

Understanding Risk

West and Central Africa | Afrique de l'Ouest et Centrale

Human Capital and Innovation for a Resilient Society

Capital Humain et Innovation, Moteurs de la Résilience

Proceedings from the 2019 UR West and Central Africa Conference

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Conference participants during drone photo session.





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In collaboration with



A message to the UR Community,
conference partners, and participants from

Simeon Ehui

Regional Director, Sustainable Development, Africa



I would like to express my sincere appreciation for your fantastic support and engagement during the first-ever Understanding Risk event in West and Central Africa. Over 30 technical sessions and interactive workshops, along with plenty of networking, regional knowledge and expertise have now established a vibrant African chapter of the UR Community. As part of that community, your participation, passion, and partnership can help increase resilience and reduce disaster risk for generations to come.

And it could not be more timely. In West and Central Africa, over 1 million people are impacted by floods each year. In 2017 alone, losses from flooding, coastal erosion and pollution in Benin, Côte d'Ivoire, Senegal, and Togo totaled \$3.8 billion, or 5.3 percent of their combined GDP. Tragically, these coastal degradations also accounted for 13,000 deaths in that same year.

Partnerships throughout the region, like those fostered within the UR community, show that this does not have to be the way of the future. The World Bank is continuing and increasing its support to governments in West and Central Africa on the crucial topics of understanding disaster risk and

disaster reduction and mitigation, as well as preparedness, disaster risk financing, and post-disaster recovery. To tackle urban flooding issues, worsened by rampant urbanization in the recent years, the recently initiated *Greater Accra Resilient and Integrated Development* (\$200 million) project, the Benin Stormwater Management and Urban Resilience Project (\$100 million) and new support coming to the cities of the region have been more steps in the right direction. Through the *West Africa Coastal Areas Management Program* (WACA), six coastal countries are leveraging \$222 million in World Bank financing to support their efforts to protect coastal resources and mitigate the risks that coastal communities face today.

Since 2015, through the Africa Disaster Risk Financing Initiative, in partnership with the EU, the ACP countries and managed by the Global Facility for Disaster Reduction and Recovery (GFDRR), the World Bank has been supporting governments' efforts to establish working structures to enhance financial disaster preparedness.

Lastly, to fuel innovation and leverage new technologies for disaster risk management in Africa, we are engaging

with its growing young population. The third State of the Map Africa, held in cooperation with UR West and Central Africa, showed the potential of a young entrepreneurial and innovative generation of Africans who are using their digital skills to collaboratively find solutions for resilience. They deserve our attention and support to maximize their impact.

All of these programs started thanks to collaboration and shared purpose, much like that which took place at UR West and Central Africa. To capture that essence, the World Bank compiled these proceedings of the conference with support from GFDRR. I hope you find them compelling and inspirational, and I encourage you to continue bringing your ideas and experience to the vibrant UR community.

Thank you again for your support and participation, and I look forward to engaging with you at future Understanding Risk conferences.

Sincerely,

Simeon Ehui

Regional Director, Sustainable
Development, Africa



A message to the UR Community, conference partners, and participants from

Anne Désirée Ouloto

Minister of Sanitation and Hygiene, Côte d'Ivoire

Côte d'Ivoire was greatly honored to host the regional conference, "Understanding Risk West and Central Africa," on November 20-22, 2019, on the theme of "Human Capital and Innovation for a Resilient Society."

The technical workshops, experience sharing, presentations on the crucial challenge of understanding the risks of natural disasters, and various exhibitions revitalized the need for states, local authorities, businesses, civil society, grassroots groups, and citizens to take action at all levels of prevention. It is from that perspective that Côte d'Ivoire, under the leadership of His Excellency Mr. Alassane Ouattara, President of the Republic, has undertaken major projects in Abidjan, as well as in several other cities in the country, for the realization of major sanitation works. These works, need we remind you, aim to strengthen resilience and to minimize flood risks and the diverse effects of climate change.

Numerous experiences in several countries, which the participants were kind enough to share with us, serve as a signal for awakening and action, all confirming that the time has come to stop talking.

These proceedings give an outline of the meetings that took place during this rich event in Abidjan, highlighting the key takeaways and opportunities that made this first UR conference in the region special and unforgettable.

We take this opportunity to reiterate our thanks to the bilateral and multinational partners, such as the World Bank and the European Union, who strongly supported the realization of the Abidjan conference. We extend these thanks to all the experts who contributed to or were involved in the production of this document.

See you at UR Singapore 2020!

Anne Désirée Ouloto

Minister of Sanitation and Hygiene,
Côte d'Ivoire

A message to the UR Community, conference partners, and participants from

Jobst von Kirchmann

European Union Ambassador to Côte d'Ivoire



On behalf of the European Union, I would like to congratulate you on the success of the Understanding Risk West and Central Africa Conference, held in Abidjan from November 20-22, 2019.

As factors such as climate change, population growth and urbanization are amplifying the impact of extreme weather events, the organization of such a continental knowledge-sharing event is timely.

To cite just one example: over the last 30 years, more than three-quarters of the population of West Africa has lived in an area affected at least once every other year by natural disasters, 70% of which are caused by extreme weather and climate events.

In the face of these alarming data, and to help prevent these phenomena, the European Union is committed to helping developing countries prepare for, withstand and recover from disaster events. This commitment is reflected

in several actions, including the launch of the Africa Caribbean and Pacific-European Union Natural Disaster Risk Reduction Program (ACP-EU NDRR) in 2011. It provides technical assistance, capacity building and advisory and analytical services to beneficiary countries and to date has funded more than 134 projects in ACP countries, more than half of which are in Sub-Saharan Africa.

It is also reflected in the Africa Disaster Risk Financing (ADRF) Initiative, established in 2015. ADRF helps African countries develop national risk financing tools and strategies that have the potential to significantly reduce disaster losses, accelerate recovery and build resilience to natural hazards. 21 African countries, including 6 in West Africa (Benin, Cabo Verde, Mauretania, Niger, Senegal, and Sierra Leone) have been supported by this program.

These programs also helped to finance the conference that brought us together, and I am delighted that

results such as the Climate Risk and Early Warning Systems (CREWS) initiative and the Open Cities initiative, which aim to make cities more resilient, had the opportunity to be presented there.

I would like to warmly thank our partner, the World Bank, which, through the Global Facility for Disaster Reduction and Recovery (GFDRR), manages the resources and coordinates all the activities of these programs.

I also extend my sincere thanks to the Government of Côte d'Ivoire which, through the Ministry of Sanitation and Hygiene, made it possible to hold this conference in Abidjan.

Jobst von Kirchmann
European Union Ambassador
to Côte d'Ivoire

Acknowledgments

The members of the Understanding Risk community are, without doubt, some of the greatest, most passionate, and most enthusiastic professionals in the disaster risk management field. It is thanks to them that the Understanding Risk West and Central Africa conference has been an overwhelming success. To everyone who participated or contributed from afar, we offer our thanks for your valuable contributions to the disaster risk management conversation and your continuous efforts to build resilience in Africa.

First, we would like to acknowledge and extend our sincere gratitude to our event partners. A special thanks goes to the Ministry of Hygiene and Sanitation of Côte d'Ivoire, the District Autonome d'Abidjan, the European Union (EU), the EU-funded Africa Disaster Risk Financing Initiative (ADRF), and the Africa, Caribbean, Pacific-European Union (ACP-EU) Natural Disaster Risk Reduction Programme for their co-financing and support, as well as the Global Facility for Disaster Reduction and Recovery (GFDRR) for their partnership.

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We are particularly grateful to our opening, closing, and keynote speakers: Ministre de la Ville of Côte d'Ivoire, François Amichia; Head of the EU Delegation in Côte d'Ivoire, Jobst Von Kirchman; Governor of the Autonomous District of Abidjan, Robert Beugré Mambé; Founder of Hackers Against Natural Disasters, Gaël Musquet; Coralie Gevers, World Bank Country Director in

Côte d'Ivoire; and Simeon Ehui.

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The UR West and Central Africa Core Team:

Vivien Deparday, Zainab Mambo-Cissé, Alan Dinca, Yves Barthélemy, Lorenzo Carrera, Mahine Diop, Isabelle Forge, Brice Bonjour, Anne Mussotter, Lucio Apolito, and Tamilwai Kolowa

▶
“Citizens today are able to easily map their surroundings, because [...] technologies have put them in this position for the first time [...]. Radio technology has evolved, and thus, following a natural disaster, we have been able to develop new technologies that save lives.”

—Gaël Musquet, Hackers Against Natural Disasters/ Caribe Wave, France



UR in numbers



3 days in
Abidjan

2 days in
Grand Bassam

26
Technical
sessions

8
Interactive
workshops

582
Attendees

46
Researchers

19
African NGOs

33
African
countries

8000+
Global community
members

30%
Women





URBAN RESILIENCE

Rapid urbanization in Africa is not expected to stop anytime soon. Africa's urban population stands at more than 470 million people today and is projected to grow to 1.2 billion by 2050. About 70 percent of Africa's urban areas and cities have yet to be built.¹

This burgeoning urban expansion poses many potential threats to urban resilience: land pressure is driving people to settle in unsafe areas, soil impermeabilization is

increasing water run-off, and more and more solid waste is produced, clogging drainage systems. At the same time, ever more people and businesses and their assets are concentrated in cities, becoming dependent on infrastructure networks, communications systems, supply chains, and utility connections for their well-being.

In the region, urban resilience is closely linked to urban poverty, as cities host a growing share of poor and vulnerable populations.

An estimated 60 percent of urban residents in Sub-Saharan Africa live in slums, which generally have weaker infrastructure and fewer services, while being exposed to various hazards.² Without any effort to boost cities' strength to adapt, address chronic stresses, and come back after shocks, climate change is projected to force up to 77 million urban residents globally into poverty by 2030, and most of this climate change-related increase in urban poverty will be concentrated

¹ World Urbanisation Prospects, 2018

² UN-Habitat, "World Cities Report 2016: Urbanization and Development—Emerging Futures," United Nations Settlements Programme, Nairobi, 2016.



Operation City Clean Abidjan: More than 250 young people, men, children, and women participated. Photo: © Adou Innocent Kouadio | Dreamstime.com.

in South Asia and Sub-Saharan Africa.³

While concentration of people does lead to concentrated exposure to risk, it also presents an opportunity to build resilience efficiently for a larger share of the economies' populations. Attendees at UR West and Central Africa showed a growing consensus on the urgency to invest in resilient urban systems.

Not only are people's lives and prosperity at great risk; infrastructure investments made with scarce resources are, as well. Increasingly, urban resilience is the key concept for decision makers to target if they are to mitigate risks now while also avoiding future risks. They can do this by prioritizing urban planning, keeping city residents well informed, and applying new, useful

technologies. In its discussions of diverse approaches from West and Central Africa to flood risk assessment, resilient transport, participatory strategies for resilience interventions, and the role of solid waste management, the UR brought the pieces of the puzzle closer together.

³ World Bank Group, *Investing in Urban Resilience: Protecting and Promoting Development in a Changing World* (Washington, DC: World Bank, 2016), <https://openknowledge.worldbank.org/handle/10986/25219>.



Climate change is projected to force up to

77

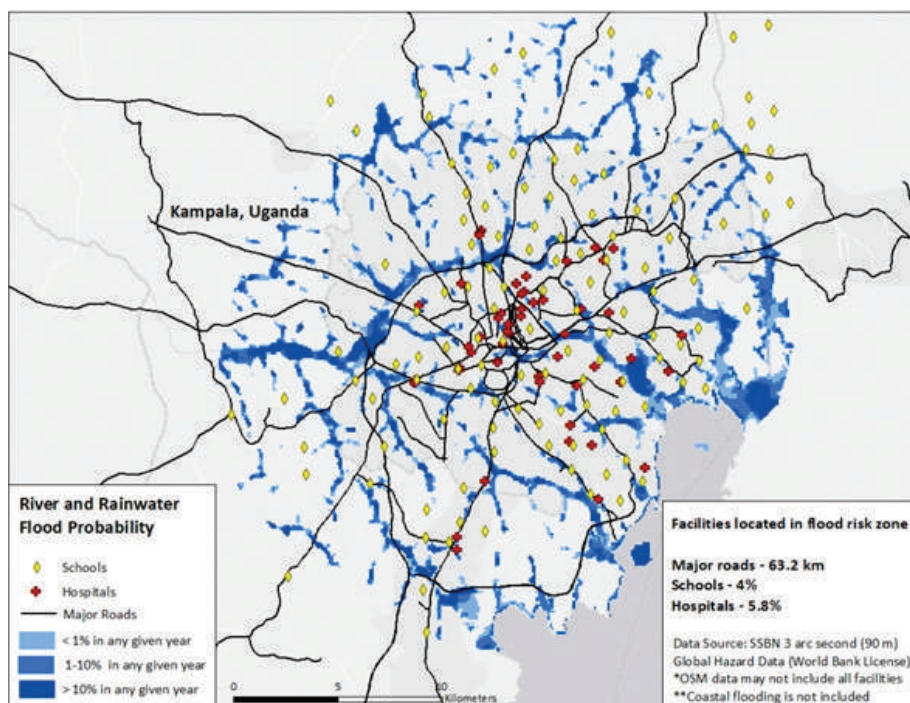
million



urban residents globally into poverty by 2030, most of them in South Asia and Sub-Saharan Africa.

Urban flood risk modeling: methods and applications

Urban flood risk is a growing challenge to sustainability. Modeling analyses for flood risk assessment require different levels of understanding, data types and sources, assessment, and decision making. A roadmap and framework for risk knowledge and assessment can help elucidate these approaches.



City scan modeling using Shuttle Radar Topography Mission (SRTM) satellite digital terrain model (DTM) (Kampala, Uganda).

The session presented a conceptual framework for the application of different levels of analysis and approaches to urban flood risk modeling. Level 1 analysis refers to preliminary broadscale

“hotspot” mapping and screening to initiate dialogue and identify the scale of existing hazard or risk, using global data. Level 2 refers to flood modeling at an urban scale, using a combination of local

information and the best available global data, and Level 3 refers to more detailed hydraulic and probabilistic models requiring high-resolution topographic information (for example, LiDAR data).

Key takeaways

- A case study for Level 1 analysis analyzed the flow behavior of drainage basins in Bamako using participatory mapping, field work, and remote sensing.
- A case study for Level 2 analysis developed a framework for investment planning based on a model of a major flood event in Greater Accra.
- A case study for Level 3 analysis for very high-resolution, detailed flood and coastal modeling is underway to inform the design of investments under the World Bank-funded Saint-Louis Emergency Recovery and Resilience Project (SERRP) and the Stormwater Management and Climate Change Adaptation Project (PROGEP) in Senegal.

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Supporting decision making for resilient transport: methods and tools for prioritizing investments

Is there a panacea for all investments' prioritization challenges? Exploring the case of road infrastructure investments in Sub-Saharan climate-exposed countries.



Bus on flood-affected road in Freetown. Photo: Xavier Espinet.

The session highlighted important questions we will have to address, such as the connectivity of the network, the accessibility to jobs, markets, and other selected services, and the redundancy of the network during natural hazard events, like flooding.

The audience also had an opportunity to debate the applicability of these methods to local goals and to the contexts and sectors in which they could be deployed.

“The [UR] audience has much appreciated the transport perspective to resilience, because they had not been touched before in the context of Understanding Risk, and I think that in the next UR conference, we have to go even further into it.”

—**Robert Luzolanu Mavema**, Provincial Minister in Charge of Public Works and Infrastructure, Kinshasa, DRC

Key takeaways

- As some African cities grow rapidly into megacities, they have to be reconsidered from the perspective of networks of districts rather than monocentric urban structures to plan effectively for transport interventions and increase resilience to shocks.
- The application of concepts like “betweenness centrality,” network redundancy, and criticality can help such transformations.
- To support decision makers effectively, analytics should go “beyond the PDF” and offer interactive tools for prioritizing investments.

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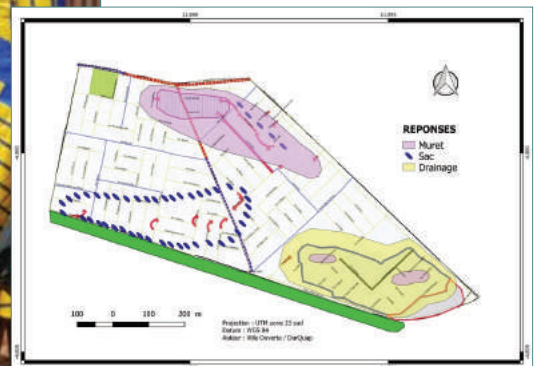
Participatory approaches and gender mainstreaming in disaster risk management and urban resilience

Governments and organizations involved in disaster risk management and urban resilience are increasingly emphasizing participatory approaches—it’s just more sustainable.



Left: Hazard mapping in Freetown, Sierra Leone. Photo: Richard Bockarie.

Bottom: Community-planned interventions to flood risks, Pointe-Noire.



Unlike planning conducted according to conventional “top-down” guidelines, “bottom-up” planning integrates community perspectives and local knowledge into urban development and

resilience priorities. Establishing more inclusive and gender-sensitive decision-making processes can give marginalized communities a voice and allow them to implement more effective

plans, policies, and programs. Case studies from Dakar, Brazzaville, and Freetown showed the UR audience where such activities have been successfully implemented.

Key takeaways

- Participatory approaches can lead to a real “awakening” of the population’s awareness of the need to respect the environment, public spaces, and construction sites.
- For new spatial analysis solutions, the needs for response and recovery solutions must be mapped for each gender—for example, identifying for women traders the market facilities at risk from flooding or high winds.
- Participatory data collection and planning increase the ownership and the sustainability of the investments for local authorities and communities.

Session Contributors

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“If you want to go fast, go alone.
If you want to go far, travel together.”
—Session participants



Better waste management and cleaner cities in Africa

Many African cities suffer from unmanaged solid waste. In rainy periods, the waste causes rainwater drainage structures to malfunction and degrade and is a main cause of unsanitary conditions and urban flooding.



Turning trash talk into action. A story of Ibadan, Nigeria. Photo: Farouk Banna.

What are the opportunities and conditions for integrating the private sector and thus securing the financial resources necessary for the sustainability of the solid

waste management (SWM) sector in African cities? Answers revolved around technical processes relating to the recycling and recovery of waste, the risks and

constraints, and the conditions for an optimal participation of the private sector.

Key takeaways

- Solid Waste Management in developing countries is a dynamic and attractive market. Private sector operators are highly motivated to engage more in the sector in Sub-Saharan Africa, also through investments.
- Funding from development banks and partners can leverage private capital and mobilize finance for development.
- To better mobilize private capital, few pre-conditions need to be in place including a sound legal and regulatory framework, regulations for Public-Private-

Partnership (PPP), established financial sustainability mechanisms for revenue generation and availability of guarantees for investors and operations.

- In Sub-Saharan Africa, improved sorting, waste valorization, reuse and recycling can bring large benefits in the reduction of waste generation and disposal. It can also help with cost reduction or recovery. A phased and context-specific approach shall be undertaken towards a circular economy.

Session Contributors

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Mounir Ferchichi, World Bank Group (moderator)

Understanding Risk in Abidjan

A session with a local flavor on the hosting city Abidjan, at which a diversity of actors discussed innovative approaches to tackling flood risks in the city.



Adjamé Market, Abidjan, Côte d'Ivoire. Photo: @evablue.

Like other large African cities, Abidjan is experiencing significant growth in its urban population, which poses many challenges for transport management, waste management, and rainwater drainage—all as the city faces increasingly frequent floods.

At the session, different actors involved in risk management in Abidjan presented approaches, techniques, and methodologies that have been implemented in the city to prevent and manage these challenges as effectively as possible.

“A great opportunity to present one of our flagship projects, ‘the CIV flood map,’ an online flood map for Abidjan, and to build collaborations to improve the collection and dissemination of information.”

—Guy Pacome Adigra, OpenStreetMap Côte d'Ivoire.

Key takeaways

- The rapidity of urban changes makes the continuous mapping of risks essential.
- Community mapping is key to mapping exposure to floods in the city.
- Low-cost disruptive technologies bring vital information that would be difficult to get using traditional approaches.
- Partnerships among researchers, youth organizations, students, institutions, and innovators is the only possible way to build resilient societies and cities.

Session Contributors

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Côte d'Ivoire (moderator)



DISASTER RISK FINANCING

Natural disasters generate significant fiscal risk, create major budget volatility, and have devastating consequences on lives and livelihoods. The financial losses caused by natural disasters have been rising, and countries in Africa are among those experiencing the greatest impacts. These countries are extremely vulnerable, as they are repeatedly hit by droughts, floods, and cyclones, and the impacts of disasters last longer

there than in any other region of the world. Furthermore, most recent predictions have shown the African region is suffering the most economically from climate change.⁴

Crisis and Disaster Risk Finance (CDRF) addresses the fiscal impacts and economic losses caused by natural hazards and supports countries in increasing their financial resilience them. CDRF is predicated upon a

strategic switch to financial preparedness for natural disasters before they occur, as opposed to responding to an event once it has happened. Evidence shows that one U.S. dollar secured ahead of time for early disaster response can save up to five dollars in costs.⁵

Governments can take steps to reduce the negative financial effects of disasters in ways that protect both people and assets.

⁴ Noan S. Diffenbaugh and Marshall Burke, "Global Warming Has Increased Global Economic Inequality," *Proceedings of the National Academy of Sciences* 116, no. 20 (May 2019): 9808-13, <https://web.stanford.edu/~m Burke/papers/DiffenbaughBurke2019.pdf>.

⁵ W. Wiseman and U. Hess, "Reforming Humanitarian Finance in Ethiopia: A Model for Integrated Risk Financing," United Nations World Food Programme Working Paper, 2007.



Women in the CERNAFA cooperative in the Tillaberi region of Niger. Photo: Photo: © Stephan Gladieu/World Bank.

A combination of prearranged financial instruments, such as contingent reserves, contingent credit, insurance, and catastrophe bonds, can be used to increase financial protection against disasters. The optimal mixture of instruments is driven by the Governments' policy priorities for financing disaster response (focusing on protecting assets, businesses, farmers, the budget, the poorest), as well as by the types of risks faced by a country and, more specifically, on the frequency and severity of their occurrence. Risk financing strategies, when well designed

and implemented, can provide governments and individuals with rapid liquidity in crisis scenarios, protecting development gains and lessening the impact on government and household budgets.

The concept of CDRF has been gaining momentum in Sub-Saharan Africa with a growing demand for support and the tremendous drive toward preparedness by the countries in the region. Many, for example, are establishing contingency funds, Benin, Cabo Verde, Kenya, Lesotho, Malawi, and Sierra Leone are seeking secured contingent lines of credit to allow

them to respond more efficiently to disaster events. Some, such as Kenya, Niger, and Uganda, are implementing shock responsive social protection systems, and now other countries like Malawi are looking to replicate and build on these successes.

Burkina Faso, Ghana, Kenya, Malawi, Nigeria, Rwanda, Senegal, and Zambia, all have agriculture insurance programs, which have a demonstrated track record of protecting farmers from the impacts of shocks, as well as crowding in investment in the agriculture sector, through credit.



Plenary

Financial planning for a rainy day: using risk information to build smart solutions

“We need to understand, as the [affected] countries, the benefit and costs of putting instruments in place, and how we can combine them to ensure that we can cover a bigger proportion of the population.”

—**Stella Nagujja**, Disaster Risk Financing (DRF) Coordinator, Office of the Prime Minister, Uganda

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Naomi Cooney, World Bank Group (moderator)

What is a country disaster risk profile? Building a broader picture of risk in a country

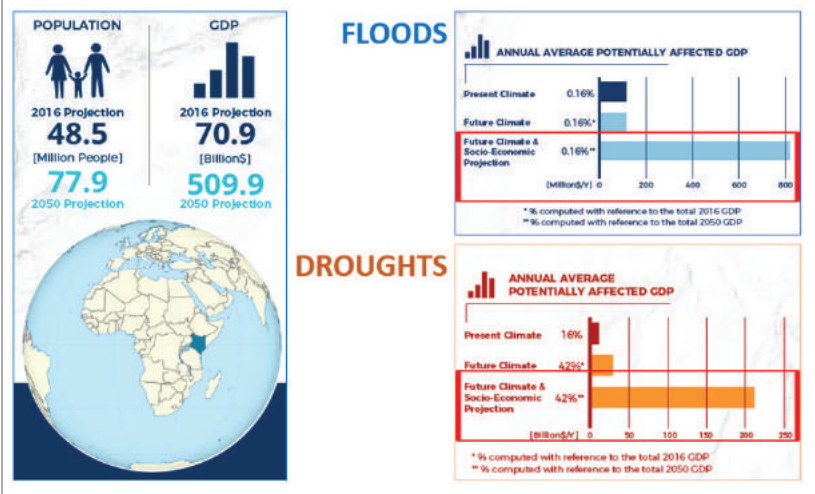
In a context of rapid urbanization and climate change, quantifying the losses that could be caused by an adverse natural event is key to conceiving interventions that reduce the impact of disasters and increase the resilience of countries.

How much is at risk? What would it take to reduce the risk? What interventions should be prioritized to reduce the potential impact of a disaster event, and where?

A country disaster risk profile (CDRP) is an instrument for advocacy and for the initiation at a national level of a dialogue on disaster risk management that can shed light on these questions. This session presented the technical aspects of developing a CDRP, reviewed the state of the art of the risk models available in Sub-Saharan Africa, and discussed how the CDRP can be used to help countries manage disaster and climate-related risk better.

“Quantifying disaster and climate risk is a necessary step to manage and reduce disaster risk.”
—Rashmin Gunasekera, World Bank Group

Country disaster risk profiles consider present and future climate and socioeconomic trends.



Country disaster risk profiles—present and future risk, Kenya. Adapted from Kenya Disaster Risk Profile, UNDRR.

“A transparent and objective mechanism to quantify drought risk is needed to design risk transfer mechanisms.”
—Assia Sidibe, African Risk Capacity

“Country disaster risk profiles provide a comprehensive view of hazard, risk, and uncertainties for floods and droughts in a changing climate.”
—Katarina Mouakkid Soltesova, UNDRR

Key takeaways

- A country disaster risk profile provides a quantification of disaster and climate-related risk to inform decision making.
- Quantifying disaster and climate-related risk implies estimating the likelihood of property,

- infrastructure, monetary, and casualty losses caused by adverse natural events.
- Disaster risk profiles have been developed for 27 countries in Sub-Saharan Africa by the World Bank, GFDRR, and UNDRR.

Session Contributors

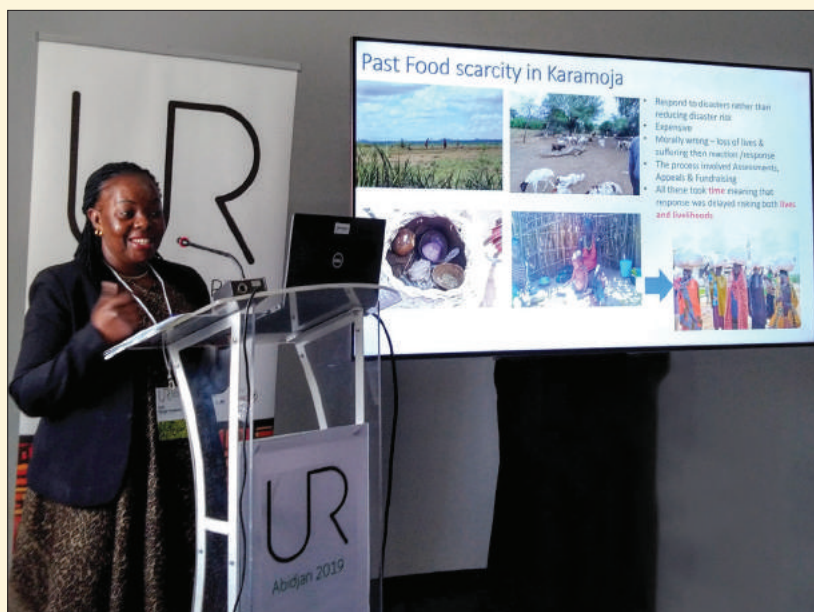
- Rashmin Gunasekera, World Bank Group
- Katarina Mouakkid Soltesova, UNDRR
- Assia Sidibe, African Risk Capacity (ARC)
- Cecil Nartey, African Development Bank
- Oscar A. Ishizawa, World Bank Group
- Joaquin Muñoz Díaz, World Bank Group

Side event Africa Disaster Risk Financing Initiative knowledge exchange session

Recent years have shown the growing demand for support and tremendous drive by Sub-Saharan African countries to work on the disaster risk financing (DRF) agenda. This was reaffirmed at UR West and Central Africa.

Over 30 participants from 15 countries gathered for a special DRF session to share experiences, knowledge, and lessons learned on DRF activities related to their respective countries and implemented within the framework of the EU-funded Africa Disaster Risk Financing (ADRF) Initiative, managed by the Global Facility for Disaster Reduction and Recovery (GFDRR).*

Addressing topics that ranged from data collection to shock-responsive safety nets to government-owned tools for policymaking, this knowledge-sharing event was a reminder of the importance of innovative solutions to meet countries' DRF needs in a variety of sectors and contexts and the continued support from the ADRF Initiative to fund them.



Stella Nagujja, DRF Coordinator, Office of the Prime Minister, Uganda, with the Understanding Risk community.



Key takeaways

- Participatory approaches are crucial in communicating risk information.
- In Uganda, an innovative shock-responsive safety net program that utilizes the latest satellite technology is predicting drought to scale up a safety net.
- Presenters showcased the drive, ambition, and dedication of African governments to find innovative and sustainable solutions for tackling the impact of natural disasters.
- In Benin, contingency funding is regarded as an effective tool for allowing the country to prepare financially for and rapidly respond to climate shocks.

Session Contributors

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* For more information on the ADRF Initiative, see: <https://www.preventionweb.net/resilient-africa/result#result5>

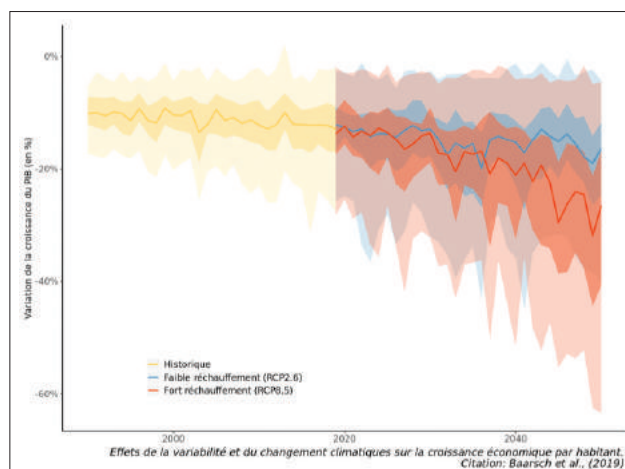
Data and people: essential links for integrating resilience into macroeconomic and local planning

The Cameroon experience

The World Bank, GFDRR, and the government of Cameroon have together made significant progress on the integration of climate risks into decision making on levels ranging from the macroeconomic to the local. The session covered the process from the diagnostic report to the training of key government and local administration officials.



Training on the guide to facilitate the integration of climate risks into strategies and projects.



Macroeconomic consequences of climate change in Cameroon in two warming scenarios: high (RCP8.5) and low (RCP2.6).

How did Cameroon do it?

“The Cameroon experience” included an analysis of the economic impacts of climate risks at the macroeconomic and sectoral levels, which led to the production of a diagnostic report and a guide to facilitate the integration of resilience into development strategies and

projects. Workshops and trainings contributed to the involvement of actors at different levels and increased their understanding of and ability to use methods to integrate climate and risk data into strategic decision making at the national and local levels, with specific application to urban planning.

Key takeaways

- New scientific and economic tools allow for the quantitative integration of climate risks into economic and financial decision making.
- Appropriate methodologies can support climate mainstreaming in development strategies and projects.
- The government of Cameroon has made significant progress on this integration, from the macroeconomic to the project levels.

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COASTAL ADAPTATION

The social and economic importance of coastal areas is tremendous given their population and production density. This is especially true in West Africa, where coastal areas are home to one-third of the population and generate 56 percent of the region's gross domestic product (GDP).⁶ That value can quickly turn into human and economic losses if planning is not done nor actions foreseen.

In 2017 alone, the cost of coastal degradation in four West African countries was an estimated US\$3.8 billion, or 5.3 percent of GDP. More than 56 percent of the coastline is affected by erosion, with an average retreat of 1.8 meters per year,⁷ and some coastal communities are at risk of disappearing, as stronger storms and rising seas leave homes uninhabitable and wipe out buildings and bridges that have served as

landmarks for generations. While vulnerability increases as a result of climate change, anthropogenic pressures exacerbate the risks, as beaches are deeply mined for sand and protective mangroves are deforested. At the same time, coastal areas continue to attract more activities and population, requiring new policy approaches and orientations.

For all these reasons, new data, tools, and community engagement

⁶ Jean-Jacques Goussard and Mathieu Ducrocq, "West African Coastal Area: Challenges and Outlook," in *The Land/Ocean Interactions in the Coastal Zone of West and Central Africa*, edited by Salif Diop, Jean-Paul Barousseau, and Cyr Descamps, 9-21 (Washington, DC: Springer International Publishing Island Press, 2014).

⁷ Lelia Croitoru, Juan José Miranda, and Maria Sarraf, *The Cost of Coastal Zone Degradation in West Africa: Benin, Côte d'Ivoire, Senegal and Togo* (WACA and the World Bank Group, March 2019), <https://www.wacaprogram.org/sites/waca/files/knowdoc/Cost-of-Coastal-Degradation-in-West-Africa-March-2019.pdf>.



Freetown, Sierra Leone. Photo: viti.

are needed in support of the development and implementation of disaster risk reduction strategies, as well as long-term resilience planning.

To meet these needs, state of the art modeling has become as important at UR West and Central Africa as new ways to communicate with people.

UR West and Central Africa has also benefited from the concurrence of the new West Africa Coastal Areas management program marketplace (WACA) by matching risk-informed proposals with financing opportunities. WACA's support for a concerted approach to managing coastal resources and

reducing risk that affects coastal communities has resulted in Coastal Resilient Investment Projects in six countries. The WACA marketplace aims to simplify the process of mobilizing finance for infrastructure solutions to erosion, flooding, and pollution issues.



One-third of West Africa's population lives in coastal areas



which generate **56%** of its GDP.

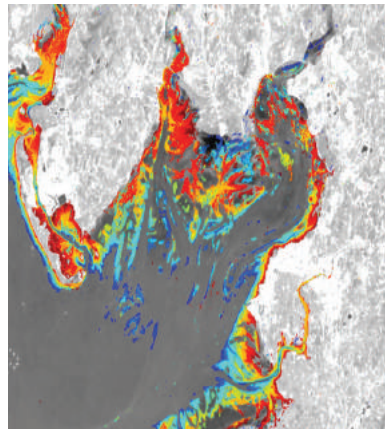
Coast to “cost” risk information for coastal management

As Africa’s cities grow, populations, assets, and economic activities in coastal areas become more vulnerable to the effects of climate change and disaster risk.



With rising sea levels, changes in precipitation patterns, and increased anthropogenic pressures along the coast, the situation in Sub-Saharan Africa is likely to become worse for many cities.

This session presented opportunities arising from the exploitation of new data and tools for coastal monitoring in support of disaster risk reduction.



Top: Coastal erosion and its effects in Abidjan.

Inset: Construction of an erosion control gabion wall in the DRC.

Left: Coastal and intertidal area mapping. Source: ESA

Key takeaways

- Satellites enable access to consistent, transboundary data that remain underutilized, particularly for marine and coastal regions.
- DRR in coastal areas requires continuous multilevel, multisectoral, community-centered, and resilience-focused strategies for withstanding perennial coastal hazards.
- Evidence from ongoing activities in West Africa shows how new datasets and information systems help improve management of coastal areas and their risks.

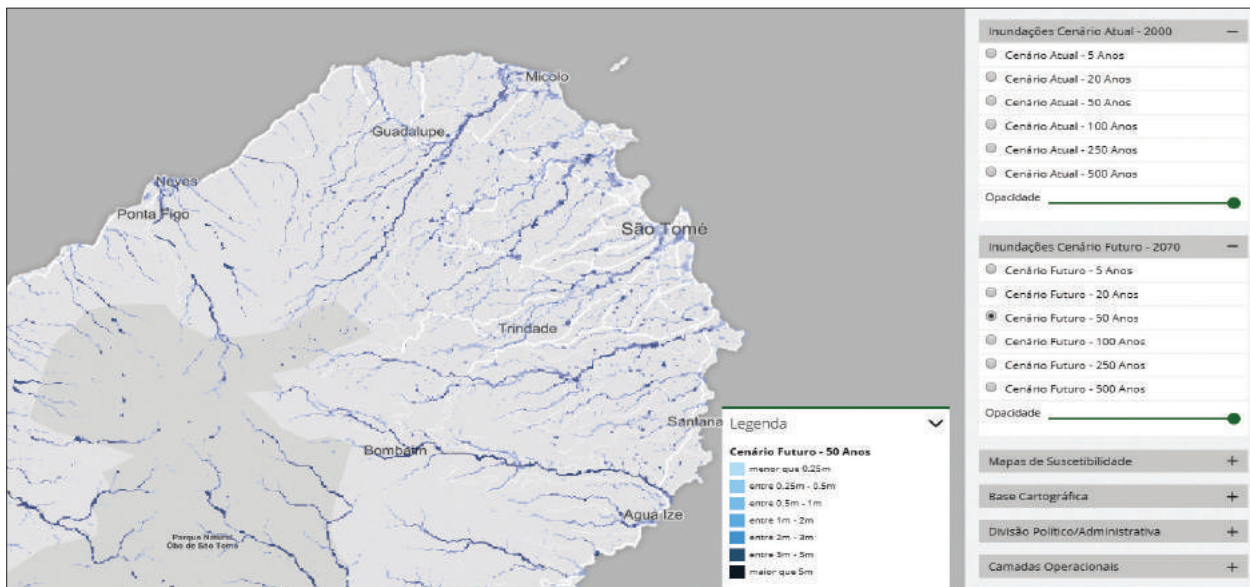
Session Contributors

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Risk-informed decision making as a basis for coastal adaptation using “green” solutions

Experiences from Côte d’Ivoire, São Tomé and Príncipe, and Nigeria

In extremely vulnerable coastal zones around the world, advanced modeling techniques, in combination with remote-sensed and local data, can be used to assess the impact of natural hazards and risks and determine possible adaptation solutions and their effectiveness.



The use of new assessment methods is particularly important for the implementation of nature-based solutions (NBSs) given the limited knowledge available about this kind of adaptation options. A study carried out by Deltares and the governments of Príncipe and

São Tomé showed how informed decisions can be made on suitable adaptation options (green and gray solutions and combinations) to mitigate the impact of natural hazards and climate change on the island state.

Flood risk models made tangible with the open DRCLima Platform: <http://www.hudd.com.br:8080/>.

Key takeaways

- NBSs are often not prioritized by decision makers but should be taken more seriously.
- Abidjan’s Félix Houphouët-Boigny University of Cocody demonstrated that the use of mangroves for riverbank protection is often undervalued.
- Enhanced risk information can be embedded in user-adapted tools, like the DRCLima in São Tomé, for DRM.

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HYDROMET

The region's core agencies, such as national meteorological-hydrological services and river basin authorities, have formal mandates for most Hydromet services but are frequently underfunded and, despite occasional investments and upgrades, have limited capacity, regular asset loss, and deteriorating infrastructure. As a result, many countries are still struggling to keep up with the

ever increasing demand for more sophisticated services to protect lives and assets, as well as to support economic activities in weather-sensitive sectors.

Over the past decades, the ability to observe and predict Hydromet events has greatly improved. The resolution of global numerical weather prediction modeling systems is currently in the range of 9-15 kilometers, and probabilistic information based

on simulation models has allowed the development of more reliable early warning systems.

Thanks to these advances and the recent development of telecommunication, artificial intelligence, and machine-learning technologies, new business opportunities have emerged for the private sector.

To take full advantage of these opportunities to boost Hydromet service abilities, developing



Photo: © Werner | Dreamstime.com.

countries need to embrace the benefits of the growing role of the private sector without putting at risk the provision of Hydromet public services. Accomplishing this requires an adequate regulatory framework be put into place.

Overall, the socioeconomic benefits of the Hydromet value chain are still underestimated, and development partners are well advised to dedicate time

and resources to helping national governments understand why the Hydromet domain is a smart investment, both for safeguarding the public and for its direct economic value.

Less than
20%

of Sub-Saharan African countries currently provide reliable weather, water, and climate services to their people and economies.



Public/private/academic: a triple-action formula for improved Hydromet and early warning services?

In the Hydromet sector, new partnerships are emerging for sustainable business models and new dynamics among public, private, and academic actors investing in innovative solutions that deliver more reliable forecasting services.

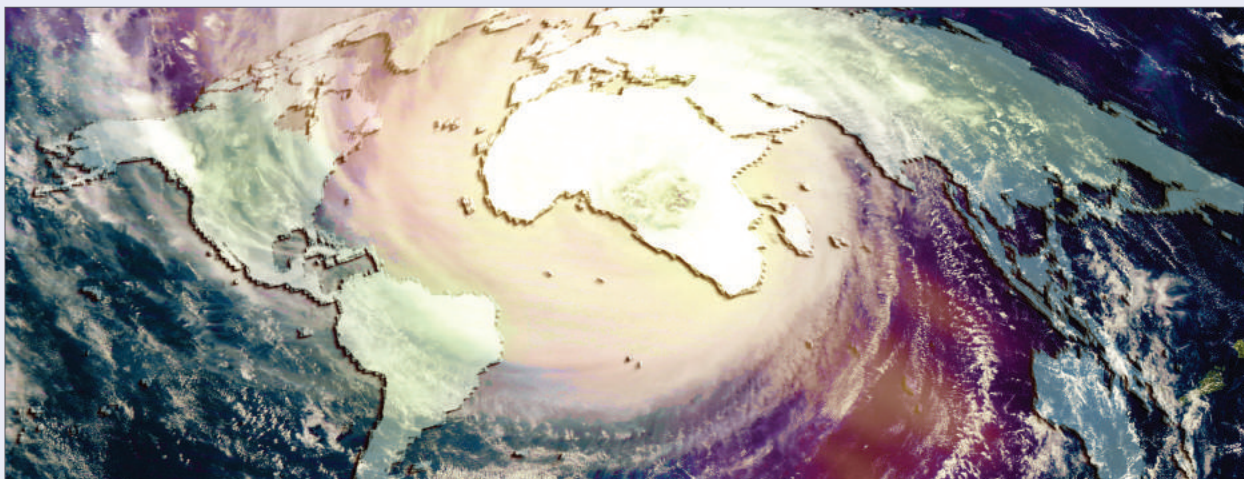


Photo: Elen11.

The UR West and Central Africa conference was a chance to explore new forms of strategic private/public/academic partnerships and mechanisms that effectively support advancements in technology, research, and innovative Hydromet services.

Changes in business approaches, data from the public sector, private sector agility, and the

basic research capability of the academic sector combine to create opportunities for collaboration.

The role of the private sector has been strictly based on the imperative of sales. In contrast, the session clearly demonstrated that all stakeholders derive benefit from long-term partnerships that inclusively target capacity building.

“The old way of doing business in Africa doesn’t work. If governments notice this, you will lose the market. The private sector must be committed to long-term partnerships that benefit national Hydromet services, as well as the company. Long-term value is more important than short-term gain.”

—Vojislav Mitrovic, Princeton Climate Analytics, United States

Key takeaways

- The broad consensus was that private sector engagement is not only necessary for improving Hydromet services, but it is undergoing a profound change through interaction with academic research and the public sector.
- All the Hydromet companies present expressed an interest in creating long-term partnerships.
- Enhanced youth job training and development to keep African talent in the region are also needed.

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Cécile Arnaud-Lorillou, World Bank Group

Case studies

Rainfall information from cellular communication networks

RainCell/SMART is an application designed to monitor flood risk by detecting extreme rainfall events from attenuating microwave signals in mobile networks. It provides an opportunistic source of high-resolution, space-time rainfall information, complementing traditional in situ measurement, such as by using rain gauges or remote sensing. RainCell/SMART was developed as an experimental pilot in Cameroon and Niger through collaboration with the mobile service provider, Orange, and the IRD (Research Institute for Development).

The operationalization of this innovative technology in continued close collaboration with cellular communication companies could benefit many sectors of activities, if the delivery of the raw data (on, for example, flood or weather prediction and risk management, agriculture, insurance, traffic control, or post-disaster organization) from the mobile operators could be guaranteed.

Also offering promising perspectives for early warning systems is the use of New Information and Communication Technologies (NICT) based on critical runoff thresholds, as developed by the CURAT in Abidjan.



The audience was keen to hear from the new partnerships that proved successful.

Ignitia: Probabilistic rainfall predictions for tropical agriculture in West Africa

Accurately predicting convective rainfall is a meteorological challenge with implications for billions of people in tropical regions, including West Africa, where agriculture is extremely dependent on rain. Currently, global forecast models fall short in predicting rainfall in the region to such a degree that climatology itself provides the same value as daily global model forecasts. To address this problem, Ignitia developed a high-resolution, numerical ensemble system that predicts the spatiotemporal distribution of tropical rainfall more reliably than global models.

With better forecasts, farmers can make better-informed decisions that reduce crop losses while increasing yields, allowing for improved lives and livelihoods in West Africa.

Princeton Climate Analytics Platform

The Terrestrial Hydrology Research Group at Princeton University, in cooperation with UNESCO, developed in 2011 the African Flood and Drought Monitor at 25km resolution to provide regions with limited capacity and data availability with consistent historic, monitoring, and forecasting data on relevant climate variables. Following on from the success of initial attempts, Princeton Climate Analytics was formed to develop the monitor further into a high-resolution decision-making platform by taking advantage of a more sustainable business environment and a team of renowned scientists and engineers.

Through close partnerships with stakeholders, PCA's suite of proprietary methodologies now contributes to an accurate integration of all available climate data sources, resulting in a system whose high spatial resolution is tailored to the availability and quality of radar and in situ data.



In Mali, the CREWS initiative financed capacity building workshops to improve preparedness.

WORKSHOP

Focus Hydromet: the CREWS initiative

The Climate Risk and Early Warning Systems (CREWS) initiative is a financing mechanism that was launched in 2015 at the 21st Conference of Parties on Climate Change (COP21).

Through multistakeholder engagement, the CREWS supports governments and the private sector in measuring access to and the effectiveness of high-quality and timely end-to-end multi-hazard early warning systems, with the overall objective of substantially reducing global disaster mortality by 2030 in least-developed countries and small island developing states. CREWS works to ensure that early warnings related both to the weather and climate events are people centered, impact based, and risk informed. The initiative seeks to raise US\$100 million by 2020 and is driven by the expertise of its implementing partners: World Bank, GFDRR, the United Nations Office for Disaster Risk Reduction (UNISDR), and the World Meteorological Organization (WMO).

During the UR West and Central Africa conference, a CREWS workshop brought together experts to explore the challenges of efficient communication and quick action when preparing for a disaster, through a roleplay exercise.



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Innovative approaches to flood forecasting and early warning in West and Central Africa

The importance of collaboration to fostering good practices and innovations in flood forecasting places the empowerment of communities at the center of efficient early warning.



Discussing new ways to know what happens, before it happens.

Traditionally, many competent people with access to and knowledge of the relevant technology are needed for innovation to take place. This session brought together eight such people to highlight innovations in technologies for flood prediction. In the city of Douala, for example, fluctuations

in radio signals on the mobile phone network are used to make precipitation maps and early warnings. In Togo, the Red Cross involves communities in early risk detection using the functional estimate system. An innovative collaboration includes transboundary work with the river basin authority to tackle flood risk.

Key takeaways

- It is important to strengthen synergy between policy initiatives at the regional level and riparian country initiatives, as well as harmonized policy for data sharing, roles, and responsibilities for flood forecasting.
- National meteorological and hydrological services must work together to develop multiscale, integrated systems.
- Lives are saved when communities are well trained and provided with modern digital tools that are easy to use and adapted to their circumstances. Any member of a given community can play a lifesaving role.
- Early warning systems need continuous support and regular updates to remain efficient.

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TECHNICAL INNOVATION

Much of African urbanization is being built on an unsteady foundation. The continuously growing cities are exposed to disaster risks, exacerbated by climate change and unplanned expansion. Securing their future means addressing those risks as soon as possible.

Yet, we cannot fix what we cannot observe and measure. A deep understanding of these challenges is key to building resilience. Moreover, traditional ways of

gathering and processing data are not developing as quickly as the vulnerability, and there is a dire need for disruptive new ideas.

Fortunately, Sub-Saharan Africa has a tremendous resource to help meet this need: the fastest growing youth population in the world. These “digital natives” present an outstanding opportunity to fill information gaps on disaster risk while developing digital skills and employment opportunities.

Many of the UR communities’ engagements demonstrate that, given the chance, students and young entrepreneurs excel at what they do. At UR West and Central Africa, they come together and map, code, and build. The “chance” that is lacking often depends on the affordability of data: Africans are subject to the most expensive internet charges in the world, relative to average earnings. At the same time, public access options, such as free public Wi-Fi, are not as readily available



as they are elsewhere.⁸ This is constraining the young, who have low incomes but perhaps the freshest ideas.

The UR community provides opportunities for firsthand learning and application of digital skills—for instance, through the Open Cities Africa Initiative—for a young, entrepreneurial, and innovative generation, eager to find ways to build resilience. Highly motivated

and at the cusp of entering the workforce, this generation can be empowered by digitization to take resilience issues into their own hands. Policymakers should take care not to miss their chance to unlock this potential.

Only **2.9%** of the African continent has been mapped locally, compared to **87%+** of Europe.

⁸ Alliance for Affordable Internet (A4AI), “2019 Affordability Report, 2019,” <https://a4ai.org/affordability-report/report/2019/>.



Plenary

Digital skills and youth: toward a resilient society

“Unfortunately, as a species, we have a lack of confidence in the youth. It’s not right, because there are youths that produce excellent things and we have to drop this confidence-barrière vis-à-vis the younger generation.”

—Linda Valée, Director General of the Digital Youth Foundation, Côte d’Ivoire

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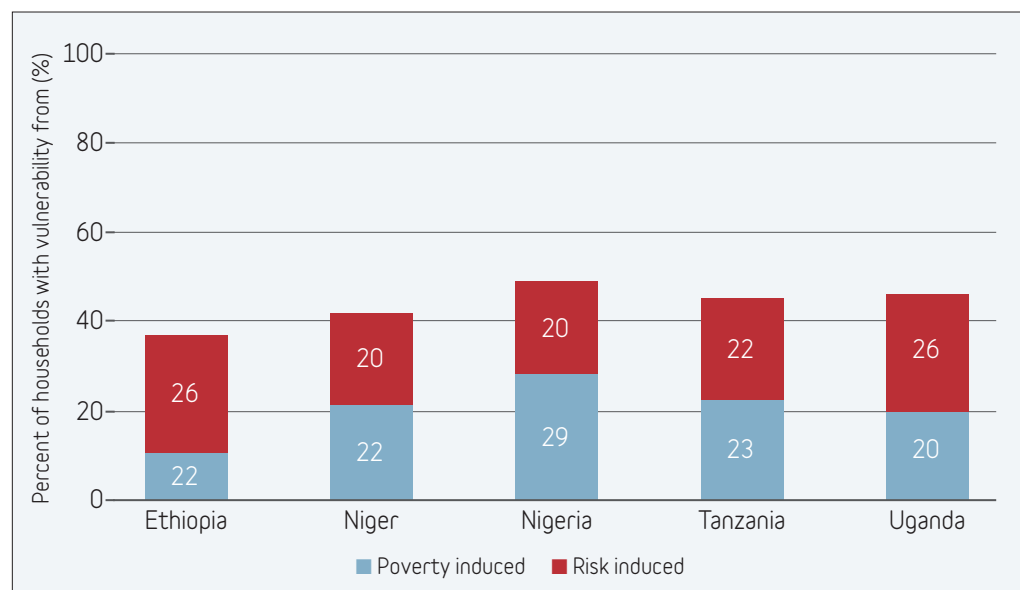
Linda Valée, Director General of the Digital Youth Foundation, Côte d’Ivoire

Karim Sy, Jokko Labs/Digital Africa, Senegal

Simeon Ehui, World Bank Group (moderator)

One step forward, two steps back: social vulnerability in a riskier world

Natural disasters play an important role in preventing households from moving out of poverty and in pulling others right back into it. Disaster risk response is, therefore, an important component of poverty reduction, especially when the shocks are recurrent.



Understanding vulnerability is one of the first steps toward informed interventions in social protection.

An increased focus on fragility, transient poverty, disaster risk management, and crisis response makes it essential to develop and improve upon methodologies for

the ex ante identification of people who are vulnerable to poverty.

Households can, for example, be vulnerable because they are poor or because they are exposed to

large risks. These considerations have to be paired with policy measures to move from understanding risk to enhancing social protection.

Key takeaways

- Across West Africa, countries are making their social protection systems adaptive so that vulnerable populations can receive support in times of scarcity, enabling them to protect their livelihoods and preventing them from falling into poverty.
- Increasingly, countries are also using data to understand the profile of the population that will suffer the most from a given disaster. Analysis of these data can inform their adaptive social protection systems in terms of targeting support on both the geographical and household levels.

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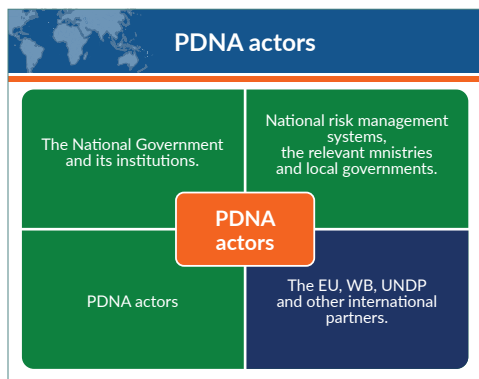
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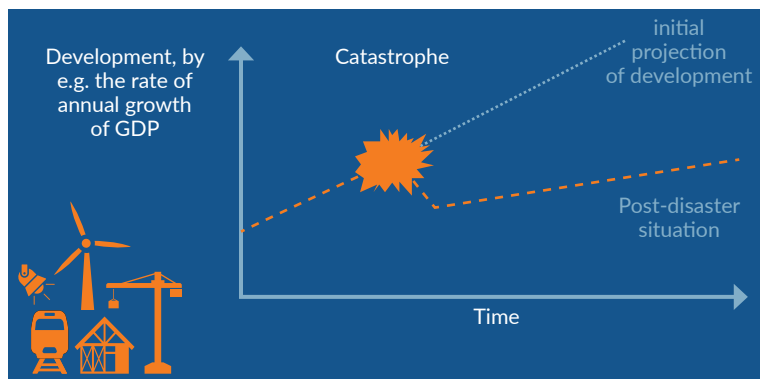
Dieynaba Ndiaye, General Secretary of the Social Protection Direction, Senegal (moderator)

Assessing the impact of a disaster: the PDNA and GRADE methodologies

In the aftermath of a disaster event, rapidly forming an understanding of the economic impact, amount, and spatial distribution of the direct and indirect losses is critical to inform emergency response and to speed up planning of the recovery and reconstruction process.



Flowchart of the GRADE earthquake damage estimation process. Source: Methodology note on the Global RAPid post-disaster Damage Estimation (GRADE) approach, World Bank, 2018.



Contribution to total damages and losses by sector. Source: Sierra Leone PDNA, World Bank, 2017.

How do we determine the physical damage, economic losses, and costs to inform recovery needs in the aftermath of a disaster? Both the World Bank’s global rapid post-disaster damage estimation (GRADE) and the government-led post-disaster needs assessment (PDNA) have been successfully used several times in the

aftermath of disasters, providing vital information to governments and other key stakeholders involved in post-disaster damage assessment, relief, and recovery.

The session discussed the strengths, complementarity, and limitations of both methodologies and explored opportunities for future assessments.

“The objective is to promote a resilient recovery, as well as Building Back Better at the micro and macro levels.”

—Isabelle Forge, GFDRR, World Bank Group

“A quantitative reliable estimate of economic damage helps to facilitate government’s response strategies, support communication and coordination with multiple stakeholders, including donors, and provide a platform for more detailed analysis where needed.”

—Rashmin Gunasekera, World Bank Group

Key takeaways

- Understanding the impact of a disaster is critical to meet recovery needs.
- PDNA is a government-led process that serves to assess the impact of a disaster in main social and infrastructure sectors, allowing the prioritization of recovery and reconstruction needs.
- GRADE is a rapid desk-based damage assessment that produces within two weeks a quantification of the extent and severity of a disaster’s physical impact, with a focus on housing and infrastructure.

Session Contributor

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Joaquín Muñoz Díaz, World Bank Group

Youth, innovation, and resilient transport in Sierra Leone

Flooding, landslides, and other disasters severely affect urban mobility and transport infrastructure in many West and Central African cities. In Freetown, innovators, young entrepreneurs, and engineers came together to enhance the resilience of its transport system.



Working on their prototype during the Resilient Urban Mobility Hackathon in Freetown, August 2019.



The entire Sierra Leone Delegation during UR West Africa.

Freetown suffers from recurring urban flooding and urban geohazards that disrupt severely the mobility of its citizens. This session addressed the question of how to combine youth, innovation, data, and entrepreneurship to create new ways to reduce the risk to urban transport in Freetown.

Included in the presentation were the geohazard challenges that affect Freetown transport; a robust method to involve university students in data collection toward resilient transport; and the outcomes of involving young entrepreneurs in the development of new tools to improve climate resilience.

“Many brilliant ideas around resilient urban mobility were brought to life during the hackathon.”

—Sullay Katta, Directorate of Science, Technology and Innovation, Sierra Leone

“It is critical to allow for budgetary provisions within institutional budgets of MDAs to address geohazards.”

—Ing. Oba Davies, Fourah Bay College, Sierra Leone

Key takeaways

- Using a smartphone app, a group of eight civil engineering students collected data on more than 200 vulnerable points in the Freetown road network and 102 routes of public transport.
- One hundred young people, comprising social workers, entrepreneurs, IT specialists, and engineers, competed in a hackathon to develop tools to improve the resilience of urban mobility.

Session Contributors

Badamasi Savage, Highway and Transport Lecturer and Consultant, Sierra Leone

Ester and David, Students from Fourah Bay College, Sierra Leone

Oba Davies, Fourah Bay College, Sierra Leone

Akiko Toya, World Bank Group

Sullay Katta, Directorate of Science, Technology and Innovation, Sierra Leone

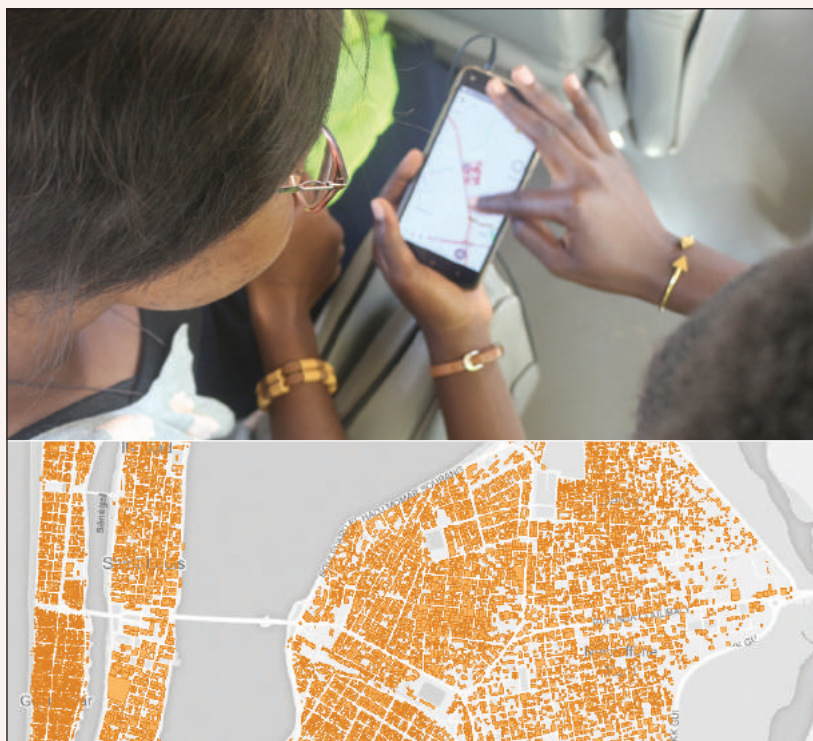
Mariam and Ishmael, Entrepreneurs, Sierra Leone

Xavier Espinet Alegre, World Bank Group

Open Cities Africa: digital skills for resilient societies

Understanding risk starts with data. But getting data can be cost and time intensive. What if cities could fill in the data gaps, enrolling and training students and citizens to collect rapidly the local data needed to reduce risks?

As technology becomes both more advanced and more accessible, ordinary citizens can learn how to use phones, cameras, drones, and other technologies to help identify the needs of their cities. Since 2018, the Open Cities Africa program has trained more than 1,000 community members, university students, and civil servants in 12 cities to gather or analyze data on risk. These digital cartographers have mapped more than 500,000 buildings, roads, markets, schools, hospitals, parks, canals, and other features onto OpenStreetMap, a free and collaborative map of the world.



“This is all sustainable because of a comprehensive action from the World Bank resilience project, government programs in Accra, and Open Cities. Data needs are taken care of and the implementation is also taken care of, so you can say for sure that it is going to create a visible impact.”

—**Jamila Salihu**, Assistant Physical Planning Officer, Ayawaso East Municipal Assembly, Accra, Ghana

Twelve Open Cities delegations from across Africa gathered at UR WCA to share their accomplishments, challenges, and lessons learned from the program. Through ignites, poster sessions, and panels, UR participants learned how open-source mapping is equipping local governments to improve resilience through

interventions that target zones where hundreds of thousands of homes are at risk from floods; expand stormwater canals in cities into pockets in urgent need of drainage; plant natural vegetation to reduce erosion and mudslides; and identify where to relocate households before rising seas reach their walls.



GFDRR
Global Facility for Disaster Reduction and Recovery

OPEN DRI

Open Data for Resilience Initiative

“We are integrating the Open Cities Africa training modules into risk prevention curricula at the university. Today you will find master’s level coursework on collaborative mapping for risk management with OpenStreetMap, which is now taught all over Africa.”

—**Michel Tchotsoua**, Director of Geomatics Lab, University of Ngaoundéré, Ngaoundéré, Cameroon

After the UR program, Open Cities delegations attended their third and final regional workshop, where special focus was placed on sustaining the future of the Open Cities network—including how to support and mentor new cities and mappers.

As urbanization and climate change vulnerability rise, it is easy to feel daunted by the challenge of disaster risk management

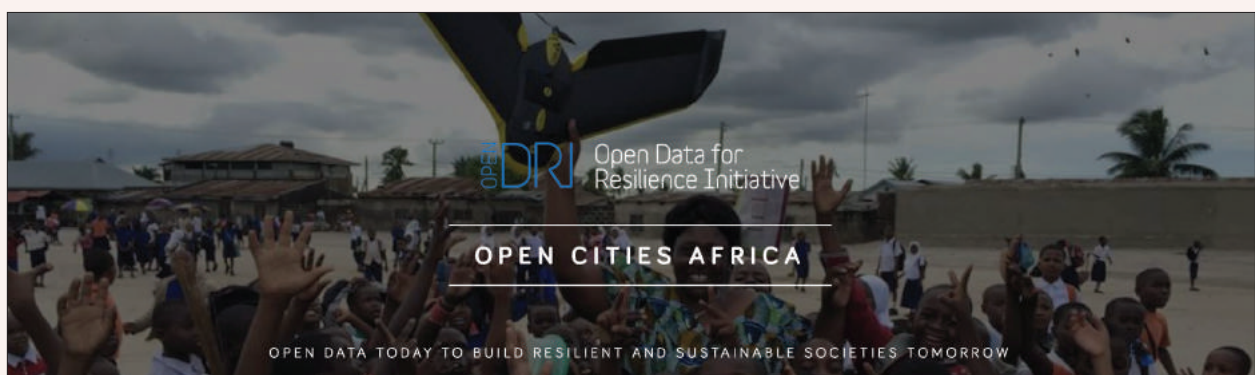
in Africa. But witnessing the enthusiasm, technical expertise, and collaborative nature of the Open Cities Africa cohort inspires great optimism.

“As we tap into this data, it will bring a lot of new and updated information that we can use for decision-making.”

—**Tsiry Rabemiafara**, Computer Scientist in Database and Software Management at Cellule de Prévention et d’appui à la Gestion des Urgences, Antananarivo, Madagascar

Highlights

- For government leaders in Ngaoundéré, Cameroon, accustomed to paper and often outdated maps, georeferenced data have become a valuable resource for planning. The Ngaoundéré City Council will use Open Cities basemaps to develop an own-source revenue system to support the collection of taxes.
- In Pointe-Noire and Brazzaville, Republic of Congo, local governments are using data collected by neighborhood leaders, local government, students, experts, and the World Bank to implement urban upgrading.
- Gender analysis and gender integration were integral to the Open Cities methodology in Accra, Ghana, where gender-balanced field teams ensured women from the community could work with female mappers.
- In Monrovia, Liberia, where flooding has damaged streets and sanitation systems, Open Cities maps are now being used to improve connectivity and locate garbage collection points in densely packed neighborhoods.



ACCRA Ghana
ANTANANARIVO Madagascar
BRAZZAVILLE Rep. of Congo
KINSHASA Dem. Rep. of Congo

KAMPALA Uganda
POINTE-NOIRE Rep. of Congo
MONROVIA Liberia
NGAOUNDÉRÉ Cameroon

SAINT LOUIS Senegal
ZANZIBAR CITY Tanzania
SEYCHELLES Seychelles
DAR ES SALAAM Tanzania
Resilience Academy

Artificial intelligence for mapping and urban monitoring

African cities are growing at astounding rates. Everyone is talking about artificial intelligence (AI), but what can we actually do with it to promote urban resilience? A lot, as it turns out.



Wuraola Oyewusi knows there's more than enough talent that only needs to be unlocked.

Artificial intelligence (AI) offers new tools that can help scale, speed, and deepen our understanding of risk. This session demonstrated exciting new tools to see how African cities are growing and changing—and how these innovations can help toward effective disaster risk management.

Innovators are making use of open data (like global satellite imagery) or images collected by the crowd (like street-view imagery) to capture exposure and vulnerability better. Also clear is that AI can be used to augment human skills through more rapid digitization.

AI doesn't only enable humans to do more. The use of open data and open tools encourages us to work together and learn from each other. And, as Wuraola Oyewusi showed, there are many bright, young African minds ready to develop local solutions.

"It was a refreshing time of listening, sharing, and discovering how different people are using data at their work. That was my first time of hearing about OpenStreet Maps; now my team and I are learning how to use it. I had a great time co-hosting the Artificial Intelligence for Mapping and Urban Monitoring Session. I'm glad that I made it for the conference."

—Wuraola Oyewusi, Data Science Nigeria

Key takeaways

- Open satellite imagery and AI can monitor the growth of African cities (DLR).
- AI can speed up your digitization work, enabling you to map faster (Facebook).
- You can collect street-view data to map your neighborhood (Mapillary), which can be used to assess building vulnerability faster and more accurately (DevSeed).
- Young African talents are using open AI tools to develop local solutions (Data Science Nigeria).

Session Contributors

Wuraola Oyewusi, Data Science Nigeria, Nigeria

Mattia Marconcini, PhD, German Aerospace Center (DLR), Germany

Danil Kirsanov, PhD, Engineering Manager, United States

Olaf Veerman, Development Seed, United States

Lindsey Higgins, Mapillary, Sweden

Caroline Margaux Gevaert, World Bank Group

Drones give me wings: the African drone movement

The drone revolution is coming to Africa! Discover how the flying robots are used in disaster risk management by African innovators!



This session explored the role of drones in disaster risk management, how national regulations for drones are being developed across Africa, business models for local pilots and organizations, project applications, and technological challenges.

Top: Drone pilot at work during the session.
Right: Drone session participants ready for takeoff.



Key takeaways

- Professional mapping drones are being designed and manufactured in Niger
- Many organizations in Africa are already successfully using drones for flood risk mapping.
- Governments in western Africa are actively developing drone regulations to make their use easier and safer.

Session Contributors

Clara Tessler, Flying Labs, Senegal

Aziz Kountche, Drone Africa Services, Niger

Stephen Mather, OpenDroneMap, United States

Colonel Major Bako, Civil Protection at Ministry for Domestic Affairs, Niger

Ismaila Seye, UrbaSEN, Senegal

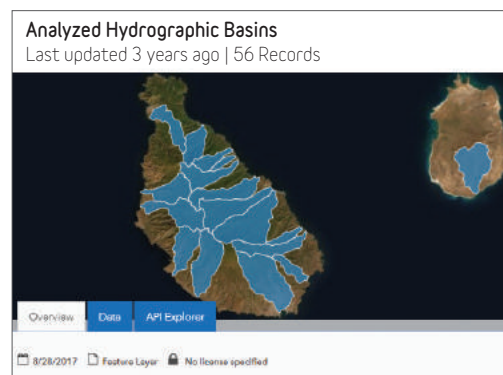
Cristiano Giovando, World Bank Group (moderator)

Geographic information management: life and death of spatial data infrastructure (SDI)?

While some may think they can do without it, a Spatial Data Infrastructure (SDI) is essential for risk management. It allows for data sharing and greater involvement of the stakeholder communities. Cabo Verde and the Seychelles share their experience.



Geomatic staff in Seychelles. Practitioners have to choose from multiple approaches and new technologies, while adapting legal frameworks and exchange protocols. Below: Spatial data infrastructure in Cabo Verde.



This session provided an overview of Spatial Data Infrastructures (SDI) and the essential role of spatial information for disaster risk management in two small island states, Cabo Verde and the Seychelles. Cabo Verde has been a pioneer in the development of its GDI by enshrining its development in its policy since 2012 and has very rapidly developed its infrastructure

using proprietary technologies. A few years later, the solutions have evolved a lot and the possibilities offered by Open Source solutions have matured and become equally attractive. Reflections are therefore underway to migrate from a proprietary solution to a solution integrating free and open source tools. The representatives of Seychelles insisted on the

difficulty of sharing data between institutions as a major obstacle but also on the opportunities offered by the OpenStreetMap initiative to facilitate the collection and dissemination of data to the greatest number; free GIS software has also made it possible to train the younger generations in the use of geographical information.

Key takeaways

- In hazard-prone environments, such as small island states, GIS data are key for disaster risk management.
- At the technical level, open-source spatial data management solutions have matured and can be an alternative to proprietary solutions
- Open and shared data is essential for better risk management
- OpenStreetMap facilitates the provision of information for all and allows multiple actors to coordinate their activities.

Session Contributors

Ivete Ferreira, National Institute of Land Management (INGT), Cabo Verde

Ineida Baptista, National Institute of Land Management (INGT), Cabo Verde

Justin Prosper, Ministry of Environment, Energy and Climate Change, Seychelles

Julien Cour, Immergis-Cameroun, Cameroon (moderator)

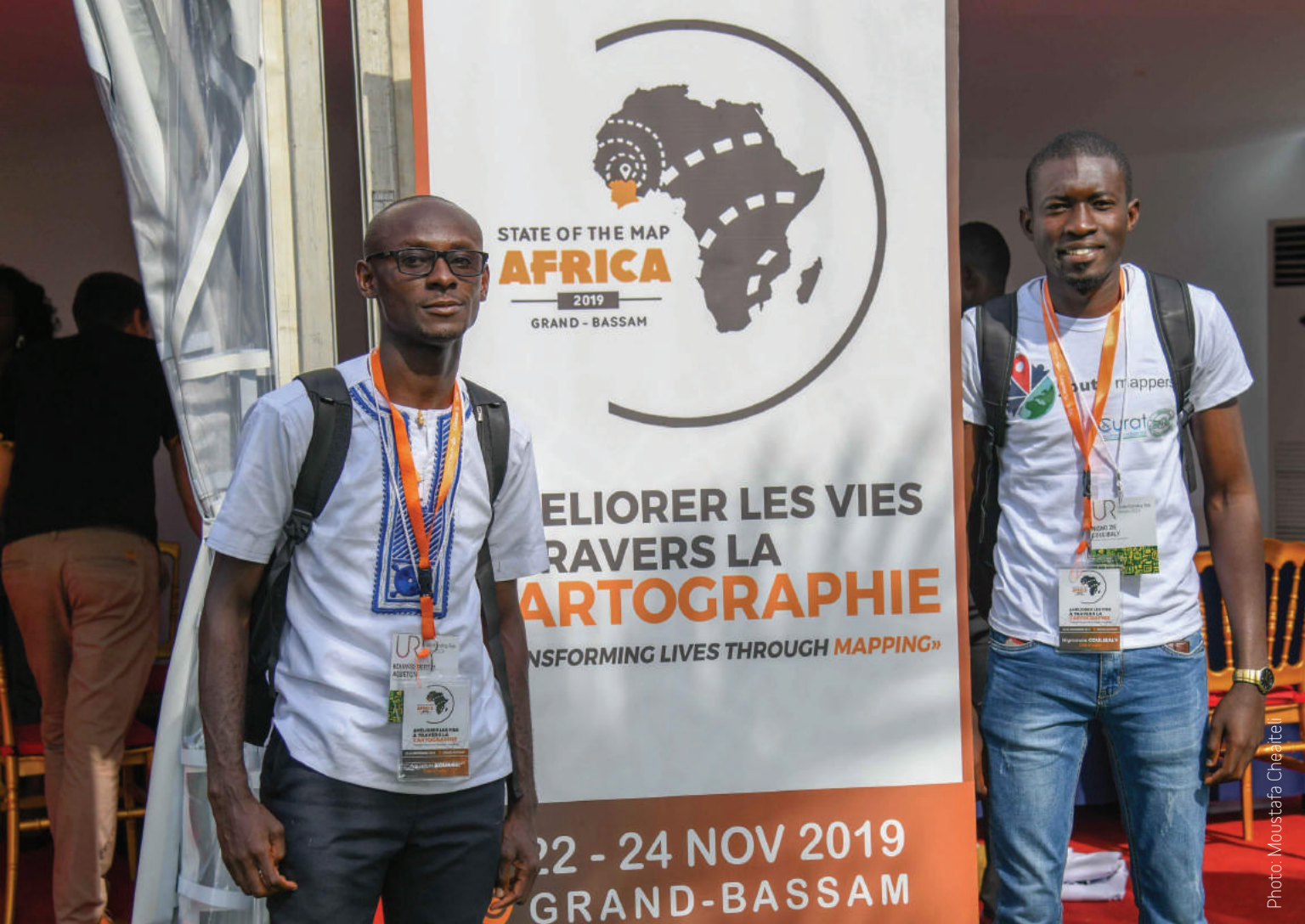


Photo: Moustafa Cheaitel

State of the Map Collaboration

OpenStreetMap is an initiative to create geographical data and make them globally available under an open-source license. OpenStreetMap started in 2006 and today counts more than 6 million contributors, who are industriously working every day to build a high-quality map with rich and reliable information. The open-source mapping is often the only source of map data available over vast territories where large mapping companies do not venture.

Every year, the OSM community meets at the StateOfTheMap conference, a global event that is

more regional or local in alternate years. The first SOTM Africa took place in 2017 in Kampala, Uganda, and brought together more than 200 participants for three days.

Since the World Bank and GFDRR have long used OSM data as a source of spatial information for mobility analysis, environmental mapping, urban planning, and risk management, it seemed both natural and essential to bring together the passionate and committed people involved in Understanding Risk and SOTM.

With this in mind, Understanding Risk invited all SOTM participants to share one day of their

conferences. The day turned out to be a highlight for both groups, with more than 600 participants able to learn from one another and exchange information and experiences during technical and plenary sessions.

A better understanding of the secrets of creating the geographical data that are at the heart of risk management applications will allow risk managers to perform more refined analyses. For the OSM community, meeting with some demanding consumers of OSM data has made it possible to refine further the quality of the data made available.



An open data mapper's perspective on Understanding Risk

Open-data mappers from diverse backgrounds shared their knowledge with UR WCA participants during the conjoint conference day. One, Nathalie Sidibe, discussed the crucial role of women in the open mapping community.



Members of the OpenStreetMap community (here, Nathalie Sidibe) provided first hand experience with data collection, problem solving, and community building.

OpenStreetMap Session

This is a woman's world: Map it, and it is yours. Women's involvement with digital mapping technology.

Although they are very underrepresented in the OSM world, women are highly engaged and leaders in the building of strong and knowledgeable communities and in the production of high-quality data. It may be more difficult for them to engage, however, as a result of various

social, cultural, and religious factors.

This session gave OSM mappers a platform not only to share their experience with women, but also to empower them. OpenStreetMap should be a project that empowers women, rather than constraining them.

Key takeaways

- Although they are a small minority—only about 3 percent—of participants in OpenStreetMap, women are making a significant contribution to building, consolidating, and managing communities and producing open geospatial data around the world.
- In this context, it is critical to create a welcoming and safe space for women to participate beyond a priori
- It is particularly important to capture women perspective in mapping as women are impacted differently and often more by disaster and inclusive urban development need to take into account how different gender are using the space and its amenities.

Session Contributors

Sidibe Astou Nathalie, OSM Mali

Fatiman Alher, OSM Niger

Sharon Omojah, OSM Kenya

Tshedy Thobei, OSM Lesotho

M'Bella Barry, GeoSynapse, Guinea

Léa Soma, OSM Burkina Faso

Maimouna Kone, OSM Côte d'Ivoire

OpenStreetMap CONTRIBUTORS

OSM, a good medicine for health applications ?

Guy Pacome,
OpenStreetMap Côte d'Ivoire

Ifeatu Enedah, Brains and Hammer, Nigeria

Nombré Apollinaire,
ILRI, Burkina Faso

Abedje Nesit Bérenger,
Development Gateway,
Côte d'Ivoire

Laura Mugeha.
Crowd2Map, Kenya

OSM data for land-use applications

Enock Seth Nyamador,
OSM Ghana

Stephen Mawutor Donkor, OSM Ghana

Nako Kofele Martin Alain, Expanding Horizon,
Cameroon

Eyongetta Njeassam,
GYSSL, Cameroon

Benard Kulohoma,
University of Nairobi,
Kenya

Alex Duclaux, SIGE,
Morocco

Gender and local empowerment

Ata Franck Akoute, OSM
Togo

Barry Mamadou Bella,
GeoSynapse, Guinea

Confidence Kpodo, UCC
YouthMappers, Ghana

Rock around SDG's with OSM

Michael Diala, UN SDSN,
Nigeria

Nathalie Sidibe, OSM
Mali

OSM collaboration with institutional and governmental actors on urban planning projects

Willy Franck Sob,
SOGEFI, Cameroon

Ernest Ruzindana, Youth Mapper,
University of Rwanda



The OpenStreetMap community participating at UR West and Central Africa.

Eight interactive workshops engaged session participants at UR West and Central Africa

Modeling and communicating the consequences of climate change for economic development

Recent advances in the economic sciences allow us to quantify climate risks so they can be included numerically in economic planning and decision making. This workshop presented an approach and how it is being applied by the Ministry of Economy, Planning, and Regional Development (MINEPAT) of Cameroon.

The workshop covered a peer-reviewed methodology for assessing the economic impacts of climate change that can be integrated into the decision-making tools of public authorities and private operators.

Participants engaged in hands-on testing of an online platform called etO.co, where decision makers can access all the results of economic modeling, with explanations in French and English. In addition, Ariane Wakap from the Ministry of Economy, Planning, and Regional

Development explained how training helped familiarize the government of Cameroon with the results and with ways to communicate them to public and private decision makers.

Key takeaways

- Recent advances in economic sciences allow for a quantitative integration of climate risks into economic decision making and planning.
- Staff from relevant ministries and private-sector actors can

be trained to implement these modeling and communications methods in their workflows.

- The government of Cameroon has made significant progress in training its staff to apply these methods.

Session Contributors

Florent Baarsch, etO, United Kingdom

Ariane Wakap, MINEPAT Cameroon

Discover the world of OpenStreetMap

OSM is an innovative project with a great many talented people involved and immense and diversified potential in terms of disaster management. This workshop aimed to transmit a spark of open data to everyone who had not yet been ignited.

OpenStreetMap engages volunteers in building a database of free geographical data from throughout the world. This session presented the OSM project and the ways and purposes for which the database has been used in Africa, particularly in tourism, the mapping of erosion and flood risks in Kinshasa (DRC), the promotion of gender equality (GirlsMap in Togo and elsewhere in Africa), and territorial diagnosis and decision support in the city of Bouaké in Côte d'Ivoire.

Key takeaways

- In addition to its extensive database, OSM offers a wide range of tools and a large community that can play its part in disaster management and the development of African countries.
- The GirlsMap initiative is about to be implemented in Cameroon, Chad, and Senegal.



Source: Juliana Castano Isaza

Interactive sessions started off the conference to put people to work and out of their comfort zone.

Session Contributors

Ata Franck Akouete, OpenStreetMap Togo

Yongololo Kapay, OpenStreetMap DRC

Saliou Abdou, OpenStreetMap Benin

"[We have to ask,] what relationship do OpenStreetMap communities have with public services specialized in disaster management to ensure that this wealth of data and tools is properly integrated into disaster prevention and response protocols?"

—Dr Rafatou Fofana, Volta Basin Authority (VBA), Burkina Faso

Spatial data and resilience planning

Free and open-source geospatial information—like hazard maps and Earth Observation data—help local governments make informed urban resilience decisions. In this workshop, working groups formed of government officials engaged in a mapping activity to gain an understanding of cross-sectoral socioeconomic and disaster risks in their cities.

Spatial data empower local municipal officials to take action against the climate risks their cities face. Centered on the results of a review of local conditions and hazards, including flooding and road network vulnerability, the Spatial Data and Resilience Planning Workshop directly informs the preparation of real strategic plans and helps policymakers understand investment priorities across urban neighborhoods, levels of investment, kinds of projects, and timelines. Through its activities and dialogue, the workshop stimulates a spatial and cross-sectoral—rather than siloed—perspective on urbanization, urban resilience, and related socioeconomic risks.

The UR West and Central Africa session featured presentations of Earth Observation techniques useful for monitoring the urban and coastal environments, such as terrain deformation analysis, land cover change, and coastal erosion. City working groups were chaired by government delegates from the cities of Bamako, Mali; Banjul, The Gambia; Kinshasa, DRC; Monrovia, Liberia; and Zanzibar City, Tanzania.

Key takeaways

- Free-to-use and publicly accessible geospatial datasets can help city leaders make rapid and accurate urban planning decisions.

- Urban growth has a unique spatial pattern in each city that may increase its exposure to hazards.
- Most cities have critical roads, schools, or other social service infrastructure that are vulnerable to hazards, especially flooding.

Session Contributors

Isabel Margarita Cantada,
World Bank Group

Grace Doherty, World Bank
Group

Fabio Cian, World Bank Group

Alberto Lorenzo Alonso,
European Space Agency

Workshop contributors

Simple solutions to complex problems: A toolkit for quick assessment of coastal problems and adaptation solutions

Alessio Giardino, Deltares
Kouadio Affian, Curat

Early warned and steady wins the race against disasters: A CREWS initiative story (CREWS workshop)

Tamara Comment, MET
Alliance

Cécile Arnaud-Lorillou,
World Bank Group

Michel Nikiema, Climate
Risk and Early Warning
Systems (CREWS)

Muliru Mashauri, World
Bank Group

Cheikh Kane, Red Cross
- Red Crescent Climate
Center

Become a drone open-source hero

Stephen Mather,
OpenDroneMap

Cristiano Giovando,
GFDRR/World Bank Group

Critical infrastructure and how to build urban resilience: We need your voice!

Mike Woning, Delft
Technical University

Alvina Erman, GFDRR /
World Bank Group

Honoré Tabuna, CEEAC

Oliver Kipkogei,
Intergovernmental
Authority on Development,
IGAD

Michel Ndjatsana,
COMIFAC

Moudi Pascal, Centre
Climatique CEEAC, Douala

Pierre Y. Mounanga,
Projet de Développement

des Infrastructures
Locales (PDIL2), Gabon

Célestin Nga, Plateforme
Sous-Régionale des
Organisations Paysannes
d'Afrique Centrale -
PROPAC

Megha Mukim, World
Bank Group

Laurent Corroyer, World
Bank Group

Vulnerability mapping with OpenDataKit, KoBoToolbox, and OpenMapKit: Technical demonstration and feedback from the Cohesion Bouaké, OpenCities Accr, and GEMS projects

Arsène Adou, Université
Félix Houphouët-Boigny,
Abidjan

Nicolas Chavent,
OpenStreetMap/
geOrchestra/UNSDIT/ HOT
US Inc/Projet EOF/LLG

Severin Menard,
OpenStreetMap/Projet
EOF/LLG

Stephen Mawutor,
Ghana Youth Internet
Governance Forum

Jan Dams, Fragile,
Conflict, and Violence (FCV)
- GEMS

OSM collaboration with institutional and governmental actors in the context of urban planning projects

Willy Franck Sob,
SOGEFI, Cameroon

Ernest Ruzindana, Youth
Mapper, University of
Rwanda



Art in Resilience

Artists have an essential and up-to-date role in our societies. UR wanted to involve as many artists as possible in this event.

Several weeks before the conference, a call for artists was launched in Côte d'Ivoire. A great many talented people responded, making for a tough selection phase, but ten artists, both male and female, were finally chosen. They exhibited their works all over the conference site, allowing everyone to immerse themselves in the artistic offerings throughout the event. Some works were even created live in front of conference participants.

Through their work, these artists showed how the arts can be used to highlight, realize, or improve societal understanding of the risks resulting from natural disasters.



Green event

Carbon emissions from the conference were offset through our partnership with Climate Neutral Now, the United Nations' platform for carbon offsetting.

Climate Neutral Now is an initiative launched in 2015 by UN Climate Change to encourage everyone to take action to help achieve the goal of a climate-neutral world by the middle of the century, in line with the Paris Agreement. The organizing team of UR West and Central Africa did its utmost to minimize the carbon impact of the conference. Recycling was implemented onsite, and water fountains were provided to avoid the use of disposable plastic bottles.

All participants were encouraged to calculate their CO² emissions from air travel using the ICAO calculator and to learn how to offset them. Onsite artwork made from recycled materials also helped to raise awareness.

For more information, visit <https://unfccc.int/climate-action/climate-neutral-now>



UR

Thank you for being part
of our ever growing community.

The UR Team



What is Understanding Risk?

Understanding Risk (UR) is an open and global community of over 8,000 experts and practitioners interested and active in the creation, communication, and use of disaster risk information. This vibrant community—a diverse group of people from the private, public, nonprofit, technology, and financial sectors—meets at the UR global forum every two years. Each iteration of the UR Forum has produced new ideas and partnerships that have improved risk information and helped to integrate evidence into policymaking and development planning.

This publication captures the experiences, lessons, and best practices in the field discussed at the UR West and Central Africa Conference, held in Abidjan, Côte d'Ivoire, from November 20 to 22, 2019.



GFDRR
Global Facility for Disaster Reduction and Recovery

ACP-EU Natural Disaster Risk Reduction Program
An initiative of the African, Caribbean and Pacific Group, funded by the European Union and managed by GFDRR

In collaboration with:



www.understandrisk.org