2-3 OCTOBER 2023, TUNIS

“Status of Science, Innovation, and Technology from the African Region in Disaster Risk Reduction (DRR) ”

The Current State, challenges and Opportunities for Science and Technology in DRR

02 – 03 October 2023
Tunis - Tunisia

Background

This presentation aims to :

Discuss progress made, innovations driving change, and the road ahead in integrating science, innovation, and technology in DRR across Africa.

A Global assessment (UNDRR 2019) for the period 1997 and 2017 showed:
88 million people worldwide affected by multi-hazard disasters,
Floods accounting for 76 million.

Mortality associated with natural hazards has generally declined, in the last three decades, 92% of such deaths occurred in low and middle-income countries, mainly in the Asia-Pacific region and **Africa.**

Background

According to the UNDRR, 2020:

- There are on average 700 disasters each year in Africa
- This affects approximately 50 million people
- The economic losses > $10 billion.

- N/B: The last 20 years has seen a dramatic increase of 251% in direct economic losses from climate-related disasters.

- Africa: Emerging significant hotspots of disasters.
- Mainstreaming Disaster risk reduction (DRR) in development strategies is thus imperative

- Although this is very challenging, it poses opportunities for development which necessitates the application of **science and technology (S &T) in DRR as S & T** have become an essential requirement for informed decision making.

IMPORTANCE OF SCIENCE, INNOVATION, AND TECHNOLOGY IN DRR

EARLY WARNING SYSTEMS

Mitigate the risk produced by disasters.

RISK ASSESSMENT AND MAPPING

Assess each risk and its causes and consequences individually

RESILIENCE BUILDING

Minimise the potential impact of hazards and avert disasters.

DATA COLLECTION AND ANALYSIS

- Knowledge generation for effective predictions and management
- Role of scientists, private sector emphasized

Current Status of Science, Innovation, and Technology Initiatives

Science has supported establishment and implementation of major international initiatives in DRR:

- Hyogo Framework for Action 2005–2015.
- The Sendai Framework for DRR 2015–2030 - recognizes the importance of S & T in all of its priority action areas.

The integration of scientific research with DRR efforts has significantly enhanced resilience and saved countless lives.

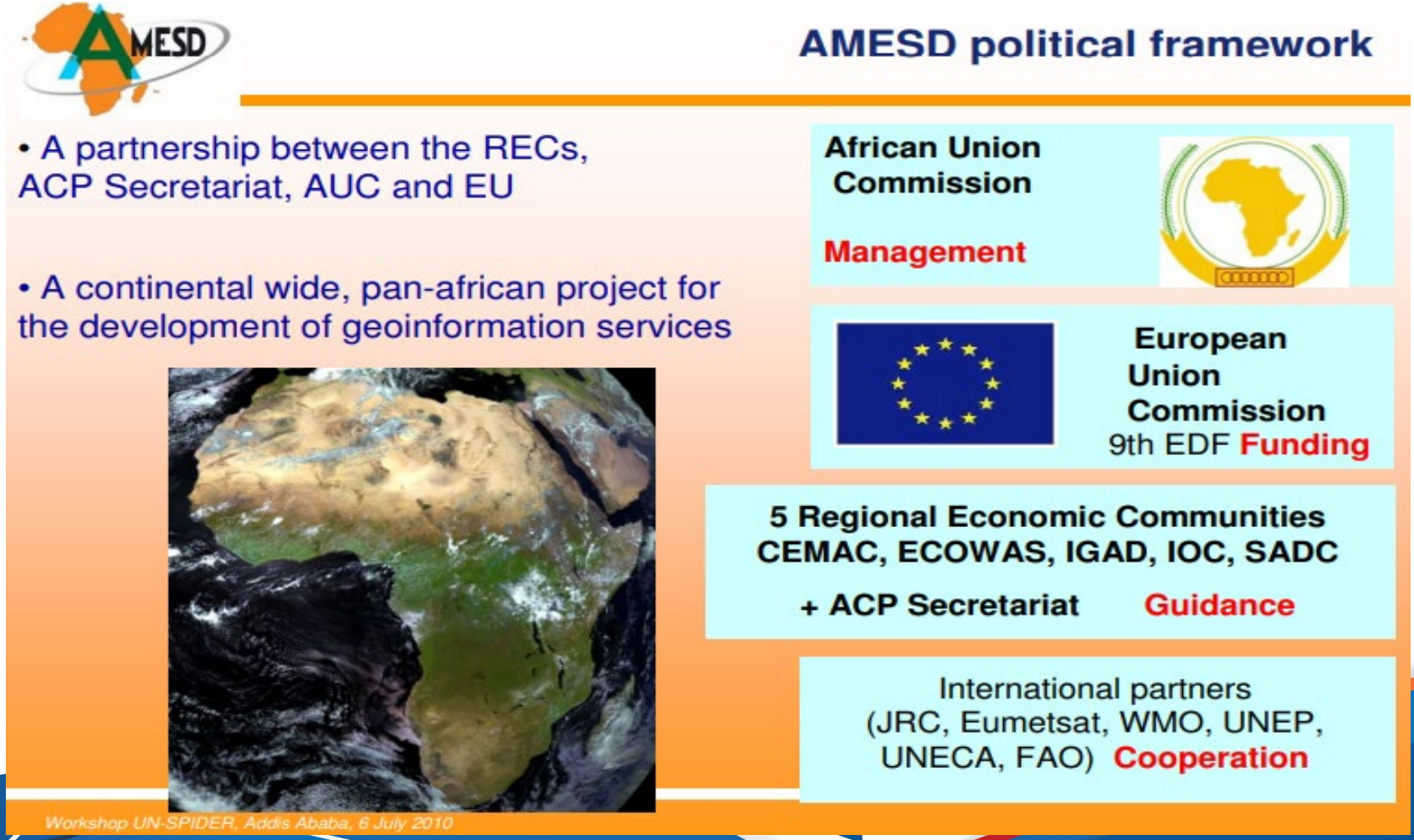
Innovation and technology on the other hand have catalysed transformative changes in DRR practices (Fritz *et al*., 2019).

Current Status of Science, Innovation, and Technology Initiatives

- A glimpse on the state of S & T in DRR in Africa:

- Africa has seen commendable progress in integrating science, innovation, and technology into DRR efforts. Some key initiatives include:

African Monitoring of the Environment for Sustainable Development (AMESD):



Current Status of Science, Innovation, and Technology Initiatives

- Development of the: Science, technology Innovation strategy for Africa 2014-2024 (STISA)

STISA Pillars:

- Building research Infrastructure,

- Enhancing technical & professional competencies (The AU-STRC built the Capacity of 800 African Scientists between 2018 & 2019);

- Innovation and entrepreneurship,

- Enabling environment (international, regional and country level collaborations)

- Africa's institutional and operational strategic framework to implement a Multi-Hazard Early Warning and Early Action System (MHEWAS):

It aims to reduce disaster losses by ensuring that early warning systems at continental, regional and Member State levels are fully coordinated to ensure effective early action.

Current Status of Science, Innovation, and Technology Initiatives

- Creation of the Africa science and technology advisory board on DRR (AfSTAG) and the Africa youth Advisory board on DRR (AYAB).

- AfSTAG: 10 Publications on NATURAL HAZARDS GOVERNANCE IN AFRICA (Oxford Research Encyclopedias).

(AfSTAG is set to Public 44 more to cover the 54 African states).

Oxford Research Encyclopedias

NATURAL HAZARD SCIENCE

https://oxfordre.com/naturalhazardscience/

- AYAB: Development of a mobile phone app on DRR called KNOW-DRR Smart Phone Edutainment App (Available on Play store & Apple store)

Science-based approaches and tools in DRR

- **Early warning systems (EWS):**

UNDRR (2022): Countries with substantial to comprehensive EWS coverage have one-eighth the disaster mortality of those with limited or no coverage but Sadly..

However, only 21 countries in Africa have reported having multi-hazard early warning systems. (40 % of African people covered by these systems.

- According to the Global Commission on Adaptation: US$800 million on EWS in developing countries would avoid losses of $3 to 16 billion per year.

The action plan was unveiled on the opening day of the Africa Climate Summit in Nairobi, Kenya, on 4 September.

Science-based approaches and tools in DRR

Example: Regional Flood Early Warning System for West Africa (WAFRIS): For improved flood forecasting and early warning.

At country level:

- **FLOODS**: Uganda and Kenya (Atyang, 2014): Installation of solar-powered Flood Early Warning Systems to alert residents about rising water levels.

- **CONFLICTS**: EWS to detect and mitigate violence and conflicts (Atyang, 2014).

- **DESERT LOCUST EWS:** East African Community Early Warning and Response Mechanism (EWRM).

- **VEGETATION CONDITION INDEX (VCI3M)** (Kenya): as a key component of its early Warning and Response (CEWARN) mechanism (Barrett et al, 2020)

- **WILDFIRE EWS**: South Africa: (Heyns *et al.*, 2021).

Science-based approaches and tools in DRR

Seismology and earthquake monitoring in Africa

Research in this area is inadequate due to limited expertise in the area, availability of data and infrastructure.

Recent Earthquakes: Benouar et al,1998; (Mourabit et al, 2014).

- South Sudan of magnitude (Mw) 7.2 (1990),
- Egypt, Cairo of magnitude (M) 5.8 (1992),
- Algeria of magnitude (Mw) 6.8, (2003),
- Al Hocima of magnitude (Mw) 6.4 (2004),
- Mozambique magnitude (Mw) 7 (2006), and
- Malawi of magnitude (Mw) 6.2 (2009) among others are damaging earthquakes that happened in Africa

Most recent in Africa : Morocco of magnitude 6.8

- (02) two aftershocks of 4.9 and 4.5 Magnitude respectively,
- which claimed 2,862 lives and injured 2,562. (Continental Watch, 2023).

Science-based approaches and tools in DRR

- **Drones/UAV**

UAVs are especially valuable in disaster areas for locating survivors, tracking rescue teams, and conducting disaster assessments.

Participants learn how to fly drones at a workshop in the Seychelles.
Photo: Drones for Development / World Bank

Malawi and Rwanda. These countries have opened up their airspace to researchers, UAV companies, and manufacturers (Mugala,2020).

During Cyclone Eloise in January 2021, drones were instrumental in searching for survivors in affected areas of Mozambique, Malawi, Eswatini, Zimbabwe, and South Africa (Hayat2016).

Science-based approaches and tools in DRR

- **Geoinformation systems and remote sensing**

- Eleven African countries have launched 36 satellites.

- This number is estimated today to about 41 satellites, thus, joining the league of “sensing” countries rather than countries on a “sensed” continent (Woldai,2020).

- This has led to about 130 companies in 25 countries, in GIS and remote sensing making a profit in millions of $US.

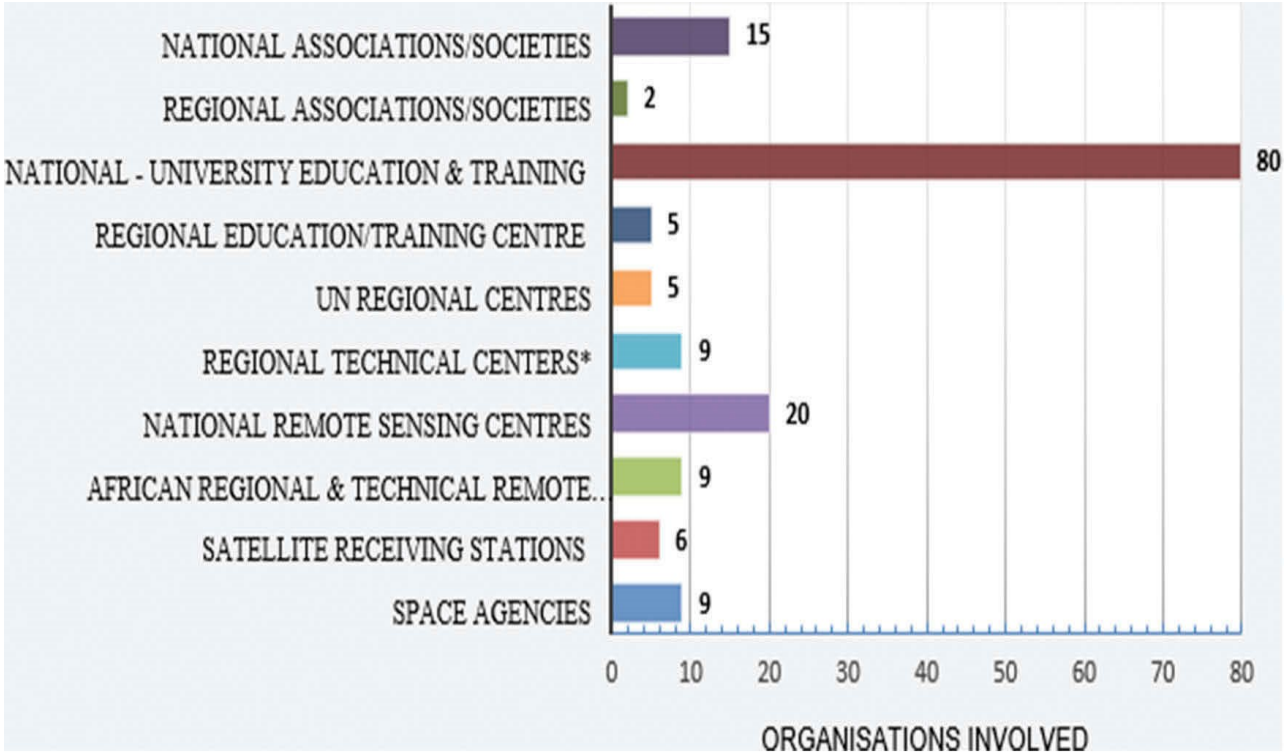


Figure 1: Number of national and regional organizations, including space agencies and facilities currently involved in remote sensing and Geo-Information Sciences in Africa. (retrieved from Woldai, 2017)

Science-based approaches and tools in DRR

- **Mobile Applications and Phones**

- Sendai Framework on Disaster Risk Reduction (United Nations, 2015) recognises the importance mobile phones in DRR.

- This is so because about 95% of the global population is now covered by mobile signals (GSMA, 2020a).

- Yet the potential of mobiles in the DRR realm has only recently been recognized and documented; a process that has been accelerated by the proliferation of context-specific DRR mobile applications (apps).

Challenges in Utilizing Science, Innovation, and Technology in DRR

Financing and Infrastructure: Limited funding and inadequate infrastructure pose barriers to the implementation of technology-driven initiatives.

Capacity Building: Adequate training and capacity building in the scientific and technological domains are essential for sustainable development and innovation.

Digital divide: Unequal access to technology and internet connectivity hampers the effective dissemination of information and services to remote and underserved areas.

Policy and Governance: The absence of robust policies and coordination mechanisms may hinder the integration of innovation and technology into national and regional DRR strategies.

Lack of data: Limited data available and for available data there is the issue of data quality.

Opportunities and way forward

There is a lot of opportunities in many areas ranging from early warning systems, infrastructure development, research, monitoring, etc.

- **Empowering Local Innovators**: Supporting and investing in local innovators can lead to context-specific solutions tailored to African needs, e.g. In development of tools and methods for DRR.

- **South-South Cooperation**: Strengthening collaboration among African nations fosters knowledge exchange and the sharing of best practices.

- **Public-Private Partnerships**: Engaging with private sector entities can attract investment and technological expertise in DRR projects.
- **Education and Awareness:** Promoting education in science and technology, along with raising awareness about their potential, can foster a culture of innovation and adaptation.

- **Bridging the Gap between policy and science & Technology**: Policy should be informed by scientific and technological innovations with scientist working with policy implementers.

Conclusion

The African region has shown commendable progress in integrating science, innovation, and technology into Disaster Risk Reduction efforts.

However, challenges require concerted efforts and innovative solutions. By empowering local innovators,

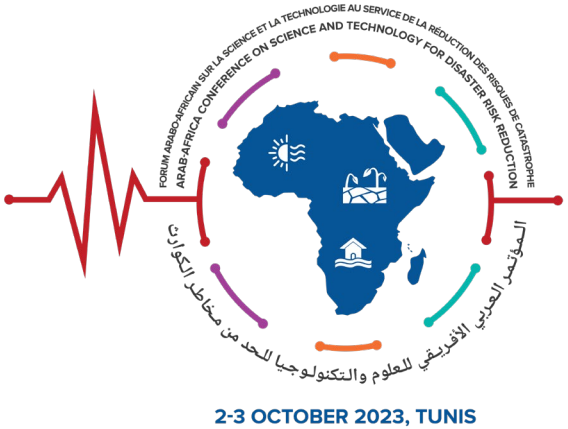
Fostering collaboration, and investing in education and infrastructure, Africa can further advance its resilience-building endeavours and achieve sustainable development.

African Union

AFRICAN UNION AfSTAG ON DRR

AR-STAG
Scientific and Technical Advisory Group (STAG)
SENDAI FRAMEWORK
FOR DISASTER RISK REDUCTION 2015-2030

UNDRR
UN Office for Disaster Risk Reduction



2-3 OCTOBER 2023, TUNIS

THANK YOU