

# 2017



## **CRC/SWAC INTERREGIONAL WORKSHOP FOR DESERT LOCUST INFORMATION OFFICERS**

**FAO COMMISSION FOR CONTROLLING THE DESERT  
LOCUST IN THE CENTRAL REGION (CRC)**

**FAO COMMISSION FOR CONTROLLING THE DESERT  
LOCUST IN SOUTH-WEST ASIA (SWAC)**

**No. 9**

**7–10 May 2017  
Cairo, Egypt**



**Food and Agriculture Organization  
of the United Nations**

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FAO COMMISSION FOR CONTROLLING THE DESERT LOCUST IN THE  
CENTRAL REGION (CRC)

FAO COMMISSION FOR CONTROLLING THE DESERT LOCUST IN  
SOUTH-WEST ASIA (SWAC)

**REGIONAL WORKSHOP  
ON DESERT LOCUST MANAGEMENT  
IN THE WESTERN REGION**

7–10 May 2017  
Cairo, Egypt

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 2017

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## **CRC/SWAC Interregional Workshop for Desert Locust Information Officers**

**7–10 May 2017 (Cairo, Egypt)**

### **1. Introduction**

The FAO Commissions for Controlling the Desert Locust in the Central Region (CRC) and in South-West Asia (SWAC) sponsored an interregional workshop for Desert Locust Information Officers (DLIOs) in frontline countries of both regions. The CRC secretariat organized the workshop at the FAO Regional Office for the Near East and North Africa in Cairo, Egypt on 7–10 May 2017. The FAO Senior Locust Forecasting Officer, Keith Cressman, conducted the workshop assisted by a resource person from Oman, Nassor Al-Harthy, and the RAMSES GIS developer, Mehdi Ghaemian, from I.R. Iran. Due to visa approval delays, Mr Ghaemian and the other two participants from I.R. Iran arrived only on the last day of the workshop.

A total of 19 DLIOs attended the workshop from eight frontline countries in the Central Region and three in South-West Asia as well as the Desert Locust Control Organization for Eastern Africa (Annex 1).

This year's workshop was the ninth annual DLIO workshop since 2008.

### **2. Programme**

Similar to previous workshops, participants indicated what problems and difficulties they faced in their daily work as DLIOs and what they would like to gain from this year's workshop. This information was used to ensure that the workshop programme met the needs of the participants. The main emphasis of this year's workshop was using RAMSESV4 for the analysis of weather, ecology and locust data in order to assess and summarize the Desert Locust situation. This was the second attempt to teach participants the processes and methodologies for analyzing data after an initial introduction at last year's workshop. The programme consisted mainly of hands-on practical exercises and demonstrations in the classroom, supplemented by participatory discussions and a few presentations (Annex 2). The hours of the four-day workshop were from about 0830h to 1630h with coffee breaks in the morning and afternoon, and a 1 hour break at midday for lunch.

The first half of the morning on the opening day was dedicated to checking all the PCs of the participants so as to fix any problems and align the versions of Rv4.1 with the latest updates. Ideally, this would have allowed the participants to start the workshop at the same level and avoid unexpected problems during the course of the workshop, greatly reducing unnecessary disruption and distraction from the main programme and exercises. However, in practice it took the Senior Locust Forecasting Officer more than two days to fix six PCs (one-third of the participants) because of a shortage of trained persons to assist (Annex 3). This year, the IT expert from CLCPRO could not participate in the workshop and the RAMSES GIS developer only arrived on the last day when all the PC problems had been resolved. In future workshops, it is strongly recommended to continue the practice of checking participants' laptops on the first day prior to using Rv4.1.

## 2.1 Participant expectations and difficulties

The participants indicated that they often faced several difficulties during their daily work:

- insufficient number of DLIOs within the national locust programme;
- eLocust3 with incorrect date and time, and needs recharging for at least 5 days without interruption;
- refresher training is required for eLocust3;
- eLocust3 batteries require good maintenance when in storage;
- other DLIOs need training in Rv4.1;
- Internet connectivity is not stable, reliable or sufficiently fast in several countries, especially Ethiopia, Eritrea and Yemen;
- IRI maps may appear to be outdated but it may be simply sufficient to clear the browser cache (ctrl+Refresh).

It is of utmost importance that every country has a sufficiently fast and reliable Internet connection at the national locust centre because DLIOs require this to obtain eLocust3 data from the field, to download remote sensing imagery and use Google Earth Engine, to update Rv4.1, to report to DLIS, and to share information with other countries and CRC. It is not possible for DLIOs to carry out their duties without a good Internet connection. This will become increasingly important in the near future as the Rv4.1 database migrates to the cloud. In general, participants wished to use the new tools developed by DLIS and others more effectively and efficiently. Participant expectations and difficulties were similar to those expressed in previous workshops except that there were far fewer difficulties in using eLocust3 and Rv4.1, which suggests that both tools have now become stable.

## 2.2 PC maintenance

During the workshop, it was noted that many users' PCs were cluttered with numerous files and applications, some of which may not be necessary. Desktops were often full of files and directories, which can slow down the performance of the computer. In some cases, the RAMSES standardized systematic filing procedure was not followed (Annex 3).

Participants were provided with several tips to ensure that their computer operates as efficiently as possible:

- maintain a systematic approach to filing including sensible naming schemes that make it easier to find and identify files, e.g. YYMMDDdescription (170513report), and to always follow this scheme;
- try to limit the number of files, folders and shortcuts on the desktop to about a maximum of ten;
- whenever possible, Drive C should be reserved for program files while data files should be stored on Drive D or E;
- make sure to have a robust anti-virus programme installed and keep it up to date;
- do not open unknown attachments or download unknown files and applications;
- ensure that the date and time are always correct on the PC;
- do not use unofficial software, especially the operating system.

## 2.3 Reporting

The Senior Locust Forecasting Officer explained to participants how DLIS evaluates the quality, timeliness and frequency of reporting from locust-affected countries. Each message, whether it is a bulletin, Rv4.1 data or other information, is registered and evaluated in a simple three-point system (Annex 4). This allows the assessment of reporting in each country

over time to identify any weaknesses or gaps that should be strengthened in order to ensure high quality and timely reporting that is the backbone of the preventive control strategy.

Participants completed an exercise in which each country evaluated a report of another country for quality and timeliness. Their scores were compared to those by DLIS. In this way, participants could better understand the evaluation system and reporting requirements by DLIS. It was agreed that the system was fair and should continue to be implemented.

The Senior Locust Forecasting Officer presented the results of the reporting evaluation in 2016 (Annex 5). In general, countries continue to perform well in both quality and timeliness; however, it was noted that there was a slight declining trend in reporting quality during 2016 when compared to previous years. This may be partially due to higher exceptions in reporting given the substantial investments in training and support provided by DLIS and CRC/SWAC during the past decade. But it may also be due to the need for refresher training on the various tools used in data management as well as increased attention in working carefully, systematically and precisely.

The slight decline in reporting was noted at the last SWAC session where it was decided to organise a regional workshop for SWAC DLIOs every year in the autumn so that SWAC DLIOs will have two workshops per year, the CRC/SWAC DLIO workshop in about May and the SWAC DLIO workshop in about November. It is hoped that this will improve reporting quality.

Several other activities were suggested for improving reporting:

- DLIOs could prepare an annual report of reporting that would supplement the annual periodic reports prepared by DLIS and sent to countries
- eLocust3 training could be provided before a breeding season or survey campaign
- a post-season/campaign review session could be organized by DLIOs and locust management for all field officers

## **2.4 RAMSESv4 (Rv4.1)**

DLIOs continue to use Rv4.1 to manage survey and control results (Annex 6). During outbreaks, this usage increases. Up until now, Rv4.1 is primarily used for importing and displaying data. As Rv4.1 has now become stable and the basic data management functionality has been implemented, it was appropriate to initiate the next level of Rv4.1 usage, that is, analysis. This was the primary emphasis of this workshop based on lessons learned from the CRC/SWAC workshop last year.

The workshop participants were trained in all aspects of using the latest and newest functions of Rv4.1, specifically:

- (a) reinstalling databases, including those of other countries (for the exercises in this workshop)
- (b) automatic backup and updating
- (c) locust presence/absence/control query
- (d) breeding first and last dates query, and associated estimates of laying, hatching and fledging
- (e) use of remote sensing and background maps
- (f) making maps for bulletins

The Senior Locust Forecasting Officer reviewed the concept of systematic analysis and its application to analyzing weather, ecology and locust data in Rv4.1 in a step-by-step manner by breaking the analysis into smaller components over time (monthly) and space (seasonal breeding areas). The GIS functionality of Rv4.1 can facilitate this approach in organizing queries and displaying their results by visualizing different data layers. The Senior Locust Forecasting Officer demonstrated this approach through an introductory analysis of the locust situation in Sudan during the summer of 2016 that the participants completed together. This was followed by a basic analysis (Eritrea, autumn 2016) and a more difficult and complex advanced analysis (Saudi Arabia, late 2016) that were completed by each DLIO. The results were then presented and discussed. In this way, participants were able to practice general data analysis and Rv4.1 functionality.

As the Iranian DLIOs arrived only on the last day, the following day was utilised to provide additional training on Rv4.1 analysis to SWAC DLIOs in which they practiced with a complex analysis of Mauritania (autumn 2016).

It was noted that a number of additional functions and improvements are required in Rv4.1 to facilitate analysis and provide a more complete assessment of locust situations (Annex 7). For example, it was not possible to analyze changes in locust densities, sizes of infested areas and number of locations infested. It was also not possible to summarize the types of locust populations that were treated and by what means over time. It was difficult to load a large number of data and remote sensing layers and manage them.

## **2.5 eLocust3**

Countries were encouraged to use eLocust3 as efficiently as possible; that is, to try to reduce unnecessary de/activation and subscription costs (Annex 8). This means that units should only be deactivated if they are not to be used for at least six months. Activated units should be used as much as possible in the field, making at least six stops per day during normal recession periods. Each team should be equipped with eLocust3 and use it correctly. During periods of increased locust activity and control operations, additional units can be made available immediately to countries by DLIS and CRC. Requests for de/activation should be received by DLIS by about the 25th day of the month.

During the workshop, participants mentioned that some eLocust3 units did not maintain the correct time and date settings. It was explained that this was due to the need to recharge the internal clock battery by connecting the tablet to the mains power, turning it on (the display can be off) and leaving it plugged in to a continuous power source without interruption for 72 hours. Tablets should be stored at 50 percent battery charged and checked every month.

Egypt mentioned that they faced a problem in data transmission via satellite at certain times and in certain places of the south. However, due to the randomness of this problem, it was difficult to understand its causes and propose useful solutions. Consequently, it was suggested to monitor this issue and report it to DLIS.

If possible, the eLocust3 software should be updated so that latitude and longitude coordinates are mandatory before a report can be transmitted. Other minor improvements concerning control units should be implemented.



The Egyptian DLIO, Osama Rabie, presented the Locus app that he developed and showed participants how to make layers with previous survey data, greenness maps and satellite imagery. The Locus app is:

- useful for GPS/navigation, background maps, recent maps, survey data display
- has a companion standalone Windows desktop app for making maps
- can utilise Google Earth Pro for dynamic imagery and Rv4.1 CSV data, which can be saved as KMZ and sent by email to field stations and copied onto the SD card

## **2.6 New technologies and tools**

Several Internet resources were introduced and reviewed with participants that can be used to assist in carrying out the duties and responsibilities of the DLIOs (Annex 9).

### **2.6.1 Slack**

Slack ([slack.com](https://slack.com)) is tool that allows DLIOs and others to easily communicate and share information between themselves and FAO (DLIS and the regional Desert Locust commissions). This is done through specific thematic channels such as drones, eLocust3, eLocust3d, Google Earth Engine, remote sensing, reporting, Rv4.1 and so on. An operational advantage of using Slack is that problems can be shared with the entire DLIO community rather than only with DLIS or CRC. In this way, solutions can be provided much quicker because everybody participates rather than relying, for example, only on the Senior Locust Forecasting Officer. This encourages and facilitates horizontal collaboration and problem-solving. Users can also communicate directly with each other in private channels. All DLIOs are automatically members of the FAOlocust slack team. Anyone can become a member by sending an email to Keith Cressman ([keith.cressman@fao.org](mailto:keith.cressman@fao.org)).

### **2.6.2 Zoom**

CRC participants felt that the monthly Zoom call organized by DLIS and CRC is a very useful means for DLIOs to keep in contact, share current experiences, resolve problems on the spot and for DLIS to provide clarifications and short training. Therefore, it was agreed that the 45-minute calls should continue and be scheduled for the last Monday, Tuesday or Wednesday of every month at 10h Rome/Cairo, 11h in all other countries except Oman (12h) with invitations distributed one week in advance.

For SWAC, it was agreed to establish a monthly Zoom call, similar to CRC and CLCPRO, on the last Wednesday of every month at 12h FAO time, 1430h Iran, 15h Pakistan and 1530h India times.

### **2.6.3 Windytv**

The Internet continues to expand its delivery of information. Recently, a new service ([windy.com](https://windy.com)) provides extremely useful weather information such as winds, temperatures and clouds at different atmospheric levels on a map. This information is in real time and also includes historical as well as forecasted data. DLIOs can use this information to understand current weather conditions, see upcoming possibilities for rainfall and determine potential locust movements. The service is free and does not require registration.

#### **2.6.4 Google Earth Engine**

In 2015, FAO signed a partnership agreement with Google that allows access to advanced technologies. One such technology, Google Earth Engine, can be used to shorten the delivery time of the remote sensing imagery, specifically the dynamic greenness map. Users can access a custom interface developed by DLIS, Desert Locust Mapper, where they can indicate the desired date range of the dynamic greenness map and associated Desert Locust data (hoppers, adults, bands, swarms). The greenness map is processed on-demand in less than a minute using parallel computing and cloud technologies; hence, an Internet connection is required. In this way, DLIOs do not have to wait for the standard decade product to become available in the websites of Columbia University IRI or VITO; instead, they can prepare a map, ideally of a 10-day period, at any time according to their need. Desert Locust Mapper will soon be available on Locust Watch and incorporated into Rv4.1.

The results of an initial comparison and validation of the greenness map distributed by IRI/VITO and that which is produced on-demand using Google Earth Engine suggests that Google Earth Engine more accurately indicates vegetation conditions at 56% of the locations versus 32% by IRI/VITO. More validation is required and countries were encouraged to participate in this exercise by providing geo-referenced photos of field conditions in Desert Locust habitats.

#### **2.6.5 Mac laptops**

One-third of the participants arrived at the workshop with PC laptops that were not working correctly due to outdated applications, incorrectly installed or non-licensed software, viruses, operating system issues and poor maintenance. This was compounded further by a wide variety of laptop models and two different operating systems, Windows 7 and Windows 8. This problem has plagued each of the annual DLIO workshops and it appears that little progress has been made to resolve it. This year, half a morning and another two days was spent resolving such issues before all DLIOs could fully participate in the workshop. During the workshop itself, some participants could not display the necessary background maps on their PCs.

The Mac platform offers several advantages that would be useful in locust-affected countries: (a) enhanced stability with a single version of the operating system and standardized 64-bit architecture, (b) less virus and malware attacks, (c) improved memory management and graphical display, (d) more intuitive and a better user experience and (e) does not need to be replaced so often. As Rv4.1 is developed on the Mac, it is optimized for this platform.

This issue was discussed amongst the workshop participants and the CRC Executive Secretary. The DLIOs from two pilot countries, Eritrea and Pakistan, who had been using Mac laptops for all DLIO duties during the past eight months reported positively about their experience and were very happy with the Mac laptops. The DLIO from Saudi Arabia had just begun using a Mac laptop a few weeks before and said that it was easy, very powerful, stable and better than the PC. The RAMSES developer indicated that he does all Rv4.1 programming on his Mac laptop that is more than six years old. He expects that the laptop will be operational for about another four years. This contrasted dramatically from PC laptops in which all users, except one, had to replace their laptop much more often, usually less than five years. SWAC decided at its last session to provide every DLIO in the three frontline countries with a Mac laptop. CLCPRO will begin distributing Mac laptops to some of its frontline countries in a progressive step-by-step manner.

Although all DLIOs expressed their interest in using a Mac laptop for their work and despite favourable reports concerning the use of Mac laptops, the CRC Executive Secretary preferred to wait and address the issue properly before providing Mac laptops to some DLIOs in the Central Region. Accordingly the situation will be reviewed based on the experiences of the DLIOs who currently use Mac laptops this year.

### **3. Conclusion**

The workshop contributes directly to the strengthening of the Desert Locust early warning system, which is the basis for preventive control in order to reduce the frequency, duration and intensity of Desert Locust plagues.

The participants were pleased with the organization, contents, trainer and facilities of the workshop. They reaffirmed the importance of and the need to continue to organize the CRC/SWAC interregional workshop for Desert Locust Information Officers on an annual basis. The workshop offers the only opportunity for DLIOs from locust-affected countries within the two regions to get together to exchange experiences and share knowledge face-to-face, and to receive important training and feedback from DLIS. Therefore, it is critical that all frontline countries allow their nationally designated DLIO to take part in this activity, and that CRC continues to organize this activity every year with DLIS participation.

Ideally, Desert Locust Heads should be invited every few years to participate in the workshop with their DLIO so they can observe first hand the tools that had been developed by DLIS and how their information officers use them in reporting and early warning. This would also help to strengthen the important collaborative link between locust directors and locust information officers.

The participants expressed their keen interest and need to continue to update RAMSESv4 so that it provides additional functionality to summarize and analyze data, and to simplify tasks. Consequently, a number of additional features are required. Future workshops should concentrate on presenting these new tools and training participants in their use.

## **Annexes**

## Annex 1. Workshop participants

	<b>CRC participants</b>
<b>Djibouti</b>	Haissama Ali Ahmed
<b>Egypt</b>	Khaled Ibrahim Kelany
	Osama Rabie
	Mohamed Riyad
<b>Eritrea</b>	Feven Tekle Keleta
<b>Ethiopia</b>	Solomon Mirete
<b>Oman</b>	Khalid Al-Harrasi
<b>Saudi Arabia</b>	Meray Saeed Qahtani
	Fahad Hassan Al Shamrani
<b>Sudan</b>	Hussien Osman Abaker
<b>Yemen</b>	Saeed Al-Mamaary
<b>DLCO-EA</b>	Mehari Tesfayohannes
	Felege Elias

	<b>SWAC participants</b>
<b>India</b>	Pramod Gour
	Chandra Shakher Sharma
<b>Iran</b>	Mahmoud Chalaki
	Ali Babali Fashki
<b>Pakistan</b>	Shahbaz
	Jawed Iqbal Khan

	<b>Trainer and resource persons</b>
<b>FAO</b>	Keith Cressman
	Nassor Al-Harthy
	Mehdi Ghaemian

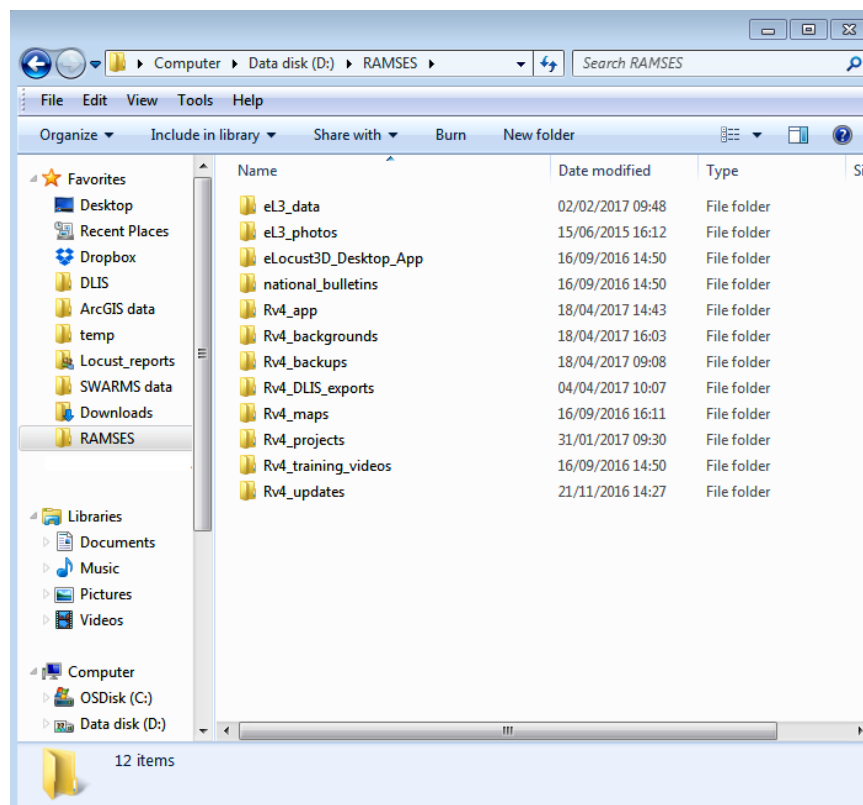
## Annex 2. Workshop programme

	Topic	Details
<b>7 May (Sunday)</b>		
0830–1000 1030–1200	<b>Verification of PCs and Rv4.1</b> <b>Opening</b> <ul style="list-style-type: none"> <li>Participant exceptions &amp; problems</li> <li>Workshop objectives &amp; programme</li> </ul> <b>Reporting</b> <ul style="list-style-type: none"> <li>Reporting evaluation methodology</li> </ul>	Trainers, participants  Card method Card method  Presentation, exercise
1300–1430, 1500–1630	<ul style="list-style-type: none"> <li>Evaluation of 2016 reporting</li> </ul> <b>Rv4.1</b> <ul style="list-style-type: none"> <li>Overview of new functions</li> <li>Map making</li> </ul>	Presentation  Demonstration
<b>8 May (Monday)</b>		
0830–1000, 1030–1200	<b>Rv4.1</b> <ul style="list-style-type: none"> <li>Review of analysis methodology</li> <li>Introductory analysis (SUD 7–12/16)</li> </ul>	Presentation Practical (plenary)
1300–1430, 1500–1630	<ul style="list-style-type: none"> <li>Introductory analysis (cont.)</li> </ul>	
<b>9 May (Tuesday)</b>		
0830–1000, 1030–1200	<b>Rv4.1 (cont.)</b> <ul style="list-style-type: none"> <li>Basic analysis (ERI 7/16–2/17)</li> </ul>	Practical (each country)
1300–1430, 1500–1630	<ul style="list-style-type: none"> <li>Presentation of basic analysis results</li> </ul> <b>Locus app</b>	Discussion Review (Osama)
<b>10 May (Wednesday)</b>		
0830–1000, 1030–1200	<b>Rv4.1 (cont.)</b> <ul style="list-style-type: none"> <li>Advanced analysis (SAU 7/16–2/17)</li> </ul>	Practical (each country)
1300–1430, 1500–1630	<ul style="list-style-type: none"> <li>Presentation of analysis results</li> </ul> <b>Other issues</b> <ul style="list-style-type: none"> <li>Google Earth Engine (GEE) overview</li> <li>Mac laptops</li> </ul> <b>Workshop evaluation</b> <b>Closing</b>	Discussion  Presentation Discussion Questionnaire

### Annex 3. PC problems and solutions

Nearly one-third of the participants arrived at the workshop with laptop computers that had a variety of problems. These problems had to be resolved before the workshop could commence.

Rv4.1 users are encouraged to maintain a standardised systematic filing system on their PC so that it is easy to locate files and to allow DLIS to easily identify and resolve problems. The following directory hierarchy is considered to be the current standard. Users should pay close attention to the correct naming of each directory.



#### DJIBOUTI

Problem. Rv4.1 was not working properly.

Solution. Reinstalled Rv4.1.

#### DLCO-EA

Problem. The Rv4.1 version on the laptop from DLCO-EA HQ in Addis Ababa had not been updated for about one year. This was probably due to problems with local Internet connectivity. As a result, Rv4.1 was not automatically updating even when connected to the Internet.

Solution. New versions of .bin and window.bat files were installed that allowed Rv4.1 to then automatically update itself.

## **ETHIOPIA**

Problem. Rv4.1 was not working properly and often would not start up.

Solution. Mehdi Ghaemian fixed the problem remotely using TeamViewer. However, it was noted that the laptop was littered with many strange files that should be reviewed and deleted or filed as necessary. A robust anti-virus app should be installed and constantly updated (requires Internet connection).

## **India**

Problem. Rv4.1 files were not in the correct location and Rv4.1 was outdated and not updating automatically.

Solution. Moved files to the correct directories, updated Rv4.1 manually by copying the latest lib and ext files, which allowed Rv4.1 to auto update.

## **Saudi Arabia**

Problem. Rv4.1 was not installed on Mac laptop.

Solution. Rv4.1 was installed on the Mac laptop and then the OS was upgraded to the latest version (Sierra, 10.12), but then Rv4.1 had to be uninstalled and reinstalled.

## **Sudan**

Problem. Out dated and too many versions of RAMSES, none of which were working perfectly because the laptop had been loaned to a friend who deleted important files.

Solution. After some Windows system repair and maintenance, Rv4.1 was reinstalled on drive D.



#### Annex 4. Desert Locust reporting evaluation system used by DLIS

DLIS employs a simple three-point system to evaluate every message received from locust-affected countries that relates to locust information such as Rv4.1 data, bulletins and reports. Rv4.1 data should have been checked and corrected prior to transmission and include a brief summary of the data. National bulletins should include sections on weather, ecology, locust situation, control operations, forecast and current resources. The Bulletins should contain maps produced in Rv4.1 that are up-to-date and clear with a legend, and a caption that explains the map. The text of the bulletin should summarize the Rv4.1 data and include a plausible analysis of the situation.

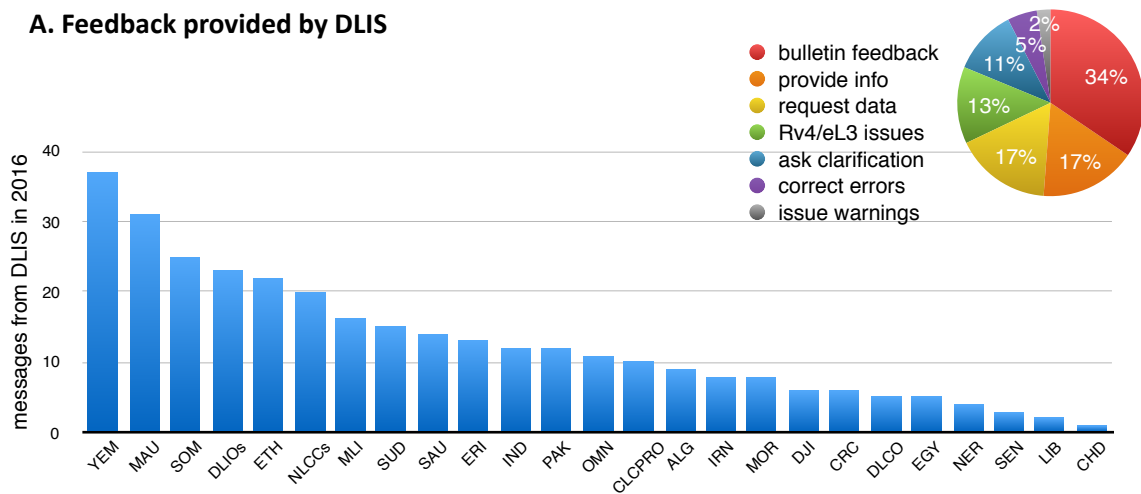
Each message is registered and catalogued with a unique identification number and evaluated for quality and timeliness. This system allows DLIS to provide relevant feedback to countries regarding reporting performance over time.

QUALITY	Data	Bulletin
3/3	<ul style="list-style-type: none"> <li>paragraph summary</li> <li>data complete and correct</li> </ul>	<ul style="list-style-type: none"> <li>complete text that matches data</li> <li>current maps and with captions</li> </ul>
2/3	<ul style="list-style-type: none"> <li>poor paragraph summary</li> <li>data incomplete and not correct</li> </ul>	<ul style="list-style-type: none"> <li>incomplete text OR</li> <li>text does not match data OR</li> <li>maps outdated or without captions</li> </ul>
1/3	<ul style="list-style-type: none"> <li>no paragraph summary, or</li> <li>no data</li> </ul>	<ul style="list-style-type: none"> <li>incomplete text AND</li> <li>text does not match data AND</li> <li>no maps</li> </ul>

TIME	Data or Bulletin
3/3	received within <b>5 days</b> of end of survey or end of month
2/3	received <b>6–14 days</b> of end of survey or end of month
1/3	received after <b>14 days</b> of end of survey or end of month

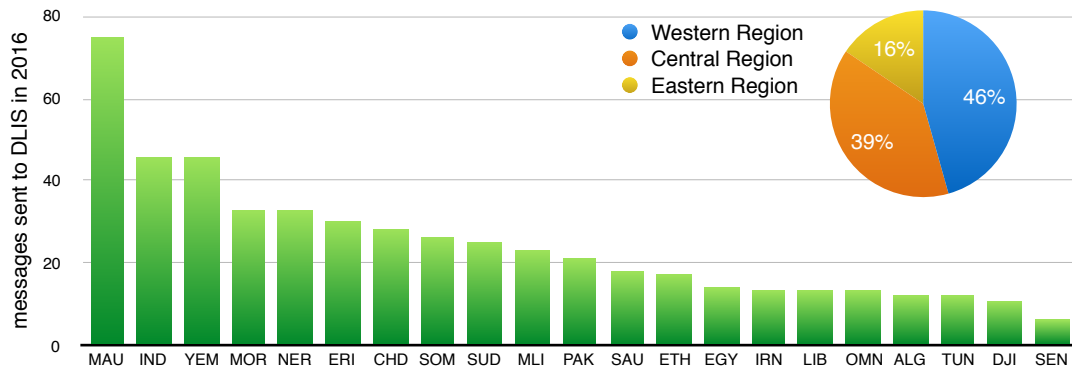
## Annex 5. Evaluation of Desert Locust reporting in CRC and SWAC during 2016

### A. Feedback provided by DLIS



In 2016, DLIS sent 256 messages to countries, consisting of feedback on bulletins (34 percent), provision of general information (17 percent), requests for data and bulletins that were missing or late (17 percent), Rv4.1 updates and eLocust3 issues (13 percent), requests further clarification or details (11 percent), corrections to errors including area treated totals (5 percent), and issue specific warnings (2 percent).

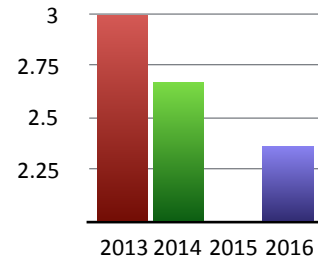
### B. National reporting



In 2016, 515 messages were received in DLIS from countries. Of this, 235 (46 percent) were from the Western Region, 200 (39 percent) from the Central Region and 80 (16 percent) from the Eastern Region. The messages were bulletins, reports and Rv4.1 data. Each message was evaluated and scored for quality and timeliness.

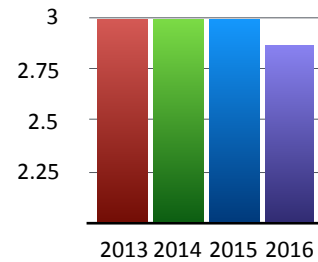
**Djibouti** (*quality=2.36, timeliness=3.00, number of reports=11*)

In the monthly bulletins, the Desert Locust situation should be clearly mentioned in the country. If surveys were not carried out then this should be indicated. All unconfirmed reports should be mentioned as well. During the winter period, the latest rainfall and greenness maps should be included. A monthly bulletin should be prepared and distributed every month.



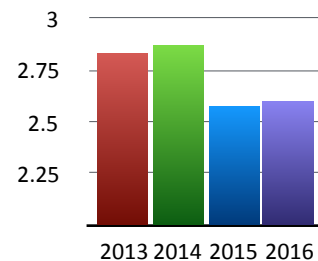
**Egypt** (*quality=2.86, timeliness=2.86, number of reports=14*)

In the bulletins, a caption should be included for each map that indicates the correct dates and a brief interpretation. During the winter period, the latest rainfall and greenness maps should be included.



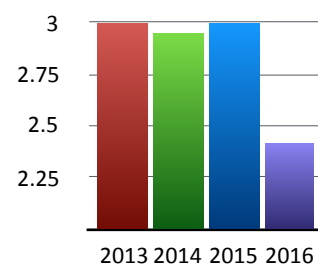
**Eritrea** (*quality=2.60, timeliness=2.60, number of reports=30*)

Information reported in the bulletins and summaries should always match the Rv4.1 data. This data should be sent every month and twice per week during outbreaks and control operations and include a brief summary. The correct format of the bulletin and data should be attached to the email message (not “.” resource files). The bulletins should contain the latest rainfall and greenness maps prepared in Rv4.1. Bulletins and Rv4.1 data should be sent on time without delay as nearly half the reports received in 2016 were more than five days late. It was noted that reporting often ceases during periods of increased locust activity due to an absence of staff at the NLCC in Asmara. This and a lack of internet connectivity in the country are a major hinderance to good reporting.



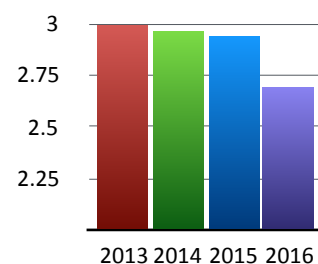
**Ethiopia** (*quality=2.41, timeliness=2.65, number of reports=17*)

eLocust3 should be used by all survey and control teams, and Rv4.1 should be used to analyze the data in a timely manner, especially during field operations. Rv4.1 data should be sent regularly on time to DLIS. The bulletins should contain the latest rainfall, greenness and locust maps prepared in Rv4.1 and have a caption that indicates the correct period with a brief interpretation. Control totals and information reported in the bulletins and summaries should match the Rv4.1 data. The date of information from the field should always be reported. Similarly to Eritrea, reporting often ceases during periods of increased locust activity due to an absence of staff at the NLCC in Addis Ababa. This and unreliable internet connectivity in the country are a major hinderance to good reporting.



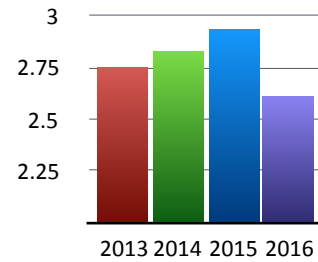
**Oman** (*quality=2.69, timeliness=3.00, number of reports=13*)

Control totals and information reported in the bulletins and summaries should match the Rv4.1 data. When there is rainfall, the bulletins should contain the latest rainfall and greenness maps prepared in Rv4.1 and have a caption that indicates the correct period with a brief interpretation.



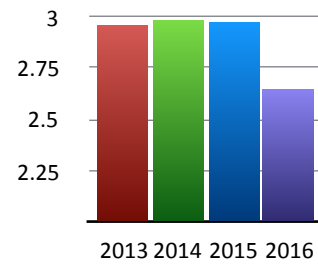
**Saudi Arabia** (*quality=2.61, timeliness=2.89, number of reports=18*)

Control totals and information reported in the bulletins and summaries should match the Rv4.1 data. All survey and control teams should be using eLocust3 and the corresponding Rv4.1 data should be included when reporting to DLIS. When there is rainfall, the bulletins should contain the latest rainfall and greenness maps prepared in Rv4.1 and have a caption that indicates the correct period with a brief interpretation. Care should be taken not to stretch and distort map graphics.



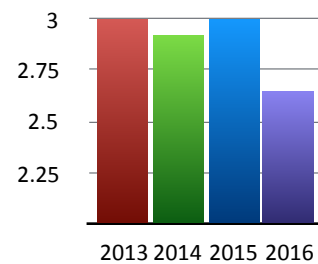
**Sudan** (*quality=2.64, timeliness=2.92, number of reports=25*)

When surveys are not carried out, this should be clearly mentioned. The maps in the bulletins should have a caption that indicates the correct period with a brief interpretation. Information reported in the bulletins and summaries should always match the Rv4.1 data.



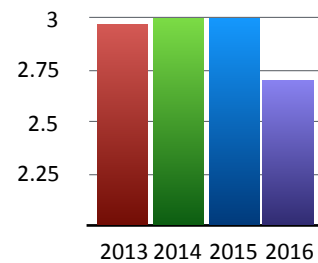
**Yemen** (*quality=2.65, timeliness=2.91, number of reports=46*)

A brief summary should be provided when sending completed forms and Rv4.1 data. Information reported in the bulletins and summaries should match the Rv4.1 data. The bulletins should contain the latest rainfall, greenness and locust maps prepared in Rv4.1 and have a caption that indicates the correct period with a brief interpretation. Do not send duplicate Rv4.1 data to DLIS.



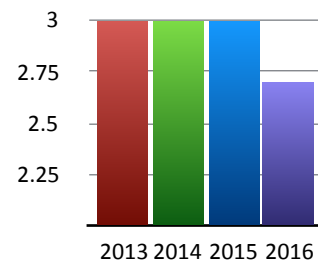
**India** (*quality=2.70, timeliness=2.89, number of reports=46*)

When sending Rv4.1 data to DLIS, a summary should always be included that reflects the data accurately, the date range of the data and not to be too brief. Locust information reported in the bulletins and summaries should match the Rv4.1 data, especially the number of survey stops.



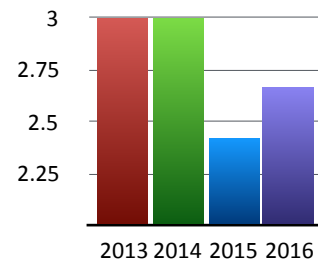
**Iran** (*quality=2.69, timeliness=2.92, number of reports=13*)

The summary of Rv4.1 data should reflect the data accurately and not be too brief. In the bulletins, the latest rainfall and greenness maps should be used and have a caption that indicates the correct period of the image and presents a brief interpretation of the image.



**Pakistan** (*quality=2.67, timeliness=2.95, number of reports=21*)

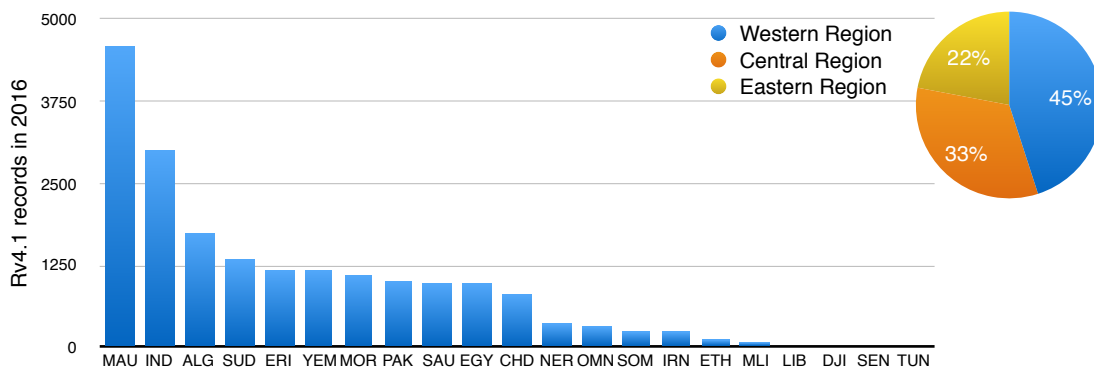
When surveys are carried out, Rv4.1 data should be sent to DLIS with a brief summary of the data. Coordinates should be checked before they are sent to DLIS to ensure that they fall within the country. Locust information reported in the bulletins and summaries should match the Rv4.1 data. It is noted that the DLIO was absent in 2016 because he was participating in the 11-month training course at DLIS. No alternative was appointed during the period. The format of the fortnightly bulletin was revised and improved in late 2016.



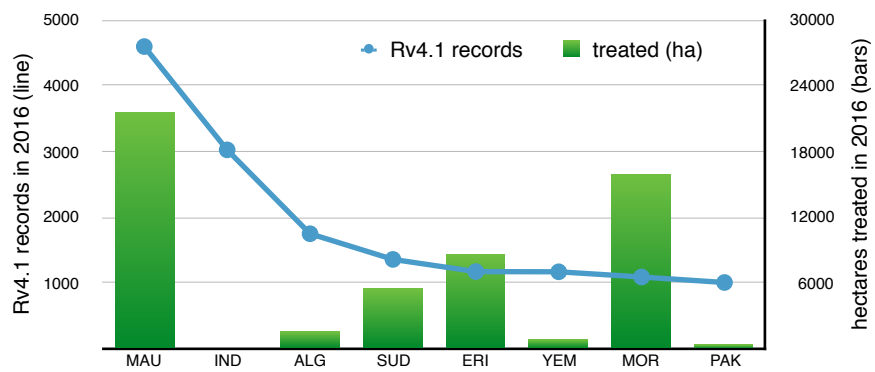
## Annex 6. RAMSES usage in CRC and SWAC during 2016

RAMSES is the custom GIS used in locust-affected countries by national DLIOs to manage and analyze the eLocust3 data collected by their own survey and control teams. Since 2000, it has been an important component in the Desert Locust global early warning system. A new platform-independent multi-lingual (English, French, Arabic) version, RAMSESV4, became operational on 1 January 2015 utilising open-source software and containing a single unified database. RAMSESV4 has been updated 31 times, including a major upgrade, RAMSESV4.1 (Rv4.1), released in May 2016 that was subsequently updated five times in the past six months. Rv4.1 consists of improved functionality for entering, importing, editing, querying, displaying and exporting data. Rv4.1 automatically installs new updates as well as backing up the database to the user's PC and to the cloud as an additional precautionary measure to ensure that valuable databases are not lost. The application is no longer restricted to specific versions of third-party software.

Rv4.1 is used in 17 frontline countries where survey and control operations are carried out in which data are collected that need to be managed and analysed. In addition, the Desert Locust Control Organization for Eastern Africa (DLCO-EA) also uses Rv4.1. The application may eventually be established in other countries such as Djibouti, Senegal, Somalia and Tunisia, depending on needs.



In 2016, frontline countries sent **19,303** records of Rv4.1 data to DLIS. Of this, the Western Region sent the highest number (8,688) compared to the Central (6,362) and Eastern (4,253) regions. This may have been due to increased locust activity and an outbreak in Mauritania that accounted for more than half the number of records (4,597) sent from the Region and nearly 24 percent of the total from all regions. India (3,023) was the second highest country, indicating the sizeable effort that is undertaken in early warning despite the absence of an outbreak in 2016. Algeria (1,745) and Sudan (1,354) were third and fourth highest users of Rv4.1 respectively.



Contrary to conventional wisdom that would suggest Rv4.1 usage may be higher during periods of control, the number of records and control data in Rv4.1 suggest the contrary. For example, Mauritania (4,597 records) treated 21,598 ha while Morocco (1,086 records) treated 15,797 ha, Sudan (1,354 records) treated 5,400 ha and Algeria (1,745 records) treated 1,417 ha. This anomaly could be explained if not all the control teams use eLocust3 in the field.

## Annex 7. New functions required in RAMSES

The workshop participants identified several bugs and additional functionality that is required in Rv4.1 to improve its ability to summarize and analysis field data in the database.

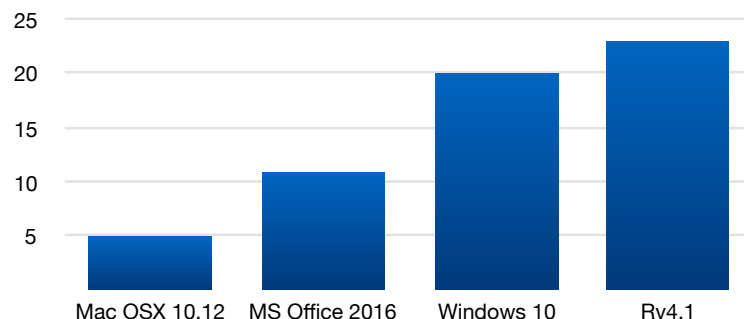
### New functionality

Reported by CLCPRO DLIO workshop (March 2017)

- turn off mandatory data field in the Scientific Editor (to allow unconfirmed secondary information to be entered into the database)
- tools to compare current situation with analogous historical situation(s)
- select plotted points on a map to run Min/Max (when there are locusts in more than one seasonal breeding area or in different biotopes within a country)
- add MeasureToolbox\_11 distance plugin to the next Rv4.1 update and installer
- eL3 photo management (query database, plot, click on point to show photo)
- add query that does all (behaviour, presence, veg, soil) at the same time but keep their categories
- query & display changes over time (as a table and/or graph) for:
  - density, area infested (infestation size), no. locations infested
  - no. locations with adults, hoppers, bands, swarms that were treated

Reported by CRC/SWAC DLIO workshop (May 2017)

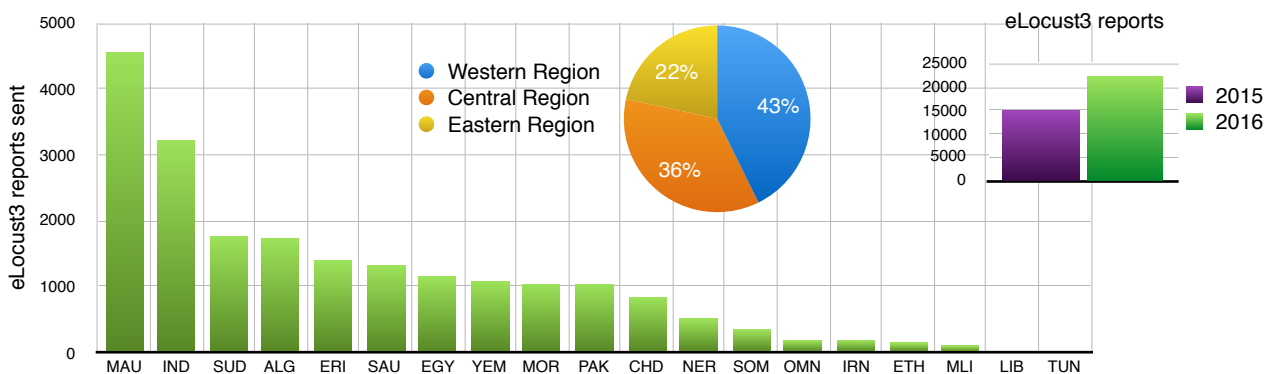
- Batch query of monthly data from/to to include data type (behaviour, soil, vegetation) and display by month or type
- Control methods – omit when values=0, daily as stacked bars not lines; decadal totals not displaying correctly (e.g. Sudan: Oct–Dec 2016)
- Locust activities – select type of comparison (years, months) (similar to Control Methods interface)
- Breeding calendar – Rv4.1 to generate from data



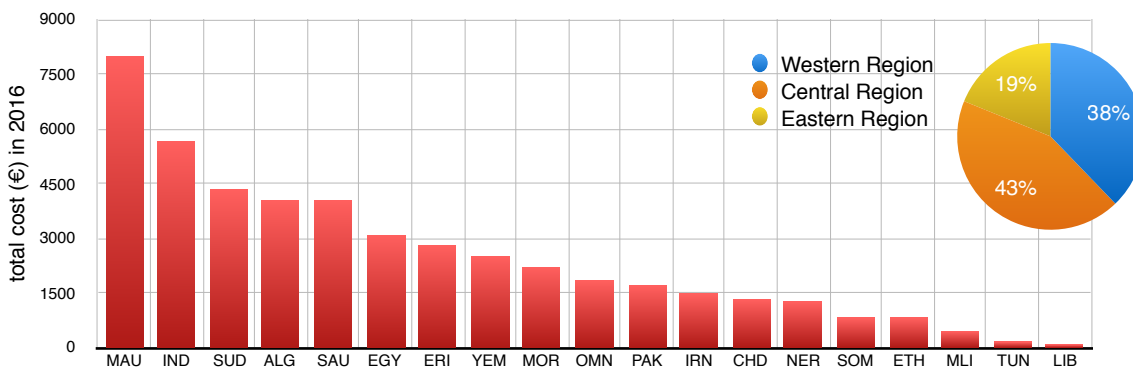
**2016 updates.** Rv4.1 was updated more often than Windows 10 operating system even though there is only one Rv4.1 programmer compared to about 2,000 Windows programmers. The Max OS was updated four times less often than Windows, suggesting that Mac is a more stable operating system.



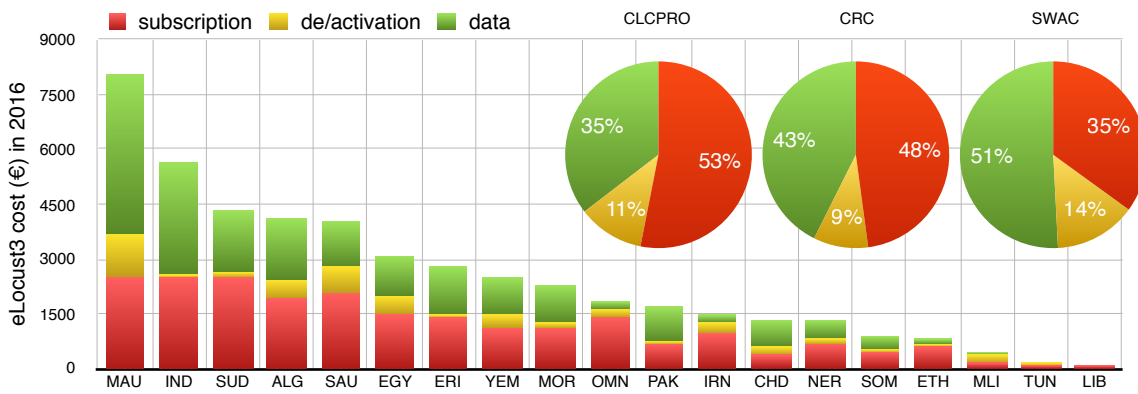
## Annex 8. eLocust3 usage in CRC and SWAC during 2016



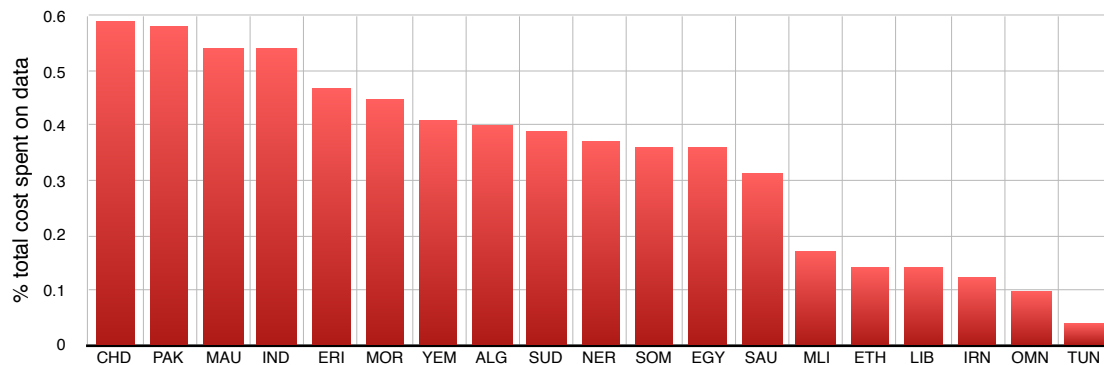
A total of **20,597** reports were sent by eLocust3 in 2016, which was a 54 percent increase from the previous year. In 2016, 43 percent (8,796) of the reports were from the Western Region (CLCPRO), 36 percent (7,353) from the Central Region (CRC) and 22 percent (4,448) from the Eastern Region (SWAC). The greatest number of reports was sent by Mauritania (4,583) followed by India (3,220). Eight other countries sent more than 1,000 reports in 2016: Sudan (1,756), Algeria (1,729), Eritrea (1,399), Saudi Arabia (1,333), Egypt (1,155), Yemen (1,079), Morocco (1,052) and Pakistan (1,045). The number of reports sent is generally a function of the locust situation.



A total of **€46,681.60** was spent on eLocust3 usage in 2016. Of this, 47 percent (€21,848.50) was spent on monthly subscription costs for activated units, 11 percent (€5,265.00) for activation and deactivation of eLocust3 units, and 42 percent (€19,568.10) for data transmission. The Central Region spent the most € 20,236.80 (43%) compared to the Western Region (€17,643.70 or 38%) and Eastern Region (€8,801.10 or 19%). The greatest cost was associated with Mauritania (€8,014.35) followed by India (€ 5,635), Sudan (€4,300.70), Algeria (€4,066.05) and Saudi Arabia (€4,058.35).



The efficient use of eLocust3 is achieved by balancing subscription and de/activation fees with data transmission charges<sup>1</sup>. Ideally, data transmission costs should be higher than the subscription and de/activation fees. In 2016, this was realised in the Eastern Region (SWAC). It requires timely activation and deactivation of individual eLocust3 units. The general rule is to deactivate those units that will not be used for the next six months or so. A few countries had difficulties in using eLocust3 efficiently. Iran and Oman sent very little data while maintaining relatively high subscription and de/activation costs. Ethiopia, Libya and Mali did not activate eLocust3 very often and when the units were activated, they were not used very much. Egypt and Saudi Arabia used eLocust3 a lot but also had very high subscription and de/activation costs.



Four countries (Chad, Pakistan, Mauritania, India) used eLocust3 very efficiently in that more than half the total annual cost was spent on data in 2016, but for different reasons. Chad and Pakistan only transmitted an average amount of data while they spent very little on subscriptions and de/activations. Mauritania spent the most on eLocust3 total costs and de/activation fees, and was the third highest for subscription fees but also transmitted the most data. Similar to Mauritania, India spent nearly the most on eLocust3 total costs, subscription fees and data transmission costs but saved money by spending very little on de/activations.

<sup>1</sup> Under the FAO/Novacom contract for 1/10/15–30/9/20, eLocust3 fees are:  
 Subscription (activated units only): 18.50€/month/eLocust3 unit  
 Activation: 45€/eLocust3 unit (only upon activation)  
 Deactivation: 15€/eLocust3 unit (only upon deactivation)  
 Data transmission: 1€/location

For the effective monitoring and control of Desert Locust, FAO recommends that countries establish separate survey, survey/control (search and destroy) and control teams in the field. Each team should be equipped with eLocust and use it for recording and transmitting their field observations. A survey team should try to make as many stops as possible in order to cover a large area and have a complete picture of the situation. Ideally, one survey team should make at least 6–10 stops per day, depending on the difficulty of the terrain, ecological and weather conditions, and other factors. About 20 minutes should be sufficient to collect the required survey data at each stop. Mixed survey/control and control teams will make substantially less, perhaps only one or two, stops in a day. It is clear that relying only on mixed survey/control teams will result in an incomplete and poor overview of the situation and prolong the duration of a control campaign. Therefore, it is critical to maintain separate survey teams during control operations.

## Annex 9. Useful Internet resources

New and useful websites appear nearly every year that can be utilised in the daily work of the DLIO. These as well as previous sites were presented at the workshop and are listed below.

	website	purpose
CLCPRO	<a href="http://clcpro-empres.org">http://clcpro-empres.org</a>	FAO Commission for Western Region
CRC	<a href="http://desertlocust-crc.org">http://desertlocust-crc.org</a>	FAO Commission for Central Region
Desert Locust Mapper	<a href="https://code.earthengine.google.com/ea3694a9e0595bb68a98bb467b13c3a1">https://code.earthengine.google.com/ea3694a9e0595bb68a98bb467b13c3a1</a>	Google Earth Engine delivery of greenness map and summarised locust data
FAOLocust Facebook	<a href="https://www.facebook.com/FAOLocust">https://www.facebook.com/FAOLocust</a>	FAO DLIS facebook page
FAO Locust Watch	<a href="http://www.fao.org/ag/locusts">http://www.fao.org/ag/locusts</a>	FAO DLIS main website
GeoFlex	<a href="http://geoflex.novacom-services.com">http://geoflex.novacom-services.com</a>	eLocust3 data display & team management
Gmail	<a href="https://mail.google.com">https://mail.google.com</a>	email for eLocust3 data
Google maps	<a href="https://www.google.com/maps">https://www.google.com/maps</a>	map & navigation
IRI	<a href="http://iridl.ldeo.columbia.edu/maproom/Food_Security/Locusts/">http://iridl.ldeo.columbia.edu/maproom/Food_Security/Locusts/</a>	daily, decadal, monthly rainfall, decadal greenness; 16-day NDVI, MODIS, EVI imagery
Rv4 & eL3 updates	<a href="https://sites.google.com/site/rv4elocust3updates/">https://sites.google.com/site/rv4elocust3updates/</a>	eLocust3 activation manager; Rv4.1 installer; latest Rv4.1 updates (for Mac users)
Slack	<a href="https://faolocust.slack.com">https://faolocust.slack.com</a>	team communications
SMELLS	<a href="http://smells.isardsat.com/data-portal/">http://smells.isardsat.com/data-portal/</a>	1 km decadal soil moisture maps
SWAC	<a href="http://www.fao.org/ag/locusts/SWAC">http://www.fao.org/ag/locusts/SWAC</a>	FAO Commission for Eastern Region
Translate	<a href="https://translate.google.com">https://translate.google.com</a>	translation
UAE meteo	<a href="http://www.ncms.ae/en#!/Radar_Merge_Sat/26">http://www.ncms.ae/en#!/Radar_Merge_Sat/26</a>	cloud & radar (Arabia only) maps of rainfall
Windfinder	<a href="https://www.windfinder.com/weather-maps">https://www.windfinder.com/weather-maps</a>	current wind maps
WindFlow	<a href="https://earth.nullschool.net">https://earth.nullschool.net</a>	current wind maps
Windy	<a href="https://www.windy.com">https://www.windy.com</a>	current wind, cloud, rainfall & temperature maps
Wundermap	<a href="https://www.wunderground.com/wundermap">https://www.wunderground.com/wundermap</a>	current wind, cloud, rainfall & temperature maps