ITU/WMO/UNEP Workshop on AI for Natural Disaster Management

Keynote

Shamila Nair-Bedouelle
Assistant Director General for Natural Sciences, UNESCO

Science is the engine of prosperity. The cars and trains that got us here today, our smart phones, the energy that lights this chamber, the clothes we wear, the food we eat: All of these were developed and improved through research and science.

Science can fuel/fire our imagination!
Science is humankind's greatest enterprise

We need Science, more and better science, not for its technology, not for leisure, not even for health or longevity, but for the hope of wisdom which our kind of culture must acquire for its survival – Lewis Thomas

unesco

Open Science for the People, Planet & Prosperity

Open Science has the potential of making the scientific process more transparent, inclusive and democratic.

Open Science is increasingly recognized as a critical **SDGs accelerator.**

Open Science can be a true game changer in **bridging the science, technology and innovation gaps** between and within countries and fulfilling the **human right to science.**

A global understanding is needed

However, in the **fragmented scientific and policy environment**, a **global understanding** of the meaning, opportunities and challenges of Open Science is still missing.

UNESCO 40th Session of the General Conference

At the UNESCO 40th General Conference, 193 Members States tasked UNESCO with the **development of an international standard-setting instrument on Open Science in the form of a UNESCO Recommendation on Open Science** (40 C/Resolution 24).

Why is Disaster Risk Reduction (DRR) important ?

DRR FACTS

From 2000 to 2019, natural hazards caused:

$2.97 trillion in damage

affected **over 4 billion** people worldwide

claimed **1.23 million** lives

Almost **91% of the recorded disasters were climate-related**

Total number of people affected by disaster type (2000-2019)

41%
1.65 billion
Flood

35%
1.43 billion
Drought

18%
727 million
Storm

3%
118 million
Earthquake

3%
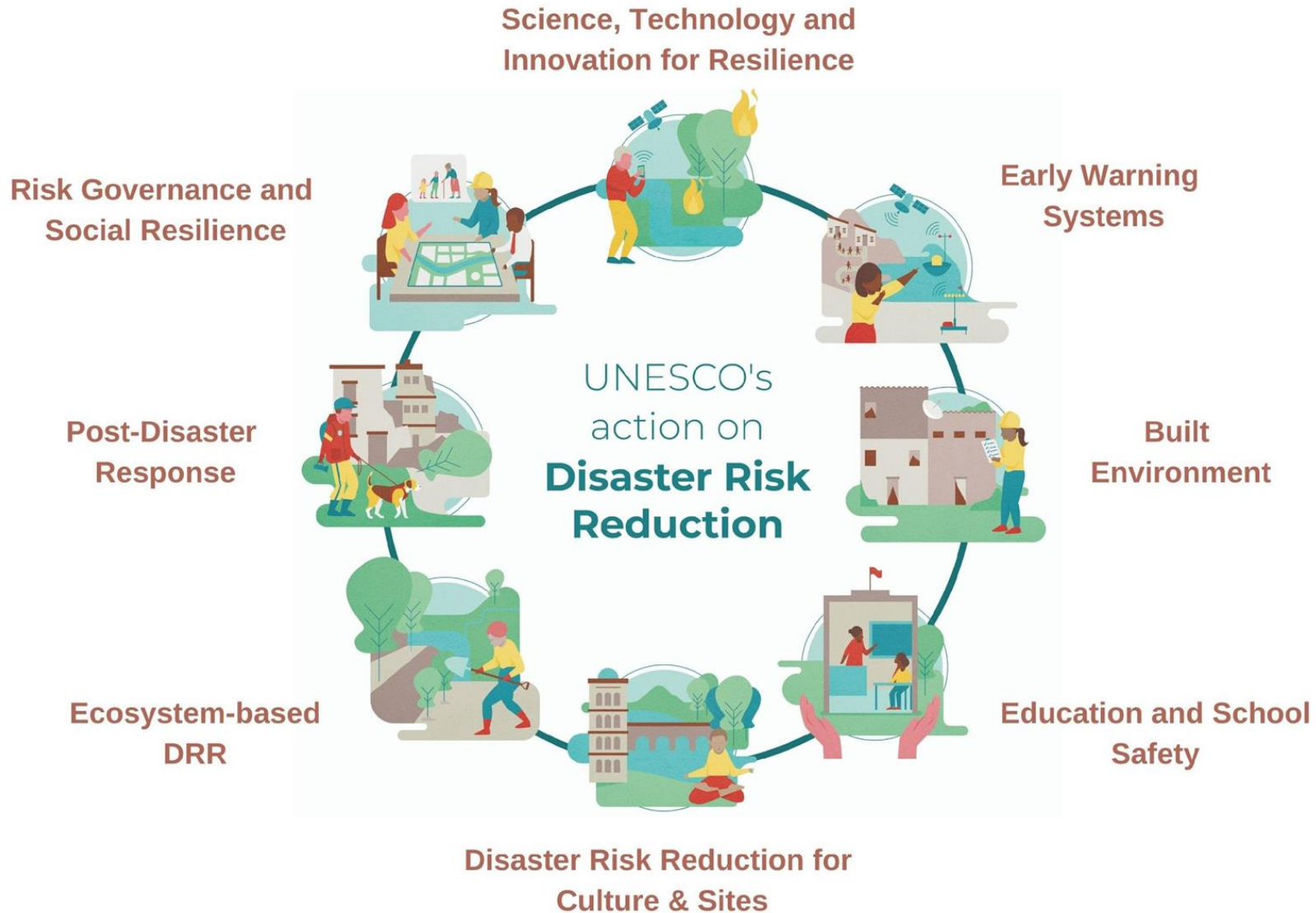109 million
Extreme temperature
Volcanic activity
Landslide
Wildfire

7,348 reported disasters in 20 years

Science, Technology and Innovation (STI) for Resilience

STI play an important role in **enhancing linkages between DRR and diverse socio-economic and environmental processes while securing citizen's role in the DRR inquiry**, allowing local and inclusive actions to build resilience.

STI is **crucial for the implementation Sendai Framework for Disaster Risk Reduction 2015-2030**, especially for Priority Action 1: 'Understanding disaster risk'.

UNESCO fosters hazard knowledge exchange to improve and develop STIs for disaster and risk resilience. UNESCO's work involves use of **citizen science, participatory research, local and indigenous knowledge** and development, use of **low-cost sensors** and application of **AI** and advanced **ICTs**.

UNESCO's STI partners

UNESCO through international scientific collaboration including the private sector, and its different academic networks and programmes, promotes and fosters knowledge exchange in all kinds of hazards to conduct activities and research that improve and develop science, technology and innovation for resilience.

UNESCO statutory scientific network

IHP

IOC

IGCP

MAB

UNESCO Centres and Chairs on AI/ICT

International Knowledge Centre for Engineering Sciences and Technology

International Centre for Water Hazard and Risk Management under the auspices of UNESCO

International Research Centre on Artificial Intelligence

Regional Science and Technology Advisory Group for DRR (UNESCO is member for LAC, Arab, APA and Africa)
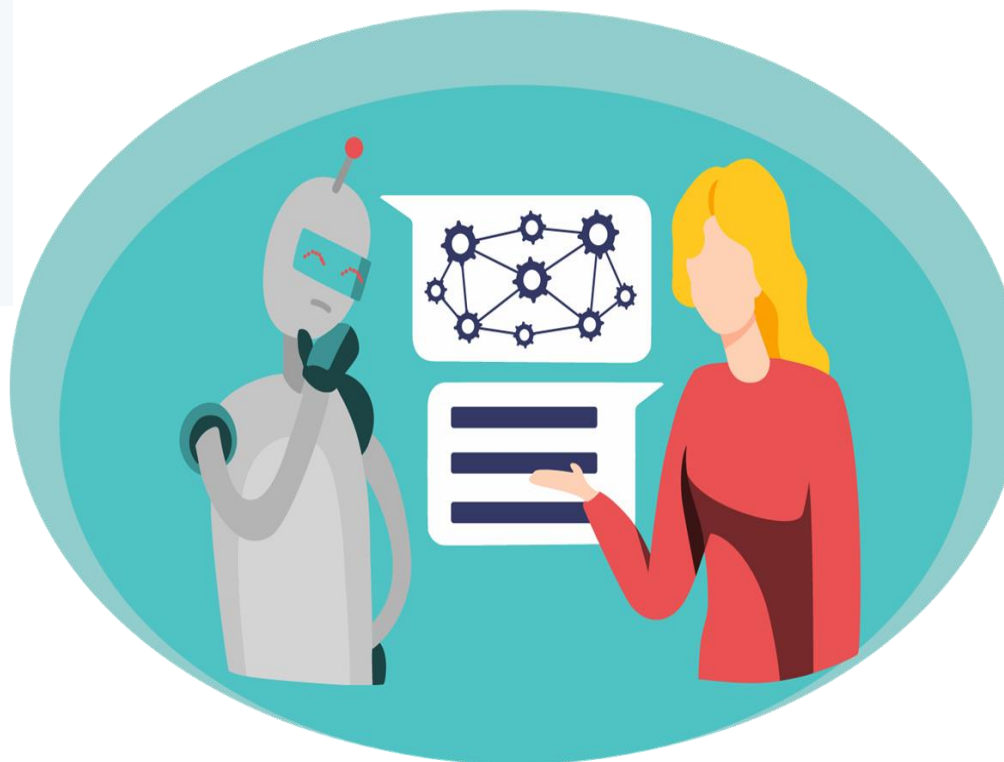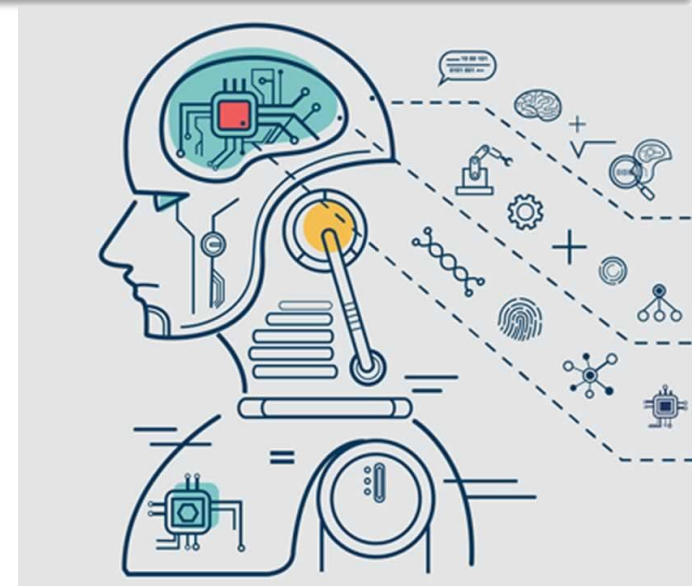
UNESCO Task Teams on AI

Practical application of Artificial Intelligence (AI)

Image processing

Language analysis

Machine learning

UNESCO's AI-related projects

EUROPE

Improving Resilience to Emergencies through Advanced Cyber Technologies (I-REACT project)

- Three-year European Project that targeted public administration authorities, private companies, as well as citizens in order to provide increased resilience to natural disasters.

- Developed the first European-wide platform to integrate emergency management data coming from multiple sources, including that provided by citizens through social media and crowdsourcing.

- Used a kit of new technological tools for processing large quantities of data in near time, to automatically delineate flood extent from the satellite imagery, and detect inaccurate and inappropriate images from in-field reports.
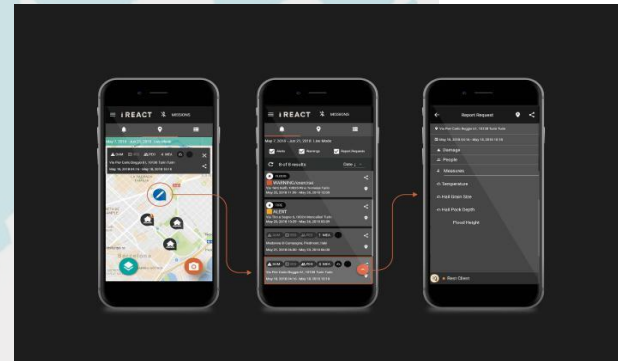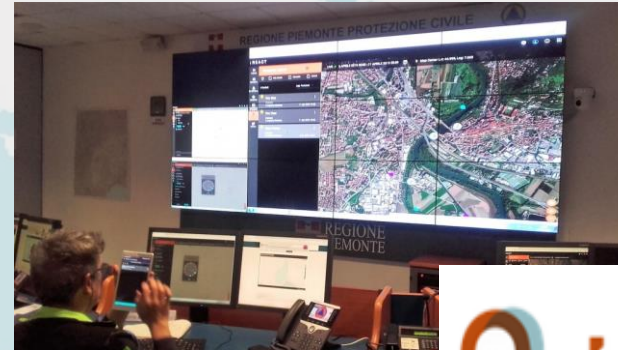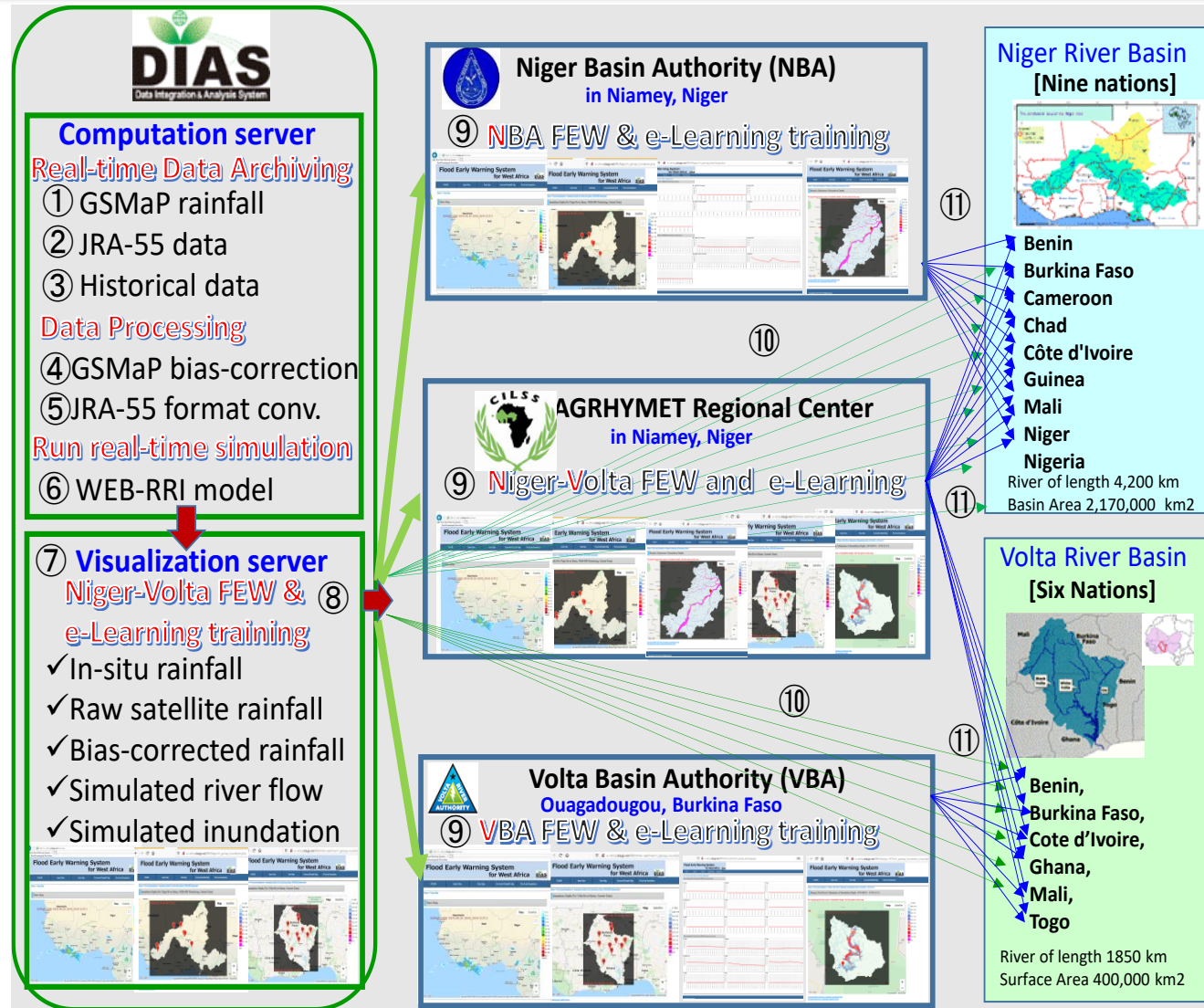
UNESCO's AI-related projects

WESTERN AFRICA

Water disaster Platform to enhance climate resilience in Africa (WADiRe-Africa project)

- Adoption of AI-related Data Integration and Analysis Systems (DIAS) to collect, analyze, and visualize flood-related images and thus find concrete solutions to the local issues in real time.

- Target countries: Benin, Burkina, Cameroon, Chad, Cote d'Ivoire, Ghana, Guinea, Mali, Niger, Nigeria and Togo.

Partners

DIAS
Data Integration & Analysis System

Computation server
Real-time Data Archiving
① GSMaP rainfall
② JRA-55 data
③ Historical data
Data Processing
④ GSMaP bias-correction
⑤ JRA-55 format conv.
Run real-time simulation
⑥ WEB-RRI model

⑦ **Visualization server**
Niger-Volta FEW &
e-Learning training ⑧
✓ In-situ rainfall
✓ Raw satellite rainfall
✓ Bias-corrected rainfall
✓ Simulated river flow
✓ Simulated inundation

Niger Basin Authority (NBA)
in Niamey, Niger
⑨ NBA FEW & e-Learning training

AGRHYMET Regional Center
in Niamey, Niger
⑨ Niger-Volta FEW and e-Learning

Volta Basin Authority (VBA)
Ouagadougou, Burkina Faso
⑨ VBA FEW & e-Learning training

Niger River Basin
[Nine nations]

⑪ ⑩ ⑪

Benin
Burkina Faso
Cameroon
Chad
Côte d'Ivoire
Guinea
Mali
Niger
Nigeria
River of length 4,200 km
Basin Area 2,170,000 km2

Volta River Basin
[Six Nations]

⑩ ⑪

Benin,
Burkina Faso,
Cote d'Ivoire,
Ghana,
Mali,
Togo

River of length 1850 km
Surface Area 400,000 km2

UNESCO's AI-related projects

Western Africa Gambia Early Warning System of floods

- Use of drones for EWS for flood management in The Gambia, targeting Lower and Upper River Regions and the Greater Banjul Area.

- Drones with software for accurate mapping and analysis of the most affected terrains.

- To cover existing gaps in the national data structure for real-time flood management, new automatic weather stations, hydrometric equipment and training activities were purchased and developed.

UNESCO's AI-related projects

EASTERN AFRICA

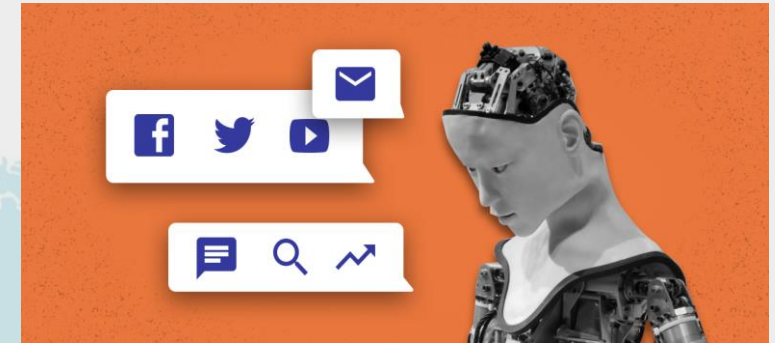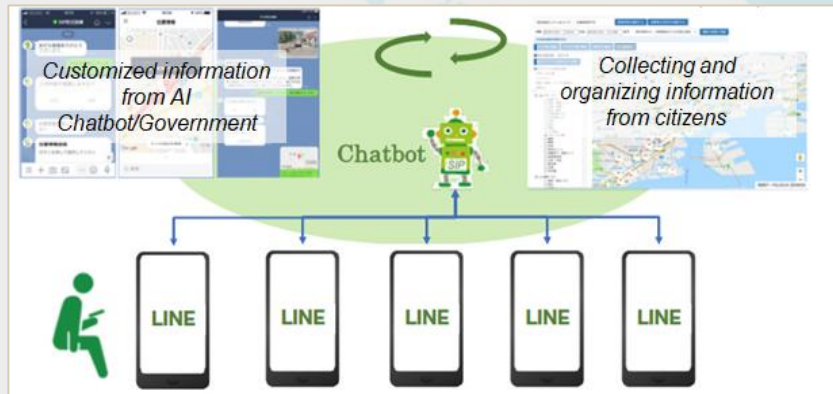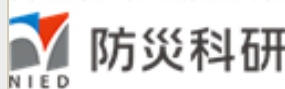**Strengthening Disaster Prevention Approaches in Eastern Africa (STEDPEA project)**

AI Chatbot

- *Optimize the communication* between government and citizen
- *Share the information* of supplies and evacuation immediately
- *Grasp the situation* of damage/recovery accurately for both side
- *Familiar communication tool* helps to get information easily

Language processing on social media

Partners

Customized information from AI Chatbot/Government

Chatbot

Collecting and organizing information from citizens

Target countries

Kenya

Rwanda

South Sudan

Tanzania

Uganda

AI ethics and Open Science recommendation

UNESCO has embarked on a two-year process to elaborate **the first global standard-setting instrument on the ethics of artificial intelligence in the form of a Recommendation**, following the decision of UNESCO's General Conference at its 40th session in November 2019.

Likewise, Members States tasked UNESCO with the development of an **international standard-setting instrument on Open Science in the form of a UNESCO Recommendation on Open Science**. The Recommendation is expected to define the principles for the dissemination of scientific information through scientific journalism and media, popularization of science, open lectures and various social media communications, building public trust in science while increasing the engagement of societal actors beyond the scientific community.

DRR policies in East Africa and AI considerations

SIGNIFICANCE

- DRR strategies are the cornerstone of building resilience to disasters.

- 41 policies/strategies reviewed and analyzed through AI and citizen lens across the DRR, CCA and planning sectors.

- Scope of study: Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Somalia, South Sudan, and Uganda.

CONCLUSION AND RECOMMENDATION

- There are no references of use of technology and citizen science in the DRR instruments examined.

- There is potential use of technology and citizen science in many domains including: risk mapping; risk information; communication; early warning systems and response to support risk reduction and sustainable development in Africa.