# Stakeholder Workshop on Earth observation-based information products for drought risk on a national basis

Organised by

**DiMTEC, University of the Free State (UFS), South Africa**

**ZFL, University of Bonn**

**UNU-EHS**

**UNOOSA / UN-SPIDER**

In cooperation with the

**National Disaster Management Centre of South Africa (NDMC)**

4 to 8 June 2018; Pretoria and Eastern Cape, South Africa

## Introduction

The EvIDENz project included the conduction of a second stakeholder dialogue entitled *Stakeholder Workshop on Earth observation-based information products for drought risk on a national basis* in South Africa to present the workflows developed by the Remote Sensing Laboratory of Land Surfaces of the University of Bonn (ZFL) and the Institute for Environment and Human Security of the United Nations University (UNU-EHS). These workflows have been developed to estimate the number of affected people (Target B) with respect to the SFDRR goals, in crop and livestock production due to the impact of droughts in South Africa. In addition, the workshop was used by ZFL to present additional information on the EvIDENz project, on different types of applications of moderate and high-resolution satellite imagery in agricultural applications. The workshop was used by UNU-EHS to present its model for risk assessment in case of droughts and its explicit application in the Eastern Cape region, to collect feedback on both the workflows and the proposed risk assessment model and to make participants aware of the upcoming Globe-Drought project.

The stakeholder workshop was organised by the Disaster and Emergency Management Training and Education Centre (DiMTEC) of University of the Free State (UFS) of South Africa and the UN-SPIDER programme of the United Nations Office for Outer Space Affairs, in cooperation with the National Disaster Management Centre of South Africa (NDMC), ZFL and UNU-EHS. The workshop included events in the headquarters of the NDMC in Pretoria and in the headquarters of the Provincial Disaster Management Centre (PDMC) of the Eastern Cape Province in Bisho, South Africa. The Pretoria event comprised of both a workshop and a training session and was conducted from 4 to 6 June 2018. The second segment in Bisho was conducted on 8 June 2018.

The workshop was used to present the procedure developed by ZFL to elaborate maps depicting the degree of severity of droughts on crops for specific regions of South Africa and to present the procedure developed by UNU-EHS to estimate the number of affected people due to droughts based on the maps elaborated by ZFL. In addition, the workshop allowed participants to become aware of the efforts conducted by UNU-EHS to characterise the degree of drought risk of the local municipal districts in the Eastern Cape Province. The workshop allowed organisers to acquire feedback from participants

representing various South Africa institutions regarding the potential use of the procedures developed by ZFL and UNU-EHS, and also the potential incorporation of risk assessments in the South African livestock and crop production for communal and commercial farmers.

## Background and Objectives

The duration and intensity of droughts have generally increased in several regions of the world. Agriculture is especially affected, triggering direct consequences on food security, health, and the economic situation of a country.

The EvIDENz project builds on the fact that international conventions and frameworks like the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR), which features goals, targets, priorities for action and indicators which are quantifiable and measurable rather than qualitative.

The project focuses on supporting the implementation of the SFDRR in the monitoring of drought impacts in the agricultural sector. The project contributes in two ways: raising awareness regarding an improved understanding of risks due to droughts with a key focus on the agricultural sector, and developing a procedure that can be used to estimate impacts of droughts in the agricultural sector either in terms of financial losses or the number of people affected who are engaged in agricultural activities by droughts.

The Stakeholder Workshop and its complementary training activity were conducted to facilitate the uptake at the national level of ways to enhance the understanding of risk due to droughts (priority for Action 1 in SFDRR) combining information on drought hazard, exposure and vulnerability of the agricultural sector; and to facilitate the use of the workflows developed by ZFL and UNU-EHS that allow for the estimation of the number of people affected in the agricultural sector due to crop damage and livestock loss in the case of a specific droughts.

## Venue and Attendance

The segment conducted in the headquarters of the NDMC in Pretoria, South Africa brought together 39 participants, while the event in Bisho brought together 45 participants. Annex 1 contains the list of participants to the two workshops The workshop and training segment in Pretoria included participants from NDMC, the North West Province Disaster Management Centre (NWPDMC), the South African Police Service (SAPS), the Guatema Provincial Disaster Management Centre, the South African National Space Agency (SANSA), the Agricultural Research Council (ARC), the Department of Cooperative Governance and Traditional Affairs (COGTA), the Department Of Water And Sanitation (DWS), the Western Cape Disaster Management Centre, the Council for Scientific and Industrial Research (CSIR), the South African Weather Service (SWS), the North-West University South Africa (NWU), the Gauteng Department of Agriculture and Rural Development (GDARD), and the Department of Rural Development and Land Reform (DRDLR). Annex 1 presents the list of participants who took place in the Pretoria segment.

Institutions which took part in the workshop in Bishop, Eastern Cape Province, included the Eastern Cape Department Cooperative Governance and Traditional Affairs Provincial Disaster Management Centre(ECCOGTA-PDMC), the Department of Rural Development and Land Reform (DRDLR), the Buffalo City Metropolitan Municipality Disaster Management (BCMM), the Joe Gpabi District Municipality, the Maletswai Local Municipality (JGDM), the Amathole District Municipal Disaster Management Centre (ADM), the Sarah Baartman District Municipality (SBDM), the Department of Agriculture, Forestry and Fisheries, King Williams Town (DAFF), the Provincial Disaster Management Centre of Bisho, o.R. Tambo District, the Provincial Disaster Management Centre of Cogta (COGTAEC PDMC), and the Chris Hani District Municipality (CHDM). Annex 2 presents the list of participants taking part in the Bisho segment.

In addition, the workshop was attended by experts from DiMTEC, UNU-EHS, ZFL of the University of Bonn and from the UN-SPIDER programme of the United Nations Office for Outer Space Affairs (UNOOSA).

The training segment was conducted by staff UN-SPIDER and benefitted from the technical support provided by experts from NDMC Pretoria, ZFL and UNU-EHS.

## Programme

The workshop and training segment in Pretoria included an opening segment and three sessions:

Session 1: EvIDENz project and its workflows;

Session 2: Monitoring droughts in South Africa;

Session 3: Training on monitoring progress on reporting the SFDRR goals

The Workshop in Bisho, in the Eastern Cape Province, included two sessions:

Session 1: EvIDENz project and its workflows;

Session 2: Monitoring droughts in the Eastern Cape Province

Annex 2 presents the agenda for the two events.

### Summary of the Pretoria Workshop

### Opening segment

During the opening segment, NDMC, DiMTEC and UN-SPIDER welcomed participants and provided an overview of the *Stakeholder Workshop.* In their comments, they stressed the relevance of addressing droughts not only in South Africa, but worldwide.

DiMTEC gave an overview of its research efforts and commented on a recently published book on droughts in South Africa. Based on this research, DiMTEC has proposed the classification of the severity of droughts into five classes and emphasises the need to address drought susceptibility and coping capacities of communal and commercial farmers.

NDMC expressed its interest in being incorporated as an Authorised User in the context of the International Charter Space and Major Disasters in collaboration with the South African National Space Agency (SANSA). NDMC commented on effort conducted along these lines in previous years and looks forward to completing the procedure.

UN-SPIDER took the opportunity to make participants aware of the global manifestations of droughts and their differentiated impacts in different regions of the world.

### Summary of Session 1: EvIDENz project and its workflows

To start this session, UN-SPIDER made participants aware of the severity of droughts in many regions of the world in recent years referring to a recently published report of the Food and Agricultural Organization (2018). Participants were made aware of the impacts of droughts compared with other natural hazards in the last decade, and regarding the impacts of droughts in Asia, Africa, Latin America and the Caribbean. UN-SPIDER then presented general details of the EvIDENz project.

SANSA made a presentation on the use of space technologies in various types of applications, and on its efforts to collect satellite data from various platforms including Landsat, SPOT and MODIS since 1972. SANSA conducts Earth observation in the following thematic areas;

- Human settlement and their dynamics;
- Water resources and expansion, contraction and eutrophication of water bodies and dams;
- Vegetation, agriculture and forestry;
- Monitoring of natural hazards including droughts, floods and fires;
- Algae bloom mapping;
- Irrigated area mapping;
- Maize, soy and sunflower harvest projection based on satellite information.

In the specific case of vegetation, SANSA is using the Normalized Difference Vegetation Index (NDVI) to track vegetation vigour and to track effects of droughts on vegetation over time. The Space Agency also monitor water stress conditions.

ZFL then made a presentation on various topics. ZFL made participants aware of the EvIDENz project and how different partners are contributing to the project. The ZFL expert noted that there are several Earth-observation-based vegetation indices such as NDVI and the Enhanced Vegetation Index (EVI) as well as composite indices such as the Vegetation Condition Index (VCI) and the Standard Vegetation Index of Vegetation Anomaly Index (SVI). In addition, ZFL noted that there are other indices focusing on water and temperature. ZFL stressed the need for ground-based data to compare Earth observation outputs with ground conditions.

ZFL commented that two types of open satellite imagery are used in the EvIDENz project: moderate and high resolution. The moderate scale is used because it is available since 2001. The high-resolution scale is only available since 2015 in the context of Sentinels. The moderate resolution imagery is used to extract the time series of EVI starting in the year 2001. With the time series, the VCI is generated using 16-day intervals. As part of this EvIDENZ project, ZFL is also extracting information from satellite imagery to track the phenology of plants to track the start, the peak and the end of season. The median value of the VCI over the period from November of one year to May of the next year was used as cropland representative, while the median value VCI over the period from July of one year to June of the following year was used the grassland representative VCI which livestock depend on. All pixels in the region of interest are then classified into three categories of impacts on crops using the median values:

- No damage;
- Damage;
- Total loss.

The experts from ZFL highlighted the following strengths with respect to the methodology developed:

- Use of free and open data;
- Free and open software
- The procedure takes into consideration agricultural/plant condition;
- The procedure considers only the growing season VCI
- The procedure yields more accurate severity detection.

In a similar fashion, the following weaknesses were identified:

- VCI values do not directly equate to drought conditions;
- It is difficult for the procedure to carry out drought detection in fallowed parcels;
- The procedure is not really geared for double seasonality detection;
- The procedure is not well suited if there are crop rotations over the years.

The presentation by ZFL ended with an outline of elements to be discussed, including the need for validation of results and enhancement of the methodology by adding crop phenology to the output.

UNU-EHS then reminded participants of the Sendai framework, its four priority areas, and the seven global targets and indicators in impacts that are used to monitor progress in achieving one of the targets. Then the expert from UNU-EHS reminded participants of the elements of risk including hazard,

vulnerability, susceptibility and coping capacities. She referred to the recent study conducted by DiMTEC on the risk of communities to droughts in the Eastern Cape Province, and the drought classification scheme proposed by DiMTEC based on four levels.

With this introduction, the expert from UNU-EHS introduced its segment of the workflow. This segment of the workflow is designed to address two particular indicators of the Sendai targets:

- Number of workers with damage or loss on crops (indicator B5a); and
- Number of hectares of crops damaged or destroyed (indicator C2CA).

The workflow uses as inputs the drought severity map developed with the ZFL for cropland and grassland; the land-cover map developed Environmental Geographical Information Systems (E-GIS) released on the 7th of June 2016, Land-cover maps were generated from Landsat 8 as a basis to extract polygons which contains cultivated land, as well as in-situ data on South African census from 2001 and household statistics to extract the number of people engaged in agriculture and livestock activities.

Using these data and annual impacts between 2005 and 2015, experts from ZFL were able to deduce that 7,035 inhabitants per 100,000 inhabitants have been affected by droughts in the Eastern Cape Province between 2005 and 2015.

## Summary of Session 2: Monitoring droughts in South Africa

This session started with a presentation from NDMC. NDMC commented that its portfolio of hazard monitoring includes drought monitoring. The Centre develops drought hazard and drought risk profiles. For drought hazard monitoring the standardized precipitation index (SPI) has been used. Maps of rainfall deficits on 6-, 12-, 24- and 28-month intervals have been developed to improve the understanding of droughts. Based on the results, NDMC has taken note of a decadal variability, noting that droughts may have a period of return of 10 years. Other parameters reviewed by NDMC include the frequency of drought occurrence, the intensity of dry, duration, regularity and magnitude of periods. All of these were used to generate a hazard map, which when combined with information on vulnerability, allowed the NDMC to generate a national picture of drought risk. The information on the severity of droughts allows the NDMC to identify high priority areas, and to plan interventions to support those most affected by droughts, including through the distribution of grants.

DiMTEC presented in detail its research on drought risk assessment which was conducted using historical meteorological data starting in 1875 and surveys in the field. The analysis of the data allowed for the identification of long-term dry cycles. DiMTEC emphasized that aridity is not necessarily a drought condition when dealing with water availability. Some outcomes of the research include a model of drought severity based on four levels, and the research brought to light the fact that small-scale and communal farmers are more vulnerable that large scale commercial farmers. The expert from DIMTEC commented that many farmers are beginning to take note of geospatial products developed by the Agricultural Research Council of South Africa, and that there are different types of stakeholders engaged in dealing with droughts.

The first discussion session was kicked off with a question from UN-SPIDER on crop rotation which might cause some inconsistencies in the use of VCI, when monitoring the impact of drought using the Vegetation Condition Index (VCI) there were very different perceptions of crop rotation from one region to another. DiMTEC mentioned that in eastern side of the Free State crop rotation takes place in periods of 5 to 6 years; and that soil types play a very important role in crop rotation. In the southern region of South Africa, the soil is sandy while in the central and eastern regions it has predominantly clay soils. In some regions, there are about 5 crops on a piece of land during one growing cycle. Provincial Disaster Management Centres unanimously agreed that small-scale farmers may cultivate grains such as maize as a staple food, and are not willing to rotate to other crops. In contrasts, other farmers may change crops yearly to increase soil fertility and to improve crop yields.

Secondly, UN-SPIDER brought up the question regarding whether grassland indicates livestock production The Agricultural Research Council (ARC) responded by clearly stating that not all grassland is used for grazing of livestock. DiMTEC made ZFL and UNU-EHS aware that quantity of grazing available varies from one region to another, stocking rate plays a vital role on grasslands. Grasslands have different livestock carrying capacity and so this assumption should be carefully considered when making assumptions about the direct relation of grassland to livestock presence.

Thirdly UNU-EHS asked the question on national drought declaration: drought declaration information is mainly provided by the Department of Water and Sanitation, which has the most up to date drought and water information in South Africa. A drought coordination committee has been established to determine when to declare droughts. The measured factors for drought declaration are SPI, VCI and NDVI. Field visits are conducted by local disaster management officers to see the condition of surface water bodies, dams, farmlands, and vegetation.

During this session, participants representing their institutions commented on the responsibilities of their institutions in the context of droughts.

The ARC does climate monitoring for agricultural activities and events that could affect agriculture. ARC uses remote sensing and GIS products for decision making e.g. NDVI, VCI and SPI;

The Hydrometeorological Office of South Africa develops long-range weather forecasts;

The Climate Service has three units climate monitoring, monitoring in Antarctica and the climate data group responsible for data quality control. The climate service unit develops climate indices such as SPI;

The Department of Water and Sanitation has water information for more than 20000 boreholes in South Africa, information on settlements and water-related activities, including dam levels, and water services which deliver water resources for consumption to people in South Africa;

The South African Police Services (SAPS) provides aids and participate in response activities in cases of major natural disasters;

SANSA has data pre-processing capacity and capacity for handling most remote sensing data, has already downloaded data from many portals which includes COPERNICUS, MODIS, SPOT are used for VCI and other indices, performs SPI data and remote sensing indices correlation positively validating the remote sensing information, SANSA ensures the sustainability of projects by making satellite data available.

The participants from Provincial Disaster Management Centres participating in the workshop emphasized challenges faced when monitoring and coping with drought such as:

- The lack of knowledge on new methodologies;
- Mechanisms for implementation for newly developed methods are not in place;
- Job losses;
- Small-scale farmers are affected by water supply and fires;
- Country data is a big challenge;
- South Africa has generally reacted more in response rather than in prevention and risk reduction;
- Data download from USGS is not feasible due to data size and internet;
- Lack of a central repository for data and data unavailability;
- On ground research for an effective monitoring of drought effect on people is missing.

### Summary of Session 3: Training on monitoring progress on reporting the SFDRR goals

The stakeholder workshop in Pretoria included a training segment that was conducted on the 5 and 6 June. All institutions which participated in the workshop also took part in this training segment.

The training segment was conducted in the premises of the NDMC by staff from ZFL and UN-SPIDER who benefitted from the logistical support provided by NDMC. Support was also provided by experts from UNU-EHS. The training segment began with an introduction to the software used in the procedures called *R and R-Studio*. Subsequently, participants were given an overview of the ZFL and UNU-EHS workflows, and then participants executed the workflows from start to completion.

### Discussions Tools commonly used for drought management monitoring and Early Warning

UN-SPIDER conducted a discussion with experts in Pretoria on tools commonly used for drought monitoring and early warning. They shared with UN-SPIDER various tools, methods and websites where information for drought management could be found, but also emphasizing the use of SPI in drought monitoring. Some commonly used tools and resources include:

- Council for Scientific and Industrial Research(CSIR)- Multi-hazard dashboard

  The SCIR Multi-hazard Disaster Information System provides dashboards for Severe Weather Events, Wildfire and Drought, and further include information of disaster logistics, disaster impact assessment, social media tracking and civil unrest reports. Drought can be monitored and visualized on the interactive dashboard by using drought indices, namely the Percentage Average Seasonal Greenness (PASG), giving information on the cumulative vegetation activity during a specific period relative to the long-term average and the Standardized Precipitation Index (SPI) that can be used to analyze drought and wet periods at different time scales. Multi-hazard disaster information (CSIR) has 3 major aspects;
  a. Severe weather dashboard,
  b. Wildfire dashboard lightning monitoring based,
  c. Drought dashboard SPI driven.

- National Green Drop Certification Programme for Excellence in Wastewater Treatment Plant Operation
  The incentive-based mechanism was initiated in 2009 and aims at awarding water services authorities with Green Drop Status if they comply with waste-water legislation and other best practices required by the Department of Water Affairs. Water pollution in South Africa is mainly due to an insufficient wastewater treatment, especially manifested in the increasing incidents of non-compliance with national water resources legislation, policies, norms and standards. The Green Drop assessment measures the performance of Water Service Institutions and focuses on the entire value chain of the wastewater business;

- National integrated water information system (NIWIS)

  The drought status and management dashboard provide annual and monthly rainfall data since 1980 and a Surface Water Storage dashboard giving information on dam levels and dam storage trends since 2013. The information system provides information on drought status and management which consists of a set of dashboards that are categorized into four classes, namely;

  a. Regulatory (focusing on compliance),
  b. Operational (focusing on monitoring and analysis),
  c. Strategic (focusing on management),
  d. The drought status.

- South African Weather Service (SAWS) SMS alert service

In collaboration with NDMC, an early warning database was established which resulted in a mailing list where stakeholders receive available early warnings via email from the NDMC. In 2015/16 the focus has shifted to applying the database to inform stakeholders of early warnings via mobile technology. SAWS provide a WeatherSmart App which gives information based on the location, including weather notices, warnings and alerts. Alternatively, the weather information for a selected area and date can be accessed by dialling *120*7297#.

- National Disaster Management Centre (NDMC) GIS Portal

  The NDMC GIS Portal is a Web application of ArcGIS and provides a decision support tool to stakeholders, addressing matters related to early warning, risk and vulnerability analysis and situational awareness. It is a key initiative of the NDMC's Directorate on Early Warnings and Capability Management System (Dir: EWCMS). The user can also load own data to create new maps and layers.

## Observations and Recommendations in Pretoria

While participants took note of the procedures developed by ZFL and UNU-EHS; some of them expressed interest in utilizing the available information and are interested in factors that can lead to better preparedness to drought.

NDMC commented on on-going efforts to develop a new protocol incorporating information from SANSA, NDMC, ARC, and Provincial Disaster Management Centres for drought monitoring. Promotion of provincial risk collection and implementation of drought management measures at the municipal level and a uniform South African Early warning system should be established, but it should be considered that governance has its setback.

Disaster management experts from the NDMC brought up some significant shortcomings concerning the workflows developed;

- Only agricultural drought was captured while other types of drought were not (meteorological and hydrological drought);
- Workflow transferability should be ensured with careful considerations for each region due to differences in regions;
- The procedure does not recognize the differential degree of impacts for people affected. The impacts of drought on people vary from region to region and also depending on the type of agricultural livelihood;
- SFDRR Indicators are neither well known nor understood by local disaster managers.

NDMC further mentioned that as an entry point for monitoring the SFDRR, 6 billion Rands has been made available for people in South Africa to claim loss and damage, and this could serve as an entry point for the EviDENz project.

## Second workshop Bisho, Eastern Cape Province

The second workshop was conducted on 8 July 2018 at the Provincial Disaster Management Centre (PDMC) of the Eastern Cape Province in the city of Bisho. The workshop was opened by the PDMC, DiMTEC and UN-SPIDER with remarks on the aims of the project which is to monitor some of the SFDRR goals.

ZFL followed up with a presentation of Earth observation methods used to support international conventions such as the SFDRR, SDGs and Paris agreement emphasizing how remote sensing and satellite base information could facilitate meeting the targets stipulated in some of these international agreements.

ZFL presented its segment of the workflow and made participants aware of the types of input data used and the outputs in terms of the classification of pixels in three classes according to the level of drought: no impact; partial damage or loss, total damage or loss. ZFL also mentioned that it has been trying to improve its segment of the workflow developed for EvIDENz more specifically;

- By conducting a correlation analysis of the Standardized Precipitation Evapotranspiration Index (SPEI) and VCI. The result was a positive correlation indicating that the two remote sensing methods could monitor drought trends, with the SPEI validating the results of the VCI;
- By making some validation of the remote sensing results with the crop output and yield of farmers;
- By phenology calculation which is being improved to determine the effects of drought in the different stages of plant growth;
- By using monthly composites and median values to improve the quality of the intermediate output it produces.

ZFL commented that the following steps in the development of its segment of the workflow will include the integration of land surface temperature; the validation of intermediate outputs based on ground conditions; and drought monitoring using satellite imagery from the Sentinel 1 and 2 satellites.

UNU-EHS gave an overview of its research on vulnerability. Participants took note of several social-economic characteristics of vulnerability including: dependency on agriculture and lack of diversity; and environmental characteristics such as overgrazing. UNU-EHS mentioned how it has benefited extensively from the book entitled Coping with Drought in South Africa, volume 1 and 2, which was published by Andries Jordaan, of DiMTEC. This two-volume book was mentioned in the two workshops in Pretoria and East London. The book makes reference to 41 indicators that were assessed using surveys. 18 of these 41 indicators deal with susceptibility and 23 indicators with the coping capacity of people to drought. Low coping capacity and vulnerability lead to an increase in the risk of drought.

UNU-EHS mentioned how drought risk which includes hazard, exposure and vulnerability could improve drought management. Some challenges and assumptions during the workflow developed by UNU-EHS that were briefly mentioned included: the assumed relationship between livestock presence and grasslands, the threshold for classifying the VCI map and the unavailability of specific crop maps.

## Discussion and statements

The PDMC stated that in order to declare a drought, short term, long term and mid-term intervention must be conducted, but there has been no carefully ensured quality control of drought indicators in South Africa at the moment apart from dam water level observation which is performed by the Department of Water and Sanitation. PDMC went on to mention factors that have made drought monitoring unsuccessful and these include conflict of interest in government institutions, lack of reinvestment in drought monitoring systems such as observational systems and policy implementation.

The ARC indicating the Agricultural sector variability makes it difficult to establish a single method for drought monitoring. ARC and several PDMC stated that SPI and reservoir management are more important for monitoring drought as opposed to the method used by ZFL.

Government agencies from the Amatole Local Municipality and Chris Hani municipality mentioned there could be an overestimation of drought mainly due to lack of infrastructure e.g. water pipeline destruction and lack of maintenance. It was also mentioned that the strategic location of commercial farmers in more suitable regions with better rainfall and rich soils has reduced significantly the vulnerability of commercial farmers compared to communal farmers. As stated by the local municipality staff, billions of Rands could be spent on transporting water to communities from over 80 kilometres.

DiMTEC commented on the importance of considering the difference between drought and aridity, Vulnerability assessment, coping assessment and risk assessment. DiMTEC concluded its statement by bringing up other factors like bushfires, stocking rate, and the unsuitability of using an average to estimate loses which may lead to erroneous overestimation.

The last session was concluded with a presentation by UN-SPIDER; explain the duties of the office; its mission statement, and its key tasks which includes; technical advisory mission, knowledge portal, capacity building and fostering cooperation. The locations of the UN-SPIDER and Regional Support offices roles were also stated. Other key aspects of the office which was discussed were the application of space technologies in all phases of disaster management, Recommended Practices, and The International charter for space and Major Disasters.

## Overall conclusions

The workshops in Pretoria and Bisho allowed the partners of the EvIDENz project to make participants aware of the project, its aims and the workflows that have been developed to contribute to the assessment of the impacts of droughts in the agricultural sector.

Participants took note of the way in which some of the drought indices developed by the space community such as the EVI and the VCI can be used to extract information on the effects of droughts on crops and grassland. In addition, they took note of a procedure to combine data on such effects with socio-economic data from national census to extract estimates regarding the number of people affected by droughts who are engaged in agricultural activities.

The EvIDENz partners took note of advances by South African institutions regarding the use of Earth observation to generate products such as the NDVI, the SVI and the VCI; and noted the use of the SPI by government agencies in South Africa to estimate the severity of droughts. In addition, they took note of other parameters used at the local level, such as the level of water in dams and reservoirs, to characterise the severity of drought to elevate requests for support. In the context of vulnerability, the partners took note of the differential vulnerability of communal farmers and commercial farmers. It is important for government agencies to take note of the notion of differential vulnerability and support communal farmers before the impacts of drought are severe.

Some of the assumptions used in the elaboration of the workflows should be revised. For example, not all grasslands are indicative of livestock. And the use of census data should be made with care given that it is outdated and may not reflect the reality of communities in rural areas in recent years.

Finally, participants took note of the advances by the space community in developing new satellites that offer the possibility to monitor a larger variety of processes in Earth for the benefit of communities worldwide.

# ANNEX 1

**List of participants, Pretoria segment**

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# ANNEX 2

# Agenda

**4 June 2018 (stakeholder workshop): Pretoria**

| Day / Time | Activity | Remarks |
|---|---|---|
| 8:30 am - 9:00 am | Registration of participants | |
| 9:00 am - 9:30 am | Opening Segment (DIMTEC, UFS; UN-SPIDER; NDMC) | Brief welcome remarks by DiMTEC and UN-SPIDER<br>Welcome remarks by Dr. Mmaphaka Tau, Head of the NDMC |
| 9:30 am – 10:00 am | ZFL | Introduction to the EvIDENz project |
| 10:00 am- 10:30 am | Coffee break, Group Photo | |
| **Session 1: EvIDENz project and its workflows** | | |
| 10:30 am- 11:00 am | ZFL | Elements for a Workflow to estimate the degree of severity of agricultural drought in South Africa |
| 11:00 am- 11:30 am | UNU-EHS | Workflow to estimate number of people affected due to agricultural drought and understanding drought risk in South Africa |
| 11:30 am- 12:00 am | UN-SPIDER | Space technologies for disaster management: examples and emergency mechanisms |
| 12:00 pm- 13:30 pm | Lunch break | |
| **Session 2: Monitoring droughts in South Africa** | | |
| 13:30 pm- 14:00 pm | NDMC | Recent advances in the implementation of the Sendai Framework and key challenges to monitor impacts as per the Sendai framework targets. |
| 14:00 pm- 14:20 pm | DiMTEC | Droughts in South Africa, lessons from the field |
| 14:20 am- 15:30 am | Discussion | What are the current challenges in South Africa regarding the compilation of data on impacts of droughts and other hazards to generate reports to be incorporated in the Sendai Monitoring tool? |
| 15:30 pm- 16:00 pm | Coffee break | |
| 16:00 pm- 17:30 pm | Discussion | Next steps to improve the EvIDENz workflows in the case of South Africa:<br>• Testing<br>• Potential implementation |
| 17:30 pm | End of stakeholder workshop in Pretoria | |

## 5 June 2018: Training segment – Pretoria

| Day / Time | Activity | Remarks |
|---|---|---|
| **Session 3: Training on monitoring progress on reporting the SFDRR goals** | | |
| 09:00 am-10:00 am | Introduction to the Work-flows – UN-SPIDER | Introduction to:<br>• Types of data used in the workflows (MODIS composite products);<br>• Additional, in-situ data needed; |
| 10:00 am-10:30 am | ZFL | The beginning of training on the use of the workflow:<br>(1) downloading data,<br>(2) the building of monthly composites,<br>(3) index/VCI calculation,<br>(4) classification of VCI according to Kogan,<br>(5) creating optional mean/median values for (5a) defined growing season (suggested for cropland: November to May) or (5b) annual values (for grassland: July to June) and application of hazard classification. |
| 10:30 am-11:00 am | Coffee break | |
| 11:00 am-12:00 am | ZFL | Continuation of training on ZFL's segment of the workflow |
| 12:00 am-14:00 pm | Lunch break | |
| 14:00 pm-17:00 pm | ZFL | Continuation of training on ZFL's segment of the workflow |
| 15:00 pm-17:00 pm | Wrap up first day | |
| 17:00 pm | Wrap up | |

**6 June 2018 (continuation of training segment)**

| Day / Time | Activity | Remarks |
|---|---|---|
| 8:30 am - 11:00 am | UN-SPIDER | Training on UNU-EHS's segment of the workflow addressing impacts in terms of people affected who are engaged in agricultural and livestock activities. |
| 11:0 am - 12:00 pm | Discussion and wrap up | |
| 12:00 pm | End of Pretoria segment of the stakeholder and user workshop | |

## 8 June 2018 (stakeholder workshop): Eastern Cape

| Day / Time | Activity | Remarks |
|---|---|---|
| 8:30 am - 9:00 am | Registration of participants | |
| 9:00 am - 10:00 am | Welcome: PDMC, DIMTEC, UFS; UN-SPIDER | Welcome Stakeholders and round table introduction |
| **Session 1: EvIDENz project and its workflows** | | |
| 10:00 am-10:30 am | EvIDENz workflow - ZFL | Segment of the workflow on the use of space-based vegetation indexes |
| 10:30 am-11:00 am | EvIDENz workflow - UNU-EHS | Workflow to estimate number of people affected due to agricultural drought and understanding drought risk in South Africa |
| 11:00 am-11:30 am | Coffee break, Group Photo | |
| 11:30 am-12:00 am | Drought monitoring in Eastern Cape | Presentation on efforts in Eastern Cape to monitor drought as a weather event and its impacts on hydrologic resources |
| 12:00 am-13:30 pm | Lunch break | |
| **Session 2: Monitoring droughts in South Africa** | | |
| 13:30 pm-15:00 pm | UN-SPIDER and ZFL | On overview of the operational elements of the workflow:<br>• Hardware and software employed to use the workflow;<br>• Data sources and pre-processing;<br>• Characterization of severity of droughts in Eastern Cape: an example from the workflows;<br>• Incorporation of the in-situ data on land-use (agriculture, livestock, population census);<br>• Output of the workflow (number of people affected by drought). |
| 15:00 am-15:30 am | Coffee break | |
| 15:30 pm-17:00 pm | Discussion on ways to improve the workflow | Next steps to improve the EvIDENz workflow to assess and report on crop losses in South Africa:<br>• Testing;<br>• Potential implementation. |
| 17:00 pm | End of stakeholder workshop in Eastern Cape | |