



Food and Agriculture
Organization of the
United Nations



SEMIDE
EMWIS

Feasibility Study for the information component of the Information and Training Centre for Water in Lebanon

Validation workshop

Overview of study findings & recommendations

Eric MINO
SEMIDE / EMWIS

20 June 2018, Beirut, Lebanon

Presentation outline

1. Study approach

2. Diagnosis of the situation

3. Recommendations

- Foreseen architecture
- Governance
- Monitoring networks
- Key data applications

Study approach

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Study objectives

Feasibility Study for the information component of the Information and Training Centre for Water

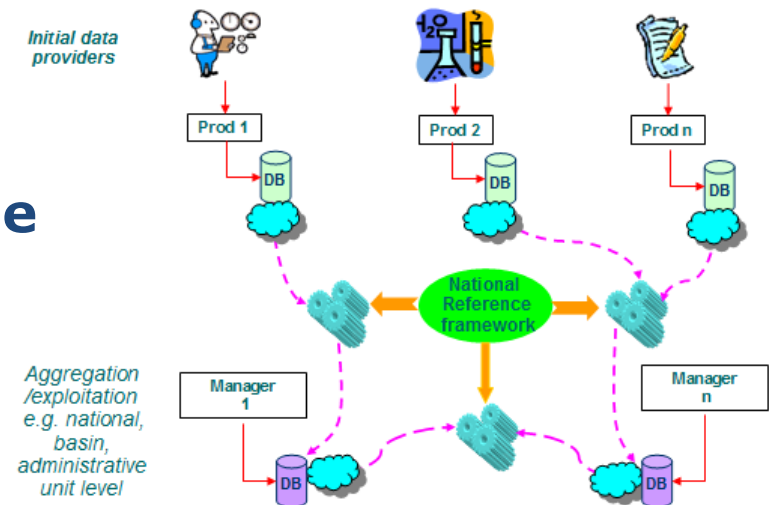
- ➔ Centralised access to information on the Lebanese water sector for IWRM
- ➔ Taking benefits of existing data and information generated by projects and by stakeholders

Expected outputs

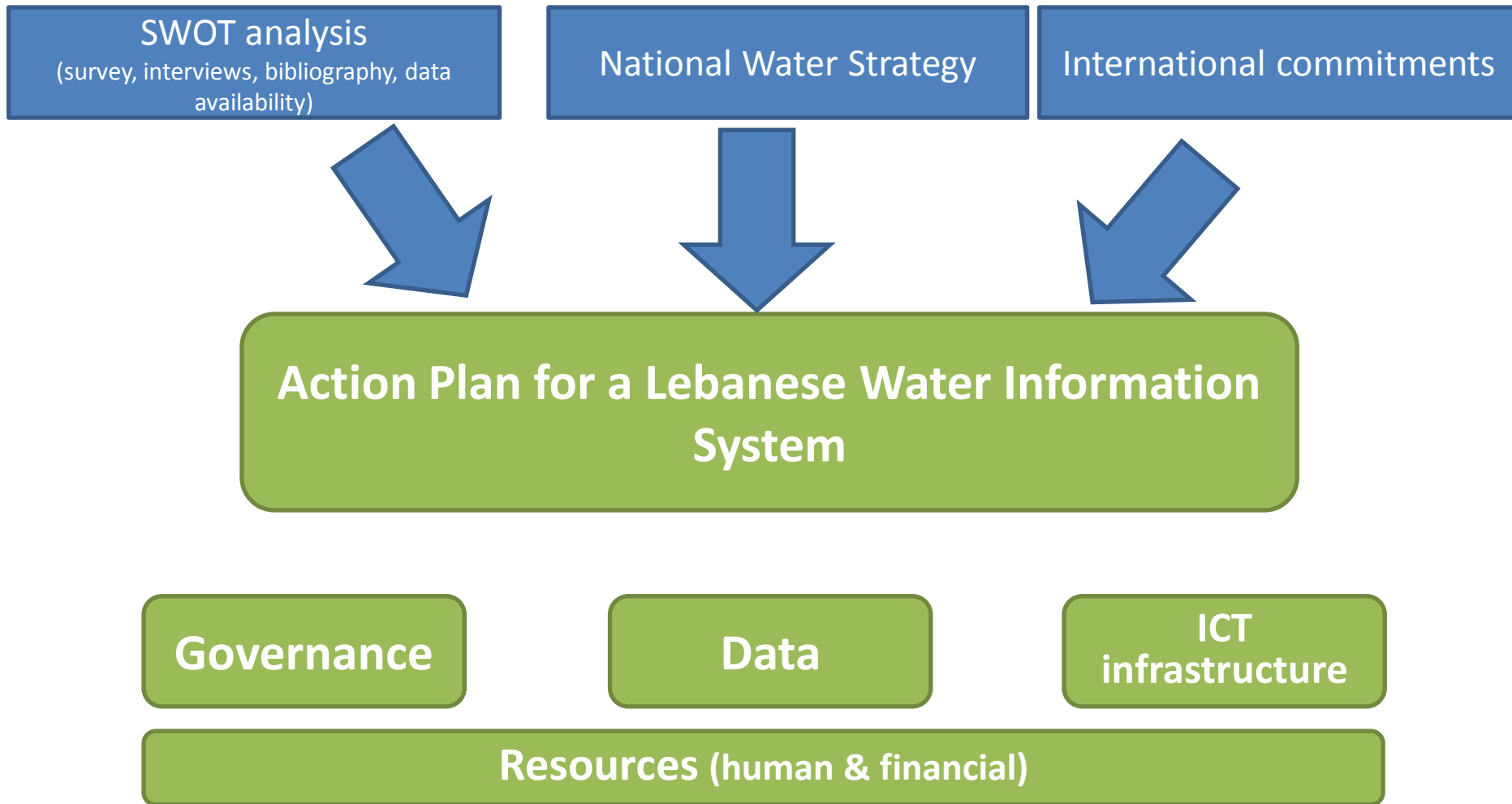
- **Review of stakeholders needs and status in terms of water data management**
- **Institutional recommendations:**
 - Governance structure
 - Article introducing the NWIS into the water code
 - Memorandum of understanding for data exchanges
- **Data availability and gaps**
 - Online inventory of existing data sources
 - Mapping existing data against IWRM data needs
 - Possible information product combining data from various sources
- **Road map for implementation of the Lebanese water information system**
 - Actions proposed with associated budget and planning

NWIS vision for the Future

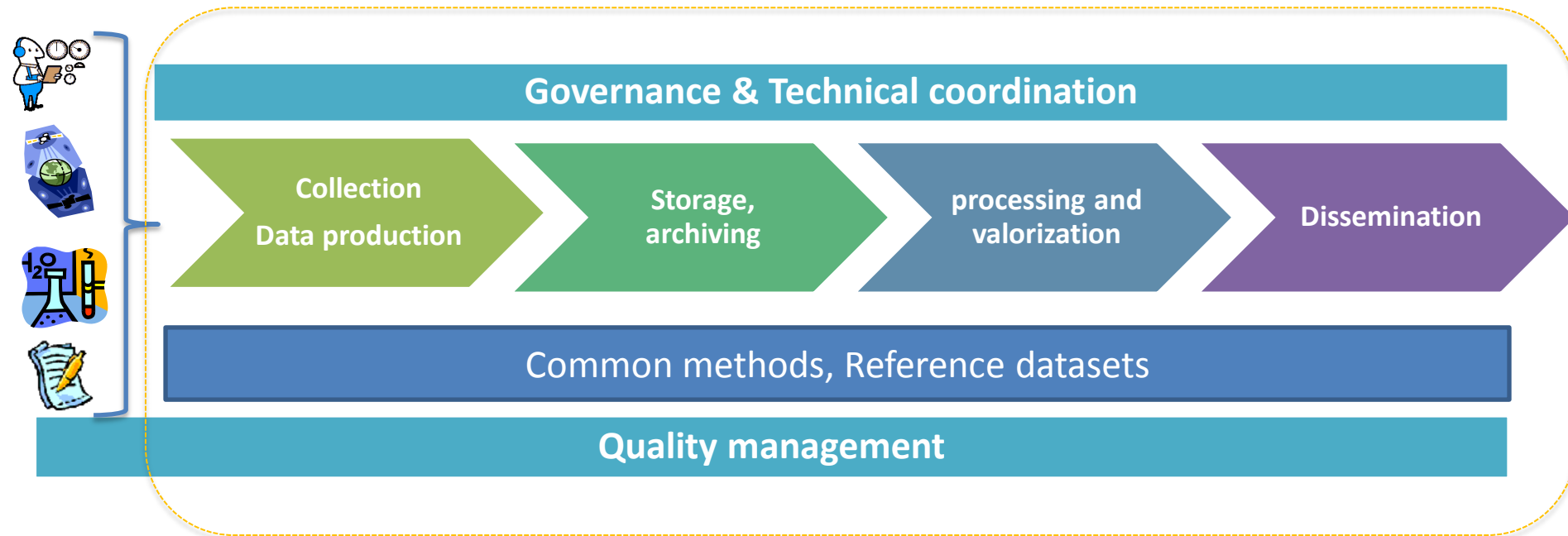
- Water actors **produce information at local level** for their own needs using **international standards**
- They use tools to **register data and to do their own job** at the same time
- The registered data is available for others via harmonised interfaces, internet technology and **homogeneous referencing system**
- Water resources management planners, water regulators and reporting obligations **use the same raw** or aggregated information provided by **National Water Information Systems**



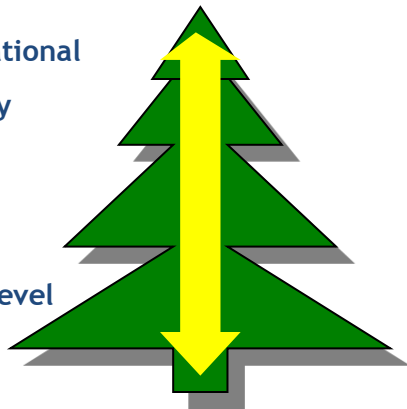
Approach for action plan preparation



Typical data work flow for a Water Information System



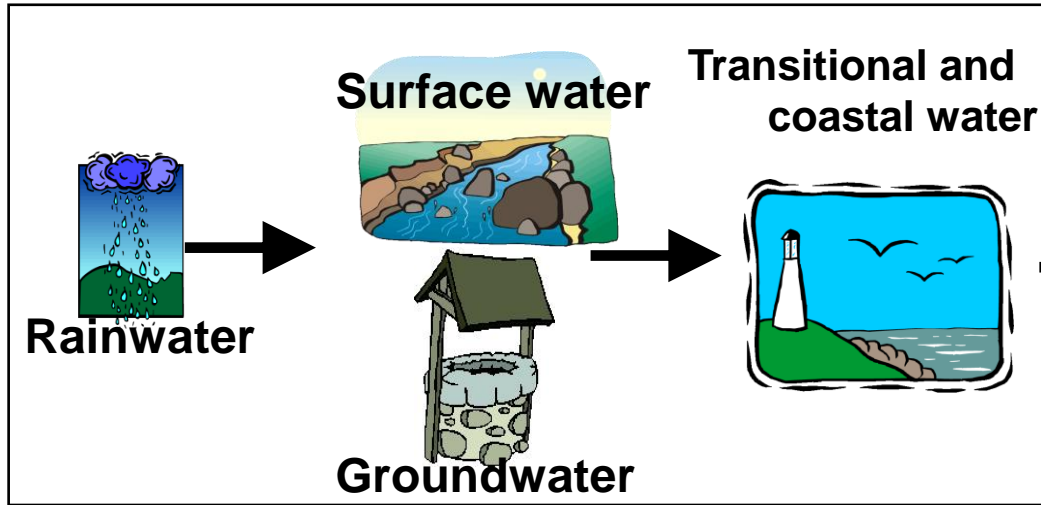
International
Country
Region
Local level



Vertical integration

Data management at local level
Responding to upper level
needs/reporting

Data management: Thematic Scope (resources)



This block contains four icons representing different water management resources: a faucet for Drinking water, a wastewater treatment plant for Waste water Collection, treatment & reuse, a desalination plant for Desalination, and a dam/weir for Dams / weir.

Biota

Two illustrations representing biota: a crayfish and a mangrove tree with its characteristic roots.

Labs

An illustration of a hand using a pipette to transfer liquid into petri dishes, representing laboratory work.

Monitoring Facilities

Two photographs representing monitoring facilities: one showing water level gauges in a river and another showing a large ship named 'Iremer' on the water.

Focus on data for IWRM planning

Status of water resources (aquifers, rivers, reservoirs and non conventional) in terms of **quality and quantity**

Pressures from Agriculture, Industries, Urban areas (e.g. water abstractions, pollution generated by the activity)

Impacts (socio-economic and environmental)

Water infrastructures, including in project (WWTP, dams, transfers, desalination plants, etc.)

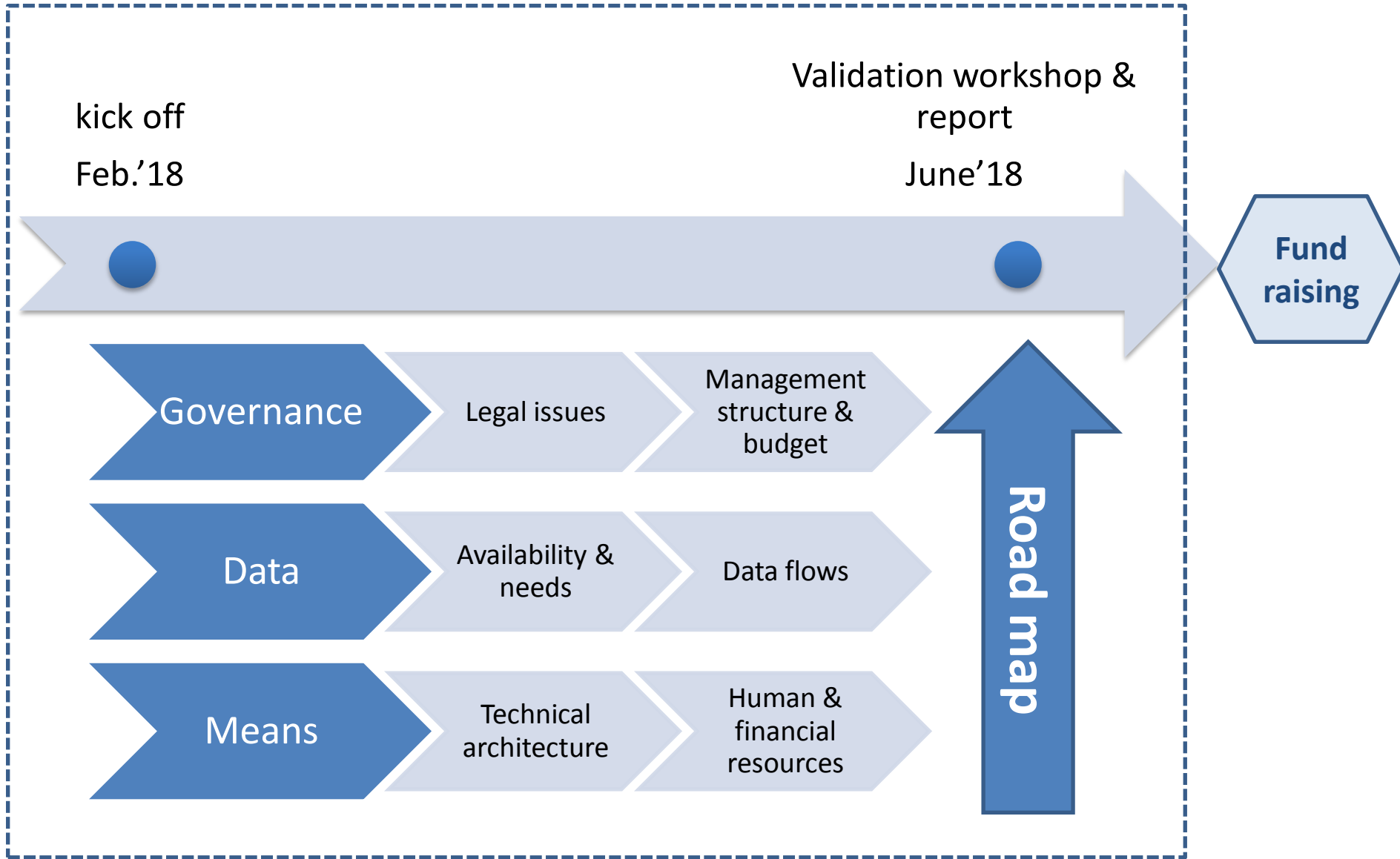
Soft measures: tariffs, permits

Actors

Reference datasets

Hydrography, hydrogeology, monitoring networks, land use/cover,
Management units

Planning overview



Diagnosis of the situation

1. Study approach

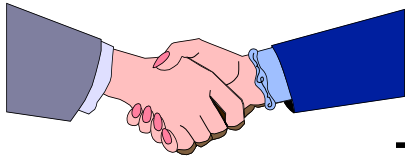
2. Diagnosis of the situation

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SWOT Analysis

**Policy Framework Agreement
(main objectives, priorities)**



Institutional Cooperation

Common language

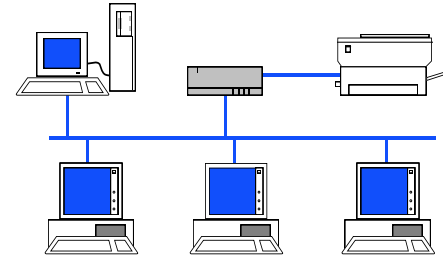


Content

Specific need definition / agreements on procedures



**System development
(e.g. interconnection capacities)**



Infrastructure

Human and financial resources

Institutional cooperation

| Strength | Weaknesses |
|---|---|
| <ul style="list-style-type: none"> • Solid existing institutional structure • Water strategy highlighting data priorities • Leading role of MEW recognised for coordinating a NWIS | <ul style="list-style-type: none"> • Lack of regulation for (systematic/mandatory) data exchanges • Lack of reliable data for routine operation and decision making • Low level of coordination between stakeholders • Some overlap of responsibilities • Lack of resources to implement all legal obligations |
| Opportunities | Threats |
| <ul style="list-style-type: none"> • New water code • Political willingness expressed by Lebanese presidency • Information and Training Center for Water | <ul style="list-style-type: none"> • Overlap of (data) activities • Competition between institutions due to possible economic value of data • No article focusing on water information system |

Content

| Strength | Weaknesses |
|--|--|
| <ul style="list-style-type: none">• Some existing routine data collection (water quality for drinking purposes, water abstraction, hydrology) | <ul style="list-style-type: none">• Data exploitation not well defined• Limited data banking and archiving• Low level of data exchange• Existing data exchange are not based on standardized operational procedures |
| Opportunities | Threats |
| <ul style="list-style-type: none">• Important experience on water data structures and exchange in other countries (e.g. EU, FAO/Water accounting)• International data and interoperability standards (INSPIRE, OGC/Water ML, UN family) | <ul style="list-style-type: none">• Lack of human resources for data management• No interoperability of Databases developed by different stakeholders if no coordination |

Information infrastructure

| Strength | Weaknesses |
|---|--|
| Opportunities | Threats |
| <ul style="list-style-type: none">• Metering water abstraction is most common practice• Existing labs for water quality analysis | <ul style="list-style-type: none">• Some raw data are not collected due to insufficient monitoring (e.g. groundwater levels, water quality and use per sector)• Weak computer and Internet infrastructure and lack of computerized systems to host NWIS |
| <ul style="list-style-type: none">• Support from international technical and financial cooperation• New monitoring facilities offered by Earth Observation and crowdsourcing | <ul style="list-style-type: none">• Limited budget for investment, operation and maintenance |

Financial and human resources

| Strength | Weaknesses |
|--|--|
| <ul style="list-style-type: none">• Knowledgeable (but limited) staff | <ul style="list-style-type: none">• Lack of specialised staff (IT)• Staff dedicated to data monitoring and management |
| Opportunities | Threats |
| <ul style="list-style-type: none">• international technical and financial cooperation supporting capacity building | <ul style="list-style-type: none">• Governmental limitation for hiring civil servants• Limited financial resources |

Overview of data users vs providers

| | MEW | LRA | WE | Meteo | MoA / LARI | MoE | CAS | CNRS/ univ. |
|---|-----|-----|----|-------|------------|-----|-----|-------------|
| Hydrography network (springs, dams, rivers, aquifers, wells, catchments, etc.) | P | P | P | | | | U | |
| Water infrastructure | P | | P | | P | U | U | |
| Surface water quantity | P | P | P | | U | | U | |
| Groundwater quantity (levels) | P | P | P | | | | U | |
| Water use (consumed) | U | P | P | | P | | U | P |
| water abstraction | P | P | P | | P | | U | |
| Climatology & rainfall | U | U | U | P | P | | U | P |
| Evaporation / evapotranspiration | U | | U | | P | | | P |
| Irrigation patterns / crops | | | U | | P | | | P |
| Effluent quantities (UWWTP) | U | | P | | | U | U | |
| Effluent quality | U | | P | | | U | U | |
| Surface water quality | U | P | | | P | U | U | P |
| Groundwater quality | P | P | P | | | U | U | |
| Land cover / use | U | U | U | | U | U | | P |
| Population / industry / administrative units | U | U | U | | | U | P | |
| Economic data | U | U | U | | | U | P | |

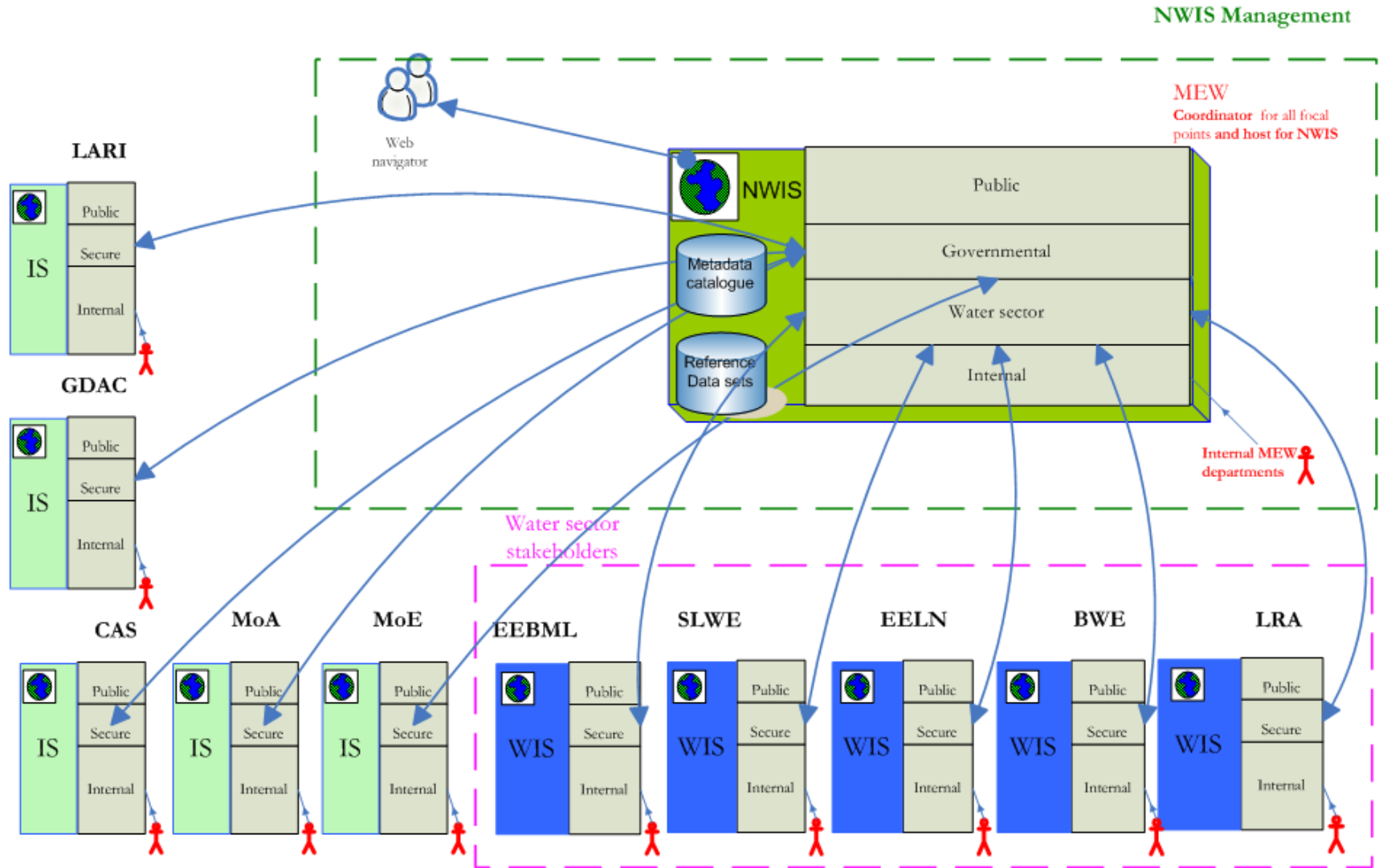
Recommendations

1. Study approach
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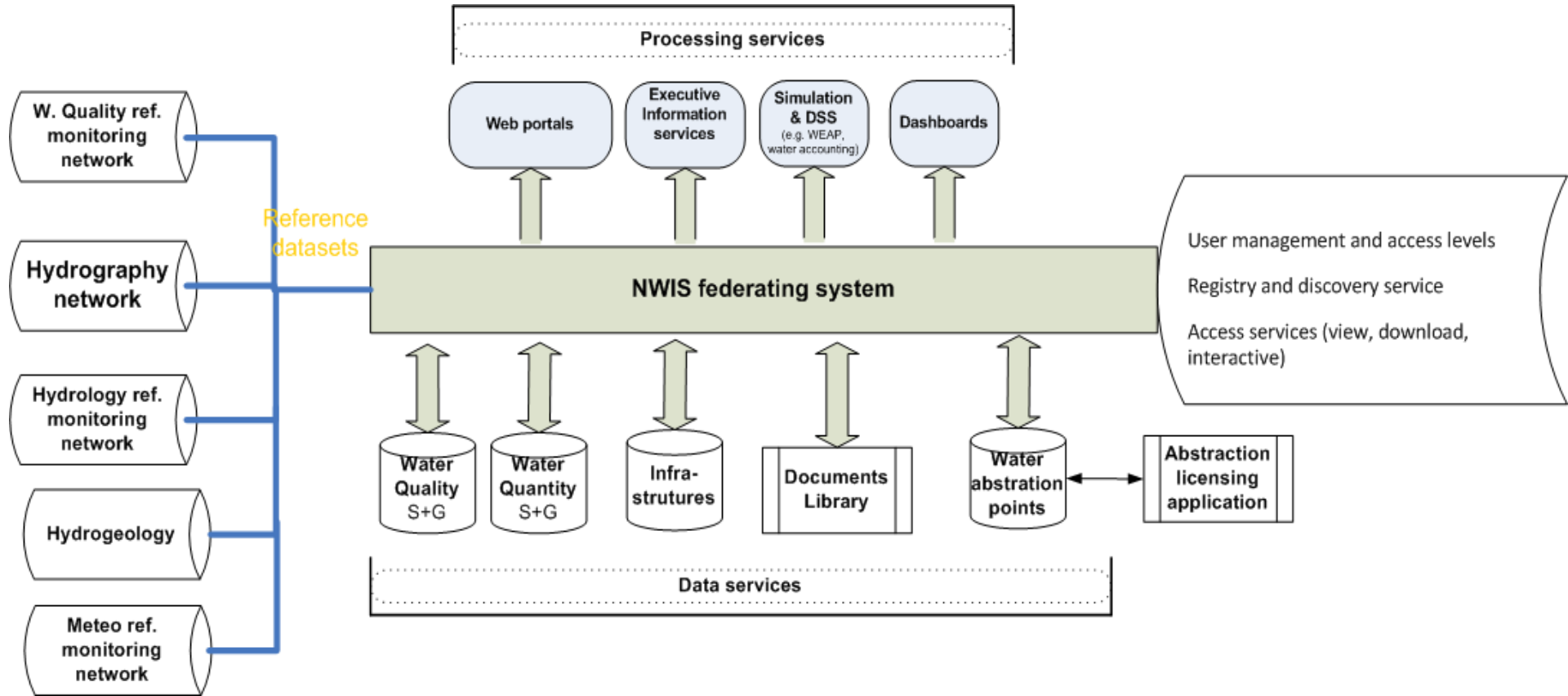
Recommendations in a nutshell

- **Create an enabling institutional environment**
 - Legal/MoU/mandates for governance bodies
 - Launch interinstitutional Working Groups on priority topics
 - Capacity building and dedicated staff
- **Progressive development of an ICT infrastructure**
 - Reinforcement/development of monitoring networks
 - Data center (hardware, software, telecommunications)
- **Develop applications around priority data for IWRM while supporting over routine processes when possible**
- **Knowledge generation and dissemination**
- **Progressive and iterative implementation**
 - Based on resources available (human and financial)
 - Synergy with international cooperation programmes

NWIS architecture overview



National Water Information System architecture (priority components)



Legal framework

- **MoU based on water law 221**

- Art. 2 on MEW mission:

“Collecting, controlling, monitoring, establishing, studying water resources statistics and evaluate water demands and water availability in all Lebanese regions”)

- **Article for a future amendment after new water law approval**

- integrated within “Annual water report” (art. 84 & 85) or “the Monitoring system” (art. 28-35)
- or dedicated article to reinforce its visibility

Article proposed on NWIS

The National Water Information System aims to collect, store and disseminate water data. It includes data on aquatic environments, related fauna and flora, their uses, water and sanitation services, the public water domain register (water abstractions and releases) and the information necessary to fight droughts and floods risks.

In the framework of its missions related to collecting, controlling, monitoring and analysing data on water resources, the Ministry of Energy and Water sets up and guarantees the operation of a Water Information System. The Ministry of Energy and Water provides technical coordination among data producers and users. The National Water Information System contributes to a sustainable and balanced management of water resources, aquatic ecosystems and the public hydraulic domain.

Through the operation of this National Water Information System, the Ministry of Energy and Water guarantees timely access to information and data water resources and their use. The Water Information System supports state services, public water utilities and local communities in the implementation of their policies. Information on water held by public institutions and agencies shall be provided to the Ministry with no charge.

A three pillar governance

Strategic management

*Minister in charge
of water*

All partners

- Definition of priorities, preparation of regulation when necessary, mobilising financing, review results, conflict resolution
- Meeting once a year

- Supervise and validate all technical activities, incl. NWIS implementation, communication, launch of thematic working groups, yearly action plan and budget
- Meeting twice a year

Technical coordination

Water Director

All partners

Scientific council

Technical Secretariat

Dedicated staff

Working groups
with ad-hoc partners

- Guidance documents, NWIS implementation and operation, support working groups
- Working groups meetings 4 by year

Proposed working groups

Hydrography & Hydro-meteorology

- **MEW, LRA, LARI, Meteo, CDR**
- defining, developing and sharing a joint hydrographical reference datasets (with simplified water bodies, incl. infrastructures), hydrology reference monitoring network, indicators

Water quality / pollutions

- **MEW, WE, LRA, MoE, MoA, CDR, CNRS, LARI**
- defining WQ database, indicators (for decision making and shared with the public, data exchange routines, water pollution DB (later), identification need for reinforcing monitoring

Hydrogeology

- **MEW, WE, LRA, Meteo**
- defining, developing and sharing a joint hydrogeological map, reference monitoring networks, indicators (management and public information)

Water uses

- **MEW, WE, LRA, LARI, CNRS**
- defining, developing and sharing a joint hydrogeological map, reference monitoring networks, indicators (management and public information)

Water infrastructures

- **MEW, WE, LRA, CDR**
- defining, developing and sharing a water infrastructure DB (wells/springs, WWTP, dams, water transfers, reservoirs), indicators (management and public information)

Improving NWIS infrastructure

Monitoring networks

Minimum requirements to fulfil IWRM needs

- **Meteorology**
 - Existing networks from LARI and Meteo
 - 60 telemetry stations (based on UNDP study)
- **Hydrology**
 - Existing network from LRA
 - To be estimated with LRA
- **Groundwater**
 - Existing for Litany (16 wells)
 - Rehabilitation 20 wells installed by UNDP
 - Isotopic analysis for karstic areas
- **Water quality**
 - Existing for drinking water sources from WE
 - Additional need to cover all sub-basins, twice a year
 - Groundwater for wells rehabilitated (20)
- **Water abstraction**
 - Existing flow meters and estimations from WE & MEW
 - On going projects from FAO, USAID, EU
 - Assessment to be undertaken by combining all existing data

Improving NWIS infrastructure ICT hardware & software

Servers (2):

- Production & Development/tests
- Archiving & back-up
- Operating system + security bundle
- UPS (battery)

Telecom

- Router/firewall with VPN & Switch
- Internet access 4 Mbps full duplex mini

Workstations / printers

Software

- DB: PostGreSQL or SQL server
- Web server, mapping, catalogue (open source)
- Standalone GIS licenses
- Antivirus / security
- Office suite
- Statistics analysis and modelling (open sources)

ICT infrastructure for contributing partners

- Server with UPS
- Router/firewall with VPN facility
- Workstations for data entry

Developing priority data infrastructures

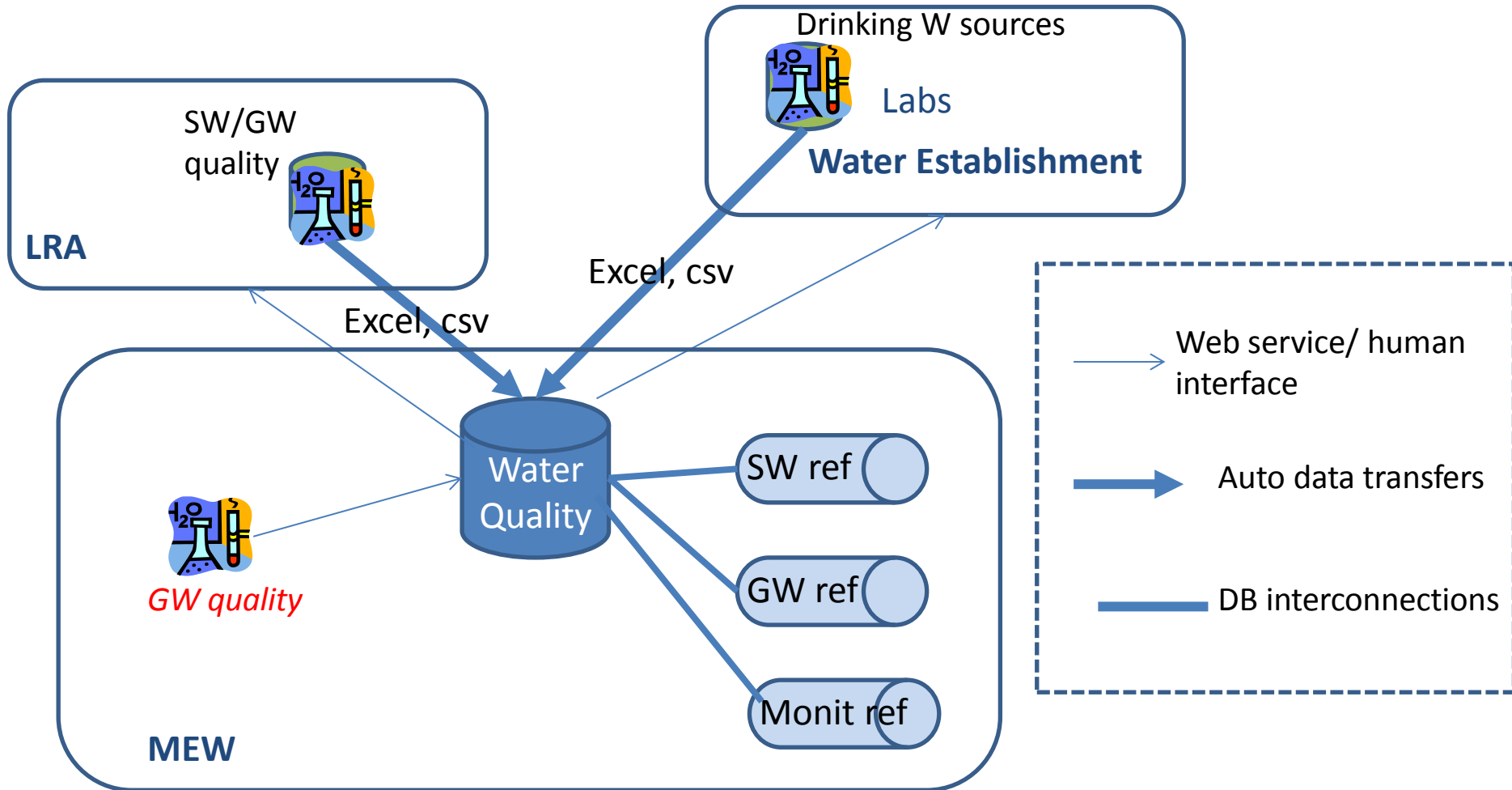
- **Reference datasets:**

- Hydrographic network (streams, reservoirs, transfer canals, catchment including coding, naming, continuity and flow directions, XYZ coordinates), surface water bodies (simple definition to start with, e.g. water segments)
- Reference monitoring stations
 - Surface and ground water quality
 - Surface water flows and levels
 - Meteo
 - Groundwater levels
- Groundwater bodies

Developing priority data infrastructures

- **Improving administrative services generating technical data:**
 - Water abstraction licensing
 - Integrated application for drinking water quality monitoring & water resources quality monitoring
- **Hydromet DB**
- **Groundwater DB**
- **Infrastructure DB (existing + planned)**
 - Wells, springs, dams, WWTP, drinking water plants, transfers, reservoirs
- **Sectoral water use DB**
- **Online water sector library with metadata catalogue**
- **Pollution DB**

Water Resources quality monitoring



Knowledge generation

- **Lebanese water geoportal**
 - All reference datasets publicly available
 - Communication campaign
 - Collection and treatment of comments
- **Annual water report (maps and indicators)**
- **Monthly bulletin / dashboards**
- **Water accounting on pilot areas**

Human resources

NWIS secretariat team

- Director
- Ing. Hydrologist
- Ing. Hydrogeologist
- Ing. Water quality / pollution (chemistry or biology)
- Ing. GIS/remote sensing
- Technician GIS
- Ing. DB, software, web
- Technician DB, software, web
- System Ing. (servers, security and telecom)
- Technicians to support data collection and monitoring network maintenance

Training programme (content to be defined)

- 2 sessions by year for max 20 persons

Budget overview

| Results | Total cost EUR | | | | | |
|--------------------------------------|----------------|----------------|------------------|------------------|------------------|------------------|
| | Y1 | Y2 | Y3 | Y4 | Y5 | Grand Total |
| 1. Governance & Enabling environment | 241 000 | 469 000 | 443 000 | 436 000 | 447 000 | 2 036 000 |
| 2. Investment (infrastructure) | 30 000 | 187 800 | 1 265 600 | 1 218 700 | 799 700 | 3 501 800 |
| 3. Data processing | 50 000 | 50 000 | 200 000 | 65 000 | 100 000 | 465 000 |
| 4. water knwoledge | | 50 000 | 115 000 | 25 000 | 25 000 | 215 000 |
| Grand Total | 321 000 | 756 800 | 2 023 600 | 1 744 700 | 1 371 700 | 6 217 800 |

| Categories | Total cost EUR | | | | | |
|---|----------------|----------------|------------------|------------------|------------------|------------------|
| | Y1 | Y2 | Y3 | Y4 | Y5 | Grand Total |
| Coordination / concertation | 64 000 | 74 000 | 70 000 | 45 000 | 45 000 | 298 000 |
| Hardware and equipment | 8 000 | 33 000 | 99 500 | 830 000 | 705 000 | 1 675 500 |
| Staff | 170 000 | 308 000 | 326 000 | 344 000 | 362 000 | 1 510 000 |
| Maintenance | | 800 | 4 100 | 4 300 | 24 300 | 33 500 |
| Software | 22 000 | 9 000 | 22 000 | | | 53 000 |
| Studies / consulting / software development | | | 1 075 000 | 314 400 | 80 400 | 1 469 800 |
| Technical Assistance / support | 57 000 | 332 000 | 387 000 | 167 000 | 115 000 | 1 058 000 |
| Training | | | 40 000 | 40 000 | 40 000 | 120 000 |
| Grand Total | 321 000 | 756 800 | 2 023 600 | 1 744 700 | 1 371 700 | 6 217 800 |



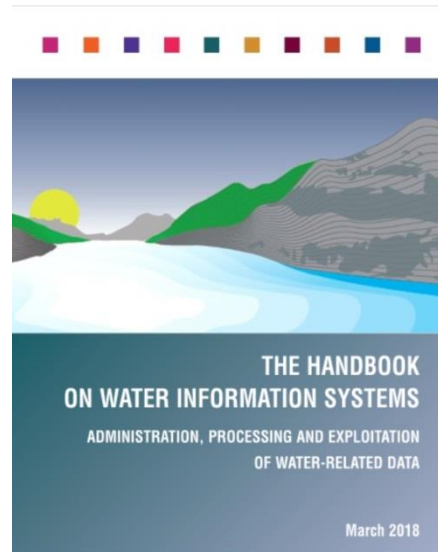
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www.semide.net/initiatives/MWKP

www.riob.org/pub/HandBook-SIE-en/

Eric MINO
Director
EMWIS Technical Unit
e.mino@semide.org