



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

**WATER RESOURCE INFORMATION MANAGEMENT
LIMPOPO PROVINCE**

**STATUS ON MONITORING &
SURFACE WATER LEVEL TRENDS
October 2015 to March 2016**

**D VILJOEN
June 2016**

GH4337



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1. EXECUTIVE SUMMARY

The majority of dams used in this report have less water than during the corresponding period last year. In the Limpopo Water Management Area the following dam levels are of concern: Luphephe is at 16.6%, Nwanedzi is at 39%, Glen Alpine Dam is at 27% and Nzhelele at 36.3%.

In the Luvuvhu / Letaba Water Management Area the following dam levels are of concern: Nsami Dam is at 16.8%, Middle Letaba is at 29.7%, Tzaneen at 39% and Modjadji at 46.9%.

The average storage volume for the Limpopo WMA is 181.1million cubic meters (64.5%) and is 84.1 million cubic meters less than the corresponding period last year (94.7%).

The average storage volume for the Luvuvhu / Letaba WMA is 337 million cubic meters (51%) and is 166.8 million cubic meters less than the corresponding period last year (76.4%).

The average storage volume for the Olifants WMA is 885.3 million cubic meters (62.2%) and is 373.7 million cubic meters less than the corresponding period last year (88.5%).

Numerous smaller dams (0.7 – 3.5 million cubic meter capacity) exist in this WMA but only two are equipped with Data Loggers namely Piet Gouws and Molepo Dams. No Real Time data is available from these dams and the obtaining of updated dam status observations are hampered by the remoteness thereof. Although provision has been made at some dams for the installation of Data logging equipment, funds for the purchasing thereof are lacking. The following dams falls within the Olifants WMA, but no status information is available: 1. Piet Gouws (3.94 million Cubic meters), Lola Montes (1.2 million Cubic meters), Makotswane (3.48 million Cubic meters), Spitskop (0.54million Cubic meters), Vergelegen (1.34million Cubic meters) Dr. Esselen (0.73million Cubic meters), Chunnies Poort (2.47million Cubic meters), Der Broggen, Lepellane and Mahlangu dams.

The average storage volume for the Inkomati WMA is 1004.9 million cubic meters (95.8%) and is 54.1 million cubic meters less than the corresponding period last year (100.9%).

The challenge in all the WMAs discussed in this report is the fact that there are smaller dams, which supply water to communities that still need to be monitored. Owing to the lack of data these dams could not be included. Infrastructure at these dams are also a major concern and will have to be put in place before any form of water level monitoring can be considered.

Gauge plates have been installed at some of the smaller dams, but there are no observers to relay gauge plate readings to the Tzaneen Office. Hout River Dam has been equipped with near real-time data acquisitioning equipment.

The information presented in this report is based on the status of all the major dams in the province up to the end of March 2016.

2. MONITORING NETWORK

The hydrological monitoring network for the Limpopo Province consists of the following amount of gauging stations:

81 river flow gauging stations (excluding canals and pipelines)

21 dam gauging stations

16 evaporation stations

Locality maps indicating the majority of dams and certain primary gauging stations have been included:

A4-A6 catchments page 8

A7-A9 catchments page 9

B8-B9 catchments page 11

It is important to take cognizance of the fact that the hydrological gauging stations in the Crocodile-West and Olifants Water Management Areas (shared boundaries) are being managed by the hydrological offices of Gauteng and Mpumalanga respectively.

For the purpose of this report and owing to the strategic location and importance of certain dams in the Olifants and Nkomati Water Management Areas, information regarding their status is also attached.

3. OVERVIEW

No river flow gauging stations graphs have been attached but a few peak flows worth mentioning is listed below:

2.1 Highest peak flows measured at gauging stations during the past rainy season up to the end of March 2016.

Station Number	RIVER AND PLACE	DATE AND TIME HEIGHT	FLOW (m ³ /s)
A6R001	Mogalakwena at Glen Alpine Dam	21/03/2016 00:24 16.64	462
A7H008	Limpopo at Beit Bridge	16/03/2016 19:00 1.376	503
B8H018	Great Letaba at Engelhardt Dam (before confluence with Olifants River at Letaba Camp in the KNP)	20/03/2016 06:24 1.075	418
B8H034	Great Letaba at Black Heron	19/03/2016 21:48 1.931	509
B7H015	Olifants at Mamba (Approximately 8 km inside the western border of the Kruger National Park at Phalaborwa)	2016/03/18, 21:11 1.668m	345.3
B7H026	Olifants at Balule (Just before confluence with Great Letaba River inside the Kruger National Park)	2016/03/19 13h48 1.455m	± 140.000

2.2 Rainfall figures for the Limpopo WMA based on daily readings indicated on monthly returns.

DAM	OCT'15 (mm)	NOV'15 (mm)	DEC'15 (mm)	JAN'16 (mm)	FEB'16 (mm)	MAR'16 (mm)	TOTAL (mm)
Mokolo	24.00	86.00	46.00	90.80	48.50	97.50	392.80
Doorndraai	34.50	60.00	83.60	48.00	108.50	129.70	464.30
Glen Alpine	4.10	77.70	6.20	47.70	86.7	133.20	355.60
Nzhelele	4.20	49.4	96.80	32.90	35.10	120.80	339.20
Nwanedzi	4.20	33.60	143.80	32.1	28.10	47.00	288.80
Mutshedzi	9.10	29.80	47.90	88.10	98.30	55.30	328.50

2.3 Rainfall figures for the Levhuvhu / Letaba WMA based on daily readings indicated on monthly returns.

DAM	OCT'15 (mm)	NOV'15 (mm)	DEC'15 (mm)	JAN'16 (mm)	FEB'16 (mm)	MAR'16 (mm)	TOTAL (mm)
Albasini	9.10	78.90	43.60	78.3	70.1	46.9	326.90
Nandoni	8.70	21.50	32.80	102.80	21.50	142.30	329.60
Ebenezer	93.80	100.5	76.70	74.83	98.00	436.7	880.53
Magoebaskloof	49.30	117.4	64.90	69.20	107.20	413.10	821.10
Tzaneen	17.00	87.40	16.70	26.06	89.30	46.30	282.76
Modjadji	27.50	57.30	9.00	64.20	42.00	314.70	514.70
Nsami	5.00	7.50	20.00	65.00	29.50	64.00	191.00

2.4 Rainfall figures for the Olifants WMA based on daily readings indicated on monthly returns.

DAM	OCT'15 (mm)	NOV'15 (mm)	DEC'15 (mm)	JAN'16 (mm)	FEB'16 (mm)	MAR'16 (mm)	TOTAL (mm)
Rust de Winter	38.9	36.20	No return	96.40	93.9	Not received yet	# 265.4
Loskop	12.0	47.30	143.9	69.50	82.00	77.4	432.1
Flag Boshielo	48.10	70.70	200.1	20.80	44.70	64.9	449.3
Ohrigstad	25.8	49.0	112.0	73.4	83.6	Not received yet	# 343.8
De Hoop	First data received on 26 Jan 2016				111.9	88.3	# 200.2
Blyde	55.3	108.6	45.00	31.80	53.3	116.8	410.8
Klaserie	62.2	12.0	32.80	15.4	38.4	125.2	286
Tours	No return	73.20	79.4	29.4	28.4	283.0	# 493.4
# Incomplete record							

2.5 Rainfall figures for the Inkomati WMA based on daily readings indicated on monthly returns

DAM	OCT'15 (mm)	NOV'15 (mm)	DEC'15 (mm)	JAN'16 (mm)	FEB'16 (mm)	MAR'16 (mm)	TOTAL (mm)
Kwena	34.60	37.60	119.7	56.20	77.00	48.20	373.30
Inyaka	17.40	57.40	105.4	100.2	75.20	219.2	574.80

To give an indication of what the normal rainfall was for the period July 2015 up to March 2016, see attached map (page 15). This information was obtained from the South African Weather Service. For information purposes a graph depicting provincial rainfall for the current hydrological year is attached (page 16).

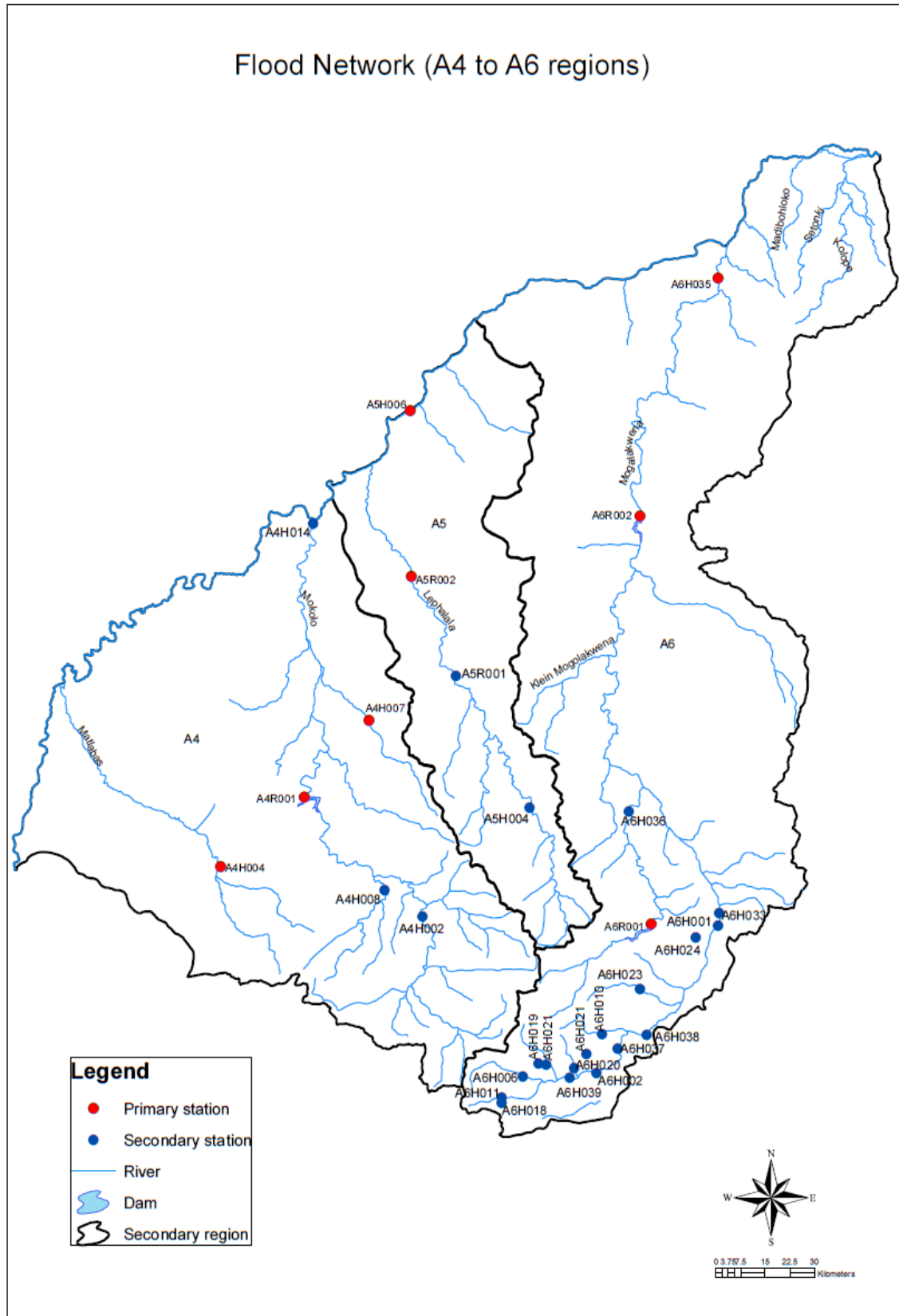
The National dam storage graph (page 17) has been attached to the report for additional information. The dam storage graphs of the two WMAs (page 18-19), indicates the current situation clearly. This information was obtained from Mr Malose Ngoepe from Water Resources Planning, National Office.

For information purposes a table indicating the comparison of water storage percentage for the different WMA's is attached on page 20.

The purpose for attaching graphs of individual dams is to give a broader picture of water storage and status in the sub drainage catchments.

4. LIMPOPO WATER MANAGEMENT AREA

The catchment consists of secondary drainage areas A4, A5, A6, A7 and A8.



4.1 A4 Drainage Area (Matlabas, Mokolo Rivers)

The Mokolo Dam (A4R001) was used as no other dam exists in the A4 hydrological monitoring network. The dam is at a storage level of 82.9% ($120.5 \times 10^6 \text{m}^3$) and 17.3% lower than the previous year, which means that the storage volume is 25.2 million cubic meters less than the corresponding period last year. See attached graph!

4.2 A5 Drainage Area (Lephalala River)

Two small dams exist in the A5 hydrological network namely the Susandale Dam (A5R001) and the Vischgat Dam (A5R002). Owing to their relatively small storage volumes of approximately 0.6 million cubic meters in total, these dams have not been included in this report!

4.3 A6 Drainage Area (Nile, Sterk, Mogalakwena and Dorps Rivers)

The Doorndraai Dam (A6R001) and Glen Alpine Dam (A6R002) were used as no other dams exist in the A6 hydrological monitoring network. The Doorndraai Dam is at a storage level of 72.4% ($31.7 \times 10^6 \text{m}^3$) and 27.9% lower than the previous year, which means that the storage volume is 12.2 million cubic meters less than the corresponding period last year. See attached graph!

Glen Alpine Dam is at a storage level of 27% ($5.1 \times 10^6 \text{m}^3$) and 73.2% lower than the previous year, which means that the storage volume is 13.9 million cubic meters less than the corresponding period last year.

It must be noted that the full capacity storage of Glen Alpine Dam is only 18.889 million cubic and therefore the dam fills and empties much faster than Doorndraai Dam! The graph of Glen Alpine clearly indicates this!

4.4 A7 Drainage Area (Sand, Blood, Diep, Hout, Dwars and Brak Rivers)

There are no existing dam monitoring stations in the hydrological network for this drainage area!

The Tzaneen Area Office in conjunction with the Hydrometry office is currently busy with the installation of gauge plates at dams in both of the Water Management Areas. Hout River Dam has been equipped with gauge plates, but a futile exercise at Mashashane Dam just reiterated the point that gauge plates should be installed once water levels are below lowest outlet levels! Data capturing and real-time equipment has been installed at Hout River Dam.

Seshego and Rietfontein Dams will be investigated, but due to high water levels and the lack of infrastructure, the installation of gauge plates remains a huge challenge. According to preliminary investigations it seems obvious that the installation of gauge plates will only be feasible when water levels at these dams are on or below lowest outlet levels!

4.5 A8 Drainage Area (Nwanedzi and Nzhelele Rivers)

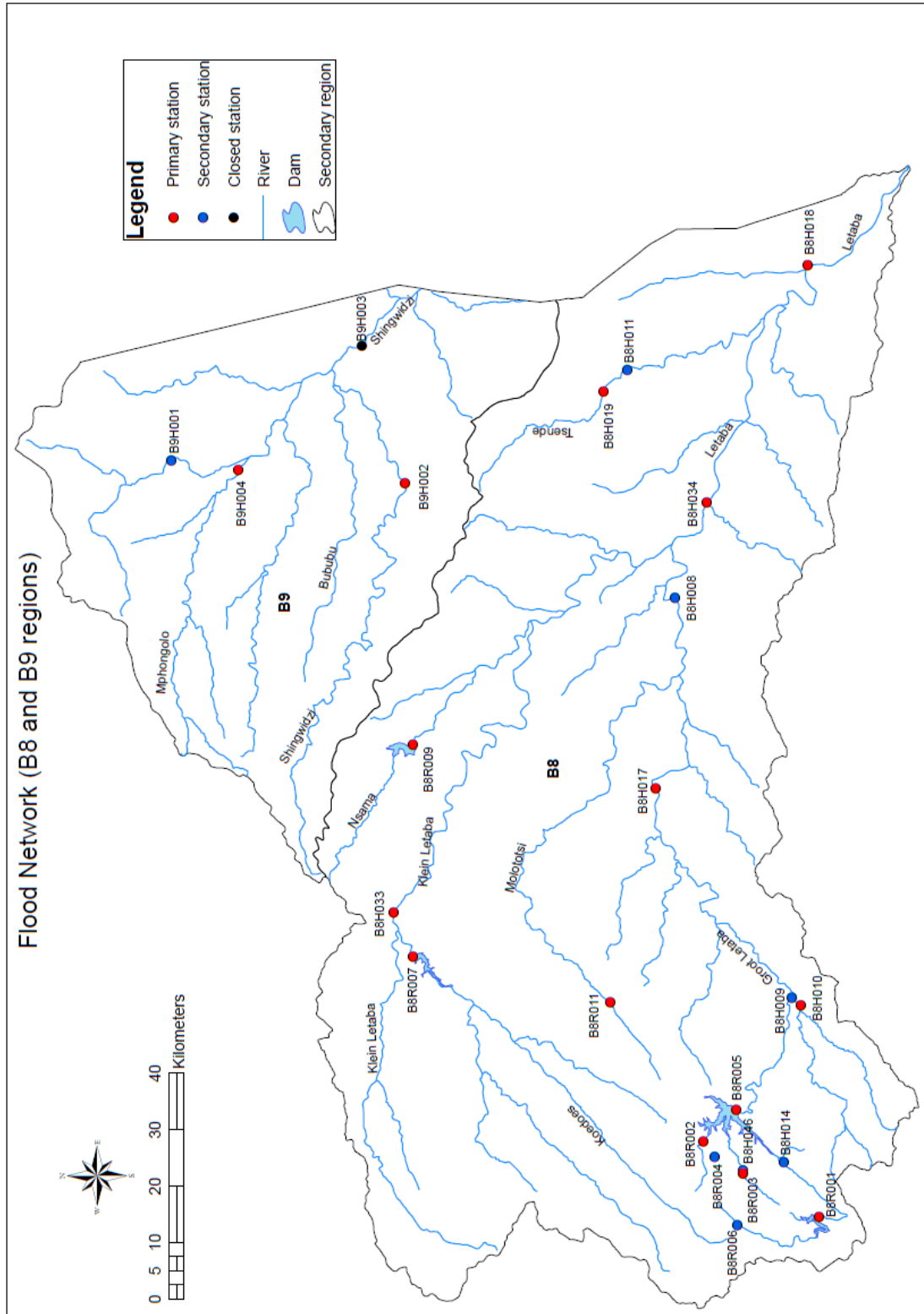
The Nzhelele Dam (A8R001), Luphephe (A8R002), Nwanedzi (A8R003) and Mutshedzi (A8R004) Dams were used as indicators! The Nzhelele Dam is at a storage level of 36.3% ($18.6 \times 10^6 \text{m}^3$) and 46.4% lower than the previous year, which means that the storage volume is 23.8 million cubic meters less than the corresponding period last year. See attached graph!

Luphephe and Nwanedzi Dams are at storage levels of 16.7% and 47.4% respectively. Their combined storage is at $4.78 \times 10^6 \text{m}^3$. The combined storage for the corresponding period the previous year was $12.2 \times 10^6 \text{m}^3$. (63.8% of storage volume) See attached graphs!

Mutshedzi Dam, is at a storage level of 49.5% ($1.0 \times 10^6 \text{m}^3$) and 50.5% lower than the previous year, which means that the storage volume is 1 million cubic meters less than the corresponding period last year.

5. LUVUVHU / LETABA WATER MANAGEMENT AREA

The catchment consists of secondary drainage areas A9, B8 and B9.



5.1 A9 Drainage Area (Mutale, Luvuvhu Rivers)

The Albasini Dam (A9R001), Vondo Dam (A9R002) and Nandoni (A9R004) Dams were used as monitoring points in this report.

Albasini Dam is at a storage level of 68.6% ($19.4 \times 10^6 \text{m}^3$) and 22.1% lower than the previous year, which means that the storage volume is 6.3 million cubic meters less than the corresponding period last year. See attached graph!

Vondo Dam is at a storage level of 62.9% ($19.2 \times 10^6 \text{m}^3$) and 31.8% lower than the previous year, which means that the storage volume is 9.6 million cubic meters less than the corresponding period last year. See attached graph!

Nandoni Dam is at a storage level of 69.9% ($116.1 \times 10^6 \text{m}^3$) and 28.9% lower than the previous year, which means that the storage volume is 47.99 million cubic meters less than the corresponding period last year. See attached graph!

5.2 B8 Drainage Area (Groot, Middle and Klein Letaba Rivers)

The Ebenezer Dam (B8R001), Magoebaskloof Dam (B8R003), Tzaneen Dam (B8R005), Middle-Letaba Dam (B8R007), Nsami Dam (B8R009) and Modjadji Dam (B8R011) were used as monitoring points in this report. The Dap Naudé Dam (B8R006) and Hans Merensky Dam (B8R002) are also being monitored, but were not included in this report!

The Ebenezer Dam is at a storage level of 79.4% ($54.9 \times 10^6 \text{m}^3$) and 17.7% lower than the previous year, which means that the storage volume is 12.2 million cubic meters less than the corresponding period last year. See attached graph!

Magoebaskloof Dam is at a storage level of 100.5% ($4.9 \times 10^6 \text{m}^3$) and the same as the previous year. See attached graph!

Tzaneen Dam is at a storage level of 39% ($61.1 \times 10^6 \text{m}^3$) and 37.6% lower than the previous year, which means that the storage volume is 58.8 million cubic meters less than the corresponding period last year. See attached graph!

Middle-Letaba Dam is at a storage level of 29.6% ($50.9 \times 10^6 \text{m}^3$) and 11.8% lower than the previous year, which means that the storage volume is 20.4 million cubic meters less than the corresponding period last year. See attached graph!

The Nsami Dam is at a storage level of 16.3% ($3.6 \times 10^6 \text{m}^3$) and 47.4% lower than the previous year, which means that the storage volume is 10.5 million cubic meters less than the corresponding period last year.

The Modjadji Dam is at a storage level of 46.9% ($3.4 \times 10^6 \text{m}^3$) and 18.2% lower than the previous year, which means that the storage volume is 1.3 million cubic meters less than the corresponding period last year.

5.3 B9 Drainage Area (Shingwedzi, Phugwane and Mphongolo Rivers)

Only a limited part of this drainage area falls outside the Kruger National Park!
There are no existing dam monitoring stations in the hydrological network for this drainage area!

6. OLIFANTS WATER MANAGEMENT AREA

Monitoring points in the B3, B5, B6 and, B7 sub drainage areas were also included in this report owing to their strategic location and importance to operational matters in the Limpopo Province.

6.1 B3 Drainage Area (Olifants, Elands, Bloed and Selons Rivers)

For information as well as operational matters the status of Rust de Winter Dam (B3R001) and Loskop Dam (B3R002) has been included in this report.

Rust de Winter Dam is at a storage level of 57.8% ($16.3 \times 10^6 \text{m}^3$) and 34.7% lower than the previous year. See attached graph!

Loskop Dam is at a storage level of 61.3% ($221.6 \times 10^6 \text{m}^3$) and 34.3% lower than the previous year. See attached graph!

6.2 B5 Drainage Area (Olifants River)

For information as well as operational matters the status of Flag Boshielo Dam (B5R002) has been included in this report.

Flag Boshielo Dam is at a storage level of 42.4% ($78.5 \times 10^6 \text{m}^3$) and 52.7% lower than the previous year. See attached graph!

6.3 B6 Drainage Area (Blyde and Ohrigstad Rivers)

For information as well as operational matters the status of Ohrigstad Dam (B6R001) and Blyde Rivierspoort Dam (B6R003) has been included in this report.

Ohrigstad Dam is at a storage level of 8.3% ($1.1 \times 10^6 \text{m}^3$) and 45.2% lower than the previous year. See attached graph!

Blyde Dam is at a storage level of 74.2% ($40.3 \times 10^6 \text{m}^3$) and 26.1% lower than the previous year. See attached graph!

6.4 B7 Drainage Area (Klaserie and Olifants Rivers)

For information as well as operational matters the status of Klaserie Dam (B7R001) and Tours Dam (B7R003) has been included in this report.

Klaserie Dam is at a storage level of 58.7% ($3.3 \times 10^6 \text{m}^3$) and 44.3% higher than the previous year. See attached graph!

Tours Dam is at a storage level of 52.5% ($3.2 \times 10^6 \text{m}^3$) and 30% lower than the previous year. See attached graph!

7. INKOMATI WATER MANAGEMENT AREA

7.1 X2 Drainage Area (Crocodile River)

For information as well as operational matters the status of Kwena Dam (X2R005) has been included in this report.

Kwena Dam is at a storage level of 49.1% ($78 \times 10^6 \text{m}^3$) and 51.6% lower as the previous year. See attached graph!

7.2 X3 Drainage Area (Mariti River)

For information as well as operational matters the status of Inyaka Dam (X3R002) has been included in this report.

Inyaka Dam is at a storage level of 67.1% ($83 \times 10^6 \text{m}^3$) and 33% lower as the previous year. See attached graph!

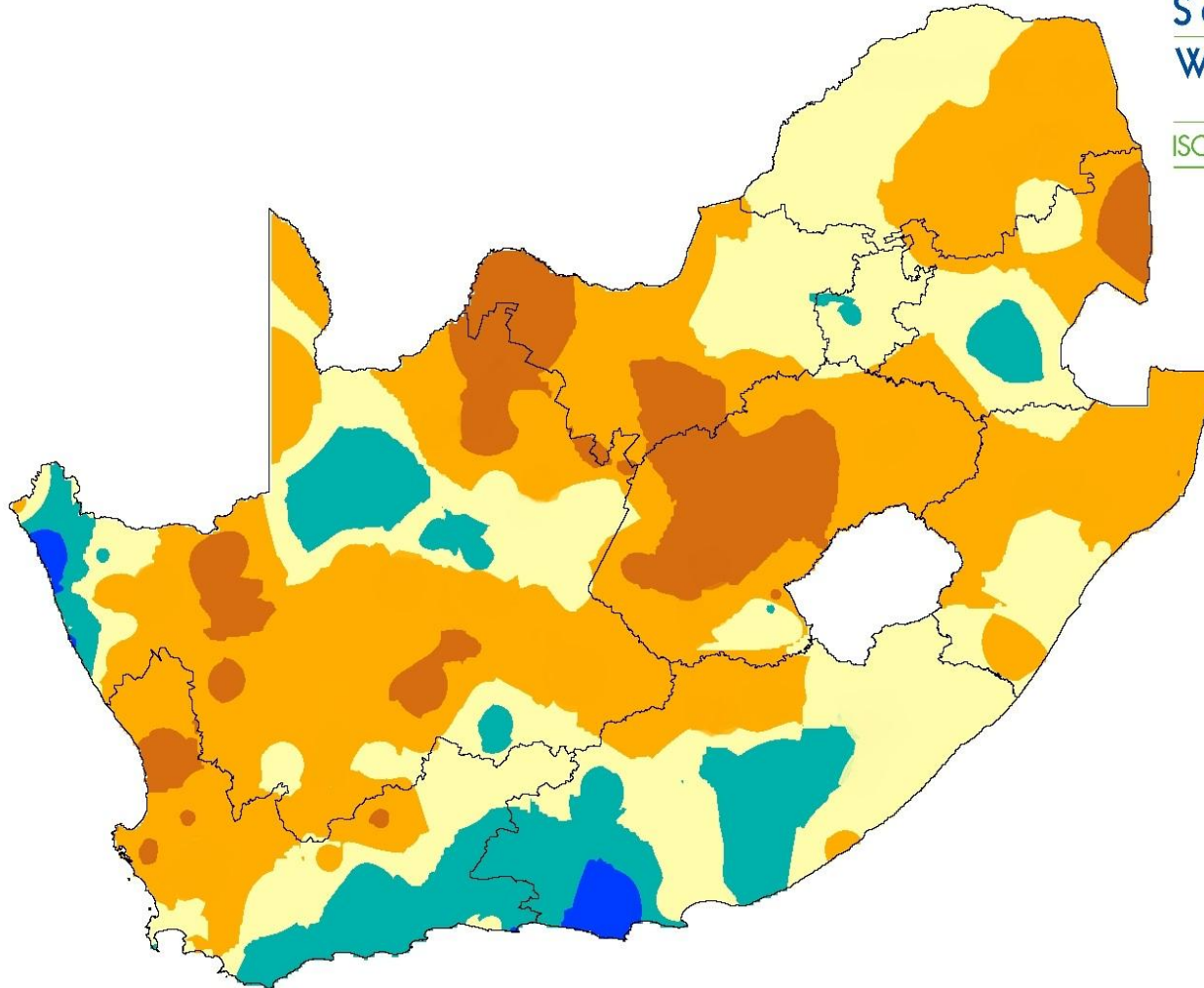
Percentage of normal rainfall for season July 2015 - March 2016

(Based on preliminary data, Normal period 1981-2010)



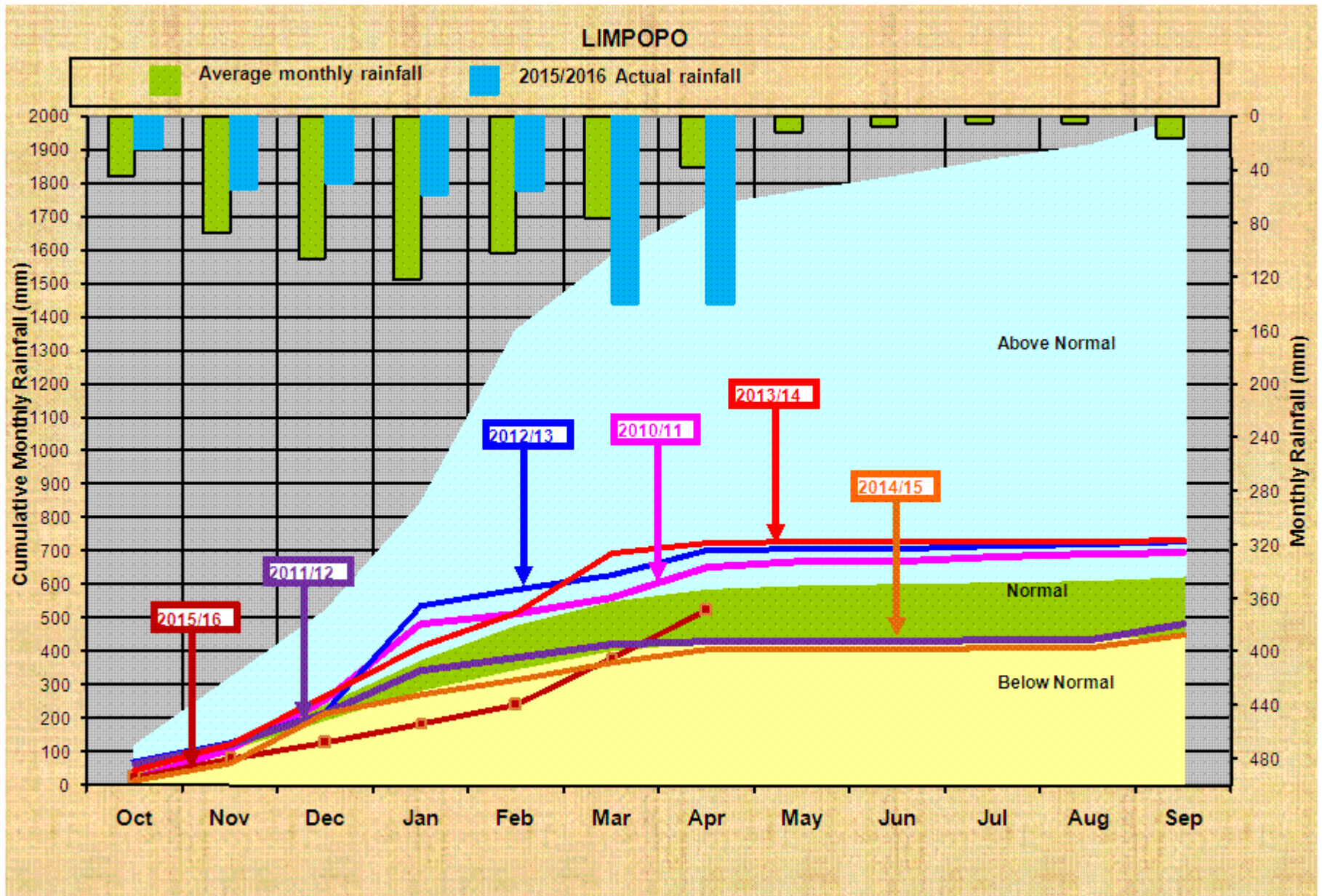
South African
Weather Service

ISO 9001 Certified Organisation



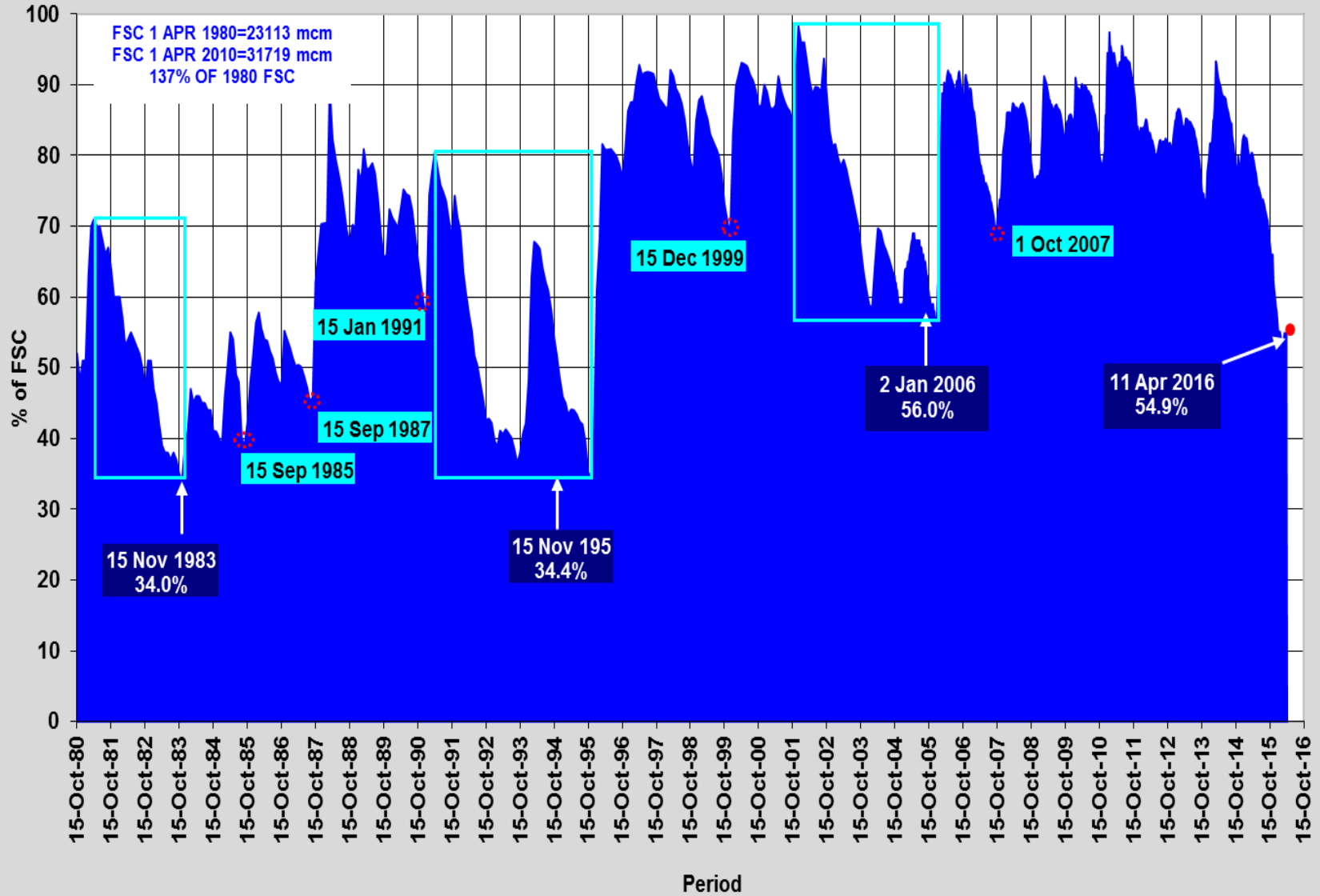
% of Normal

0 - 50
50 - 75
75 - 100
100 - 150
150 - 200
200 - 1,000

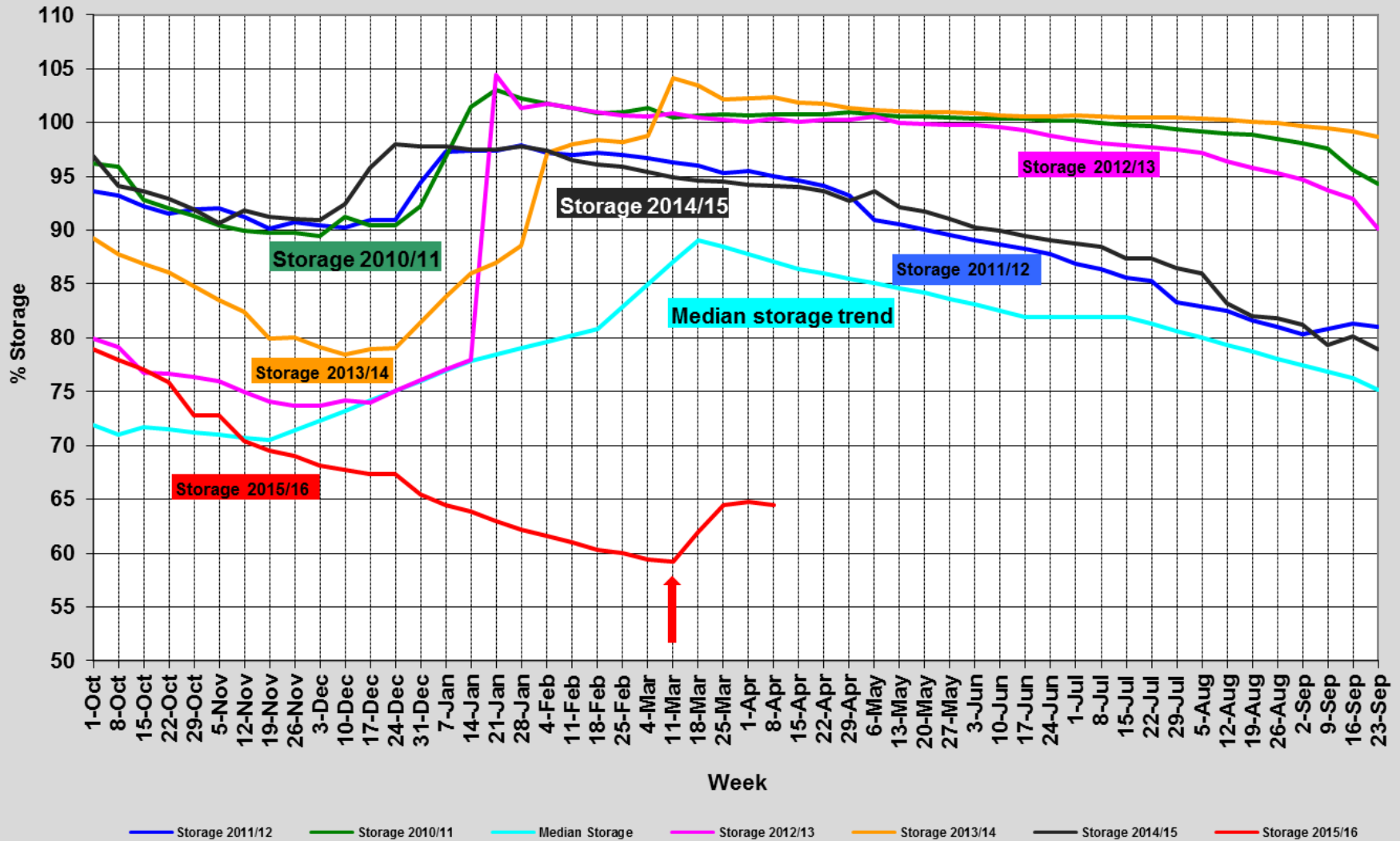


National Dams: Water Storage: The Storage for 11 April 2016 since August 1981

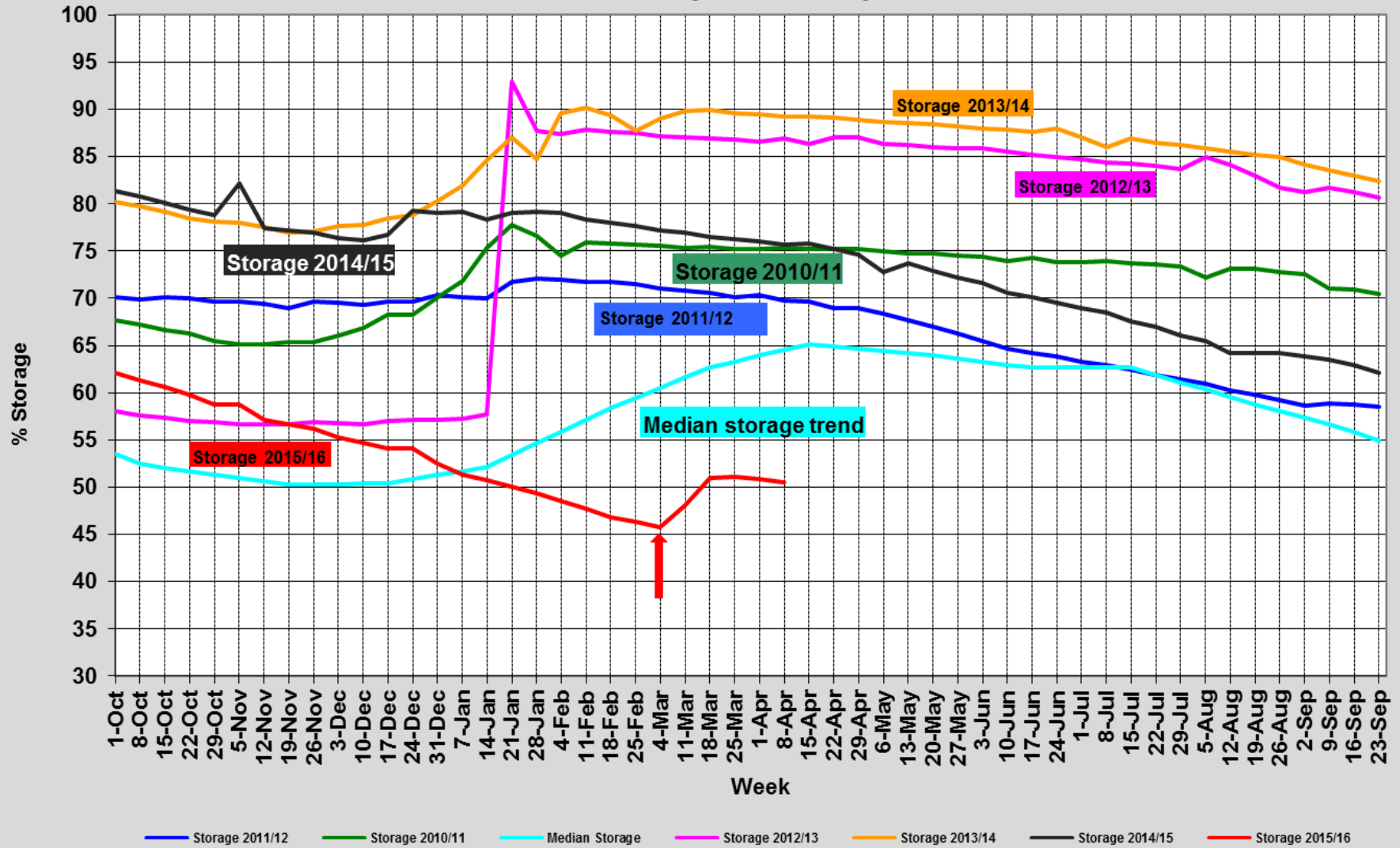
11 April 2016: STORAGE = 54.9% FSC; Median for April since 1981 = 74.0% FSC



LIMPOPO: WMA 1: STORAGE FOR CORRESPONDING WEEKS (%FSC) Weekly: Oct to Sep



Luvuvhu-Letaba: WMA 2: STORAGE FOR CORRESPONDING WEEKS (%FSC) Weekly: Oct to Sep

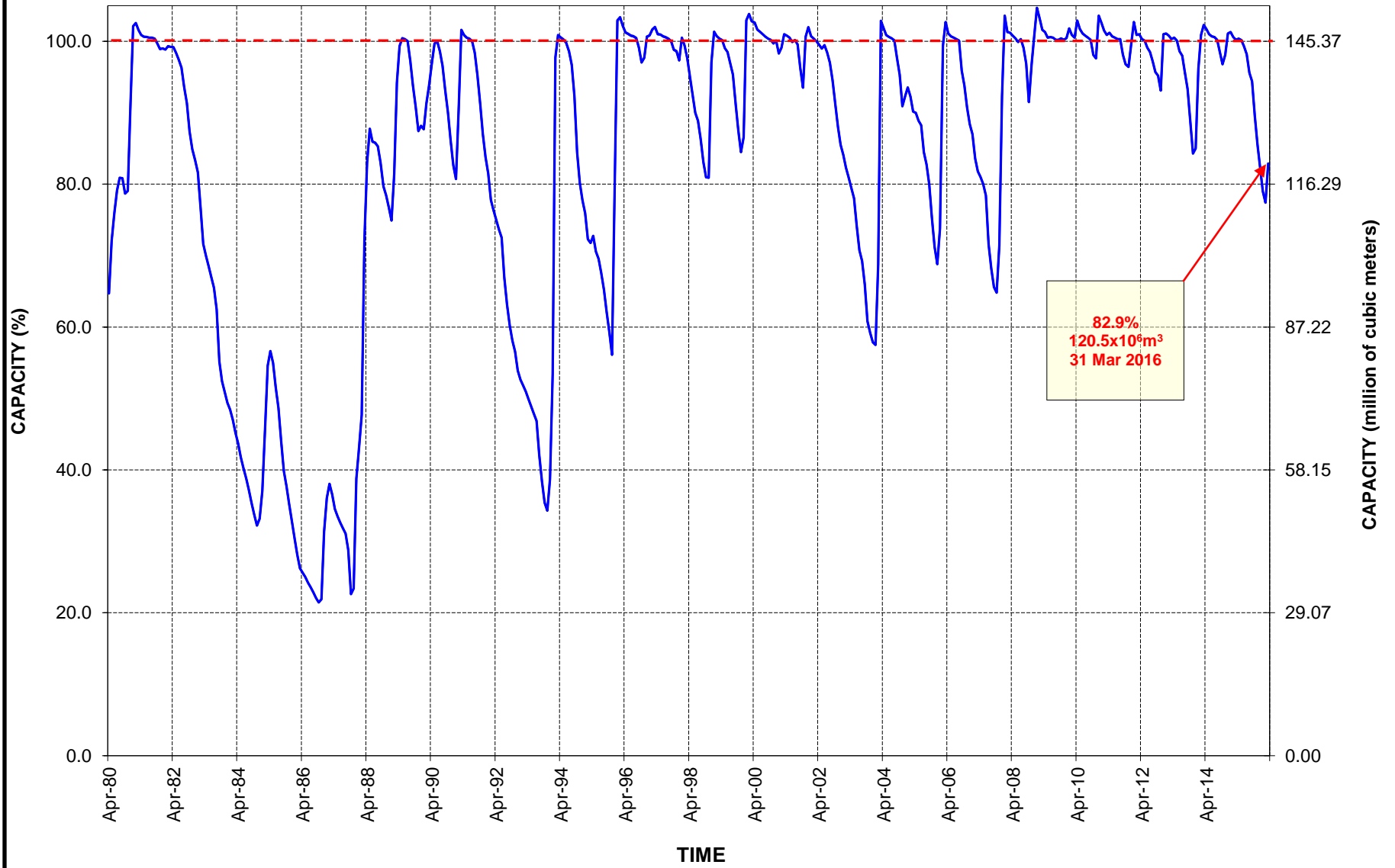


Summary WMA	Full Supply Capacity 10⁶M³	Water in Storage 10⁶M³	Last Year %Full	Last Week %Full	This Week 28/03/2016 %Full
1 Limpopo	280.7	181.1	94.7	62.0	64.5
2 Luvubu/Letaba	652.5	333.6	76.6	51.0	51.1
3 Crocodile (West) Marico	825.2	571.2	67.2	68.6	69.2
4 Olifants	1422.6	885.3	88.5	61.8	62.2
5 Inkomati	1067.5	505.8	95.9	47.8	47.4
6 Usutu/Mhlatuze	3276.6	1673.0	65.8	51.2	51.1
7 Thukela	1254.5	898.0	94.8	71.7	71.6
8 Upper Vaal	5659.2	3919.4	90.0	69.3	69.3
9 Middle Vaal	1677.3	233.9	56.6	14.8	13.9
10 Lower Vaal	169.9	104.3	83.6	61.1	61.4
11 Mvoti/Umzimkulu	801.9	429.1	81.6	53.4	53.5
12 Mzimvubu/Keiskamma	1091.6	953.9	93.5	87.2	87.4
13 Upper Orange	11428.3	5963.0	83.9	52.0	52.2
14 Lower Orange	36.1	35.9	109.5	105.3	99.5
15 Fish/Tsitsikamma	731.5	401.2	50.2	54.7	54.8
16 Gouritz	268.3	126.7	46.8	47.6	47.2
17 Olifants/Doorn	128.2	20.9	25.2	17.2	16.3
18 Breede	1058.3	321.6	51.4	31.5	30.4
19 Berg	416.5	130.7	59.0	32.1	31.4
GRAND TOTAL	32246.6	17688.6	79.9	54.9	54.9

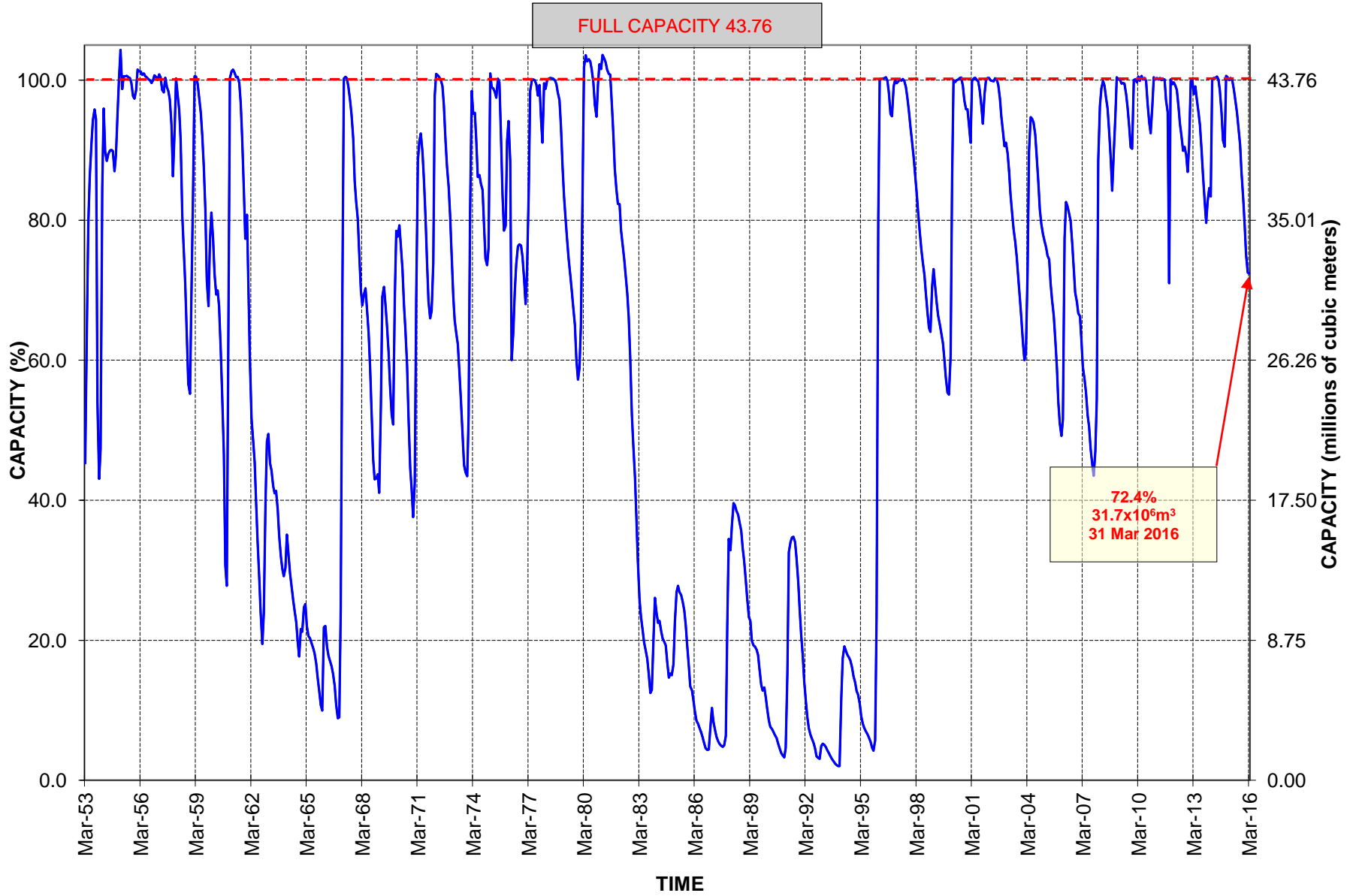
Please note that the above summaries are not representative of all dams within any of the Provinces or Water Management Areas. The summaries only reflect the storages for those dams listed in the Weekly State of Reservoirs Report.

MOGOL RIVER AT MOKOLO DAM

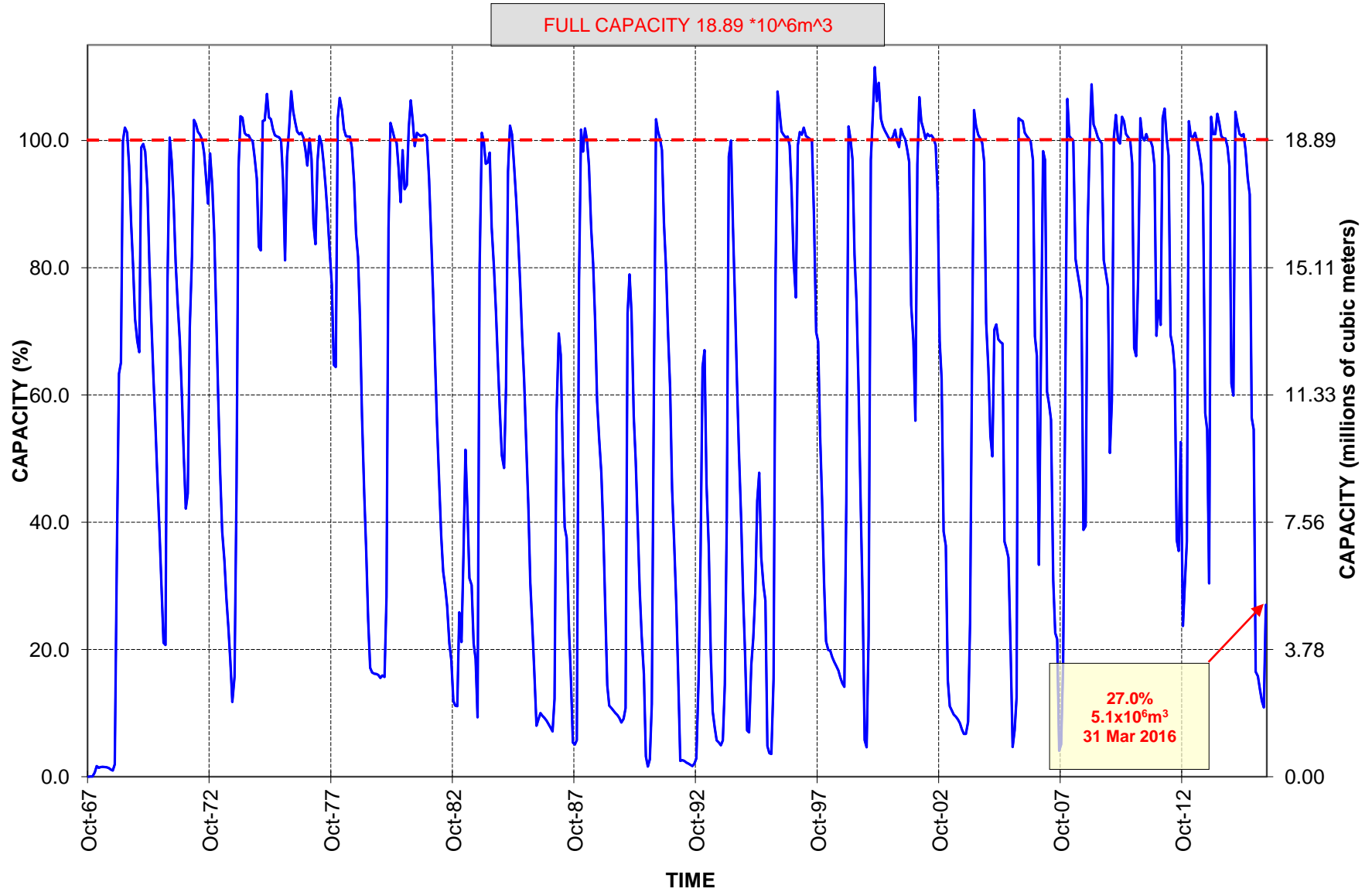
FULL CAPACITY 145.37 *10⁶m³



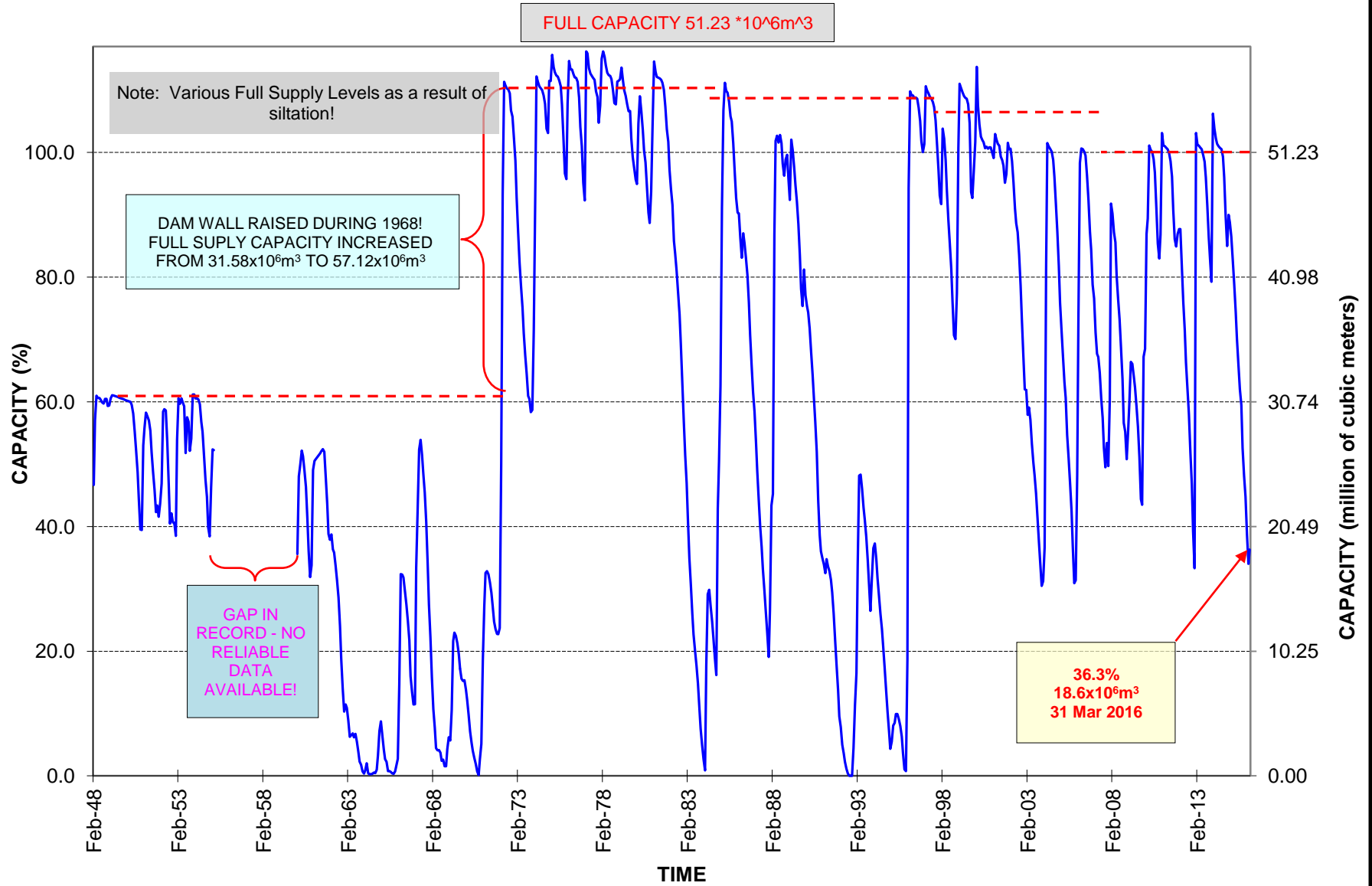
STERK RIVER AT DOORNDRAAI DAM



MOKGALAKWENA RIVER AT GLEN ALPINE DAM

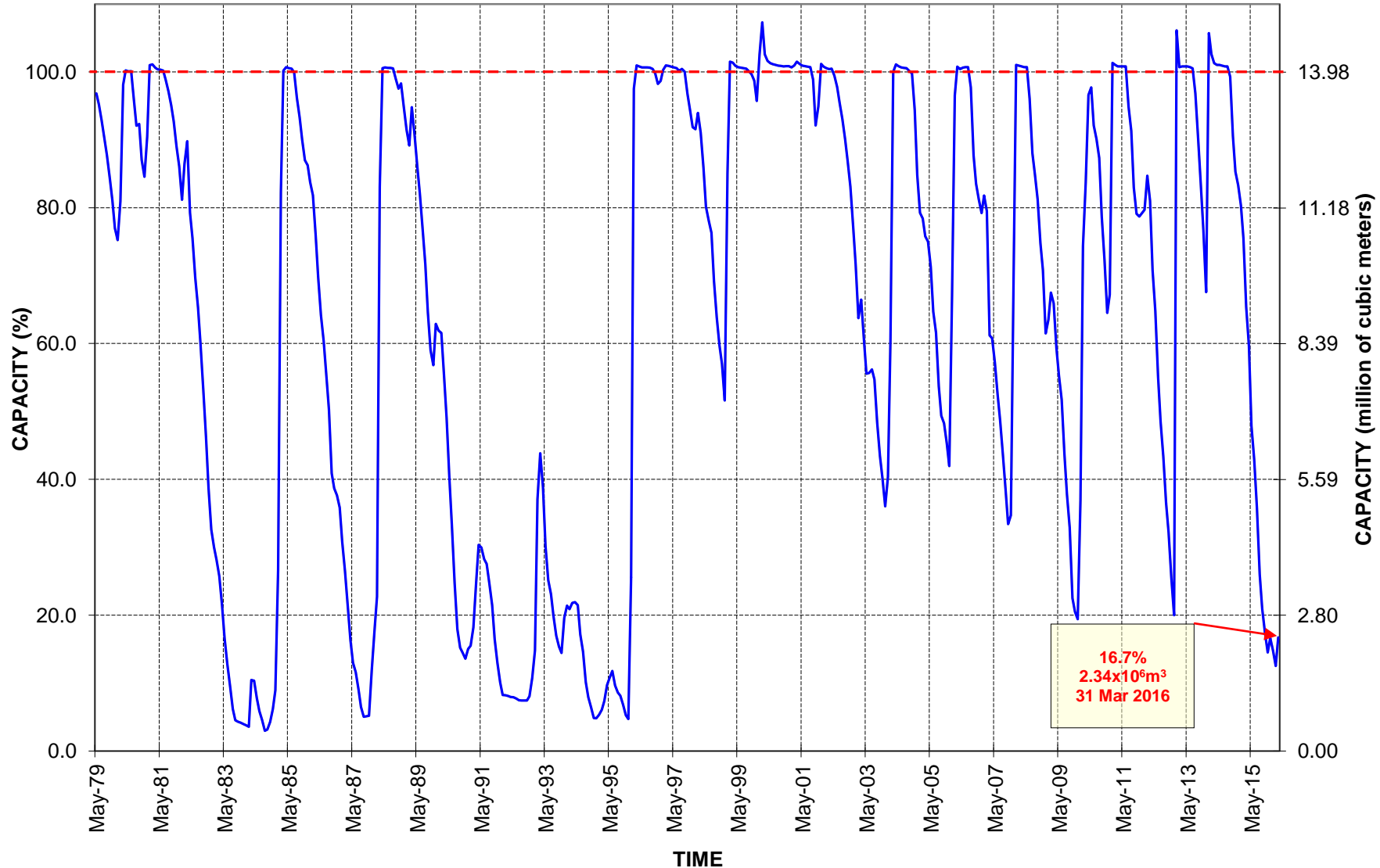


NZHELELE RIVER AT NZHELELE DAM

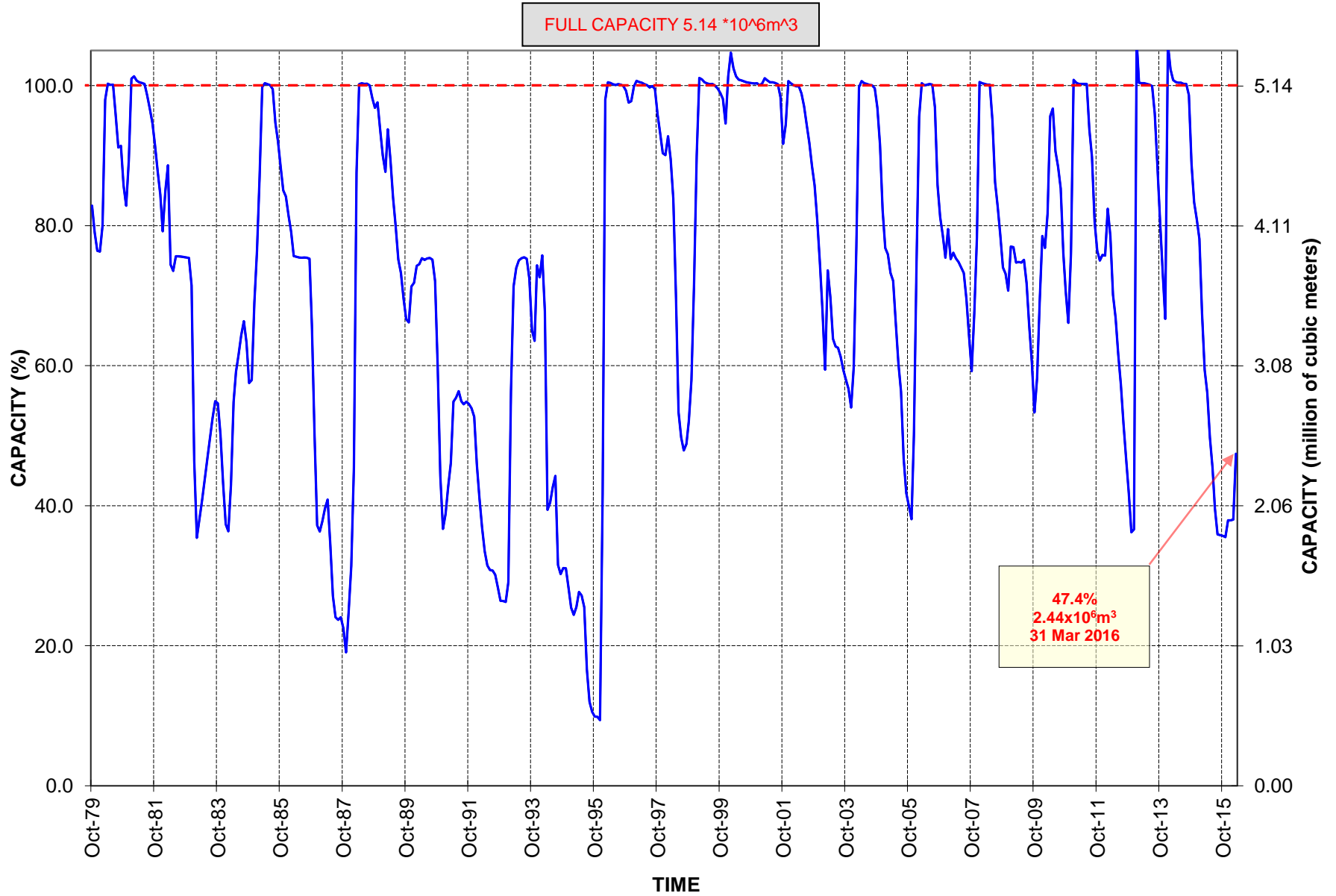


LUPHEPHE RIVER AT LUPHEPHE DAM

FULL CAPACITY 13.984 *10⁶m³



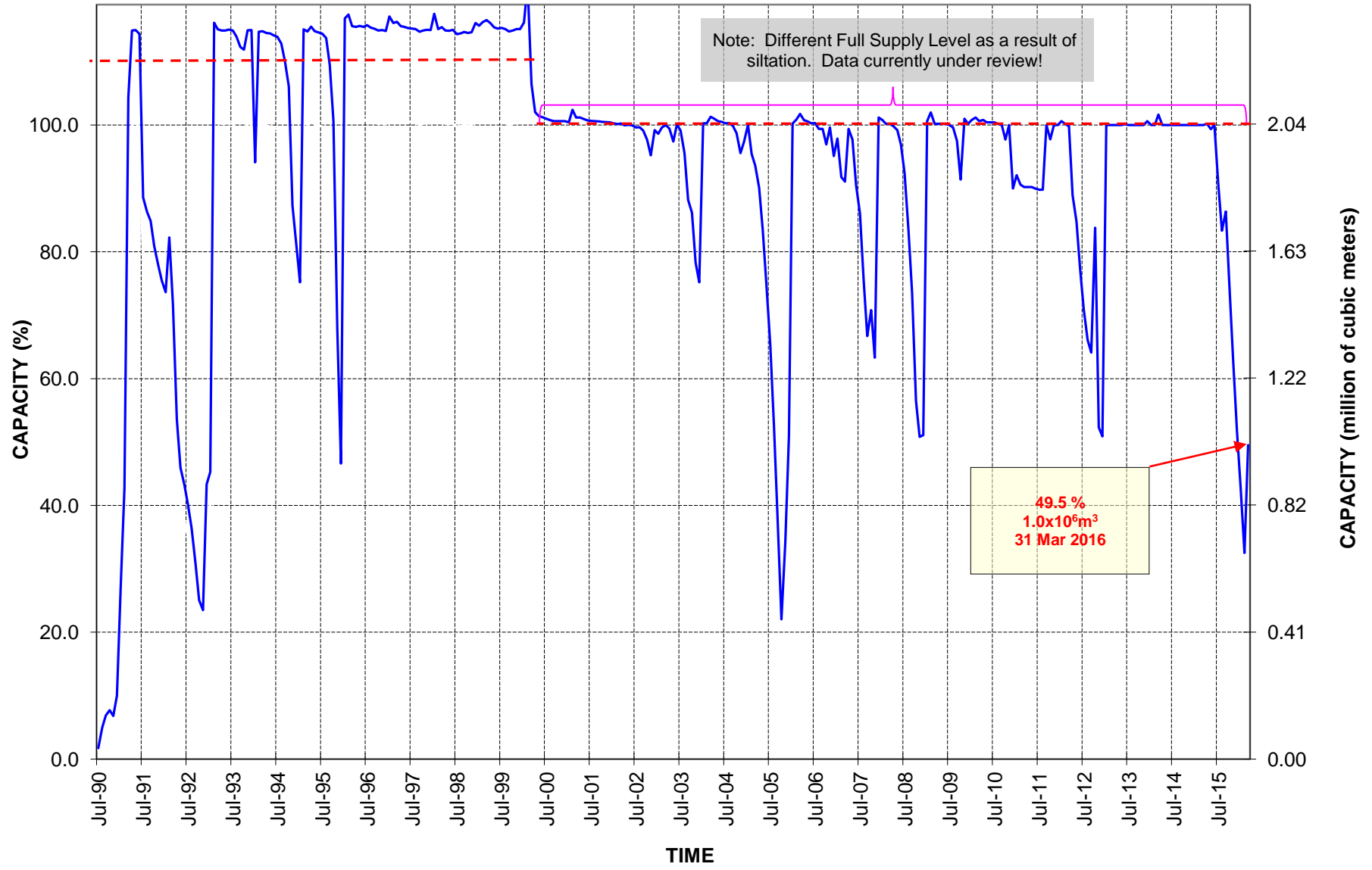
NWANEDZI RIVER AT NWANEDZI DAM



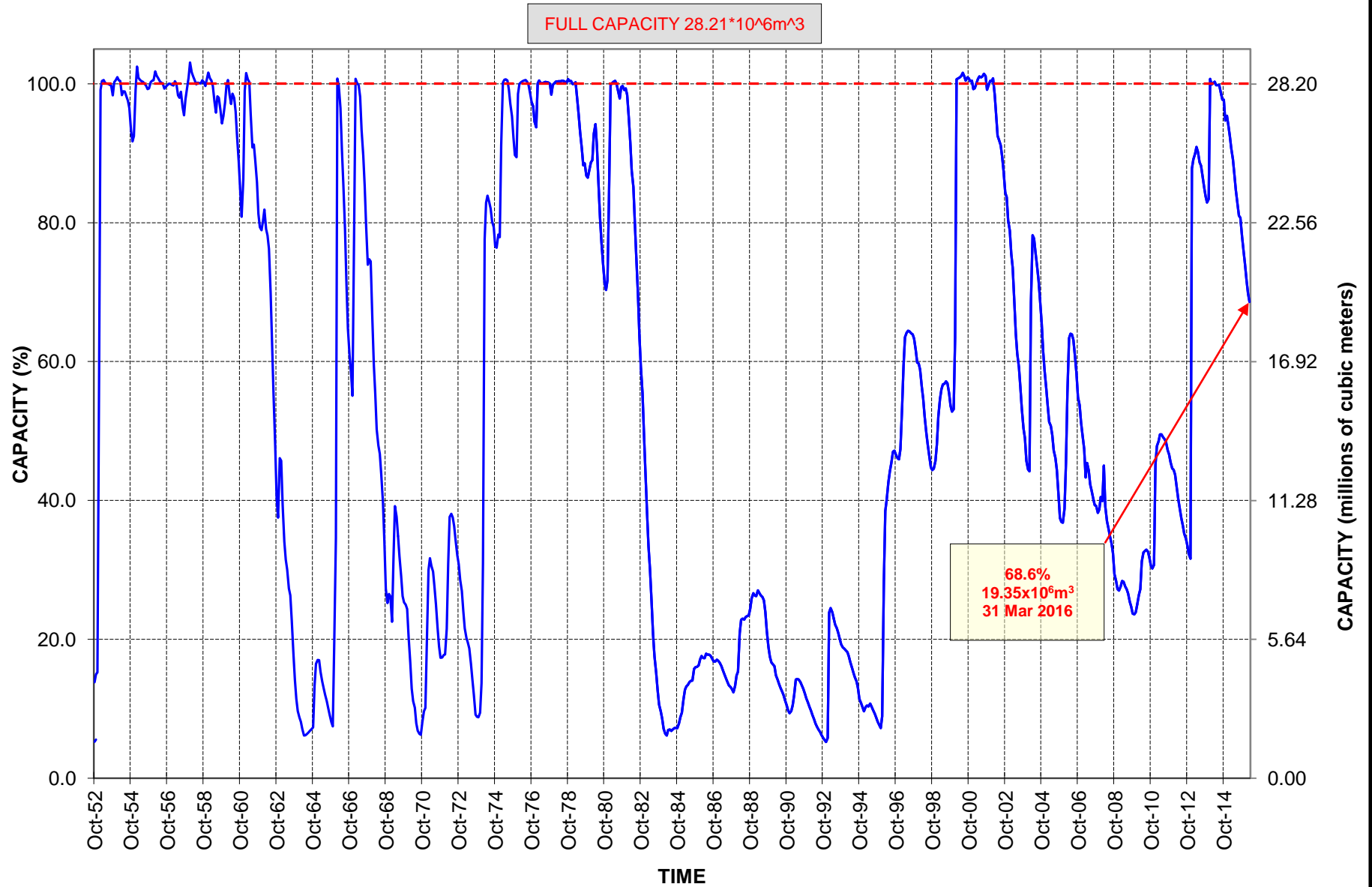
MUTSHEDZI RIVER AT MUTSHEDZI DAM

FULL CAPACITY $2.037 \times 10^6 \text{m}^3$

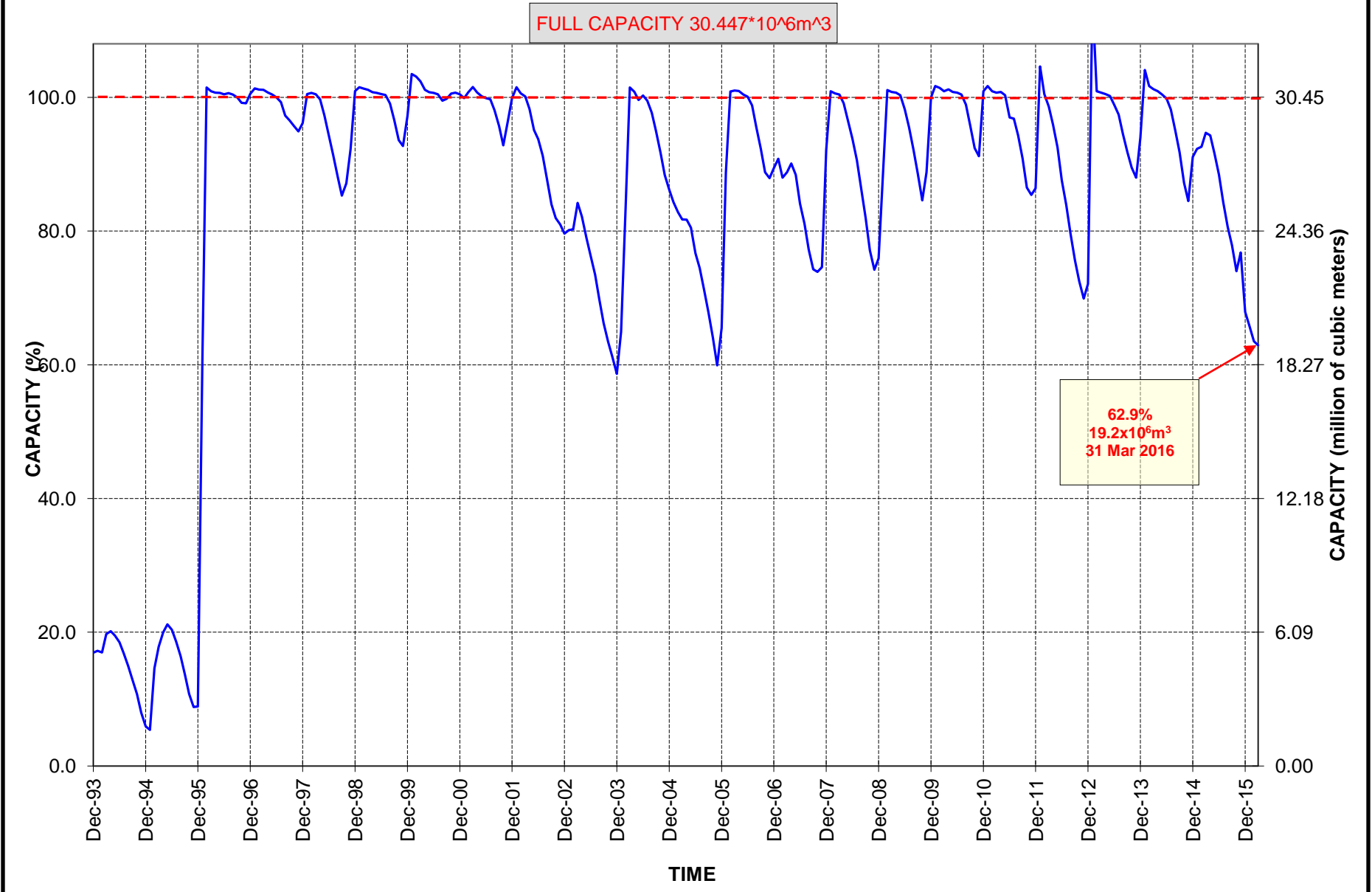
Note: Different Full Supply Level as a result of siltation. Data currently under review!



LUVUVHU RIVER AT ALBASINI DAM



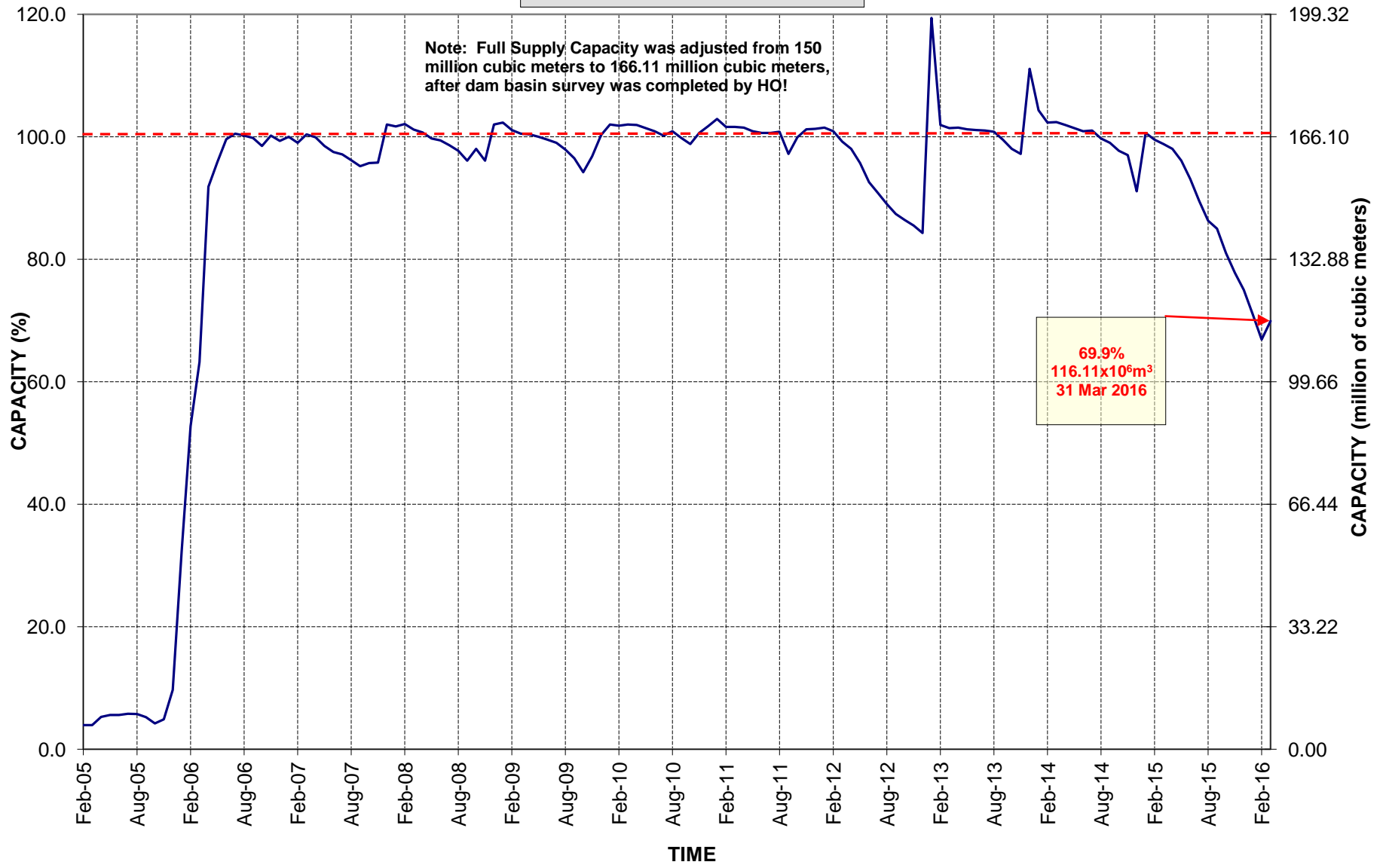
MUTSHINDUDI RIVER AT VONDO DAM



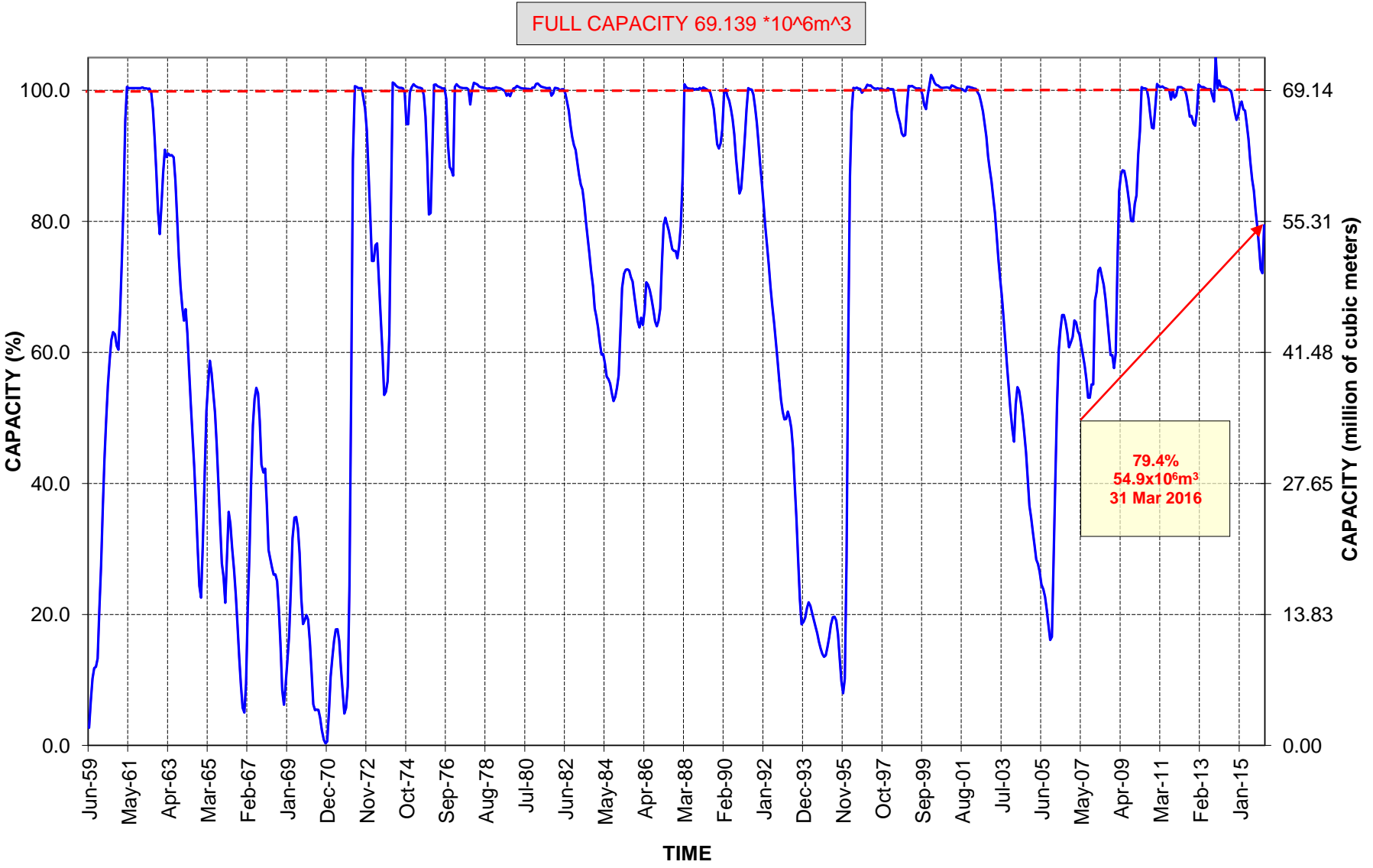
LUVUVHU RIVER AT NANDONI DAM

FULL CAPACITY 166.11*10⁶m³

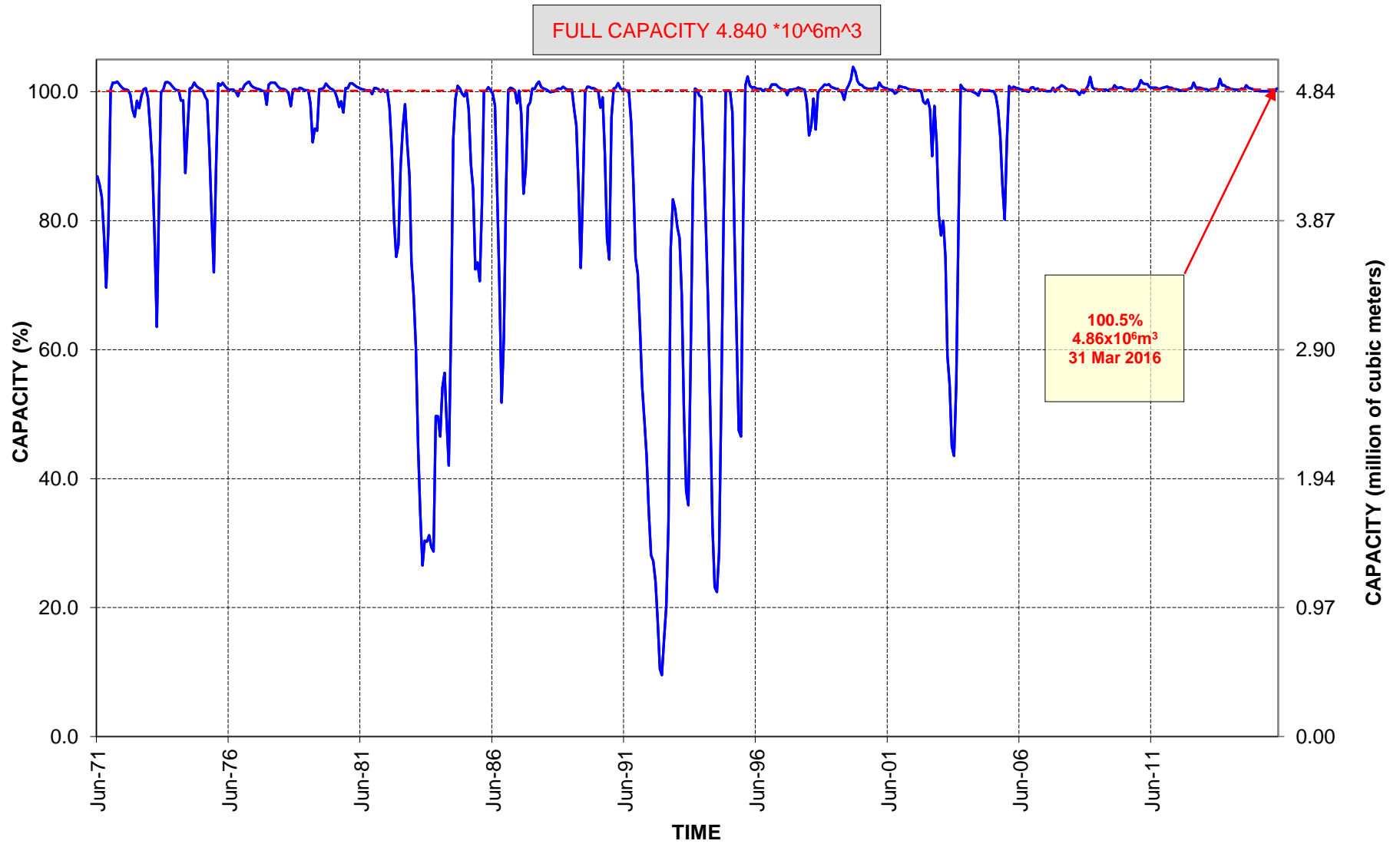
Note: Full Supply Capacity was adjusted from 150 million cubic meters to 166.11 million cubic meters, after dam basin survey was completed by HO!



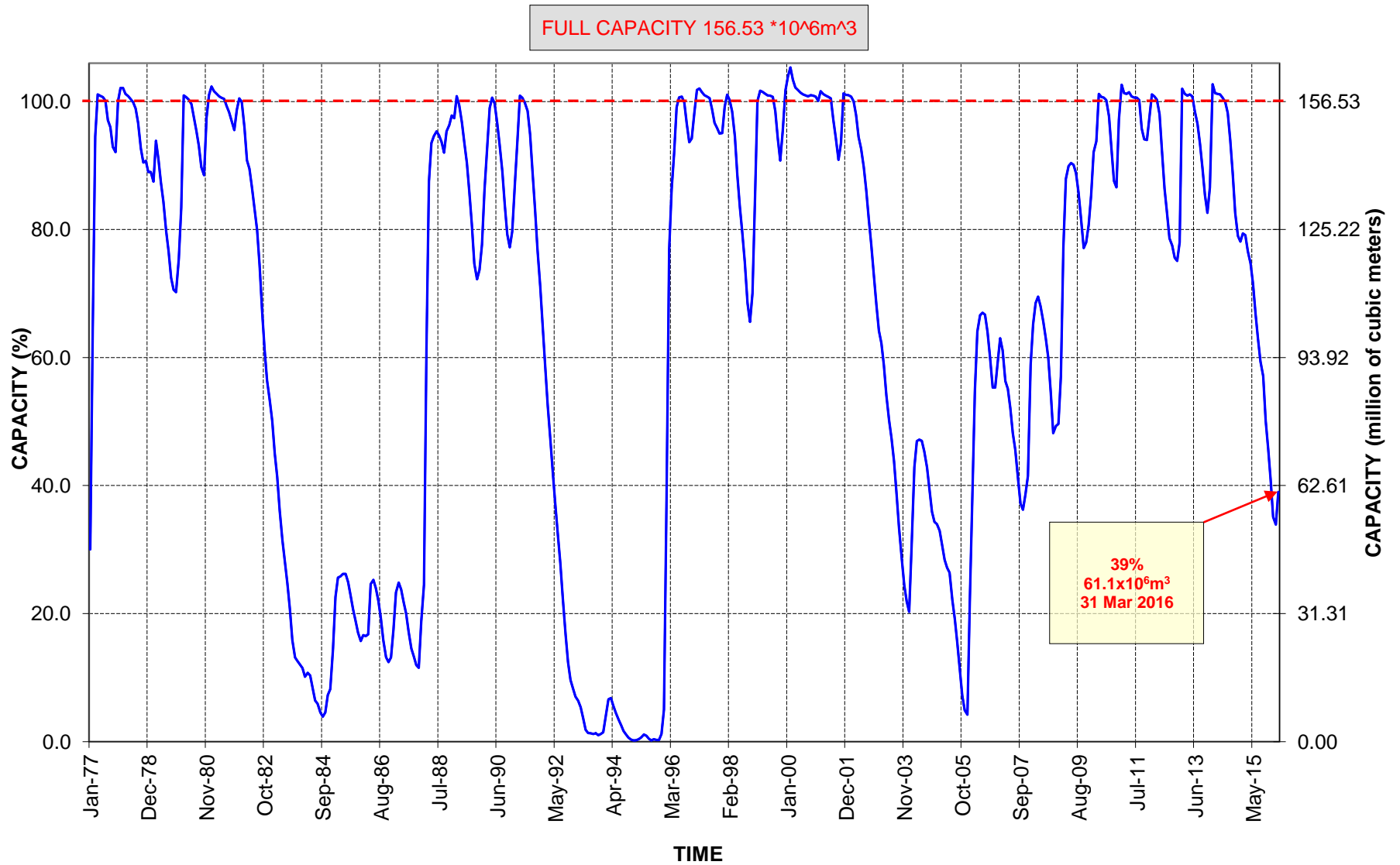
GREAT LETABA RIVER AT EBENEZER DAM



POLITSI RIVER AT MAGOEBASKLOOF DAM

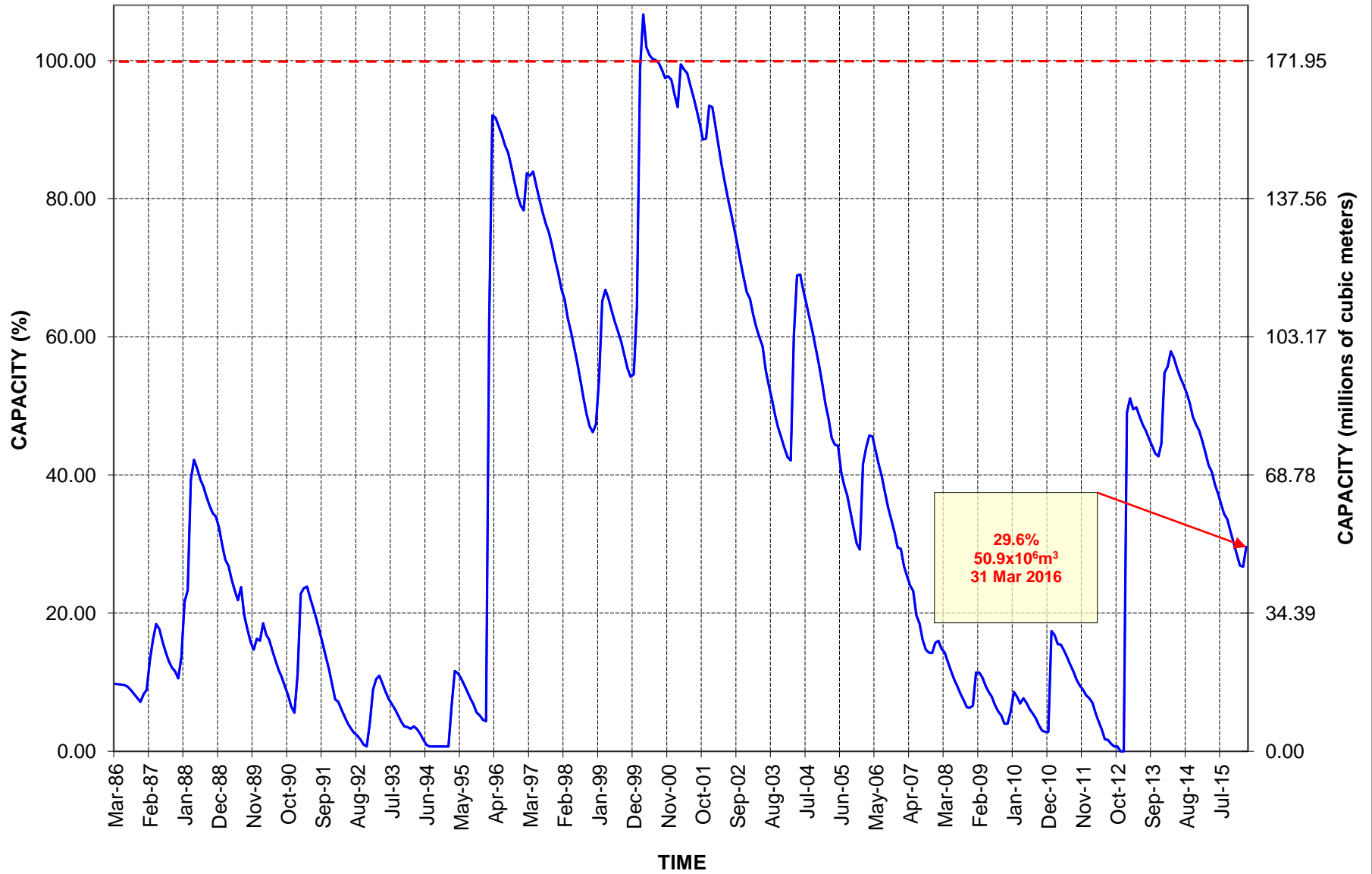


GREAT LETABA RIVER AT TZANEEN DAM



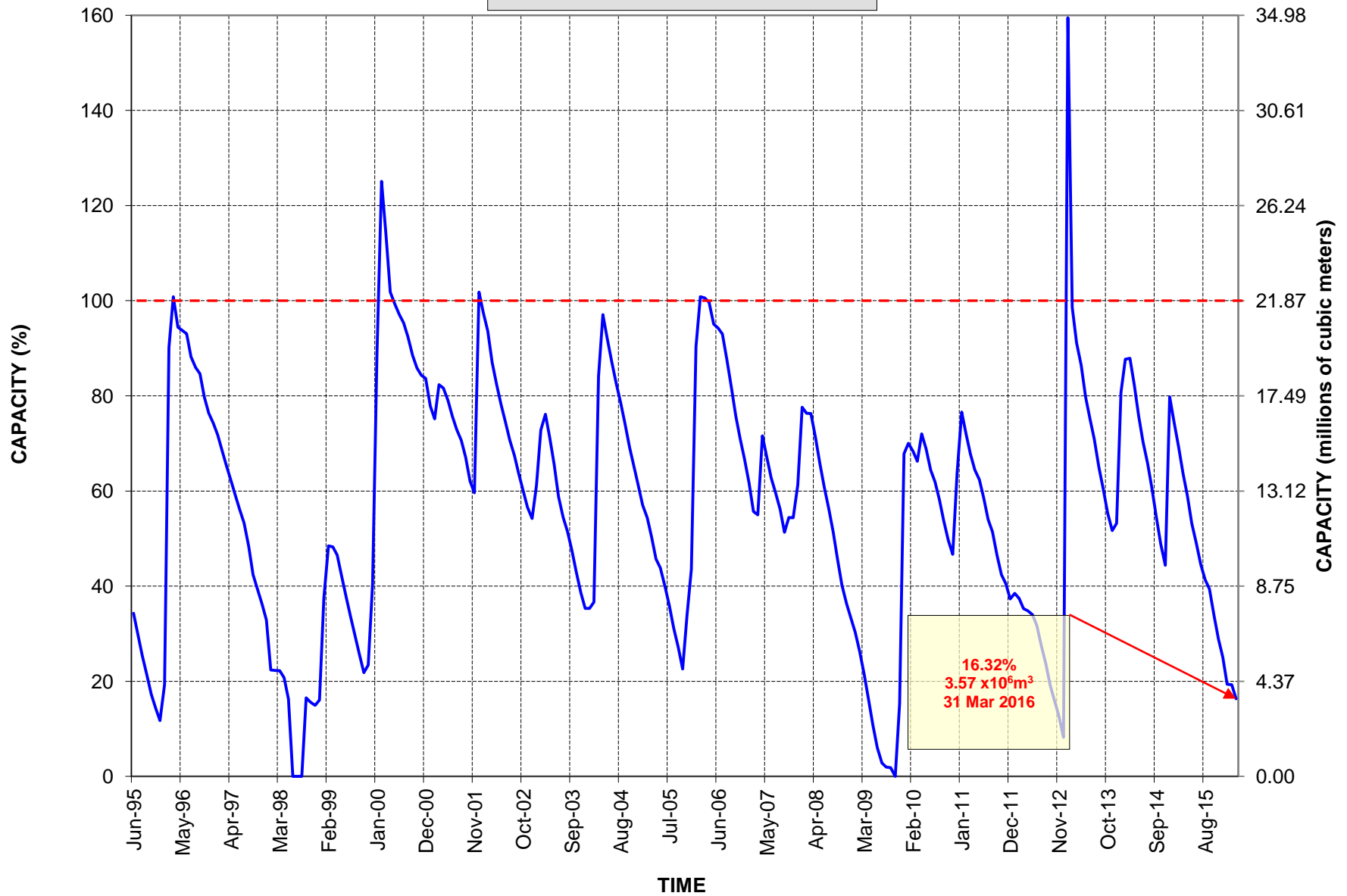
MIDDLE LETABA RIVER AT MIDDLE LETABA DAM

FULL CAPACITY 171.95 *10^6m^3

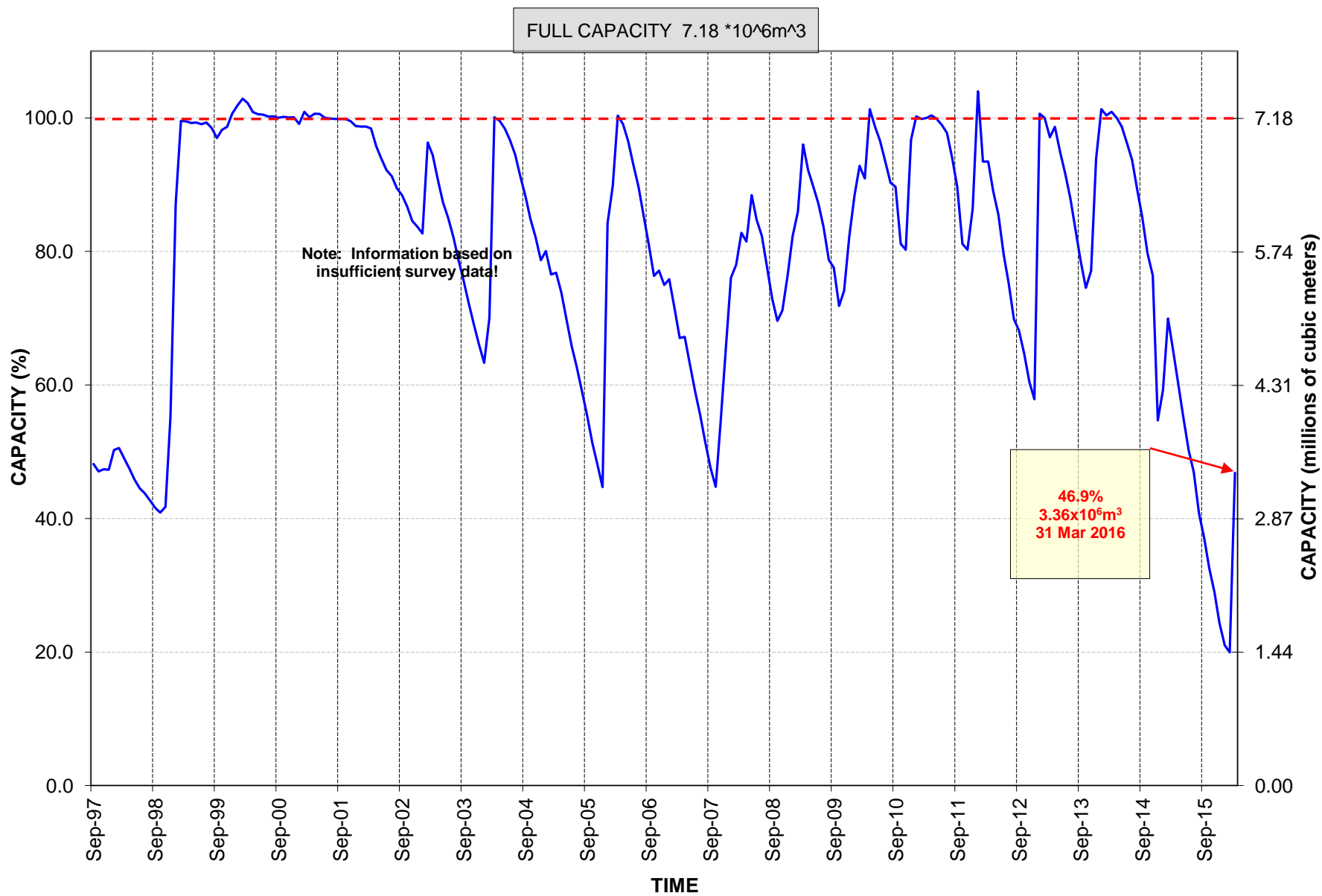


NSAMI DAM AT NSAMA RIVER

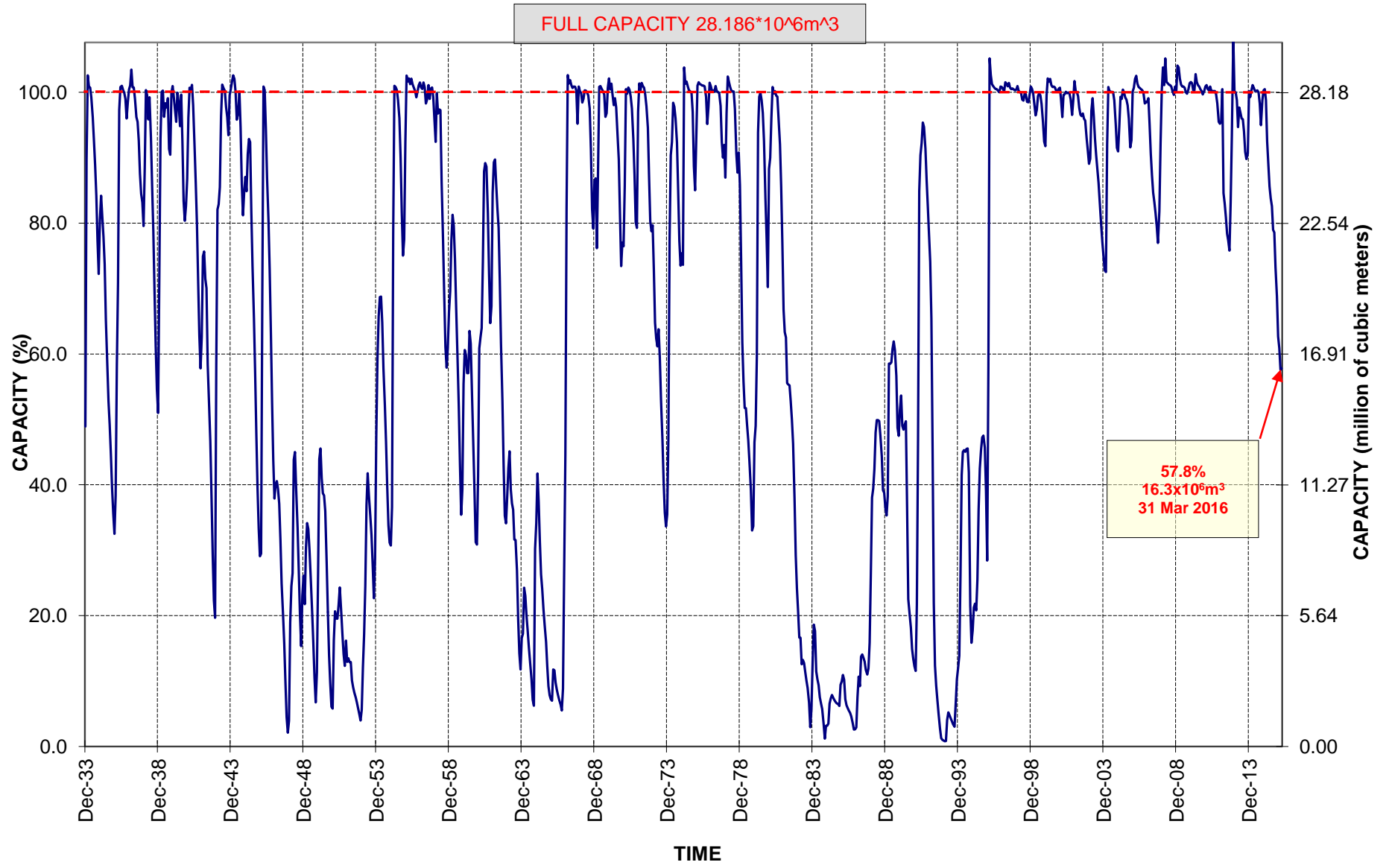
FULL CAPACITY 21.87 *10^6m^3



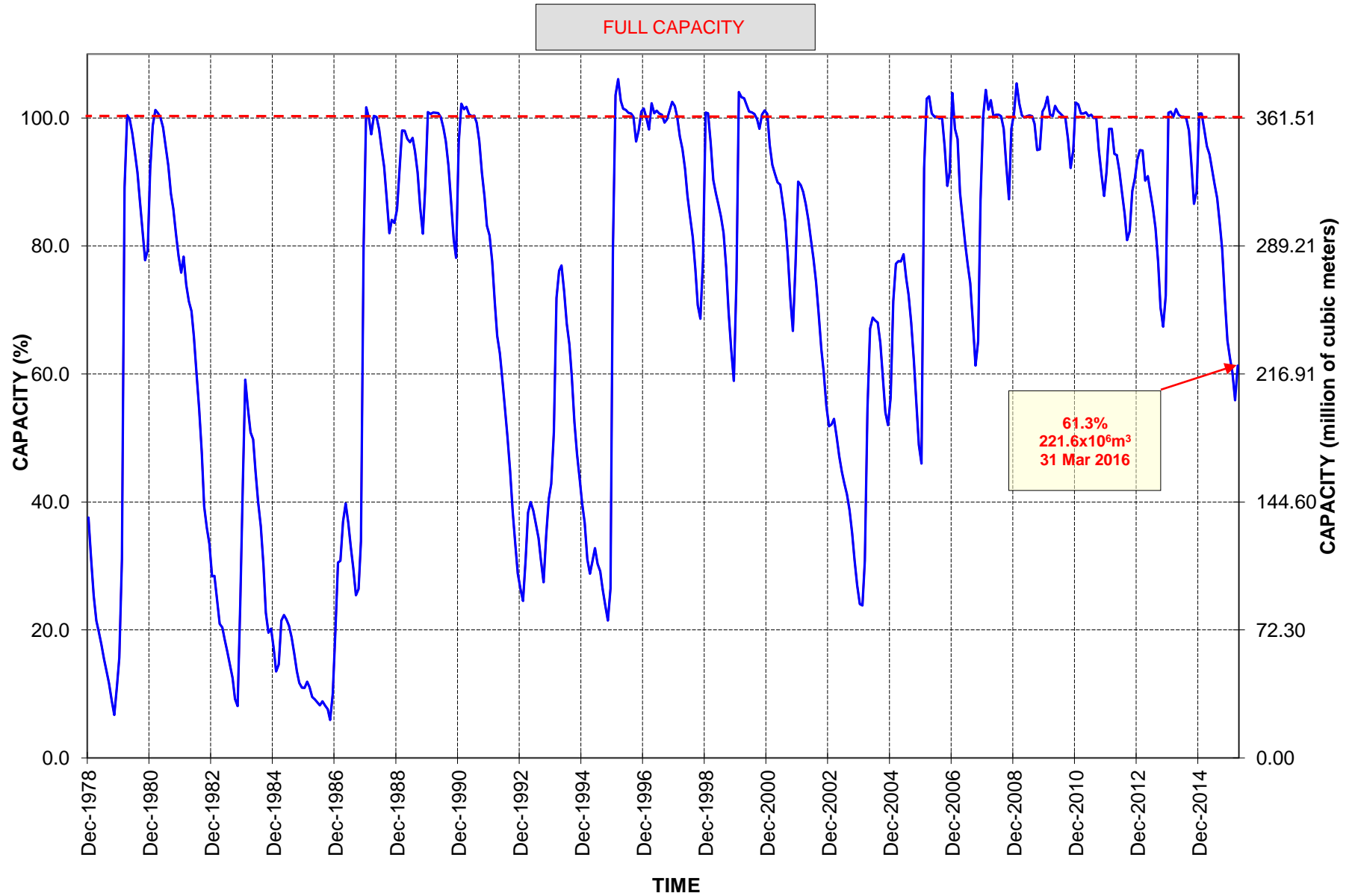
MOLOTOTSI RIVER AT MODJADJI DAM



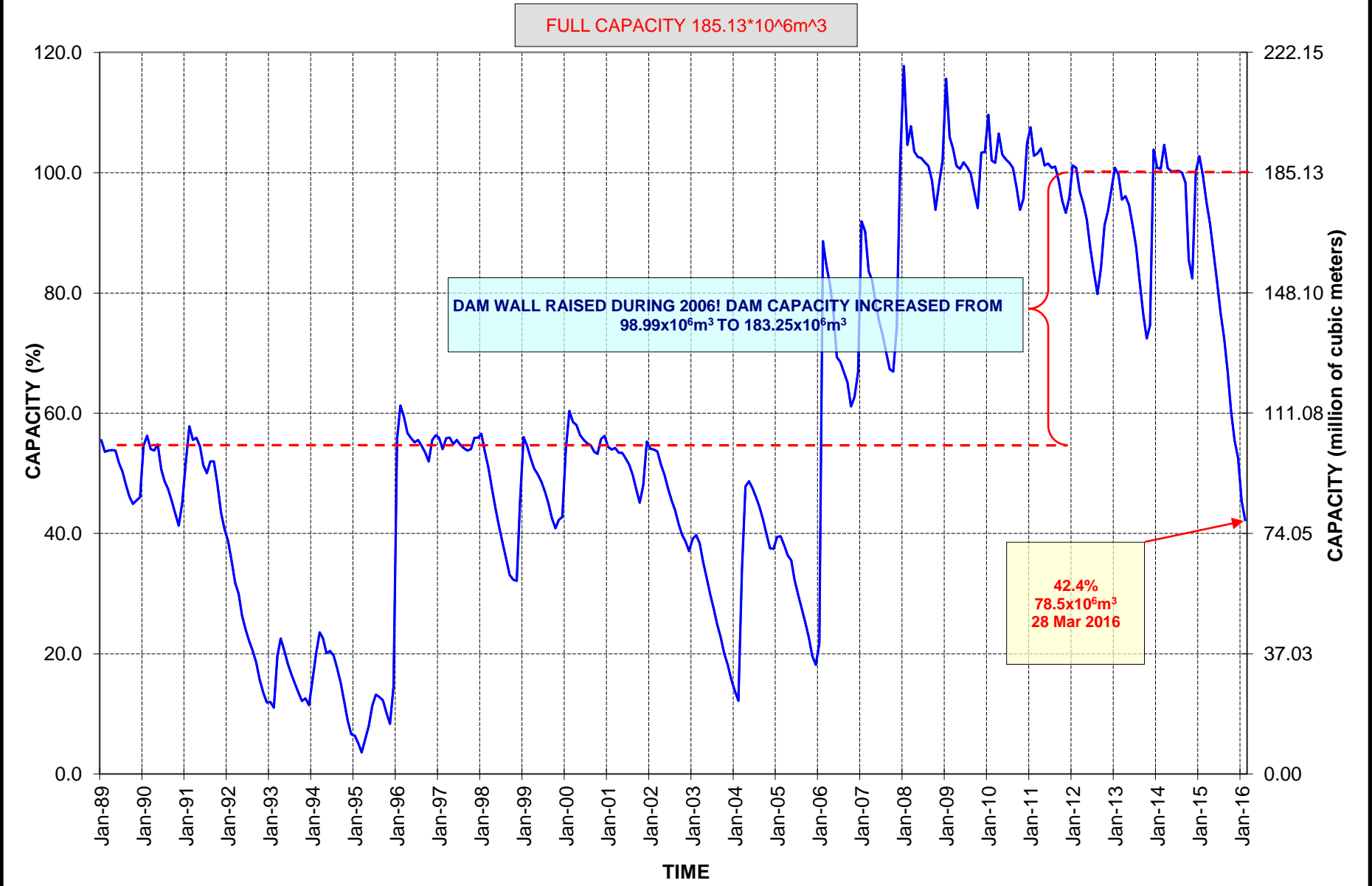
ELANDS RIVER AT RUST DE WINTER DAM



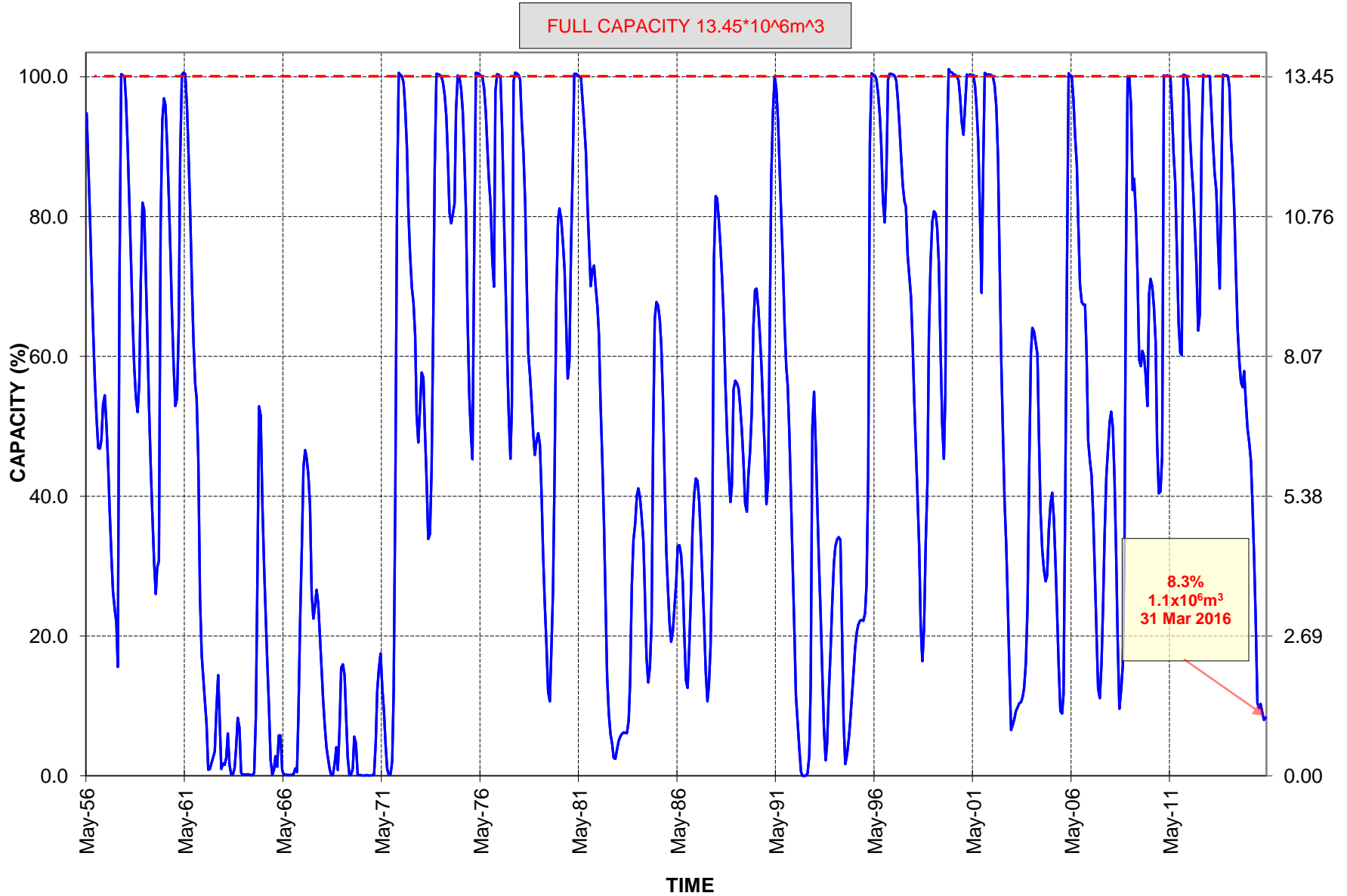
OLIFANTS RIVER AT LOSKOP DAM



OLIFANTS RIVER AT FLAG BOSHIELO DAM

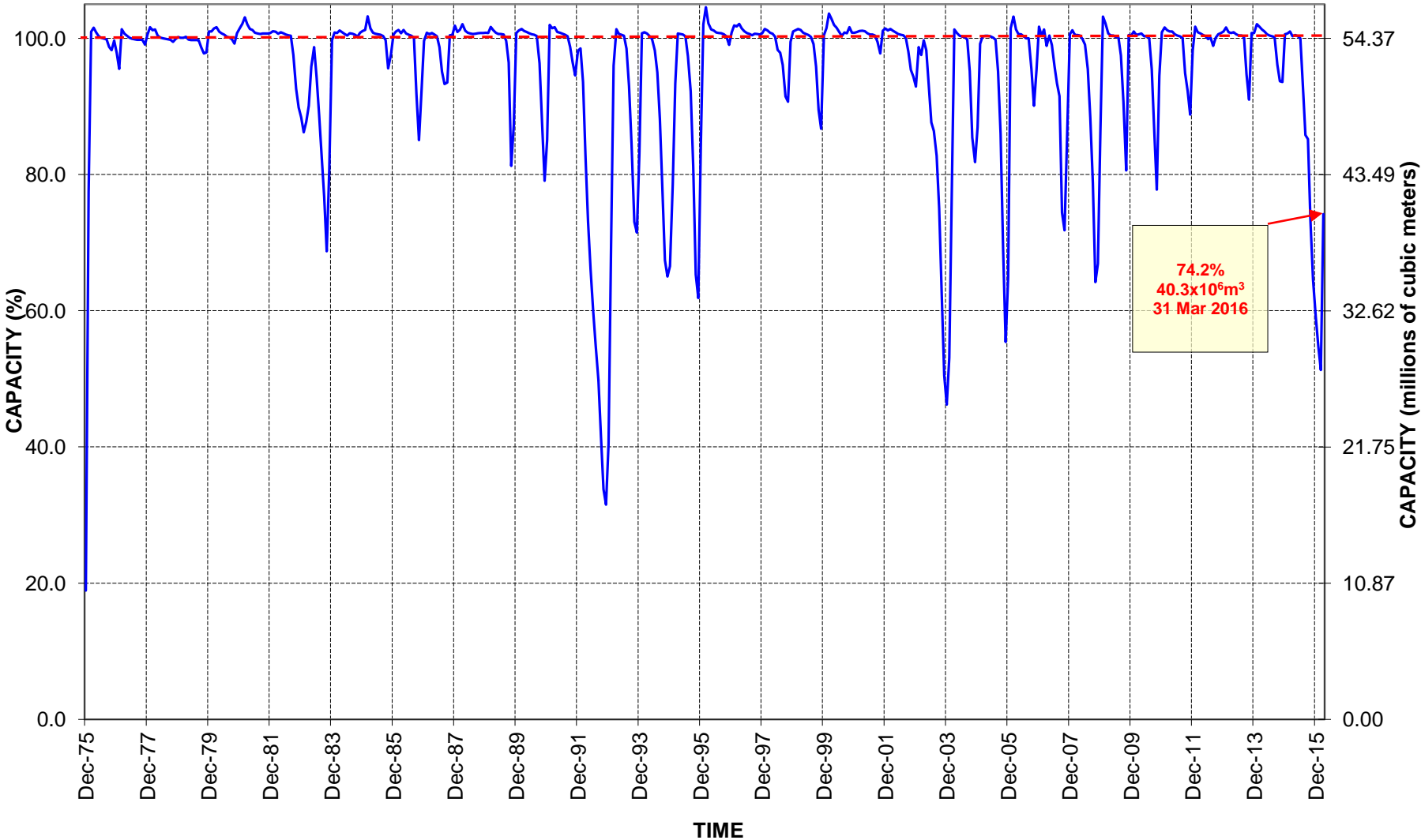


OHRIGSTAD RIVER AT OHRIGSTAD DAM



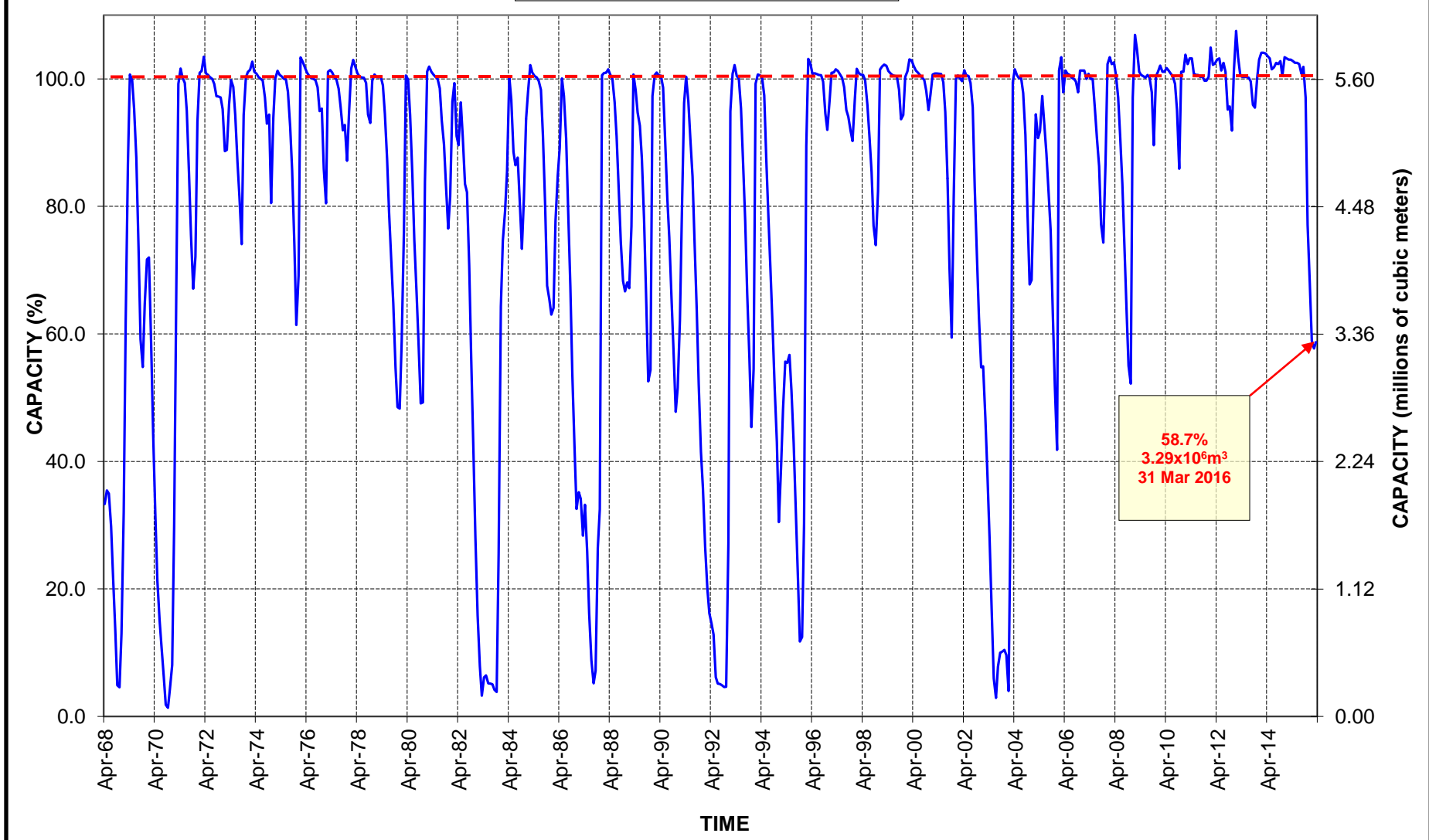
BLYDE RIVER AT BLYDE RIVIERSPOORT DAM

FULL CAPACITY $54.369 \times 10^6 \text{m}^3$

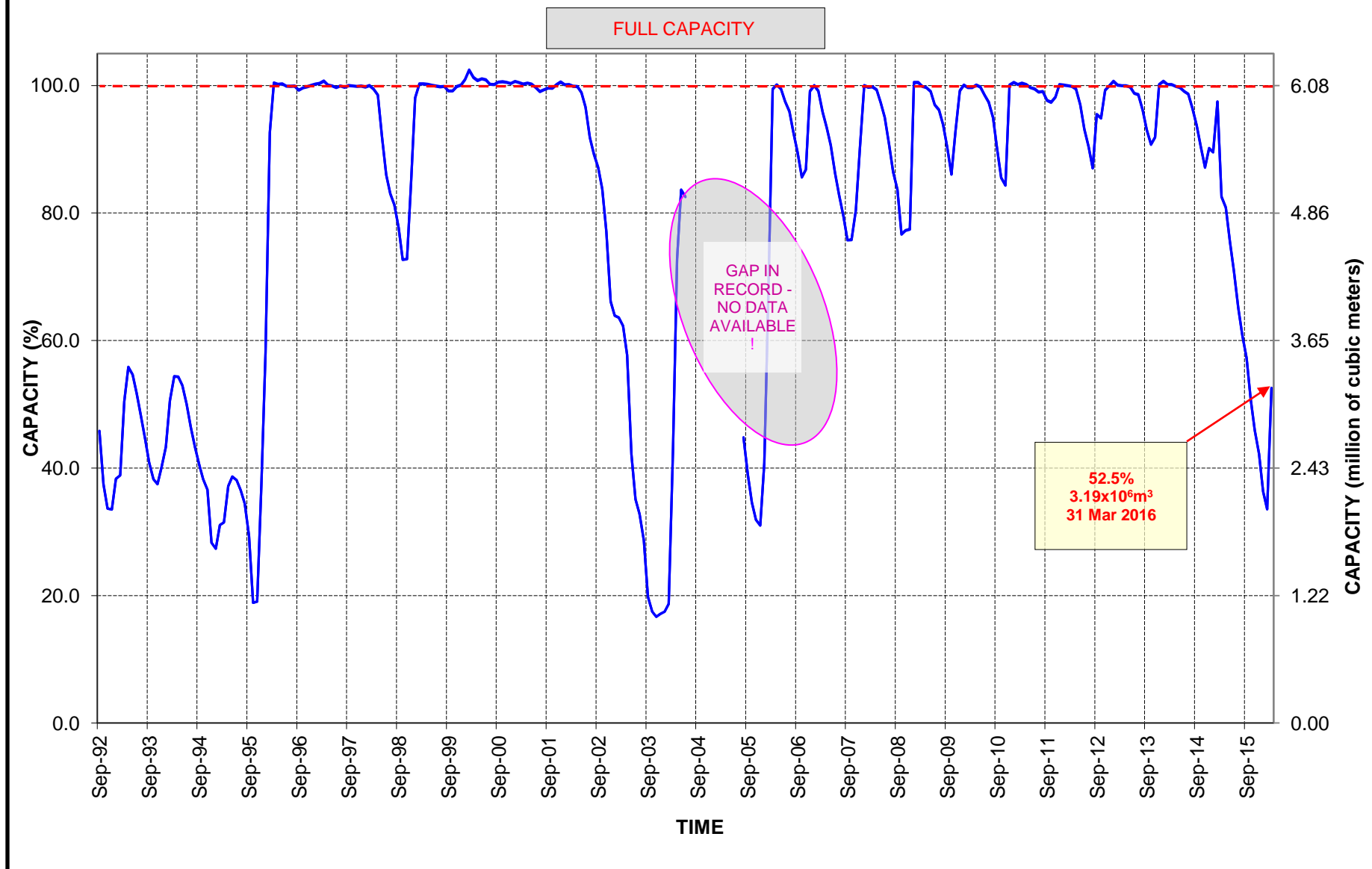


KLASERIE RIVER AT KLASERIE DAM

FULL CAPACITY $5.604 \times 10^6 \text{m}^3$

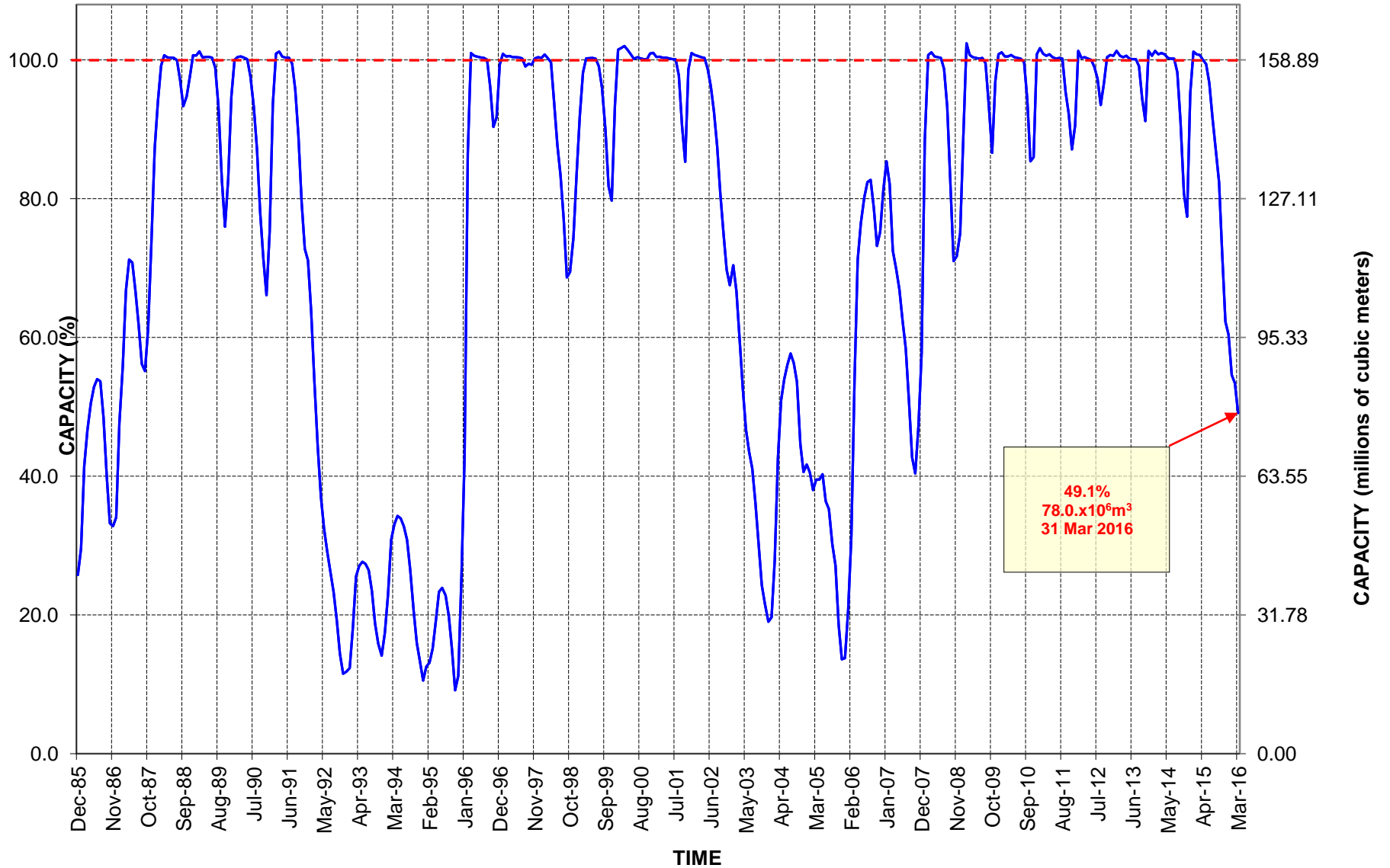


NGWABITSI RIVER AT TOURS DAM



CROCODILE RIVER AT KWENA DAM

FULL CAPACITY 158.89 *10⁶m³



MERITI RIVER AT INYAKA DAM

