Ministry of Natural Resources, Energy and Mining

Department of Climate Change and Meteorological Services

FASH FLOODS IN MALAWI: Case studies for 2013, 2015, 2016 and 2017 seasons

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Introduction

- *Floods are among the top important hazards around the world that require special attention.*
- On the average, floods affect and kill people or cause millions of dollars in property damage worldwide

  Increase in extreme events such as heavy rainfall also increased cases of flooding events
- The Department of Climate Change and Meteorological services in collaboration with partners is enhancing its operations in help to mitigate impact of these events.

Why Flash Flooding?

- It require careful planning
- Catchment response is very fast and allows very short lead times (< 12hrs) to act.
- A truly hydro-meteorological forecasting problem. This need real time forecasting
- Prediction of occurrence is of interest and require local information
- Coordination of forecasting and response is a challenge over short times

Flash Floods in Malawi

- The Flash flood of March, 1991 in Phalombe, southeast Malawi led to the establishment of Department of Disaster Management Affairs.
- The worst disaster in decades, affecting millions of Malawians in 15 out of 28 Districts was the Jan 2015.
- The January 2015 riverine floods and flash floods introduced the Malawi citizenry to the importance of adhering to and making use of the flash flood warnings and messages.
- The DCCMS timely flash flood forecasts and warnings from SARFFG systems reduced casualties, damage to properties, and enhance public preparedness.
- DCCMS works closely with the Department of Disaster Management Affairs (DoDMA).

Malawi Case Studies

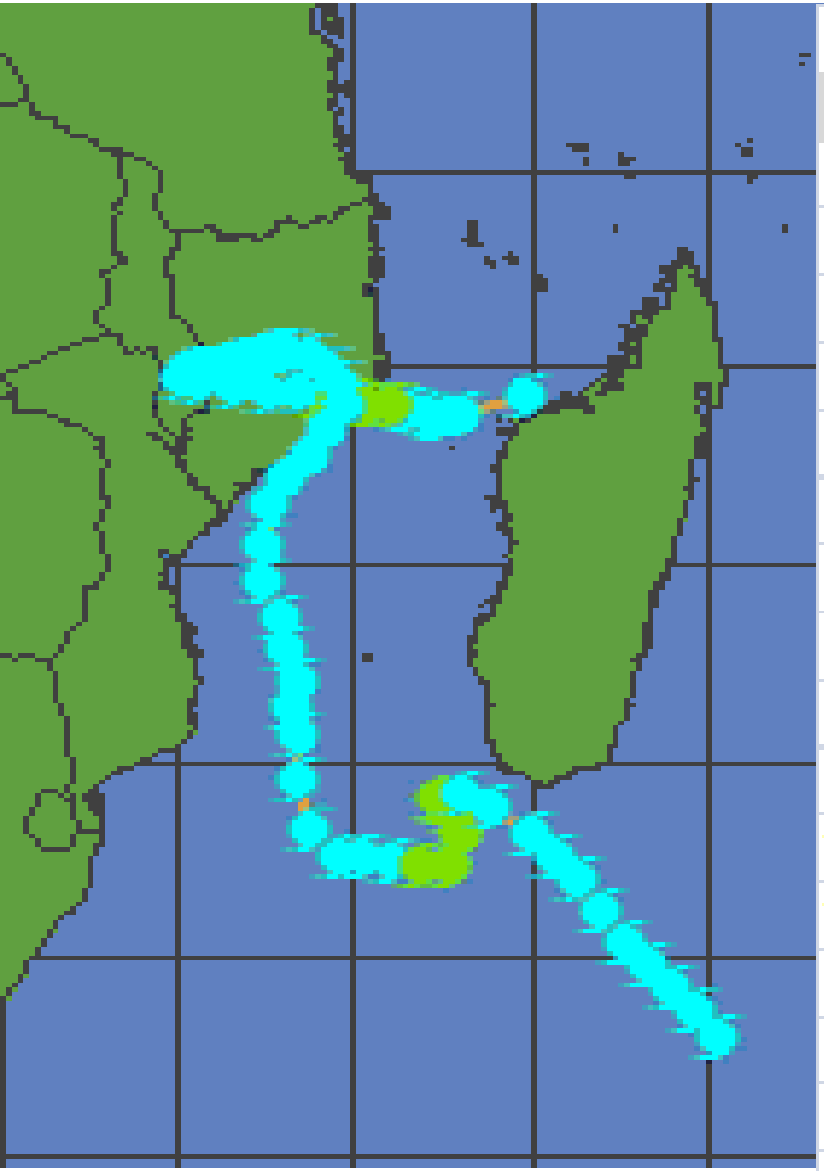
- Case studies of Flash floods using the Southern Africa Region Flash Flood Guidance (SARFFG) System in Malawi will be presented here.

Flash floods or flash flood

- Before SARRFG, little was known about flash flood
- No clear demarcation on role and mandates
- Flash floods were also regarded and riverine floods
- DCCMS was only considered as observer, no forecaster involvement
- Inclusion of forecast in flash flood was absent

(no impact based forecasts)

TC ‘Delfina’- January 2003



Actual rainfall amounts (mm) for 1,2,3 January 2003						
day totals,	1	2	3	3day Tot	10day	10Dys N
stations	25.8	7.5	54.3	150.6	166.2	52.5
Chancellor	60.8	122.5	40.7	163.5	231.3	107
Chikwawa	61.6	27.5	29.4	118.5	236.3	60.8
Mimosa	66.1	81.8	20.8	168.7	314.1	91.4
Monkeybay	5.2	57.2	60.4	122.8	159.6	64.9
Mulanje	85.3	50.7	20.4	156.4	397.3	108.4
Mwanza	40.6	100	22.9	163.5	264	72.1
Nchalo	38.6	88.6	17.1	144.3	224.9	50.6
Nsanje	69.5	52.9	15.5	137.9	214.9	56.7
Ntaja	41	52.5	33	126.5	151.7	69.9
Toleza	15.4	53.8	27.5	96.7	122.7	62.5
Thyolo	41.5	34.1	55.5	131.1	317.9	66.6
Zomba	43.4	94.1	36.5	174	242.9	73
Dedza	15.9	90.9	100.6	207.4	342.6	79.1
Ntcheu	29.1	296.5	23.1	348.7	358.3	92.9
Salima	0.7	50.3	96.5	147.5	206.7	81.3

Impacts of Tropical Depression Delfina over Malawi

- Wide spread rains resulting into flash floods
- infrastructure damages was high; roads, bridges

railway line, power lines and water points

- 9 people were feared dead and one missing
- 30,000 people were displaced
- More hectares of crop fields were washed away
- A state of disaster was declared on 11th January 2003 describing the flooding as a disaster of the highest proportion

Damages caused by T.C.Delfina

Flash floods images for Nsanje

Flood water reaching settlement

The road taken over by flood water

Abandoned school premise

Maize field washed away by flood water

Flash Flood images-Salima and Mangochi

Submerged residential-Salima

Testing water depth-Mangochi

Floods used to be a problem for a regional issue (low lying areas in Malawi). Now, due to poor land use and heavy rainfall, it is becoming a national issue.

Flood images


Crop fields, victim of flooding water


Flood water halt business in the Capital-Lilongwe


Flashfloods aftermath


Flood water cut off the main road

Flood Victims

Collapsed and submerged village in Nsanje

Flood victims searching for dry land

Floods in Nsanje

2013 NORTH RUKURU FLASH FLOOD

2013 Flash Flood Risk Assessment- Entire Malawi

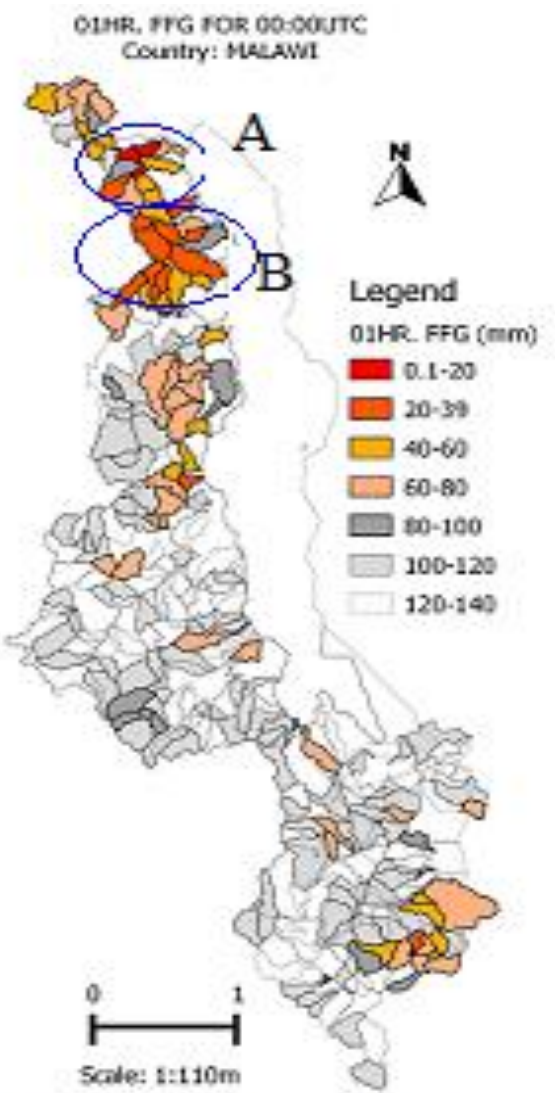


Figure.4: 01hr - Flood Flash Guidance (FFG)

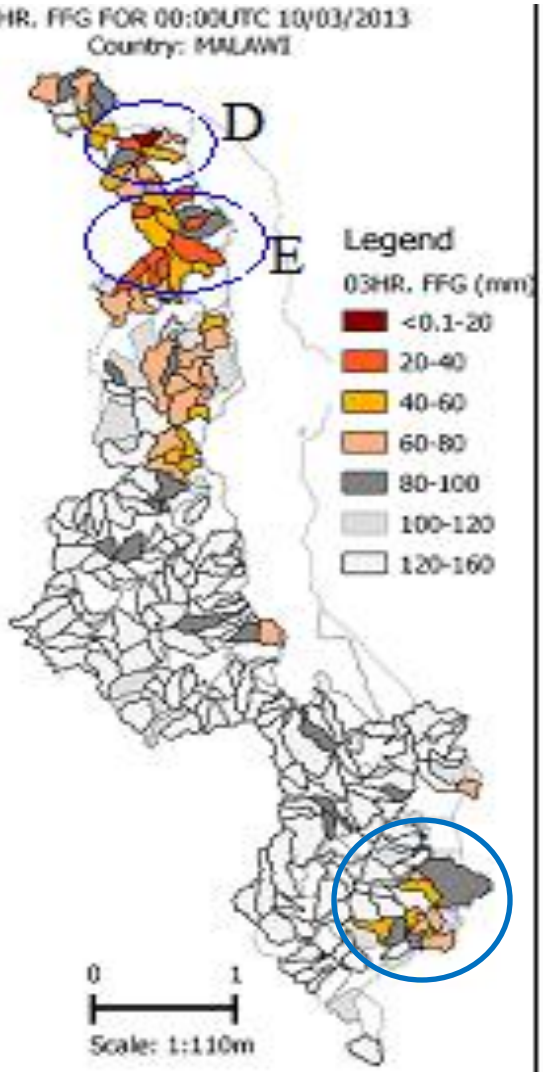


Figure.5: 03hr - Flood Flash Guidance (FFG)

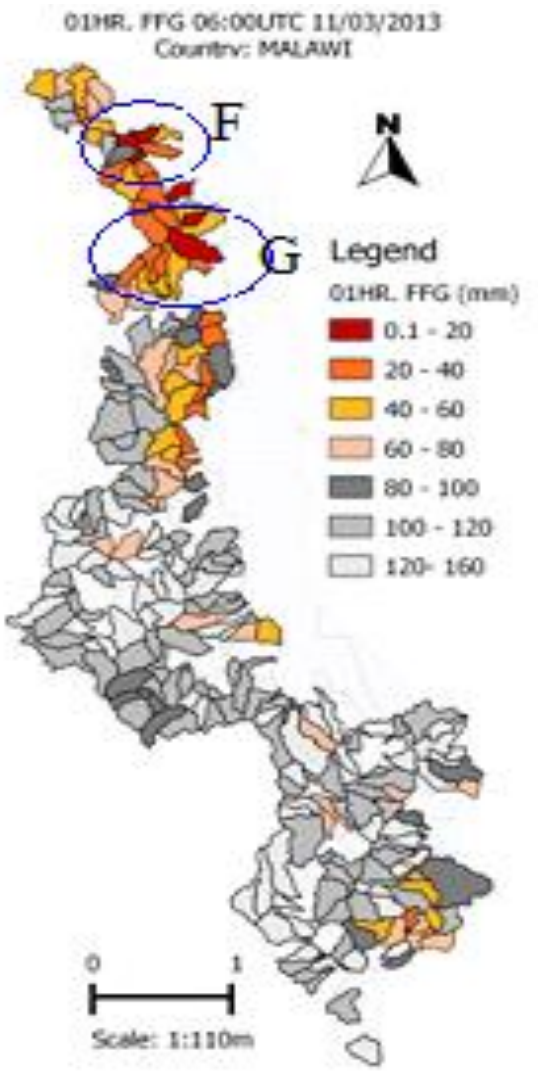


Figure.6: 6hr - Flood Flash Guidance (FFG)

2013 Flash Flood Risk Assessment-Location Specific

The System highlighted an alert for Flash floods in Rumphi and Karonga.

Figure.4-6: Figure 8 shows the aftermath of the threat.

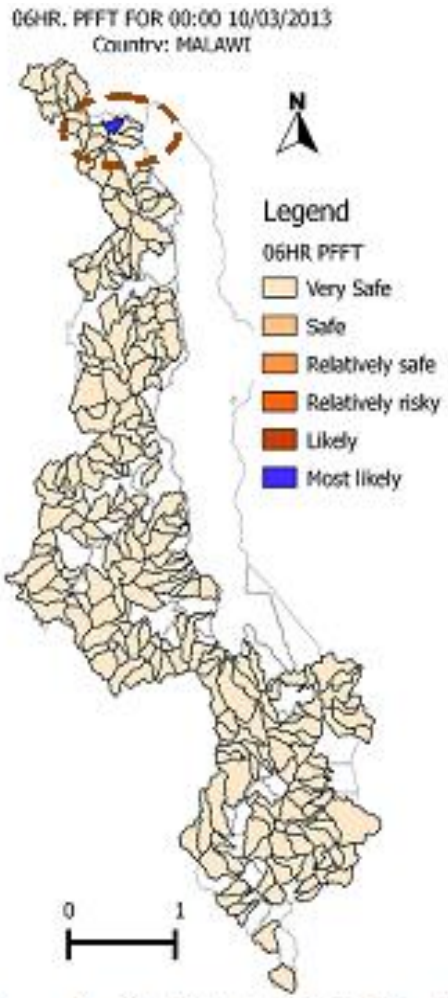


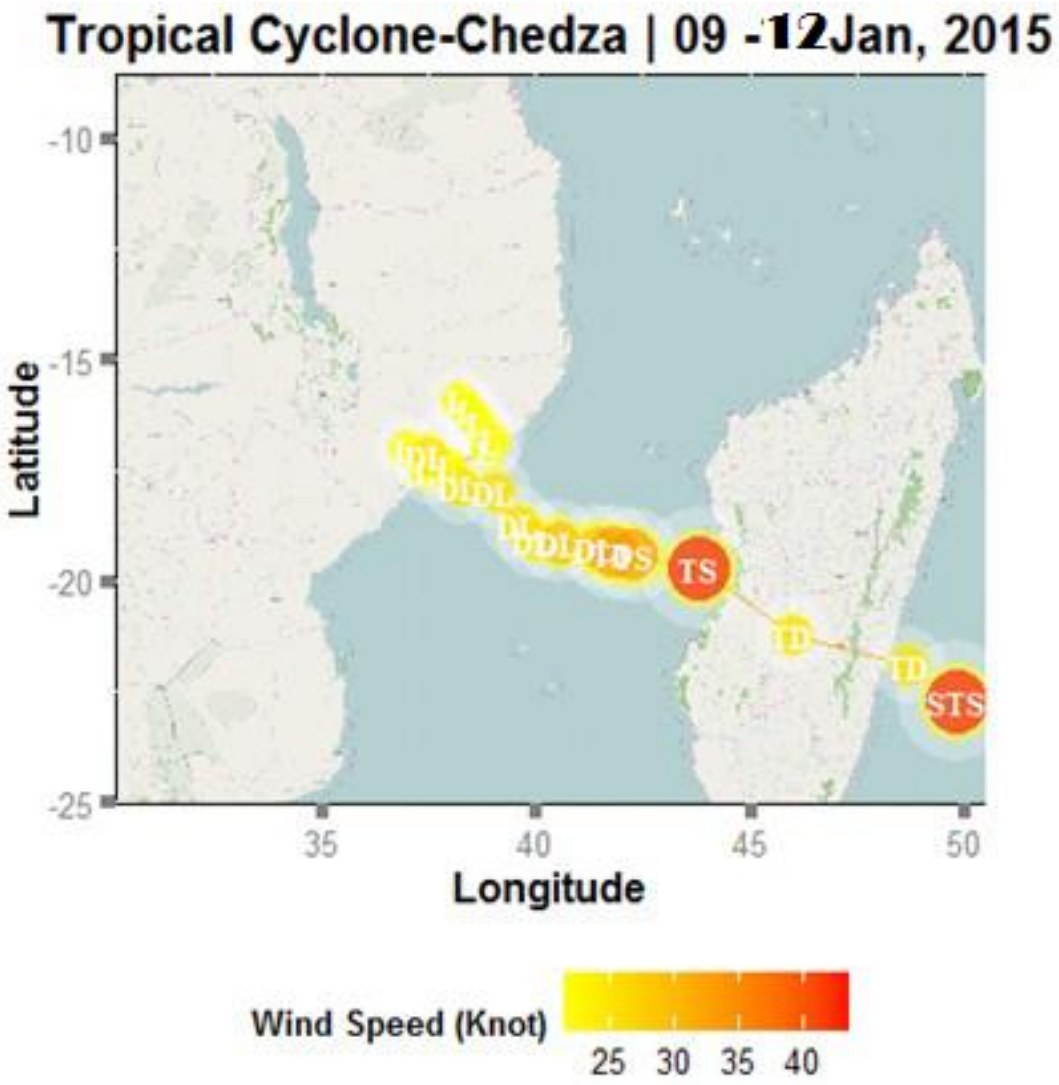
Figure.7: Predicted Flash Flood Threat (PFFT)

Figure.8: Floods due to North Rukuru River over flow on 11th January 2013

JANUARY 2015 SOUTHERN MALAWI FLASH FLOOD

Synoptic situation between 10 Jan and 12 January 2015

- A low pleasure system that developed over the coast of Mozambique.
- More rains experienced when the storm veered inland towards southeast Malawi through still in Mozambique.
- The widespread flash floods resulted into severe riverine flooding in the southern lower areas.

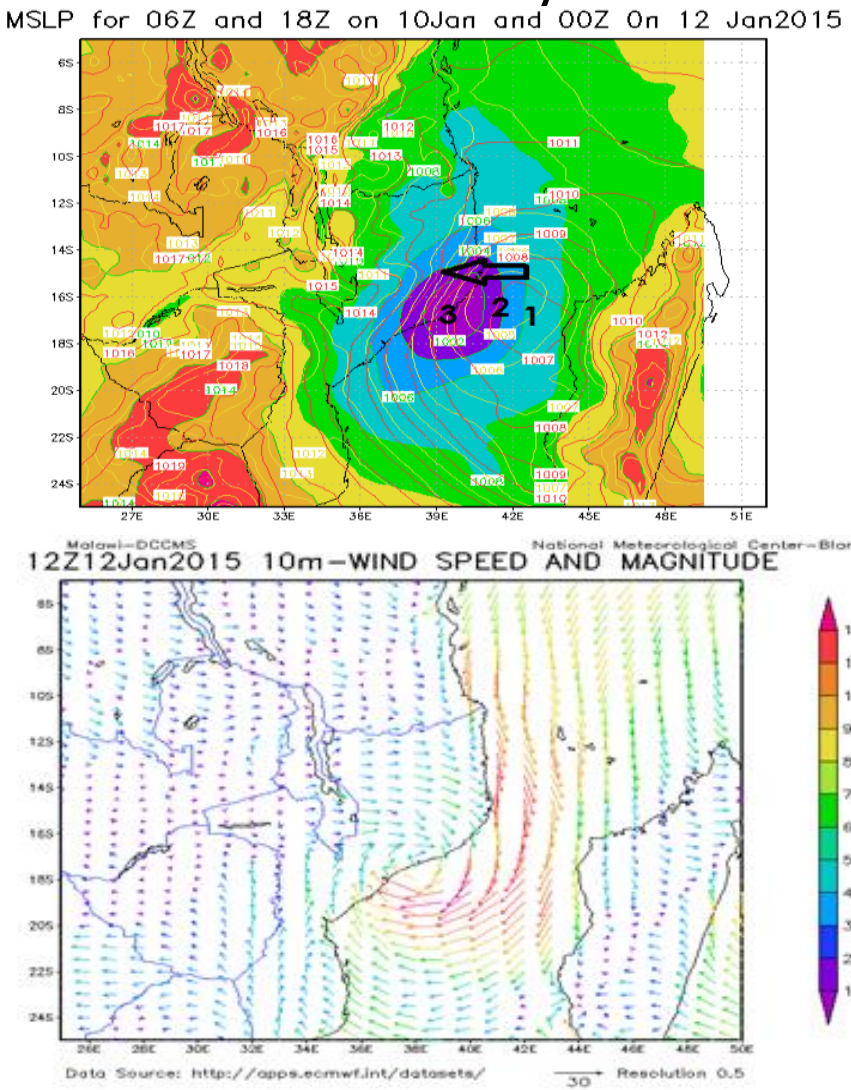


Cause and consequences

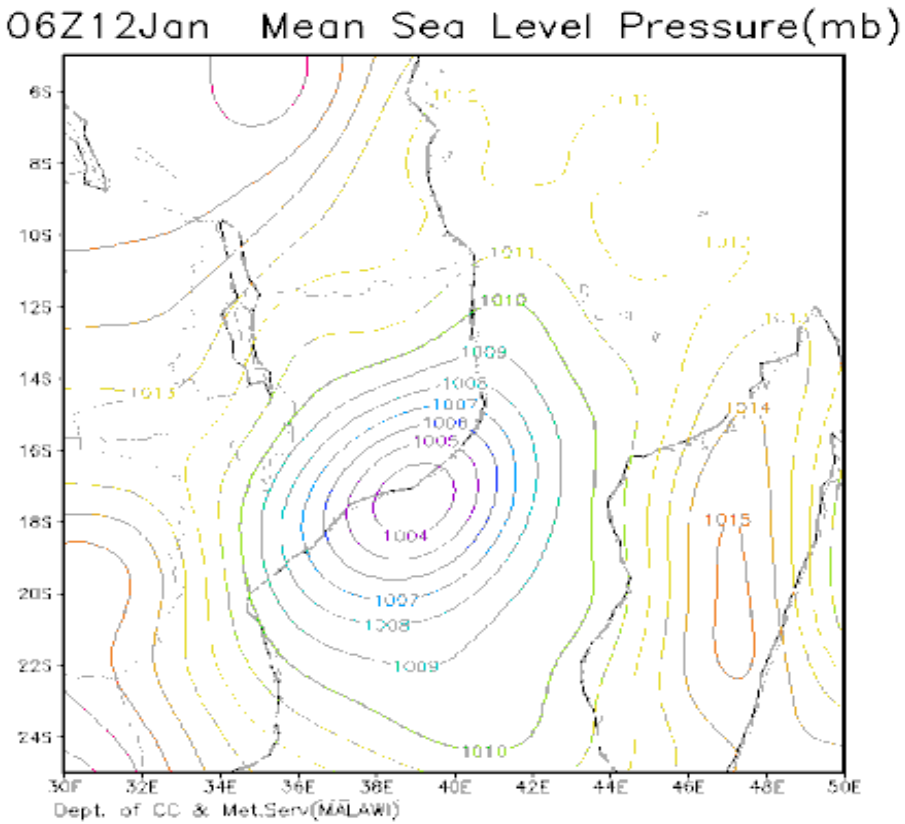
Cause of continuous heavy rains

- Meso-scale system developed over the coast of Mozambique, east of Malawi.
- Interaction of the cool southeasterly air mass and low level warm northwesterly air mass.
- Orographic lifting due to upper shire escarpment also contributed to heavy rains that caused flash flooding and riverine
- 15 Districts out of 28 were declared state of Disaster

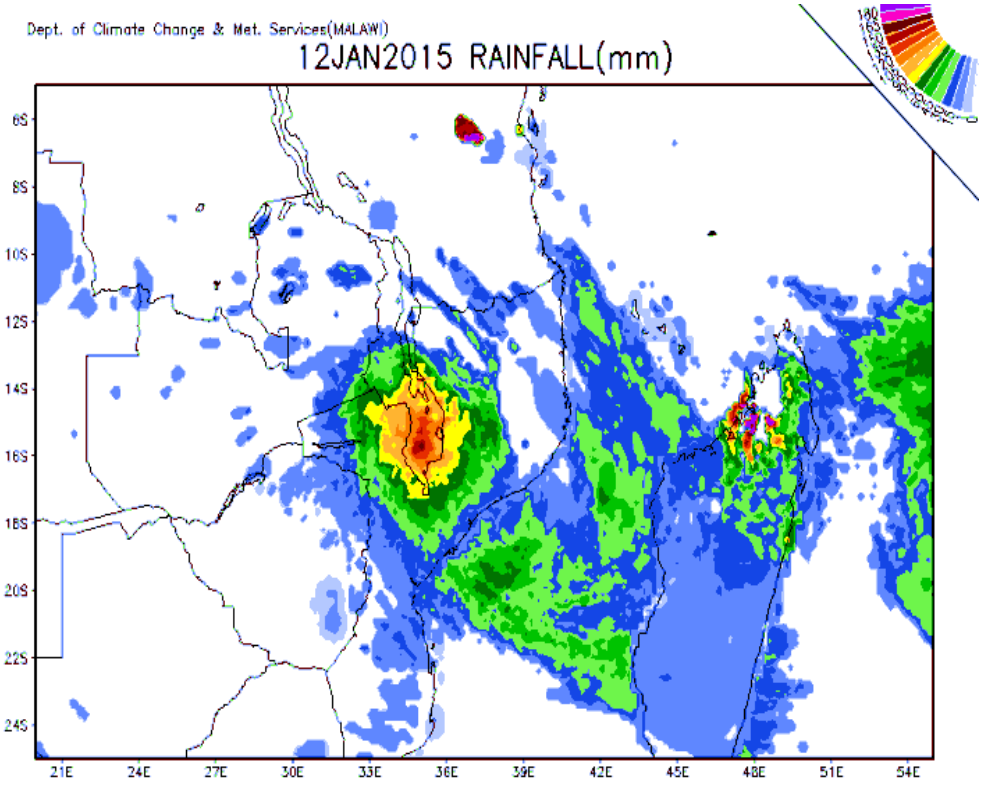
Present weather system



06Z12Jan2015 Surface Pressure analysis and 12Z12Jan2015 Precipitation



Morning surface pressure analysis:
0600Z 12Jan2015



Afternoon Rainfall analysis over Malawi.
On 13th January Chichiri Met. Station reported ~400mm/24hrs.

Data Source: Fewsnet Arc2 data for 1200Z 12Jan2015

Table.2: Rainfall amounts that led to current flooding between 10 -12 January 2015

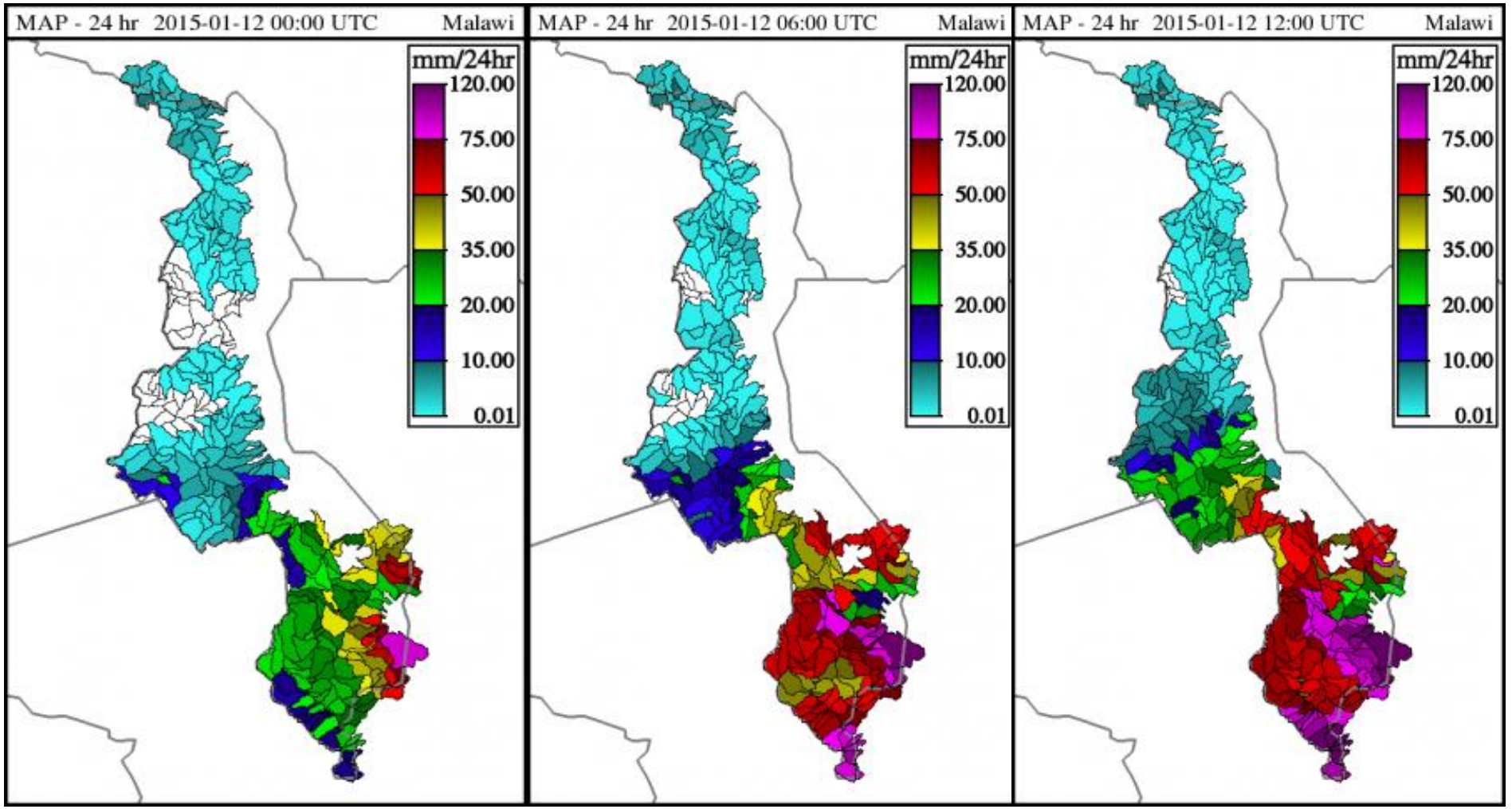
8-Jan-15		9-Jan-15		12-Jan-15	
Station	Rainfall(mm)	Station	Rainfall(mm)	Station	Rainfall(mm)
Mimosa	117.4	ZombaAgr	54.7	Chichiri	398.0
Chingale	102.3	Malomo	36.6	Mpemba	287.5
Zomba RTC	91.4	Dedza	36.0	Mimosa	267.4
Neno	70.0	Lupembe	35.0	Zomba RTC	177.2
MulanjeBoma	61.4	Supuni	34.6	Ndirande Hill SS	175.6
Mwenilondo	53.0	Madisi	31.0	Zomba NSO	173.1
NSO	47.0	Chikweo	30.9	Chileka	167.0
Sipuni	45.2	Chikweo	30.9	Kasongo	165.9
Naminjiwa	44.5	Kasongo	26.4	Chingale	145.2
Vua	39.6	Nkhulambe	25.0	Mikolongwe	122.8
Nkula Falls	39.2	Neno	25.0	TamaniAgric	108.0
Mpemba	35.5	Dwangwa	23.2	EscomNkula	107.0
Thuchira Estate	35.5	Mzimba	21.9	Ntaja	105.0
Monkeybay	35.1	Salima	21.0	Neno	99.2
Lupende	35.0	Ngabu	18.7	Mposa	97.8
Mangochi	34.7	Chileka	16.1	Lirangwe	86.1
Mlare	31.4	Billy Ngabu	11.5	BazaleAgric	83.5
Chileka	30.4	Dowa Agr	9.8	Supuni	82.0

2015 FLASH FLOODS THAT LED TO RIVERINE FLOODING

Figure 1. Identifies mean areal precipitation (MAP) amounts for basins in Malawi for 12th January, 2015 for 00UTC.

Figure 2. Identifies mean areal precipitation (MAP) amounts for basins in Malawi for 12th January, 2015 for 0600UTC.

Figure 3. Identifies mean areal precipitation (MAP) amounts for basins in Malawi for 12th January, 2015 for 1800UTC.



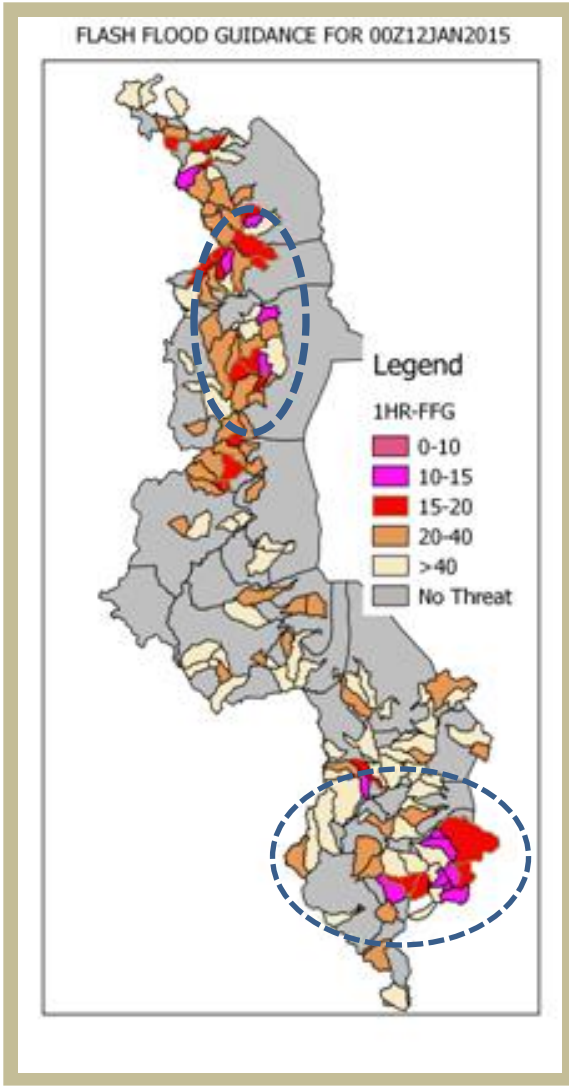


Figure 4. Identifies flash flood guidance (FFG) values for basins in Malawi for 12th January, 2015 for 00UTC.

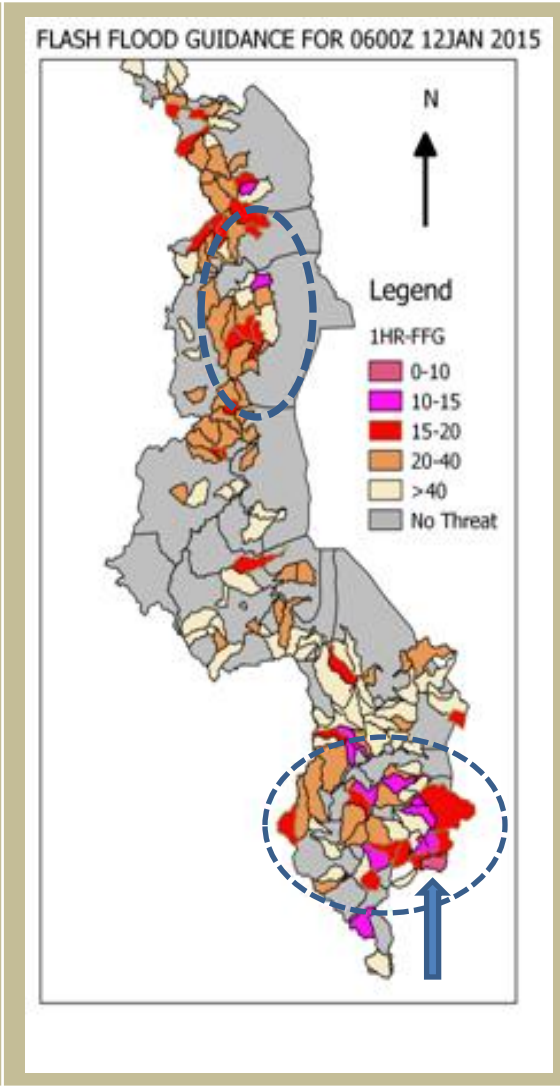


Figure 5. Identifies flash flood guidance (FFG) values for basins in Malawi for 12th January, 2015 for 0600UTC.

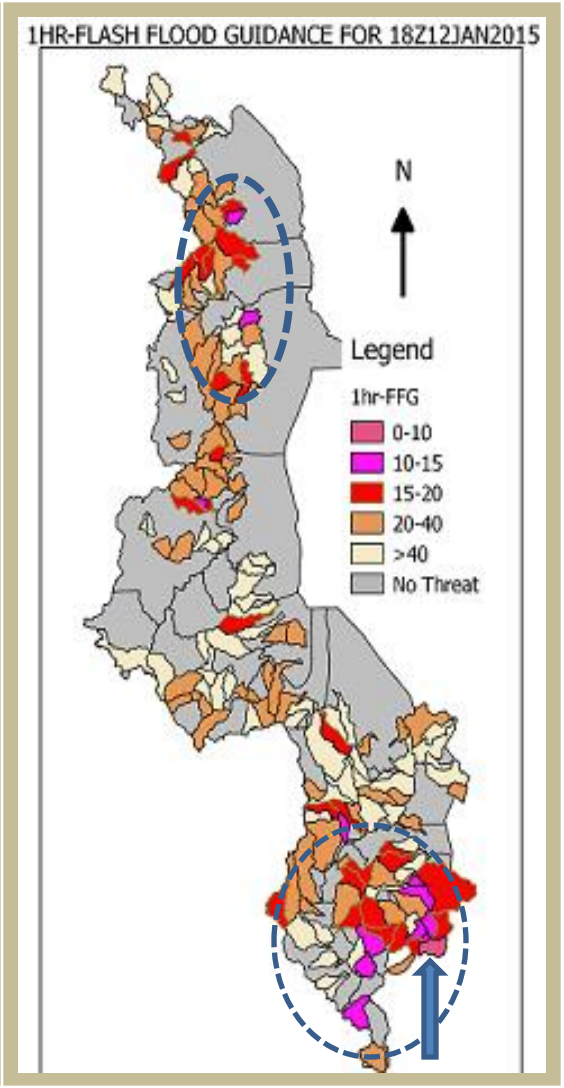


Figure 6. Identifies flash flood guidance (FFG) values for basins in Malawi for 12th January, 2015 for 1800UTC.

From Flash flood to Riverine Flooding JANUARY 2015

LILONGWE FEBRURY 2017 FLASH FLOODS AND INFRASTRUCTURE DAMAGE

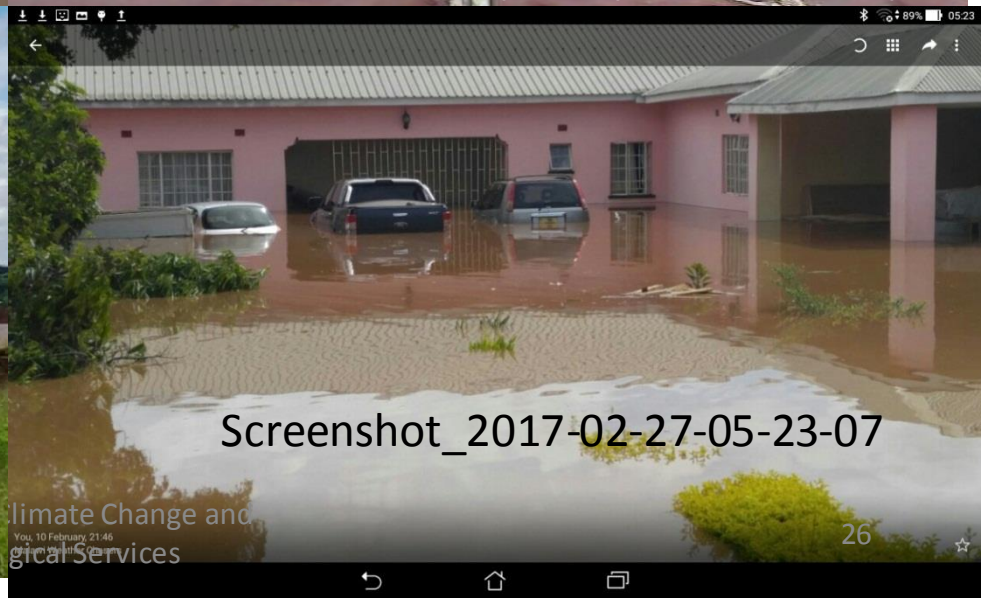
Feb 2017 Lilongwe Flash Floods in Picture


Roads became rivers:
Mtandire, Lilongwe Feb 2017

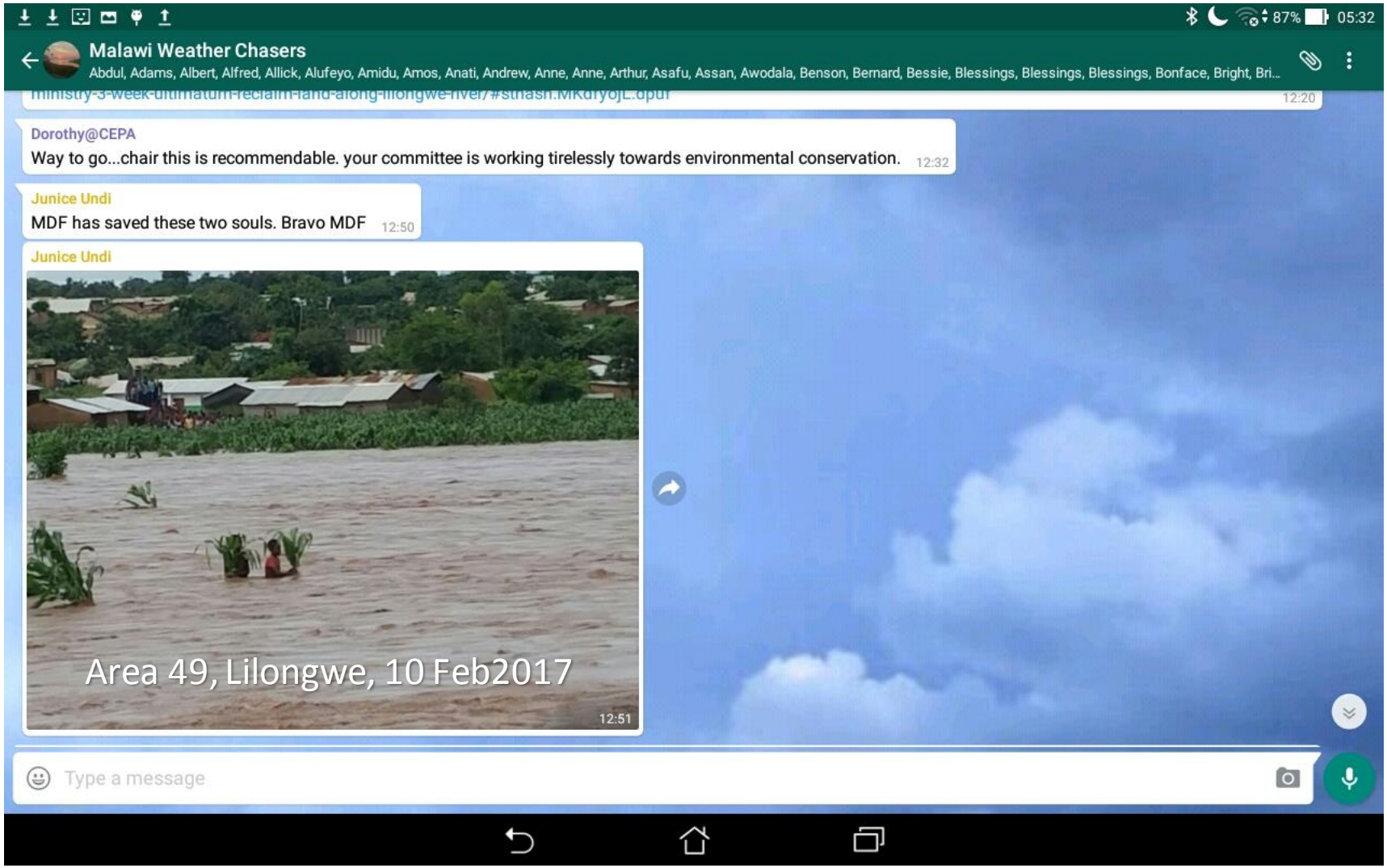

Maize field completely washed away


Army helicopter rescuing school kids trapped in the middle of a flashflood

Area 49, Lilongwe, Feb2017

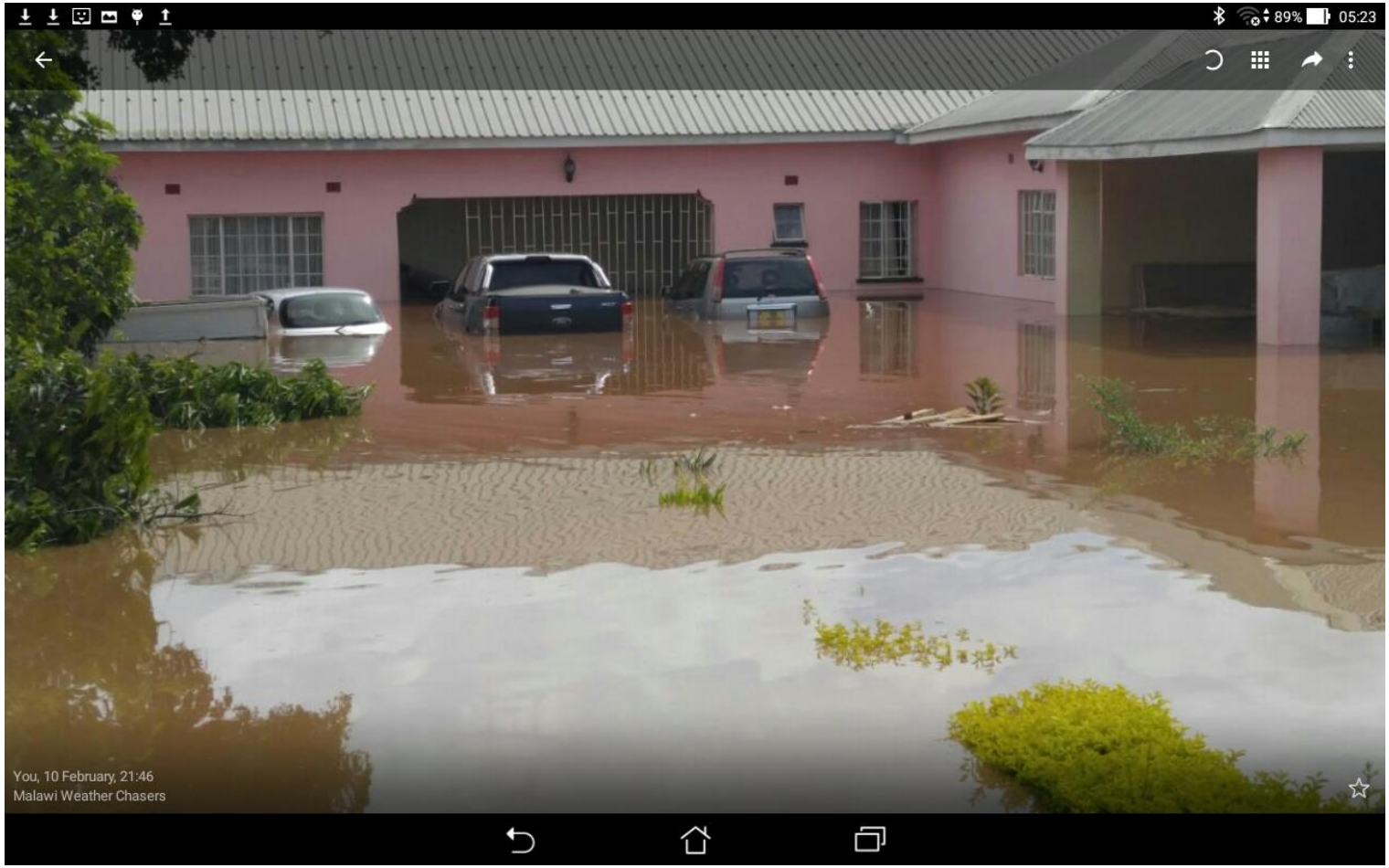

Screenshot_2017-02-27-05-23-07

Malawi Weather Chasers Report on Lilongwe Flash floods on 10 Feb 2017

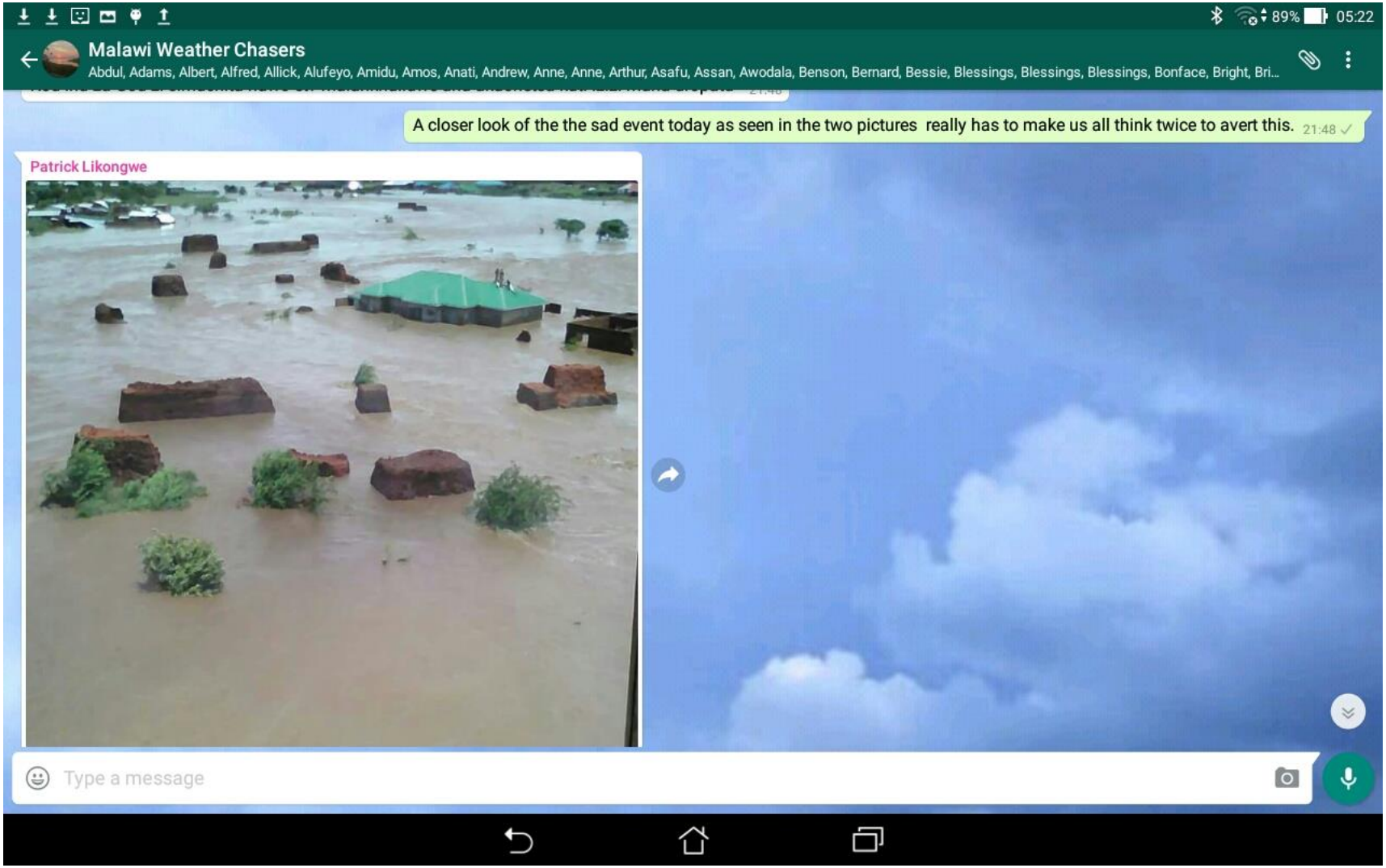


Army helicopter rescuing school kids trapped in the middle of a flood,Area 49,Lilongw
10 Feb 2017 .
16 Jan 2017 Lilongwe floods.mp4

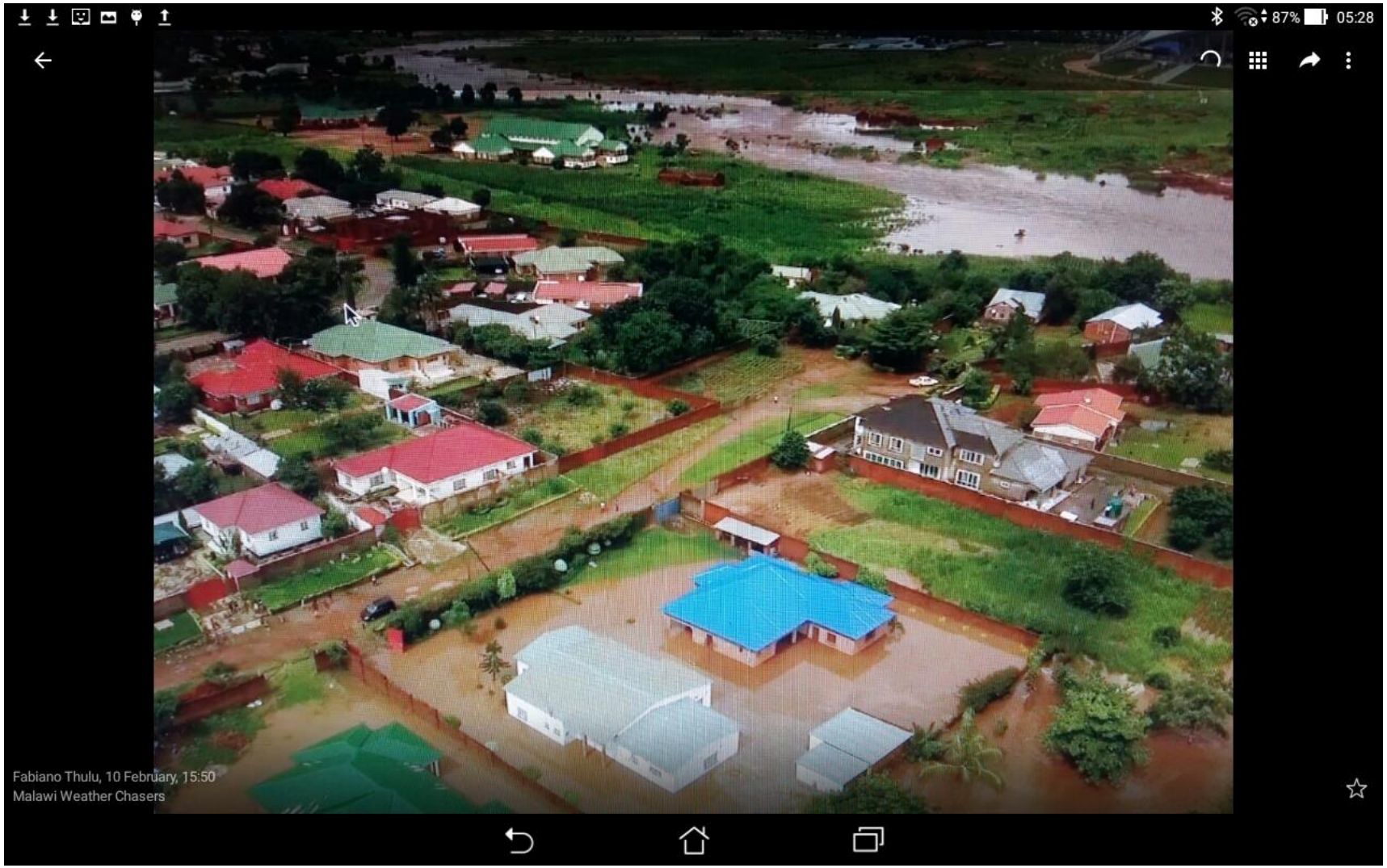
Urban flooding Lilongwe 10 Feb 2017



Urban flooding Lilongwe 10 Feb 2017



Urban flooding Lilongwe 10 Feb 2017



Urban Flooding

Blantyre urban flooding- Jan 2016


Lilongwe Urban floods

- The Blantyre Flooding was attributed to heavy precipitation and poor drainage system
- The Lilongwe flash floods were as a result of blockage of streams by constructions along and in the water-ways.

Floods hit Lilongwe

Posted By: Moses Chitsulo on: February 11, 2017 In: National

Some Lilongwe city residents yesterday woke up to horrible news after floods washed away some people, destroyed houses and property and also inconvenienced some road users.

The affected townships include Area 18, Mtandile, Area 49, Area 25, Area 47 and Nankhaka.

The capital city received heavy rains from around six in the evening of Thursday up to the early hours of Friday, which prompted Lingadzi and Nankhaka rivers to burst their banks.

The Malawi Defence Force (MDF), Police and Lilongwe City Council officers went to the affected areas for a rescue mission and the helicopter from the MDF managed to evacuate some stranded people.

Lilongwe Police spokesperson, Kingsley Dandaula, said some children from Mtandile, who were on their way to Area 49-based Shire Primary School, were caught up in the floods but the rescue team with the help of the community members managed to rescue them.

Lilongwe City Council spokesperson, Tamara Chafunya, said the council officers were still assessing the extent of the damage and it would be able to come up with the final data of the damaged property in due course.

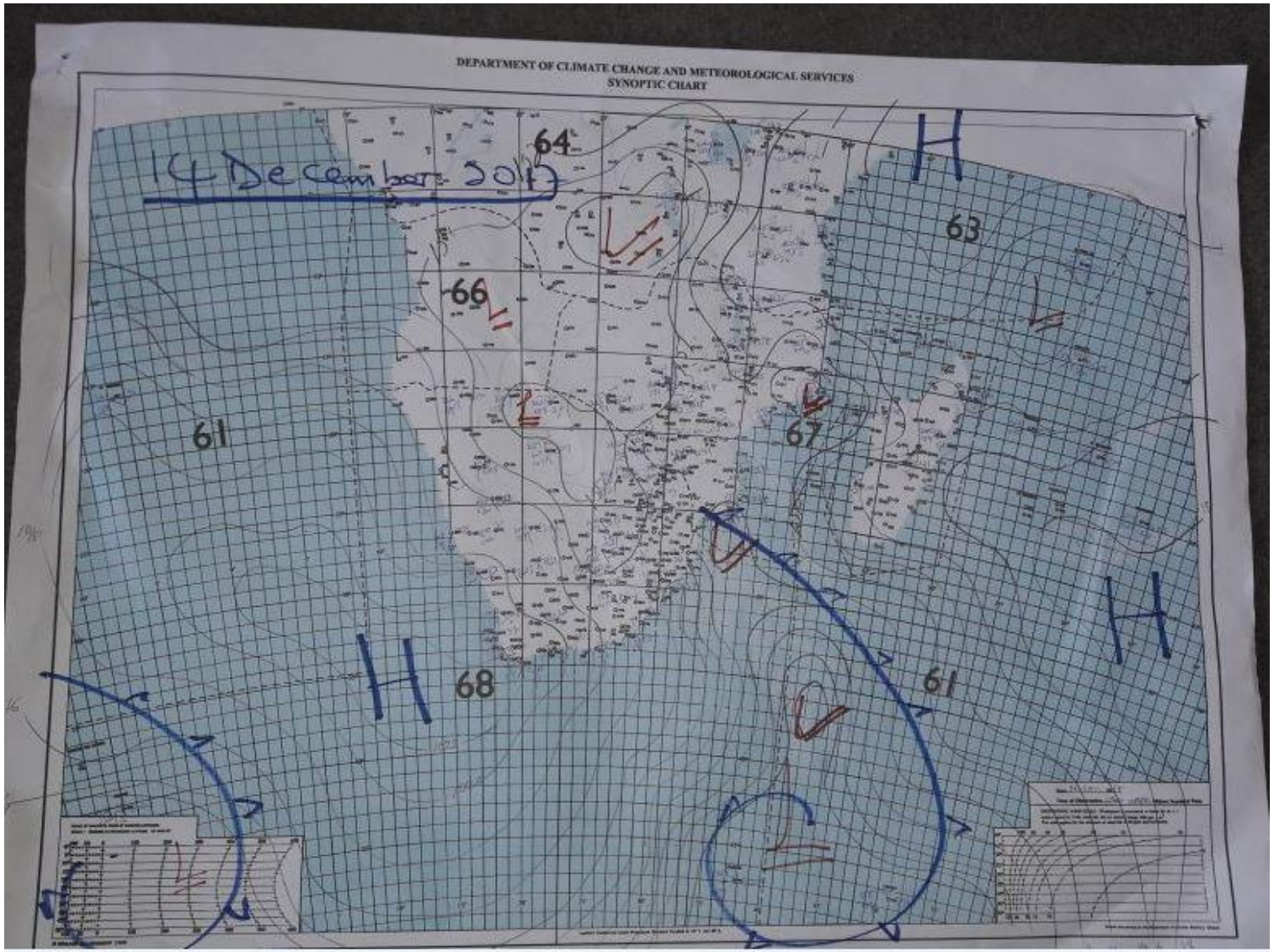
Chafunya also said the council had already communicated with the Department for Disaster Management Affairs and they were discussing ways on how best to support the affected families.

"We have also deployed other people from the DHO [District Health Office] to provide first aid to those people who may have been injured because of the floods. There may also be the need for us to erect tents for those people whose houses have been destroyed," Chafunya said.

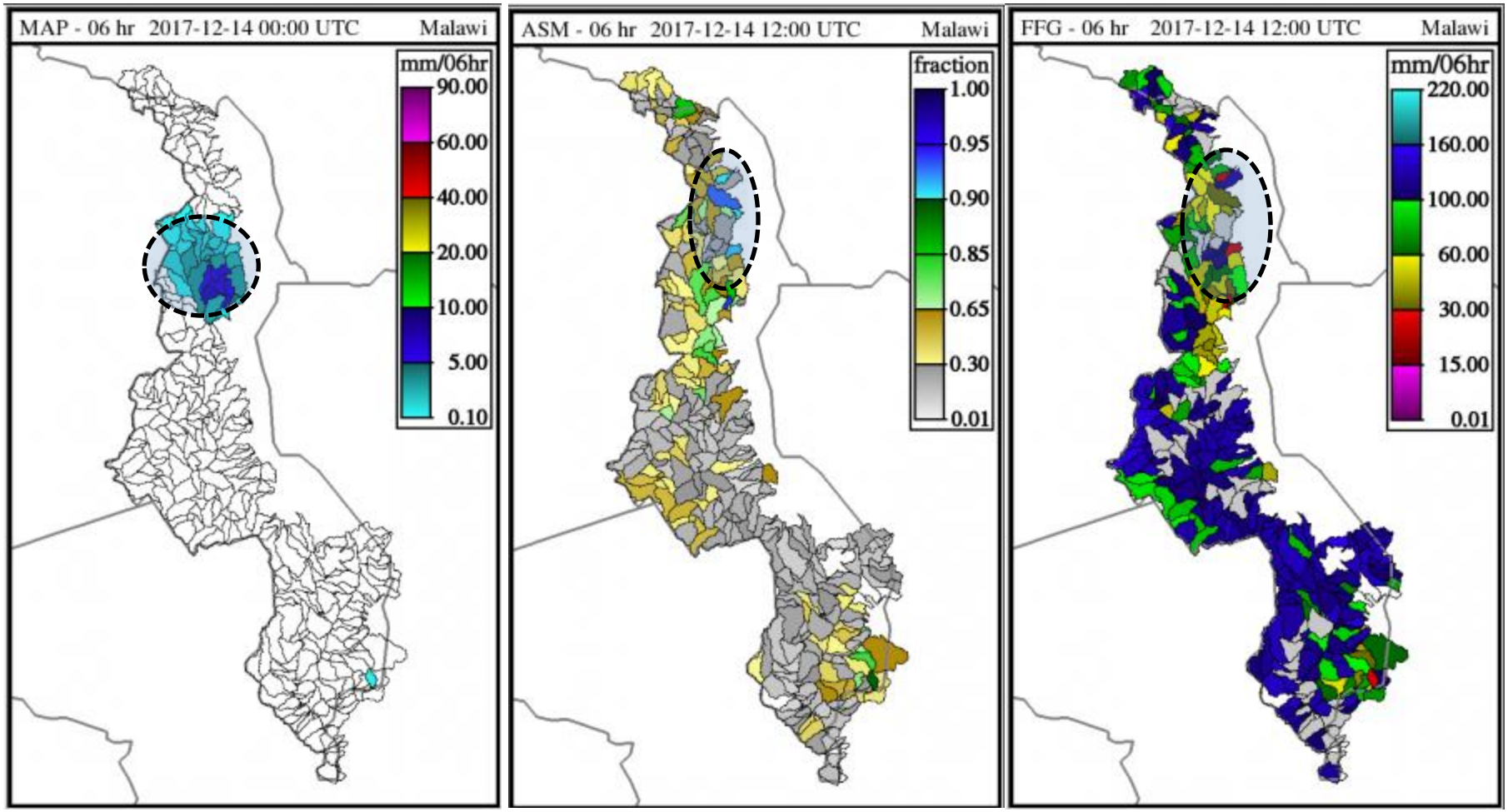
While some people suggest the poor drainage system in the city may have played a part in the flooding of some areas, others suggest that some affected people are those who illegally built houses along the river banks.

14 DECEMBER 2017 RUMPHI FLASH FLOOD AND INFRASTRUCTURE DAMAGE

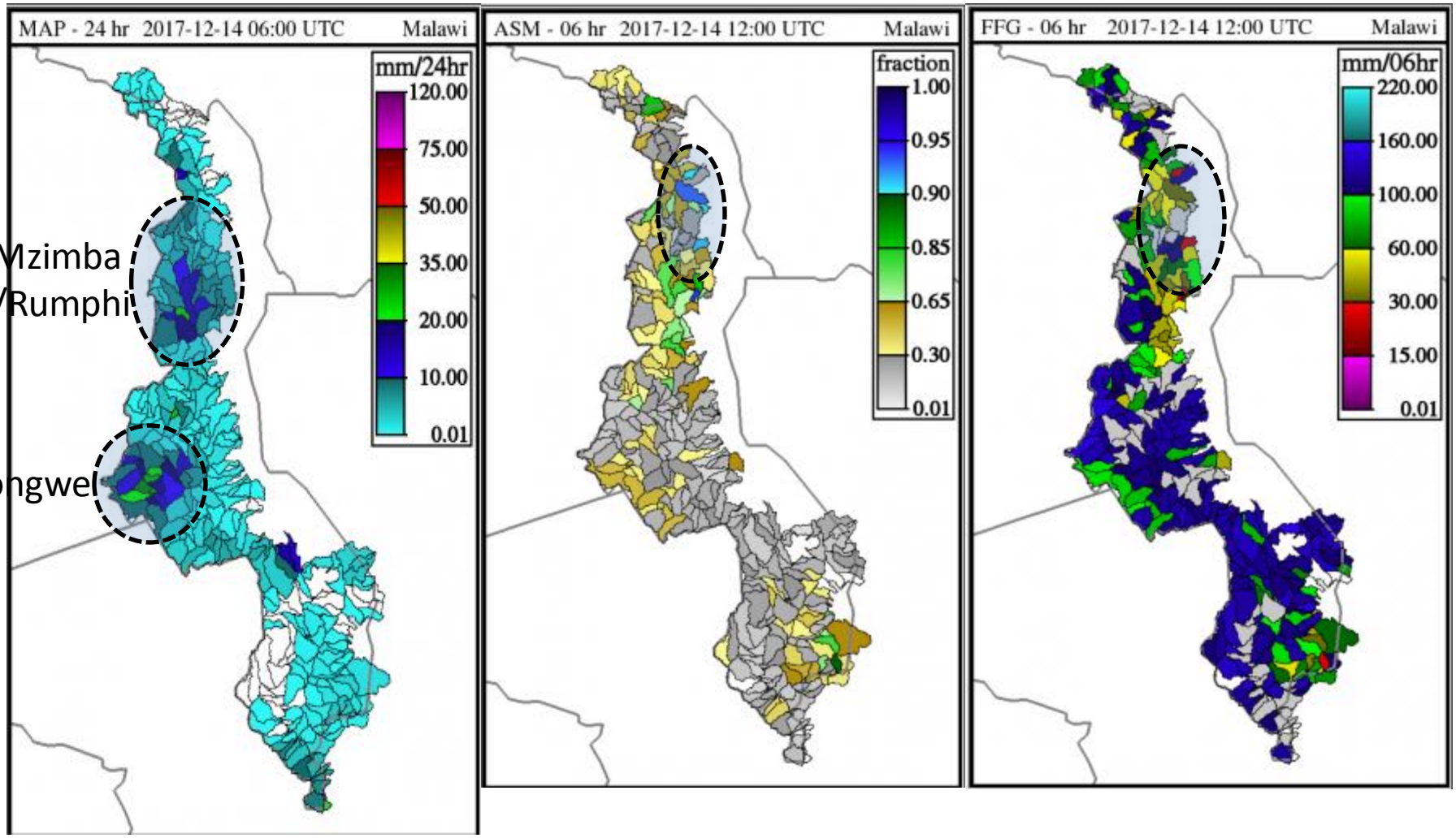
Surface weather chart on 14 December 2017



What Flash Flood was showing for Rumphi flash floods on 2017-12-14



What Flash Flood was showing for Rumphi flash floods on 2017-12-14

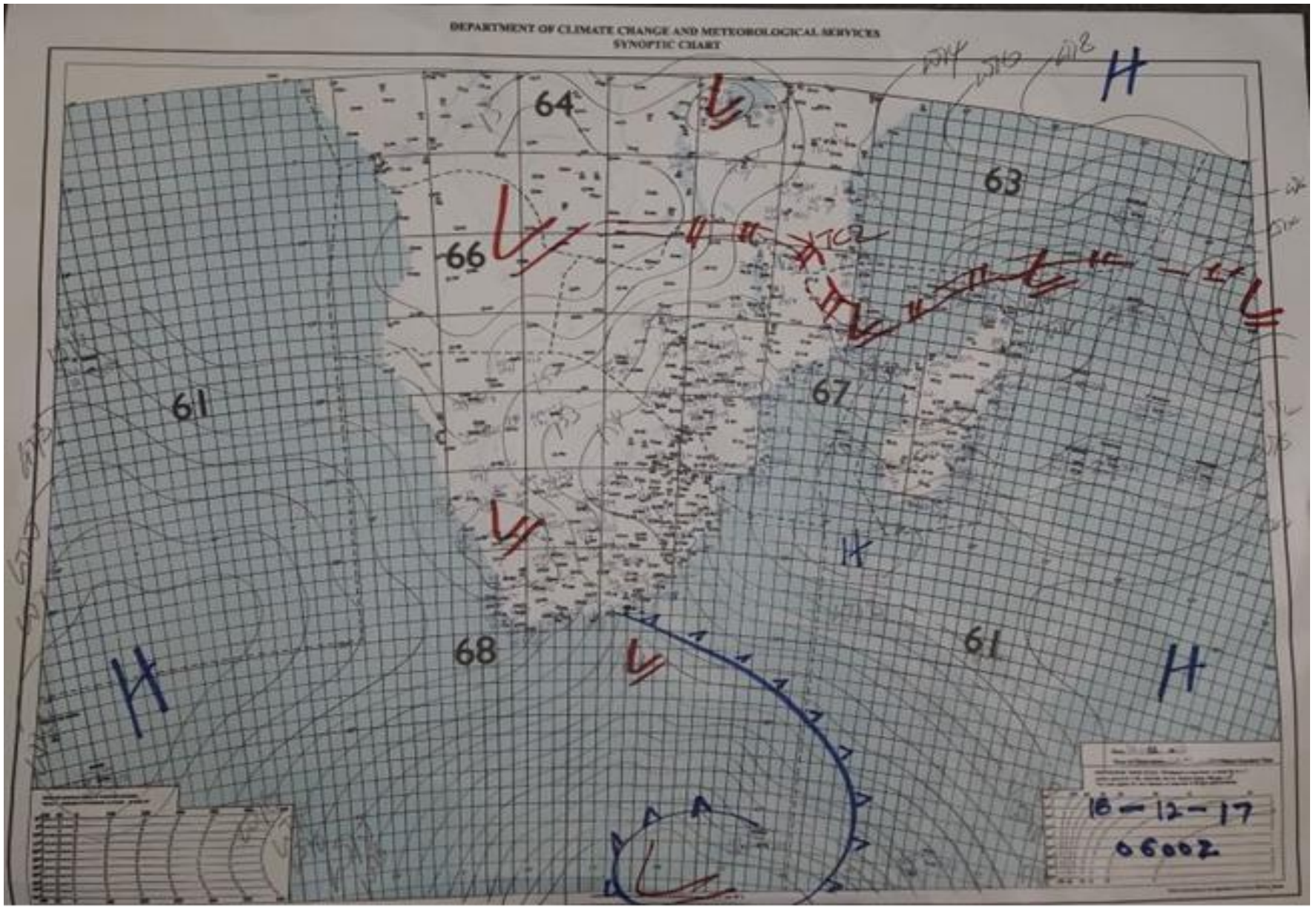


Flash Flood potentail for Rumphi 14 Dec 2017

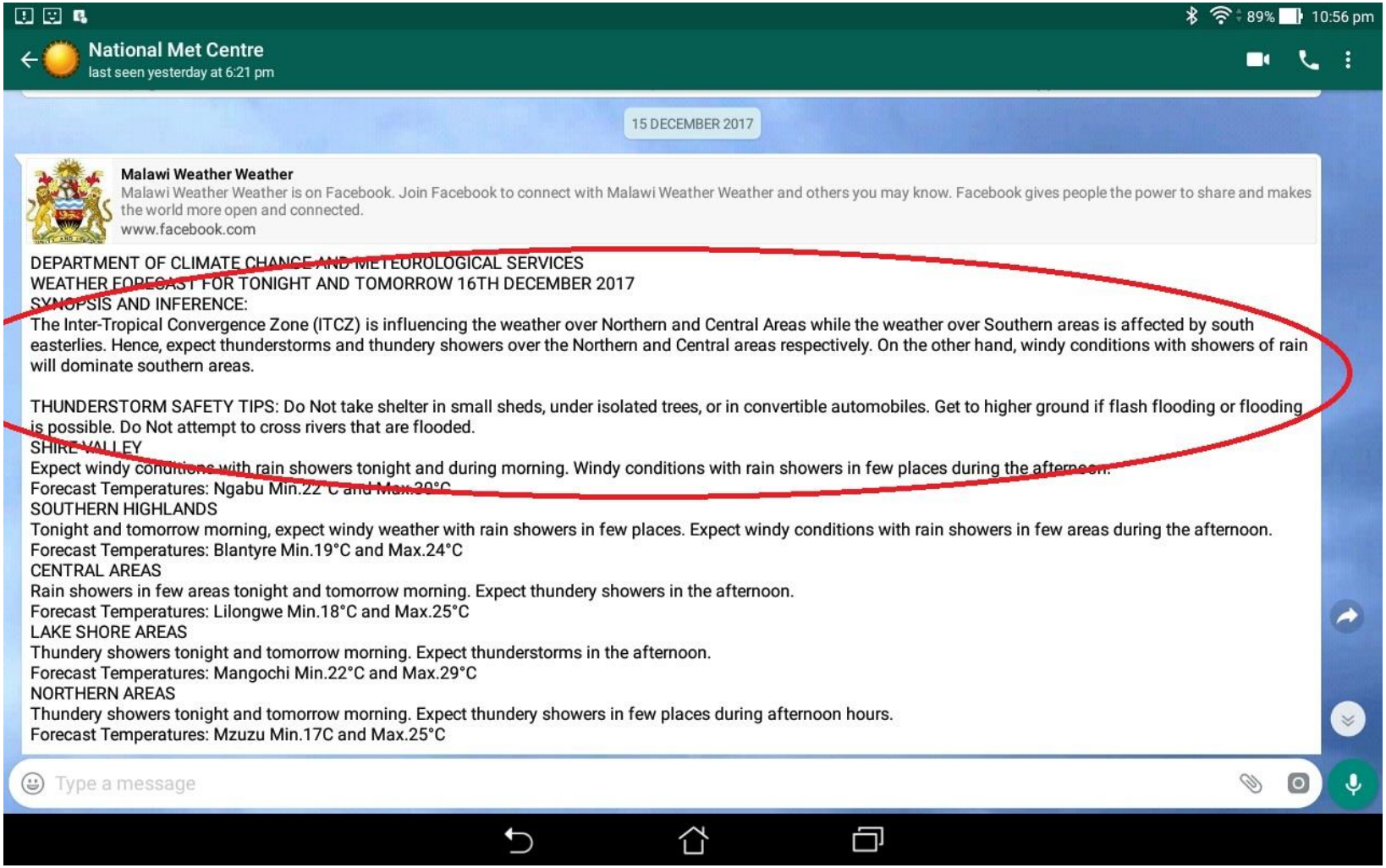
Rumphi Flash floods in pictures

16 DECEMBER 2017 LILONGWE FLASH FLOOD AND INFRASTRUCTURE DAMAGE

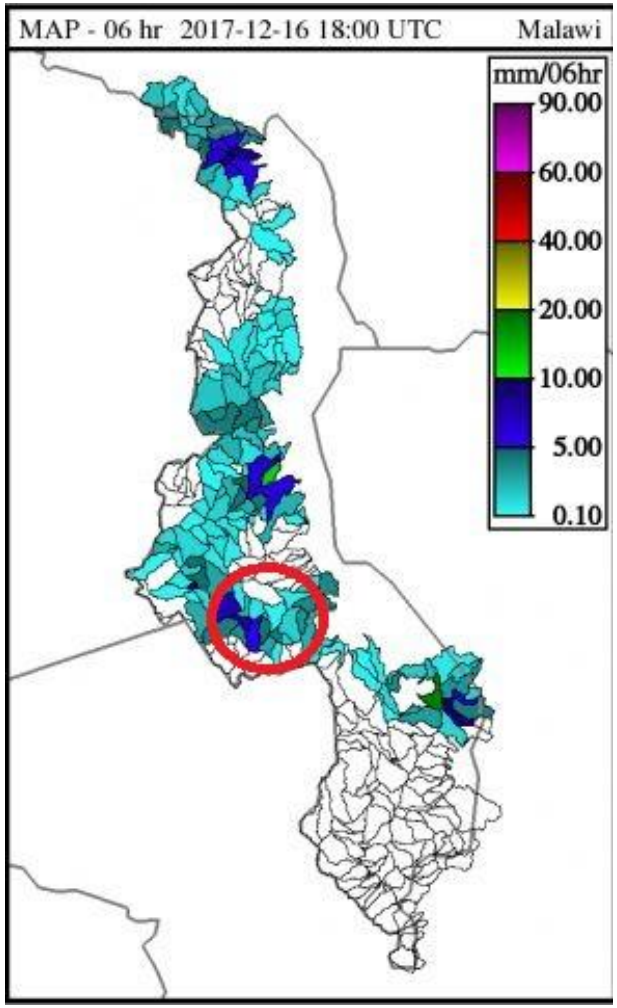
Surface weather chart for 16 December 2017

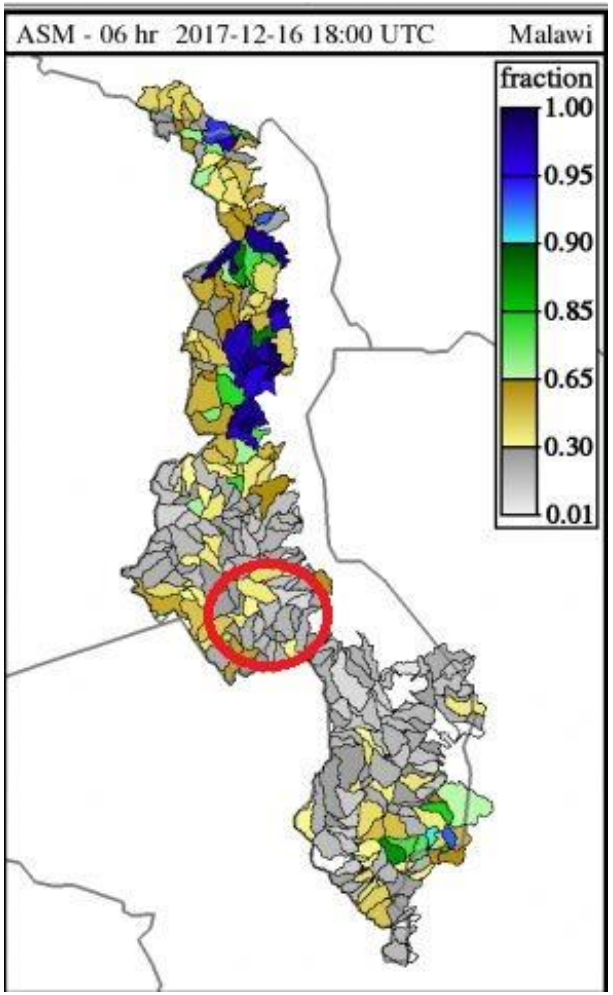


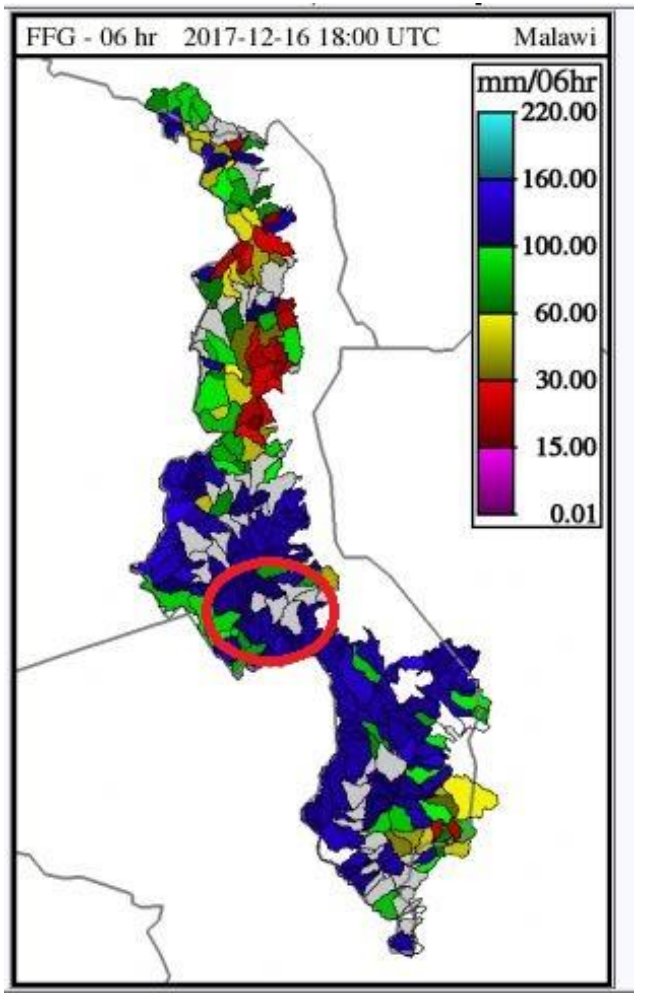
Weather forecast for 16 December 2017



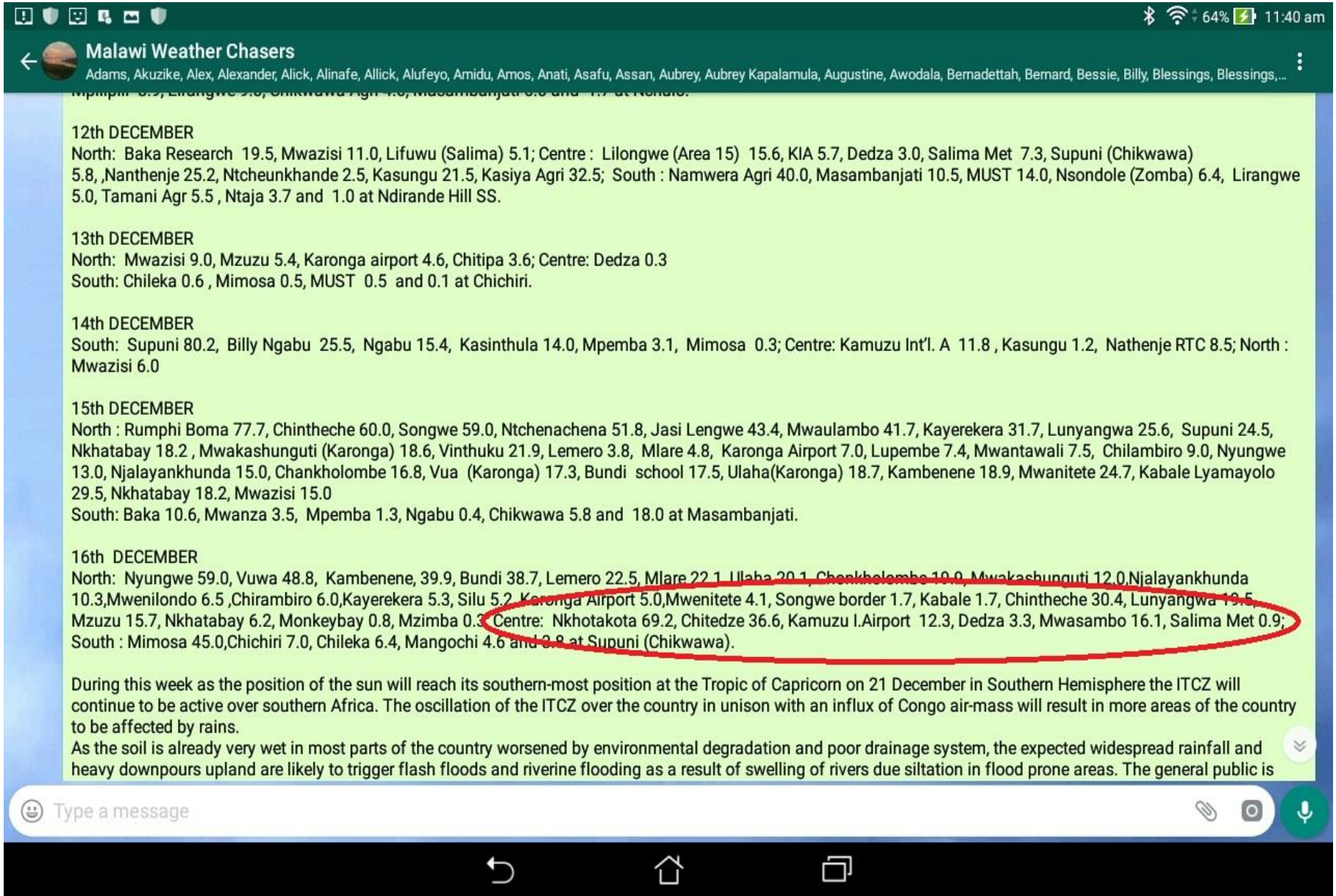
SARFFG System had no indications for flash floods potential on 2017-12-16







Feedback from people on the ground



Aftermath of the Lilongwe Flash floods

Lilongwe Flash floods in pictures

Official report

LILONGWE CITY COUNCIL

ALL CORRESPONDENCE TO BE ADDRESSED TO THE CHIEF EXECUTIVE OFFICER

P.O Box 30396
Lilongwe 3
Malawi
Tel: (265) 773 144
Fax: 01 770 885

Your Ref:

Our Ref : LCC/CEO/DD/1

18th December 2017

The Commissioner
Department of Disaster Management
Private Bag 336
Lilongwe

RE: SUBMISSION OF DISASTER IMPACT AND NEEDS REPORT

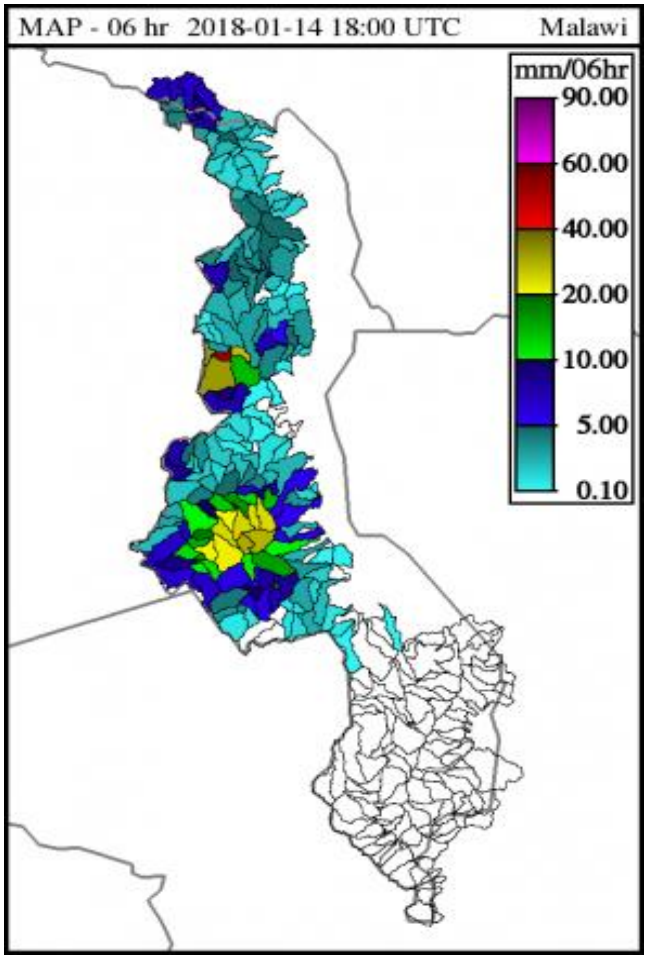
Please find below a Disaster Impact and Needs Assessment Preliminary Report on damages that occurred within Tongole, Ngwenya, Area 24 Sector 1, Area 22B, Area 22A, Chipasula, Kaliyeka, Biwi, Kawale 1, Kaondo, Katantha, Tumbwe and Chiponda on 16th December 2017 due to heavy down pour that started around 6 pm which resulted into flooding of the affected above mentioned areas. Contributory factors to the disaster are mainly due to lack of natural asset environmental protection due to illegal construction and agriculture activities. The following is a summary of the impact.

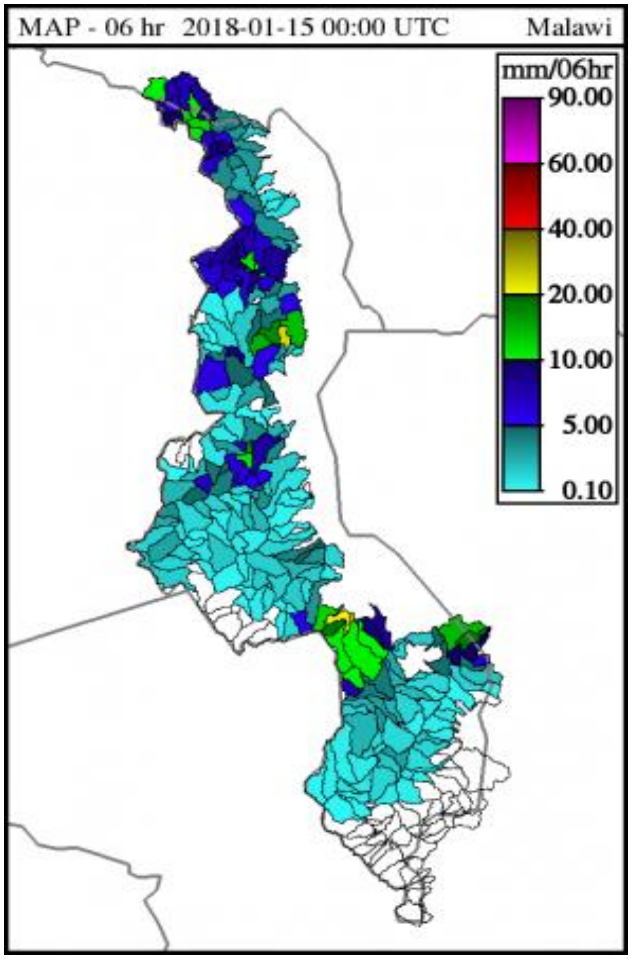
Total population affected	1186
Total children	805
Total male children	416
Total female children	389
Total households	360
Male headed h/h	274
Female headed h/h	64
Child headed h/h	3
Orphan headed h/h	2

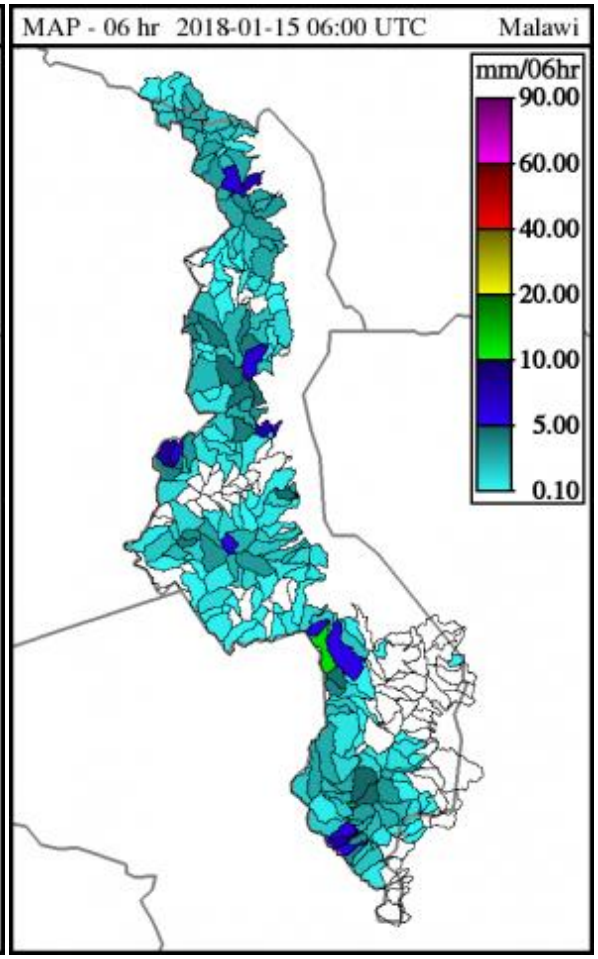
Elderly headed h/h	10
Widow headed h/h	5
Widower headed h/h	1
Expectant	6
Chronic illnesses	5
Disabled	3
Injuries	6
Females	2
Males	4
Deaths	6
Females	2
Males	4
Government infrastructure affected	4 bridges – Area 24 Bridge, Chipasula Bridge, Chidzanja, Kawale 1 Chipasula Secondary School Fence
2 private primary schools	SOS Fence, Garden fence
Churches	4
Footbridges	5 – Area 24, Kaondo, Tumbwe, Katantha, Chiponda
Culverts (ring force)	4 – Area 24 2 – Katantha
Needed bridges	2 – Kaondo, Tumbwe connecting two constituencies Lilongwe City West and Lilongwe City East
Temporary shelter for those without any assistance	Kaliyeka Primary School, Kawale 1 near Mosque and Redeemed Church

15 JANUARY 2018 RUMPHI FLASH FLOODS

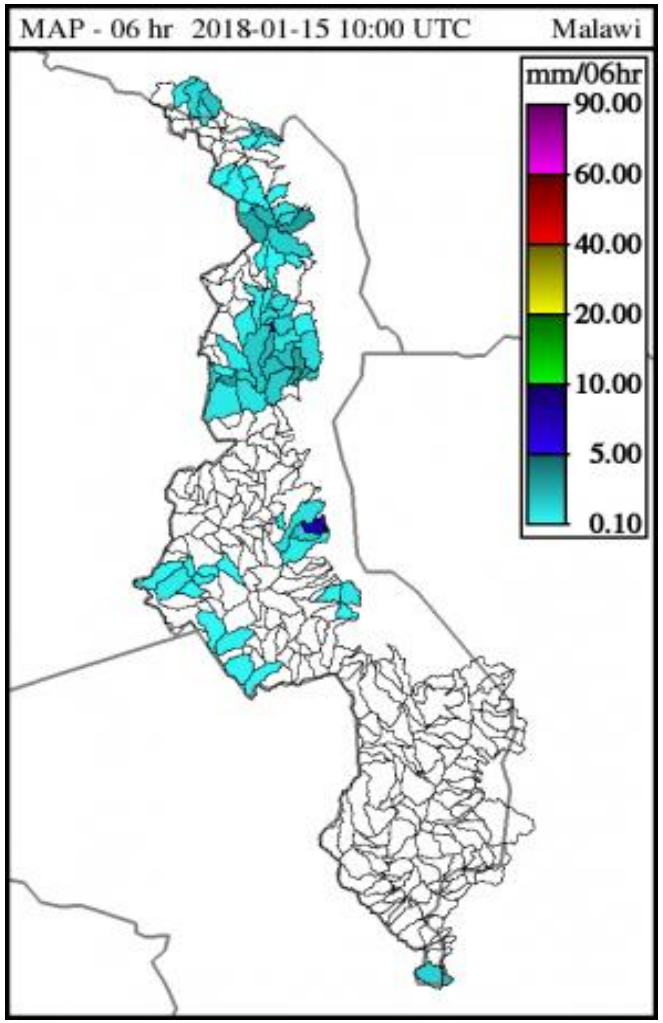
MAP

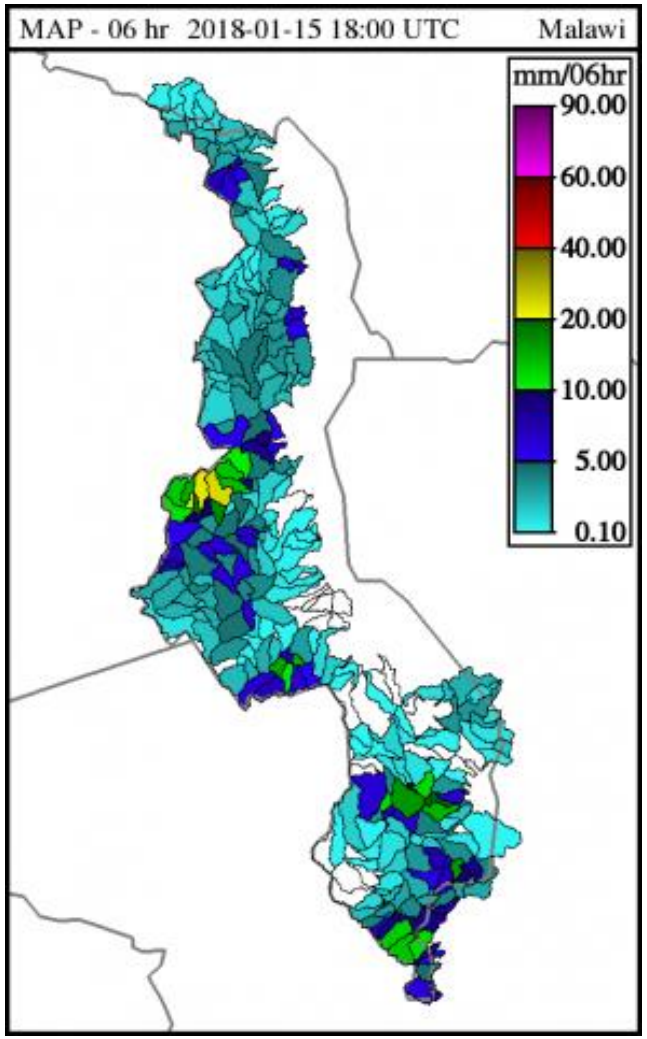

MAP - 06 hr 2018-01-14 18:00 UTC
Malawi
mm/06hr
90.00
60.00
40.00
20.00
10.00
5.00
0.10


MAP - 06 hr 2018-01-15 00:00 UTC
Malawi
mm/06hr
90.00
60.00
40.00
20.00
10.00
5.00
0.10

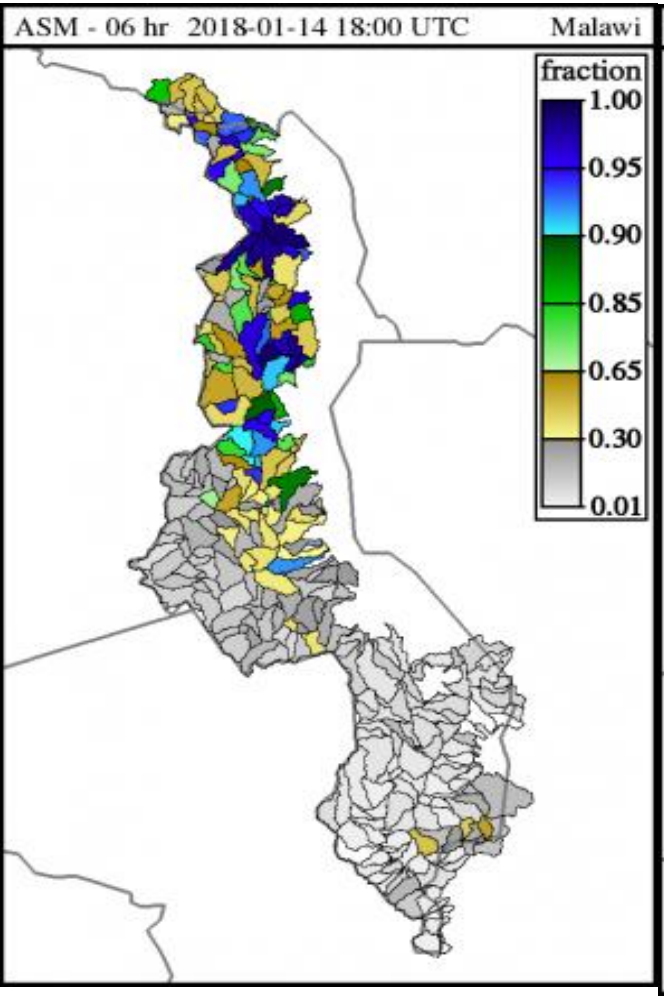

MAP - 06 hr 2018-01-15 06:00 UTC
Malawi
mm/06hr
90.00
60.00
40.00
20.00
10.00
5.00
0.10

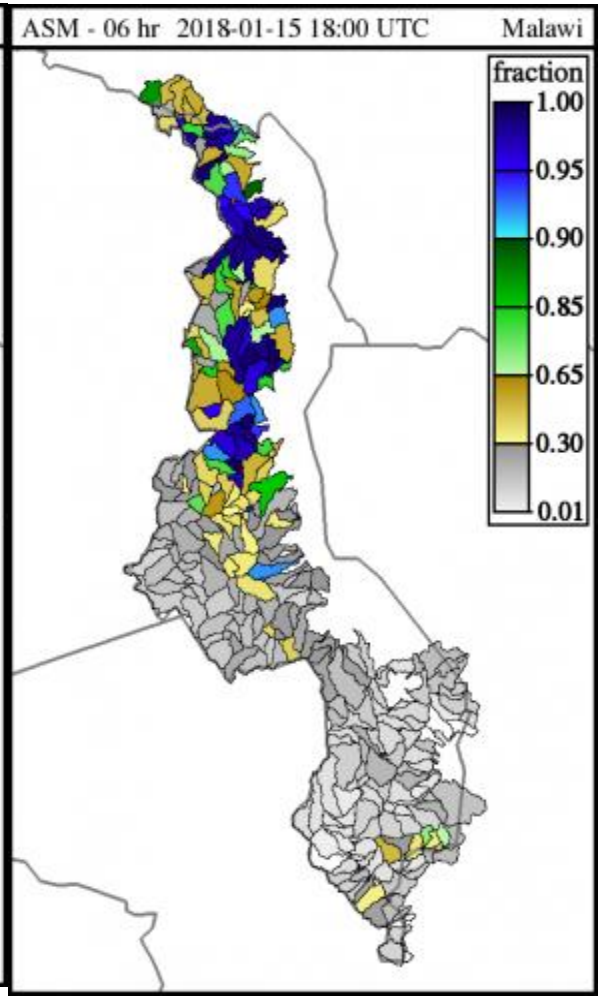
MAP

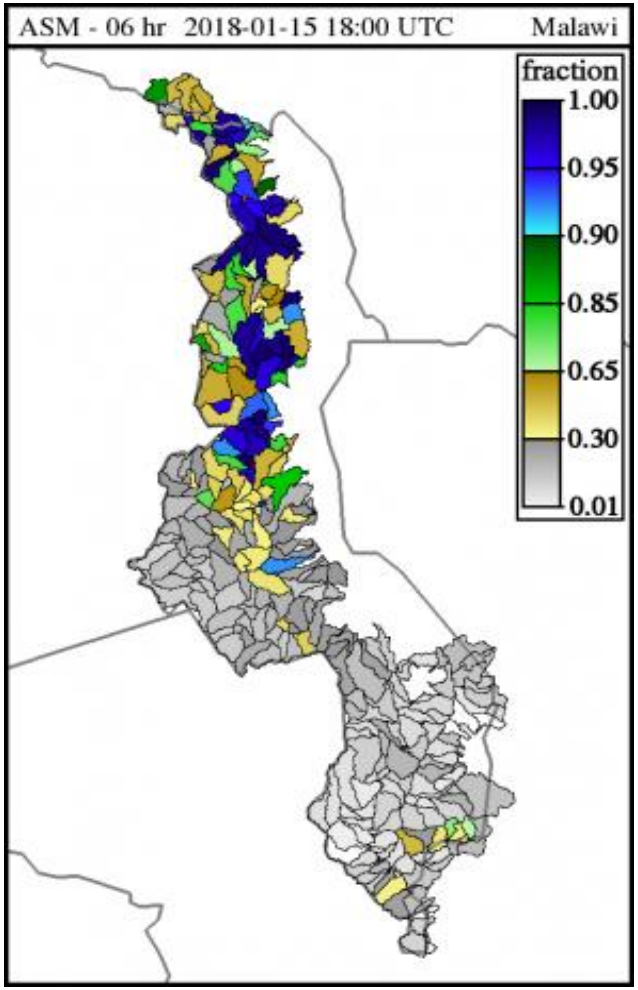

MAP - 06 hr 2018-01-15 10:00 UTC
Malawi
mm/06hr
90.00
60.00
40.00
20.00
10.00
5.00
0.10


MAP - 06 hr 2018-01-15 18:00 UTC
Malawi
mm/06hr
90.00
60.00
40.00
20.00
10.00
5.00
0.10

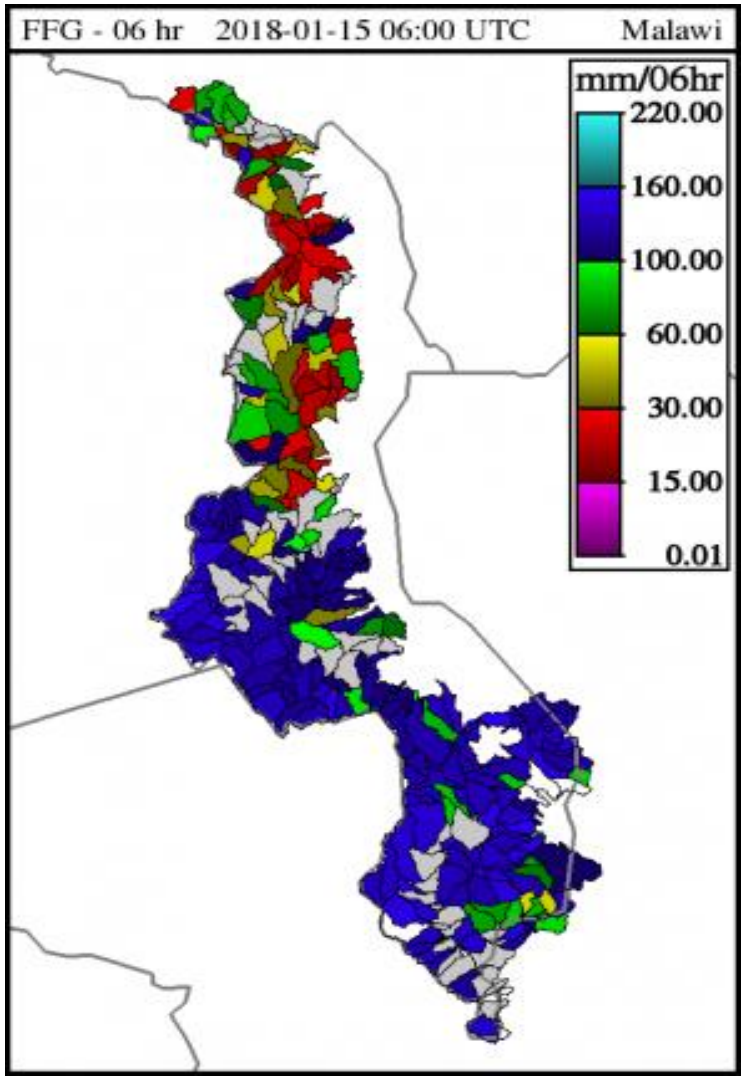
ASM

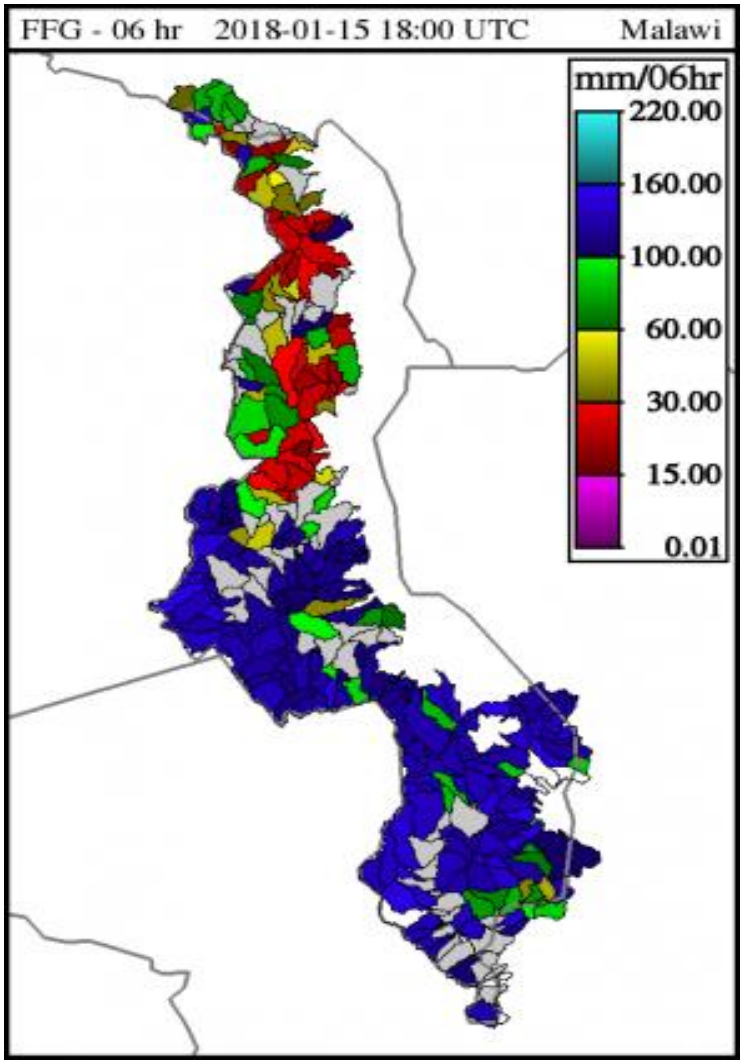

ASM - 06 hr 2018-01-14 18:00 UTC
Malawi
fraction
1.00
0.95
0.90
0.85
0.65
0.30
0.01


ASM - 06 hr 2018-01-15 18:00 UTC
Malawi
fraction
1.00
0.95
0.90
0.85
0.65
0.30
0.01


ASM - 06 hr 2018-01-15 18:00 UTC
Malawi
fraction
1.00
0.95
0.90
0.85
0.65
0.30
0.01

FFG


FFG - 06 hr 2018-01-15 06:00 UTC Malawi
mm/06hr
220.00
160.00
100.00
60.00
30.00
15.00
0.01


FFG - 06 hr 2018-01-15 18:00 UTC Malawi
mm/06hr
220.00
160.00
100.00
60.00
30.00
15.00
0.01

Aftermath

- VID-20180115-WA0013_Rumphi flash floods day 2.mp4

Be informed,

Be Wise Be Weather Wise

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