

Environment Information Network Bulletin

Issue 1

January- March 2019

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**National Environment
Management Authority**

Environmental Monitoring using Earth Observation Technologies

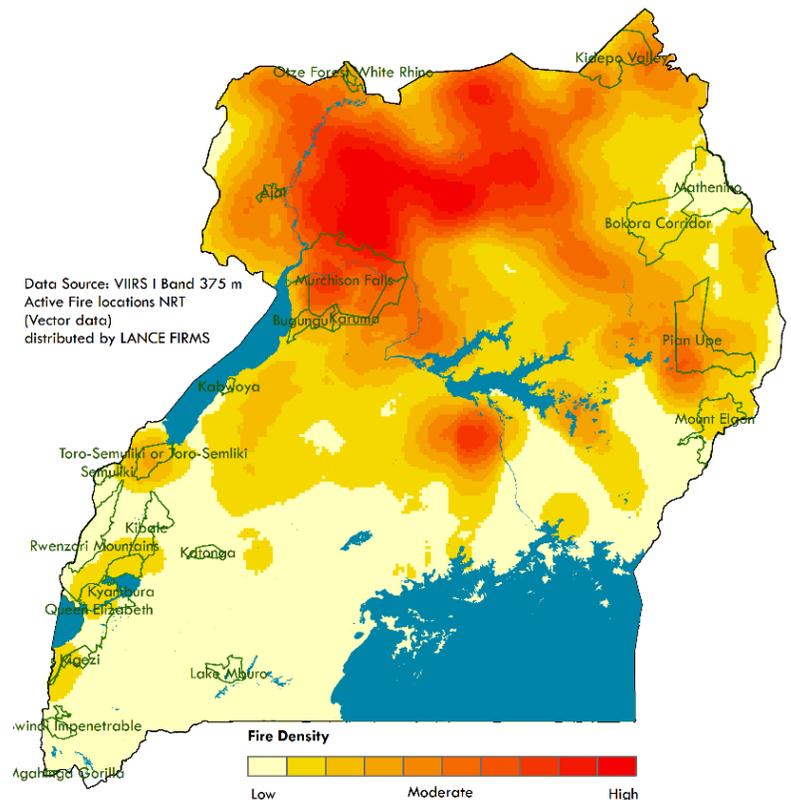
Overview

Due to drought, fires have ravaged many parts of the country and a lot of people's properties have been destroyed including 600 acres of Atiak sugarcane plantation in Northern Uganda.

Uganda received a lot of rainfall in November 2018 leading to floods and landslides that claimed a number of lives.

Issue 1 is on management of fires in protected areas by Uganda Wildlife Authority, assessment of loss of forest cover, unpredictable rainfall start, assessment of flooding of Lwajjali wetland and a success story on restoration of Limoto wetland.

Issue 1 features selected environmental topics and showcasing the use of available Earth Observation technologies for monitoring and reporting. This is with an aim of improved decision making and planning in different government departments and other actors.



THE REPUBLIC OF UGANDA

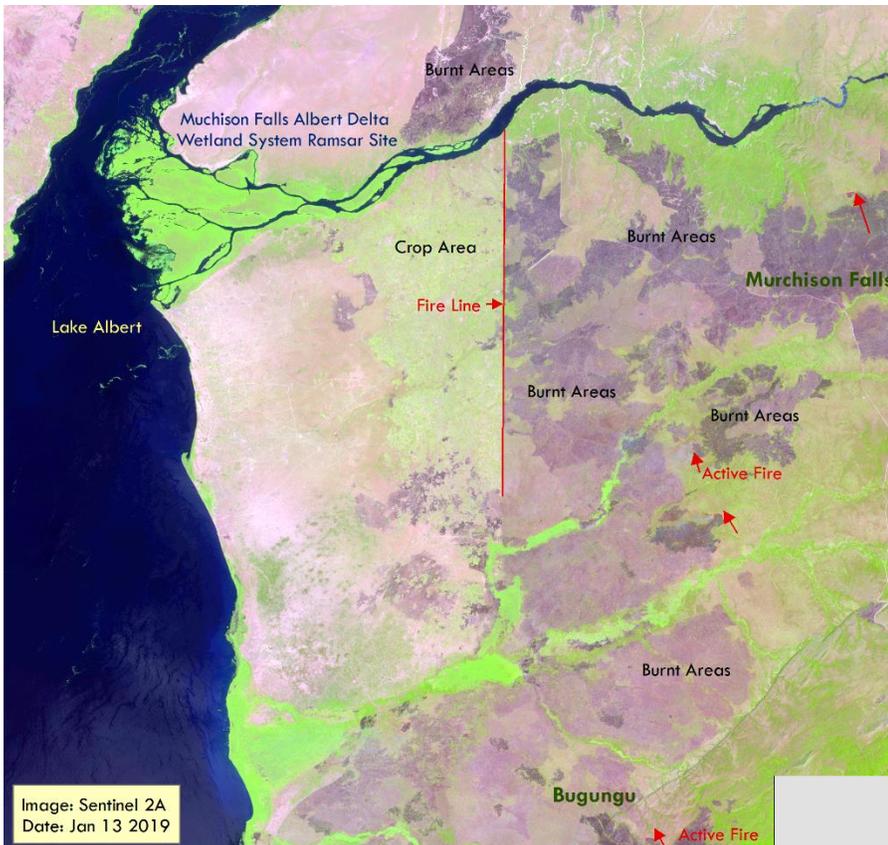


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Fires in Murchison Falls National Park



grazers. The result is seen on the left image from Sentinel 2A Jan 2019 where fires are clearly contained in Murchison Falls National Park.

Fire often goes out of control because of the high biomass level creating huge fires with wide base and high flames. Firefighting is usually done by rangers although in some cases communities are called upon to help as seen in the photo below.

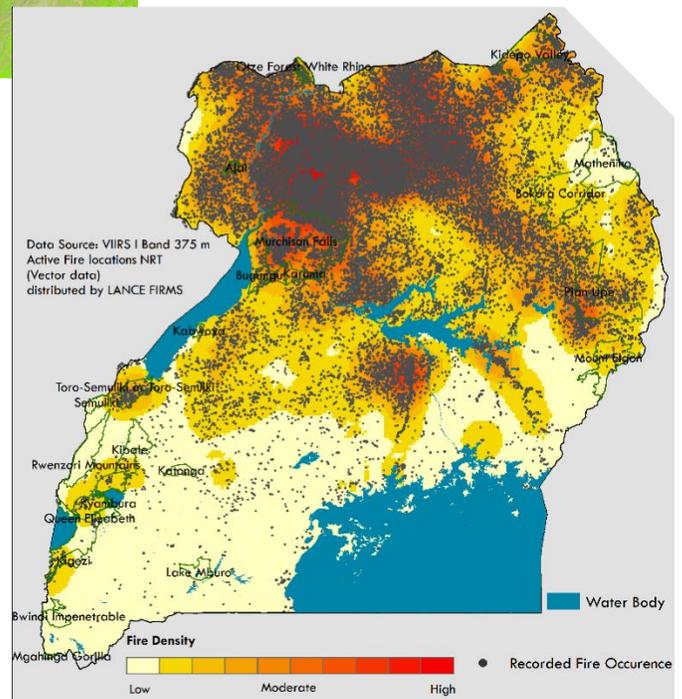


December to February is generally the peak of the fire season and so more fires are seen. This can be seen on the map captioned *Fire density map Jan-Feb 2019* which is generated from MODIS FIRMS fire occurrence data available online.

During the short dry period of late June to July, the management of Murchison Falls National Park undertakes a program of early burning in the selected blocks in the north and south banks of the Nile.

Fire lines (3m wide) are cleared in designated sites to help in stopping wild fire, in an event that fire breaks out either from the surrounding community or is set by poachers.

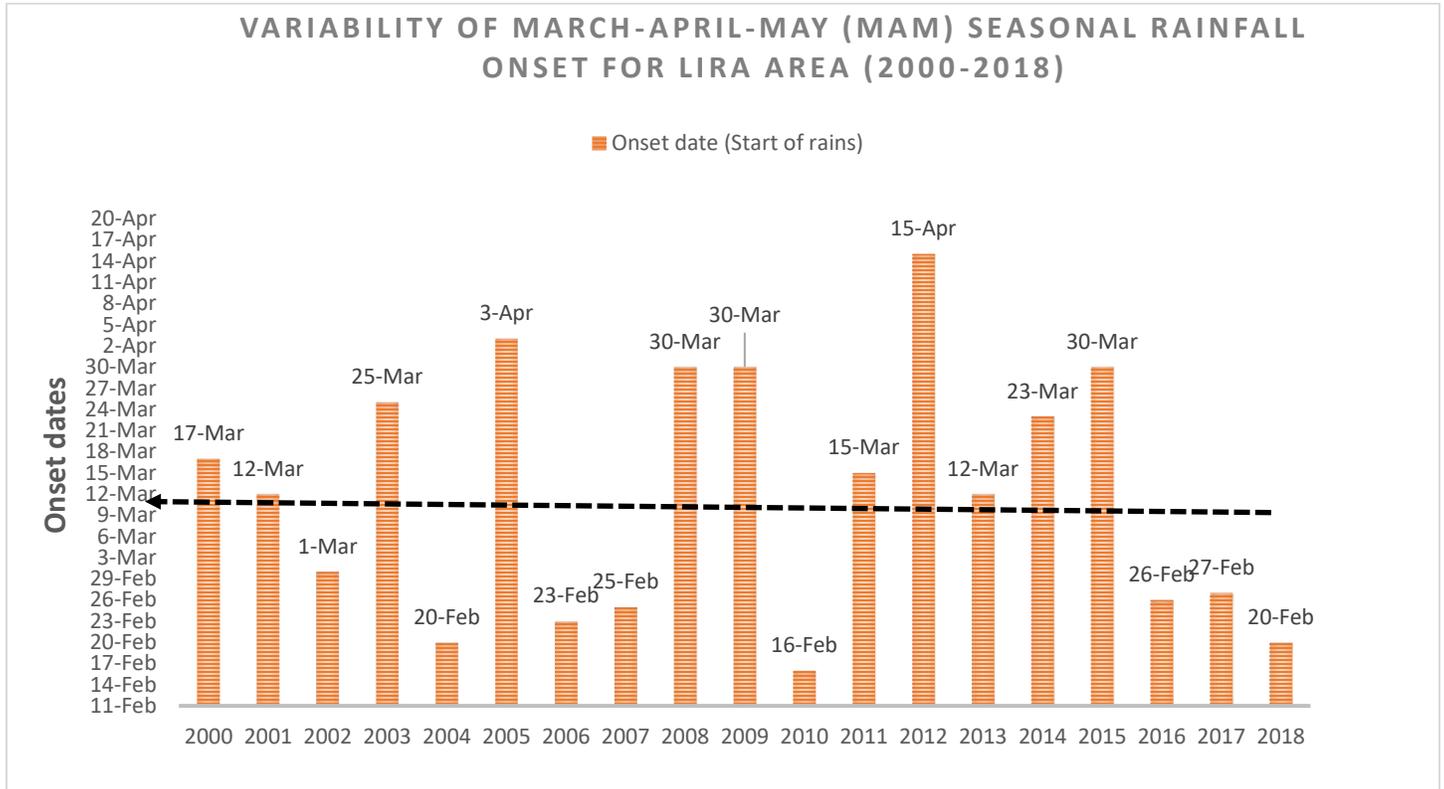
From December to early March, management fires are set in defined fire blocks to create lush burnt flush grass for



Above: Fire Occurrence and Density Map Jan-Feb 2019

Left: Rangers and Community Members Fighting Fires

Unpredictable Rainfall Start of Season – A Worry for Farmers



Source: Uganda National Meteorological Authority-UNMA, Feb 2019.

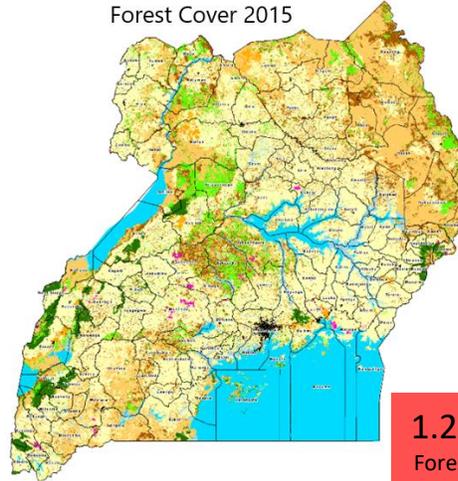
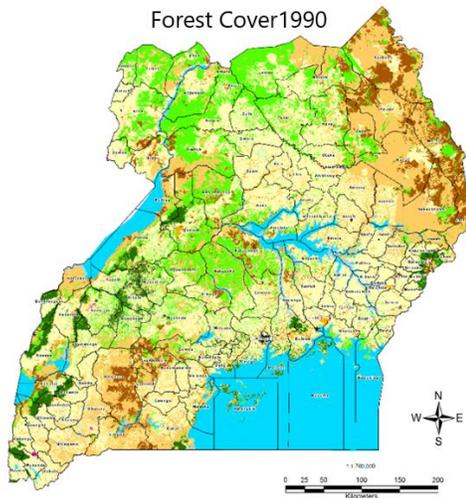
Many farmers attest to start of season being very unpredictable in the recent years. Are these signs of climate change? Lira station which lies in Northern Uganda was selected for this analysis. The MAM (March, April, May rainfall season) is



A farmer tends to his crop of beans in Karamoja, Uganda, an area vulnerable to the effects of season shifts. (Source Environment Systems, 2018)

one of the major cropping seasons in Uganda. Results reveal that earliest onset for the period investigated (2000 -2018) is the 47th day of the year (16th February), which occurred in 2010. The latest onset is on 106th day of the year (15th April) which was registered in 2012. The average onset date for the period is around 72nd day of the year (12th March) as indicated in the above bar graph. However the variability is fairly high as reflected by the coefficient of variation of 24% which calls for further investigation of the drivers/modes of variability of rainfall onsets and improve prediction of onsets. The analysis is a tool for planning planting/cropping period. The method can be replicated in other regions and different rainy seasons for the same purpose.

Protected Areas Leading in Forest Cover

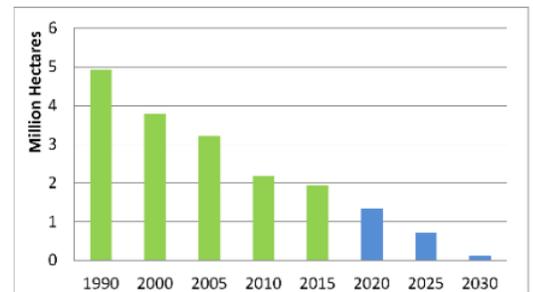


- Broadleaved Tree Plantations
- Coniferous Plantations
- Tropical High Forest Well Stocked
- Depleted Tropical High Forest
- Woodland
- Bush
- Grassland
- Wetland
- Subsistence Farmland
- Commercial Farmland
- Built up areas
- Open water
- Impediments

1.28 Million Ha
Forest Loss 2005 -2010

487,472 Ha
Forest Loss 2010 - 2015

From assessment coordinated by National Forestry Authority-NFA on deforestation from 1990 to 2015, forest cover loss amounted to 1.33million ha. From 2000 to 2015, the annual deforestation rate is 1.8%. From 2005 to 2010, the forest lost was 1.28million hectares. Whereas the area of forest lost is almost the same as the one between 1990 and 2005, the latter on happened over a period of just 5 years as opposed to the former which was 15 years. The annual deforestation rate over the 5 years was 7.15%. From 2010 to 2015, the forest lost was 487,472 hectares making an annual deforestation rate of 4.14% or 95,694ha per year.



Above Graph Showing Overall Reduction in Forest Cover over the Years

Studies have shown that almost all the natural forests outside protected areas had been cleared and most of the remaining forests are in protected areas; forest reserves or national parks. Over the entire period of 25years from 1990 to 2015, Uganda has lost 63% of its forests at an annual rate of 2.51. Currently 55% Uganda’s forests grow on protected land and 45% private land contrasting the situation in 1990 where 70% grew on private land and 30% in protected areas. Table on the right shows the proportion of forests in protected areas and private land. The changes over the years are visualized in the pie charts below.

Comparison between Forest Cover (Ha) in Protected Areas and Private Land per period

Year	PA	Private	Total
1990	1461029	3472242	4,933,271
2005	1461029	2141336	3,602,365
2010	1112758	1200862	2,313,620
2015	1009492	825656	1,835,147

Forest Proportion 1990

Forest Proportion 2005

Forest Proportion 2010

Forest Proportion 2015

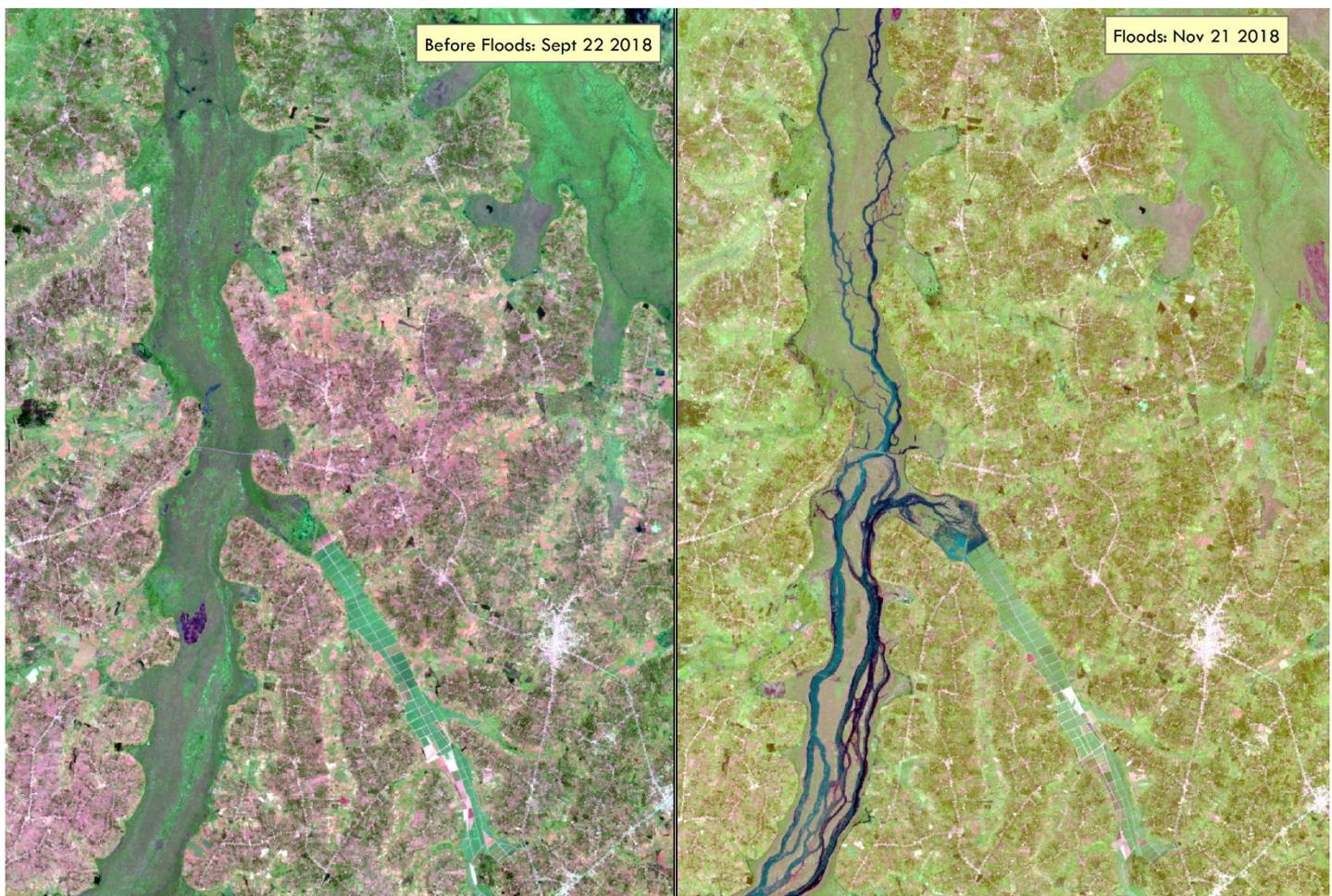


Left: Forest Area Proportion between Private and Protected Areas 1990-2015

Floods in November 2018: Rivers Mayanja and Lwajjali

In November 2018, the heavy rains that ravaged Uganda, especially Central Uganda, caused severe flooding, the most notable being that of River Mayanja in Wakiso and Lwajjali wetland. Lwajjali wetland borders Mukono and Luwero districts and it empties into river Sezibwa in Kayunga district. Using remote sensing and through the environmental data receiving station (Global Monitoring for Environment and Security in Africa-GMES) housed by the National Environment Management Authority-NEMA and Makerere University, the changes in the natural environment such as those caused by heavy rains can be detected mitigation measures undertaken.

The Sentinel 2A images below show a section of Lwajjali wetland captured on two different dates on September 22, 2018 before the rains and November 21, 2018 after the rains. The image in September shows an intact wetland well covered with papyrus and with no siltation. After the rains in November, the papyrus was washed away and open water became clearly visible. This can be clearly seen on second image with flooding of the wetland sections which washed away the road in Ndeze near the sugar cane plantations. During the floods siltation is observed as flood waters deposit silt into the wetland. With improvement in use of near real time earth observation technologies, planners and decision makers can be guided to make informed decisions like where exactly necessary actions can be taken to avoid the situation from expanding to river sezibwa and then Lake Kyoga which can affect fishing and agriculture.



Flooding in Uganda is increasing day by day arising from the increased degradation of wetlands especially in urban areas which is rendering most wetlands incapable of performing their natural flood mitigation function.

Wetlands Restoration: A success story in Limoto wetland

It is not every day that environment recovers from human destruction. But with consistent efforts from the Ministry of Water and Environment and the National Environment Management Authority, rehabilitation of Limoto wetland in Pallisa district has been a success story. The efforts began in 2016 when the Ministry of Water and Environment through the Wetlands Management Department in partnership with the National Environment Management Authority and Pallisa district local government made a decision to start the restoration of a section of Limoto wetland in Puti-Puti sub-county that was severely degraded.



A section of the Limoto wetland shown in the orange box marked 1 was used as farming land at the beginning of 2016. Interventions by NEMA, Wetlands Management Department of the Ministry of Water and Environment and Pallisa district local government started in 2016 with the communities farming in the wetland being offered alternative sources of livelihood to vacate the land. Degradation had reached the banks of Lake Lemwa which is the source of water for Pallisa town as seen in the 1st satellite image of 2016. The farmers agreed to vacate the wetland section paving the way for demarcation and restoration of the wetland. Recovery of the wetland is seen in image 2.

Further satellite derived analysis using Normalized Difference Vegetation Index (NDVI) show improved vegetation conditions in the restored area, wetness index also showed high availability of water in the wetland. Field assessments in 2018 showed complete recovery of the wetland and it is already providing natural benefits like filtration of water. Water from this wetland flows into Lake Lemwa where it ends up in the main Mpologoma wetlands before finally pouring into Lake Kyoga as its final destination. Through the 'Building Resilient Communities, Wetland Ecosystems and Associated Catchments in Uganda Project, implemented by the Ministry of Water and Environment with funding from the Green Climate Fund and UNDP, fish ponds have been constructed, a mini-solar powered irrigation system installed and agricultural inputs have been provided to neighboring communities around the wetland. Restoration of the remaining degraded arms of Limoto wetland will commence this year. Application of remote sensing technology is going to be paramount in monitoring restoration efforts and mapping out critical areas of focus.

Environment Information Network (EIN)

An Environment Information Network (EIN) for Uganda was established in 2001 by NEMA, comprising of all Ministries, Departments and Agencies that generate environmental data and information. EIN was established to enable sectors (lead agencies) at national level have a forum for collaboration in data and information sharing as well as sharing resources.

Objectives of Environment Information Network-EIN

To build capacity for the development and management of core datasets such as data on wetlands, forests, protected areas and many more.

To facilitate open access to environmental information / data and sharing of information at national level.

Development of information management tools, collate data and other data products from existing data sources.

Acknowledgements

The information shared in this bulleting was generated by Uganda Environment Information Network under the coordination of the National Environment Management Authority-NEMA.

NEMA and Makerere University host an environment data station (eStation) which receives a range of environment and climate data in near-real time. The data is distributed freely to users. For more on eStation visit www.icpac.net.



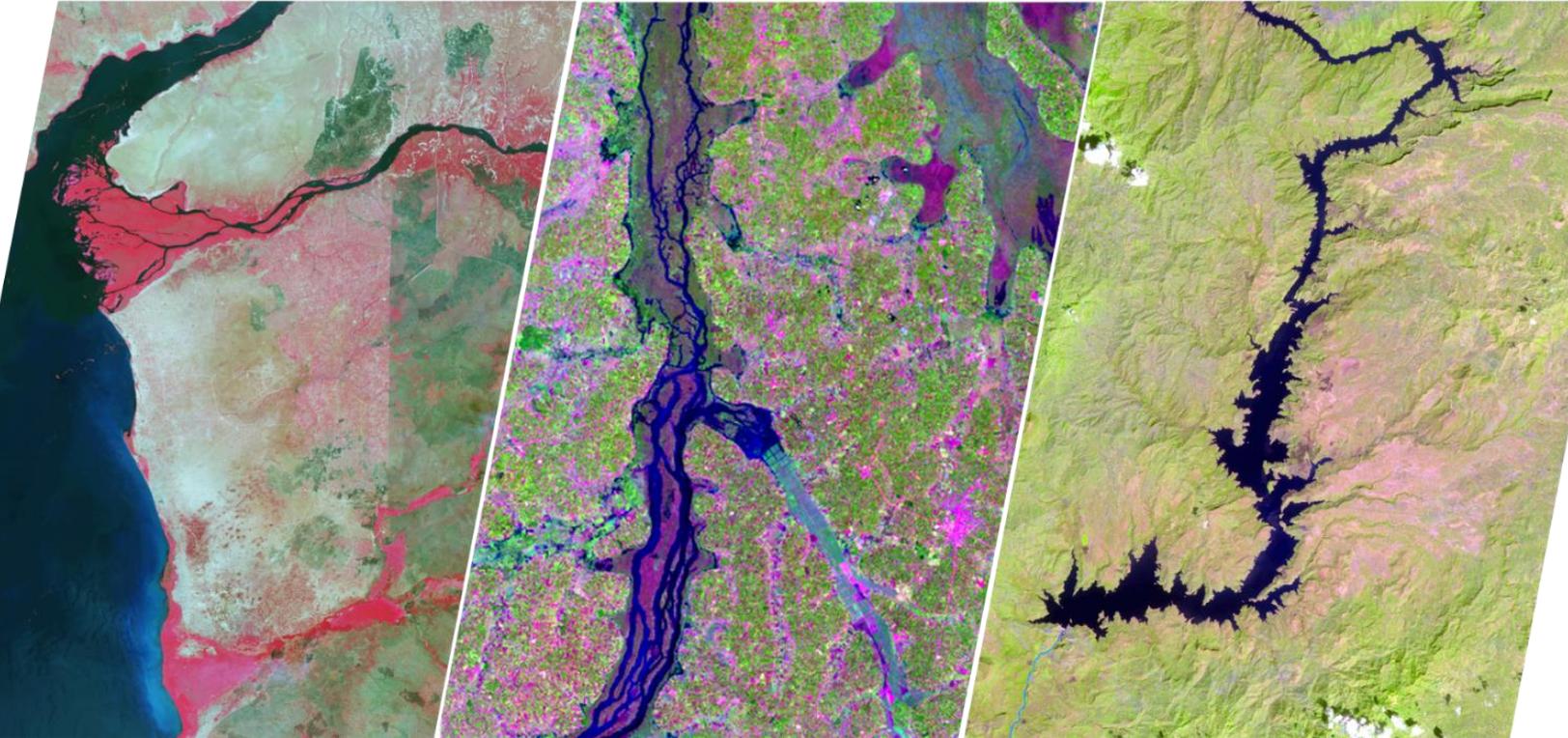


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