Digital Earth
AFRICA

DE Africa Quarterly Progress Report

October - December 2021

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About Digital Earth Africa

Our vision

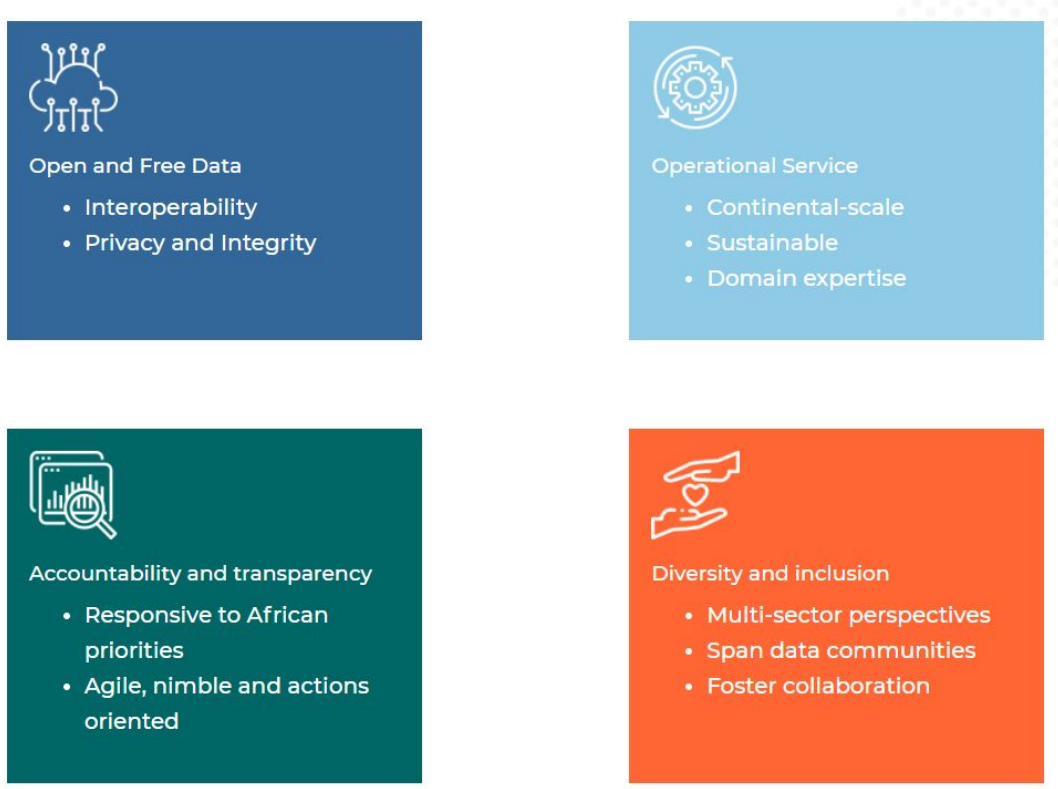
DE Africa will provide a routine, reliable and operational service, using Earth observations to deliver decision-ready products enabling policy makers, scientists, the private sector and civil society to address social, environmental and economic changes on the continent and develop an ecosystem for innovation across sectors.

Our mission

DE Africa will process openly accessible and freely available data to produce decision-ready products. Working closely with the AfriGEO community, DE Africa will be responsive to the information needs, challenges and priorities of the African continent. DE Africa will leverage and build on existing capacity to enable the use of Earth observations to address key challenges across the continent.

About this report

This Quarterly Progress Report provides a snapshot of DE Africa Phase II progress made between April and June 2021, as aligned with DE Africa's 2021 Annual Work Plan.

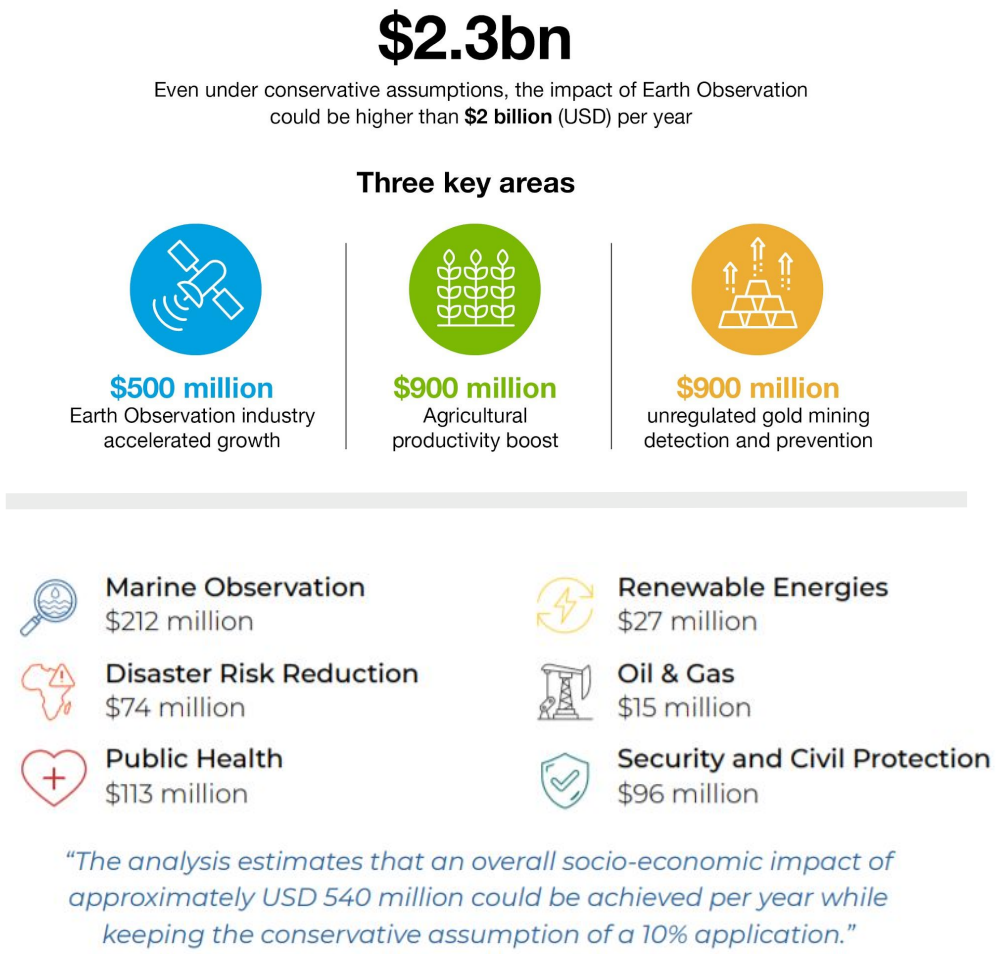


The governance of DE Africa is guided by several key principles

DE Africa outcomes - our work has impact

- **Countries are empowered**, with Earth observation data about land, water resources and human settlements enabling them to make evidence-based policy decisions.
- **Lives are improved**, through access to information that empowers governments, individuals and communities to make informed choices.
- **Development activities are more effective** through access to information that provides insights to better understand the root cause of issues and develop impactful solutions. Development of decision ready products, and analysis ready services to support African Union Agenda 2063 and the UN SDGs.
- **Digital transformation is advanced** through industry uptake and innovation using products and services from DE Africa. Increased economic development and job creation, through access to data for commercial products and services development.
- **Over $2bn USD of benefits to the African continent** are possible through accelerated industry growth, improvements in agricultural productivity and the detection and prevention of unregulated mining.

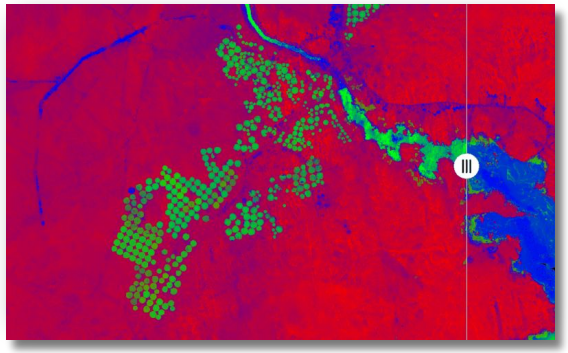
*Source; World Economic Forum Report 'Unlocking the Potential of Earth Observation to Address Africa's Critical Challenges'



October - December 2021 highlights

Technical successes

- 2.9 Pb data available in AWS
- Annual Landsat GeoMAD service operational and fractional cover coming soon
- Provisional cropland extent map (available for most of Africa)



Fractional cover service comparison - Mozambique

Strong partner support

- Active Governing Board & TAC
- PMO transition underway
- Partner awareness raising meetings
- Sustainment plan complete and implementation in progress

PMO recruitment is underway

Growing user capacity and engagement

- New training platform released in English & French
- >1450 sandbox registered users
- Over 250 completions of the Sandbox training

DE Africa Training Session - Ghana

Increasing engagement & awareness

- New economic value study published
- Event participation, including GEO week
- Zanzibar climate documentary released with >1.3m views

Zanzibar: The Essential Mangrove AWS Climate Next Documentary

Governance

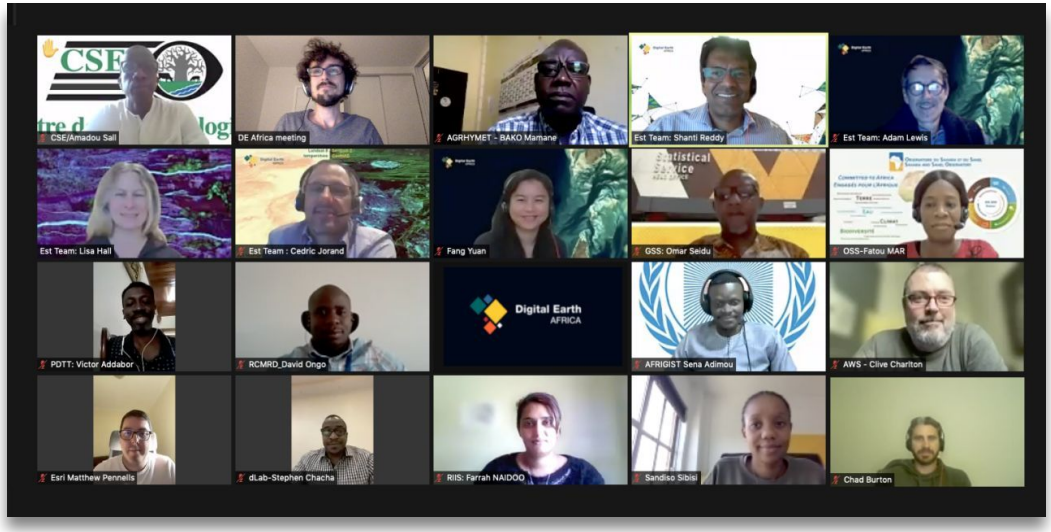
The DE Africa Governing Board met twice between October and December. Key decisions included approval of the 2022 Annual Work Plan and operational budget, endorsement of the updated Diversity and Inclusion Strategy, and approval of DE Africa's Risk Management and Monitoring, Evaluation and Learning frameworks.

We also welcomed two new Governing Board members:

- Hon. Samuel Jinapor, Minister for Lands and Natural Resources, Ghana
- Dr Mmboneni Muofhe, Deputy Director-General for Technology Innovation, Department of Science and Technology, South Africa

DE Africa's Technical Advisory Committee (TAC) continues to provide strong guidance and support for the program, meeting for the 10th time in November. The meeting was well attended as always, and focused on technical work plans for 2022.

The GEO trust fund financial steering committee continues to actively help deliver the DE Africa program.



DE Africa's 10th TAC meeting

Introducing DE Africa's new Governing Board members

Program delivery transition

To celebrate the South African National Space Agency (SANSA) becoming the new DE Africa PMO host, a launch event was hosted by the Australian High Commission in Pretoria during World Space Week in October, with members of the diplomatic community, government, scientists and researchers in attendance. The process of transitioning the PMO to SANSA is well underway. Recruitment for key leadership positions is on track to see new team members onboarded in March-April 2022.

Support from DE Africa Implementing Partners has also gone from strength to strength this quarter. On behalf of DE Africa, our Partners have hosted events (both virtual and in person), increased social media promotion and run awareness raising sessions with potential DE Africa users across the continent. We have also worked closely with our Implementing Partners to design work programs for 2022, which are now complete and endorsed by the Governing Board.

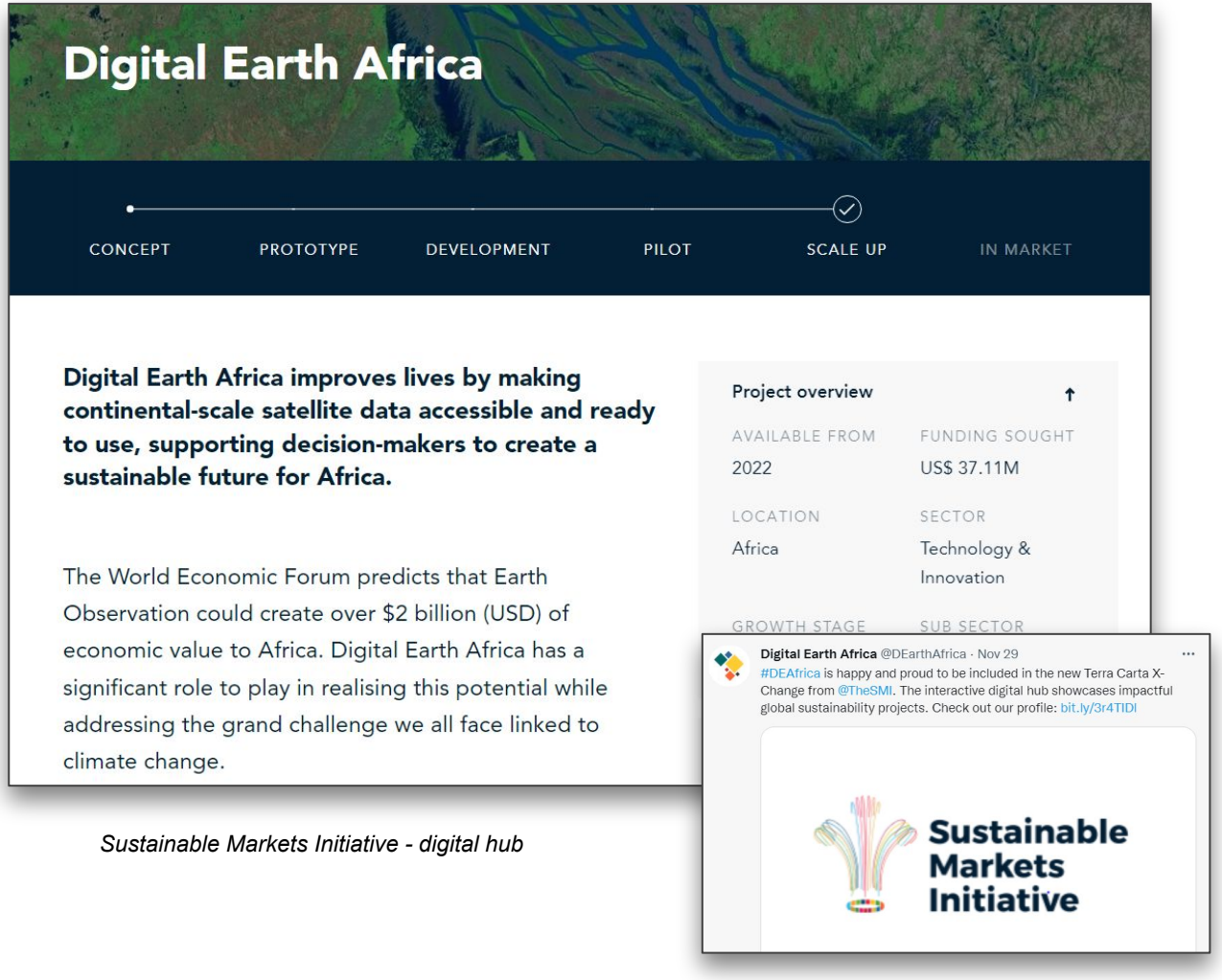
PMO launch event

DE Africa sustainment

Securing funding for the next Phase of DE Africa is of the highest importance and implementation of DE Africa's future funding strategy is now underway. Phase-III will ensure that DE Africa is embedded in the business of government, academia and civil society and will grow the number of DE Africa users and the associated impacts.

A draft report identifying a number of possible funders and how they might be approached has now been completed by DevGlobal, the consulting team supporting DE Africa's sustainment efforts.

DE Africa is featured in the first round of 20 projects showcased by the Sustainable Markets Initiative (SMI), a digital hub connecting impactful sustainable projects with the SMI investor community.



Sustainable Markets Initiative - digital hub

Economic value of EO data

In early 2021, the World Economic Forum, in collaboration with DE Africa and Disal Consulting, published a study titled "Unlocking the Potential of Earth Observation to Address Africa's Critical Challenges". Results indicated that $2bn USD of benefits to the African continent are possible through accelerated industry growth, improvements in agricultural productivity and the detection and prevention of unregulated mining.

DE Africa has now published a follow up report, in partnership with Disal Consulting titled, "Broader Perspectives on Digital Earth Africa". The report investigates the untapped potential impact of EO technologies and DE Africa to an additional six industries on the continent, including marine observation, disaster risk reduction, public health, renewable energies, oil and gas, and security and civil protection.

The new analysis estimates that a further socio-economic impact of approximately USD 540 million could be achieved per year across these additional sectors, while keeping the conservative assumption of a 10% application.

The areas of investigation include:

- **Marine Observation** $212 million
- **Renewable Energies** $27 million
- **Disaster Risk Reduction** $74 million
- **Oil & Gas** $15 million
- **Public Health** $113 million
- **Security and Civil Protection** $96 million

"Possible socio-economic impact of approximately USD 540 million per year assuming 10% application."

Diversity and inclusion

DE Africa is committed to ensuring our work promotes gender equality, and the inclusion of youth and people with disabilities. As part of our D&I focus, we have a strong practical commitment to making our platform and materials available in relevant languages, ensuring people from across the continent can access and use DE Africa products and services.

Our Diversity and Inclusion Strategy was updated and endorsed by the Governing Board to include greater focus on linguistic diversity. A number of DE Africa materials are already available, or will soon be available in French. This includes the majority of the website, learning platform and communication products.

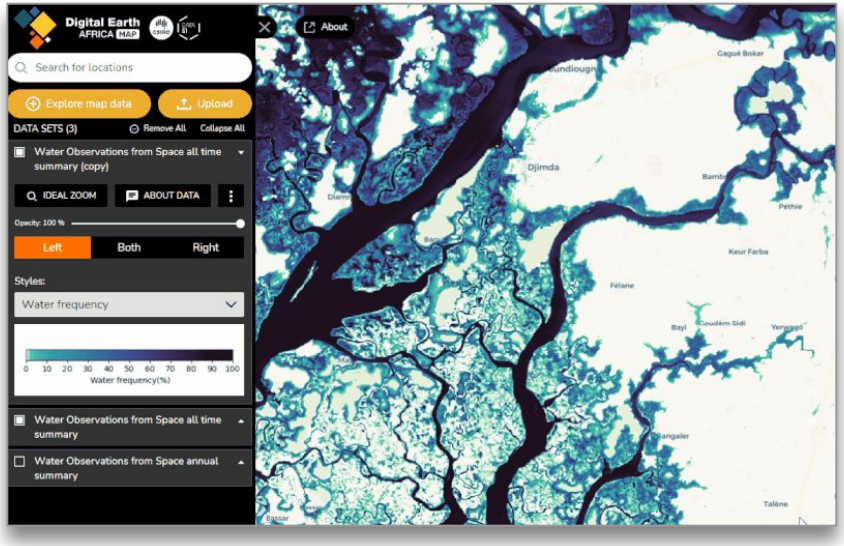
As part of our D&I focus, the DE Africa Water Observations from Space (WOfS) service now has a new look to enhance colour accessibility for visually impaired users (e.g. those with red/green colorblindness).

D&I initiatives this quarter include:

- DE Africa YouthMappers Workshop
- DE Africa awareness sessions in French and English - hosted by CSE
- A presentation by Dr Chris Atchison to the D&I Collaborative Group on the subject of inclusion of people living with disabilities
- Support GIS Day at GIS Day 2021 at TUK and JKUAT universities
- "Building Capacity and Careers" blog
- Continued involvement in the Group on Earth Observations' (GEO) Equity, Diversity and Inclusion working group

"Building Capacity and Careers" blog

DE Africa Youth Mappers workshop

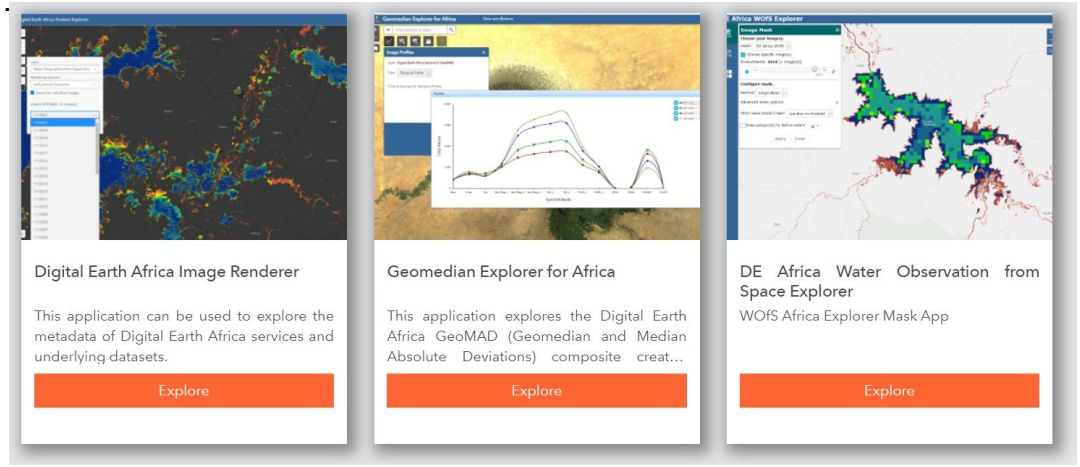


WOfS service new look to enhance colour accessibility.

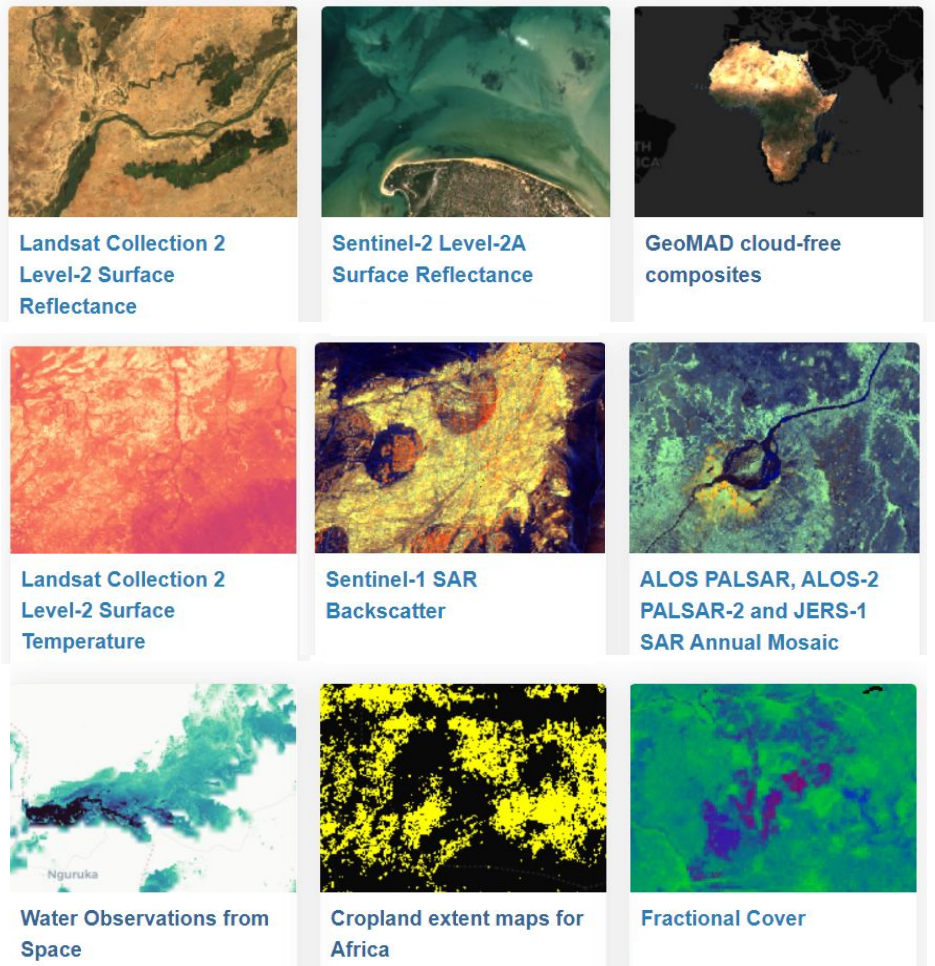
Platform and data

DE Africa now hosts a total of 2.9 PB of data on Amazon Web Services in Cape Town. See the DE Africa Data Catalog or AWS Public Dataset technical documentation for more information. This quarter we have integrated a range of additional data products into DE Africa, including land cover and climate data.

The Africa GeoPortal, supported by ESRI, uses imagery from DE Africa to provide free geospatial tools, data and training for users working on Africa geospatial challenges. A range of new DE Africa datasets and associated Apps are now available through this portal, including WOfS and GeoMAD services.



ESRI Africa GeoPortal Apps



DE Africa Data Catalog

Services and analysis tools

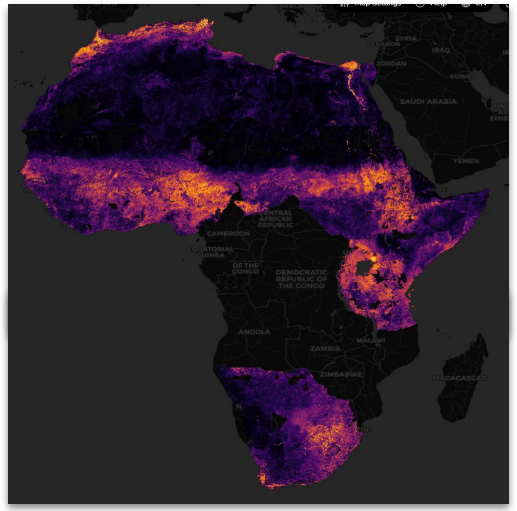
A provisional Cropland Extent service is now available for more than half of the continent, with the final regions due for completion early 2022. The cropland extent service provides important monitoring of crop presence to aid in food security mitigation activities.

DE Africa's new Annual GeoMAD is now available for Landsat 5, 7 and 8 on the DE Africa platform. The GeoMAD service creates a composite representation of pixels for the year for high quality imagery, available from 1984 to present day.

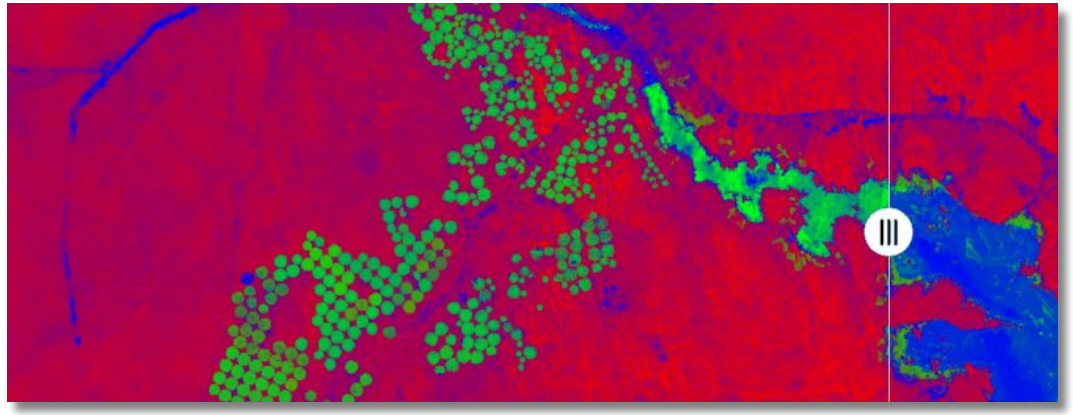
Development of our Fractional Cover service is well advanced. This service describes the landscape by classifying the ground cover as bare, green and non-green and is available from 1980s to the present day. Fractional Cover can be used to analyse vegetation dynamics such as seasonal changes in agricultural and land practices, observe impacts of erosion and assess fuel load for estimating risk of fire.

More information about DE Africa Services can be found here. We are also continuing to improve the content of the DE Africa User Guide (Read the Docs) and the DE Africa notebook repository, to include new datasets and use cases.

Landsat Annual GeoMAD



Cropland extent service coverage



Fractional Cover service

Capacity development

The DE Africa Help Desk is now live and accessible through the website and sandbox at helpdesk.digitalearthafrica.org in both English and French.

Our online 6-week self-directed training program, which supports new users to engage effectively with DE Africa data and products, is now available in both English and French. This remains very popular and we now have over 250 training course graduates.

We are continuing to run our increasingly popular weekly 'live sessions', holding our 60th meeting in November. The sessions support user engagement with DE Africa products to address real-world development challenges.

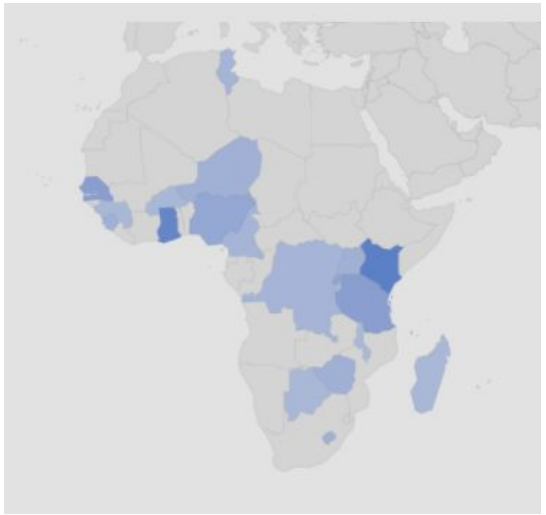
Metrics on our growing user community are shown here.

Bilingual Platform, user support and training

Growing user community

Weekly live sessions are continuing

- Diverse, active participation
- 60th live session held in Nov
- More than 15 people on average per session (max number 26 people)



Countries that participated in the live sessions

Online training success confirmed

- >250 online training awardees
- Train the trainers program complete!

Improving map interfaces

TerriaJS map

- >7000 unique users across >100 countries; interface now in French
- TerriaJS map improvements on-going
- version 8 released inc. French

ESRI Geoportal

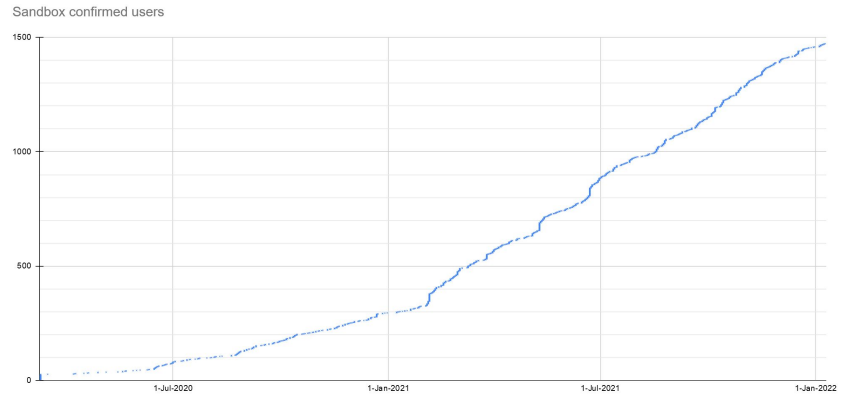
- growing catalog of indexed data

New user facing platform and sites

- Docs.digitalearthafrica.org is live
- Helpdesk.digitalearthafrica.org is live, accessible through website, sandbox and soon through a portal

Rapid increase in sandbox usage

> 1450 registered sandbox users



Industry engagement

The DE Africa Innovation Challenge is a small-scale incubator program targeted at African businesses. It aims to solve real world problems by employing satellite data, making the most of DE Africa services and fostering collaboration between end users and the private sector. As winners of the Innovation Challenge, GIS experts Big Data Ghana and agriBORA, who use data to improve agribusiness, are now taking part in the 3-month incubator, using the full archive of analysis ready satellite data available through DE Africa to help produce open source data or software to solve problems for users across Africa.

DE Africa is also proud to sponsor the Africa Earth Observation Challenge. The AEO Challenge is an annual open innovation challenge which aims to drive entrepreneurial activity in the African space industry. Furthermore, it promotes awareness of EO data's value across the continent and in multiple sectors such as water and food security.

DE Africa Innovation Challenge

DE Africa sponsorship of the Africa EO Challenge

Latest use case studies

Published

- How data and community can save Zanzibar's mangroves, Tanzania - see AWS Climate Next documentary " Zanzibar the Essential Mangrove" (premiered 1st Dec 2021 - now with > 1.3m views)
- Monitoring urbanisation in Gulu City, Uganda
- Detecting Land Degradation Using Geospatial Data, Ghana
- Rising Lakes in the Rift Valley in Kenya
- Monitoring Water Extent Using Earth Observation Data, Ghana
- Using satellite data to monitor agriculture in Ghana - The GAIMS platform from Big Data Ghana

Example cases in development

- Coastal erosion in Senegal, CSE
- Time Series Analysis of Forest Reserve in Burkina Faso, AGRHYMET
- Change detection in Kerio Valley in Kenya, Burkina Faso, AFRIGIST
- Monitoring of Lake Chad, Niger, AGRHYMET

Data driven community climate action

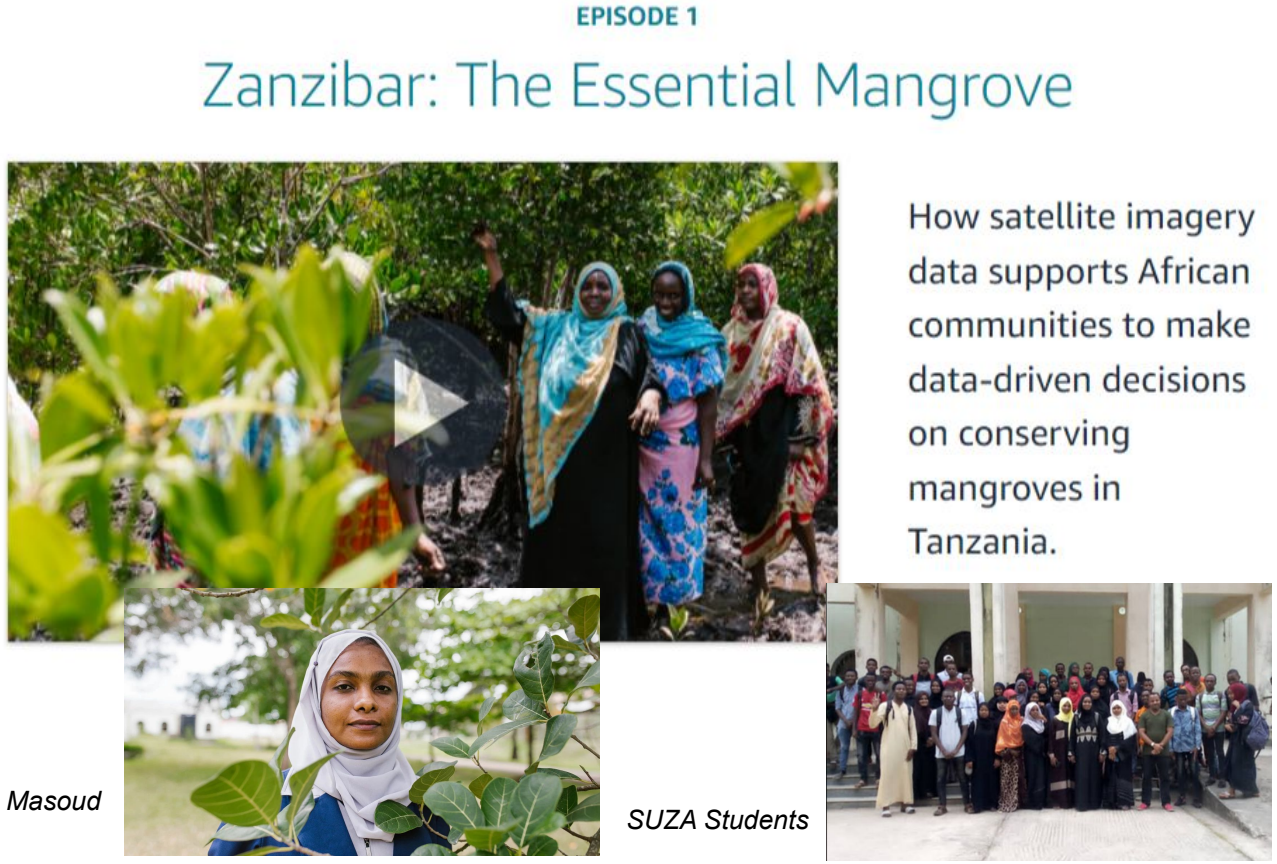
Zanzibar, Tanzania

DE Africa now features in a 10-minute mini documentary, as part of AWS's new Climate Next Series.

The video, called Zanzibar: The Essential Mangrove, details how satellite imagery data supports African communities to make data-driven decisions on conserving mangroves in Tanzania. It is available to view here and supported by a detailed blog here.

This is an excellent showcase of how DE Africa is being leveraged by students in Zanzibar to contribute to the preservation of crucial mangroves, and explores the hopes of the young people of Zanzibar for a more sustainable future. It includes interviews from Kenya-based Establishment Team member, Dr Kenneth Mubea, as well Dr Khairiya Masoud and students from the State University of Zanzibar, who use DE Africa in their everyday practices.

The documentary premiered 1st December and now has >1.3m views.



Dr Khairiya Masoud

SUZA Students

Monitoring urbanisation to support sustainable cities

Gulu City, Uganda

Hans Sentamu has been working with Dr Jane Bemigisha, Executive Director at ESIPPS and DE Africa Implementing Partner, Regional Centre for Mapping of Resources for Development (RCMRD), to better understand how urbanisation is impacting one particular area in Northern Uganda - Gulu City.

The urban extent of Gulu Municipality between 2017 and 2020 grew by approximately 4km^2, mostly along the major roads. By delivering impactful analysis in a short time frame and with free and open data, DE Africa provides a powerful platform to inform policy makers in the design of sustainable cities.

Read more here

Dr. Jane Bemigisha; Hans Mark Sentamu

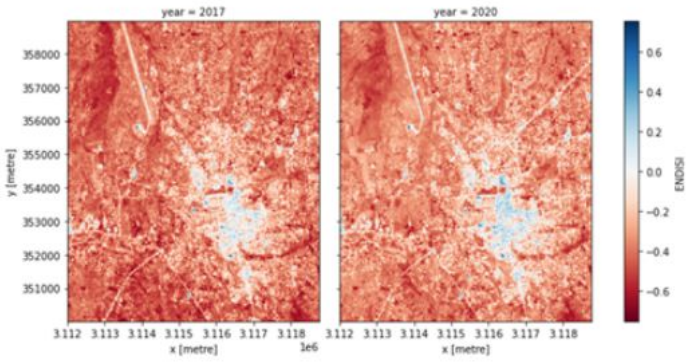


Figure 4: ENDISI algorithm showing urbanisation in Gulu.High ENDISI values indicate impervious surfaces.

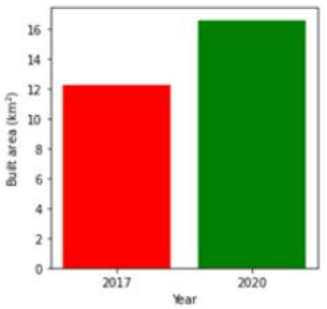


Figure 6: Plot of urban extent from 2017 to 2020.

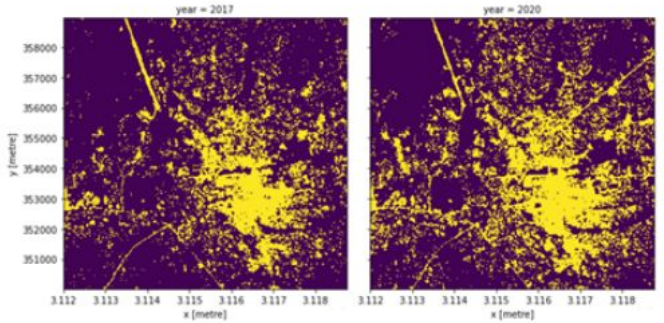


Figure 5: ENDISI algorithm output showing change in extent of urbanisation in Gulu.

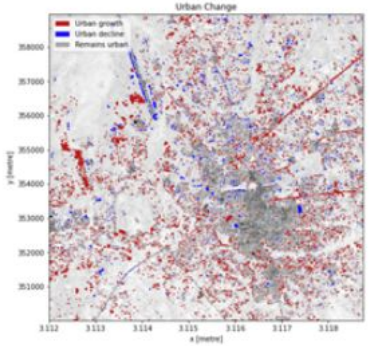


Figure 7: Urban growth hotspots in Gulu.

Rising Lakes in the Rift Valley

Kenya

For some time now, the rising water volume of most Rift Valley Lakes in Kenya has led to significant economic, social and environmental challenges, with widespread flooding causing displacement of populations, destruction of infrastructure and continued losses to the tourism sector.

Learn how David Ongo and the team at RCMRD used DEAfrica services such as WOfS to analyse the changing lakes and inform decision making around management of the systems.

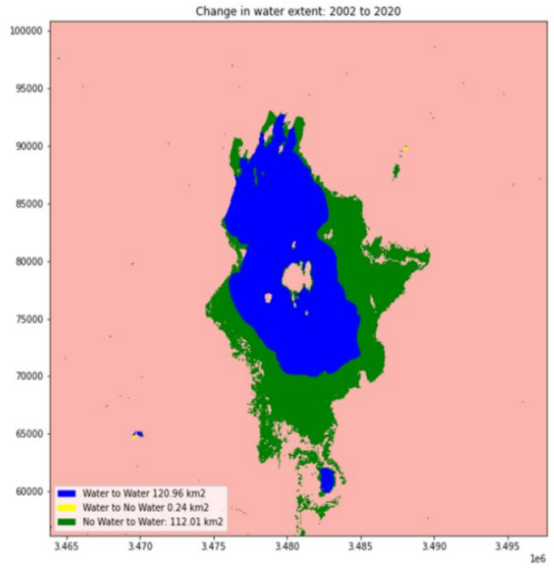


Figure 1: Change analysis of the lake water extent between 2002 and 2020, the lake has expanded by 112.01km2.

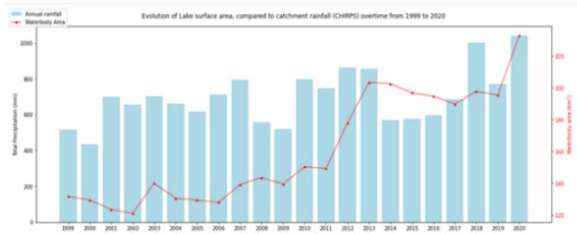


Figure 2: A gradual increase of rainfall is observed during this period, however, to fully understand the cause of the expansion, this analysis should be expanded to cover other rift valley lakes.

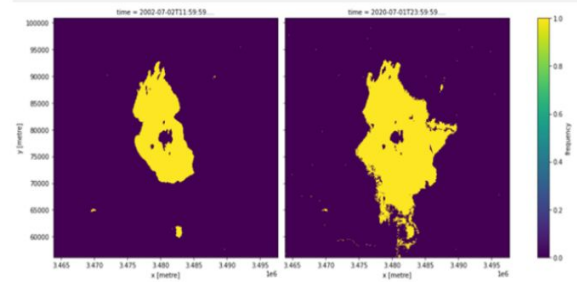


Figure 3: Plotted water classified pixel for the two dates where we have the minimum and maximum surface water extent.

David Ongo

Climate adaptation: coastline monitoring

West Africa

The coastlines of West Africa are ever changing with dynamic sand-spits off Senegal driven by north-south coastal currents, vast inter-tidal mangrove swamps in the estuaries of The Gambia, through to mobile sands on the Ghanain coastline at Accra where urban flooding is a known hazard.

DE Africa is working with the Centre de Suivi Ecologique (CSE) in Senegal, the West African Coastal Areas Management Program, the international Committee on Earth Observation Satellites and Digital Earth Australia to prove the feasibility of a comprehensive coastline monitoring system for Africa.

See DE Africa Insight report - Empowering Climate Action in Africa.

Estimated rates of coastal erosion (red) and deposition (blue) south-east of Dakar, Senegal. Units are metres per year. (Digital Earth Africa)

Changes in coastline positions due to erosion and deposition around marine infrastructure, Cotonou, Benin, 2000–2017 (Digital Earth Africa).

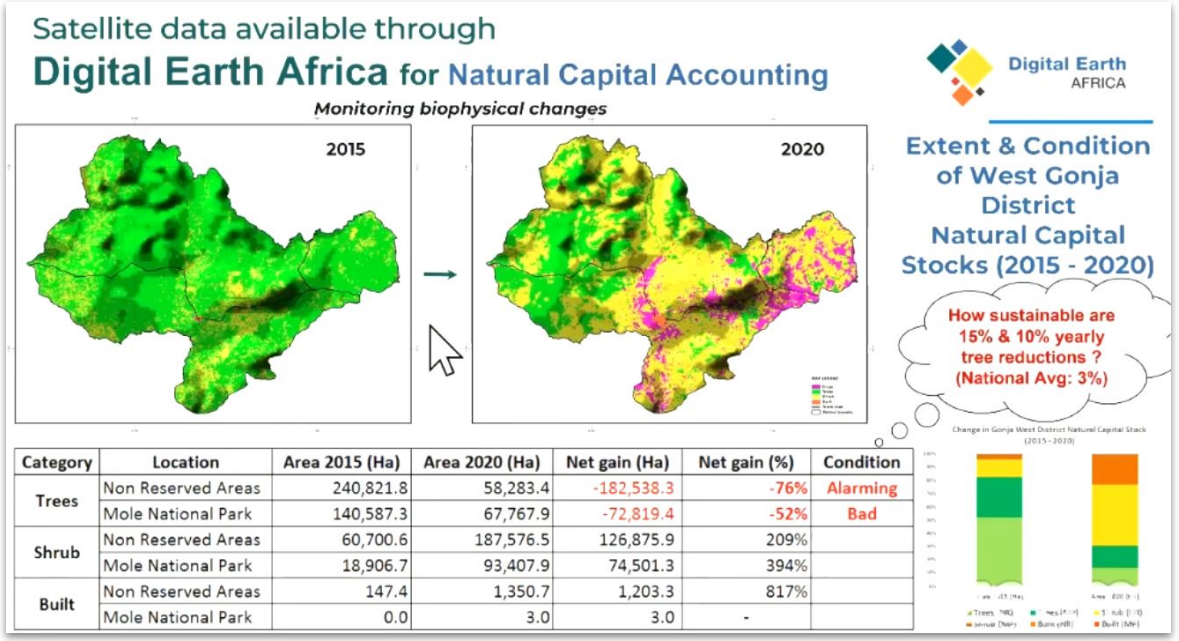
DE Africa support for government decision making

Ghana Statistical Service

Statistics agencies provide valuable information to governments, industry and other stakeholders. By integrating emerging sources of Big Data into their research and practices, statistics agencies are able to enrich and strengthen their ability to provide trusted, expert advice and insights to government and decision makers.

The Ghana Statistical Service (GSS) is at the forefront of this data revolution and is now integrating the non-traditional data and services provided by DE Africa to supplement their existing data sources and strengthen their analysis. Their work showcases how Earth observation data can be leveraged to generate more timely statistical outputs and provide richer data at a more disaggregated level for informed decision making, all at minimal additional cost.

GSS have used DE Africa to support National Capital Accounting, land cover and land use statistics and patterns of urbanisation. They have also integrated DE Africa derived insights into recently published Constituency Profile reports, which provide valuable information on the size, structure, and distribution of the population and socio-economic characteristics of key constituencies.



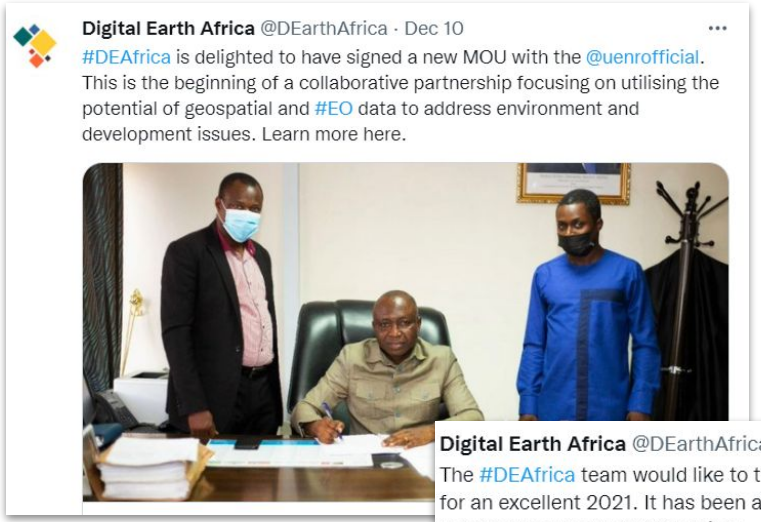
Category	Location	Area 2015 (Ha)	Area 2020 (Ha)	Net gain (Ha)	Net gain (%)	Condition
Trees	Non Reserved Areas	240,821.8	58,283.4	-182,538.3	-76%	Alarming
	Mole National Park	140,587.3	67,767.9	-72,819.4	-52%	Bad
Shrub	Non Reserved Areas	60,700.6	187,576.5	126,875.9	209%	
	Mole National Park	18,906.7	93,407.9	74,501.3	394%	
Built	Non Reserved Areas	147.4	1,350.7	1,203.3	817%	
	Mole National Park	0.0	3.0	3.0	-	

Partnerships and aligned programs

DE Africa is delighted to have signed a new MOU with the University of Energy and Natural Resources, Ghana. This is the beginning of a collaborative partnership focusing on utilising the potential of geospatial and #EO data to address environment and development issues. Read more here.

We are in active discussions with the Rwandan National Space Agencies on how to strengthen our collaboration throughout 2022, and are investigating other collaborations with groups such as the Global Partnership for Sustainable Development Data (GPSDD), UN Food and Agriculture Organisation (FAO), and the World Bank.

We continue to maintain strong relationships with the international Earth observation community, through our status as GEO initiative and our support for the Open Data Cube and the Committee on Earth Observation Satellites (CEOS).



Building awareness

This quarter we continue to see significant growth in community engagement on social media as well as increasing traffic to the website. Key metrics are shown on the following page.

A highlight for this quarter was the release of the AWS Climate Next documentary “Zanzibar;the Essential Mangrove” featuring DE Africa, which premiered on Dec 1st and now has over 1.3m views. Our work in Ghana also received press coverage. Check out DE Africa In The Media.

This quarter, the DE Africa Team and Partners have participated in a range of successful events across the continent and internationally, including GEO week (international), AfriGEO symposium, AfricaGIS (Côte d’Ivoire), Africa Water Week (Namibia), Big Data Showcase (Ghana) and Data Tamasha (Tanzania). 13 workshops/awareness raising sessions took place gathering over 250 people.

Digital Earth AFRICA

2021 communication metrics

Twitter

Gained **1,517 new followers** in 2021 - 3,603 total

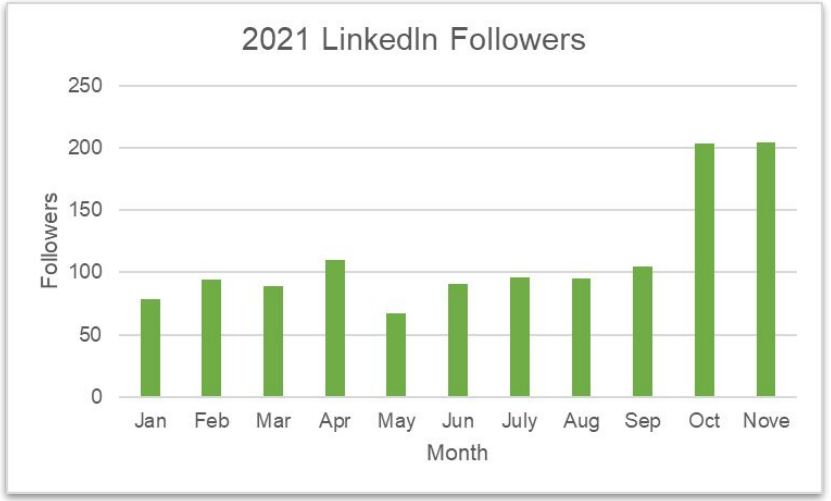
601,100 impressions over 2021

With **81.8K,** with the highest impressions in May

LinkedIn

Gained **1,367 new followers** in 2021 - 1,765 total

A total **152,637 impressions** over the year and **867** mentions from other accounts



Website

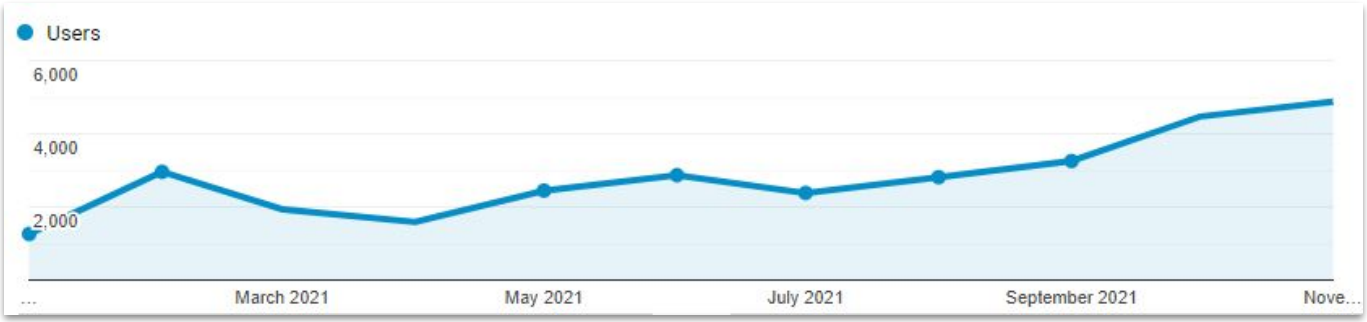
A total of **28,101** visitors so far in 2021.

Average time on page **3m 57sec**

Top countries

USA 16%, Australia 8%, Kenya 7%, South Africa 4.5%, UK 4%, Nigeria 3%

Website Visitors 2021



Note all calculations made on data 1st January to November 30th 2021.

Digital Earth AFRICA

Acknowledgements

THANK YOU