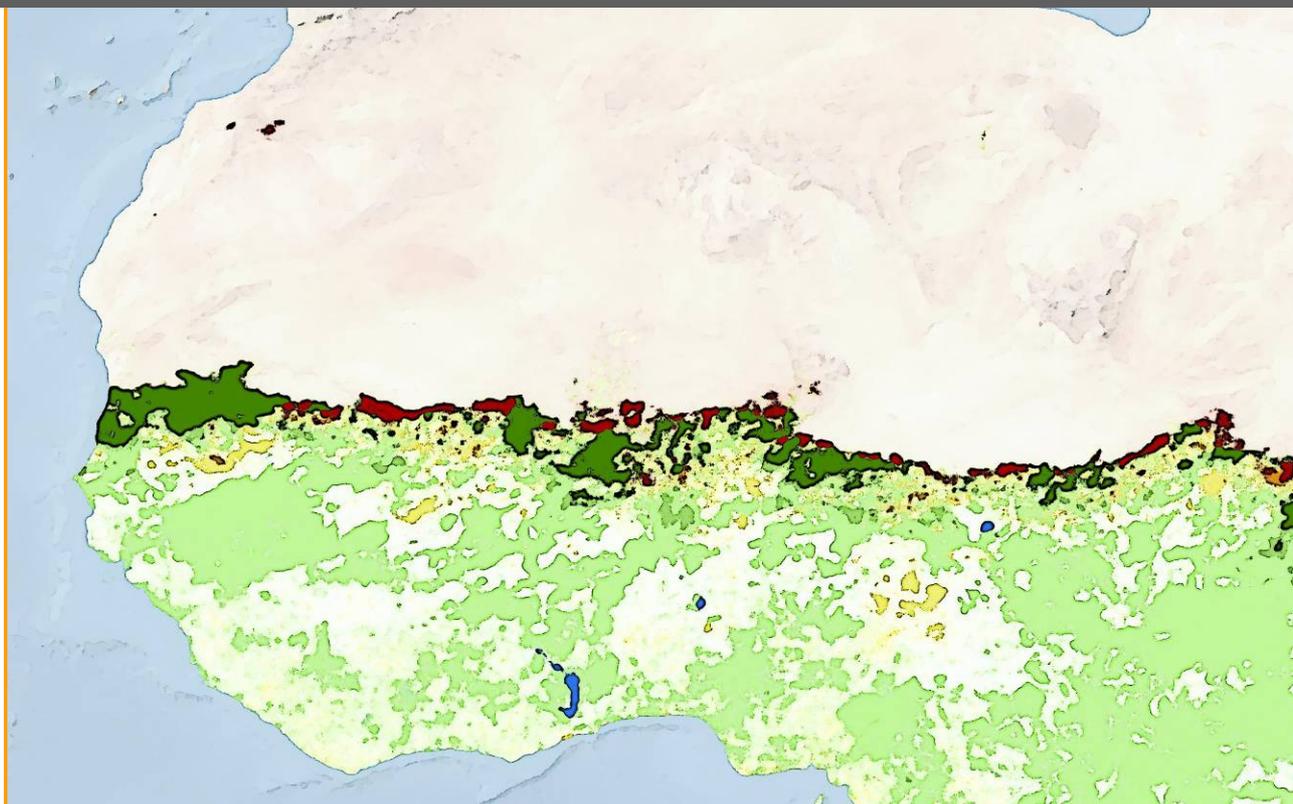


ACF International - West Africa Regional Office

Analysis of Biomass Production - 2013 Rainy Season

Technical document

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- **The Sahel vegetal biomass production has a slight surplus overall for the 2013 rainy season.**
- **The Sahel region is less productive than last year, and the area's profile reveals localized negative pockets.**
- **Pockets with biomass production deficits in pastoral areas are visible on the northern fringe where production is usually very low. Moreover, these deficits are compensated locally by surplus pockets allowing local mitigation processes taking into account the breeders' spatial adaptation strategies.**
- **Some rare deficit zones in agricultural areas may become problematic (North-east Nigeria, Senegal-Mauritania border, South-east Niger).**
- **Analysis from the perspective of biomass production suggests a second year rather favourable allowing pastoral populations to rebuild their livelihood after the 2011-2012 crises. Some follow up of the situation is nevertheless required for zones where deficits have been observed.**

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INTRODUCTION

In the North-Sahel context, which is characterized by vast spaces and an important spatial and temporal variability in rainfall, a large proportion of the population practice an extensive type breeding characterized by inter-seasonal movements linked to the availability of two natural resources: water and pasture.

For several years now, ACF and the national mechanisms for prevention of food crises in Mali and Niger have employed tools based on GIS technology to analyse the vulnerability of pastoral populations. As a result of a series of developments, ACF tools now allow a semi-automated follow up of pastoral resources (focused on the vegetal biomass production at the moment).

This approach addresses pastoral vulnerability from the perspective of availability of physical resources. The latest enhancements to the tools allow an analysis of the vulnerability of pastoral populations at the sub-region level contributing to early warning in the Sahelo-Saharan pastoral areas. However, even if the vulnerability of Sahel pastoralist breeders is dependent on physical resources, the availability of these varies seasonally, leaving other factors to greatly influence the population's capacity to cope with crises (price changes, demographics, conflicts). The conclusions drawn in this report should therefore be weighed against the structural vulnerability factors of these areas.

BIOMASS PRODUCTION AND ANOMALIES - 2013

The ACF analysis of vegetation biomass production is based upon the rainy seasons from 16 previous years.

This production is calculated from data generated by SPOT-VEGETATION and processed by VITO (Belgium). The final processing has been carried out using the BIOGENERATOR tool developed by ACF.

This report suggests a comparison of the biomass production anomaly for 2013 with the average production calculated from 1998 to 2013 time series. This biomass anomaly will be analysed first at the regional level and then specific areas will be targeted in order to complete the analysis.

For more information on the pastoral monitoring system developed by ACF:

- ACF Publication: http://www.accioncontraelhambre.org/publicaciones_biblioteca.php?sec=4 (Manuales y Guías Tab)
- Les Systèmes d'Information Géographique: un outil de ciblage de la vulnérabilité au Sahel, Humanitaire, 2012 - Médecins du Monde, p.64 – 69. <http://www.medecinsdumonde.org/publications/la-revue-humanitaire/Revue-Humanitaire-n-32>

1. Regional Analysis

❖ Biomass Production Anomaly Map

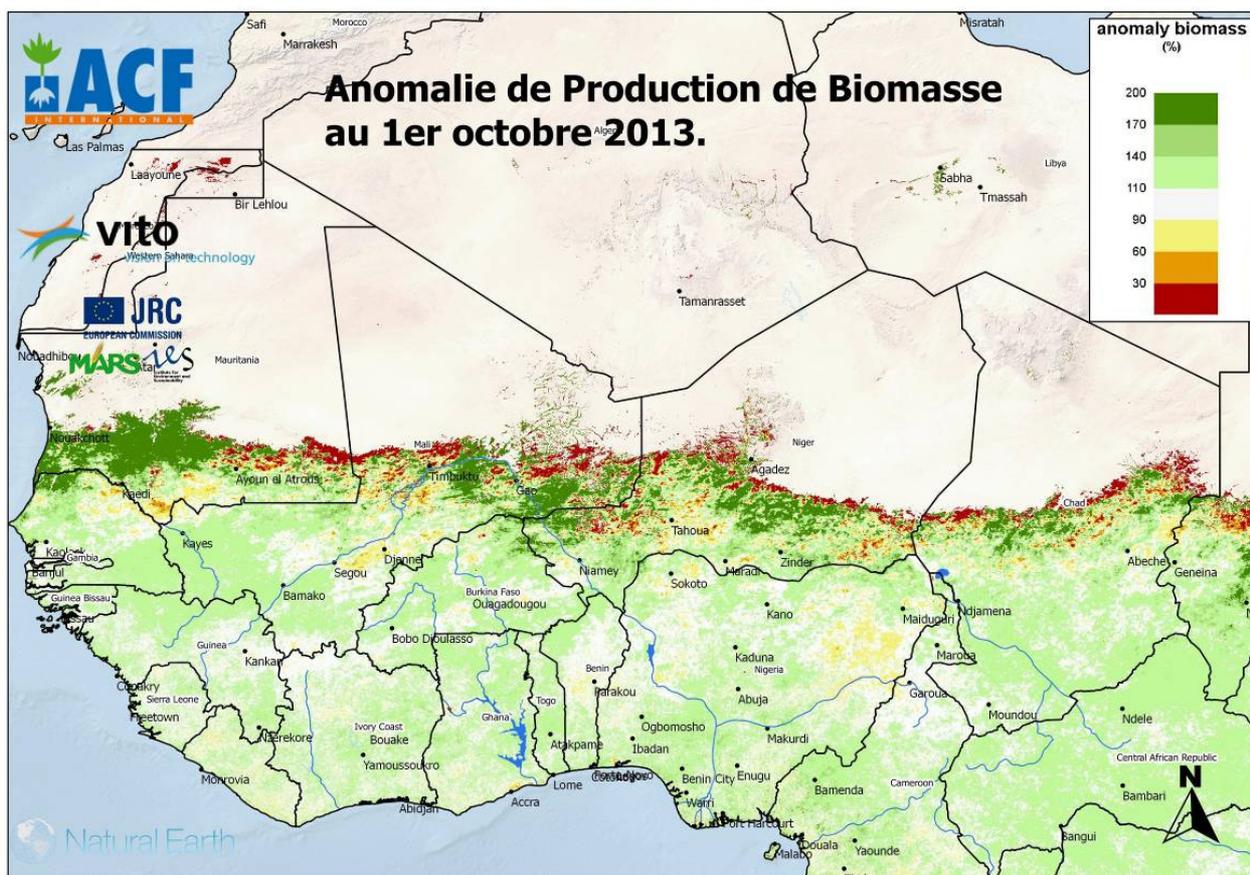


Figure 1

On this map (Figure 1), the biomass production anomaly is presented for the 2013 rainy season. In the pastoral fringe, we can find alternating zones of deficit and surplus of biomass production. The "red" production zones which are far below average are mainly located on the northern edge of the pastoral fringe. We can therefore observe a deficit band 30 kms wide. This indicates that the observed deficits are calculated on very low biomass production levels; there the production rarely exceeds 50 kg of dry matter

per hectare. In addition, these "red" areas are almost systematically located in the vicinity of "green" areas which compensates locally for the available pasture, particularly in pastoral areas where breeders use adaptation strategies based on movement.

Attention: Up to now, the vegetation production estimated by the tool does not provide information on the palatability of vegetation biomass. The deficits and surpluses observed are calculated on the basis of the total production of vegetation and do not distinguish between plant species. Consequently, some areas which are productive may not be used by the herds because of the available species. Conversely, areas of low production could be of pastoral significance, for example, in the transhumance cycle.

Compared with years used as reference (see below), we can see that on a regional scale, the situation this year is far from being comparable to 2004 (Figure 2), the lowest reference in the last 16 years. It nevertheless does not reach the level of production of 2010 (Figure 3), which was the most productive amongst the time series.

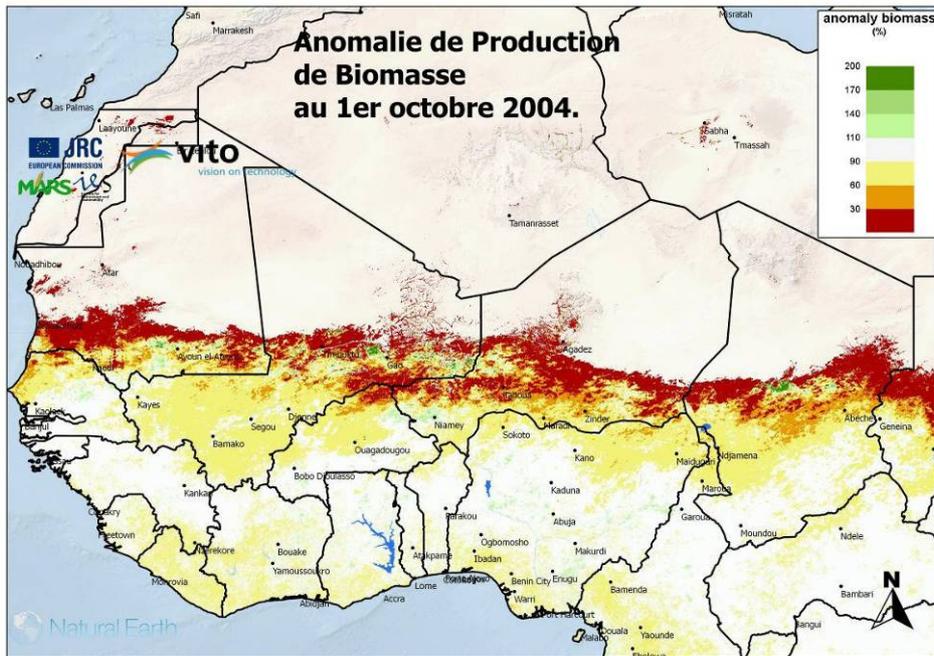


Figure 2

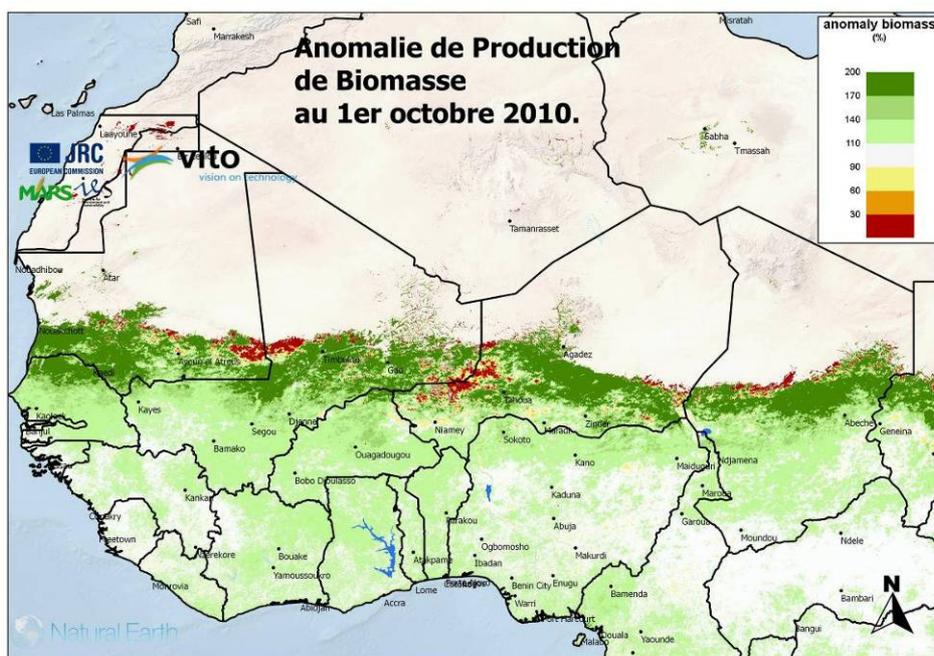


Figure 3

At the regional level, the situation observed appears to be mixed, rather favourable in most areas but likely to generate problems locally.

❖ **Analysis according to administrative entities.**

This map has a tendency to "smooth out" the results shown on the biomass anomaly production map (per pixel).

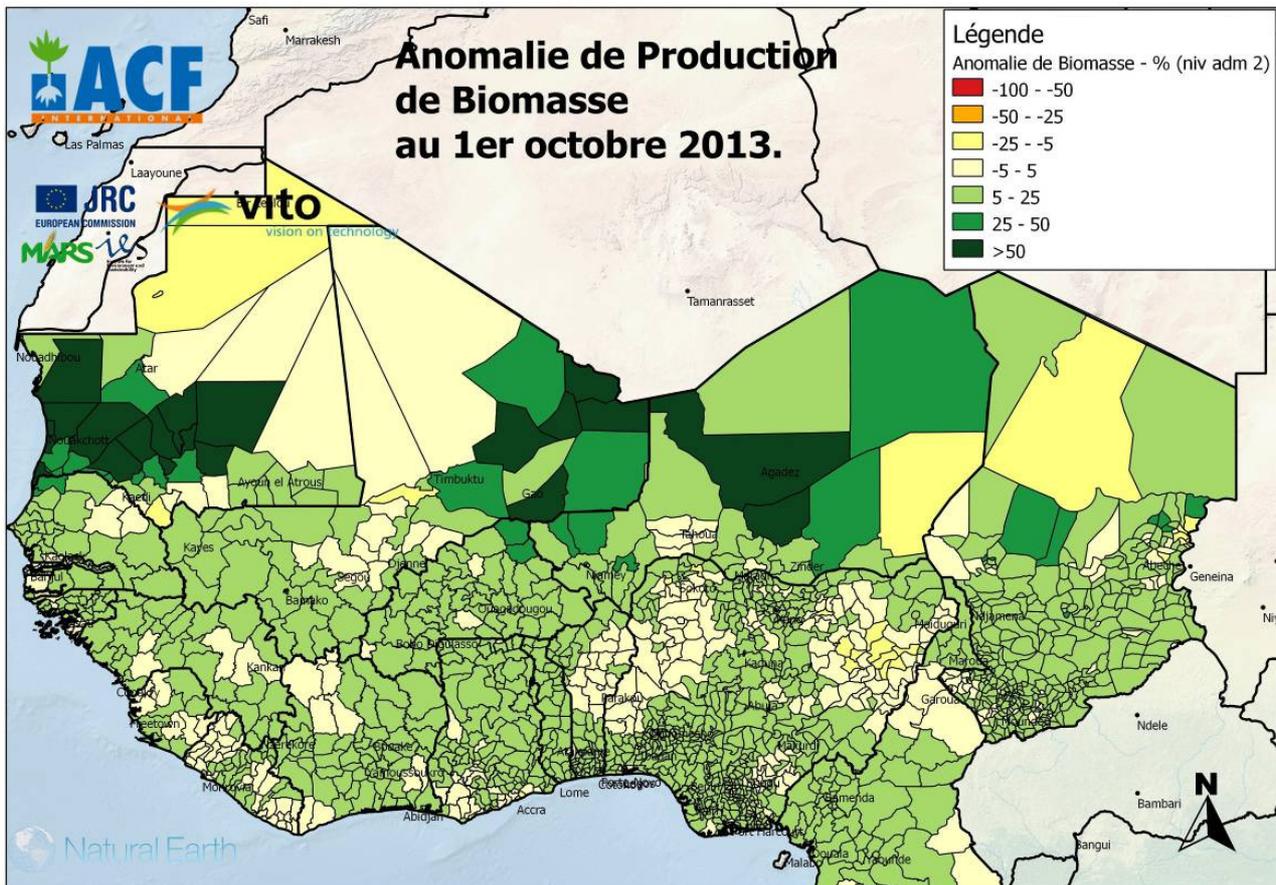


Figure 4

As shown in the map (Figure 4), when production is calculated at this level, the great majority of considered administrative entities have a biomass production equal to or greater than the average.

Only a few rare pastoral and agro-pastoral areas are deficient.

- Mauritania:
 - o Selibaby
- Mali:
 - o Niafunké
- Niger:
 - o N'Guigmi
- Chad:
 - o Borkou
 - o East of the Wadi Fira prefecture
 - o Ouadai

Also of note; in Northern Nigeria a series of deficit production areas are seen.

- o North-west, in an area in the State of Sokoto:

- North-east, in a few scattered areas in the States of
 - Gombe:
 - Bauchi
 - Yobe
 - Borno
 - Abamawa

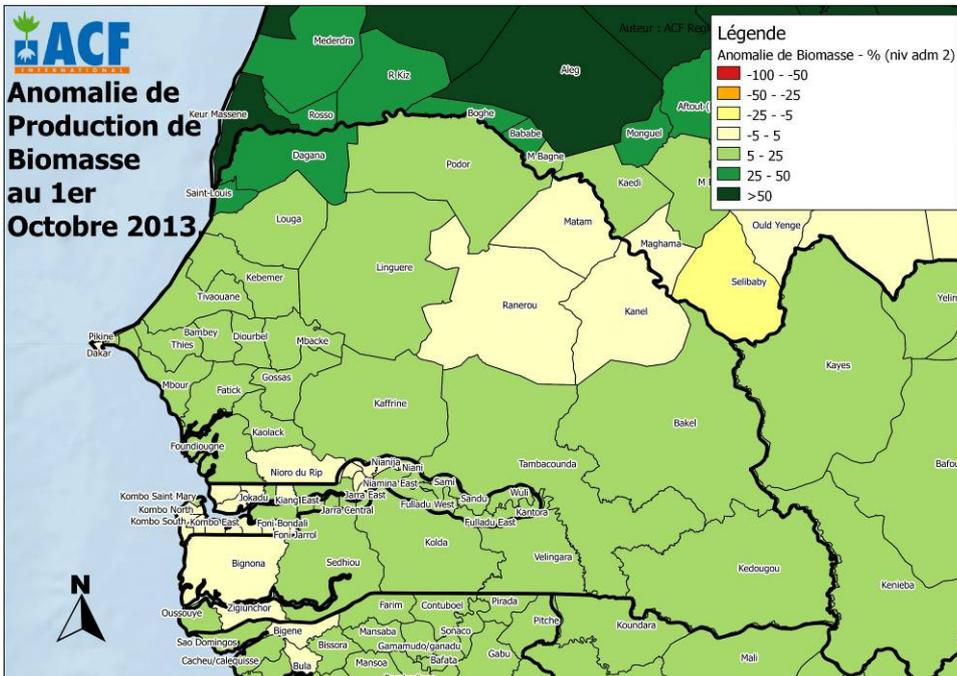
The situation of some of these areas will be analysed further in the second part of this report.

Attention:

- The values calculated for the entities located the furthest north represent the lowest quantities of biomass. Since the entities in question are very large, the anomalies and their visual impact should be viewed with caution. Therefore, it is useful to have a double reading of the maps, by pixel and by administrative entity as presented in the second part of this report.
- The experience of ACF in this area has shown that these calculations have more meaning if they are carried out on geographic entities taking into account pastoral complementarities which are related to the breeders' movements throughout the year. So successive stages of work carried out by ACF in collaboration with associations and local partners in Mali and Niger, have helped to define a number of geographical entities incorporating these agro-ecological complementarities. From workshops and research actions these zonings will be refined later but at this time are only available for these two countries. Accordingly, the analysis is limited to administrative boundaries.

2. Local Analysis

❖ Senegal



Biomass production in Senegal (Figures 5 and 6) is generally favourable to very favourable.

However, a few deficit pockets are visible especially in the departments of Matam (Figure 7), Kanel, Ranérou and Podor, suggesting the possibility of a situation which could be worrying locally for certain households.

The profile for the Matam Department (figure 7) shows a slightly lower than average production, obscuring some internal disparities.

Figure 5

In addition, the situation observed in the area of Selibaby in Mauritania could cause difficulties for the breeders in accessing pastoral resources in this border area, particularly once the 2014 hot season and hunger gap will approach. Possible tensions among breeders and between pastoralists and farmers might emerge.

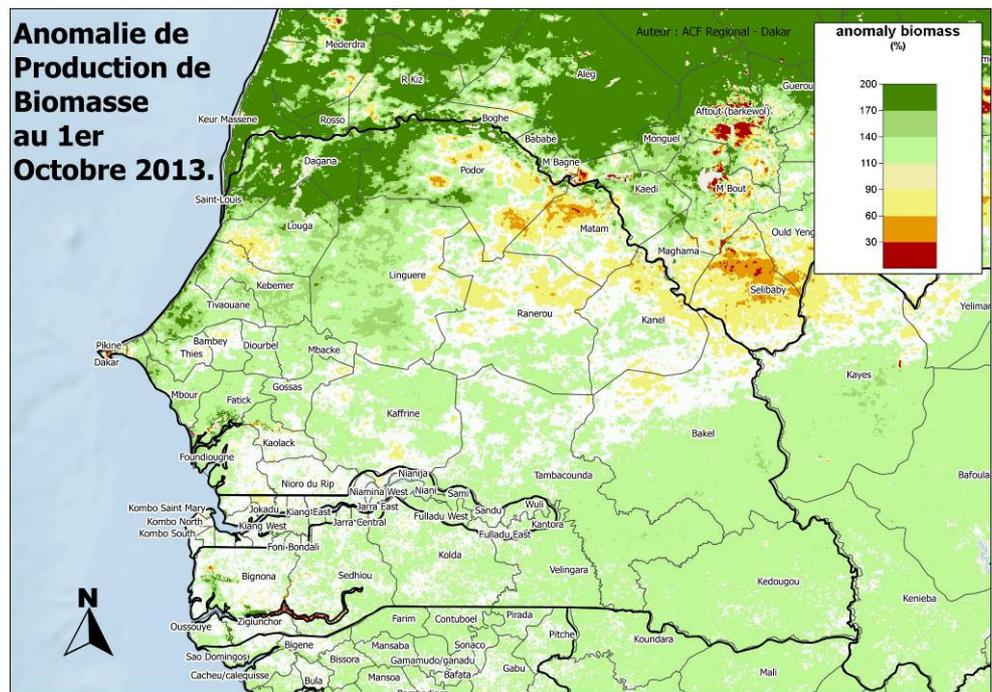


Figure 6

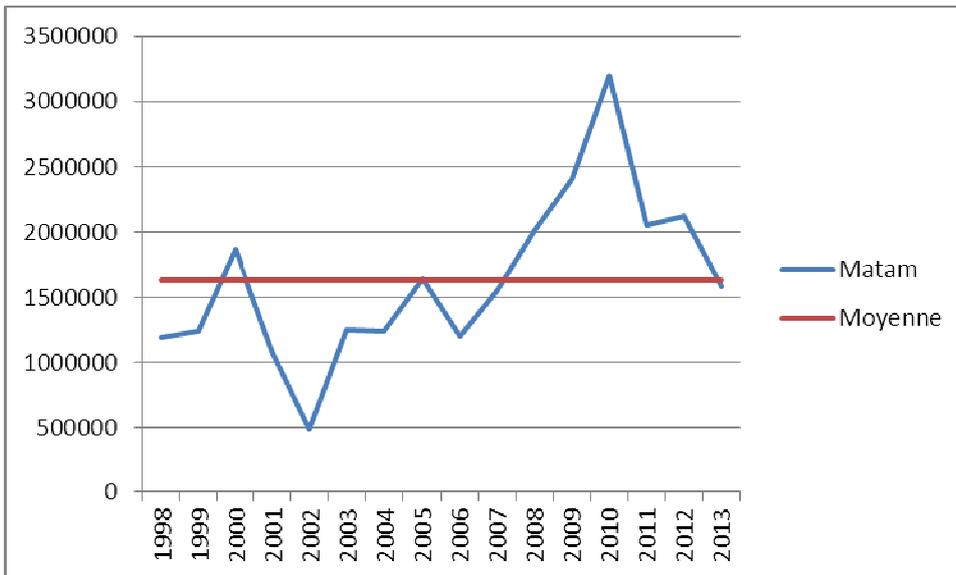


Figure 7: Evolution of the annual production of biomass in the Matam Department - Senegal between 1998 and 2013 (expressed in tonnes of dry matter)

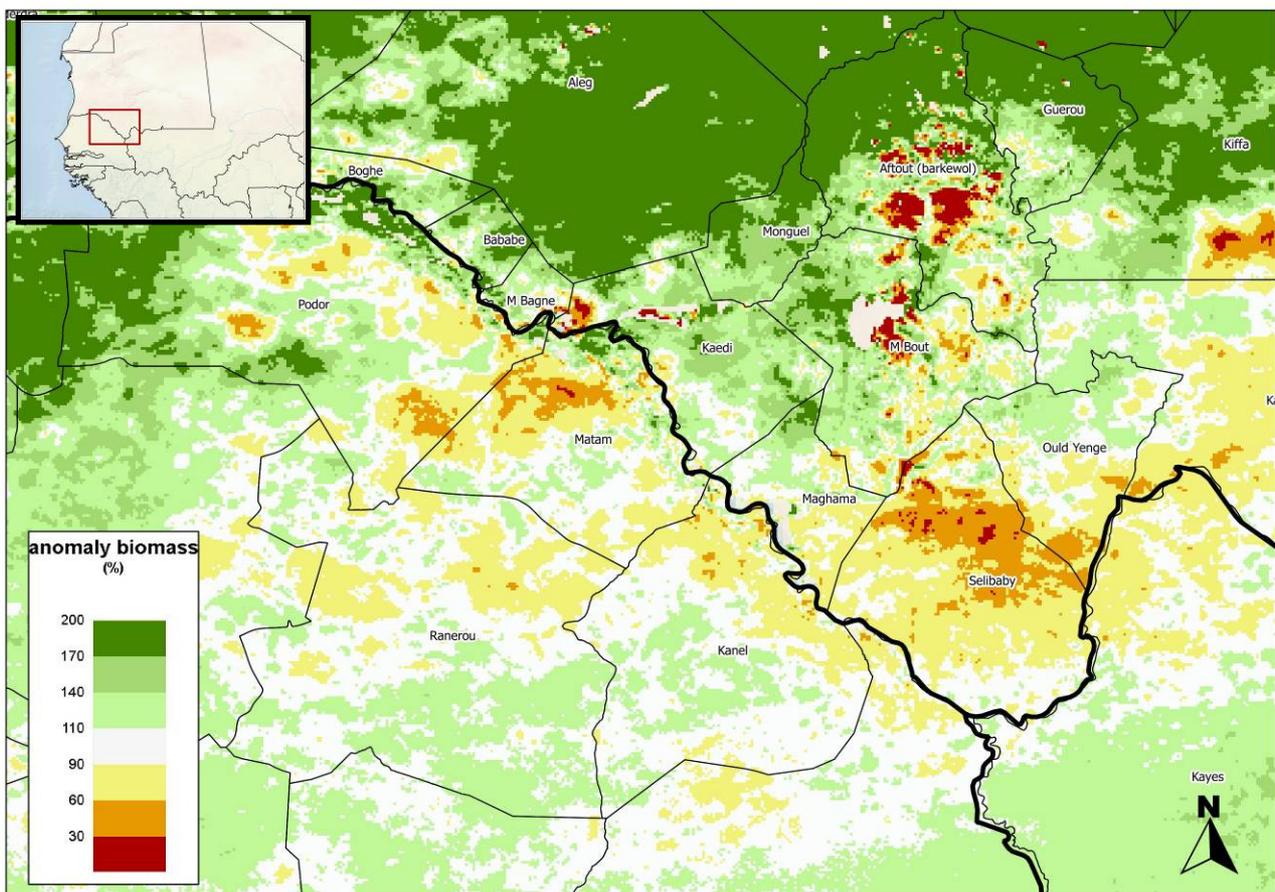
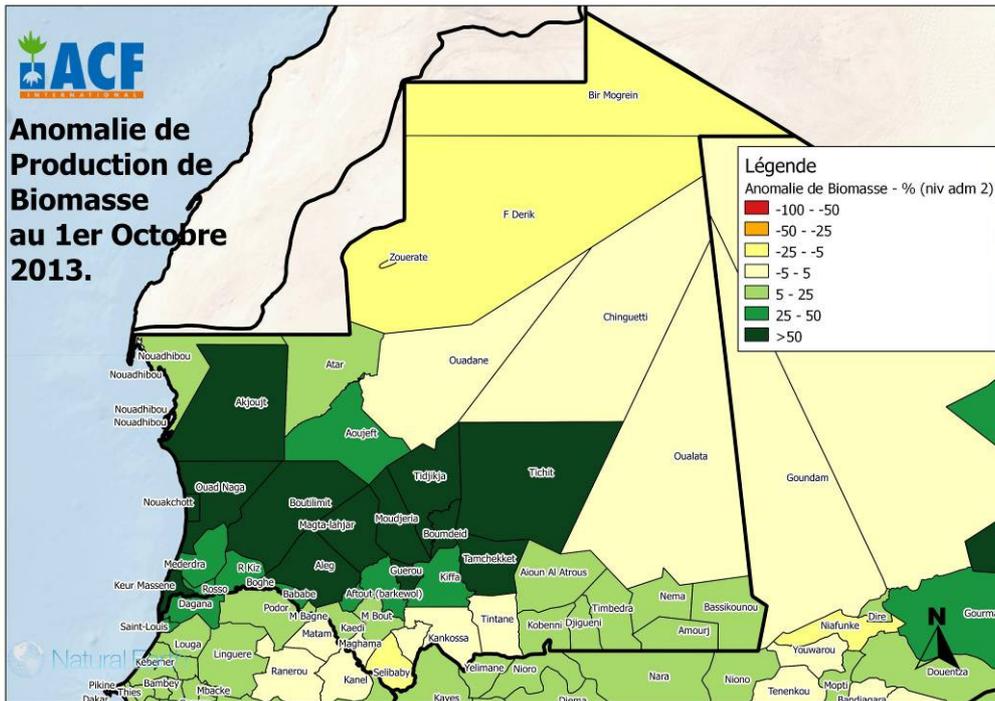


Figure 8

The map above (Figure 8) presents deficits in the border area between Senegal, Mauritania and Mali. Although the spatial aggregation by department produces production values close to the average, there are still some pockets of significant deficit. The fact that the deficit area is large (400 km x 70 km) and includes agro-pastoral areas which are usually quite productive (> 2T MS /ha) implies particular vigilance.

❖ **Mauritania**



The biomass production situation in Mauritania (tables 9 and 10) is very contrasted. It is very positive in a large part of the west of the country, production is shown to be in deficit in the central south and globally average with pockets of severe deficit in the south-east, along border areas with Mali. The situation in the north, also in deficit, is less worrying as it concerns zones of very limited production situated in the Sahara desert.

Table 9

The department of Sélibaby (table 11) is one of the most worrying zones as it is affected by a marked deficit in an agro-pastoral area which normally has a profile of high production. The pocket of deficit affecting this department equally stretches to the west towards Senegal and to the east in the direction of the departments of Ould Yenge, Kankossa and Tintane.

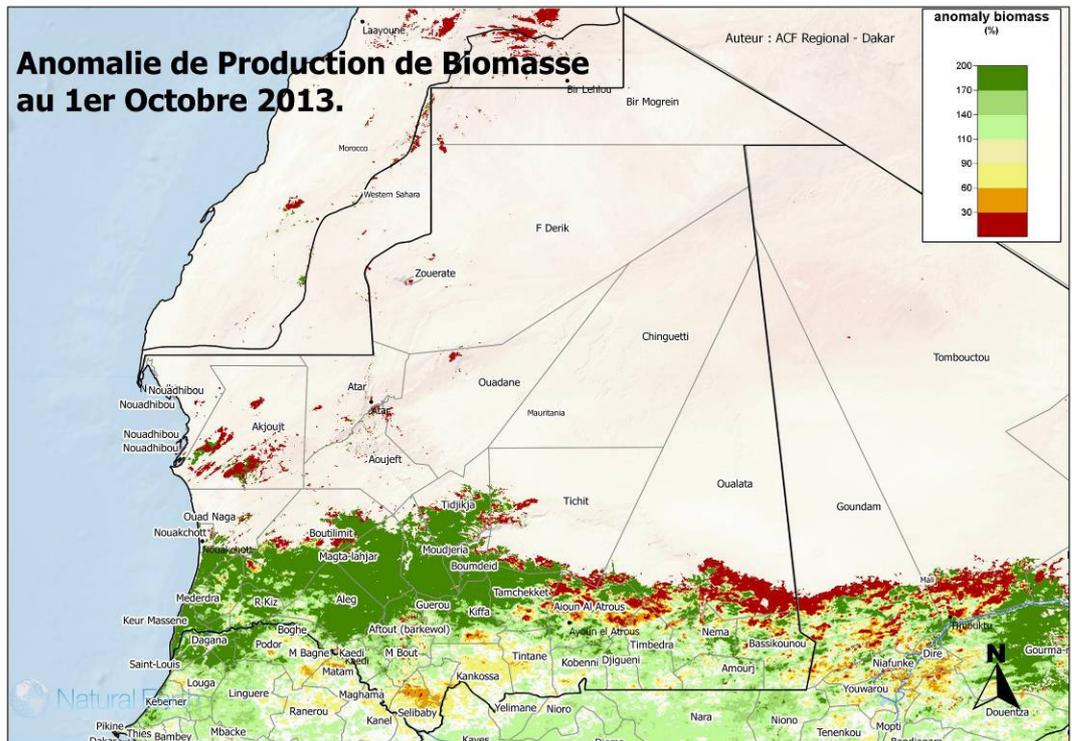


Table 10

The strong positive anomaly observed in the North will probably allow the breeders and their herds an extended stay in these northern zones before returning to the south which could result in some risk of tension on approaching these areas of deficit.

The pockets of deficit between the east of Mauritania and the Timbuktu region of Mali shown on the map below (table 12) – whilst extensive – are found close to pockets of excess of equal size. If the movements and spatial adaptation strategies of the breeders are not constrained, access to the resources should be planned without too much difficulty. A limited stay in the north and an anticipated return towards the south, to the Mali border and further, could be a direct consequences of this situation.

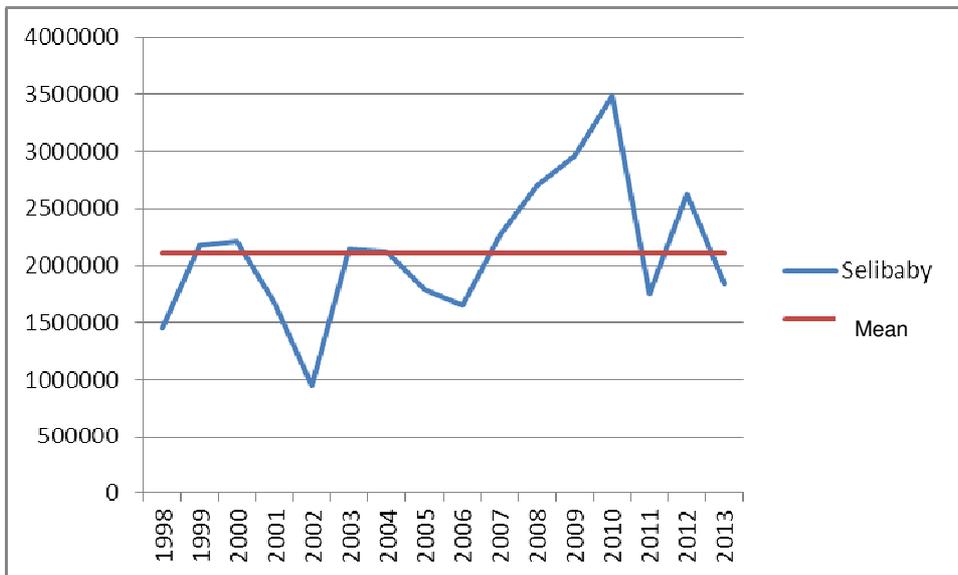


Table 11 : Evolution of annual biomass production in the Sélibaby department, Mauritania, between 1998 and 2013 (expressed in tons of dry matter).

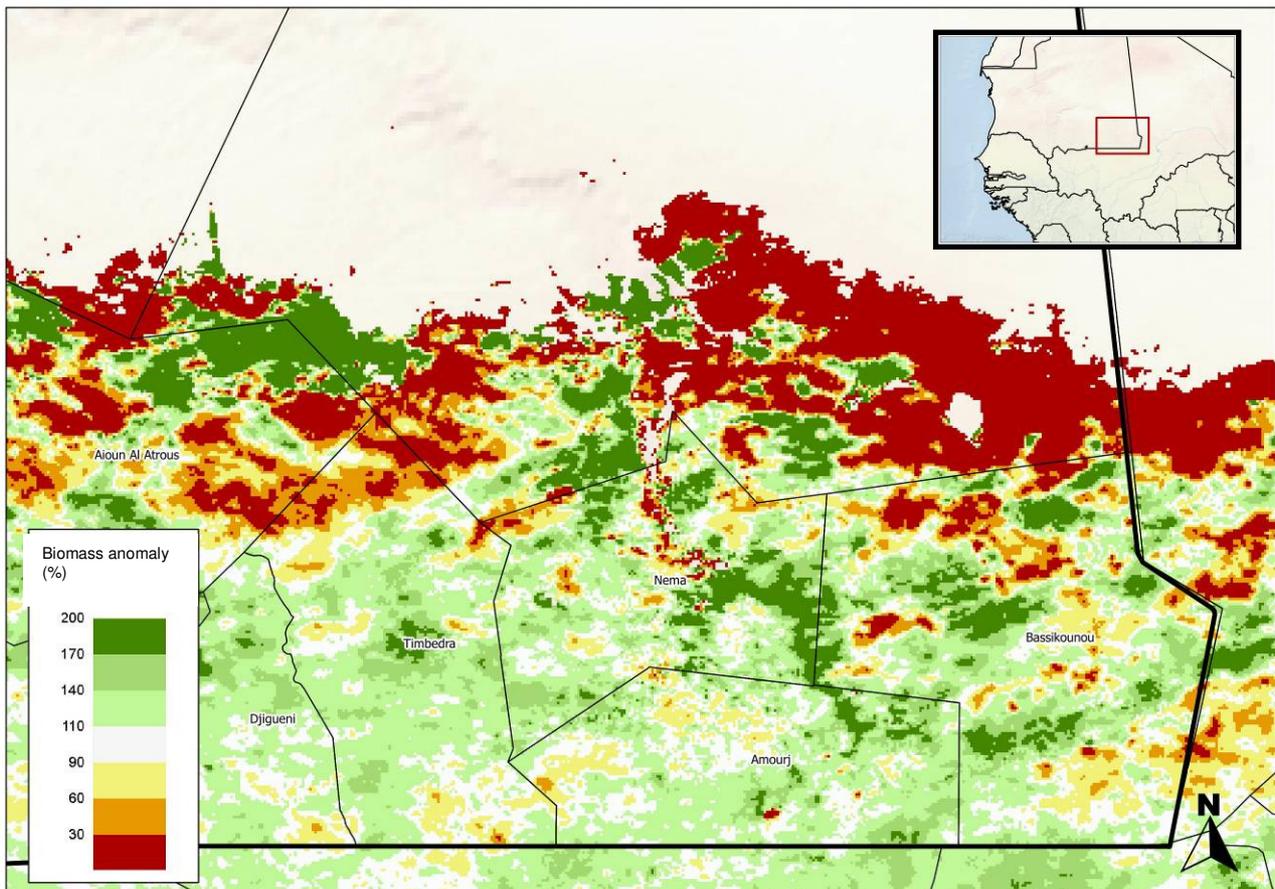
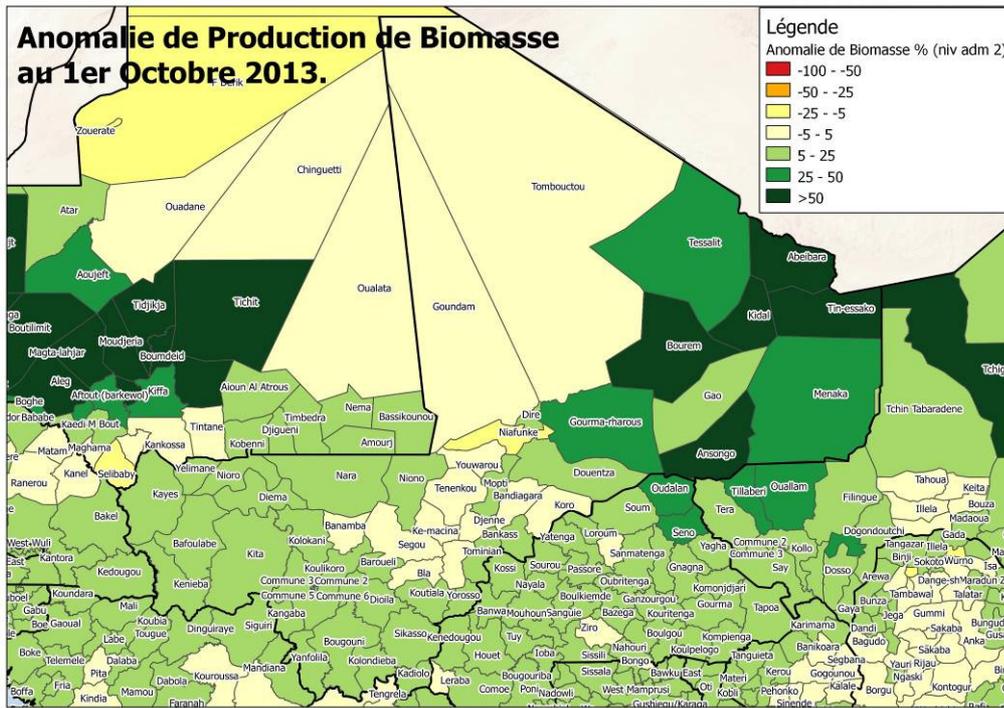


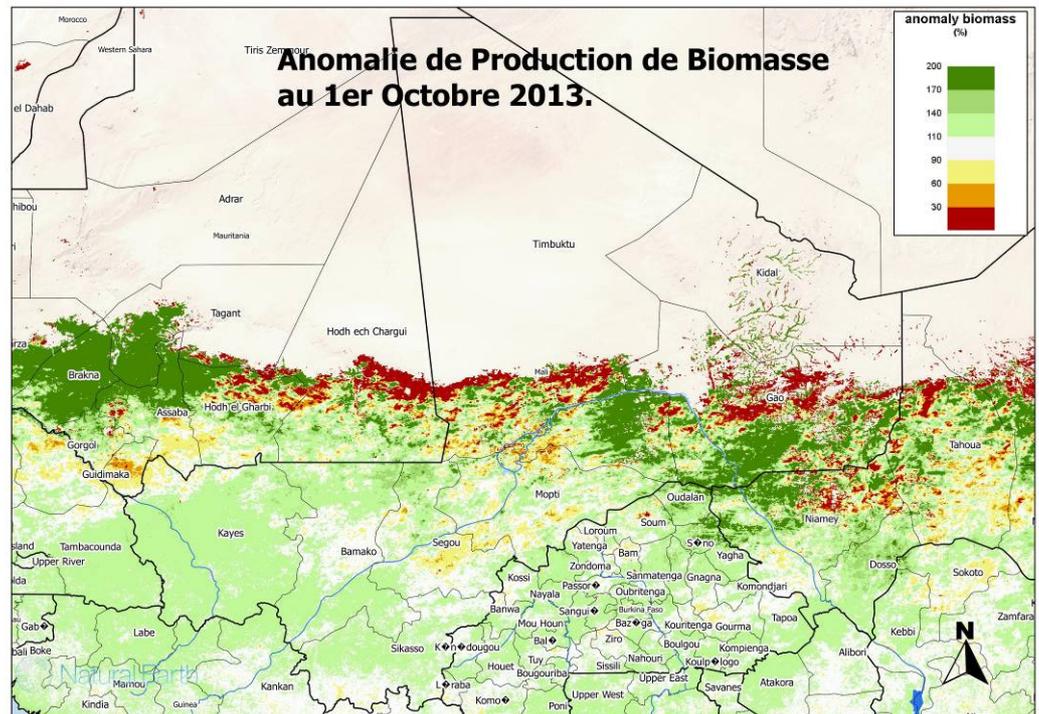
Table 12: Pockets of deficit on the fringes of pastoral regions in the east of Mauritania.

❖ **Mali**



The biomass production situation in Mali (tables 13 and 14) is globally favourable. In pastoral areas the noted pockets of deficit in the Timbuktu region in extension to those described in Mauritania should be locally compensated for by areas of excess. Local difficulty in accessing resources could still arise. The Niafunke circle, with an anomaly of -7%, is the only one which is in deficit in Mali (table 15).
Table 13

The pastoral area to the north of the Gao region also presents pockets of significant deficit. The Kidal region is well endowed with pasture this year, as is the south of the Gao region and the Nigerian areas past the border, the situation could be largely compensated for locally. Meanwhile, the movement constraints due to the military crisis in the north of Mali mean that pastoral analysis is a bit more complicated and uncertain.



The risk therefore could once again be the accessibility to pastures rather than their availability. The Gourma Rharous circle however is particularly productive this year.

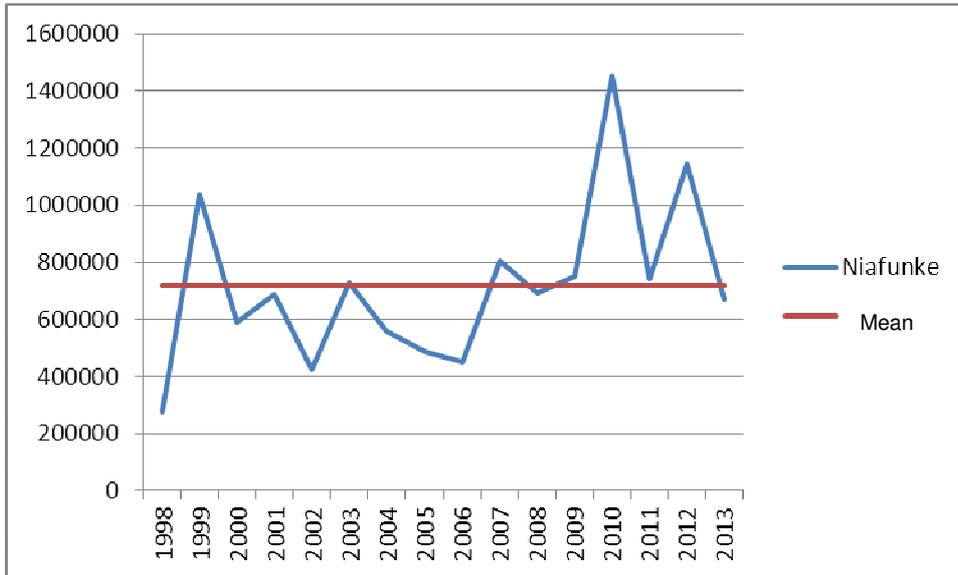
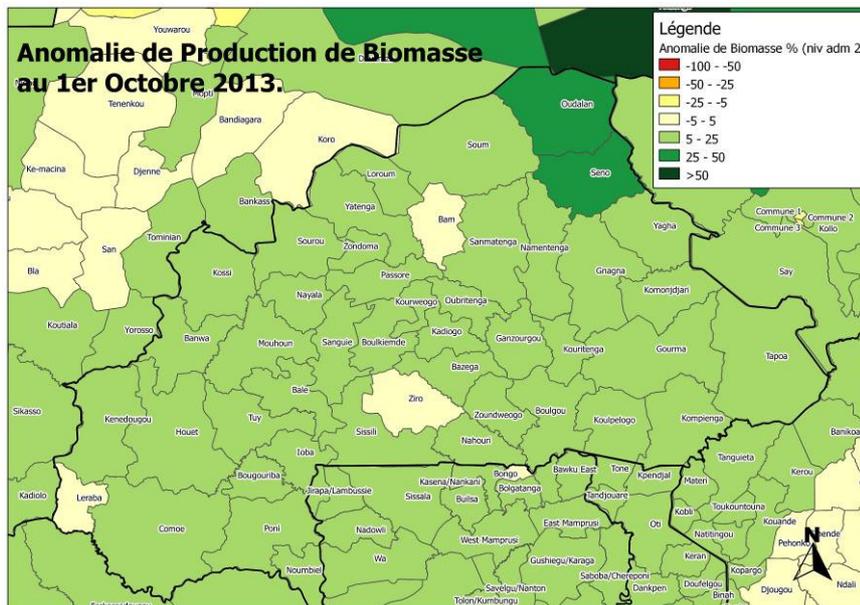


Table 15: Evolution of annual biomass production in the Niafunke circle, Mali, between 1998 and 2013 (expressed in tons of dry matter).

❖ **Burkina Faso**



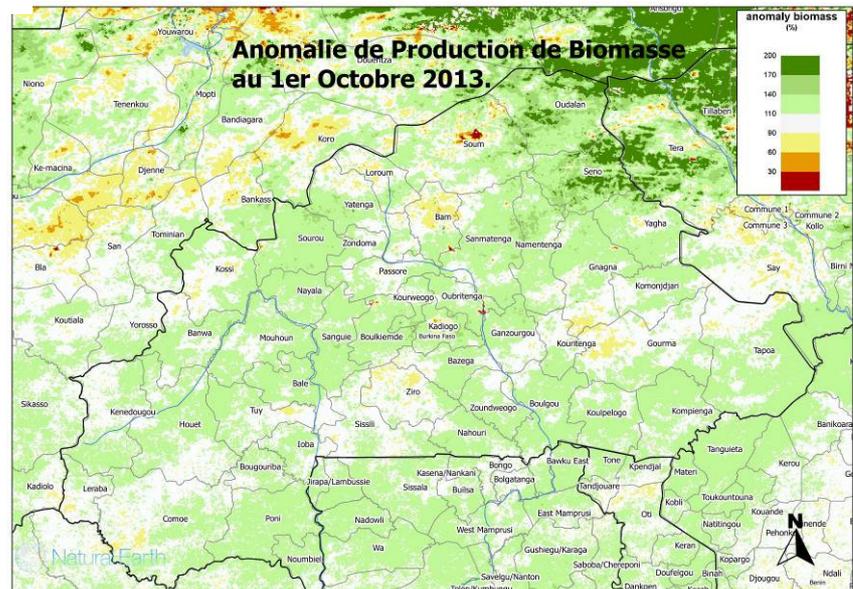
The biomass production situation in Burkina Faso (tables 16 and 17) is favourable this year.

Very few areas of deficit can be observed.

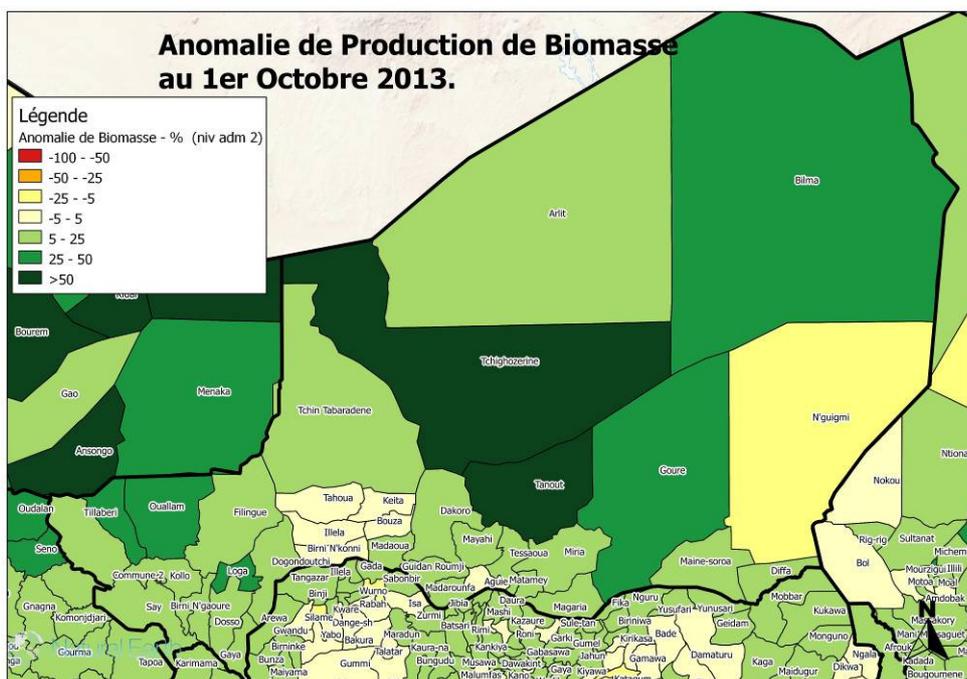
The pastoral area in the north of the country is well endowed with pasture. The transhumance movements between Mali and Burkina Faso should follow the pattern of favourable years therefore reducing the risk of tension for access to resources.

Table 16

Table 17



❖ **Niger**



The biomass production situation in Niger (tables 19 and 20) is globally in excess, however locally it is very contrasted. It presents a typically Sahel profile, with significant variation in production from one zone to another and particularly in pastoral areas. The area between Ouallam and Filingué displays exactly this profile: production zones in deficit neighbouring zones of excessive productions.

Table 18

The proximity of these two types of zones makes pastoral analysis rather optimistic, a local compensation which can be seen as being favourable to pastoral movements. In contrast however the department of Tanout is showing a largely excessive production. In the agro-pastoral zones to the south of the Tahoua region significant zones of deficit are visible. Difficulties could arise in these areas. Finally the department of N'guigmi is in deficit this year (tables 20 and 21). Large areas of deficit are visible and are not compensated for locally. With a deficit measured at 10% the situation of this department is similar to that witnessed during the rainy season in 2009.

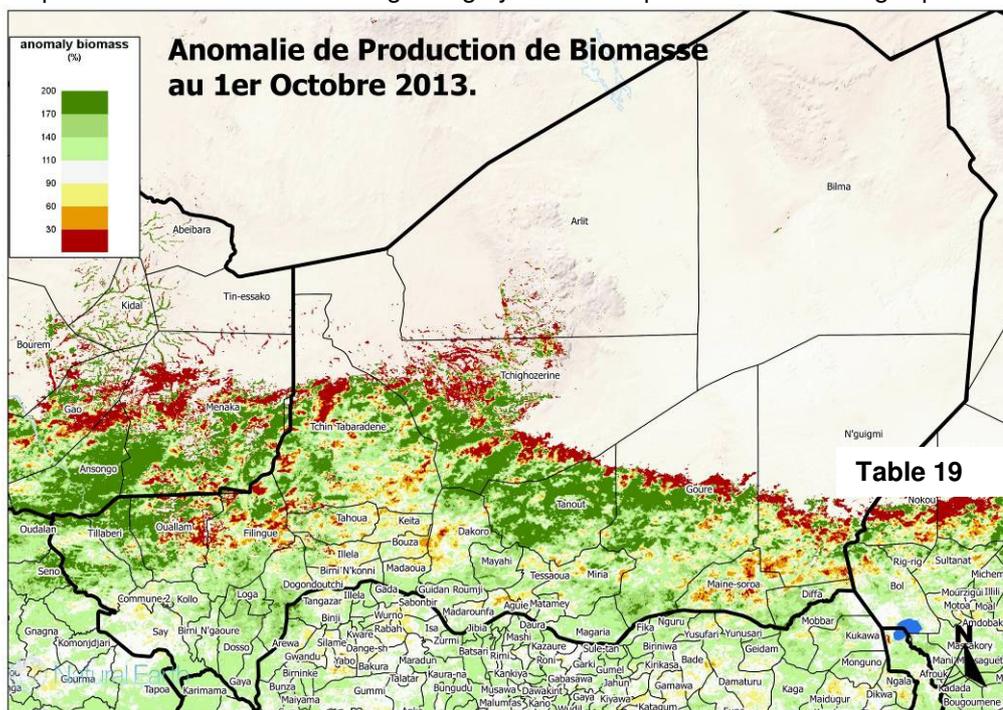


Table 19

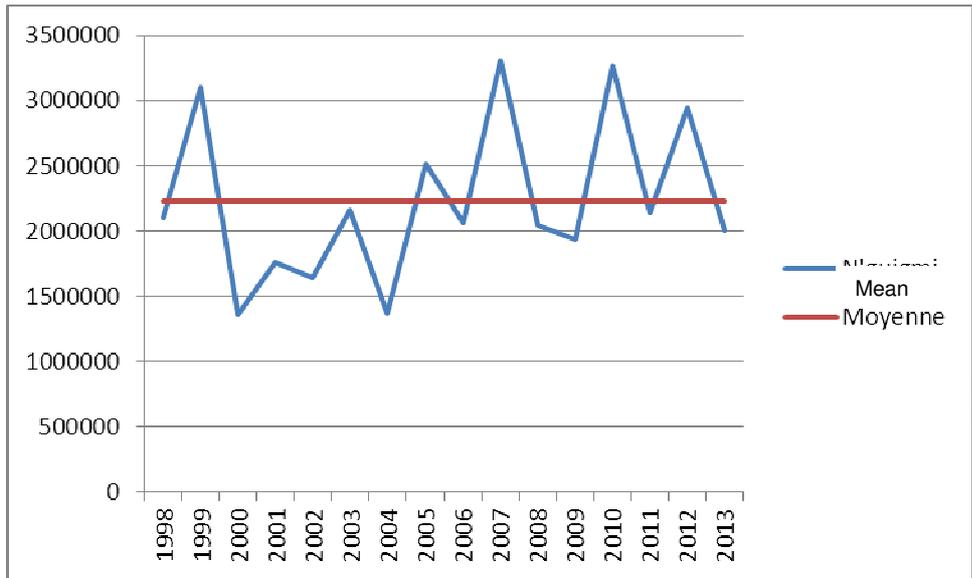


Table 20: Evolution of annual biomass production in the N'guigmi department, Niger, between 1998 and 2013 (expressed in tons of dry matter).

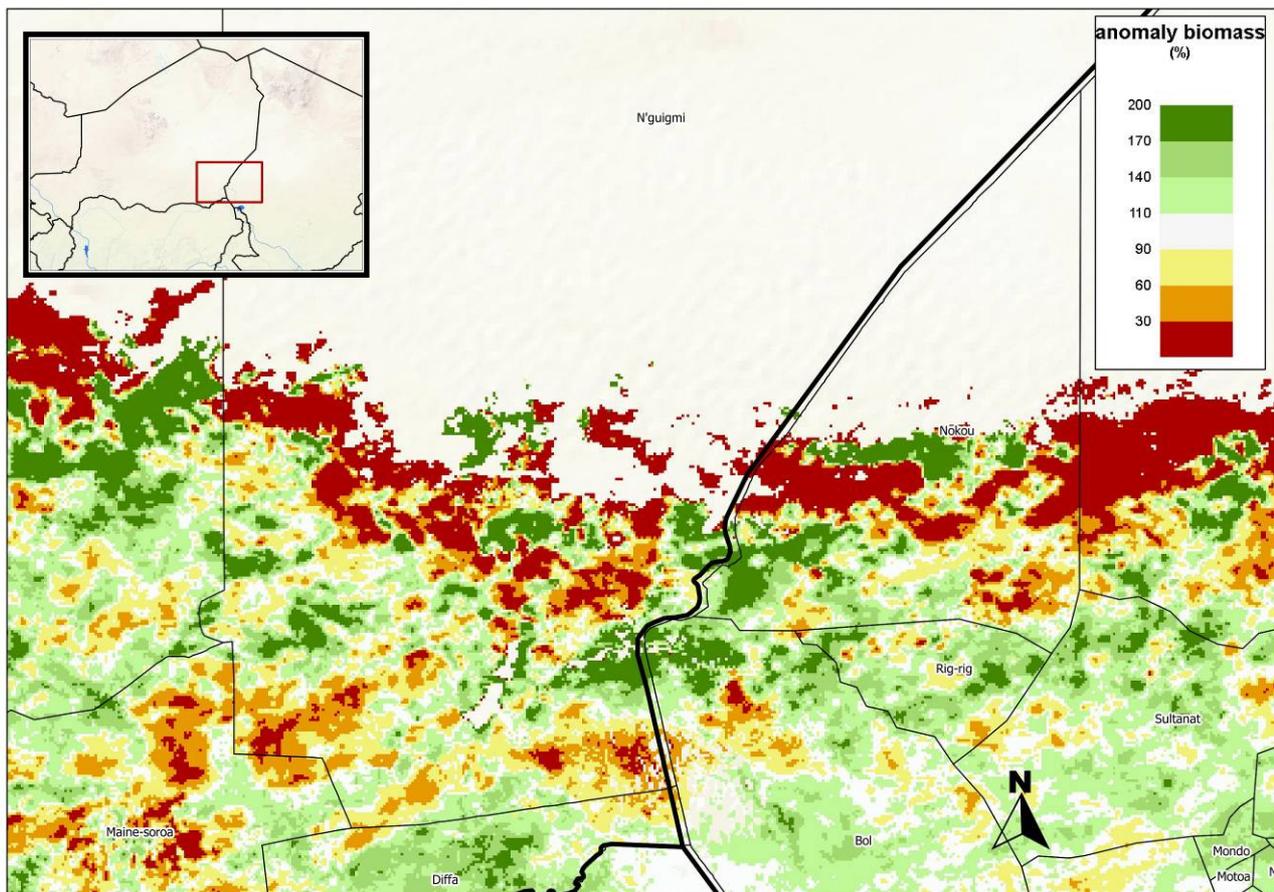
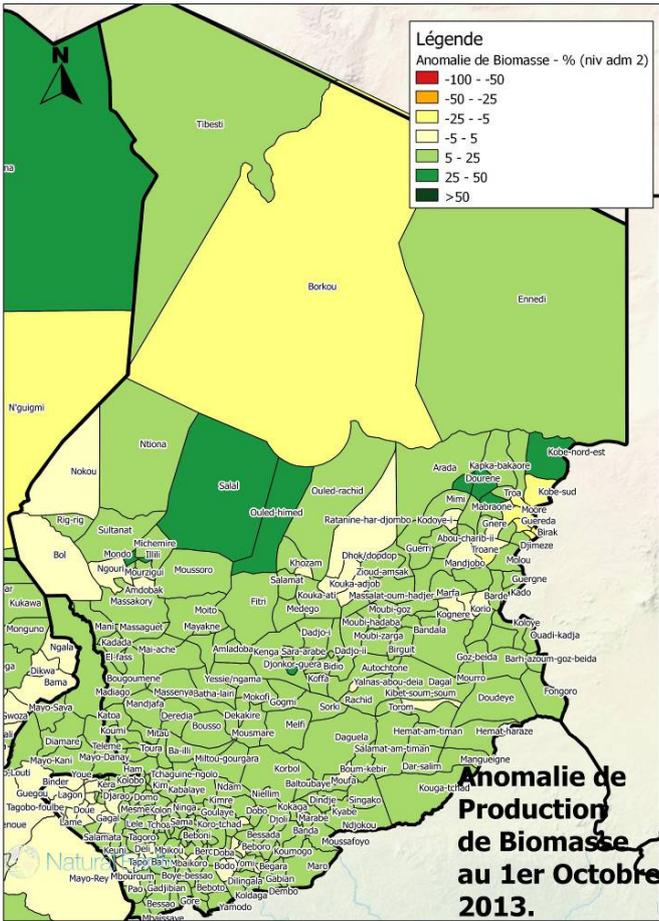


Table 21: The department of N'guigmi: patchwork of areas in deficit and excess on the Niger, Chad border.

❖ **Chad**



The biomass production situation in *Chad* (tables 22 and 23) follows a similar pattern to that of Niger; a globally excessive profile for the country masking very contrasting local reports.

Resulting in mainly positive area assessments except for in a certain number of departments which present negative assessments (in pastoral areas the department of Borkou and in agro-pastoral areas the departments of Moore, Fare, Lima, Guéréda, south Kobe on the border with Sudan). Moore's profile presents a deficit calculated to be close to 20% (table 24).

Furthermore what looks like several isolated zones of marked deficiency can be noted from the picture (table 25), notably on the fringes of pastoral areas in the departments of Nokou and Ntiona to the west of the country. The observed deficit on the other side of the Niger border encourages vigilance in these zones as well.

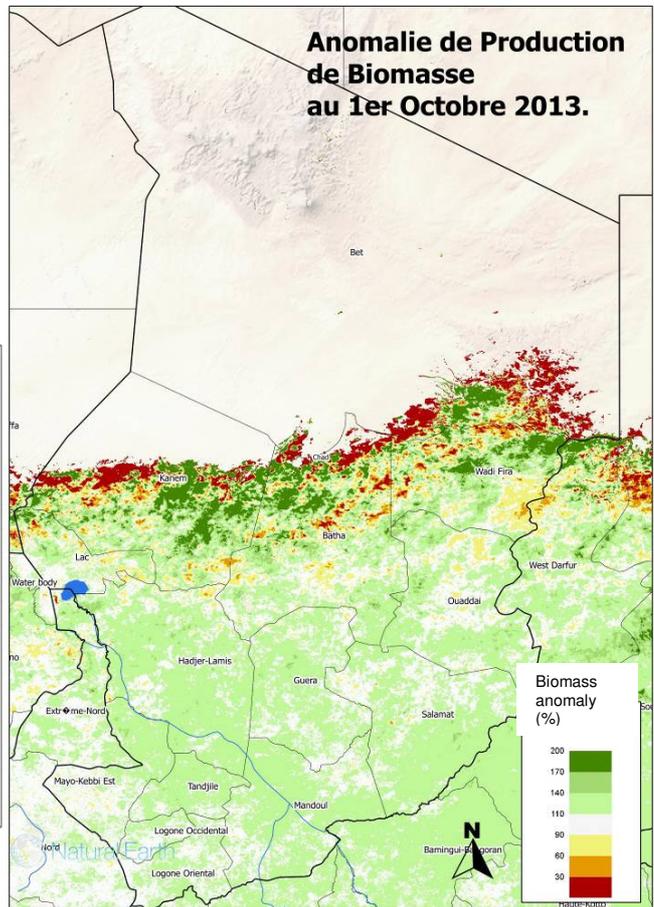


Table 23

Table 22

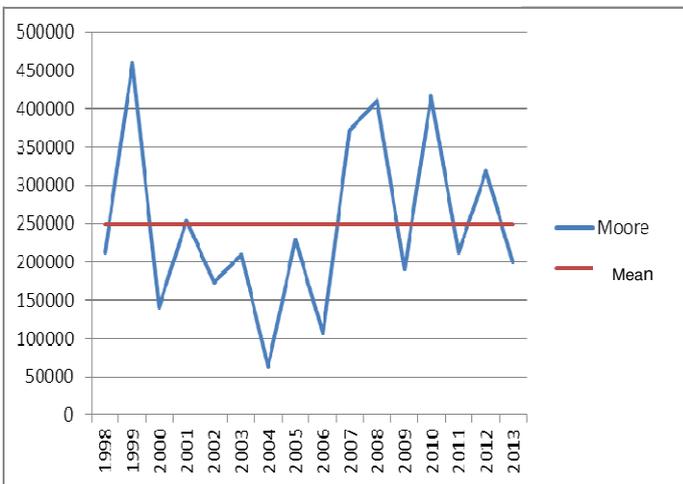


Table 24: Evolution of annual biomass production in the Moore department, Chad, between 1998 and 2013 (expressed in tons of dry matter).

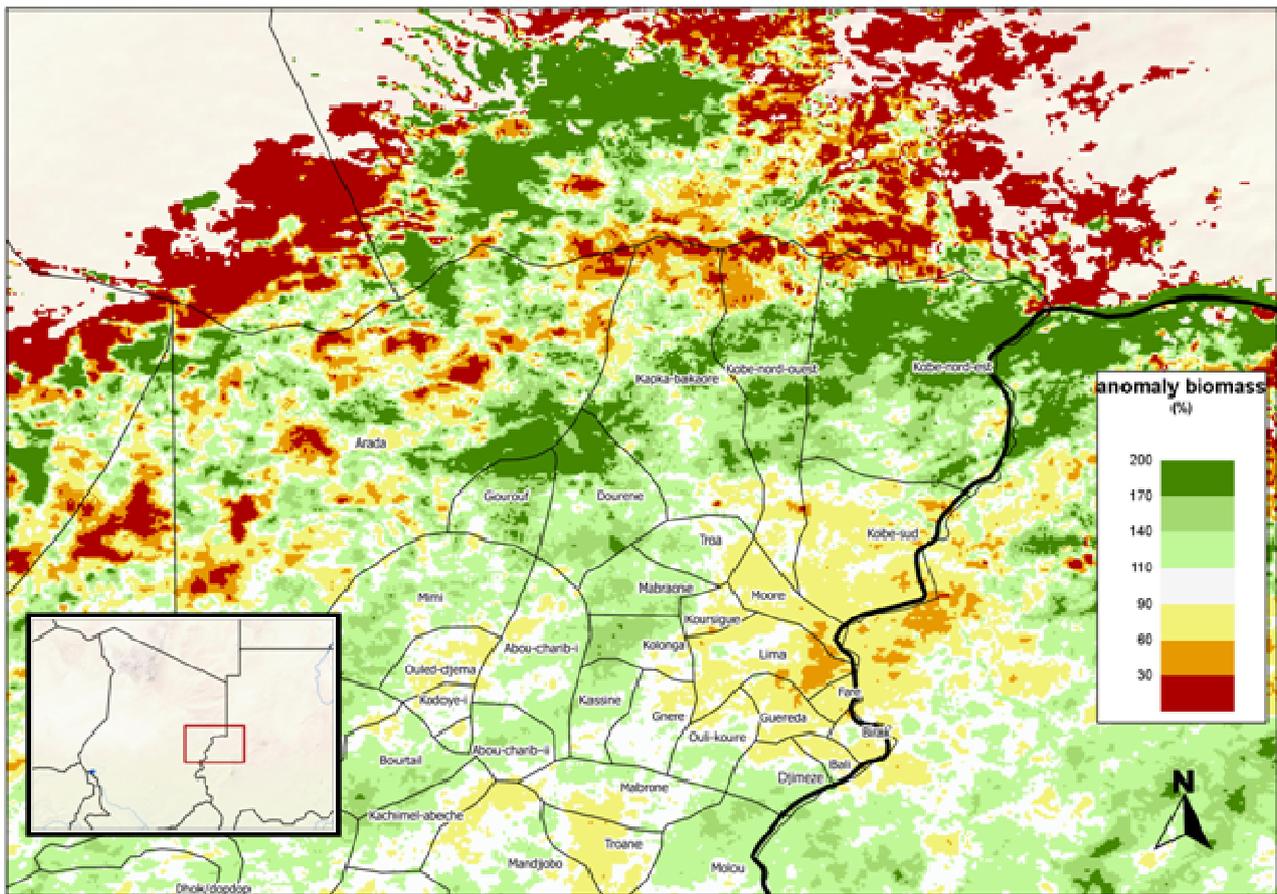


Table 25: Areas in deficit and excess on the Sudan - Chad border.

CONCLUSIONS

This rainy season 2013 has allowed a production of vegetal biomass globally equal or superior to the average of the last 16 years.

This first fact hides however some significant local differences. The spatial repartition of the rains has shown itself to be particularly variable this year, areas of significant deficit neighbour areas of important excess. Different types of areas therefore appear on the entire pastoral and agro-pastoral Sahel belt:

- extensive zones of excessive production allowing a extended stay by breeders;
- mixed zones combining areas of excess and areas of deficit locally compensated for in the majority of cases;
- several but extensive zones of moderate deficiency (Mauritania, Niger, Chad, Nigeria) possibly resulting in local shortages.

Even if this year seems favourable overall, locally difficult situations could be observed notably with the approach of the hunger gap season.

These difficulties could be furthermore exacerbated by external factors aggravating the vulnerability of households:

- spatial constraints due to military and social tensions in the north of Mali
- inter-ethnic tensions and tensions between social groups for access to resources
- locust threat
- rapid depreciation of palatable biomass in relation to heat waves

A monitoring of the pastoral situation is recommended in all areas, notably a monitoring of spatial adaptation strategies which must allow for an anticipation of possible tensions between communities for access to resources.

West Africa Regional Office

With a presence and experience of working over 30 years in West Africa and the Sahel, ACF is now present in 11 countries of the region. To consolidate and enhance this experience, ACF International regional office opened in Dakar in 2009. The objectives are, among others, to improve coordination between the various missions of ACF in the region, ensuring a harmonized quality approach to strengthen the technical areas of ACF in the region, and facilitate emergency responses in different countries of intervention by the management and allocation response funds. This office also aims to improve the ACF advocacy at regional level, and to monitor the context for all of West Africa.

The pastoral early warning system has been developed with the technical support of:



It has been developed with the financial support of :



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