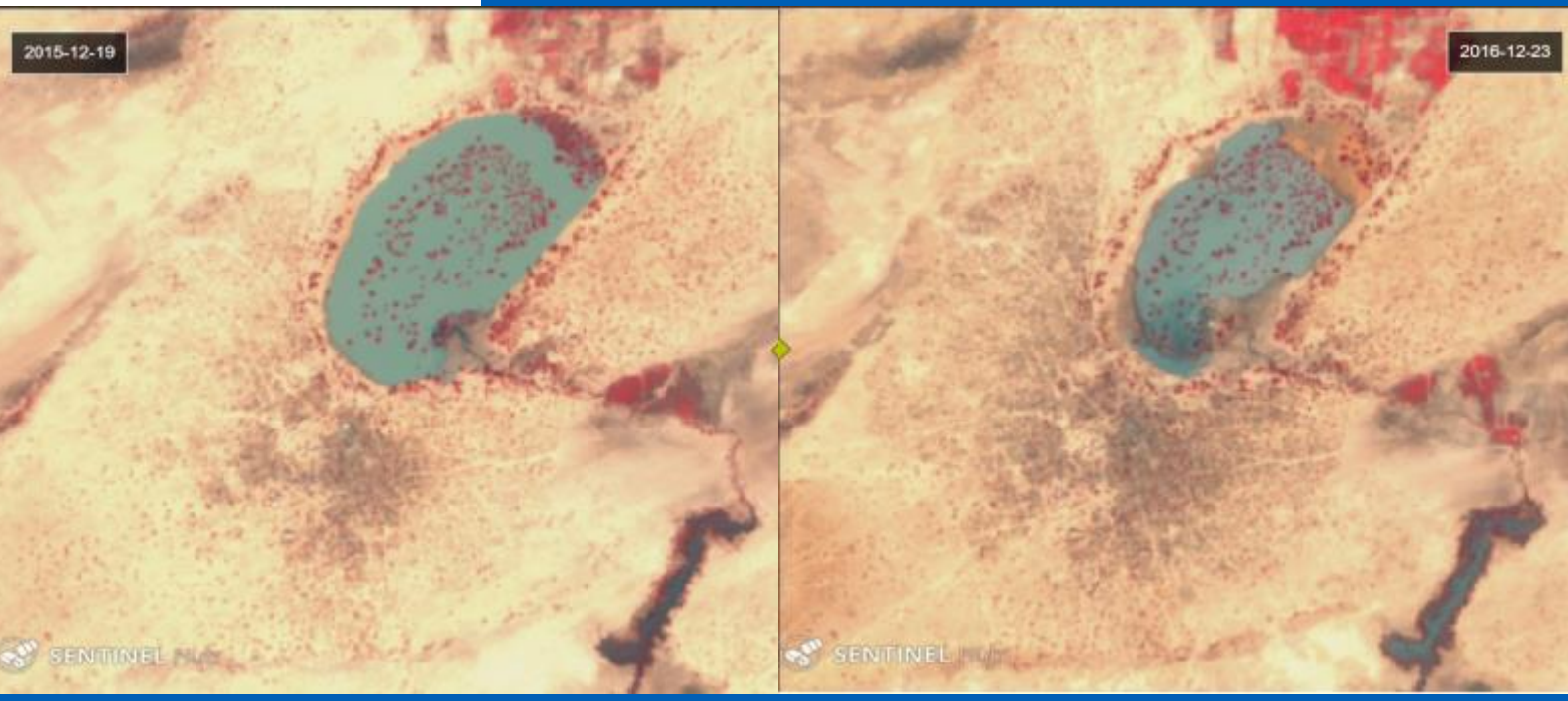



# SURFACE WATERS MEASUREMENT - HOW TO READ THE MAPS?

## WHY USE SURFACE WATERS AS A PASTORAL INDICATOR?

Water, together with pasture, is an indispensable resource for pastoralists and nomadic herders. In the sub-Saharan area, ponds and surface water points fill periodically during the rainy season. The rate and duration of filling are directly related to the quantity and distribution of precipitation.

Monitoring surface waters is important for analyzing the Lean season, for animal health purposes (e.g. to study where animals should move in order to have water available) for analyzing Environmental Pressures and also, it works as a supplement to biomass analyzes as the presence of vegetation is directed linked to water availability

## HOW IS IT MEASURED?

Surface waters data is gathered every 10 days from satellite imagery generated by the Belgian Satellite Proba-V. The imagery is provided by ACF's scientific partner, the Flemish Institute of Technology (VITO).

The methodology used is based on the use of SWB (Small Water Bodies) products available as a decade at 1 × 1 km resolution and Boolean information on the presence of surface water.

Using this one-time water presence information, HydroGenerator prepares annual maps giving statistical information on the filling time of ponds and surface water points over an annual cycle weighted by the distance to the water point. The closer the position is to a water point, the more the water point is present, the higher the accessibility index. The maximum is reached at the position of the water point.

The annual reference cycle is defined by default according to the vegetation growing season cycle from the beginning of April to the end of March of the following year, the user being able to define the integration period of his choice.

The weighting function of the distance to the water point is established by a parameter: the radius of action. Typically, the radius of action is the maximum distance a nomadic farmer can travel to find water (Max 30 km), beyond this distance, the factor is less than 1%.

Accessibility is a spatial index sensitive to the time of presence of surface water and weighted by the

distance to the water points. The index of accessibility to water at the same time intervenes the time of presence of the water points but also their spatial distribution.

## TYPES OF MAPS PRODUCED AND HOW TO RREAD THEM

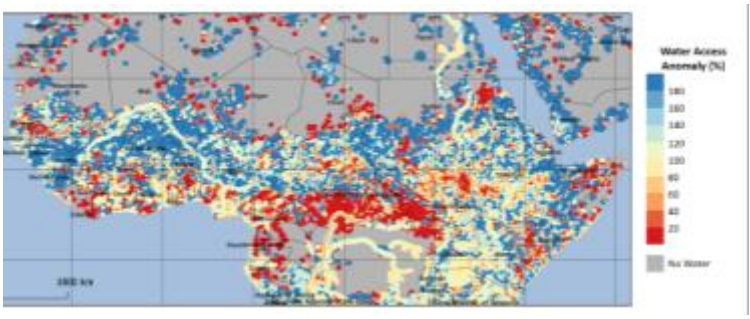
1) Map of the accessibility index calculated on average over all the available years.

The unit of the accessibility index is the filling time index of the water point weighted by a Gaussian form factor depending on the distance to the water point. A minimum value 0 of the index corresponds to a total absence of water in a radius given by the parameter Rayon_Max, while a maximum value 1 corresponds to a permanent presence of the water at the position under consideration.


The areas in blue correspond to places that are often close to water points, while the yellow areas show places that are always away from ephemeral water points.

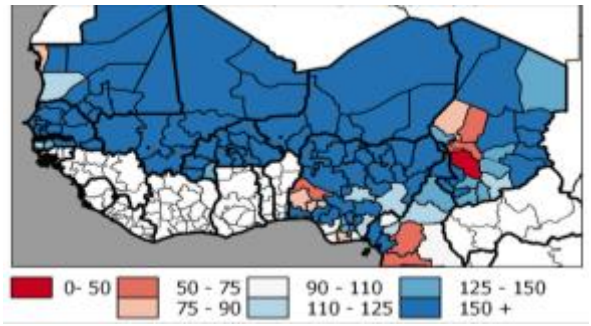
2) Map of Annual Anomaly of Water Accessibility

The anomaly is the ratio of the index of accessibility to water calculated over the year yyyy according to the parameters of period of integration compared to the average of this index computed over the same period of all the years available. The anomaly is expressed in percent (%) with a maximum threshold of 200%. In zones where water accessibility is always zero (desert zones), the output value of the bug file is set to -9998. For the current year, the calculation of the anomalies is made only over the available period.



The red zones have water accessibility much less than normal. On the other hand, blue zones have a much higher water accessibility while the areas in yellow have accessibility close to normal. On these maps, the gray areas have always had zero accessibility over the period, i.e. no water point was ever detected in the vicinity of the location over the entire period considered (in this case 1998- 2016).

3) Map of average water availability: this maps shows for each region which is the average of water availability from 1998 to 2017. This maps helps to compare a specific situation and time with the average of the last 20 years. When more availability, its color becomes blue and with less availability, red.




## USES OF THE SYSTEM

Surface waters measurements are particularly adept for measuring water availability in semi-arid environments, such as the Sahel or the Horn of Africa. This analysis provides useful information to measure the accessibility to water conditions during the dry and warm season, usually the most difficult period for livestock farmers on the Sahel. It works as complement of the biomass measurement- As a result, it's possible to identify potential stress zones, areas to be avoided by herds or areas to restock animal feed.

**CANADA**
Action Against Hunger
720 Bathurst St.Suite
500Toronto, ONM5S 2R4
+1 416-644-1016
www.actioncontrelafaim.ca

**FRANCE**
Action Contre la Faim
14-16 Boulevard
Douaumont - CS 80060
75854 PARIS CEDEX 17
+33 1 70 84 70 70
www.actioncontrelafaim.org

**SPAIN**
Acción Contra el Hambre
C/ Duque de Sevilla, 3
28002 Madrid
+34 900 100 822
www.accioncontraelhambre.org

**UNITED KINGDOM**
Action Against Hunger
1st Floor
Rear Premises 161-163
Greenwich High Rd
London SE10 8JA
+44 (0)20 8293 6190
www.actionagainsthunger.org.uk

**UNITED STATES**
Action Against Hunger
One Whitehall St. 2nd Floor
New York, NY 10004
+1 (212) 967-7800
www.actionagainsthunger.org