



**ACTION  
AGAINST  
HUNGER**



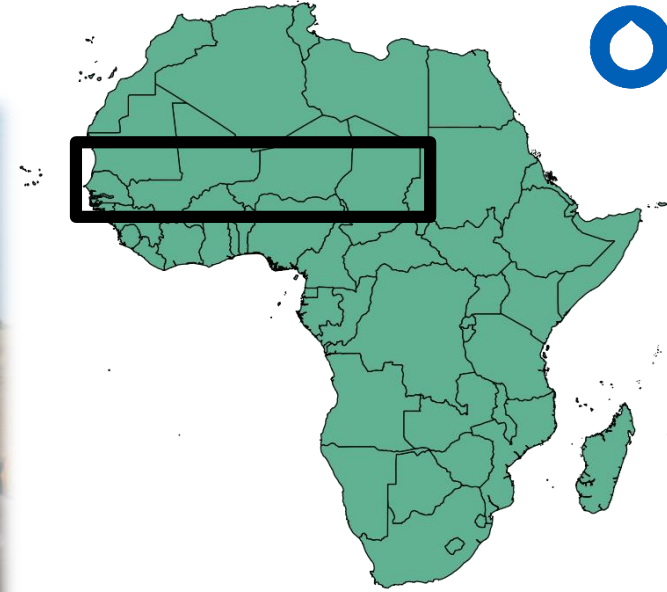
**ACTION  
CONTRE  
LA FAIM**

# Open-source GIS and early warning for nomadic herders

Alex Merkovic-Orenstein  
West Africa Disaster Risk Reduction Advisor  
Action Against Hunger

[www.sigsahel.info](http://www.sigsahel.info)

# Pastoral Surveillance

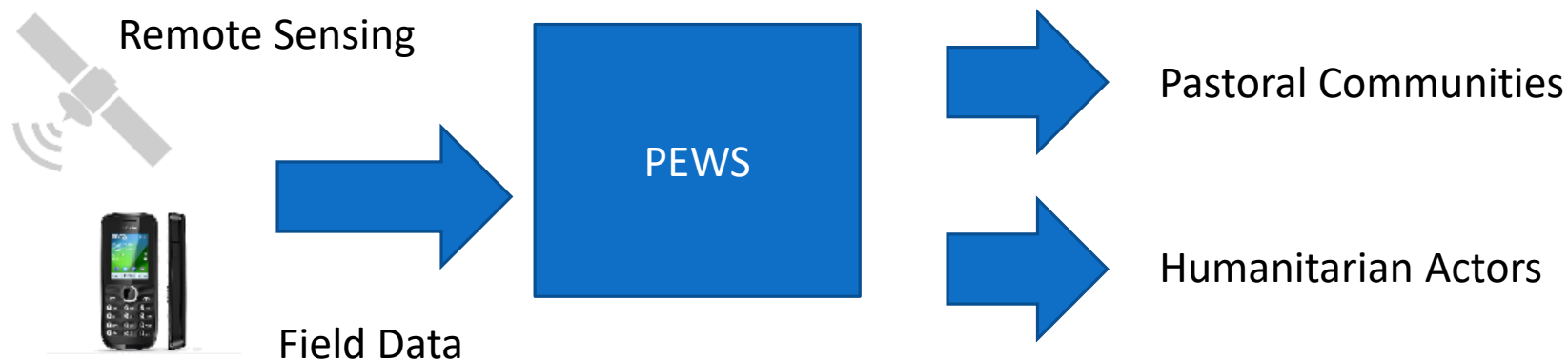


Wet season



Dry season

# Pastoral Early Warning System



How to engage  
non-traditional  
users?

How to tailor  
products for  
different decision-  
makers?

How to work in  
data-poor  
environments?

Data collection  
needs to be cheap,  
fast and flexible

# 1- Biomass Monitoring

Biomass: Kilograms of Dry Matter per hectare.

- Dry matter: Above-ground plant mass without water content.

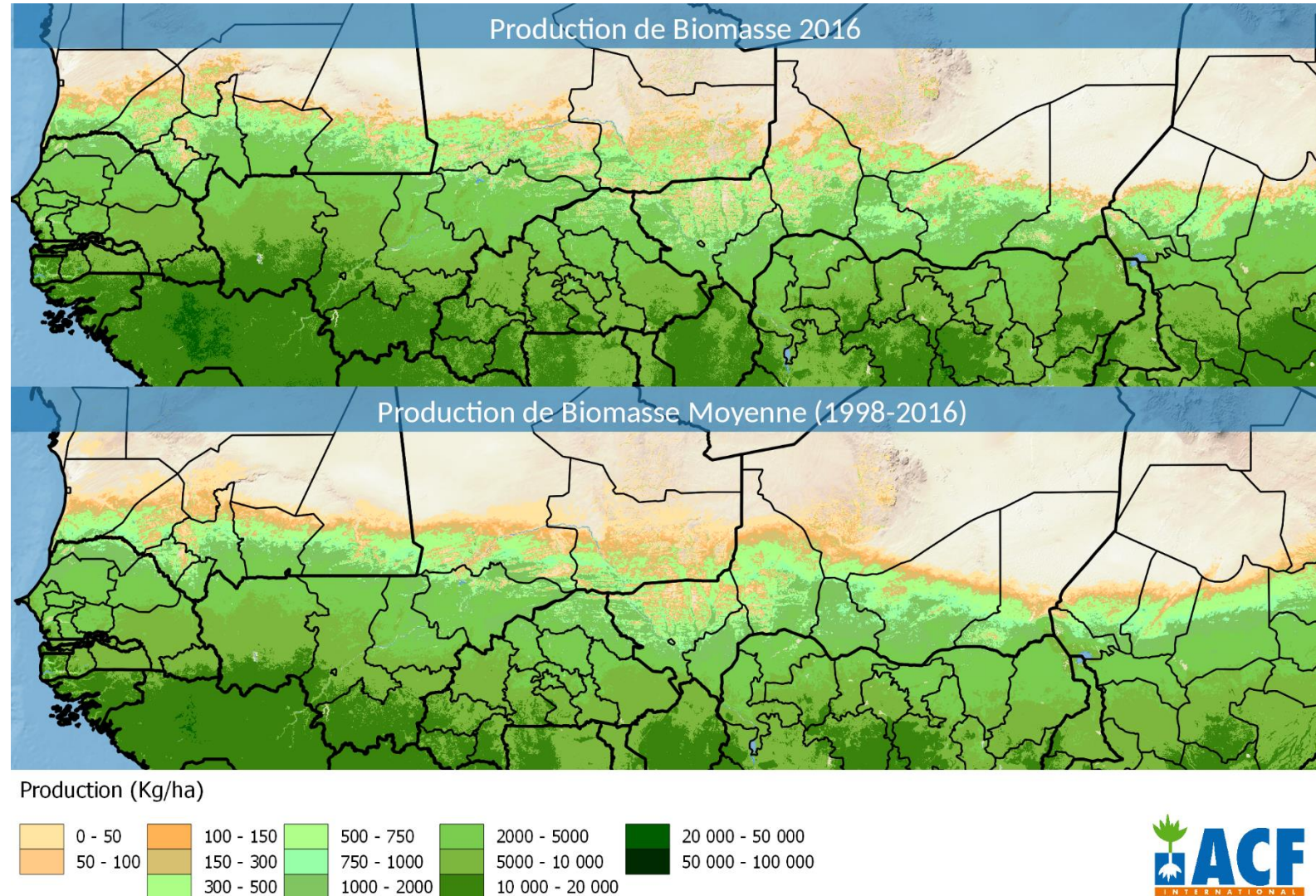
End of the rainy season (July-Oct) to measure full production of biomass

- Offers a prediction on incoming dry season conditions

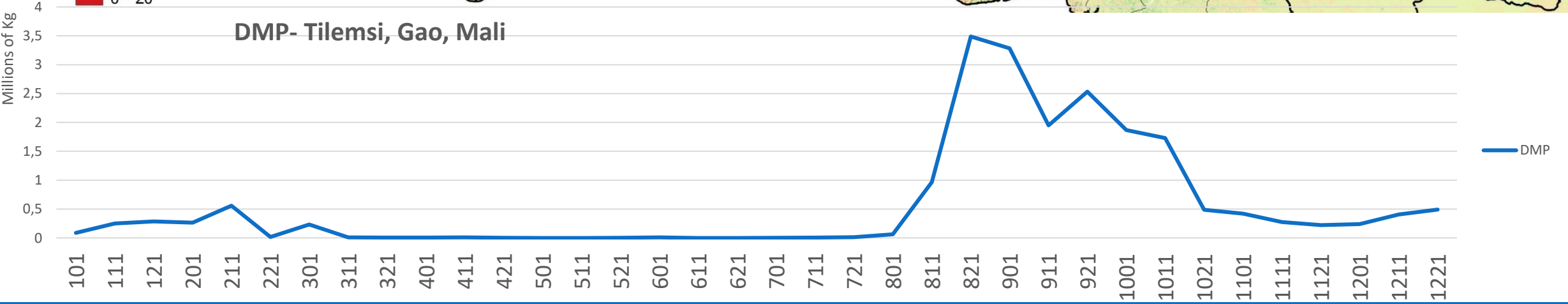
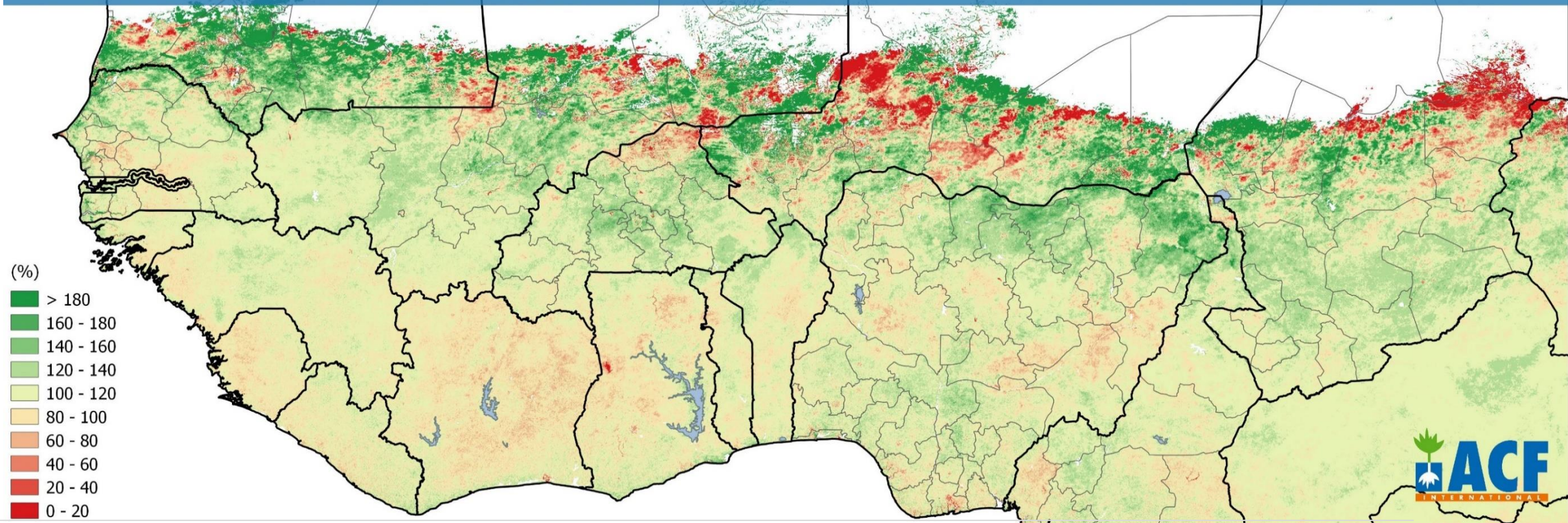
Used as a proxy for measuring pasture resources.

## Datasets

- Production
- Anomaly (vs mean)
- Anomaly Standard Deviation
- Long term trend (1998-2016)
- Vulnerability Index (recursive indicator that looks for recurring droughts)

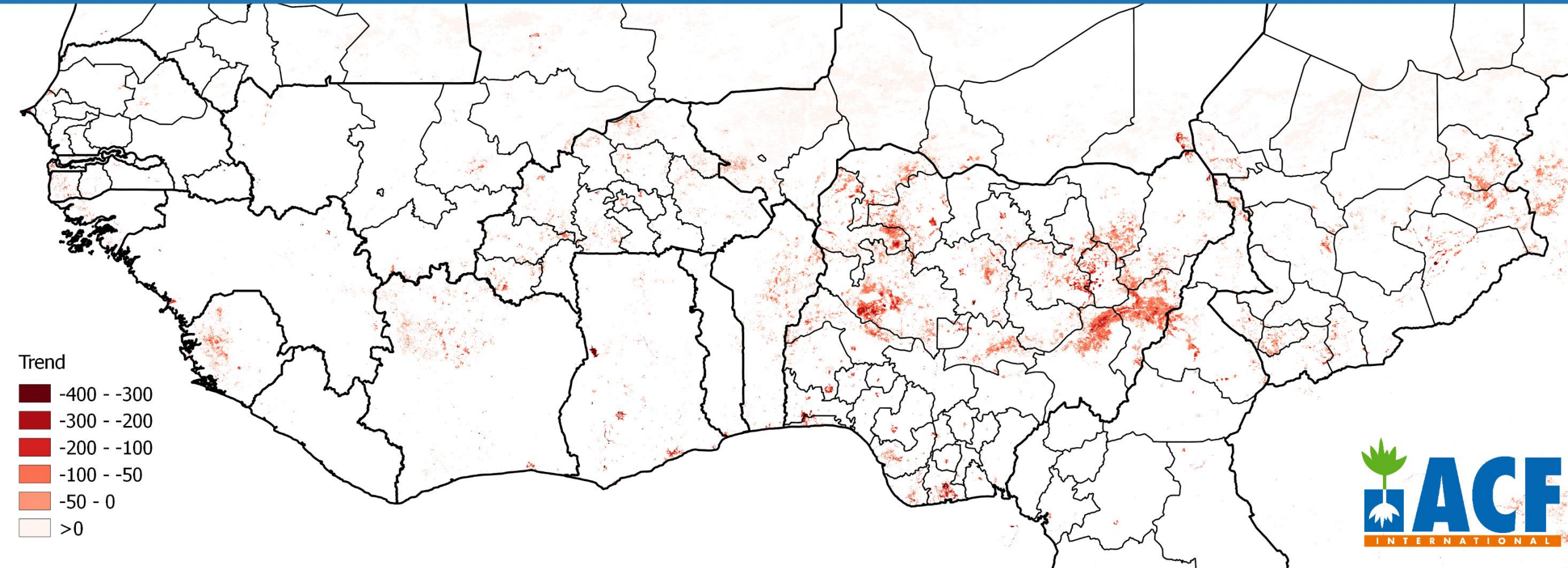


# Anomalie de la production de Biomasse au 01 Octobre 2016

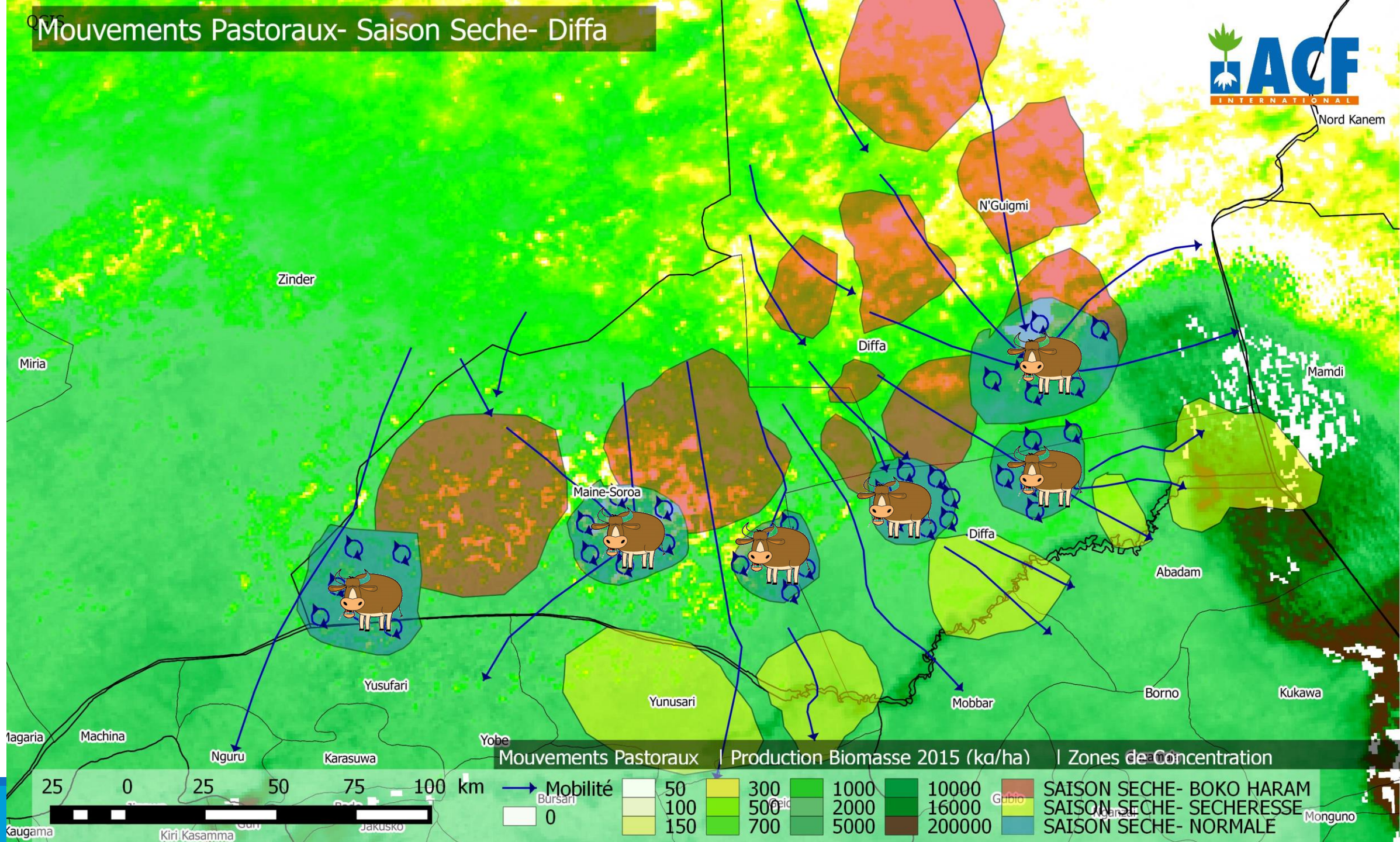


# Trend

## Negative Biomass Production Trend 1998-2016 (Kg/Ha/Year)



# Mouvements Pastoraux- Saison Seche- Diffa

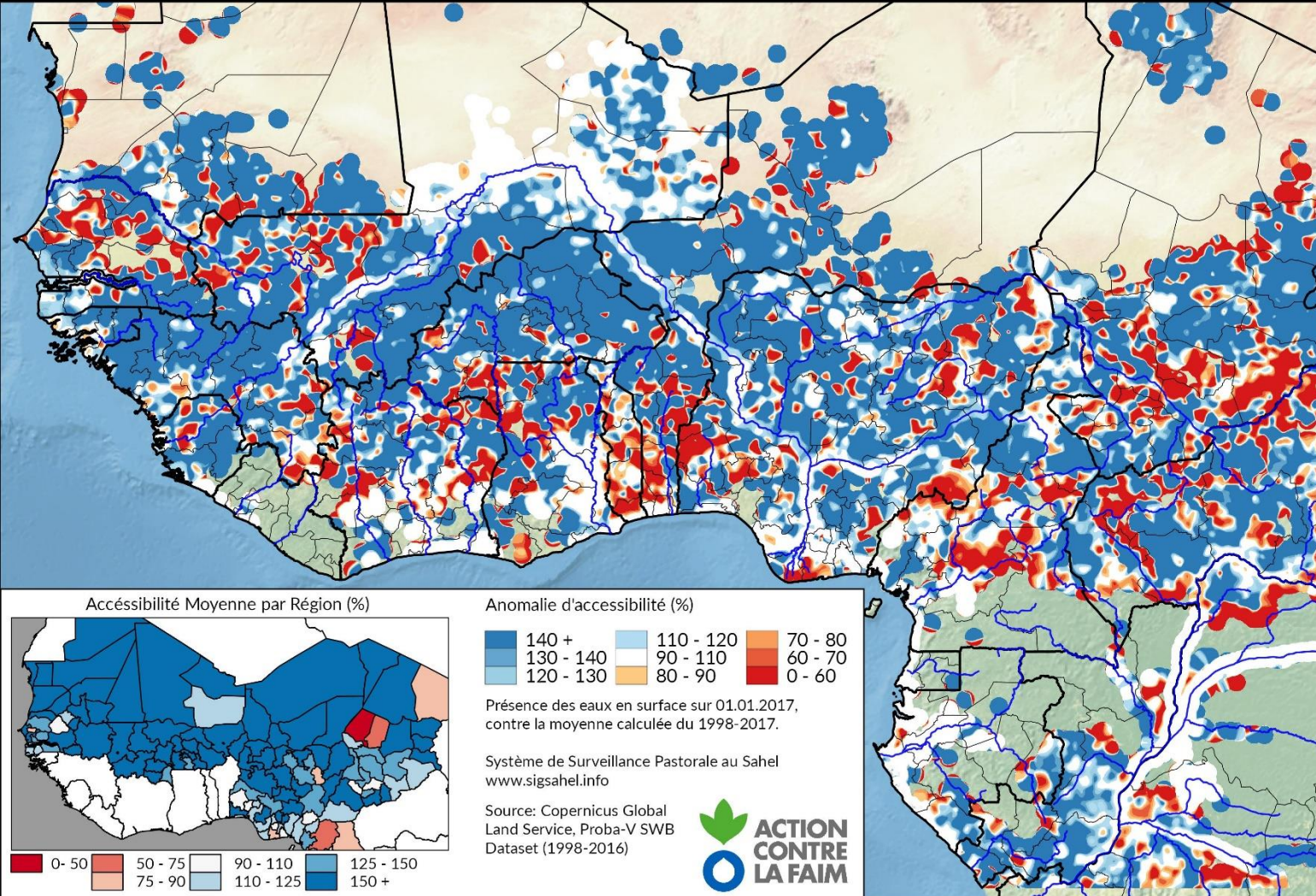


Mouvements Pastoraux | Production Biomasse 2015 (ka/ha) | Zones de Concentration

	Mobilité	0	50	300	1000	10000	SAISON SECHE- BOKO HARAM SAISON SECHE- SECHERESSE SAISON SECHE- NORMALE
		100	500	2000	16000		
		150	700	5000	200000		

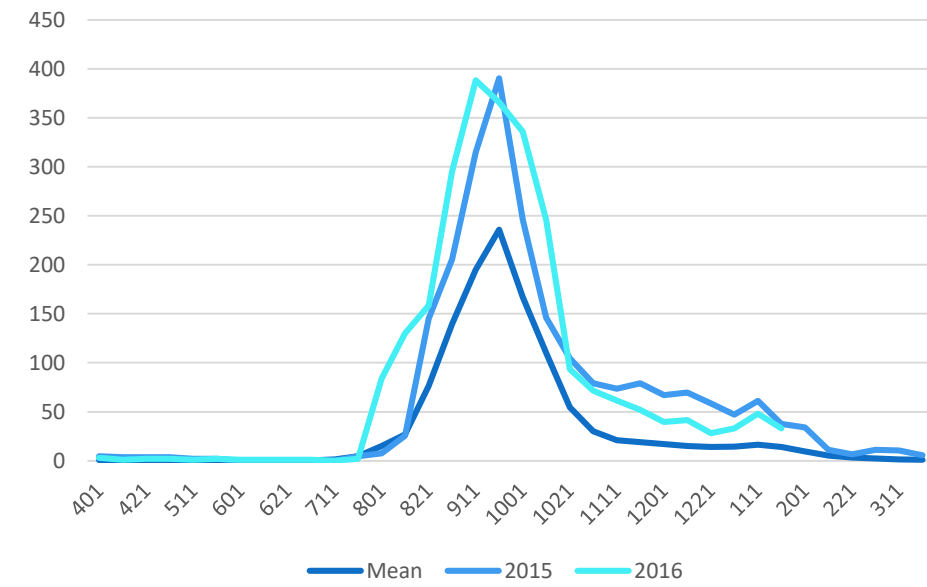
# 2- Monitoring Surface Water

## ANOMALIE D'ACCESSIBILITE DES EAUX DE SURFACE AU 01/01/2017



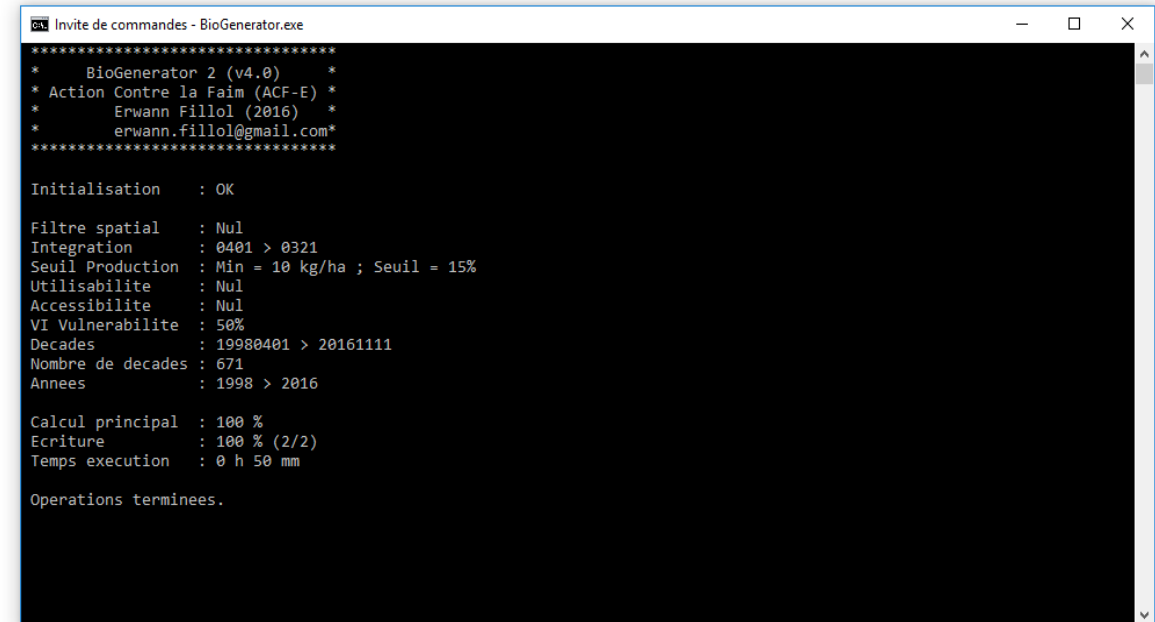
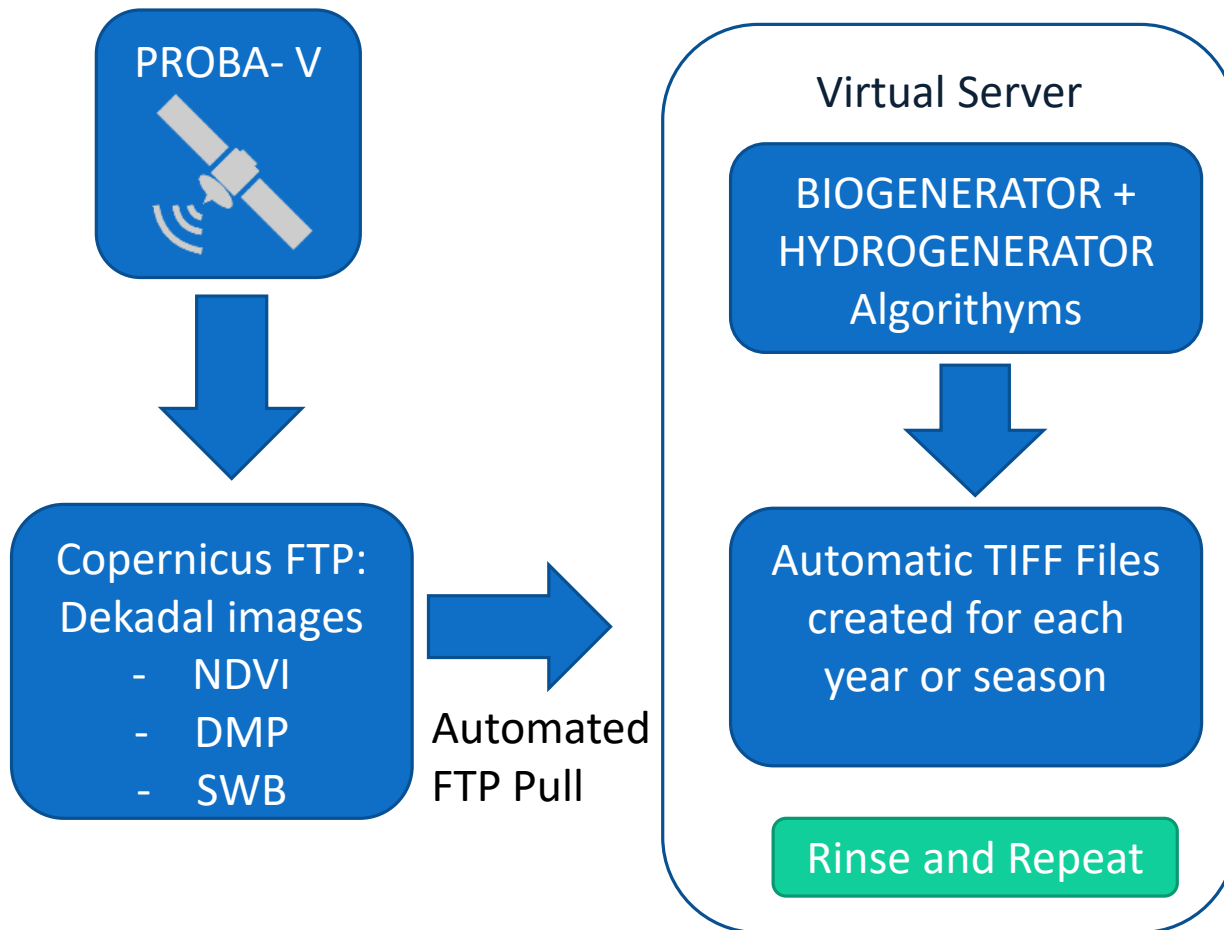
Can be done during the dry season!  
Unlike Biomass measurement

Surface Water (km<sup>2</sup>)- Matam, Senegal





# How does it work?



```
Invite de commandes - BioGenerator.exe
*****
* BioGenerator 2 (v4.0) *
* Action Contre la Faim (ACF-E) *
* Erwann Fillol (2016) *
* erwann.fillol@gmail.com*
*****

Initialisation : OK

Filtre spatial : Nul
Integration : 0401 > 0321
Seuil Production : Min = 10 kg/ha ; Seuil = 15%
Utilisabilite : Nul
Accessibilite : Nul
VI Vulnerabilite : 50%
Decades : 19980401 > 20161111
Nombre de decades : 671
Annees : 1998 > 2016

Calcul principal : 100 %
Ecriture : 100 % (2/2)
Temps execution : 0 h 50 mm

Operations terminees.
```

# Field Data- For everything you can't see from space

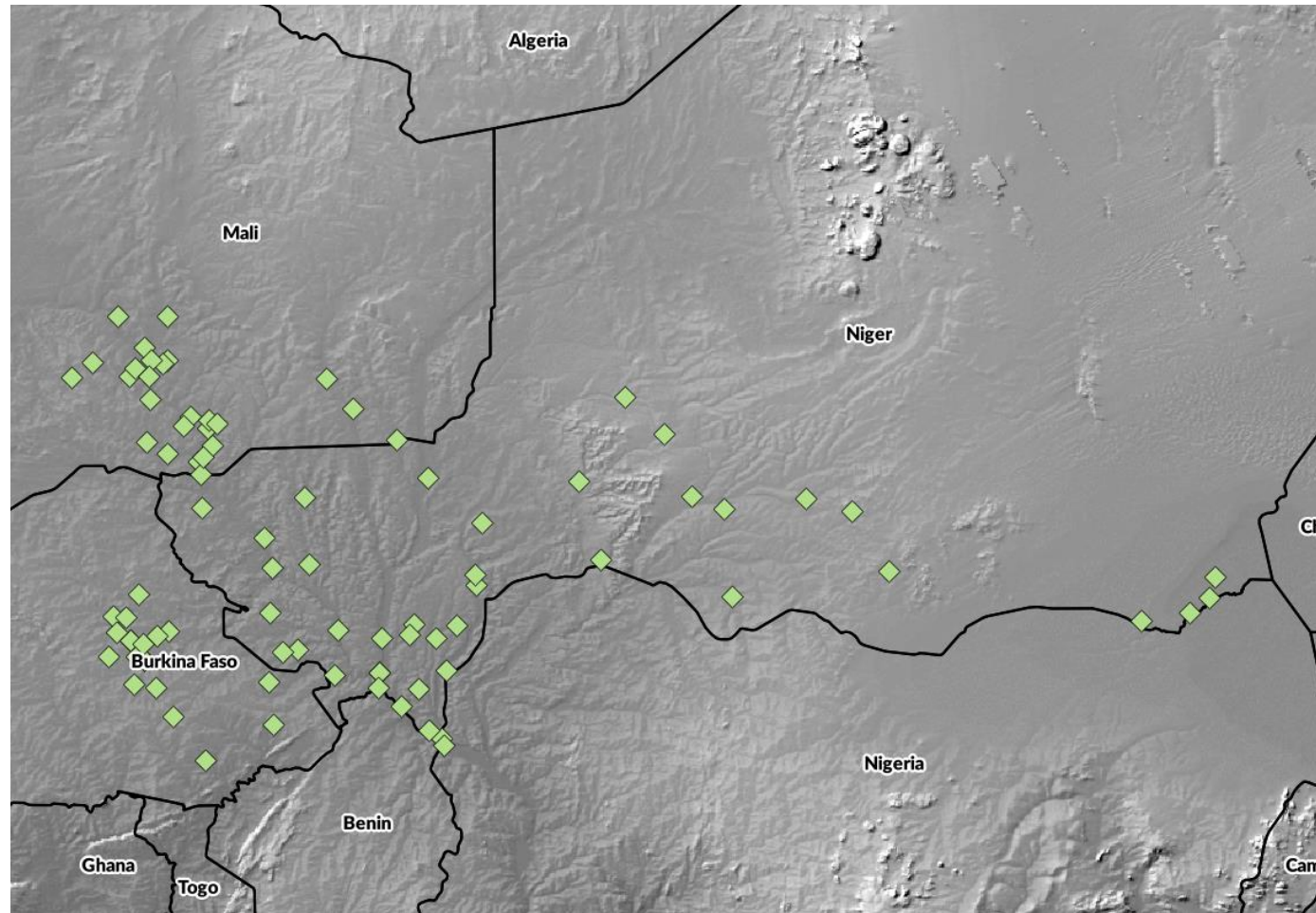
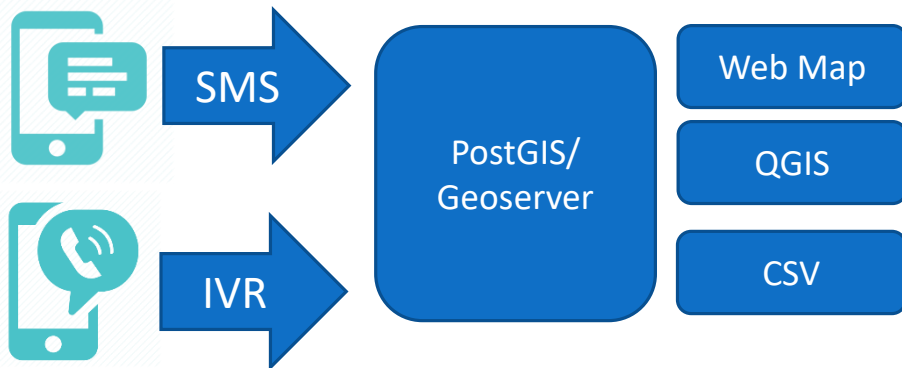
SMS/IVR

Weekly Surveys

- Pasture Availability
- Water Availability
- Terms of Trade
- Animal Diseases
- Brush Fires

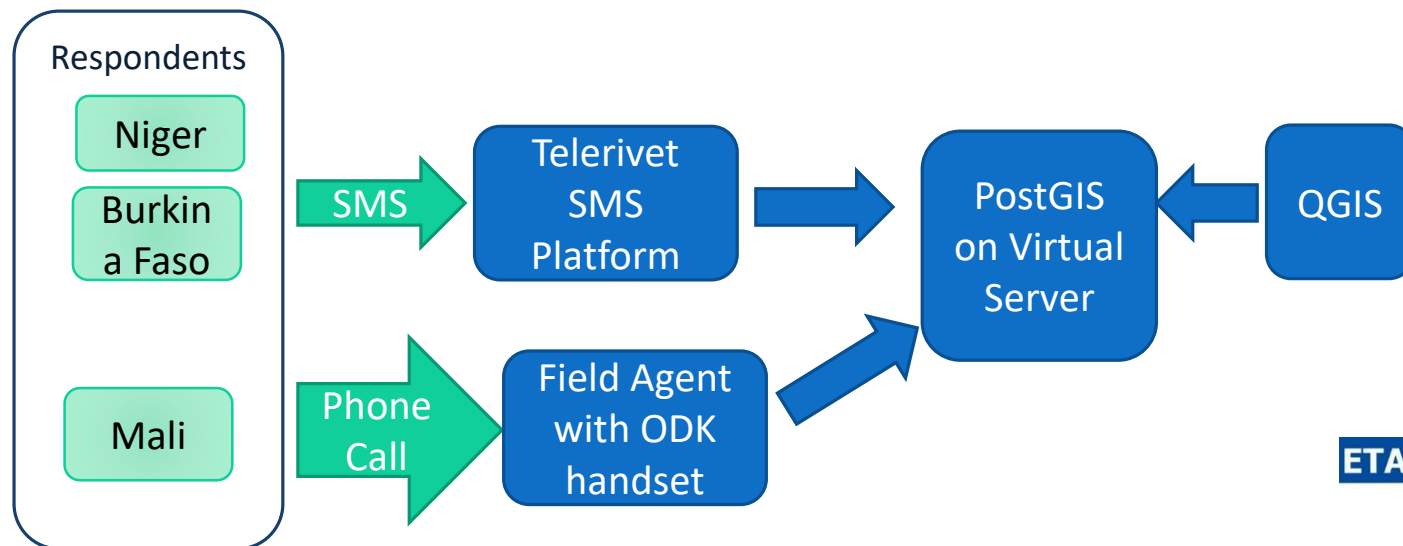
Transhumant Movements

- Seasonal Workshops



Surveillance Field Sites- Weekly Collection

# How it works – Field Data

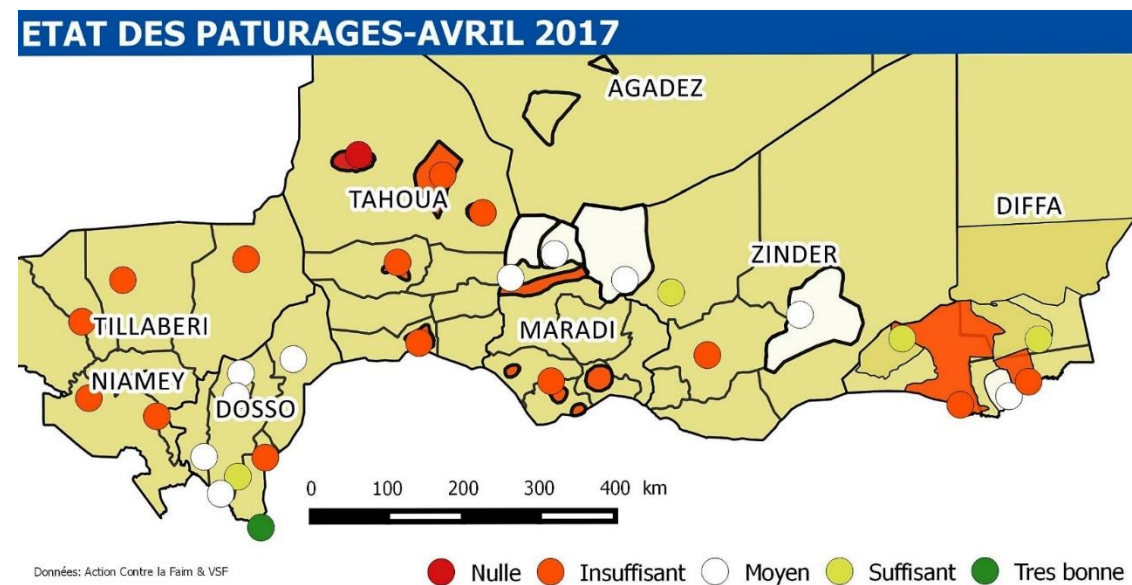


Monthly Report for each country

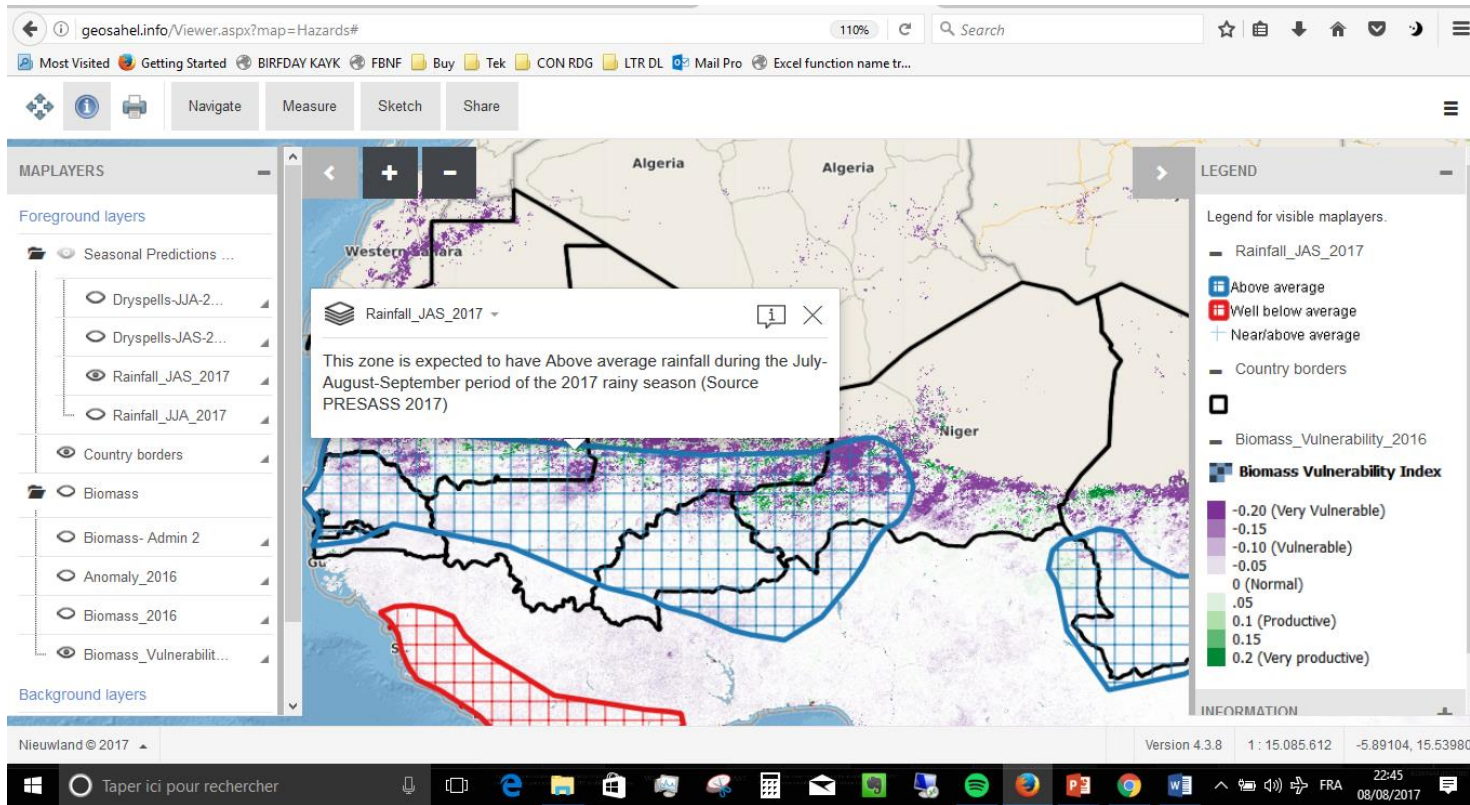
Use for preparing stocks and planning interventions:

- livestock, cash, food distribution

Audience: Livestock ministries, UN, NGO



# GeoSahel.info



Established protocol for creating vector or raster data in QGIS

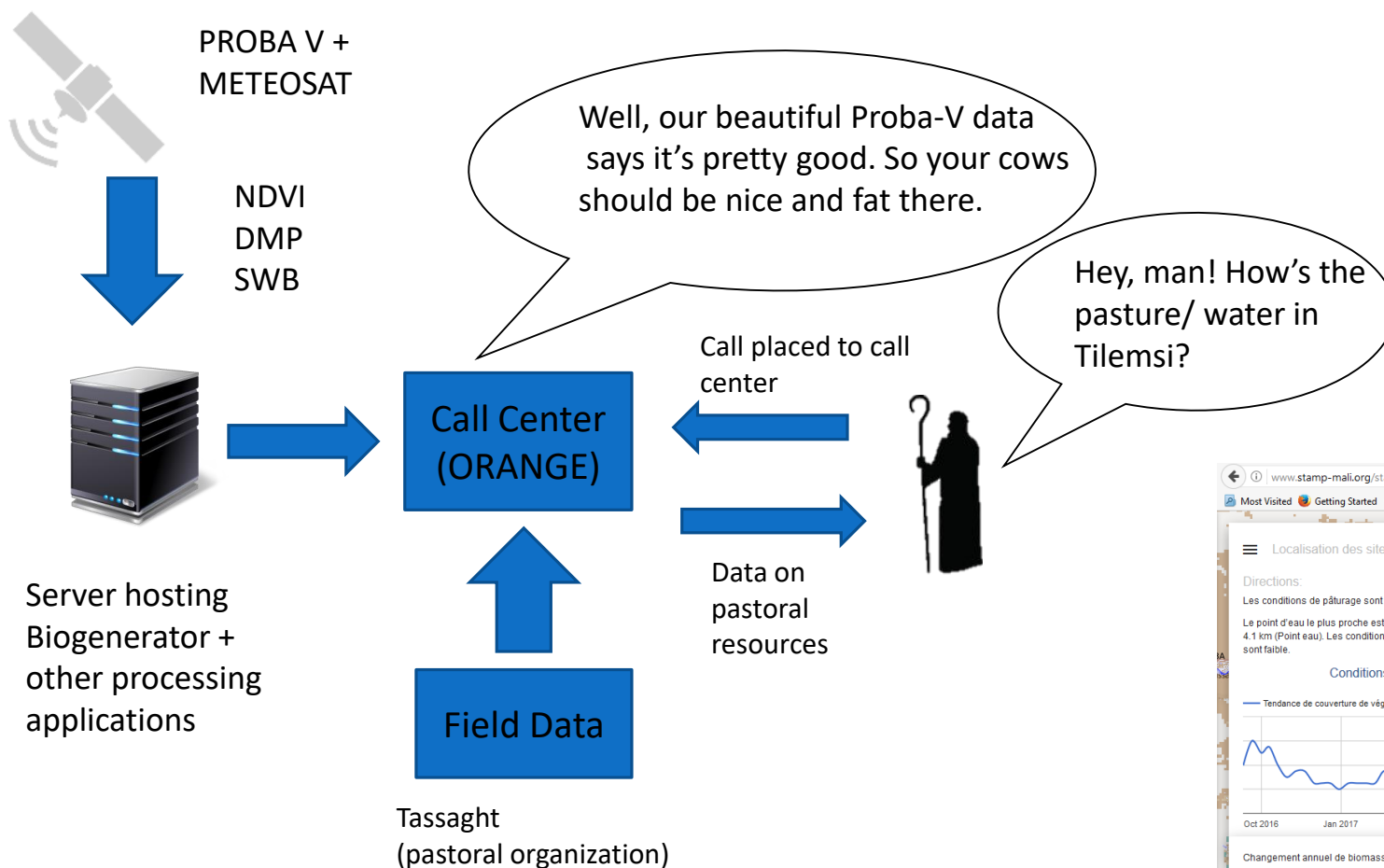


Upload to Geoserver  
- FTP  
- QGIS Plugin

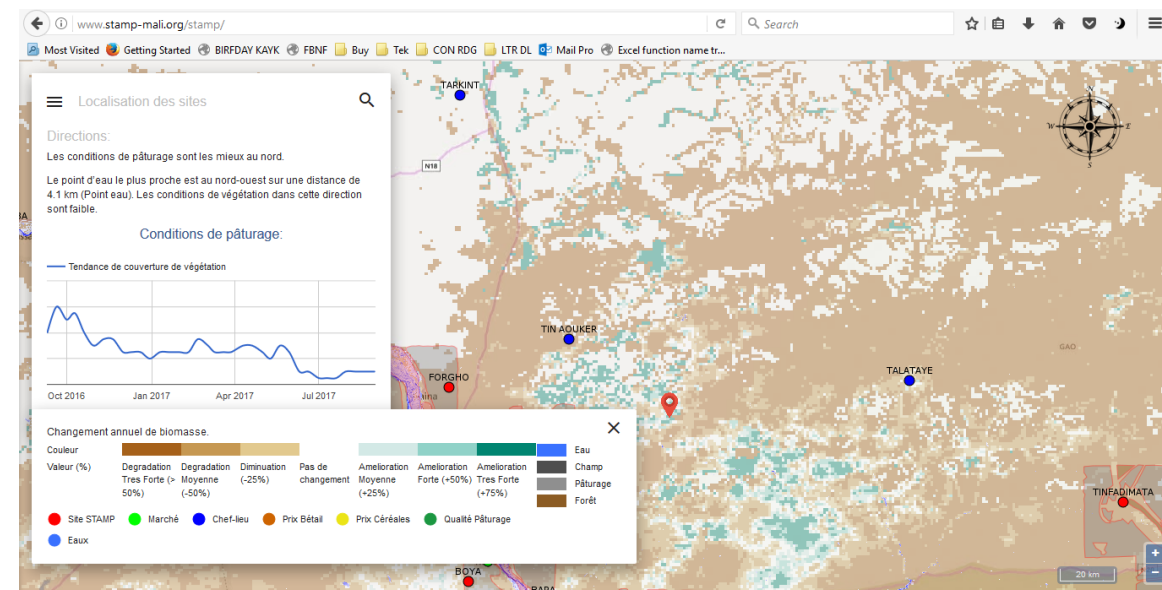


WebGISPublisher/  
your preferred web map

# Reaching the herders



- Project STAMP- Sustainable Technology Access for Malian Pastoralists
- Pilot project in Gao, Mali
- Pastoral call center providing data on surface water availability, pasture, market prices



# Lessons learned

Keep the data chain short and simple

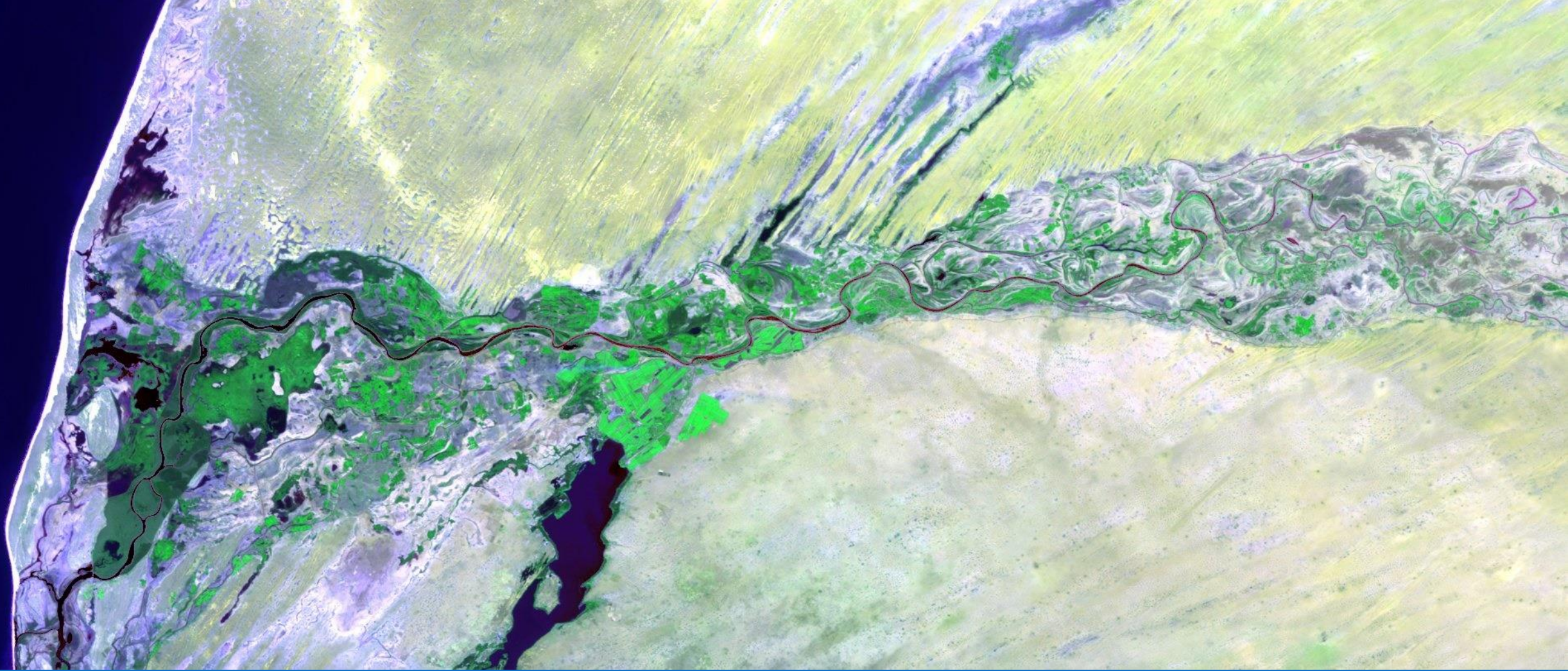
Never ignore the power of qualitative data in a GIS setting

Balance spatial and temporal resolution in imagery.

- 10m Sentinel imagery looks nice but doesn't always help if you only get one usable image every month

Automate whatever you can, but expect partners to prefer manual solutions

- EG: partners may prefer treating their data in excel and creating shapefiles manually



Thank you for your attention

[AMERKOVIC@WA.ACFSPAIN.ORG](mailto:AMERKOVIC@WA.ACFSPAIN.ORG)

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