

## **Chapter 3 – RCMRD: Land Degradation & Wetlands in Eastern & Southern Africa**

*Land Degradation and Wetlands Monitoring & Assessment — Lead Institution: Regional Centre for Mapping of Resources for Development (RCMRD)*

---

### **3.1 Background and Rationale**

The **Regional Centre for Mapping of Resources for Development (RCMRD)**, headquartered in Nairobi, Kenya, leads the *GMES & Africa* consortium titled “**Land Degradation and Wetlands Monitoring & Assessment in Eastern Africa.**” Its purpose is to transform **Earth Observation (EO)** evidence into routine, actionable inputs for national planning, restoration, and conservation across multiple countries. This involves generating regularly updated **Land Degradation Index Maps (LDIM)**, wetlands change assessments, and maintaining an open regional geodatabase accessible to ministries, agencies, and research partners.<sup>1</sup>

**Geographic coverage.** Phase II operations cover **Kenya, Uganda, Tanzania, Ethiopia, Sudan, South Sudan, Eritrea, Djibouti, Rwanda, Somalia, and Comoros**, extending outreach to **Seychelles** and **Madagascar** through regional workshops. RCMRD’s statutory mandate extends to over twenty member states across Eastern and Southern Africa, ensuring consistent cross-border methodologies and enabling spillovers beyond the GMES footprint.<sup>2</sup>

**Policy logic.** The consortium’s portfolio aligns with continental and global frameworks—particularly **Land Degradation Neutrality (LDN)**, the **wise use of wetlands**, and evidence-based climate planning. It supports commitments under the **United Nations Convention to Combat Desertification (UNCCD)** and the **Ramsar Convention on Wetlands**, while advancing the **African Space Policy and Strategy** through the institutionalisation of EO capabilities within national systems.<sup>3</sup>

### **3.2 Leadership, Partners, and Stakeholders**

**Lead institution.** RCMRD serves as the regional hub and operator of GMES & Africa services, coordinating with national line agencies, research organisations, and policy bodies.

**Active national implementers.** Kenya's **Department of Resource Surveys and Remote Sensing (DRSRS)**, Sudan's **Higher Council for Environment and Natural Resources (HCENR)**, Tanzania Forest Services Agency, Rwanda Water Board, Djibouti Environment Department, Eritrea Ministry of Water and Environment, Somalia Almaas University, Makerere University (Uganda), and the **Comoros Mapping Unit** all integrate RCMRD products into national workflows.

**Why this matters.** Such formal integration ensures that EO outputs inform **budgeted government actions**—including national reforestation, wetland restoration, and land-use enforcement—rather than remaining as stand-alone project pilots.<sup>4</sup>

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

#### 3.3.1 Catalogue of Operational Services

Service Theme	Deliverables	Typical Users	Phase Progression
<b>Land Degradation Monitoring &amp; Assessment (LDMA)</b>	LDIMs, trend bulletins, hotspot analyses	Planning, environment, restoration agencies	I → II (institutionalised)
<b>Wetlands Monitoring &amp; Assessment</b>	Extent/condition maps, vulnerability screening	Water & environment ministries,	I → II (expanded)

		Ramsar focal points	
<b>Open Regional Reference Database</b>	Harmonised basemaps (admin units, hydrology, agro-ecological zones)	All sectors needing authoritative baselines	I → II (maintained)

*Methods.*

- **EO indicators and modelling:** LDIM blends vegetation trends (NDVI), bare-soil exposure, and land-use change; wetlands products integrate radar and optical analytics with field validation.<sup>5</sup>
- **Processing platforms:** **eStation 3.0** enables near-real-time ingestion and processing, while **DUNIA**, adopted in 2024, scales up cloud processing for faster regional updates.<sup>6</sup>
- **Open access:** Products are published through the **RCMRD GMES Geoportal** and **Open Data** platforms, ensuring discoverability and reusability.<sup>7</sup>

### **3.4 Achievements and Activities**

#### **3.4.1 Phase I (2017–2021): Foundations**

- Operationalisation of core LDIM and wetlands services; creation of a regional geoportal and baseline inventories (notably for **South Sudan**, **Kenya**, and **Uganda**).
- Deployment of eStations across member states and staff training on data ingestion and product workflows.<sup>8</sup>

#### **3.4.2 Phase II (2022–2025): Scale-Up, Institutional Uptake, and Policy Engagement**

Date/Period	Output or Activity	Source/Evidence	Public Value
Sep 2022	Regional policy workshop, Kampala	RCMRD Phase II record	Policy awareness and uptake planning
Jul 2023	Policy workshop, Seychelles (with IOC)	RCMRD record	Outreach to island states
Sep 2023	LDIM–Reforestation link: DRSRS applies LDIM to Kenya's 15-billion-trees initiative	RCMRD news release	Direct EO-to-policy linkage
2023–2024	Wetlands vulnerability toolkit co-developed with Digital Earth Africa	DE Africa bulletin	Regional validation and open workflow dissemination <sup>9</sup>
Jul 2024	Policy workshop, Madagascar	Phase II record	Consolidation of cross-country methodologies
2024	DUNIA cloud-analysis adoption	DUNIA Wiki	Accelerated continental processing
Jun 19, 2025	LDIM hand-over to DRSRS (Kenya) covered by <i>The Star</i>	National media	Public recognition of EO's operational value <sup>10</sup>

Phase II thus demonstrates a **transition from project pilots to institutionalised, policy-relevant services**, supported by modern infrastructure (eStation 3.0, DUNIA) and policy dialogues across the region.

## **3.5 Decision Pathways and Effects**

### ***3.5.1 Illustrative Decision Pathways***

- **Targeting restoration (Kenya):** LDIM hand-over to DRSRS produced county-level degradation rankings used to prioritise Kenya's **15-billion-trees campaign**, linking EO directly to resource allocation.<sup>10</sup>
- **Wetlands policy screening (Sudan, Uganda):** HCENR utilised wetland vulnerability maps for **Al Dinder National Park** policy proposals, while Uganda's Ministry of Water and Environment applied EO-based wetlands maps to restoration planning.<sup>11</sup>
- **Open access for last-mile users:** The **RCMRD Geoportal** and **Open Data** sites provide seamless access, lowering entry barriers for NGOs, researchers, and county planners.<sup>7</sup>

### ***3.5.2 Indicators (Current Status and Planned Publication)***

<b>Indicator</b>	<b>Current Status</b>	<b>Planned Publication</b>
Institutional uptake	9 national institutions implementing services	Annual user registry and MoUs
Human capacity	2,269 trained; 19 trainings; 11 MSc/PhD supported; 11 internships	Training atlas (topics, gender/youth)
Operational infrastructure	eStation 3.0 active; DUNIA adopted	Release notes (uptime, update cycles)
Policy outcomes	LDIM informs tree-planting; wetlands maps used for restoration	Impact metrics (ha restored; wetlands secured)

### **3.6 Tools, Portals, and Discoverability**

- **RCMRD GMES Service Pages:** Overview and access to Land Degradation & Wetlands services.
- **RCMRD GMES Geoportal:** <https://gmesgeoportal.rcmrd.org>
- **RCMRD Open Data Site:** <https://opendata.rcmrd.org>
- **eStation 3.0 System Portal:** <https://estation.rcmrd.org>

These platforms ensure the transparent dissemination of geospatial products, metadata, and update notes.

### **3.7 Capacity Development, Inclusion, and Networks**

RCMRD trained **2,269 participants** (8 classroom, 10 online, 1 internship), supported **11 MSc/PhD research projects**, and offered **11 internships** during Phase II. Cross-learning included joint webinars with **OSS** and **ICPAC** on land degradation, and a **World Wetlands Day 2024** event co-hosted with **SASSCAL**.<sup>12</sup>

**Institutional benefit.** A DRSRS testimonial cited **KES 8 million annual savings** as LDIM replaced extensive field reconnaissance, enabling reallocation of funds while improving degradation hotspot accuracy.<sup>13</sup>

### **3.8 Case Vignettes**

- A. **“Maps to Trees” — Kenya (2023–2025).** LDIM maps handed over to DRSRS provided a nationwide degradation index that guided Kenya’s afforestation targets, ensuring that the **15-billion-trees** programme focused on priority restoration zones.<sup>10</sup>
- B. **Wetlands Under Pressure — Kenya & Uganda (2024).** In collaboration with **Digital Earth Africa**, RCMRD produced wetlands vulnerability maps revealing degradation near agricultural hubs. The results inform restoration and community engagement in floodplains and Ramsar sites.<sup>9</sup>

**C. Platform Modernisation – eStation 3.0 & DUNIA (2023–2024).** The deployment of eStation 3.0 and DUNIA significantly reduced time-to-product, enabling near-real-time EO service delivery at continental scale.<sup>6</sup>

### **3.9 Alignment with Agenda 2063 and the SDGs**

#### ***Agenda 2063 Contributions***

- *Aspiration 1* – Climate-resilient prosperity: EO-driven monitoring informs restoration and conservation.
- *Aspiration 3* – Evidence-based governance through open geo-services.
- *Aspiration 6* – People-driven development via scholarships, training, and public data access.
- *Aspiration 7* – A resilient Africa through interoperable systems and collaboration.

#### ***SDG Linkages***

- **SDG 15 – Life on Land:** Restoration and ecosystem conservation through LDIM & wetlands indicators.
- **SDG 13 – Climate Action:** Reforestation targeting informed by EO-based degradation data.
- **Cross-cutting:** **SDG 6** (water ecosystems) and **SDG 2** (food security via land productivity).

### **3.10 Sustainability and Outlook (2025–2027)**

- **Operational continuity:** Maintain regular LDIM and wetlands updates through eStation 3.0 and DUNIA, with published uptime logs and release notes.
- **Evidence of impact:** Publish before/after indicators on hectares restored, wetlands secured, and institutional uptake of datasets.

- **Policy interfaces:** Continue regional policy workshops and co-develop **Standard Operating Procedures (SOPs)** linking alerts/layers to concrete actions (e.g., restoration grants, enforcement patrols).
- **Open-data practice:** Expand access and simplify metadata for non-specialist users.<sup>7</sup>

## References

1. GMES & Africa. *RCMRD Land Degradation and Wetlands Consortium Overview*. Nairobi: African Union Commission, 2025.
2. RCMRD. *Phase II Implementation Report (2022–2025)*. Nairobi: Regional Centre for Mapping of Resources for Development, 2025.
3. United Nations Convention to Combat Desertification (UNCCD). *Land Degradation Neutrality Technical Guide*. Bonn: UNCCD Secretariat, 2022.
4. RCMRD. *Institutional Collaboration Framework: GMES Phase II National Partnerships*. Nairobi: RCMRD, 2024.
5. RCMRD. *Methodological Framework for Land Degradation Index Mapping (LDIM)*. Nairobi: RCMRD, 2023.
6. European Space Agency (ESA). *DUNIA Cloud Processing Environment: User Wiki*. Paris: ESA, 2024.
7. RCMRD. *RCMRD GMES Geoportal and Open Data Access Documentation*. Nairobi: RCMRD, 2025.
8. RCMRD. *GMES Phase I Final Report (2017–2021)*. Nairobi: RCMRD, 2021.
9. Digital Earth Africa. *Wetlands Vulnerability Mapping in East Africa: Partnership Note with RCMRD*. Cape Town: Digital Earth Africa, 2024.
10. *The Star (Kenya)*. “Government to Use Satellite Data to Guide Tree Planting Drive.” *The Star*, June 19, 2025.

11. HCENR (Sudan) and NEMA (Uganda). *Wetland Vulnerability Screening for Al Dinder and Lake Kyoga Systems*. Khartoum/Kampala: Joint Policy Note, 2024.
12. OSS–ICPAC–RCMRD. *Joint Webinar Proceedings: Land Degradation and Wetlands Management in Africa*. Tunis/Nairobi, 2024.
13. DRSRS. *Institutional Testimonial on EO Cost Savings and Efficiency Gains*. Nairobi: Department of Resource Surveys and Remote Sensing, 2024.