
Mapping target domains for flood-tolerant rice varieties in Nigeria using MODIS time series

Sander Zwart


Mohamed Hamady, Olusola Adefurin

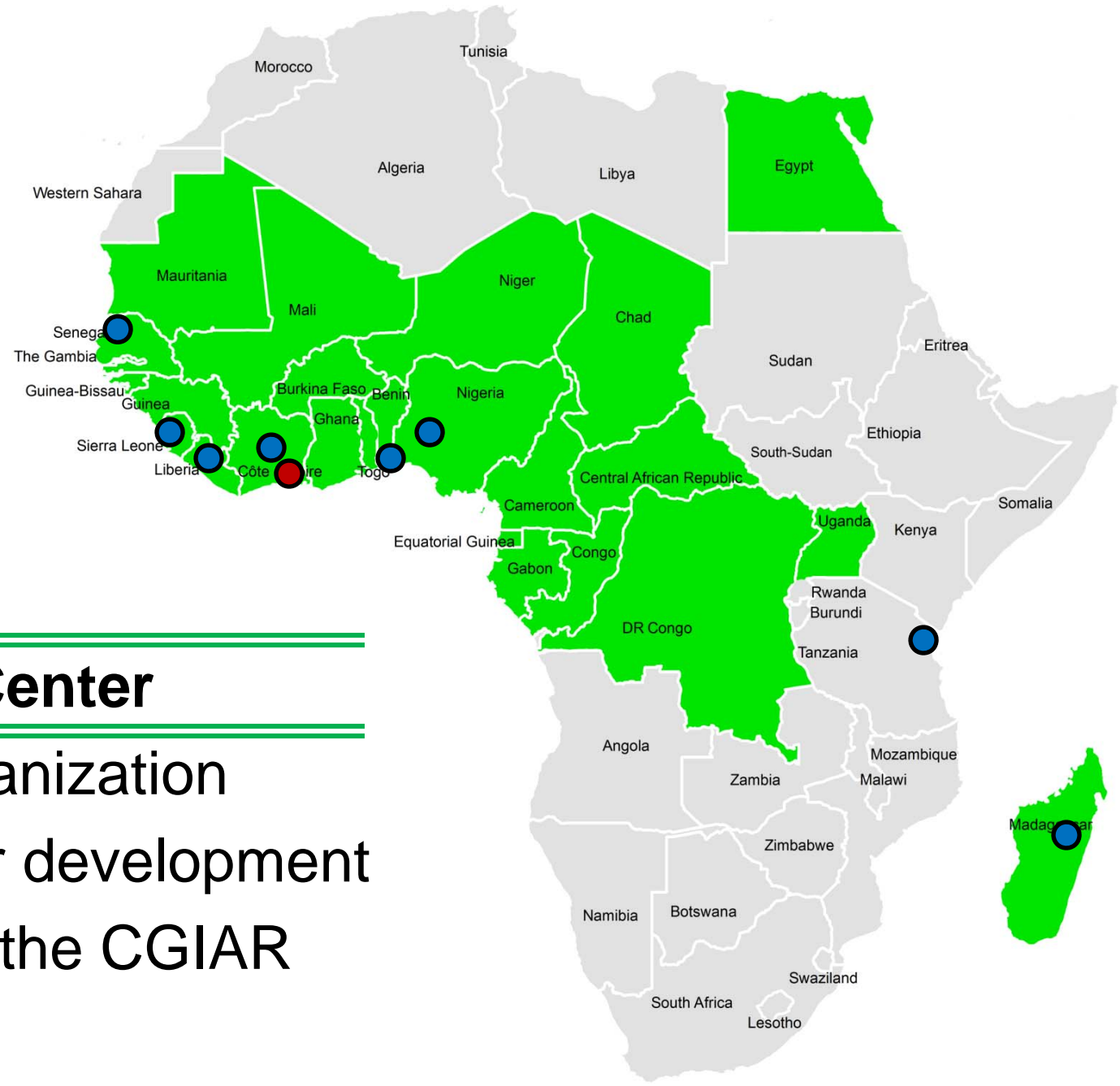


AfricaRice

*11th International conference of
the African Association of Remote Sensing for the Environment
October 24-28, 2016 – Kampala, Uganda*

www.AfricaRice.org

 AfricaRice member country



Africa Rice Center

- African organization
- Research for development
- Member of the CGIAR



AfricaRice

www.AfricaRice.org

Major research domains @ AfricaRice

- 1. Varietal improvement:** increasing yields; improving quality; increasing nutritional value; tolerance to environmental stresses
- 2. Agronomy and post-harvest technology:** sustainable agricultural practices; site-specific advise; mechanization; reducing yield losses
- 3. Rice value-chain;** access to markets; rice marketing; gender-relations; policy advice



Activity domains @ GIS Unit / AfricaRice

- 1. Providing high-quality baseline maps** of the current rice area and growing environments;
- 2. Support the effective diffusion of scalable rice technologies** by characterizing rice production systems; and
- 3. Support agriculture investment** by mapping high potential areas for rice development.



Activity domains @ GIS Unit / AfricaRice

1. Providing high-quality baseline maps of the current rice area and growing environments;
- 2. Support the effective diffusion of scalable rice technologies** by characterizing rice production systems; and
3. Support agriculture investment by mapping high potential areas for rice development.



From EMMANUEL UZOR, Onitsha

Nothing can better describe the condition of Anambra riverine communities than anguish, pain and poverty. These resulted from flooding when the River Niger overflowed its banks. Many communities in some local government areas of the state have been at the mercy of flooding and erosion and other ecological disasters since the beginning of the rainy season.

The communities include Otuecha in Anambra East local government area of the state, Odekepe, Atani and Ogwikepe all in Ogbaru local government area. The worst hit of all the local government areas remains Ogbaru local government area where 8 out of the 9 communities were sacked raising fears that the remaining one would soon be overtaken by flood.

Speaking on the incident, the leader of Ogbaru Stakeholders Forum, Sir Peter Okala lamented that this year's flooding is strange to the entire people of the area and he blames both Anambra state and federal governments for negligence and not taking proper action to avert the disaster.

"The government is not taking any action to protect lives and property of the people within the Ogbaru council area and as we are talking, every family has been displaced by the flooding. For instance, you can see me trying to pack the remaining things that I could salvage. Every community within Ogbaru has been washed away except Okepoko."

"Okepoko community is the only community that has not been washed away, Atani is gone, Ogwikepe is gone and this has vindicated our earlier call on the former Minister of Power, Prof. Barth Nwanji and NEMA to help the communities because of the impending doom we saw over the blockage of the water outlet by Power Holding Company of Nigeria, PHCN, but nobody listened to us. We also raised the alarm when flood overtook our houses and 11 innocent school children drowned but still government did not listen" he said.

Sir Okala said further that the devastating effects of the flooding had forced so many people out of their homes and destroyed property worth several hundreds of millions of Naira, noting "when we will see the major effect of this disaster is during the dry season because the water from the River Niger overflowed its banks and washed away our farms, hunger is seriously looming over us and more especially, epidemic is hanging on our necks because the flood has polluted our water, most of the



Water-logged road with helpless motorists

The Ogbaru Stakeholders' Forum further maintained that if the state and federal governments had listened to their SOS earlier and facilitated the dredging of River Niger, it could have helped the situation and averted the disaster which he said was the most severe since he started living in Ogbaru land.

Sunday Sun also gathered that school children within the communities like Iyowa-Odekepe, Atani, Ogwikepe have stopped attending school as their schools were not spared in the flooding. One of the secondary schools, St. Vincent De Paul group of schools, Atani Road, Odekepe, has been submerged by flood and residents of the area were seen fishing inside the school compound with canoes. He further disclosed that apart from the fact that the flood destroyed so many people's home and destroyed livestock, it afforded them opportunity to fish and make bank. He said that some of the fish they caught inside their compounds and even

Angry River Niger

lost everything in one night • Schools, shops shut in Atani, Ogwikepe • Residents flee

35 villages, farmlands destroyed in Ebony

From GODDI SEMA, Abakaliki

Over 35 communities in Ebonyi state have been ravaged by the flooding that destroyed farmlands and houses due to heavy rains across six development centres of the state.

The flooding of Ikwu communities which has become an annual occurrence has continued unabated despite government's efforts to contain the natural disaster. Several lives were lost and property worth millions of Naira were destroyed.

The state Commissioner for Environment, Engr. Paul Okorie, disclosed that the state government was making efforts to contain the situation having concluded a survey on the areas and waiting for possible World Bank assistance. "We are working very hard on our own to find lasting measures, he said adding "we have however done some survey and design on the areas like Uburu, Abakaliki and Ikwu and we are waiting for possible funding from World Bank".

On the rehabilitation of the flood victims, Okorie stated that his ministry is not involved in the effort as it's the responsibility of the State Emergency Management Agency (SEMA) and National Emergency Management Agency adding that "the state

government was waiting for these agencies to rehabilitate victims."

At Ekeh Ishieke community which comprises about six villages and shares a common boundary with Nkhalahyere in Ado local government area in Benue state, two secondary school students drowned in the Edeh River while trying to cross the bridge across the river.

The flooding at the communities in Izzil local government area Sunday Sun gathered, destroyed farmlands and houses, when a river along the boundary between the state and Cross River state overflowed its banks due to severe rainfall in the area.

The affected communities include Igbagu, Ebuya, Omanyi and Nnodo. One of the communities, Nwisiotri has been completely submerged in the flood, cutting it off from its neighbors. This made it inevitable for natives to resort to the use of canoes to convey children to school in the area.

At Ikwu, the communities affected are Alike, Achara, Iyumu, Akunakuna, Igbadiri, Ndiwechi, Nidinkoshi, Okwerike, Kallafu, Ogbu, Ekyonaka among others where the state, according to Ebonyi State Emergency Management Agency (SEMA) Executive Secretary, Igboka Umama recorded about 332,938 victims adding that about 50,000 victims were yet to get relief?

Continued on page 10

The chairman of Izzil local government, Nwisiotri who spoke to newsmen, explained that the flooding affected a lot of people in the area unawares explaining that the communities were facing hard times.

"Our crops, houses, property have all been destroyed. I am appealing to the Emergency Management Agency National Emergency Management Agency to come to the aid of the victims of the flood who are predominantly farmers and have virtually all their farm produce including stock to the disaster. They should help to get back on their feet," he appealed to SEMA.

Limas Ezoriri from Ndiwechi Comm and the Coordinator of Izzil Develo Centre, Charles Nwoko also lamented "victims have lost most of their belong and appealed to government to come to aid."

The South East Coordinator of N Olabode Bamidele, represented by the officer in the agency, Ifeanyi Nisiri, a joint assessment tour with Ebonyi SED the area, described the incident as "devastating" and advised victims to relocate, saying that the agency would send relief in the form of food and other necessities.

Continued on page 10

pulse News Gist Celebs Music Movies Lifestyle Events

In Kebbi 45,000 farmers lose crops worth N3bn to flood - AFAN

"Unless the farmers are assisted to massively engage in dry season farming, the state and its neighbours will face food scarcity next year, said.

Published: 02.10.2015 Pulse News Agency Local By NAN



45,000 Kebbi farmers lose crops worth N3bn to flood - AFAN (Today)

- In Jigawa Government disburses N7.5m to flood victims
- In Northern Nigeria 11 die, 86,710 hectares of farmland destroyed by flood in Sokoto, Kebbi, Zamfara - NEMA
- In Adamawa Flood kills 6-year-old boy, submerges 116 Communities

The Secretary, Kebbi chapter of the All Farmers Association Nigeria (AFAN), Alhaji Muhammad Idris, said on Friday 45,000 farmers had lost crops worth N3 billion to flood.

Idris, who made the disclosure in an interview with the Agency of Nigeria (NAN) in Birnin Kebbi, said that the des was unprecedented.

He said that the association had enlightened its members the flood that they should vacate from the flood-prone zone

"We told them what to do, but they did not heed to our

Wednesday, October 19, 2016 Abuja 28°C

- Home News #PanamaPapers Investigations Business Arts/Life Sports
- Oil/Gas Reports AGAHRIN Parliament Watch Letters

Flood threatens Nigeria's hope of rice self-sufficiency

October 15, 2012 Premium Times



Wednesday, October 19, 2016 Abuja 28°C

- Home News #PanamaPapers Investigations Business
- Oil/Gas Reports AGAHRIN Parliament Watch

Floods destroy rice farms in Kano

October 5, 2012 Premium Times



Floods and rice production

Floods:

- ... threaten rice farmer's incomes
- ... increase regional market prices for rice
- ... threaten food security
- ... are likely to occur more frequently due to climate change



A solution? Flood-tolerant rice varieties

Targeting and scaling *sub-1* rice varieties

Sub1 varieties after 17 days of submergence in the field at IRRI



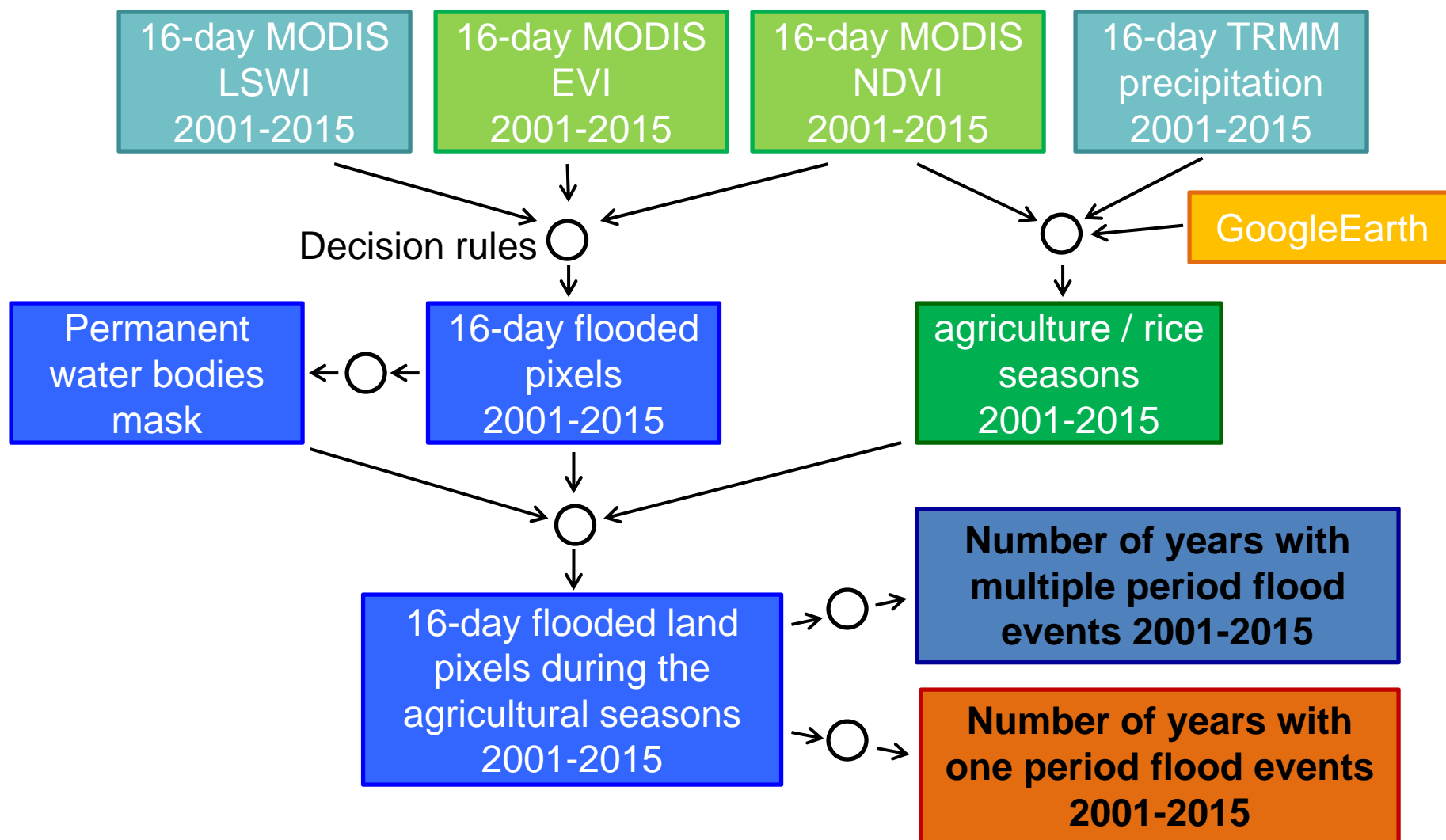
Mapping location and duration of floods...

...for targeting and scaling *sub-1* rice varieties

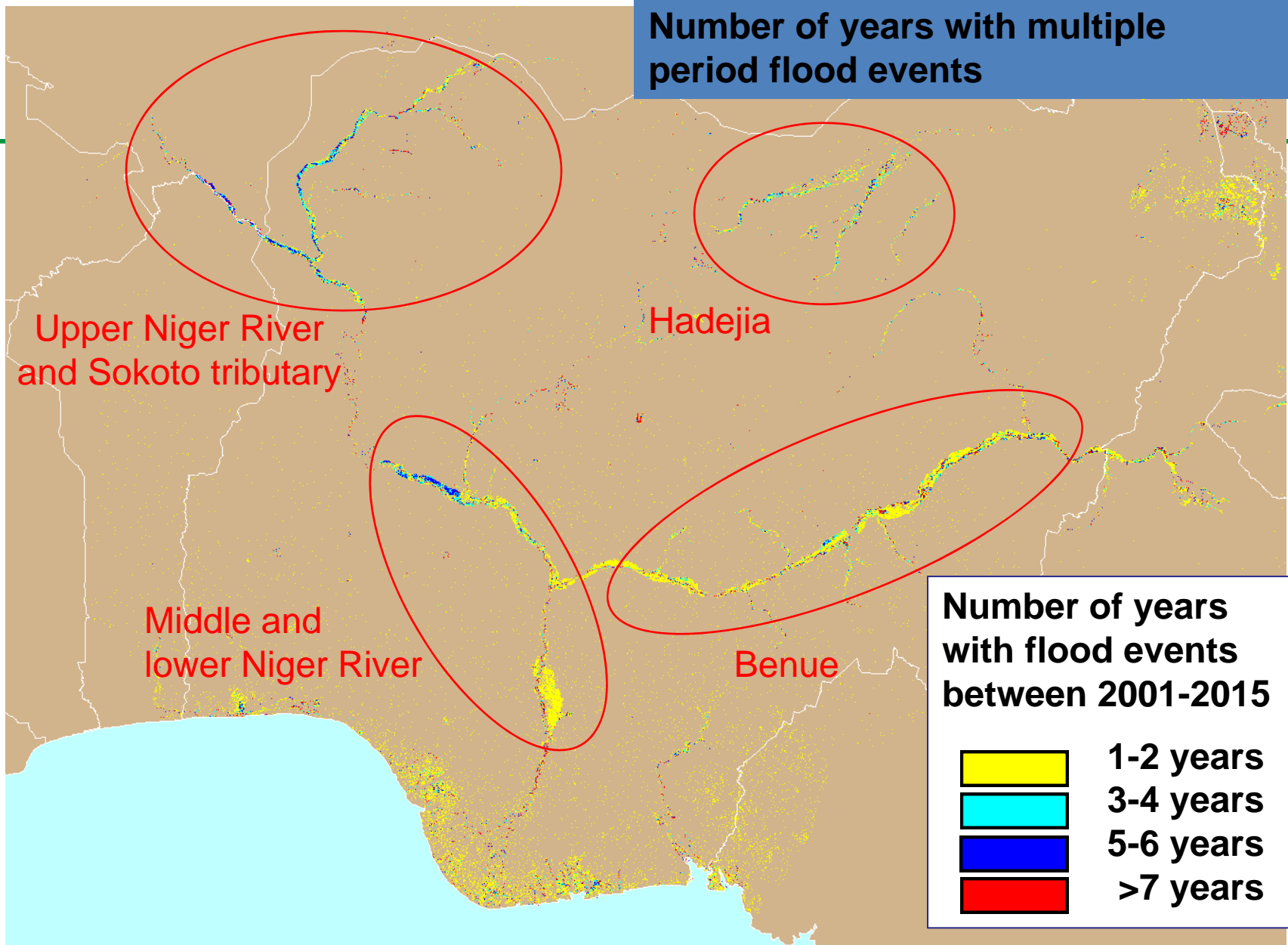
- MODIS time series of NDVI, EVI and LSWI
- Assess agricultural season (NDVI *vegetation development*, TRMM *rainfall*, GoogleEarth *rice fields*)
- Assessing “flooding hotspots” between 2001 and 2015 and...
- ... assessing flood events not lasting longer than 16 days.



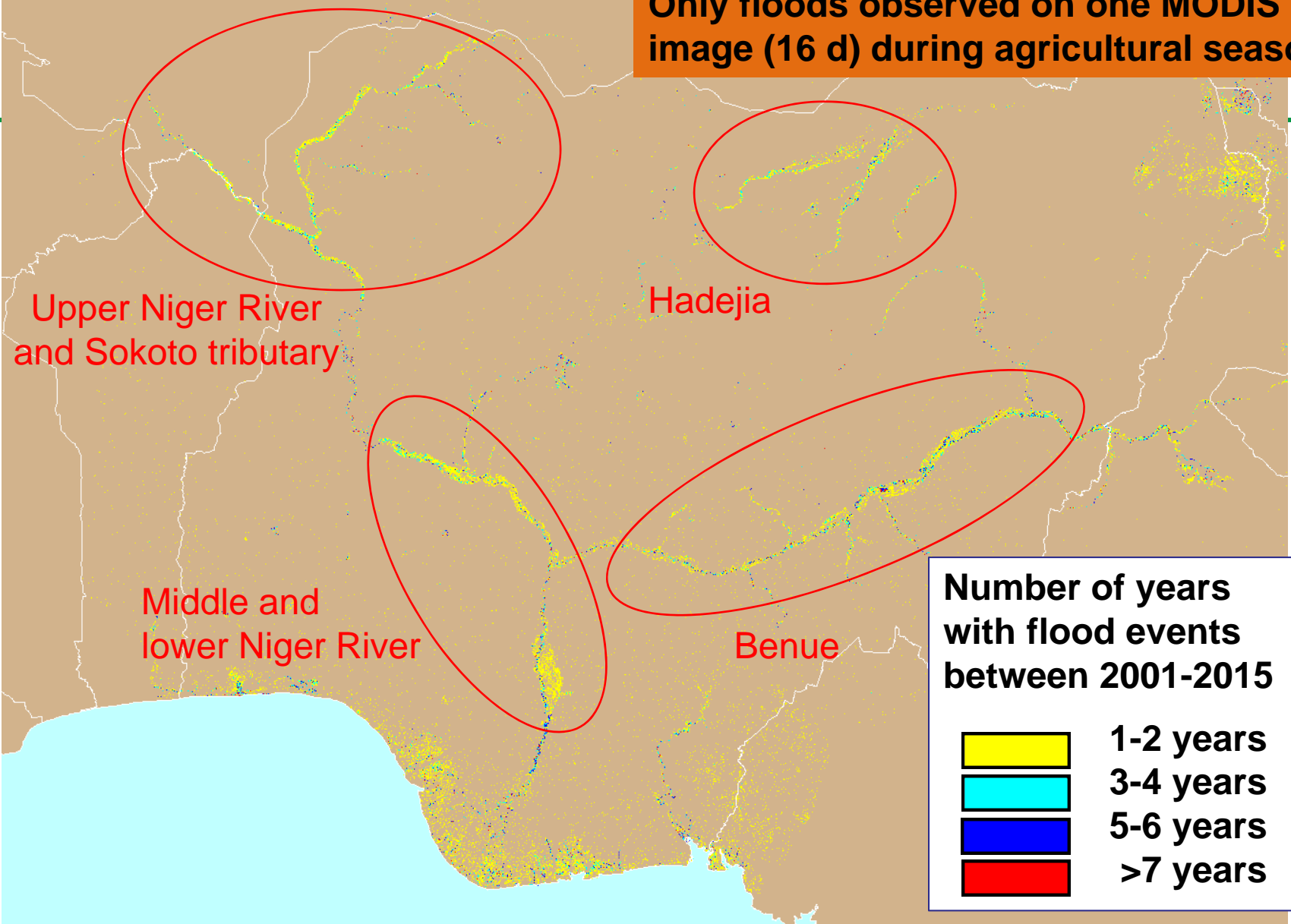
Methodology

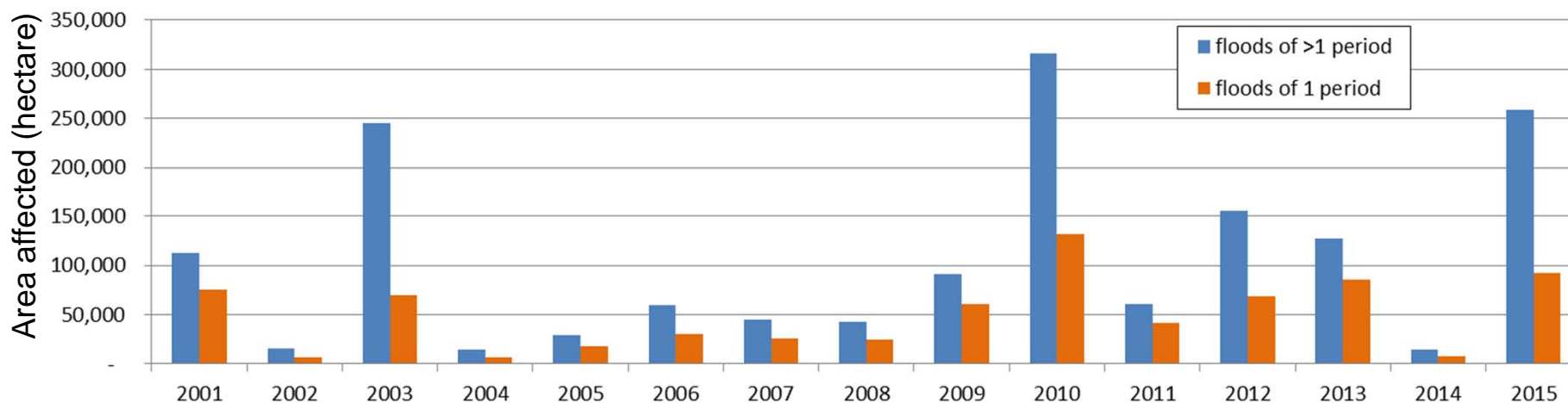
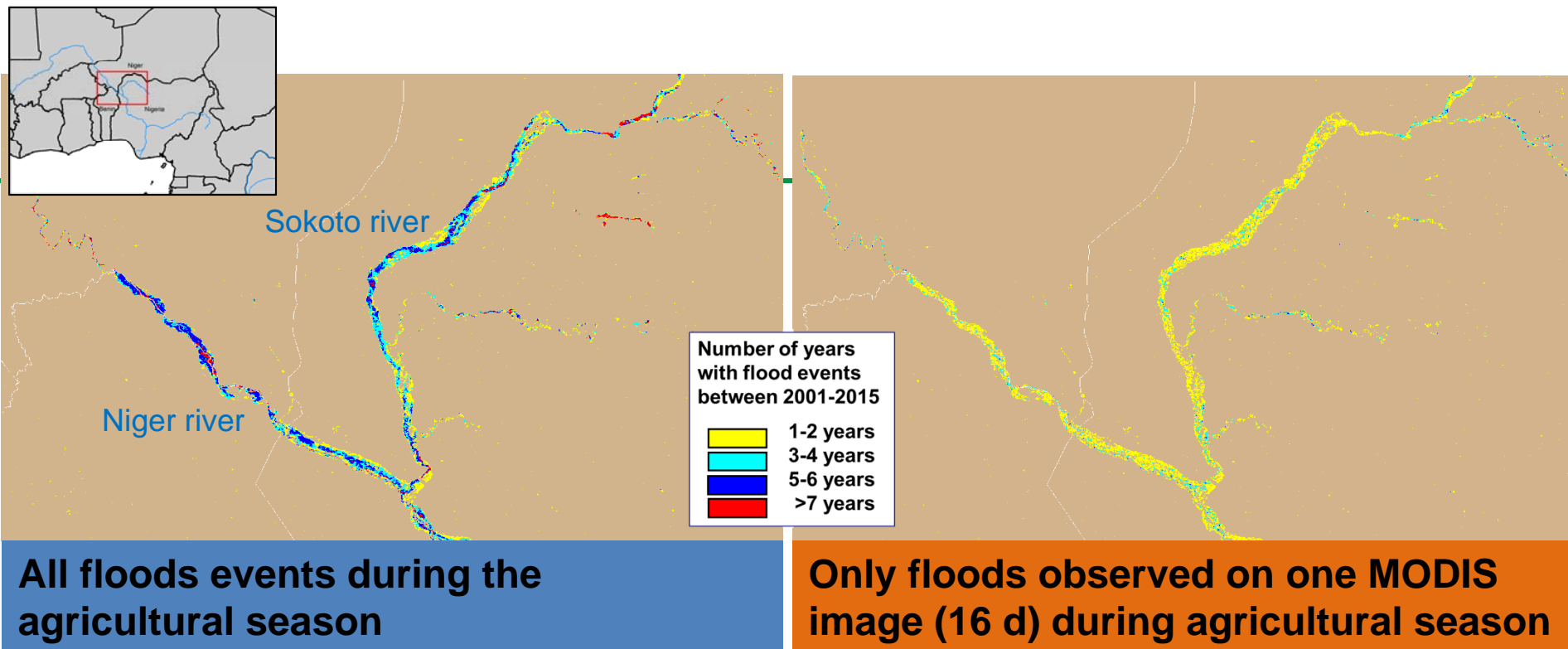


Number of years with multiple period flood events



Only floods observed on one MODIS image (16 d) during agricultural season





Top stories

From EMMANUEL UZOR, Onitsha

Nothing can better describe the condition of Anambra riverine communities than anguish, pain and poverty. These resulted from flooding when the River Niger overflowed its banks. Many communities in some local government areas of the state have been at the mercy of flooding and erosion and other ecological disasters since the beginning of the rainy season.

The communities include Otuocha in Anambra East local government area of the state, Odekepe, Atani and Ogwikepe all in Ogburu local government area. The worst hit of all the local government areas remains Ogburu local government area where 8 out of the 9 communities were sacked raising fears that the remaining one would soon be overtaken by flood.

Speaking on the incident, the leader of Ogburu Stakeholders Forum, Sir Peter Okala lamented that this year's flooding is strange to the entire people of the area and he blames both Anambra state and federal governments for negligence and not taking proper action to avert the disaster.

The government is not taking any action to protect lives and property of the people within the Ogburu council area and as we are talking, every family has been displaced by the flooding. For instance, you can see me trying to pack the remaining things that I could salvage. Every community within Ogburu has been washed away except Okopoko.

"Okopoko community is the only community that has not been washed away, Atani is gone, Ogwikepe is gone and this has vindicated our earlier call on the former Minister of Power, Prof. Barth Nnaji and NEMA to help the communities because of the impending doom we saw over the blockage of the water outlet by Power Holding Company of Nigeria, PHCN, but nobody listened to us. We also raised the alarm when flood overtook our houses and 11 innocent school children drowned but still government did not listen" he said.

Sir Okala said further that the devastating effects of the flooding had forced so many people out of their homes and destroyed property worth several hundreds of millions of Naira, noting "when we will see the major effect of this disaster is during the dry season because the water from the River Niger overflowed its banks and washed away our farms, hunger is seriously looming over us and more especially, epidemic is hanging on our necks because the flood has polluted our water supply network."

35 villages, farmlands destroyed in Ebony

From GODDY OSUJI, Abakaliki

Over 35 communities in Ebony state have been ravaged by the flooding that destroyed farmlands and houses due to heavy rains across six development centres of the state.

The flooding of Ikwo communities which has become an annual occurrence has continued unabated despite government's efforts to contain the natural disaster. Several lives were lost and property worth millions of Naira were destroyed.

The state Commissioner for Environment, Engr. Paul Okorie, disclosed that the state government was making efforts to contain the situation having concluded a survey on the areas and waiting for possible World Bank assistance. "We are working very hard on our own to find lasting measures, he said adding "we have however done some survey and design on the areas like Uburu, Abakaliki and Ikwo and we are waiting for possible funding from World Bank".

On the rehabilitation of the flood victims, Okorie stated that his ministry is not involved in the effort as it's the responsibility of the State Emergency Management Agency (SEMA) and National Emergency Management Agency adding that "the state

Angry River Niger

• lost everything in one night • Schools, shops shut in Atani, Ogwikepe • Residents flee



Water-logged road with helpless motorists

The Ogburu Stakeholders Forum further maintained that if the state and federal governments had listened to their SOS earlier and facilitated the dredging of River Niger, it could have helped the situation and averted the disaster which he said was the most severe since he started living in Ogburu land.

Sunday Sun also gathered that school children within the communities like Iyiwawa-Odekwu, Atani, Ogwikepe have stopped attending school as their schools were not spared in the flooding.

One of the secondary schools, St. Vincent De Paul group of schools, Atani Road, Odekwu, has been submerged by flood and residents of the area were seen fishing inside the school compound with canoes.

He further disclosed that apart from the fact that the flood destroyed so many people's home and destroyed livestock, it afforded them opportunity to fish and make brisk business from the sale of fish they caught inside their compounds and even

bedrooms as a result of the flooding are making money by the day because people began to catch fish inside their ponds and inside these classrooms, are big fishes that are stranded, they brought here by the river surge and they cannot go back into the River. When we see them, we use cutlass and some of us used bare hands to catch big fish that ordinarily could not be in the river before. We are making a name for ourselves here to buy fish" he said.

For Josiah Onu, a medicine dealer at Okoti road, Iyiwawa Odekwu, this flooding was the most severe in 10 years he's been living in the area lamented that the flood destroyed a thing inside his shop. All the drugs store were condemned.

"Since 25 years ago I started living this is the most severe I have ever seen as it stands now, we thought it will not

Continued on page 10

government was waiting for these agencies to rehabilitate victims."

At Edeh Ishieke community which comprises about six villages and shares a common boundary with Nsichinyere in Ado local government area in Benue state, two secondary school students drowned in the Edeh River while trying to cross the bridge across the river.

The flooding at the communities in Izzil local government area Sunday Sun gathered, destroyed farmlands and houses, when a river along the boundary between the state and Cross River state overflowed its banks due to severe rainfall in the area.

The affected communities include Igebeagu, Ebiya, Omanyi and Nnodo. One of the communities, Nwoliobi is being completely submerged in the flood, cutting it off from its neighbors. This made it inevitable for natives to resort to the use of canoes to convey children to school in the area.

At Ikwo, the communities affected are Alike, Achara, Inyimagu, Akunakuna, Igbadu, Ndieche, Ndinkoshi, Okwerike, Ekalafia, Obegu, Ekpomaka among others where the state, according to Ebonyi State Emergency Management Agency (SEMA) Executive Secretary, Igboka Umunna recorded about 332,938 victims adding that about 50,000 victims were yet to get relief?

Continued on page 10

Wednesday, October 19, 2016 Abuja 28°C

- Home
- News
- #PanamaPapers
- Investigations
- Business
- Arts/Life
- Sports
- Oil/Gas Reports
- AGAHRIN
- Parliament Watch
- Letters

Flood threatens Nigeria's hope of rice self-sufficiency

October 15, 2012 Premium Times



In Kebbi 45,000 farmers lose crops worth N3bn to flood - AFAN

"Unless the farmers are assisted to massively engage in dry season farming, the state and its neighbours will face food scarcity next year, said.

Published: 02.10.2015 • Pulse News Agency Local By NAN



45,000 Kebbi farmers lose crops worth N3bn to flood - AFAN (Today)

» In Jigawa Government disburses N7.5m to flood victims

» In Northern Nigeria 11 die, 86,710 hectares of farmland destroyed by flood in Sokoto, Kebbi, Zamfara - NEMA

» In Adamawa Flood kills 6-year-old boy, submerges 116 Communities

Wednesday, October 19, 2016 Abuja 28°C

- Home
- News
- #PanamaPapers
- Investigations
- Business
- Oil/Gas Reports
- AGAHRIN
- Parliament Watch

Floods destroy rice farms in Kano

October 5, 2012 Premium Times

The Secretary, Kebbi chapter of the All Farmers Association Nigeria (AFAN), Alhaji Muhammad Idris, said on Friday 45,000 farmers had lost crops worth N3 billion to flood.

Idris, who made the disclosure in an interview with the Agency of Nigeria (NAN) in Birnin Kebbi, said that the des was unprecedented.

He said that the association had enlightened its members the flood that they should vacate from the flood-prone zone

"We told them what to do, but they did not heed to our



Limitations of the approach

- Use of MODIS composite images only provides an approximation of the flood duration
- Approach is only applicable for flood plain and lowland landscapes due to pixel size (6.25 ha)
- Flashfloods are unlikely to be captured

Next steps

- Validate with local news reports
- Assess rice production areas and existing adaptation strategies such as deepwater rice
- Support state governments and extension services in defining scaling areas for sub1-varieties



www.africarice.org



Dr. Sander Zwart
s.zwart@cgiar.org



AfricaRice

www.AfricaRice.org