# Historical Climate Data Rescue and Digitization Efforts in Africa

**to Enhance The Development of Climate Information Services and Early Warning Systems**

**November 29 – December 1, 2017, Lusaka, Zambia**




IEDRO
INTERNATIONAL ENVIRONMENTAL DATA RESCUE ORGANIZATION

CCCEM
CENTRE FOR CLIMATE CHANGE AND ENVIRONMENT MANAGEMENT
*Enhancing community resilience and adaptation programs*


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# *PRESENTATION OUTLINE*

- **Why Data Rescue and Digitization (DR & D)**
- **DR & D Assessment and Implementation Objectives**
- **DR & D Approach Methods - Scenarios**
- **Application of the Data**
- **Data Rescue Efforts in the Visited Countries**
- **Support of the Early Warning Systems-*NCEI/IEDRO/CIRDA/CCCEM***
- **DR & D Final Products, Benefits and Examples**
- **Challenges**
- **Conclusion and Recommendations**

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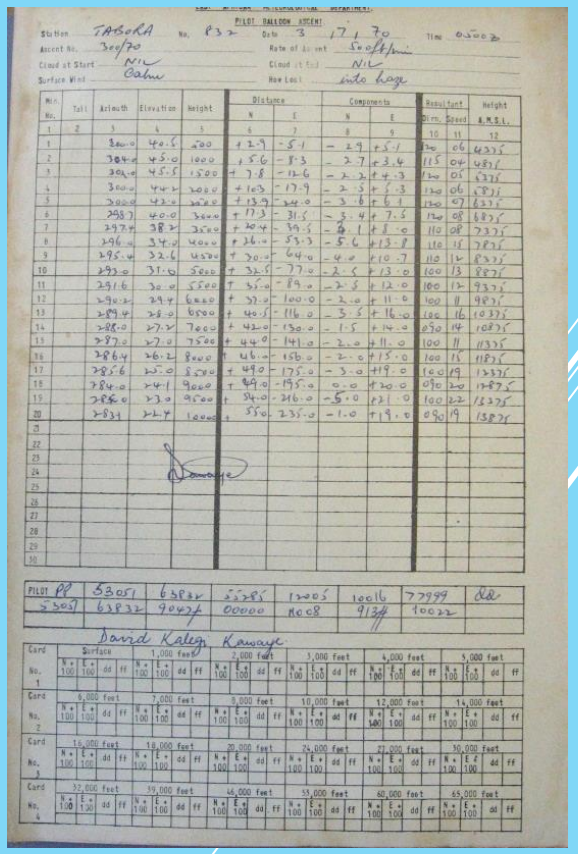
# *WHY DATA RESCUE AND DIGITIZATION (DR & D)*

**Data Rescue is *critically important!***

**We must *ensure that future generations* of scientists and other data users *have all the information they need to assess climate variability and change.***



**Process**

- ***Preserve data*** **at risk of being lost due to deterioration**
- ***Digitize current and past data*** **into a computer compatible form for easy access and utilization**

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# *DR & D ASSESSMENT/IMPLEMENTATION, 3 OBJECTIVES*

1. ***Assess*** **storage facilities and organizational readiness for DR & D Projects.**

2. ***Coordinate*** **with NMHS in developing the inventory and archive of all meteorological and hydrological records.**

- ***Determine*** **all data formats available**
- ***Obtain*** **a list of all reporting stations for each data type**
- ***Present methods*** **for tracking records: 1) Introduce accounting spreadsheets. 2) Estimate record volumes 3) Document initial and changes in record formats.**
- ***Obtain samples*** **of records to be imaged and digitized.**

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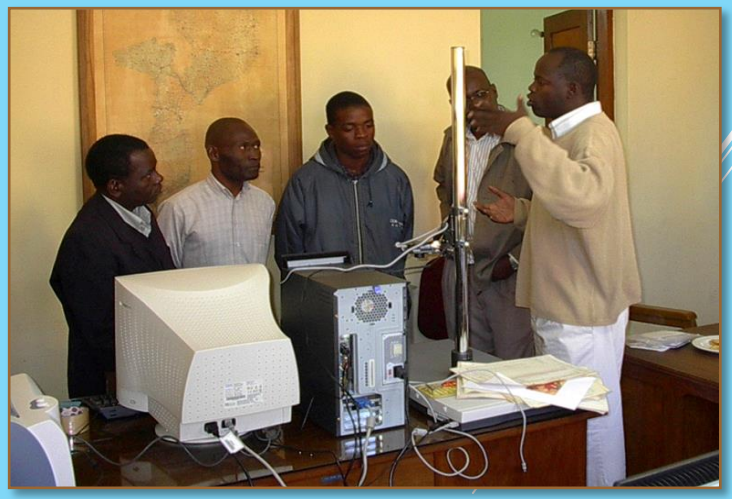
# DR & D ASSESSMENT/IMPLEMENTATION OBJECTIVES (CONTINUED)

*3. Design, Develop and Implement* **a tailored DR & D Project Plan that:**

- *Addresses NMHS needs*, **expectations, questions and issues**
- *Advises on setting priorities* **for DR & D projects**
- *Meets data application needs*, **present and future**
- *Serves as a model* **for future DR & D projects**



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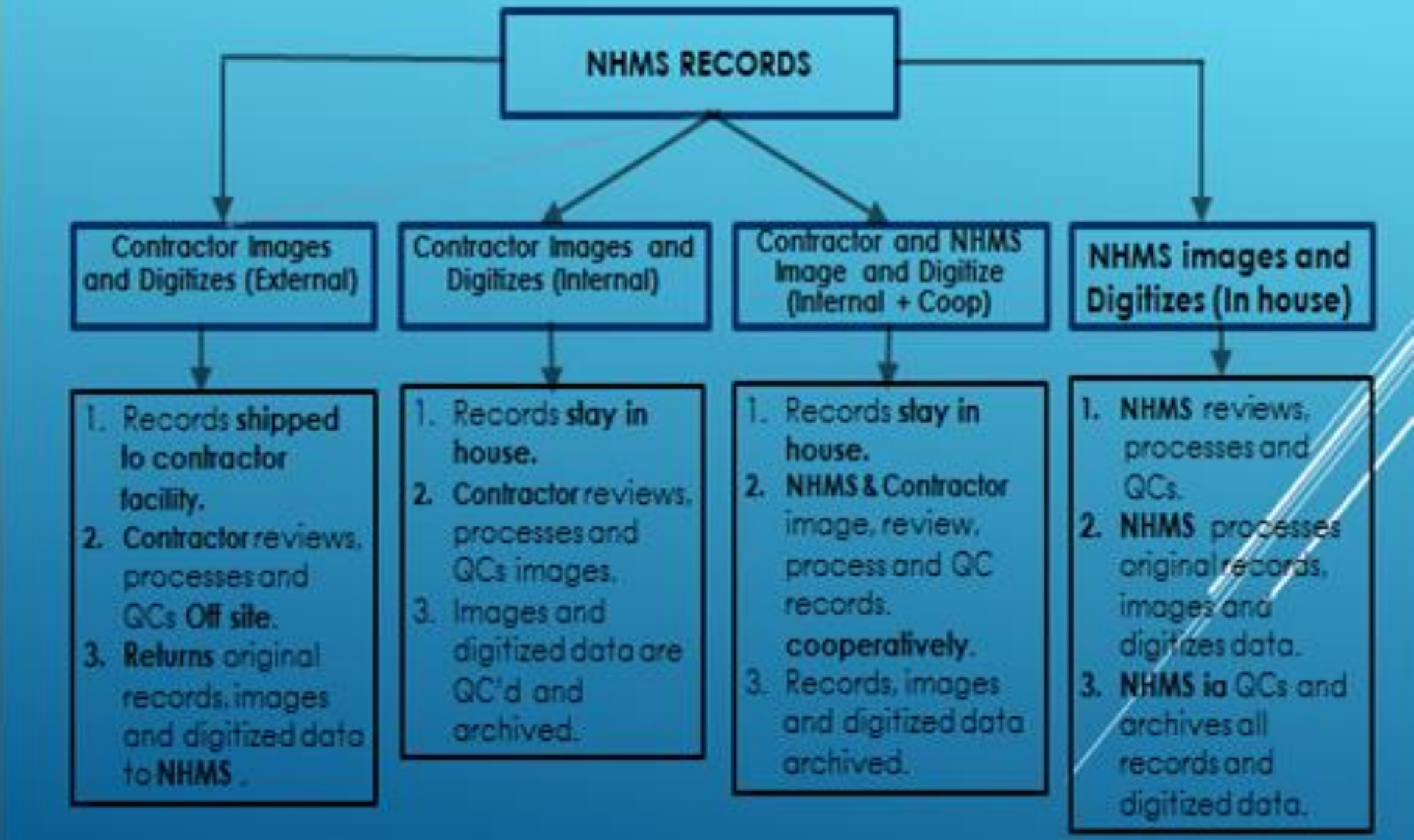
# DR & D APPROACH SCENARIOS

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# APPLICATION OF THE DATA

*Climatic data*
**are applied to a number of sectors:**

- *Agriculture and Food Security*
- *Aviation*
- *Disaster Preparedness*
- *Health*
- *Environment*
- *Marine*
- *Water Resources*
- *Energy*
- *Building and Construction Industry*
- *Future Climate Studies*

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# *DR & D EFFORTS IN THESE VISITED COUNTRIES*

***Countries Visited:***

**Mozambique, Tanzania, Kenya, Senegal, Niger, Zambia, The Gambia and Malawi**

***Example:***

**Digitized microfiche observations from Maiduguri, Nigeria**

***Status:***

**Some countries are doing better than others.**
**However…**
**tremendous efforts have been done and are being done in the rescue and digitization of climate data**

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# SUPPORT OF EARLY WARNING SYSTEMS_MLW CASE


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*Saving Data, Saving Lives*


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UNDP
*Empowered lives. Resilient nations.*

actionaid

WFP
World Food Programme

GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

LUANAR
LILONGWE UNIVERSITY OF AGRICULTURE AND NATURAL RESOURCES

World Health Organization


GOAL IN THE WORLD

MALAWI RED CROSS SOCIETY

FAO
FIAT PANIS

AFES
ACTION FOR ENVIRONMENTAL SUSTAINABILITY

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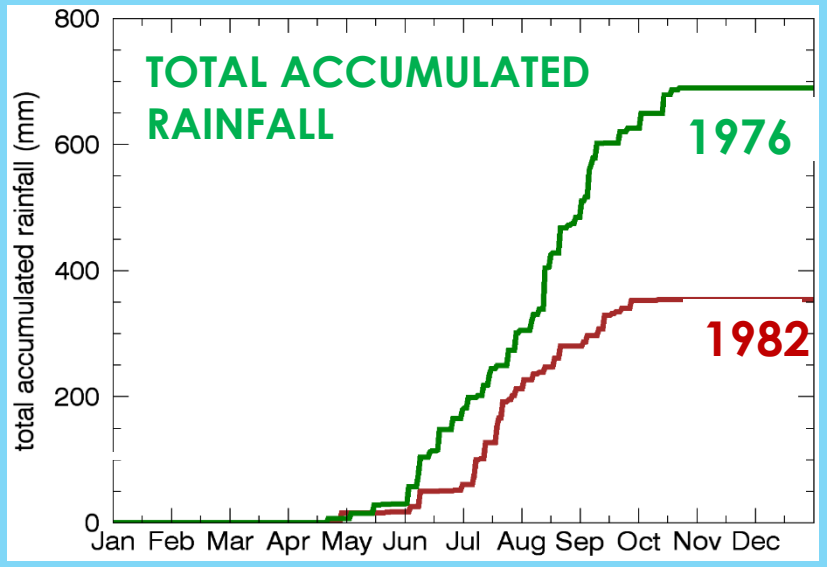
# *SUPPORT OF THE EARLY WARNING SYSTEMS/WHY?*

- *Bridge* the gaps through DR & D
- *Increase* the network of stations
- *Build capacity* for weather observers across the board (i.e. government, independent and voluntary)
- *Ensure* information is flowing from source to users.
- *Improve* information to different stakeholders.

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# *DR & D FINAL PRODUCTS AND BENEFITS*

| | |
|---|---|
| *NHMS Management* | **Digitized databases can be stored and managed by the NHMS** |

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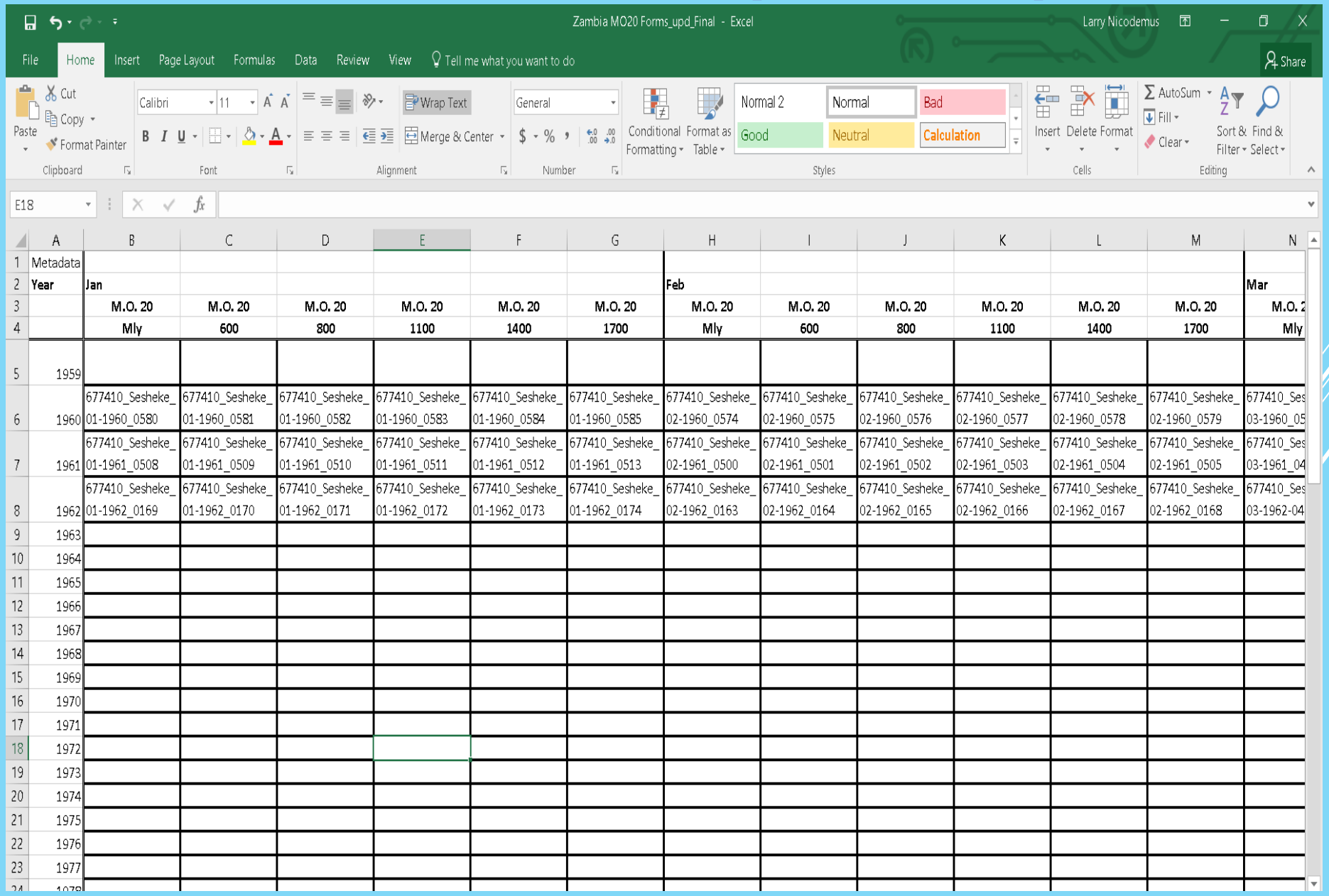
# ELECTRONIC IMAGE CATALOGUE, INVENTORY AND SPREADSHEET (EXAMPLE 1)



Zambia MO20 Forms_upd_Final - Excel

Larry Nicodemus

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do Share

Paste Cut Copy Format Painter | Calibri 11 | Wrap Text | General | Merge & Center | Conditional Formatting | Format as Table | Normal 2 | Normal | Bad | Good | Neutral | Calculation | Insert | Delete | Format | AutoSum | Fill | Clear | Sort & Filter | Find & Select

Clipboard Font Alignment Number Styles Cells Editing

E18

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Metadata | | | | | | | | | | | | | |
| 2 | Year | Jan | | | | | | Feb | | | | | | Mar |
| 3 | | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 20 | M.O. 2 |
| 4 | | Mly | 600 | 800 | 1100 | 1400 | 1700 | Mly | 600 | 800 | 1100 | 1400 | 1700 | Mly |
| 5 | 1959 | | | | | | | | | | | | | |
| 6 | 1960 | 677410_Sesheke_ 01-1960_0580 | 677410_Sesheke_ 01-1960_0581 | 677410_Sesheke_ 01-1960_0582 | 677410_Sesheke_ 01-1960_0583 | 677410_Sesheke_ 01-1960_0584 | 677410_Sesheke_ 01-1960_0585 | 677410_Sesheke_ 02-1960_0574 | 677410_Sesheke_ 02-1960_0575 | 677410_Sesheke_ 02-1960_0576 | 677410_Sesheke_ 02-1960_0577 | 677410_Sesheke_ 02-1960_0578 | 677410_Sesheke_ 02-1960_0579 | 677410_Ses 03-1960_05 |
| 7 | 1961 | 677410_Sesheke_ 01-1961_0508 | 677410_Sesheke_ 01-1961_0509 | 677410_Sesheke_ 01-1961_0510 | 677410_Sesheke_ 01-1961_0511 | 677410_Sesheke_ 01-1961_0512 | 677410_Sesheke_ 01-1961_0513 | 677410_Sesheke_ 02-1961_0500 | 677410_Sesheke_ 02-1961_0501 | 677410_Sesheke_ 02-1961_0502 | 677410_Sesheke_ 02-1961_0503 | 677410_Sesheke_ 02-1961_0504 | 677410_Sesheke_ 02-1961_0505 | 677410_Ses 03-1961_04 |
| 8 | 1962 | 677410_Sesheke_ 01-1962_0169 | 677410_Sesheke_ 01-1962_0170 | 677410_Sesheke_ 01-1962_0171 | 677410_Sesheke_ 01-1962_0172 | 677410_Sesheke_ 01-1962_0173 | 677410_Sesheke_ 01-1962_0174 | 677410_Sesheke_ 02-1962_0163 | 677410_Sesheke_ 02-1962_0164 | 677410_Sesheke_ 02-1962_0165 | 677410_Sesheke_ 02-1962_0166 | 677410_Sesheke_ 02-1962_0167 | 677410_Sesheke_ 02-1962_0168 | 677410_Ses 03-1962-04 |
| 9 | 1963 | | | | | | | | | | | | | |
| 10 | 1964 | | | | | | | | | | | | | |
| 11 | 1965 | | | | | | | | | | | | | |
| 12 | 1966 | | | | | | | | | | | | | |
| 13 | 1967 | | | | | | | | | | | | | |
| 14 | 1968 | | | | | | | | | | | | | |
| 15 | 1969 | | | | | | | | | | | | | |
| 16 | 1970 | | | | | | | | | | | | | |
| 17 | 1971 | | | | | | | | | | | | | |
| 18 | 1972 | | | | | | | | | | | | | |
| 19 | 1973 | | | | | | | | | | | | | |
| 20 | 1974 | | | | | | | | | | | | | |
| 21 | 1975 | | | | | | | | | | | | | |
| 22 | 1976 | | | | | | | | | | | | | |
| 23 | 1977 | | | | | | | | | | | | | |

# DR & D FINAL PRODUCTS AND BENEFITS

| | |
|---|---|
| *NHMS Management* | **Digitized databases can be stored and managed by the NHMS** |
| *Electronic Images* | **Long-lasting, easily retrievable images with interactive inventories** |

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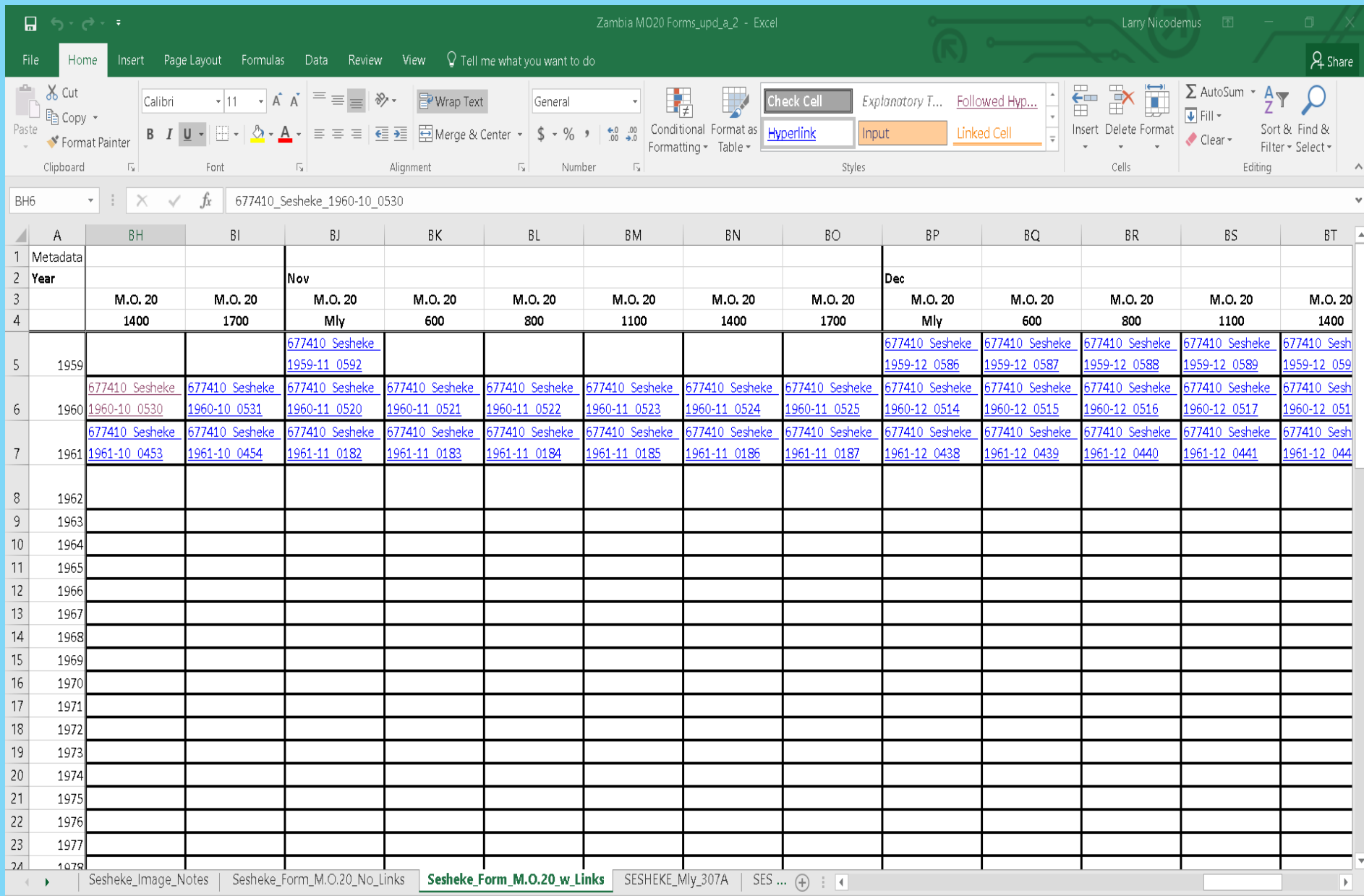
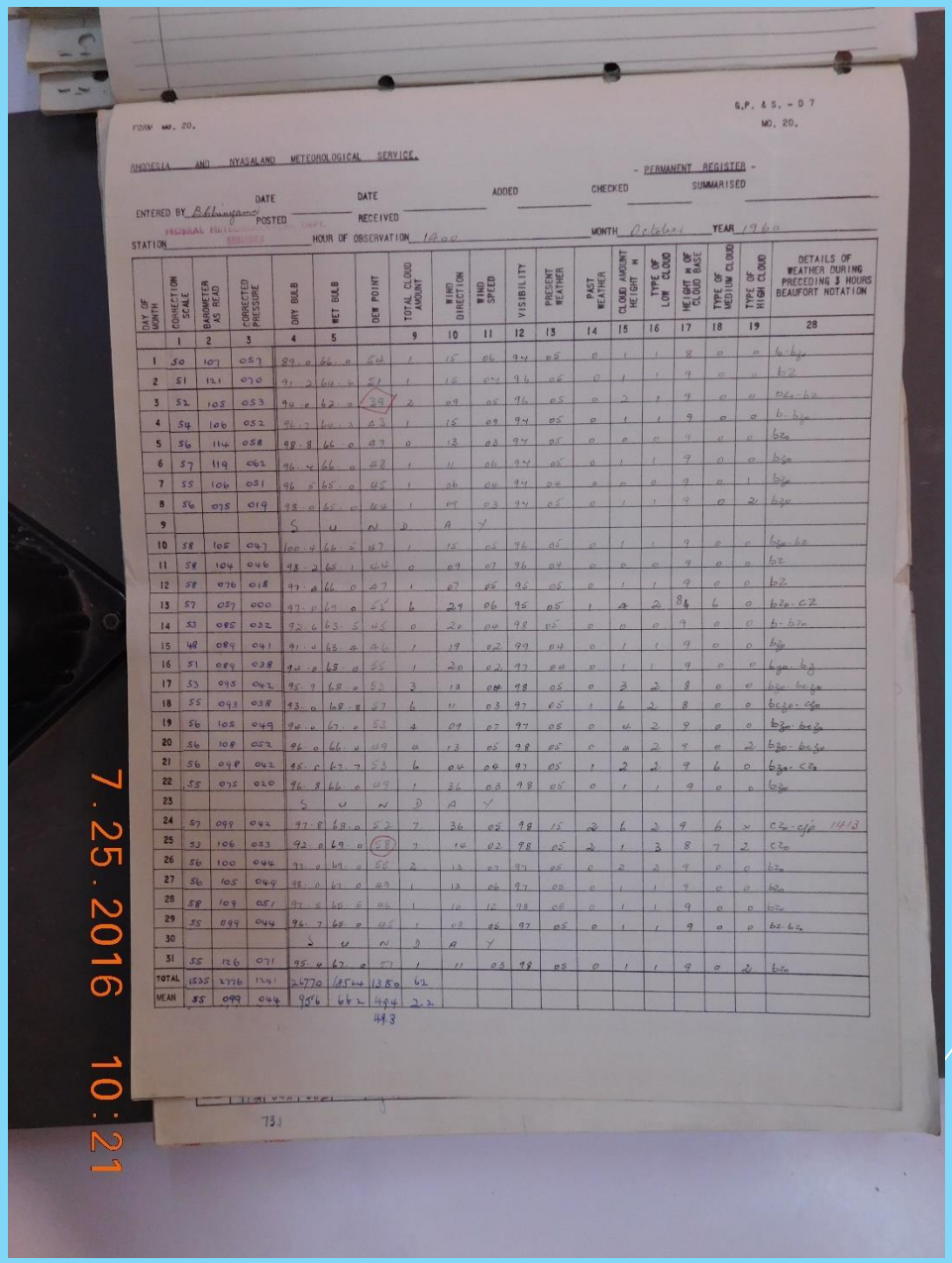
# INTERACTIVE EXCEL SPREADSHEET (EXAMPLE 2) (SIMULATED ACTION)




| | A | BH | BI | BJ | BK | BL | BM | BN | BO | BP | BQ | BR | BS | BT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Metadata | | | | | | | | | | | | | |
| 2 | **Year** | | | Nov | | | | | | Dec | | | | |
| 3 | | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** | **M.O. 20** |
| 4 | | **1400** | **1700** | **Mly** | **600** | **800** | **1100** | **1400** | **1700** | **Mly** | **600** | **800** | **1100** | **1400** |
| 5 | 1959 | | | 677410_Sesheke_1959-11_0592 | | | | | | 677410_Sesheke_1959-12_0586 | 677410_Sesheke_1959-12_0587 | 677410_Sesheke_1959-12_0588 | 677410_Sesheke_1959-12_0589 | 677410_Sesh_1959-12_059 |
| 6 | 1960 | 677410_Sesheke_1960-10_0530 | 677410_Sesheke_1960-10_0531 | 677410_Sesheke_1960-11_0520 | 677410_Sesheke_1960-11_0521 | 677410_Sesheke_1960-11_0522 | 677410_Sesheke_1960-11_0523 | 677410_Sesheke_1960-11_0524 | 677410_Sesheke_1960-11_0525 | 677410_Sesheke_1960-12_0514 | 677410_Sesheke_1960-12_0515 | 677410_Sesheke_1960-12_0516 | 677410_Sesheke_1960-12_0517 | 677410_Sesh_1960-12_051 |
| 7 | 1961 | 677410_Sesheke_1961-10_0453 | 677410_Sesheke_1961-10_0454 | 677410_Sesheke_1961-11_0182 | 677410_Sesheke_1961-11_0183 | 677410_Sesheke_1961-11_0184 | 677410_Sesheke_1961-11_0185 | 677410_Sesheke_1961-11_0186 | 677410_Sesheke_1961-11_0187 | 677410_Sesheke_1961-12_0438 | 677410_Sesheke_1961-12_0439 | 677410_Sesheke_1961-12_0440 | 677410_Sesheke_1961-12_0441 | 677410_Sesh_1961-12_044 |
| 8 | 1962 | | | | | | | | | | | | | |
| 9 | 1963 | | | | | | | | | | | | | |
| 10 | 1964 | | | | | | | | | | | | | |
| 11 | 1965 | | | | | | | | | | | | | |
| 12 | 1966 | | | | | | | | | | | | | |
| 13 | 1967 | | | | | | | | | | | | | |
| 14 | 1968 | | | | | | | | | | | | | |
| 15 | 1969 | | | | | | | | | | | | | |
| 16 | 1970 | | | | | | | | | | | | | |
| 17 | 1971 | | | | | | | | | | | | | |
| 18 | 1972 | | | | | | | | | | | | | |
| 19 | 1973 | | | | | | | | | | | | | |
| 20 | 1974 | | | | | | | | | | | | | |
| 21 | 1975 | | | | | | | | | | | | | |
| 22 | 1976 | | | | | | | | | | | | | |
| 23 | 1977 | | | | | | | | | | | | | |
| 24 | 1978 | | | | | | | | | | | | | |

# AUTOMATICALLY RETRIEVED IMAGE (EXAMPLE 3) (SIMULATED RESULT)



FORM NO. 20.

G.P. & S. - D 7
NO. 20.

RHODESIA AND NYASALAND METEOROLOGICAL SERVICE.

- PERMANENT REGISTER -

ENTERED BY ... DATE ... POSTED ... DATE RECEIVED ... ADDED ... CHECKED ... SUMMARISED ...

STATION ... HOUR OF OBSERVATION 1400 ... MONTH October ... YEAR 1960

| DAY OF MONTH | CORRECTION SCALE | BAROMETER AS READ | CORRECTED PRESSURE | DRY BULB | WET BULB | DEW POINT | TOTAL CLOUD AMOUNT | WIND DIRECTION | WIND SPEED | VISIBILITY | PRESENT WEATHER | PAST WEATHER | CLOUD AMOUNT HEIGHT M | TYPE OF LOW CLOUD | HEIGHT M OF CLOUD BASE | TYPE OF MEDIUM CLOUD | TYPE OF HIGH CLOUD | DETAILS OF WEATHER DURING PRECEDING 3 HOURS BEAUFORT NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 28 |
| 1 | 50 | 107 | 057 | 89.0 | 66.0 | 54 | 1 | 15 | 06 | 94 | 05 | 0 | 1 | 1 | 8 | 0 | 0 | $b_{1g}$ |
| 2 | 51 | 121 | 070 | 91.2 | 64.4 | 51 | 1 | 15 | 04 | 96 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_2$ |
| 3 | 52 | 105 | 053 | 94.0 | 62.0 | 39 | 2 | 09 | 05 | 96 | 05 | 0 | 2 | 1 | 9 | 0 | 0 | $b_{2a}$-$b_2$ |
| 4 | 54 | 106 | 052 | 96.2 | 64.2 | 43 | 1 | 15 | 09 | 94 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_1$-$b_{1g}$ |
| 5 | 56 | 114 | 058 | 98.8 | 66.0 | 47 | 0 | 13 | 03 | 94 | 05 | 0 | 0 | 0 | 9 | 0 | 0 | $b_{2a}$ |
| 6 | 57 | 119 | 062 | 96.4 | 66.0 | 48 | 1 | 11 | 06 | 94 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_{2a}$ |
| 7 | 55 | 106 | 051 | 96.5 | 65.0 | 45 | 1 | 26 | 04 | 94 | 04 | 0 | 0 | 0 | 9 | 0 | 1 | $b_{2a}$ |
| 8 | 56 | 075 | 019 | 98.0 | 65.0 | 44 | 1 | 09 | 03 | 94 | 05 | 0 | 1 | 1 | 9 | 0 | 2 | $b_{2a}$ |
| 9 | | | | S | U | N | D | A | Y | | | | | | | | | |
| 10 | 58 | 105 | 047 | 100.4 | 66.5 | 47 | 1 | 15 | 02 | 96 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_{2a}$-$b_2$ |
| 11 | 58 | 104 | 046 | 98.2 | 65.1 | 44 | 0 | 09 | 07 | 96 | 04 | 0 | 0 | 0 | 9 | 0 | 0 | $b_2$ |
| 12 | 58 | 076 | 018 | 97.4 | 66.0 | 47 | 1 | 07 | 05 | 95 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_2$ |
| 13 | 57 | 057 | 000 | 97.0 | 69.0 | 54 | 6 | 29 | 06 | 95 | 05 | 1 | 4 | 2 | 8 | 6 | 0 | $b_{2a}$-$c_2$ |
| 14 | 53 | 085 | 032 | 92.6 | 63.5 | 48 | 0 | 20 | 04 | 98 | 05 | 0 | 0 | 0 | 9 | 0 | 0 | $b_1$-$b_{2a}$ |
| 15 | 48 | 089 | 041 | 91.4 | 63.4 | 46 | 1 | 19 | 02 | 99 | 04 | 0 | 1 | 1 | 9 | 0 | 0 | $b_{2g}$ |
| 16 | 51 | 089 | 038 | 94.0 | 68.0 | 55 | 1 | 20 | 02 | 97 | 04 | 0 | 1 | 1 | 9 | 0 | 0 | $b_{2g}$-$b_{2g}$ |
| 17 | 53 | 095 | 042 | 95.9 | 68.0 | 52 | 3 | 13 | 04 | 98 | 05 | 0 | 3 | 2 | 8 | 0 | 0 | $b_{2g}$-$b_{2g}$ |
| 18 | 55 | 093 | 038 | 93.0 | 68.8 | 57 | 6 | 11 | 03 | 97 | 05 | 1 | 6 | 2 | 8 | 0 | 0 | $b_{2g}$-$c_{2g}$ |
| 19 | 56 | 105 | 049 | 96.0 | 67.0 | 53 | 4 | 09 | 07 | 97 | 05 | 0 | 4 | 2 | 9 | 0 | 0 | $b_{2g}$-$b_{2g}$ |
| 20 | 56 | 108 | 052 | 96.0 | 66.0 | 49 | 0 | 13 | 05 | 98 | 05 | 0 | 0 | 2 | 9 | 0 | 2 | $b_{2g}$-$b_{2g}$ |
| 21 | 56 | 098 | 042 | 95.0 | 67.7 | 53 | 6 | 04 | 04 | 97 | 05 | 1 | 2 | 2 | 9 | 6 | 0 | $b_{2g}$-$c_{2g}$ |
| 22 | 55 | 075 | 020 | 96.8 | 66.0 | 49 | 1 | 26 | 03 | 98 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_{2g}$ |
| 23 | | | | S | U | N | D | A | Y | | | | | | | | | |
| 24 | 57 | 099 | 042 | 97.8 | 68.0 | 52 | 7 | 36 | 05 | 98 | 15 | 2 | 6 | 2 | 9 | 6 | x | $c_{2g}$-$c_{fg}$ 1414 |
| 25 | 52 | 106 | 033 | 92.0 | 69.0 | 58 | 7 | 14 | 02 | 98 | 05 | 2 | 1 | 3 | 8 | 7 | 2 | $c_{2g}$ |
| 26 | 56 | 100 | 044 | 97.0 | 67.0 | 55 | 2 | 13 | 07 | 97 | 05 | 0 | 2 | 2 | 9 | 0 | 0 | $b_{2g}$ |
| 27 | 56 | 105 | 049 | 98.0 | 67.0 | 49 | 1 | 13 | 06 | 97 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_{2g}$ |
| 28 | 58 | 109 | 051 | 97.8 | 65.5 | 46 | 1 | 10 | 10 | 98 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_{2g}$ |
| 29 | 55 | 099 | 044 | 96.7 | 65.0 | 45 | 1 | 09 | 05 | 97 | 05 | 0 | 1 | 1 | 9 | 0 | 0 | $b_2$-$b_2$ |
| 30 | | | | S | U | N | D | A | Y | | | | | | | | | |
| 31 | 55 | 126 | 071 | 95.4 | 67.0 | 57 | 1 | 11 | 03 | 98 | 05 | 0 | 1 | 1 | 9 | 0 | 2 | $b_{2g}$ |
| TOTAL | 1535 | 2776 | 1341 | 24770 | 1851+ | 1380 | 62 | | | | | | | | | | | |
| MEAN | 55 | 099 | 044 | 956 | 662 | 494 | 2.2 | | | | | | | | | | | |

49.3

731

7.25.2016 10:21

# DR & D FINAL PRODUCTS AND BENEFITS

| | |
|---|---|
| *NHMS Management* | **Digitized databases can be stored and managed by the NHMS** |
| *Electronic Images* | **Long-lasting, easily retrievable images with interactive inventories** |
| *Increased storage space* | **Reduction in space required for original record storage** |

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# STORAGE SPACE REDUCTION ILLUSTRATIONS (EXAMPLE 4)

4 TB External Hard Drive (Approximate size of a book.)

256 GB Flash Drive (Less than the size of your thumb.)

64 GB Flash Drive (Less than the size of your thumb nail.)

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| | |
|---|---|
| *NHMS Management* | **Digitized databases can be stored and managed by the NHMS** |
| *Electronic Images* | **Long-lasting, easily retrievable images with interactive inventories** |
| *Increased storage space* | **Reduction in space required for original record storage** |
| *Permanent Archival* | **Documents and images prepared for permanent storage** |
| *Offsite storage* | **Added security with additional offsite backup storage of the electronic images** |
| *Data exchange* | **Electronic images and digitized data are available for use by people in different countries** |

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# CHALLENGES FACING DR & D

Lack of Policies and Institutions. Though we say DR & D is an ongoing process but not all the NHMS allocate monthly budgets for this task

We have to convince the governments to make DR & D a priority in their monthly budget allocations

Malawi scenario: Lack of coordination among government and organizations in the production of climate data and information

No climate services as a subject in some school curricula

No long-term plans to build capacity among key players in the production of climate data

Lack of feed back between users and providers

Rapid change in technological advances.

Missing data & lack of funding

# CONCLUSION AND RECOMMENDATIONS

- *Budgets:* **There is a need for African governments to factor in Data Rescue and Digitization in their respective national budgets so that DR & D is done as a real ongoing process.**
  - **DR & D is normally supported through projects and as such it is not sustainable.**
- *Participation in Africa:* **DR & D seems to be recognized away from Africa. As such there is a need to increase DR & D efforts within the continent in a coordinated manner.**
- *Capacity Building:* **It has been observed that most African countries are not investing in capacity building in terms of infrastructure and human resource.**

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INTERNATIONAL ENVIRONMENTAL DATA RESCUE ORGANIZATION

CCCEM
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*Enhancing community resilience and adaptation programs*

# *THANK YOU*
# *FOR YOUR ATTENTION!*
# *MAY GOD BLESS US ALL!*



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