# Chapter 4 — North Africa Land, Water & Agro-Climate Services (OSS)

*Earth Observation for Sustainable Management of Water and Natural Resources in North Africa — Lead Institution: Sahara and Sahel Observatory (OSS)*

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## 4.1 Background and Rationale

North Africa spans roughly six million square kilometres of predominantly arid and semi-arid lands where rainfall variability, groundwater stress, land degradation, and recurrent drought intersect with rapidly evolving agricultural systems. The **Sahara and Sahel Observatory (OSS)** leads the *GMES & Africa* consortium **"Earth Observation for Sustainable Management of Water and Natural Resources in North Africa."** Its mandate is to translate Earth Observation (EO) data into reliable public services that help governments and producers manage land, water, and crops under a changing climate. Core service lines—**seasonal agriculture monitoring and early warning**, **water withdrawal and use in irrigated areas**, and **land degradation monitoring**—were launched in Phase I (2018–2021) and significantly expanded and institutionalised in Phase II (2022–2025).[1]

**Geographic coverage.** Phase I focused on **Algeria, Egypt, Libya, Morocco, Mauritania, and Tunisia**; Phase II deepened operations in these countries while collaborating with institutions beyond the sub-region, keeping North Africa the principal locus of service delivery.[2]

**Strategic approach.** OSS emphasises **co-design with end-users** (ministries, water agencies, extension services), **routine product updates**, and **institutionalisation**—embedding tools and indicators in standard procedures and reporting cycles rather than isolated pilots.[3]

## 4.2 Leadership, Partners, and Governance

**Lead institution.** OSS (Tunis, Tunisia) convenes national space, water, agriculture, and environment agencies, universities, and private firms around a shared operational agenda for EO services.[3]

**Regional platform.** The **GMES & Africa – North Africa** dissemination hub provides a transparent public entry point to services, news, releases, and training materials—reinforcing a service-oriented governance model.[4]

## 4.3 Service Portfolio and Methods (Phase I → Phase II)

### *4.3.1 What the services deliver (non-specialist view)*

| **Service line** | **What users receive** | **Typical decisions supported** | **Phase trajectory** |
|---|---|---|---|
| **Seasonal agriculture monitoring & early warning (GuetCrop)** | Crop-condition anomalies, rainfall/vegetation dashboards (regional & national) | Food-security outlooks; contingency planning; extension advice | Prototype in Phase I → Operational Phase II (2023 release)[5] |
| **Water withdrawal & use in irrigated areas (MISBAR; SAQIYA app)** | Scheme-level irrigation water balances; **smartphone irrigation scheduling** at farm level | Groundwater abstraction management; on-farm water savings; allocation rules | MISBAR Phase I → **SAQIYA scaled to farms in Phase II (2024)**[6] |
| **Land degradation monitoring (MISLAND /** | Degradation indicators & hotspot maps aligned with **SDG 15.3.1**; | Restoration targeting; neutrality reporting; anti- | North Africa in Phase I → **Continental |

| | | | |
|---|---|---|---|
| **MISLAND-Africa)** | country and continental portals; mobile access | desertification policy | scale in Phase II (2025)**[7] |

### *4.3.2 Methods in brief*

- **EO foundations.** Multi-sensor time series (Sentinel-1/2, Landsat, MODIS) underpin vegetation condition, land productivity, and soil-moisture/surface-water indices; weather inputs feed crop and irrigation analytics.[1] [5]
- **From basin to farm. MISBAR** quantifies irrigation demand and likely withdrawals at scheme scale; **SAQIYA** converts this into **field-level irrigation schedules** via mobile/web, tuned to crop stage, soil moisture, and forecasts.[6]
- **Continental harmonisation. MISLAND-Africa** standardises indicators across ~30 million km², supported by a **Joint Implementation Network (JIN)** of 275+ experts to ensure quality and national uptake in diverse ecoregions.[7] [8]

### *4.4 Phase I (2018–2021): Foundations and First Operations*

- **MISBAR** launched as an irrigated-agriculture monitoring geoportal, informing managers (e.g., Algeria, Tunisia, Libya) on water use and sustainable abstraction in major aquifers.[1]
- **MISLAND (North Africa)** tracked vegetation productivity and land-use dynamics, delivering consistent degradation hotspots aligned with **UNCCD** metrics.[7]
- **Capacity baseline.** User-needs and institutional assessments with regional partners (e.g., **CRTEAN**, **CRASTE-LF**) guided service design; by 2021, North Africa recorded **the highest training volume** across GMES regions.[3]

### 4.5 Phase II (2022–2025): Scaling, Downscaling, and Institutionalisation

### *4.5.1 Notable releases and platforms*

| Tool / platform | Type | Purpose | Year |
|---|---|---|---|
| **GuetCrop** | Web geoportal | Regional crop monitoring & drought early warning for North Africa | **2023**[5] |
| **SAQIYA** | iOS/Android/Web app | **On-farm irrigation scheduling** using EO-derived moisture & forecasts | **2024**[6] |
| **MISLAND-Africa** | Continental portal & docs | Harmonised land-degradation indicators for all African countries (+ mobile access) | **2025**[7] |
| **Joint Implementation Network (JIN)** | Expert network | Pan-African community **(>275 experts)** supporting MISLAND uptake | **2023**[8] |

**Public entry points.** The **GMES North Africa** hub aggregates releases, training, and news; **MISBAR**, **GuetCrop**, and **MISLAND-Africa** portals are public; **SAQIYA** is available via app stores and web.[4–7]

### *4.5.2 Representative activities and uptake*

- **Country workshops & adoptions.** National events (e.g., Mauritania) showcased MISBAR, MISLAND, GuetCrop, and SAQIYA to ministries and agencies, supporting formal adoption.[3] [4]
- **Hands-on training.** Continuous distance and in-person training cycles (e.g., MISBAR water-balance; regional hackathons on crop mapping).[5]

- **User-facing design. SAQIYA** demonstrates "EO-to-day-to-day" translation: **when and how much to irrigate** at plot level, reducing over-irrigation and energy costs.[6]

## 4.6 Decision Use and Effects

### *4.6.1 How the information becomes action*

- **Food-security early warning (GuetCrop).** National analysts use seasonal anomaly maps to anticipate shortfalls and trigger advisories or contingency measures; GuetCrop is a joint **OSS–JRC** release tailored to North Africa.[5]
- **Irrigation governance → farm practice (MISBAR → SAQIYA).** Water managers monitor scheme-level balances and probable withdrawals; farmers receive **plot-level irrigation schedules**, cutting water and energy use and protecting aquifers.[6]
- **Restoration & neutrality reporting (MISLAND → MISLAND-Africa).** Countries identify degradation hotspots and feed **SDG 15.3.1** reporting; the continental portal brings consistent, cross-border indicators and mobile field verification.[7]

### *4.6.2 Emerging indicators (as reported/available)*

| **Indicator** | **Current status (Phase II)** | **Source** |
|---|---|---|
| Public portals online | MISBAR (operational), **GuetCrop (2023)**, **MISLAND-Africa (2025)** | 5–7 |
| Farmer-level decision support | **SAQIYA** released (2024); field demos under way | 6 |
| Continental community of practice | **JIN >275 experts** supporting MISLAND-Africa adoption | 8 |

Phase II shows deliberate **two-way scaling**: **up** to continental indicators (MISLAND-Africa) and **down** to farm decisions (SAQIYA), with **GuetCrop** binding the portfolio through regional early warning.

### 4.7 Tools, Portals, and Discoverability (general audience)

- **GMES North Africa hub (news, docs).**[4]
- **MISBAR irrigated-areas monitoring portal.**[1]
- **GuetCrop crop monitoring & early-warning portal.**[5]
- **SAQIYA irrigation advisory (mobile/web).**[6]
- **MISLAND-Africa portal & documentation (incl. mobile).**[7]

### 4.8 Capacity Development and Inclusion

Phase I established a strong training baseline using a **training-of-trainers** model that cascaded nationally. Phase II added **digital learning** and **open hackathons** (with partners like Digital Earth Africa and ESA/GeoVille/DUNIA), widening participation to **young professionals and startups**.[3] [5] [7]

### 4.9 Alignment with Agenda 2063 and the SDGs

### Agenda 2063.

- *Aspiration 1* (prosperity & sustainability): EO-enabled **water-use efficiency** and **degradation reversal** support climate-resilient economies.
- *Aspiration 3* (good governance): routine, public portals and indicators improve transparency and evidence-based decision-making.
- *Aspiration 6* (people-driven): farmer-facing tools (**SAQIYA**) and open early-warning platforms broaden access.

- *Aspiration 7* (resilient Africa): **MISLAND-Africa** and the **JIN** demonstrate African-led, interoperable systems.

**SDGs.**

Primary links:

- **SDG 6** (Clean Water) via optimised irrigation/aquifer stewardship;
- **SDG 13** (Climate Action) via drought preparedness;
- **SDG 15** (Life on Land) via land-degradation tracking & restoration. Contributions to **SDG 1** (livelihoods) and
- **SDG 12** (sustainable production). Services directly support **SDG 15.3.1** reporting.

### 4.10 Outlook (Next 24 Months)

- **Operational continuity & scale.** Maintain routine **GuetCrop** and **MISBAR** updates; expand **SAQIYA** national instances with ministries; deepen **MISLAND-Africa** customisation and mobile field-validation workflows.[6–7]
- **Policy interfaces.** Co-develop **SOPs** tying each alert/indicator to an action (e.g., irrigation scheduling advisories, drought contingencies, restoration targeting).
- **Community & innovation.** Grow the **JIN**; publish "before/after" indicators (hectares restored; on-farm water saved; avoided losses); continue open hackathons and e-learning.[8]

### References


1. OSS. *MISBAR: Monitoring Integrated Services for Best Assessment of Natural Resources* (portal documentation). Tunis: Sahara and Sahel Observatory, 2021–2025.
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3. OSS. *GMES & Africa – North Africa: Phase I & II Design, Governance and Capacity Reports (2018–2025)*. Tunis: Sahara and Sahel Observatory, 2025.
4. GMES & Africa – North Africa Hub. *News, Releases, and Training Pages*. Tunis: OSS, 2023–2025.
5. OSS and European Commission JRC. *GuetCrop: Regional Crop Monitoring and Drought Early Warning for North Africa* (portal & release notes), 2023–2025.
6. OSS. *SAQIYA: Field-Level Irrigation Advisory (Mobile/Web App) — User Guide and Release Notes,* 2024–2025.
7. OSS. *MISLAND-Africa: Harmonised Land Degradation Indicators (Portal and Technical Documentation),* 2025.
8. OSS. *Joint Implementation Network (JIN) for MISLAND-Africa: Membership and Terms of Reference,* 2023–2025.