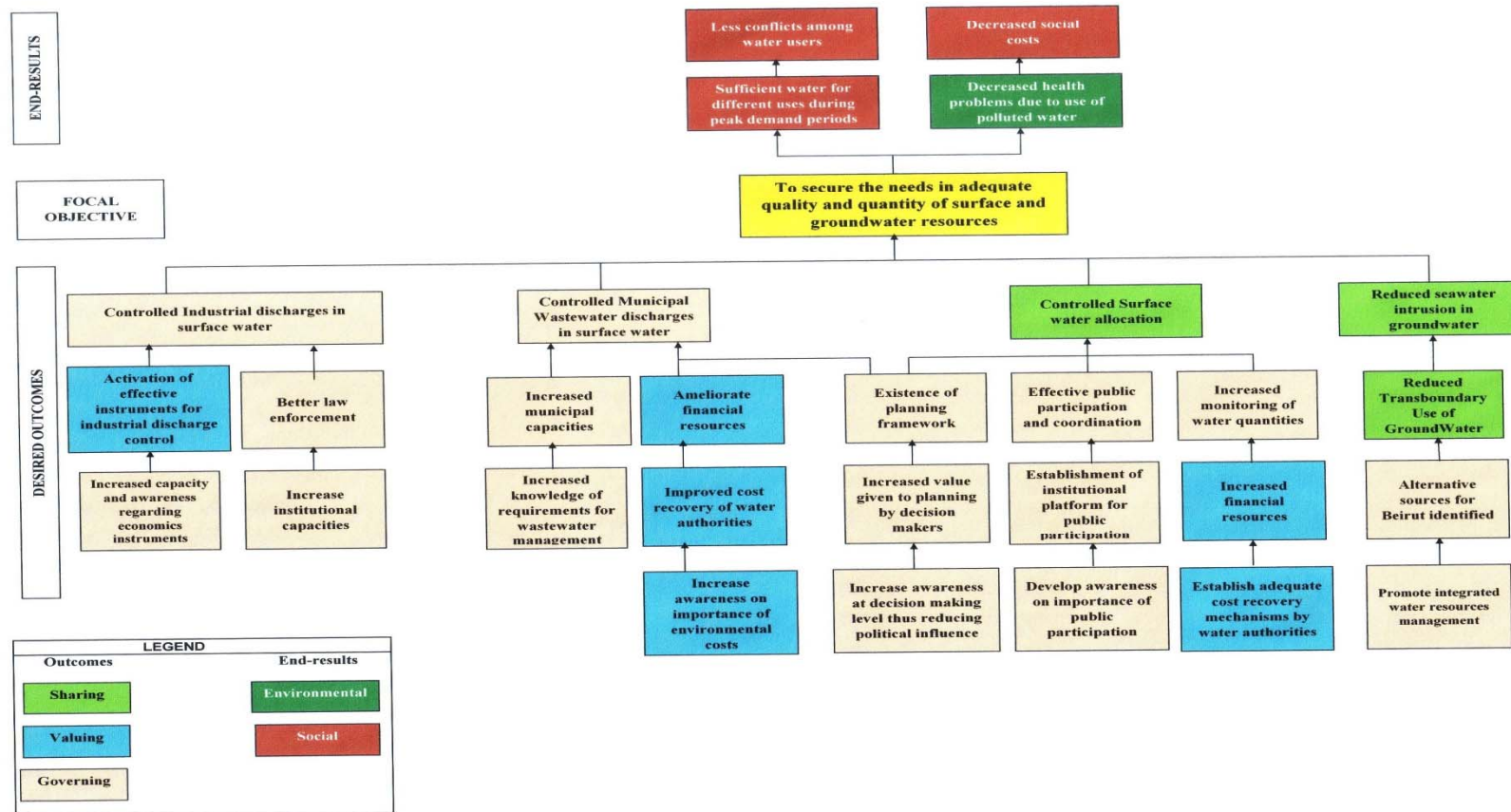
- Lack of water quantities for irrigation & domestic usage during drought season
- No sufficient discharge standards to ensure proper treatment of domestic & industrial waste water prior to disposal in the river
- Limited law enforcement
- Absence of sewage network

INECO Participatory Process (cont.)

- **A tentative definition of Objectives for mitigating water stress in the Damour River Basin culminated in the following proposal on Objectives:**

INECO Participatory Process (cont.)

Objective Tree



INECO Participatory Process (cont.)

The objectives defined in collaboration with local stakeholders articulated around 4 main elements:

- To secure necessary quantity & adequate quality of surface & underground water particularly during drought seasons
- Rehabilitate infrastructure & reinforce monitoring & control of institutions over the water matters
- Stress on water pollution prevention
- Allocation of water based on a comprehensive socio economic survey & analysis

INECO Participatory Process (cont.)

The alternative solutions were also examined by stakeholders & the following suggestions were formulated:

- Secure water quantities by building the promised Dam on the Damour River
- Reduce inter basin water transfer
- Limit the underground wells
- Prevent pollution by creating water treatment plants

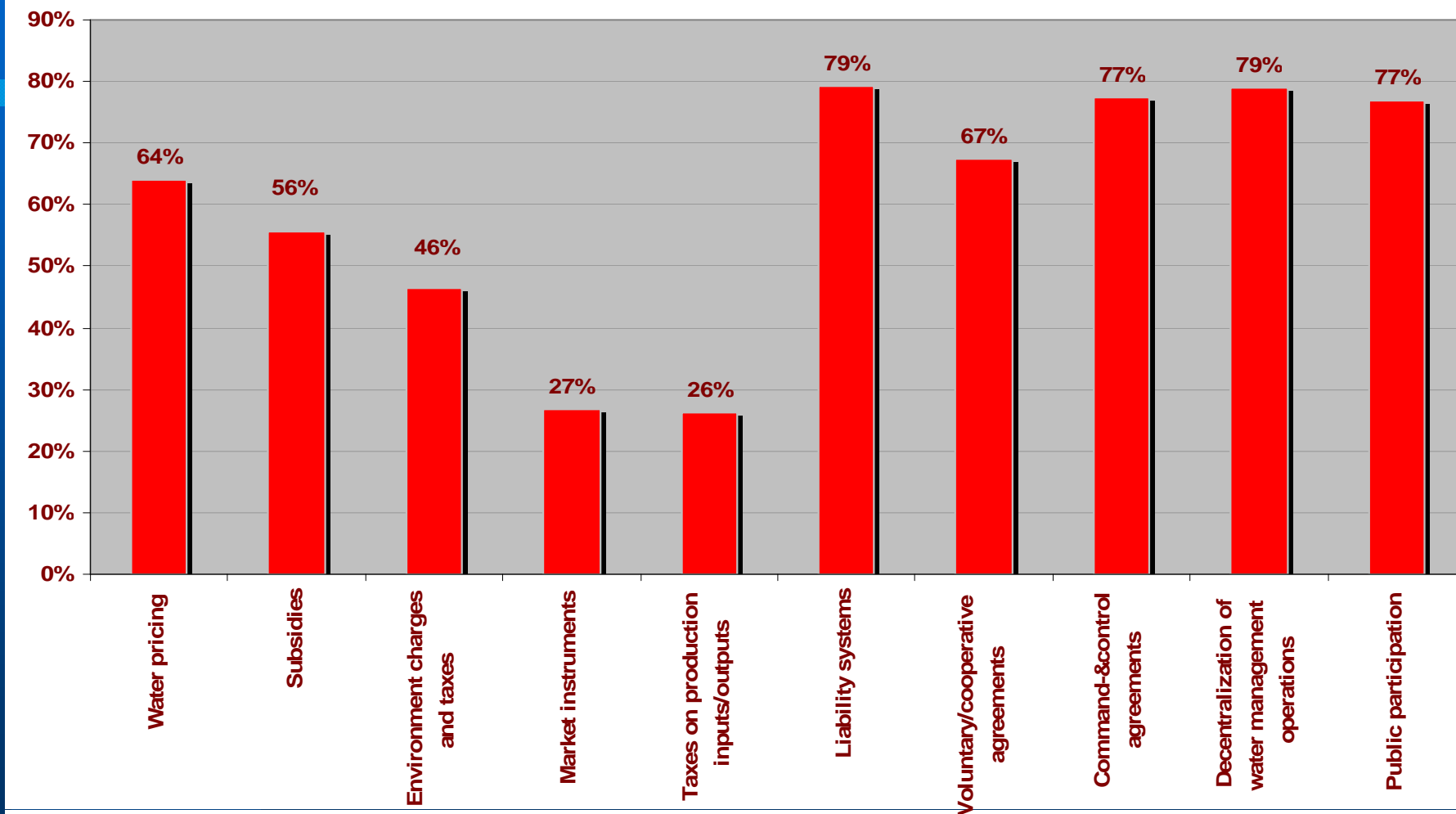
INECO Participatory Process (cont.)

- Prevent misuse of water & limit violation & illegal use
- Rehabilitate infrastructure net & install canalization instead of open air
- Install water meters
- Implement liability system
- Create citizen awareness via campaigns on usage of water and pollution prevention

Evaluation of Options by Local Stakeholders and Comments

- **The questionnaires distributed to the different categories of stakeholders revealed a convergence of opinions with regards to water problems & their solutions :**

Evaluation of Options by Local Stakeholders and Comments



INECO Participatory Process (cont.)

- If compared with the checklist on alternative instruments, opinions & solutions expressed by stakeholders can be listed as follows:
- × Pricing of water seems not to be problematic, consequently installation of water meters will be accepted & tariff structure could be revised on different level basis, provided it does not exceed logical limit
- × A possible differentiation among customers would be envisageable by setting one fixed charge (low) and one mobile
- × Cost recovery would ameliorate substantially to reach sustainability

INECO Participatory Process (cont.)

- **Command & Control** which implies establishment of discharge permit system, penalty & sanction, implementing of technology standard would be easy to adopt
- **Market based instruments** are not a preferred nor appreciated option. Stakeholders ignore such option & are not currently applied in Lebanon for different socio-economic reasons
- **Voluntary agreements:** Though not currently implemented in Lebanon, yet this option rallies 67% of stakeholders preference
- **Implementing of such agreements** would have a certain economical impact & would necessitate compensations & financing policies

INECO Participatory Process (cont.)

- Decentralization remains a must & a most wanted solution to enable water management solution & development to go forth
- Public participation is very well wished & stakeholders are willing to be involved in solving water problems & secure their water
- Last but not least, taxes on production output & input are least preferred & not envisaged so far, particularly environment taxes and charges
- Public participation rallies all categories of stakeholders & hopefully will not remain a wishful thinking

Meetings & Workshops

Dedicated meetings to Water Management problems in the Damour River Basin area:

- **INECO Workshop on 12/09/07**
- **Follow-up meetings with Damour & Meshref municipalities (October 2007, January 2008)**
- **Preparatory meeting & distribution of questionnaires to stakeholders (Meshref: April 2008)**

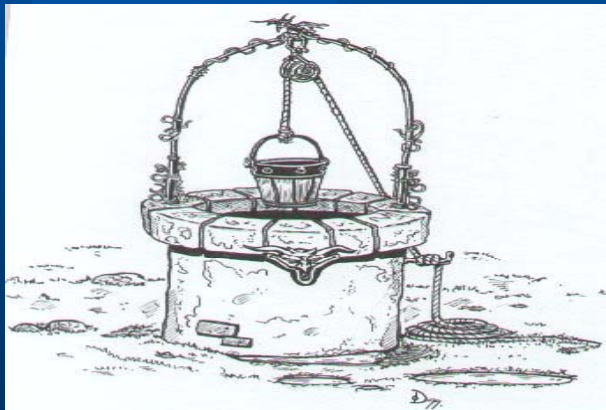
Proposals for WM solutions

- **The proposals that won the stakeholders approval on Water Management problems & solutions :**

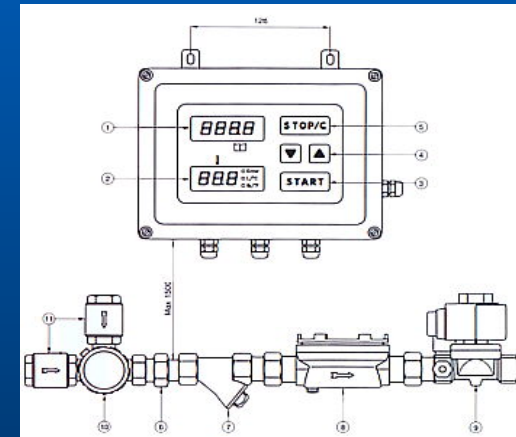
Proposals for WM solutions (cont.)



Building dam



Limit extractions



Install Watermeters

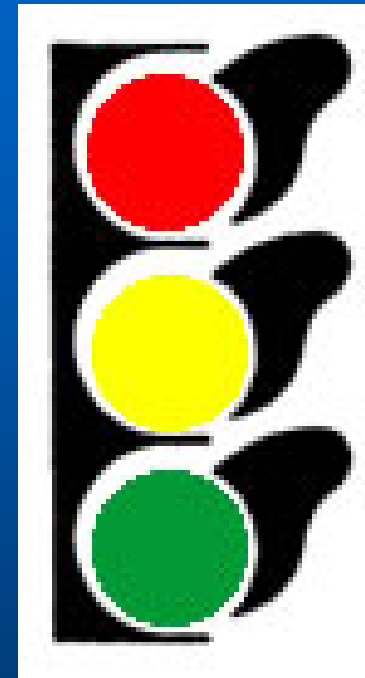
Proposals for WM solutions



Prevent Pollution



Law Enforcement



Community Respect
to Rules

**THANK YOU
FOR
YOUR ATTENTION**