

Revised priority domains for the foreseen EO applications, 18 December 2012

This table is based on the concept note resulting from the EMWIS/ESA 1st workshop, Sept. 2010, and it was updated during the workshop held at ESA (Frascati) on 5 December 2012. It takes into account what is planned within the current GEF/World Bank/NASA project. One potential focus identified during the workshop was requirements for more detailed information (spatial resolution < 30 meters) at the watershed level.

Priority domains	Lebanon	Morocco (*)	Jordan	Egypt (**)	Tunisia (***)
Water availability	CC impact on water availability (Drought monitoring, forest fires, etc.) RS ¹ of: precipitation, ET, Soil moisture, Temperature, Snow cover, snow monitoring	CC impact on water availability (Drought monitoring: environmental indicators; early warning system)	Management of shared SW & GW resources	Ground water availability monitoring	CC impact on water availability Drought monitoring Soil moisture monitoring
Flash floods	Monitoring runoff & mapping Flood-prone areas	Early warning system, modeling, and forecasting	Early warning system and modeling prediction	Early warning system & modeling	Floods Mapping & Modeling (high resolution flood mapping)
Water quality	Pollution & WQ monitoring	Pollution & WQ ² monitoring	Enhancement of WQ monitoring and modeling	Pollution & WQ monitoring	WQ monitoring (SW & GW)
Water Use	Irrigation monitoring (field crops, ET ³ , etc), RS of (Vegetation covers, ET, Soil moisture)	Monitoring irrigated areas (water use, water requirement)	Monitoring land use management of shared SW & GW, RS application	Soil moisture monitoring, seasonal crops mapping, ET & water balance, wetlands	CC impact on agriculture & crop/irrigation mapping ET Estimation Soil moisture monitoring Vegetation health monitoring
Infrastructure & resources management	Determining vulnerability Areas Estimating areas for water Harvesting (SW, GW ⁴ , etc)		Estimating areas for water Harvesting (SW, GW, etc) CC on water resources	Impact of CC on coastal zones	GW storage & compare it with soil moisture Coastal protection
Base maps	Digital maps DEM (high resolution)	DEM (10-20 m resolution) Land use/ cover maps (10-30 m resolution)	DEM (higher resolution than offered by NASA: less than 10m) - Satellite images with HR ⁵	DEM ⁶ (higher resolution than offered by NASA: SRTM ⁷)	Digital GIS data sets for planted area of major crops DEM (<30 m resolution)

¹ RS : Remote Sensing

² WQ : Water quality

³ ET : Evapotranspiration

⁴ SW & GW : Surface waters & Ground waters

⁵ HR : High Resolution

⁶ DEM : Digital Elevation Models

⁷ SRTM : Shuttle Radar Topography Mission (NASA mission to map the world, using sensors such ASTER – 90m)

Details:

(*) MOROCCO

Moroccan team needs VS components:

1. CC impact on water availability (Floods, Drought monitoring)

-Floods:

- Rapid mapping tools
- Access to high temporal and spatial resolution data (radar and optic)

-Drought:

- Environmental indicators
- Early warning system

2. Early warning system, modeling, and forecasting

- Inputs for hydrological modeling (high resolution)
- Forecasting in small watersheds

3. Pollution & WQ⁸ monitoring

- High spectral and spatial resolution images (more bands and 10-30 m resolution)

4. Monitoring irrigated areas (water use water requirement)

- Evapotranspiration (ET) and soil moisture at high spatial and temporal resolution (daily and 10-30m)
- Crop coefficient at high spatial and temporal resolution (daily and 10-30m)

5. Key parameters

- DEM (10-20 m resolution)
- Vegetation indices
- Wind speed, LST, Soil humidity, ET
- Land use/land cover maps (10-30 m resolution)

() EGYPT**

1- Water Quality (Pollution and water quality monitoring)

- a. very high resolution satellite imagery (Worldview 2, QuickBird,...) or
- b. medium resolution (Rapideye, Spot, Landsat,...) satellite imagery is required

2- Water Use (Soil moisture monitoring, seasonal crops mapping, ET & water balance, wetlands, etc)

- a. Optical medium resolution Landsat, SPOT, Rapideye
- b. Radar imagery.
- c. High temporal resolution imagery MODIS.
- d. The techniques used for pan sharpening MODIS with medium resolution imagery are required.

3- Flash Floods (Early warning system and modeling)

⁸ WQ : Water quality

- a. DEM (higher resolution than offered by NASA: 90m – SRTM) for Sinai and Upper Egypt.
- 4- **Infrastructure and resources management (Impact of CC on Coastal Zones)**
 - a. Time series of medium resolution imagery
 - b. Higher resolution DEM or if applicable LIDAR can be used
- 5- **Water availability (Ground water availability monitoring)**
 - a. GRACE data for ground water changes in the Nile basin and in Egyptian western Deseret

For all the above priority domains sentinel 1 and 2 satellites will be a great addition. Meanwhile we think that EMWIS/ESA could help better by transferring knowledge and Experience through real projects implemented in Europe in similar priority domains. What were the challenges and how earth observation data helped to overcome those challenges? What were the algorithms used and how they were validated? In addition capacity building is always important especially in Radar as it will help for rice field mapping in Egypt which consumes double or triple water quantity than other crops consume.

() TUNISIA**

Tunisian team propositions:

1. **Water availability**
 - **CC impact on Water availability**
 - Historical low resolution images data to define the impact of CC
 - Monitoring of water availability at high resolution (< 30m)
 - **Drought:**
 - Environmental indicators (improvement of existing ones) with combined images radar and optic
 - Early warning system and eventually improvement of existing ones
2. **Flash floods**
 - **Floods:**
 - choice of type of resolution in Tunisian context taking in account the watershed characteristics
 - combination of radar and optical images to get rapid information with high temporal and spatial resolution data
 - Procedure to get rapid mapping on flood (availability of images: type and spectral and temporal resolution)
 - **Hydrology:** Modeling at high resolution flood mapping in according to watershed characteristics
3. **Water quality**
 - Quality monitoring of surface water quality (Lagoon, lake, sebkha, sea in the near coast) with water quality parameters (in relations with pollution or salinity..)
 - Satellite processing to retrieve water quality parameters with High spectral and spatial resolution images
 - Waterflow prediction and monitoring of water level in lakes and lagoon in particular those where birds migratory stop over
 - Indicators to detect change of groundwater quality
4. **Water Use**
 - Crop coefficient at high spatial and temporal resolution (daily and 10-30m)
 - Estimation of irrigated crops areas to generate water demand scenarios
 - Water balance to estimate ET and irrigation water requirements with high resolution (<30m)

- Models for assessment of actual ET to analyze and detect crop water stress.
- The quality of irrigation water used and effect on soil salinity
- Introduce the ET parameter, as an essential tool, by means of high resolution environmental satellites such as Radar etc. This is to quantify water requirement and water consumption.
- All the crop parameters are defined according to the air humidity for each season. This should be monitored and mapped by E.O. system in order to define the thematic maps of each culture and with appropriate agro-meteorological parameters.

5. Infrastructure & resources management

- Groundwater storage & compare it with soil moisture and surface indicators
- Coastal protection ; water quality parameters at ports and harbors
- Water quality in the coast and pollution in the sea
- Groundwater in arid area should be mapped and monitored by E.O. and specially for the transboundary aquifers in order to limit conflicts between users
- The desert area, should be mapped and monitored in different scale in order to understand the behavior of desertification and the land change

6. Base maps

- Digital GIS data sets for planted area of major crops
- DEM (<30 m resolution)