

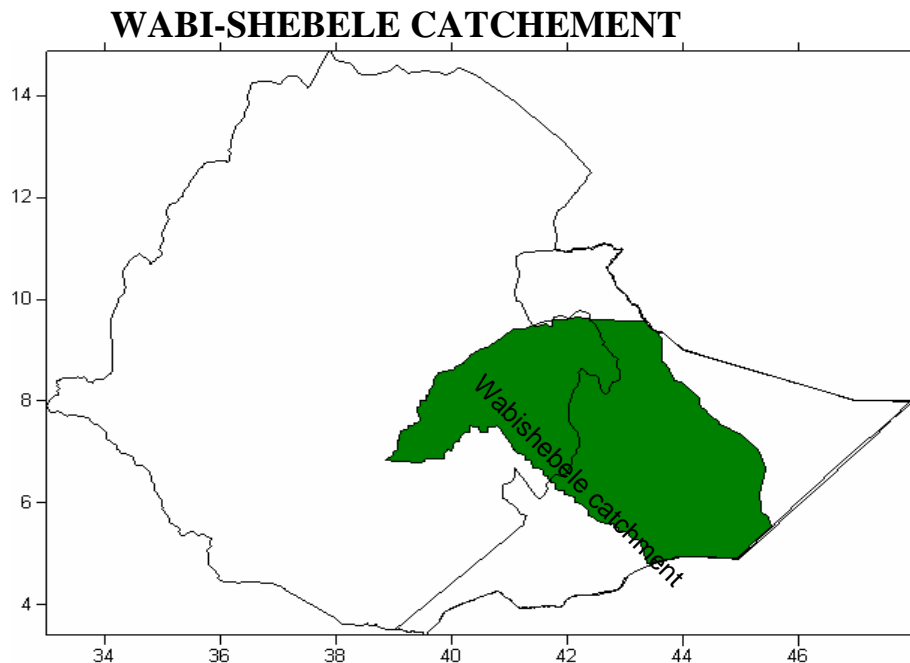
Hydro-meteorological Forecast & assessment for Belg 2011

Introduction

Wabishebele catchment is one of the major river catchment is one the major river catchments of Ethiopia and it is also the largest of all river catchments with total area coverage of 205,697sq.km. Its basin starts from Mt.Gololcha with altitude of 3626 mts above sea level, which is located over high lands of Bale. The basin ends over Ogaden lowland with altitude of 200 mts above sea level over Somali region. Its geographical location is located on East, North and South Eastern half of Bale; in Hararghe Southern part of Garamuleta Mountains and West of 43 degree E, South and South Eastern part of Arsi. It includes the number of very high peaks of Battu and Chilalo Mountain at the upper part and descends to the South following Wabi-shebele River which receives its perennial waters from the upper catchments through many tributaries and towards arid type of climate in the South East lowlands. It is also located between latitudes of 4.7 to 9.8 and between longitudes of 38.8 to 45.5. The total volume of water over this catchment is about 3.16 Bm³/annuam.

The Wabi-shebele River is a permanent river, mainly supplied by the tributaries flowing down from the high plateau. But the tributaries of the down stream part as well as the Fafen River, which forms an independent basin, are temporary rivers.

The flow regime of this river is governed by two rainy seasons with different characteristics. The first from March to May leads to high flood peak at Gode in April to May, and the second from July to September, results in large flood volume, with generally modest peak around Gode area.



General characteristics of Wabishebele catchment.

Basin Name	Geographical location		Area Km ²	Length of river in Meter			Source and mouse	Altitude (meter) and places / Regions Sharing	
				Within Eth.	Outside Eth.	total		1.Max	Regions covered
								2.Min	
Wabi-Shebele	7 ⁰ 01'	38 ⁰ 30'	205,697	1340	660	2000	Arssi mt/Guge Arid area/Kelafo	Mt. Gololcha 200 Somalia Desert	Oromia, Somalia, Harari

Table 1:- source: - summarized and updated from recent studies

In this Bulletin, there are many computing steps of different calculations based on Thornthwaite for water budget in order to produce this hydro-meteorological assessment for Bega wx ass & forecast 2010 &2011 that depict the aridness of the area.

Notice:- Meteorological parameters that are used in this publication are:-

- Daily maximum temperature
- Daily minimum temperature
- Mean Daily temperature
- Mean monthly temperature and
- Total rainfall of the month

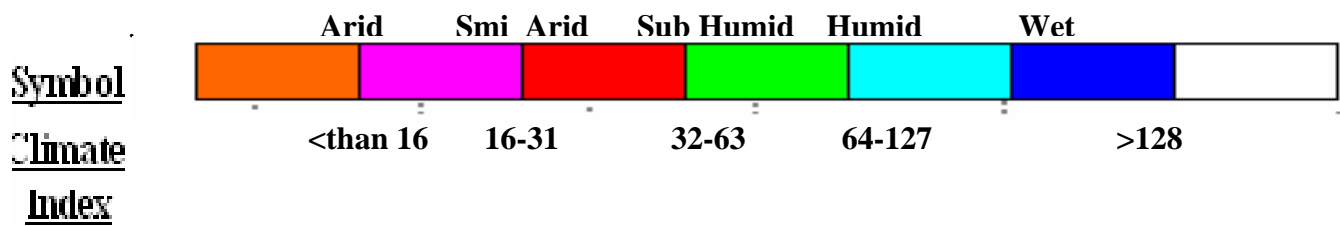
Notice:-

- ❖ Heavy rainfall intensity is greater than 7.5mm/hr.
- ❖ Medium rainfall intensity is between 2.5 & 7.5mm/hr.
- ❖ Light rainfall intensity is less than 2.5mm/hr.

The aridity of the catchment and the frequency of heavy falls that exceeds 30mm can be shown as a single map on the monthly bases. There is also brief description for this hydro- meteorological assessment for Bega wx ass & forecast 2010 &2011 both on monthly bases as well as on seasonal basis.

The Forecast of the oncoming Bega season is also made in the form of aridity map that depict the aridity of the catchment. There is also general interpretation of hydro- meteorological outlook for the oncoming Bega 2010.

Legend for Climatic Regions



PE INDEX	CLIMATE
More than 128	Wet
64-127	Humid
32-63	Sub-humid
16-31	Semi-arid
Less than 16	Arid

Hydro-meteorological assessment For Bega 2010

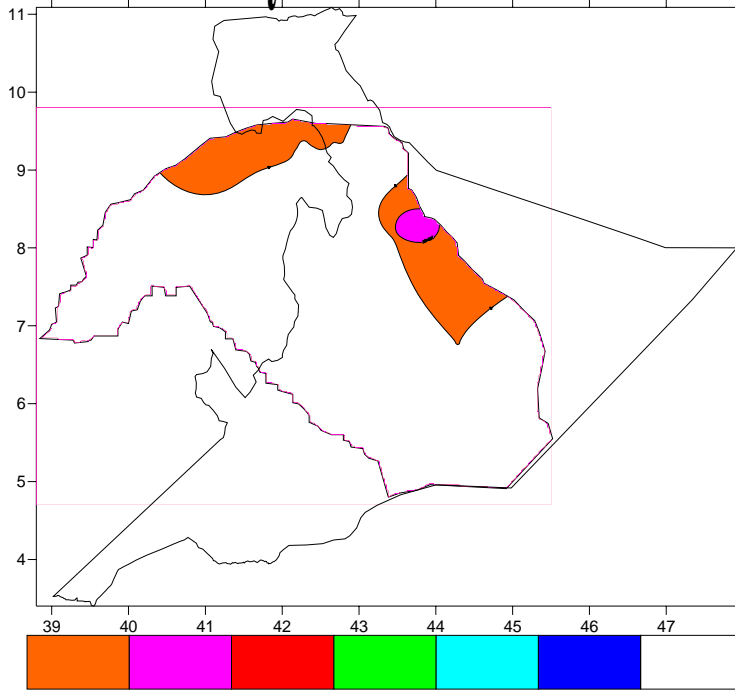
. Bega 2010&2011 areas around the catchments is dry season have no good performed moisture condition, owing to this moisture condition its implication on the various hydrological impacts along the basin were good in providing water for drinking , agricultural activities and hydropower generation among others.

According to the analysis made for Aridity index during October 2010, there was arid, semi-arid conditions extend from North tip parts of the catchments and also some Eastern parts of the catchments was covered by arid and semi arid conditions. Some areas showed semi arid condition such as Degahabur in the Eastern parts of the catchment whereas many areas such as Dire-Dawa, Harar, Alemaya, K/dahar, Error and Jijiga showed arid conditions that is most areas around the catchments was dry.

During November 2010, there was arid, semi-arid and sub-humid conditions that extends from North tip parts of the catchments towards North Western parts of the catchments. Arid condition appeared around Dire-Dawa, Harar, Alemaya, K/dahar, Error and Jijiga whereas semi arid condition was covered around Girawa and sub-humid condition around Dengego appeared but it covers very small pocket areas. Therefore, on this month the Wabi Shebele was remaining dry to semi dry condition.

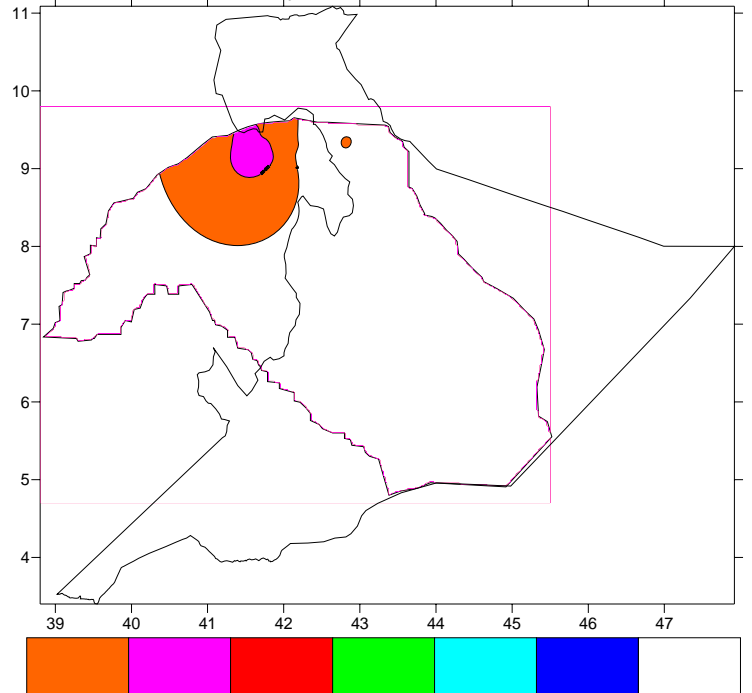
During December 2010, there was an only arid condition that extends from North tip parts of the catchments. Arid condition appeared all over the catchment on this month such as around Dire-Dawa, Harar, Alemaya, Dengego, K/dahar, Error and Jijiga. Therefore, on this month the Wabi Shebele was remaining dry condition.

October Aridity Index Over The Catchment



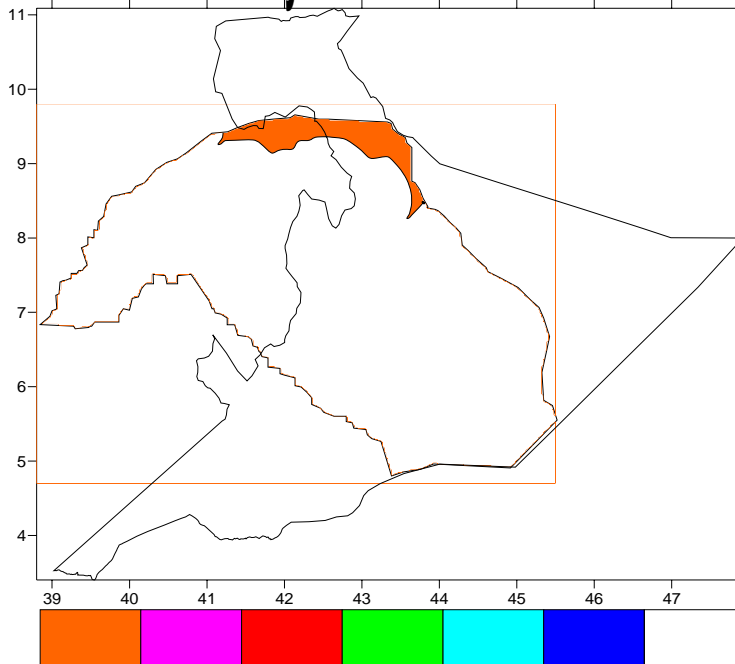
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November Aridity Index Over The Catchment



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December Aridity Index Over The Catchment



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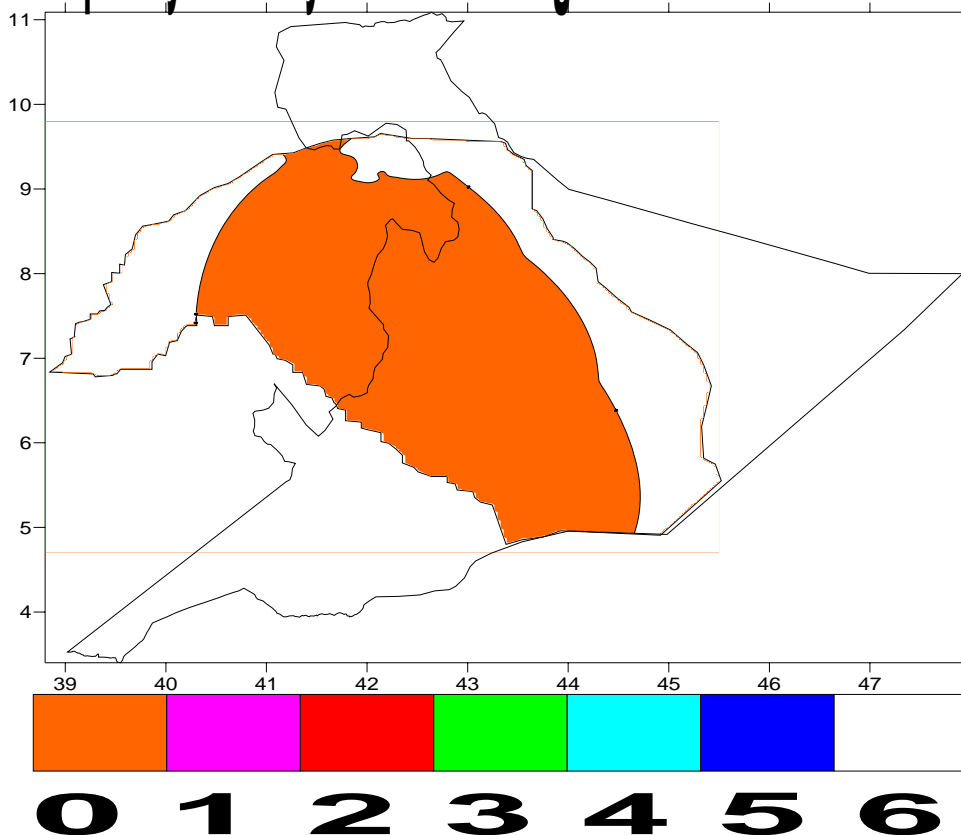
Frequency of heavy falls exceeding 30 mm

There was no much amount of rainfall in most parts of the catchment. During October 2010, there was no rainfall in all parts of the catchment; there was no high frequency of heavy rainfalls that exceeds 30mm for one day i.e. this month was very dry compare to the last year month October 2009 in all parts of the Wabi-Shebele catchment.

During November 2010, the rain fall performance was relatively more than that of October 2010 but less rainfall presented than November 2009 and there was high frequency of heavy rainfalls that exceeds 30mm for only one day around Dengego areas was attaining with a value of 33 mm.

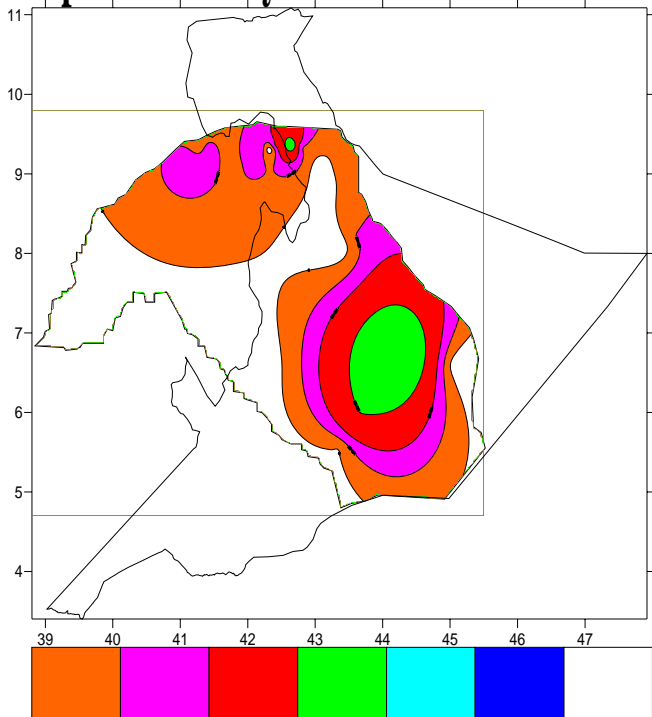
During December 2010, the rain fall performance was relatively less than that of November 2010 that is there was no significant rain fall but there was more arid conditions presented than November 2009 and there was no high frequency of heavy rainfalls that exceeds 30mm for one day. So on this month there was no moisture performance.

Frequency of heavy ffalls exceeding 30 mm for November 2010



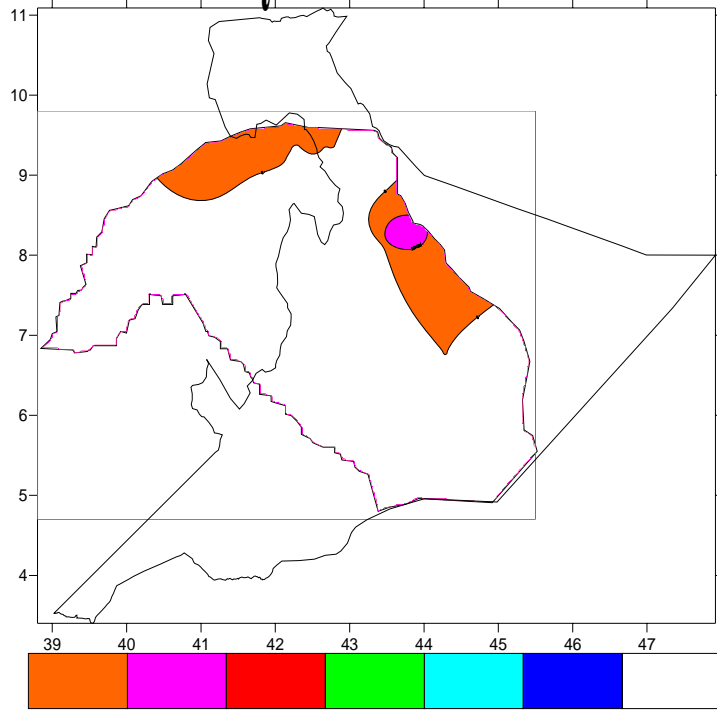
FORECAST VERIFICATION

Expected Aridity Index For October 2010



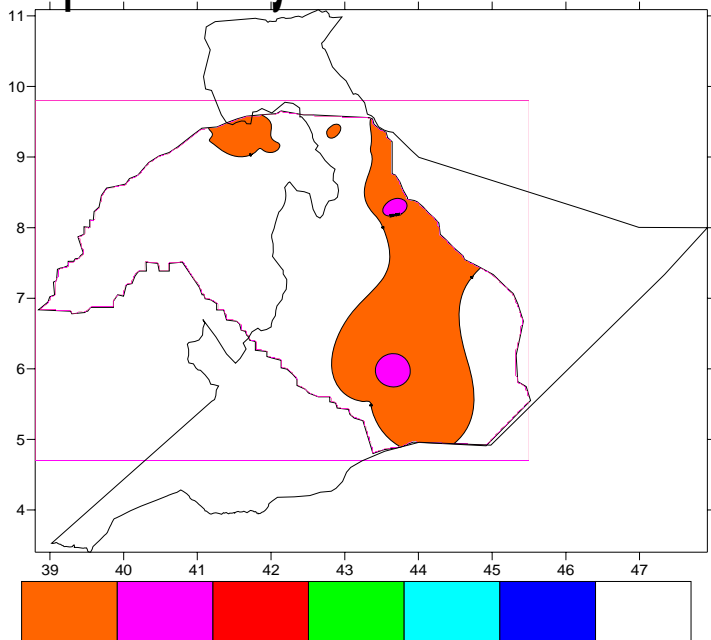
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October Aridity Index Over The Catchment



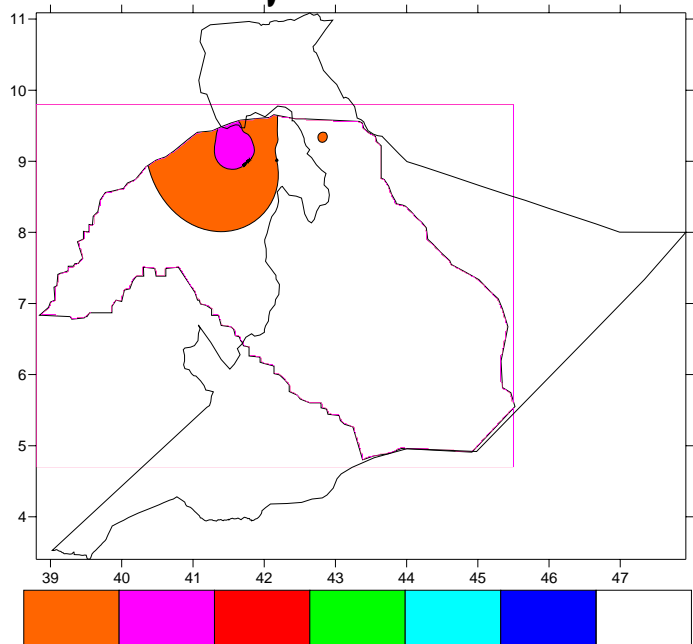
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Expected Aridity Index Of November 2010



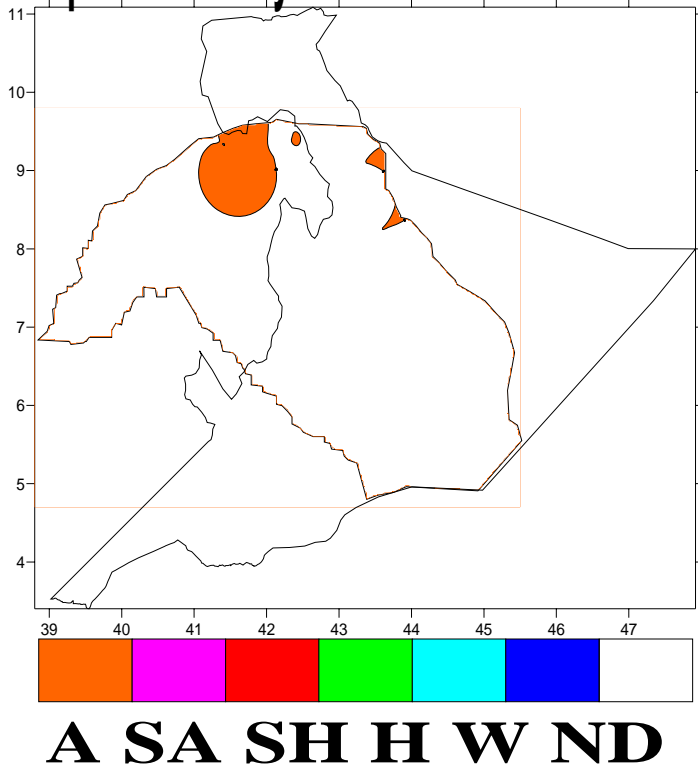
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November Aridity Index Over The Catchment

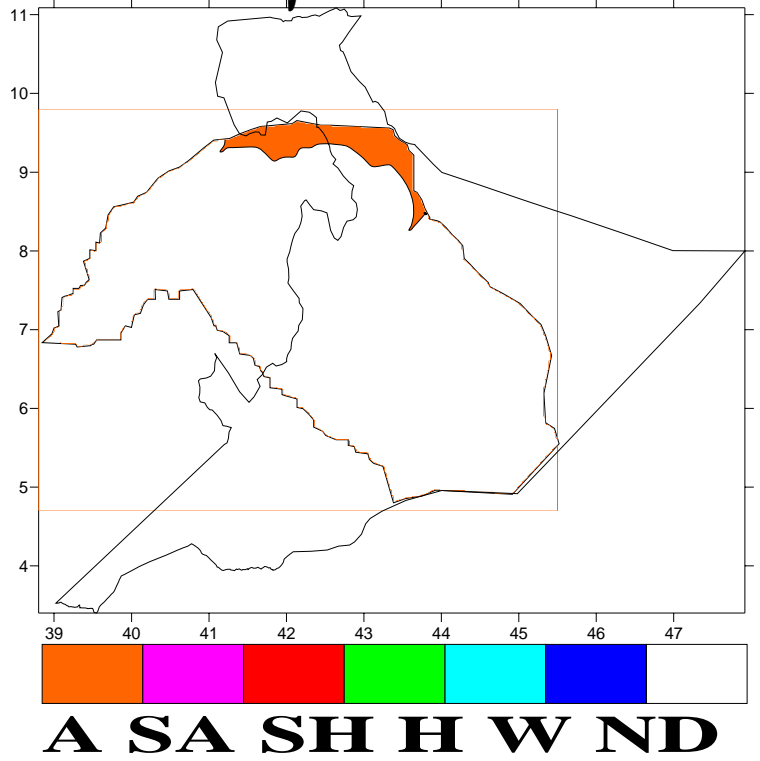


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Expected Aridity Index Of December 2010



December Aridity Index Over The Catchment



SUMMERY

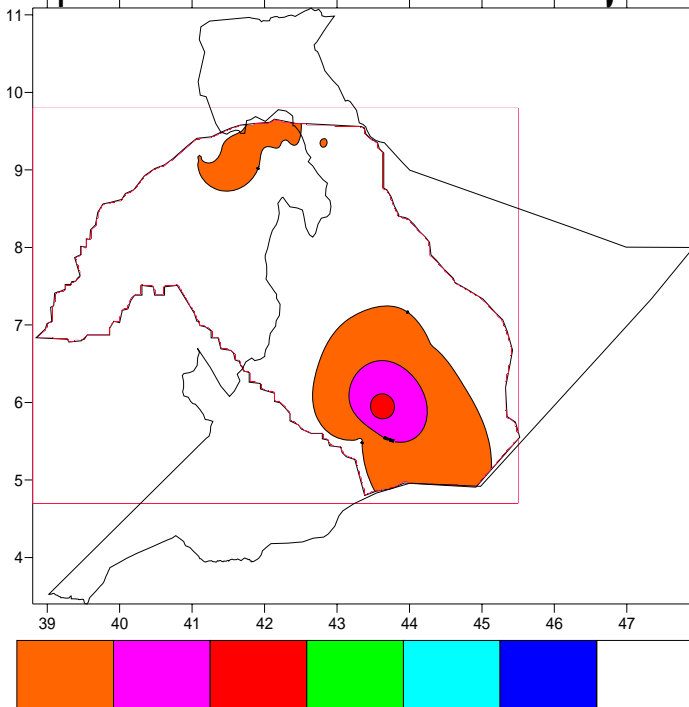
The moisture performance of October 2010, observed less than the moisture performance observed in the last year October2009 in all parts of Wabi Shebele catchment so that there was no the moisture performance on October2010 because there was no observed wet condition. The moisture performance of November 2010 observed less than the moisture performance observed in the last year November 2009. However, the moisture performance appeared on November 2010 better than the moisture performance appeared on October 2010 because in this month there was sub-humid condition in small pocket areas around Dengego.

Generally the weather assessment made for the November and October 2010 shows moisture stress on most parts of the catchment, and also there was high shortage of water and lower performance of moisture condition for the entire Bega season over the catchment. Based on this weather assessment most areas of the of the catchment users was a great problem by lack of water specially irrigation users, dam users (Water harvesting) and so on. Therefore, we have to give an advice for wise utilization of expected limited moisture condition by using techniques such as Water harvesting.

Hydro-meteorological Forecast for Belg 2011

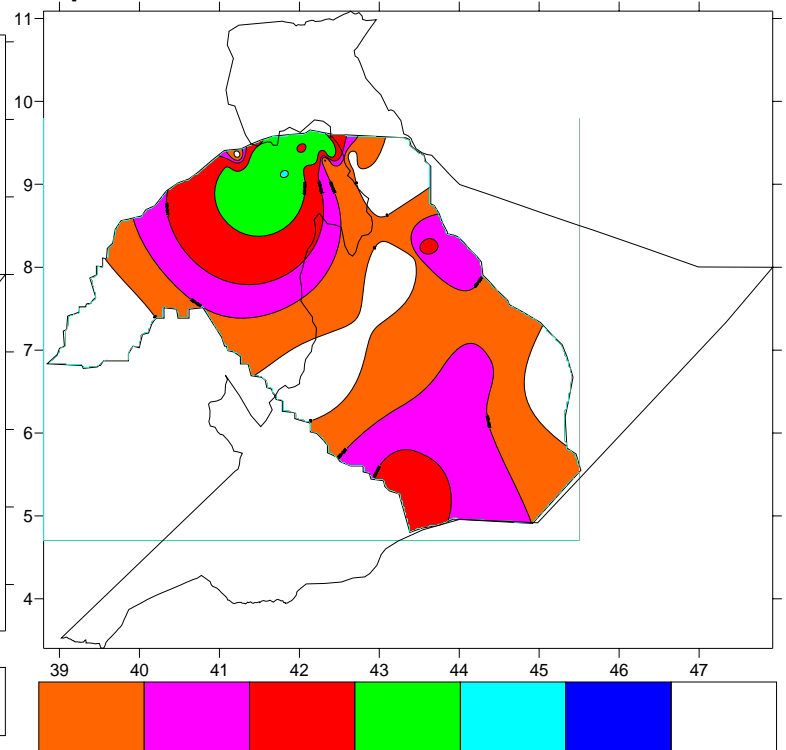
Belg is already known that is the small rain season that covers the period from February to May based on the seasonal rainfall pattern of the country. However, in Somali region by this year there is expected humid condition season except the month of February will remain only dry condition. This indicates that the presence of moisture conditions for most parts of the catchment of Wabishebele will present. Depending upon the analysis made by NMAs Analysis and forecast team; in order to give the forecast of Belg 2011 it is essential to show the Sea Surface Temperature (SST) trend of the selected analogue years are 1971, 1974, 1999. Among these best analogue years is 1999. Depending upon these best analogue years, the expected moisture index for Belg 2011 are shown on the following graphs.

Expected AI Over the catchement of February 2011



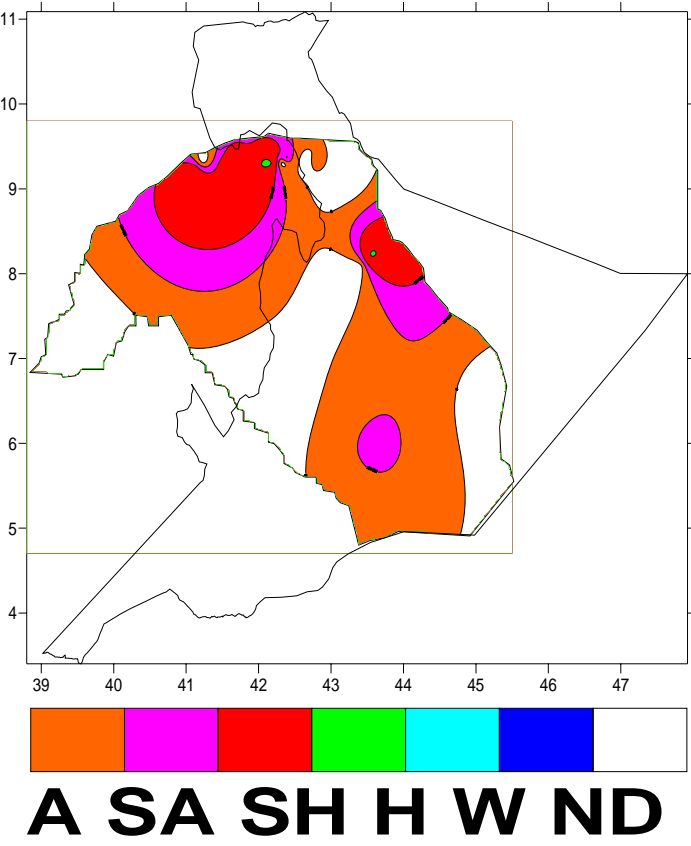
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Expected AI Over The Catchment Of March 2011

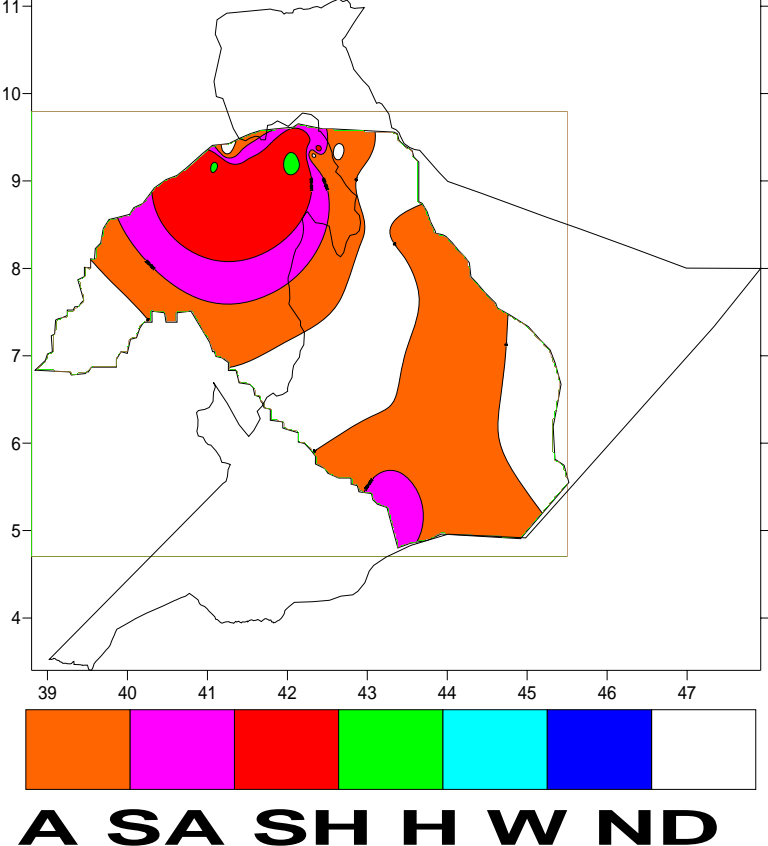


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Expected AI Over The Catchment Of April 2011



Expected AI Over The Catchment On May 2011



Based on the analog year 1999, it should be noted that the contribution of Belg rainfall season for surface runoff is very insignificant over most parts of the catchment, especially for runoff associated with drinking water dam and hydro-electric dams. Thus efficient management of dam water is important for hydro-electric and drinking water purposes.

The expected aridity index for February 2011 shows that there will be arid, semi arid and sub-humid conditions that presence in the North parts of the catchment. But most areas around the catchment was dry especially North Eastern part of catchment whereas in the Southern parts of the

catchment there will be appeared sub-humid conditions such as around Gode areas. Arid condition appeared around Dire-Dawa, Harar, Alemaya, K/dahar, Error and Jijiga whereas semi-arid, humid and wet conditions will not appeared all over the catchment.

The expected aridity index for March 2011 shows that there will be arid, semi-arid, sub-humid, humid and wet conditions that shows in the Northern part of catchment especially humid and wet conditions. Arid condition will appear around Jijiga whereas humid condition will be presented around Dire-Dawa, Harar, Hirna, Gursum and dengego and wet conditions will appeared around Girawa. And also sub-humid condition also shows around Alemaya, Kulubi and semi-arid condition will cover around Kebridahar. Generally this month has the best moisture status compared to February 2011.

The expected aridity index for April 2011, there is arid, semi-arid, sub-humid and humid conditions in the North and South parts of the catchment. Arid condition will appear around Kebridahar and Jijiga. Sub-humid and humid conditions will appear in the Northern and Eastern tip part of the catchment. Sub-humid condition shows around Alemaya, Harar, Hirna, Kulubi, Gursum and Dengego and semi-arid condition will cover around Gode and Dire-Dawa; humid condition will be presented around Deghabour and Deder whereas wet condition will not presented all parts of the catchment. This indicates that the presence of moisture in this month is less compare to that the month of March 2011but more moisture than February 2011.

The expected aridity index for May 2010, there is arid, semi-arid, sub-humid, humid conditions. Arid, semi-arid and sub-humid conditions extend from the North towards the central parts of the catchment, and also arid and semi-arid conditions also extend from south towards central and eastern parts of the catchment. Arid condition will appear around Kebridahar and Gode and Dire-Dawa; semi-arid condition will cover around Kulubi, Dengego, Kebridahar and Jijiga. Sub-humid condition shows around Alemaya, Harar, Gursum and Girawa; humid condition will be presented around Harar and Hirna whereas wet condition will not appear all parts of

the catchment. This indicates that the presence of moisture in this month is more than the months of February and April 2011 but less moisture status will appear than March 2011.

Generally the analysis made for the coming Belg 2011 season shows moisture stress on the months of February April 2011 but on the months of March and May 2011 there will appear some moistures most parts of the catchment, and also the high probability of lower parts of this catchment will be expected dry to sub-humid condition results in lower performance of moisture condition but upper Wabishebele will be expected wet condition for the entire Belg season over the catchment. Based on this analysis the reservoirs and dams have a better chance in order to capture water at the end of Belg season and hot and long dry spell condition will be dominated in most parts of the catchment. So it should be noted that Belg rain has small contribution for surface runoff. It is important this catchment which will be in wet condition to compensate the loss of water due to evaporation over irrigation schemes, hydro-electric dams and drinking water purposes In addition to that Belg rain benefiting, attention should be given for the coming months in wise utilization of expected limited moisture condition by using techniques such as Water harvesting.