High Level Ministerial Conference:

ON THE SUSTAINABLE MANAGEMENT OF DESERT LOCUST AND OTHER TRANSBOUNDARY PESTS IN THE IGAD REGION

Concept note

BACKGROUND

Since the end of 2019, a massive desert locust upsurge has been affecting the Greater Horn of Africa (GHA), the Arabian Peninsula and Southwest Asia. The current upsurge developed gradually as a result of two cyclones which brought heavy rains to the Empty Quarter of the Arabian Peninsula in May and October 2018. This allowed an unprecedented three generations of breeding to occur undetected in an extremely remote area that ground and aerial teams could not reach or monitor. Over nine months, locust numbers increased 8,000-fold and spread in two directions: the Greater Horn of Africa and southwest Asia.

While several warnings were issued (starting in December 2018 and through out 2019) and control actions launched in frontline countries[1] (over 2 million hectares of land were controlled in Egypt, Eritrea, India, Iran, Oman, Pakistan, Saudi Arabia, Somalia, the Sudan and Yemen in 2019 alone), the situation deteriorated rapidly in January 2020, largely due to Cyclone Pawan that hit the GHA in December 2019.

Although positive leaps have taken place from 2020 to-date in the management of desert locusts by communities, national, regional and international agencies, the current upsurge has highlighted a lack of capacities, readiness and preparedness in the GHA region. It has also raised a number of questions about the roles and responsibilities of regional pest management institutions and bodies, namely the Desert Locust Control Organization for Eastern Africa (DLCO-EA) and Commission for Controlling the Desert Locust in the Central Region of the Near East and Horn of Africa (CRC).

[1] Frontline countries are: Saudi Arabia, Egypt, **Eritrea**, **Ethiopia**, Oman, **Somalia**, **Sudan**, Yemen; while Countries of invasion are: Bahrain, **Djibouti**, United Arab Emirates, Iraq, Jordan, Kuwait, Lebanon, Qatar, Syria, **Kenya**, **Uganda**, **South Sudan** and Tanzania.

In this respect, the Food and Agriculture Organization of the United Nations (FAO), the World Bank (WB) and the French Development Agency (AFD) conducted and launched a number of exercises[2] in 2020 in order to stimulate, inform and guide regional discussion and a set of actionable recommendations on mid-term strategic planning for the IGAD region vis-à-vis future desert locust outbreaks/upsurges.

In order to build consensus on the identified actionable recommendations, IGAD, FAO, WB and AFD organised two virtual meetings in January and February 2021, where these recommendations were presented to technical staff from relevant ministries (from IGAD Member States), regional agencies involved in desert locust control and development partners. The recommendations were then consolidated, discussed and finalized at a technical consultative meeting with all mentioned stakeholders on the 4th and 5th of May 2021.

MINISTERIAL CONFERENCE

Following the above technical meeting, it was agreed that a conference of relevant Ministers of Agriculture from IGAD Member States be organised with the objective to reach consensus on the set of actionable recommendations around a desirable setting in GHA and neighboring countries to monitor, prevent and respond to future desert locust and other transboundary pest outbreaks. It is important that IGAD Member States initiate the building of consensus on the steps toward a sustainable management system for Desert Locust and ultimately other transboundary pests.

EXPECTED PARTICIPANTS

- IGAD
- Ministers of Agriculture from IGAD Member States
- Ministers of Agriculture from desert locust source/breeding countries (Yemen and Kingdom of Saudi Arabia)
- Regional Technical Partners (FAO, CRC, DLCO-EA, other UN Agencies and NGOs)
- Regional Development Partners (WB, AFD, USAID, EU, FSDO, etc.)

[2] Real-Time Evaluation by FAO; Countries Rapid Assessments by WB and Regional Review by AFD

EXPECTED MEETING OUTCOMES

- Reinforced commitment to strengthen the management of desert locusts and other transboundary pests, regionally and inter-regionally
- Agreed upon set of actionable recommendations to monitor, prevent and respond to future desert locust and other transboundary pest outbreaks

DATE AND VENUE

Virtual (Video-conference)
June 17, 2021 at 1PM

Attached:

- Priorities and Recommendations for Improved Monitoring and Response

Desert Locust Upsurge in East Africa

Priorities and Recommendations for Improved Monitoring and Response

June 2021

Abbreviations

AFD	*Agence Française de Développement* (French Development Agency)
CLCPRO	FAO Commission for Controlling the Desert Locust in the Western Region
CRC	FAO Commission for Controlling the Desert Locust in the Central Region
DLCC	Desert Locust Control Committee
DLCO-EA	Desert Locust Control Organization for Eastern Africa
DLIS	FAO's Desert Locust Information Service
EAC	East African Community
FAO	Food and Agriculture Organization of the United Nations
GHACOF	Greater Horn of Africa Climate Outlook
GHoA	Greater Horn of Africa
HoA	Horn of Africa
ICPAC	IGAD Climate Prediction and Application Centre
IGAD	Intergovernmental Authority on Development
KIIs	key informant interviews
MoA	Ministry of Agriculture
NALU	National Anti-Locust Unit
OED	FAO Office of Evaluation
P-ASA	Programmatic Advisory Services & Analytics
PPD	Plant Protection Department
RAMSES	Reconnaissance and Management System of the Environment of Schistocerca
RTE	real-time evaluation
SOP	Standard operation procedures
SWARMS	Schistocerca Warning and Management System
WB	World Bank

1. This note has been prepared to present recommendations for discussion at a High-Level Ministerial Conference among IGAD member states in May 2021.

A. Introduction and background context

2. The year 2020 will go down in history as a uniquely challenging year dominated by the COVID-19 pandemic. In the Greater Horn of Africa (GHA), it will also be remembered for the worst desert locust upsurge in at least 25 years, made worse by historic rainfall and floods. What is, perhaps, most compelling about the locust upsurge is that by 2020, the locust crisis had been building for about 18 months. A mix of climate shocks, fragility, and conflict underpin this crisis. In 2018, two extremely rare cyclones made landfall and brought heavy rains to the Empty Quarter of the Arabian Peninsula in May and October, respectively. Such remote locations were not monitored regularly and could not be accessed by control teams; thus, allowing an unprecedented three generations of breeding to occur undetected. After nine months, locust populations had increased 8,000-fold and spread to the GHA and to Southwest Asia.

3. Warnings were issued by FAO as early as December 2018, and throughout 2019 control operations were launched in frontline countries. Nearly 1.9 million hectares of land were treated in Egypt, Eritrea, Ethiopia, India, Iran, Oman, Pakistan, Saudi Arabia, Somalia, the Sudan, and Yemen that year. However, unseasonably heavy rains throughout the autumn of 2019—400% above normal—contributed to the conditions that fueled swarm growth. When cyclone Pawan struck the coast of Somalia in December 2019, it helped the situation deteriorate rapidly. One month later, the Director-General of FAO activated L3 protocols, the highest emergency level in the United Nations system in response to the upsurge spreading to the Horn of Africa. In 2020, FAO and the Governments of the locust-affected countries treated over 1.56 million hectares of land infested with desert locusts and protected enough food production to feed 28 million people across the GHA and Yemen for an entire year. Another 1.3 million hectares were treated outside the region.

4. This confluence of crises is a reminder of the **importance of building resilient livelihoods and food systems** for communities and systems to sustainably increase their resilience to the frequent and extreme shocks. **Communities with resilient livelihoods are better able to prevent and reduce the impact of disasters in their lives**. They can better withstand damage as well as recover and adapt when disasters cannot be prevented.

5. Going forward, a combination of factors is needed to win the current battle against this destructive pest and be better prepared in the future. First, countries were able to build their response capacity relatively rapidly throughout 2020 (for example, more trained personnel, more spray aircraft with the right equipment, ULV vehicle-mounted sprayers, more eLocust3 assets); however, control operations need to be sustained through the upsurge and beyond. Second, weather conditions that have been favorable for desert locust breeding since 2019 will be a key determinant in 2021. If weather patterns return to normal (alternating wet and dry seasons vs. continuous wet conditions as observed in the past 18 months), the locusts will find less favorable conditions forcing them to migrate, die or return to their solitarious phase. Third,

national institutes need further strengthening to manage desert locust in a sustainable and environmentally friendly manner. Finally, only by working together in a coordinated fashion to promote locust preventive control strategy, can the region overcome the desert locust threat.

B. Challenges faced in responding to the desert locust invasion

6. All the partners involved in controlling the desert locust have identified several challenges ranging from operational capacity, limited coordination, environmental and resource limitations as summarized below:

a. Lack of strong regional coordination infrastructure despite desert locust being a regional and global challenge. There is a lack of harmonized and coordinated effort at regional and sub-regional level which has contributed to the rapid spread of the pest from the start of the crisis.
b. Inadequate national and regional institutional capacity such as limited trained experts in some countries, aging aircraft, vehicles, equipment for surveillance and control, etc.
c. Inadequate resources for control, impact assessment, emergency food assistance and livelihood support.
d. COVID-19 pandemic and poor weather conditions have disrupted response operations in terms of delays or limited importation of control equipment, chemicals, and experts, as well as effective deployment of experts to the field.
e. Desert locust control in protected habitats such as national parks and game reserves where pesticide use is restricted.
f. Targeting the appropriate time to control the locust is challenging.
g. Insecurities and cross border surveillance and control limitations due to cross border security issues.
h. Armed conflict in several IGAD member states rendered some of the desert locust breeding areas and destinations inaccessible.
i. Limited financial capacity of some of the affected member states has further hampered control efforts.

C. Desert locust response coordination

7. Desert locust response coordination at the national level has been led mainly through the Plant Protection Directorates in the Ministries of Agriculture with support from other government agencies, technical partners, and donor agencies. Response focused on surveillance, monitoring, and control operations by ground and air.

8. Some of the previously treated areas were reinfested and control efforts were undertaken despite challenges. For most of the upsurge, Yemen was a reservoir of locusts due to unusually favorable breeding conditions and internal conflict that hampered monitoring and control efforts. In 2020, Ethiopia became the epicenter as swarms continued to migrate back and forth between Kenya, Somalia, and Yemen.

D. IGAD high-level conferences in 2020

9. IGAD, in collaboration with its development partners, conducted a series of regional meetings and conferences during the first two quarters of 2020 on the topic of desert locust.

10. The first event was the IGAD Ministerial Meeting on 7 February 2020 followed by the IGAD Heads of State and Governments at their 34th Extraordinary Summit on 9 February 2020, both held in Addis Ababa. The events recognized the need to coordinate with neighboring regions particularly countries in the Arabian Peninsula. The latter meeting endorsed several recommendations:

a. Member states to collectively join forces with neighboring countries and relevant agencies including IGAD agencies and desert locust control organizations, towards the control of desert locust and address the broaderaspects of climate change in the region,
b. IGAD member states to proactively share information and best practices among each other, and to coordinate and build necessary capacities in predicting, monitoring and controlling the spread of desert locust, and
c. International Development Partners of IGAD to build the requisite financial, technical and logistical capacities of IGAD member states, and support ongoing efforts to effectively control the desert locust invasion.

11. IGAD also organized two high-level meetings: An Inter-Regional high-level technical meeting and a meeting of IGAD Ministers of Agriculture held on 23 April and 21 May 2020 respectively. The high-level ministerial meeting mandated IGAD to lead an inter-regional coordination platform for Desert Locust and other transboundary pests. Participants shared lessons on good practices, discussed challenges and proposed a framework for joint complementarity in desert locust control. As a follow up, IGAD developed a regional Food Security and Livelihoods Response Strategy for COVID-19, desert locust, and floods.[1]

E. Studies done in 2020 by WB, FAO and AFD

12. **The World Bank** is implementing several programs and operations in the Horn of Africa to strengthen regional resilience. The Programmatic Advisory Services and Analytics (P-ASA) *'Strengthening resilience in the Horn of Africa'* aims to improve thefoundations for regional approaches to resilience by improving the knowledge base and institutional capacity related to climate shocks among others. Under the P-ASA a *"Qualitative Assessment to Strengthen Desert Locust and Droughts Risk Management"* was implemented and aims to undertake a qualitative assessment on how to improve regional preparedness and responsiveness during desert locust and droughts events in the Horn of Africa region. The assessment was based on three pillars: (1) monitoring and early warning systems; (2) vulnerability and impact assessments; and (3) preparedness plans and actions. Each of these pillars were assessed through semi-structured

[1] IGAD Food Security and Nutrition Response Strategy (2020 - 2022): In the Context of COVID-19, Desert Locust Invasion and Floods

interviews with key informants of national line Ministries, including the Plant Protection Departments within the Ministries of Agriculture, in Djibouti, Ethiopia and Kenya. Discussion groups and workshops also took place with regional stakeholders (IGAD, DLCO-EA[2], FAO and CRC[3]). The most important recommendation is to improve the regional institutional setup for the management of this transboundary pest to ensure that institutional roles are additive and integrative. An external and independent institutional assessment is therefore a key priority. Other recommendations are to strengthen the surveillance systems in frontline countries and to enhance secondary environmental data, data flow management and warnings to improve monitoring and early warning. A regional preparedness plan as well as national plans should as well be developed.

13. **FAO and its partners** have mobilized more than USD 190 million since January 2020 and up to March 2021 for supporting their response operations. The response includes three components: (a) curbing the spread of desert locusts (including surveillance), (b) safeguarding livelihoods and promoting recovery, and (c) coordination and preparedness of the rapid surge support.

14. In this context, the FAO Office of Evaluation (OED) was requested to conduct a real-time evaluation (RTE), conducted across three phases spread over one year. Each phase will cover specific aspects of the response, as follows:

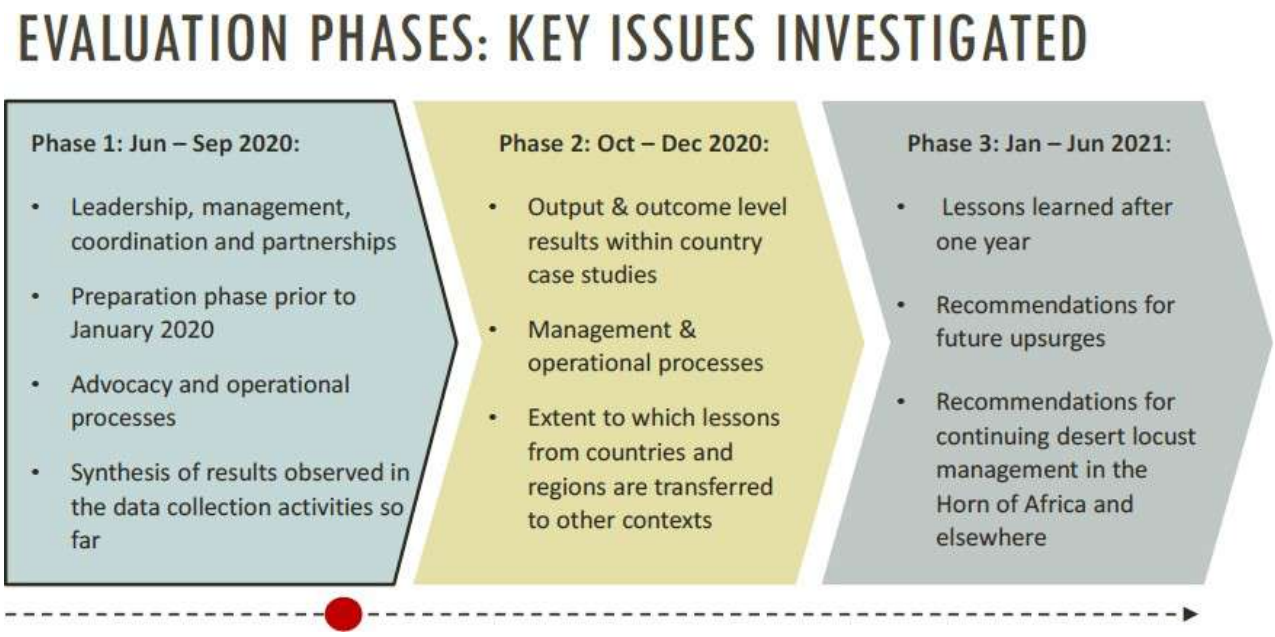


Figure 1. RTE Phases

[2] Desert Locust Control Organization for Eastern Africa (DLCO-EA)

[3] FAO Commission for Controlling the Desert Locust in the Central Region (CRC)

15. Given the focus on leadership, management and coordination of the response during Phase I, the evaluation team focused their activities on key informant interviews (KIIs) with the major stakeholders involved in the management of the scale-up appeal and its response[4]. In addition, the RTE team reviewed project documentation and a purposive sample of background literature[5].

16. Since the beginning of the crisis, France supports the efforts made to fight against this historical invasion. **The AFD, *Agence Française de Développement***, is more specifically interested in the response to be given in the medium and long terms to prevent new upsurges. The AFD has indeed a solid and successful experience in West Africa since 2005 regarding the strengthening of regional coordination to prevent desert locust invasion along with FAO (and particularly in the support to the CLCPRO[6]). In this context, AFD, in close discussions with IGAD and FAO, launched a "*Prefeasibility study for Strengthening Regional Coordination against Locust Invasion in Eastern Africa*'' in order to deepen the understanding for regional coordination needs and to identify the different options to strengthen the regional action capacity against desert locust, both in the short-term to deal with the current crisis but utmost in the medium to long terms to prevent future crisis, considering that prevention is better than cure.

F. Priorities and recommendations

17. While the international, regional, and national actors have responded tirelessly to the desert locust upsurge, there is room to improve the systems in place to respond to desert locust and other transboundary pests threatening East Africa. This section outlines the situation on the ground that the studies have found and proposed reforms and decision points. It describes key concepts that guide the nuance of the recommendations. It also outlines short- and long-term interventions to support the coordination, monitoring, early warning, and control of desert locusts and minimize their impacts on livelihoods and food security. The recommendations are presented in five focus areas to frame actions moving forward: strategies and preparedness; governance and institutions; research and innovation; capacity building; and livelihood impact and support.

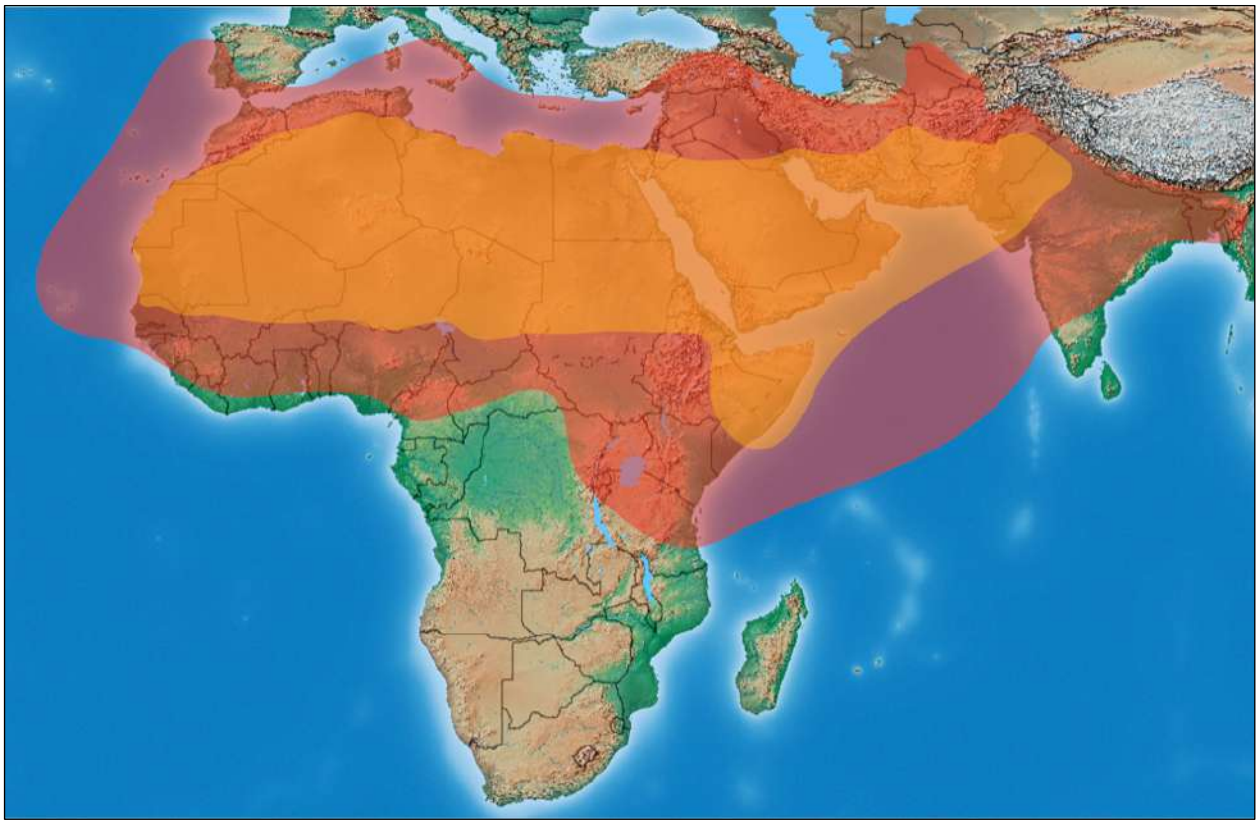
[4] Key informant interviews: the RTE team conducted 52 semi-structured remote interviews with key stakeholders from FAO Headquarters, FAO Country Representatives and country office staff involved in the response, regional desert locust commissions and donors. In addition, the team observed the weekly coordination meetings held by FAO with country offices in the Horn of Africa, West Africa and South West Asia.

[5] Literature review: the RTE team reviewed project documentation for 50 FAO funded projects (under GRP 2020). They also reviewed the GRP 2020 and subsequent revisions, the FAO Desert Locust Watch website and communications page, the FAO Desert Locust Guidelines and external sites including the IPC phase classifications, IGAD, CRC and CLCPRO.

[6] FAO Commission for Controlling the Desert Locust in the Western Region (CLCPRO).

i. Strategies and preparedness

18. The countries of East Africa should commit to building and maintaining a system of preventive control of desert locust as opposed to a strategy of curative control. A preventive control strategy is based on permanent monitoring of locust populations in their primary habitats within recession areas to allow early warning, early reaction and elimination in a preemptive strike to contain outbreaks before swarms get out of control. It implies data collection throughout the year —monitoring known breeding sites, tracking climatic conditions, etc.— and destroying first *transiens* population within the breeding areas of frontline countries. The ideal habitat for desert locust breeding is formed by a combination of sandy soils (orange area in Figure 2a) and wet conditions. Breeding areas within the recession area (16 million km^2) are mapped in Figure 2b and based on field data collected from 1985 to present. A curative strategy, by contrast, implies the destruction of hopper bands and swarms after they have expanded into the wider remission areas or even into invasion areas (29 million km^2 red colored area in Figure 2a) during upsurges and plagues.



Figures 2a. Desert Locust recession (orange) and invasion (red) areas.

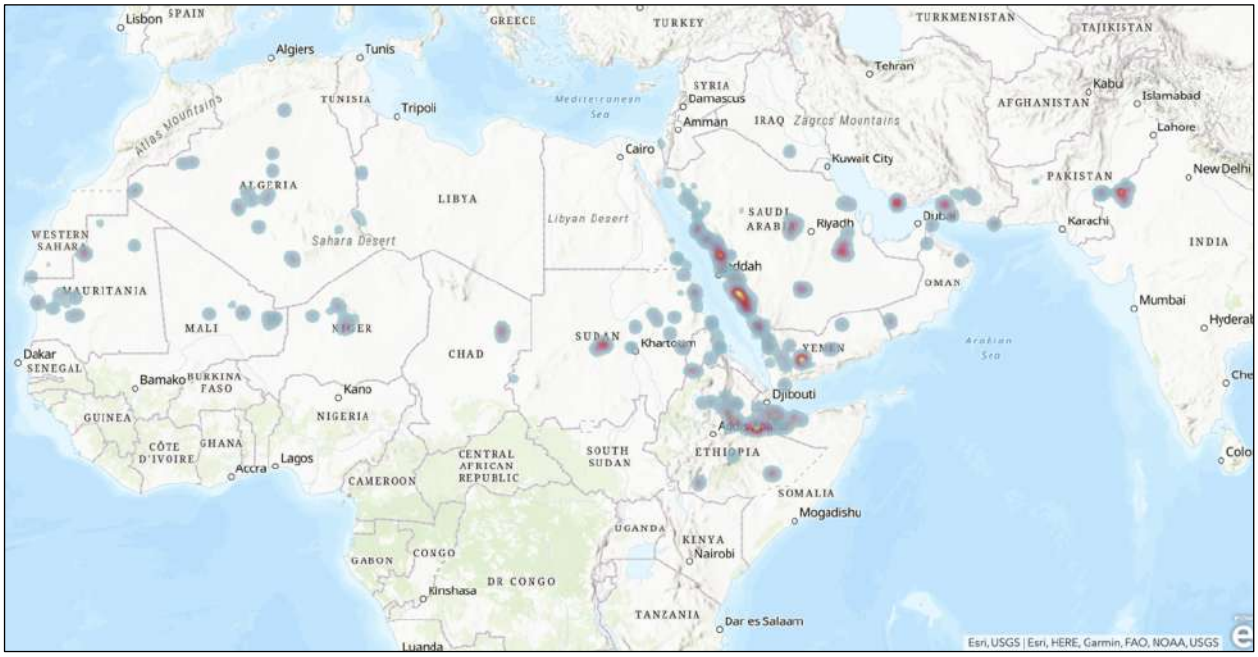


Figure 2b. Desert Locust gregarization areas based on Locust Hub data (1985-present). Source: DLIS, FAO

19. The West African 2003-2005 desert locust upsurge showed that as the population of locusts grows exponentially, so does the cost of controlling them. The estimated cost of that three-year control operation was approximately USD 570 million (FAO, 2012)[7]. This was an example of curative control or responding with control efforts *after* the desert locust population had reached beyond the outbreak point. This involved large amounts of chemical pesticides delivered by trained technicians on foot, on the back of vehicles and by air. The cost of curative control in the upsurge would have paid for 170 years of preventive control in ten countries of the Sahel. The current upsurge in East Africa is approaching the USD 500 million mark in terms of cost, and continued control efforts will be needed through the end of the year to bring the locust population back under control. The current investment also does not yet include the full cost of recovery —of household income, of natural resources, and production systems— moving forward.

20. A preventive strategy can save money, property, livelihoods, and lives. However, adopting such a strategy implies embracing a set of priorities in policies, investments, and institutions that need to be considered, adopted, and enacted before the formation of locust swarms. Preventive control requires close monitoring of known breeding grounds, documenting locust behavior (solitarious, gregarization, swarm formation), and responding quickly with targeted ground-based use of pesticides, preferably biopesticides.

21. Successful implementation/enforcement of the preventive strategy in frontline countries requires a good institutional foundation and enabled autonomous/semi-autonomous Locust/Transboundary Pest Control Unit within the Ministry of Agriculture where this unit should

[7] http://www.fao.org/ag/locusts/common/ecg/2002/en/121004SahelDLthreatOverviewEw.pdf

be responsible of monitoring, surveillance and control operation of desert locust.

22. Adopting a preventive strategy has implications on the policies, institutions, and technology that a country should select. For example, if a country does not have breeding sites, it cannot monitor them. Therefore, at the regional level, if a preventive strategy is adopted, the institutions, capacity needs, and technology investments would vary across frontline and invasion countries. This also raises the question of whether technology innovations can increase the efficacy and efficiency of monitoring so that a strategy is sustainable in countries that face budget constraints.

23. Countries face different ground realities that will influence the nature of their surveillance and early warning response system. Desert locust management is different in frontline countries from invasion countries (Figure 3), so the systems needed to be adopted by each will be different.

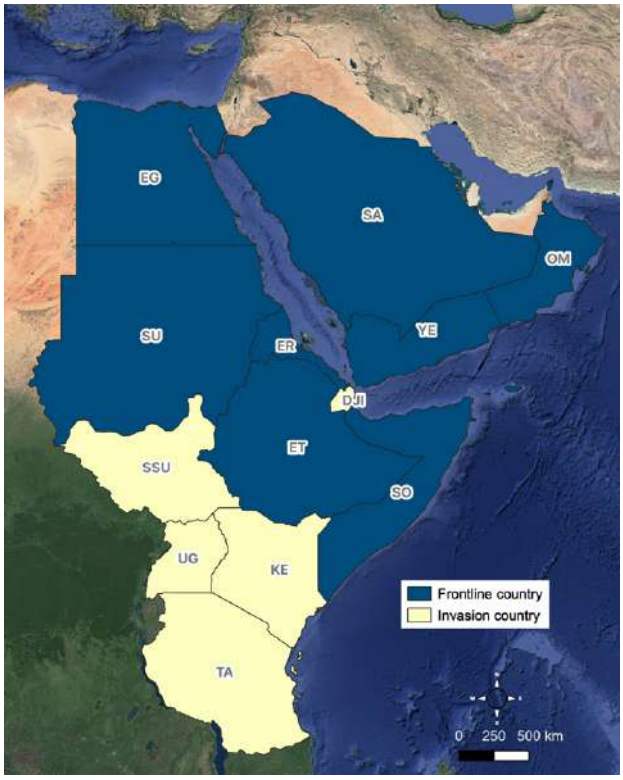


Figure 3. Desert locust frontline and invasion countries

24. Frontline countries contain breeding sites where locusts are endemic and where gregarization starts under favorable environmental/wet conditions. The threat of outbreaks is always there. In the Middle East and East Africa, the frontline countries are Egypt, Sudan, Eritrea, Ethiopia, and Somalia. As such, plant protection departments within the ministries of agriculture need to regularly monitor breeding sites and collect data on the ecological conditions and population numbers and undertake preventive control when necessary (surveillance operations). Based on the West Africa model, AFD recommends that frontline countries create or strengthen autonomous entities within relevant ministries (for example, the Ministry of Agriculture) based on the West African model of National Anti-Locust Units (NALUs).

25. Invasion countries —such as Djibouti, Kenya, South Sudan[8], Uganda and Tanzania do not have breeding sites to monitor. However, they need to be aware of locust development in neighboring countries and regions so that they can prepare for a potential swarm invasion. Investment for such preparation should be proportionate to the level of exposure to the risk of invasion (See table 1. for details on the historic level of risk). Hence, the countries require trained

[8] South Sudan received its independency in 2011.

personnel, a practical response plan and appropriate equipment fragility. Conflict and violence conditions often impede surveillance in breeding areas of GHA.

YEARS	COUNTRIES							
	Sudan	Eritrea	Somalia	Ethiopia	Djibouti	South Sudan	Kenya	Uganda
Plague 1967-1969	X	X	X	X	X			
Upsurge 1972-1974	X	X	X	X	X			
Upsurge 1977-1979	X	X	X	X	X			
Upsurge 1985	X	X		X				
Plague 1986 -1989	X	X	X	X	X			
Upsurge 1992-1994	X	X	X	X	X			
Upsurge 1994-1996	X	X						
Upsurge 1996 -1998	X	X	X	X	X			
Upsurge 2004-2006	X	X						
Outbreak 2010	X							
Outbreak 2012	X	X	X					
Outbreak 2014	X							
Outbreak 2016	X	X						
Upsurge 2020-2021	X	X	X	X	X	X	X	X
TOTAL	**14**	**12**	**8**	**8**	**7**	**1**	**1**	**1**

Table 1. Past Desert Locust upsurges in the Horn of Africa since 1967 (Source: FAO 2020 data[9]).

26. There exists a general agreement on the importance of re-establishing a preventive control strategy in frontline countries, while invasion countries should develop curative response capacities during upsurges. The challenge is that the threat of swarms could be so rare— for example, Kenya, South Sudan, and Uganda had not experienced desert locust swarms in about 70 years — that they cannot maintain the capacity for monitoring and early response.

27. Each country should develop a preparedness plan or contingency plan for responding to a desert locust threat (and threats by other transboundary pests and diseases). These should be linked and coordinated with solid national plans aggregating to define the work at the regional level. The national plans can be tested through pilots and mock exercises. The content of these plans should be agreed upon. The regional plan should be implemented in coordination with the National Preparedness Plans and with the CRC Regional Contingency Plans. Technical guidelines for national plans can be developed at the regional level involving all stakeholder countries so that all plans are aligned and complement each other. The plans should include guidelines for pesticide inventory management and disposal of obsolete stocks.

[9] Source details:
- FAO Desert Locust Guidelines
- A Celebration of 50 Years of Service, CRC
- CRC 28th, 29th and 30th session reports
- FAO/DLIS

ii. Governance and coordination

28. **East African countries should commit to reforming the current institutional framework that exists to combat desert locusts.** Many institutions are involved in desert locust management at the regional and international level with overlapping mandates and roles that can subvert the efforts to efficiently coordinate response across borders (Figure 4). The regional institutions include CRC[10], FAO[11], DLCO-EA[12], EAC[13] and IGAD. There is a need for regional communication and coordination to facilitate timely response during outbreaks and upsurges. This includes streamlining national regulations and procedures and connecting technical specialists with the decision-makers who control the enabling environment for any response mechanism (assigning implementation authority and providing necessary funding and physical plans to carry out those duties). Communication delays or failure between these two parties can severely impede emergency response. This is one of the coordination activities that IGAD's coordination platform on desert locust and transboundary pests could facilitate among its member states. Some of the specific recommendations include:

Sustainably restructure DLCO-EA. The AFD assessment recommends restructuring DLCO-EA by strengthening the human and physical resources, improving organizational governance, ensuring political and financial commitments by its member countries and increasing its collaboration with CRC. The assessment also recommends securing advance funding of CRC's emergency fund and ensuring that principal donors are sensitized to the potential of desert locust upsurges in the future. World Bank and FAO recommend an independent assessment of DLCO-EA and the other institutions to inform any reform-focused investment. Such an assessment would include a functional analysis of the different missions, whether current structures support the mission, current activities, and challenges to operations. Given the expansive members fee arrears in some institutions, a value-for-money assessment, financial sustainability, and quality of services analysis is recommended. It may be worthwhile to engage in a regional

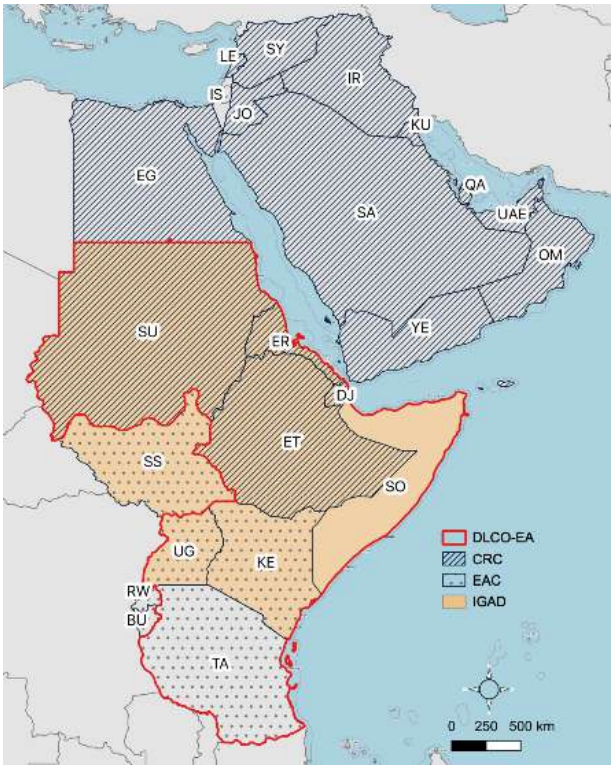


Figure 4. Desert locust institutions in the GHA

[10] FAO Commission for Controlling the Desert Locust in the Central Region
[11] The Plant Production and Protection Division and Emergency Division
[12] Desert Locust Control Organization for Eastern Africa
[13] East African Community

level discussion on how DLCO-EA needs to be reformed to meet the 21st century needs of its member countries.

iii. Research and innovation[14]

29. Successful control operations depend highly on the rapidity or timeliness of interventions after the first populations have been identified in the breeding areas or when hopper bands and swarms have been detected in the invasion areas. Surveillance action, early warning and control operations are a cross-scale effort based on a highly interconnected multi-tiered information chain of field data, ecological and environmental conditions and models of locust development and migration. Surveillance operations are implemented in frontline countries by NALUs[15] while monitoring and early warning is led by FAO's Desert Locust Information Service (DLIS) within the Plant Production and Protection Division. Field surveys are planned based on the environmental conducive conditions for locust development (rainfall and vegetation development) and data are collected using handheld eLocust3 devices[16] and incorporated within standard national RAMSES geographic information systems (GIS), which feeds into the global SWARMS GIS and database at the DLIS. Besides FAO's DLIS, there are other desert locust early warning systems, operated by DLCO-EA and IGAD.

30. The elocust3 tablet is operated by experienced NALU staff in frontline countries while a suite of other eLocust3 tools for mobile phones and GPS are used by national locust teams, local communities, scouts, and agriculture agents in both frontline and invasion countries. The standardized data are incorporated into each country's RAMSES GIS database and forwarded on to the SWARMS GIS database at FAO's DLIS for analysis and forecasting. DLIS oversees global monitoring and early warning since 1978. Monthly Desert Locust bulletins and six-week forecasts, supplemented by warnings and alerts, are communicated to the countries, and shared on the internet in Locust Watch (Figure 5). The RAMSES data are available online through the FAO Locust Hub.

31. The World Bank proposes the implementation of a detailed data flow and data management assessment to ensure effective monitoring and the organization of that phase based on the existing systems in place. The idea of creating transboundary pest units might be financially more sustainable. Therefore, the World Bank recommends an assessment on how such units with a broader mandate could fit into the desert locust monitoring system—e.g., are there technology options to monitor pests and filter the information on desert locusts to the appropriate channels, how can countries establish standard operating procedures to respond to an early-warning alert on desert locusts and other transboundary threats, etc.

[14] This section considers operations, surveillance action and early warning including innovative technologies

[15] Invasion countries have no NALU nor surveillance system in place.

[16] eLocust3 tablet is only available in frontline countries and usually operated by experienced NALU staff.

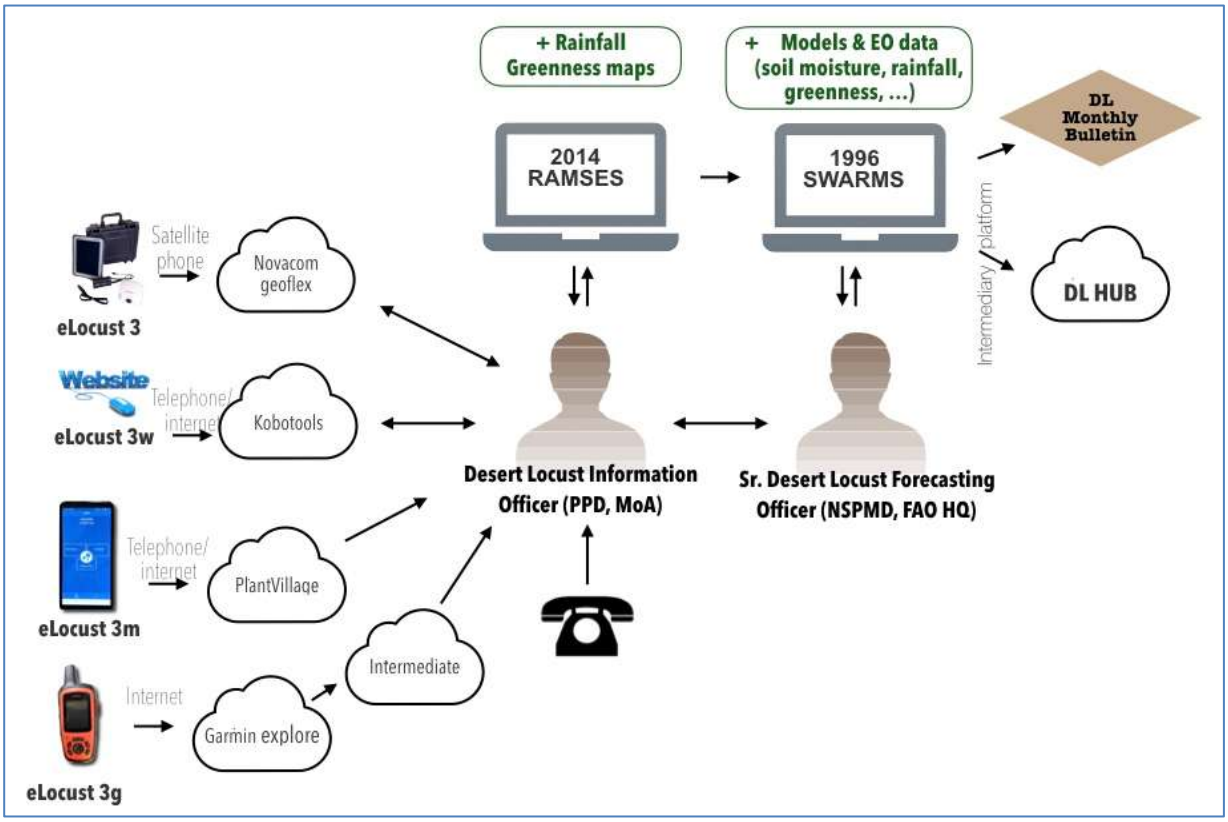


Figure 5. Data flow for desert locust monitoring and forecasting

32. On the other hand, IGAD proposes to establish an inter-regional early warning system for migratory pests, including desert locusts; an early response action plan and also plans to initiate and expedite a desert locust infestation data collection and sharing protocol with IGAD member states. IGAD proposes to use ICPAC and GHACOF[17] to promote climate monitoring and prediction to enhance prediction of pest outbreaks.

33. **Stakeholders should take advantage of new technologies that can aide in monitoring forecasting, surveillance and control.** Earth observation and secondary products help to identify the environmental conditions conducive for desert locust development and migration. Desert locust breeding requires moist soil for the deposition and the development of the eggs while hopper development depends on recent green vegetation. In the breeding areas –all located in the desert– these conditions are associated with rainfall. Climate service products (rainfall, wind direction, air temperature, greenness maps) support locust forecasters to make more precise predictions of the scale and timing of desert locust breeding and migration. The World Bank study stresses the potential of new secondary data for desert locust while IGAD promotes the use of drones, machine-learning and artificial intelligence for monitoring desert locust and other transboundary pests. The World Bank study describes how the use of data and tools has changed over time (Figure 6 - systems that are not being used are placed between brackets) and recommends the use of more recent and detailed information products. The national RAMSES

[17] Greater Horn of Africa Climate Outlook

GIS allows the import of rainfall maps and greenness maps that can be overlayed with field data and have been developed 10-15 years ago. Practice has shown that higher-resolution greenness maps would better support the planning of field surveys, especially to overcome omission errors (when vegetation covers have low density but are still sufficient to support desert locust development). The use of soil moisture maps to locate potential egg-laying areas is considered as the Holy Grail of Earth Observation products but are only just now available for operational purposes. DLIS would also benefit from improved wind and rainfall data (lead time and detail) as well as cyclone warnings to improve the forecasts of desert locust displacement, especially for long term warnings. IGAD promotes the use of new technologies such as drones, machine-learning and artificial intelligence for Desert Locust and other transboundary pests' surveillance and monitoring.

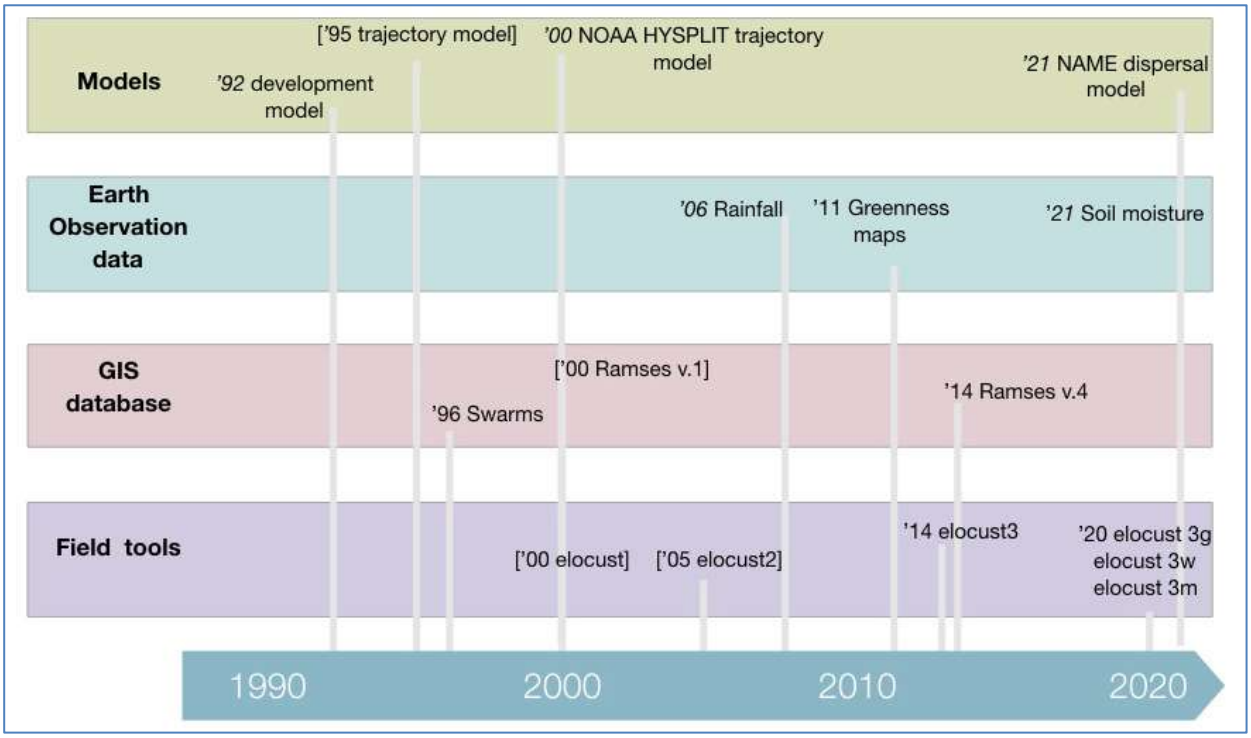


Figure 6. Environmental data and models for desert locust monitoring and forecasting over time

34. **Inclusive and meaningful warnings for decision-makers and control operations.** Warnings are targeting a technical audience but should be developed and adapted for a broader audience including decision makers, local organizations and people. Early warnings and alerts should be improved so that they can better support the processes of decision making and planning of control operations. Different warnings (calm, caution, threat and danger) and infestation (recession, outbreaks, upsurge and plagues) levels should be linked and defined by measurable indicators. A broad cross-scale consultation on the necessary information to ensure early action from all stakeholders at each level (field to global level) and different warning levels is proposed.

35. Alternative control options may be used to mitigate the use of conventional pesticides that are harmful to the environment and human health: Insect growth regulators (IGRs) and biopesticides. IGRs are low-toxicity pesticides, which have low impact on non-target organisms and not harmful for mammals. These IGRs insecticides are efficacious only against immature locust stages – hoppers (nymphs), which makes it impossible to use them against swarms of adults. The biopesticides (for example: Metarhizium acridum; phenylacetonitrile, a hormone that influences gregarious behavior) are highly specific as they kill only locusts and are practically harmless to other beneficial arthropods, such as pollinators (honeybees). They are also harmless for humans, birds, and fish. However, their efficacy on adult locusts' mortality is difficult to evaluate. What is needed is research on the modalities of use of these different biocides should provide tangible elements that can help decision-makers and managers in desert locust control.

36. IGAD proposes ensuring availability of airplanes, vehicles and other surveillance and response equipment in frontline and invasion countries and promoting use of remote-sensed climatic and ecological data to model desert locust breeding and monitor likely impact on pasture and crops.

iv. Capacity building

37. AFD and FAO agree on the fact that human capacity within national institutions for surveillance and early detection in frontline and invasion countries is currently lacking and should be strengthened. IGAD and AFD propose to increase the number of trained experts and develop desert locust training programs directed to all national staff involved in control activities, focusing on those that may be implemented in frontline countries.

38. At regional level, IGAD proposes sharing of information, best practices, and equipment within and between regions through south-south cooperation programs. IGAD also recommends supporting and building regional capacity on desert locust infestation risk management, including risk transfer and micro-insurance.

39. AFD proposes training programs to establish specialized curriculum with universities focusing on the governance of desert locust control activities and to develop and implement regional training plans and to pool resources.

40. At international level, AFD proposes to develop a south-south cooperation program between CLCPRO and CRC to a) share tools and methods of desert locust preventive control and b) CLCPRO to support NALUs' creation in CRC's Member countries. The World Bank assessment suggests enhancing the documentation[18] available on desert locust risk management in coordination with the DLCC[19], regional Commissions and research institutions.

[18] Such as FAO guidelines, forms, SOPs and Locust Watch website

[19] Desert Locust Control Committee

41. **IGAD** recommends building a national and an inter-regional capacity to monitor, survey and assess desert locust impacts using harmonized regional approaches.

v. Livelihood impact and support

42. In December 2019, when the infestation was considered as an outbreak, the GHA region already had over 22.5 million severely food insecure people (IPC Level 3+) and an additional 12 million who were displaced from their homes (many due to conflict). A region with this level of vulnerability is less likely to absorb shocks such as the desert locust upsurge. Combined with the existing fragility, conflict and violence and COVID-19, the locust upsurge has exacerbated impacts on food supply, production, livestock, incomes as well as food and nutrition security in affected areas. Locust swarms destroy vast amounts of food crops and animals become deprived of access to pasture or fodder. Pastoralists engage in distress sales with consequent asset losses and falling income as herds lose weight and exhibit increased mortality.

43. All partners agree on the need to advocate towards the implementation of rehabilitation and support operations for populations affected by desert locust.

44. The FAO study concluded that the widespread pre-existing food insecurity has challenged the targeting of livelihood protection activities to those most affected by the locusts and therefore recommends prioritizing the coordination of livelihood protection response with country-level actors, including country food security cluster bodies, where available.

45. IGAD recommends support of emergency food assistance to populations affected by desert locust invasion and support of livelihoods recovery and resilience interventions for instance through climate-smart agriculture, to address the root causes of food and nutrition insecurity. Furthermore, IGAD recommends strengthening of regional information systems, analytical capacities and institutional mechanisms for food security, nutrition and resilience to track the impact of drivers of food and nutrition insecurity, including desert locust and other transboundary pests.

46. IGAD, in collaboration with the World Bank, French Development Agency and FAO, organized two virtual meetings in January and February 2021, where these recommendations were presented to technical staff from relevant ministries (from IGAD Member States), regional agencies involved in desert locust control and development partners. The recommendations were then consolidated, discussed, and finalized at a technical consultative meeting with all mentioned stakeholders on the 4th and 5th of May 2021. The final outcomes have been a set of granular recommendations and summarized recommendations to be presented at a ministerial conference.

47. The recommendations were divided among three final topics, as follows:

a. Strategies and preparedness

MINISTERIAL RECOMMENDATION (To be presented at the ministerial meeting)	**GRANULAR RECOMMENDATIONS FROM TECHNICAL DISCUSSIONS** (Technical Meeting Consolidated feedback)
1. Establish dedicated desert locust units or teams in relevant national entities to maintain a high level of alertness on potential desert locust invasion/upsurge. Affected countries should establish: ■ Dedicated and autonomous desert locust units within the relevant Ministry at the national level in **frontline** countries (i.e., Sudan, Eritrea, Ethiopia and Somalia). ■ Dedicated transboundary pest teams within the Plant Protection Department (PPD) or other relevant bodies at national level in **invasion** countries (i.e., South Sudan, Kenya, Djibouti and Uganda)	Establish teams within the Plant Protection Department (or other the national entity that manages migratory pests). These teams should work in close collaboration with the FAO desert locust information system.
	Establish teams within the Plant Protection Department (or other the national entity that manages migratory pests) to work in close collaboration with the desert locust information systems of relevant regional agencies.
	Establish desert locust centers at the national level within ministries to work in close collaboration with relevant regional agencies.
2. Building on the achievements of the ongoing campaign, each member country should develop a national preparedness plan encompassing the required institutional and human capacity, infrastructure/technology, training programs, research, and information required for a sustainable national system. A similar system should be developed at the regional level that creates connection between the individual national plans and supports cross-border cooperation. More specifically, countries and the region should build effective surveillance, monitoring and early warning and early response systems to prevent locust outbreaks/upsurges in future: **a. Frontline countries (i.e., Sudan, Eritrea, Ethiopia, and Somalia)** ■ Develop and implement National and cross-border prevention strategy (including review and adjust technical guidelines and training modules/packages) ■ Establish a coordinated National and cross-border protocol for surveying and monitoring (mostly during breeding season)	Develop technical guidelines on how to prepare national and regional level prevention strategies and/or preparedness plans for desert locust and other transboundary pests.
	Develop and implement national and regional prevention strategies and/or preparedness plans for desert locust and other transboundary pests.
	Establish joint surveying exercises among neighboring countries especially during breeding season.
	Strengthen the capacity at national level to build effective early warning systems surveillance and monitoring systems to prevent locust outbreaks in future.
	Harmonize the monitoring and surveillance tools used in the field for various transboundary pests and have a common tool for the member states that defines the communication chain/channel of notification taking into consideration that some pests have similar monitoring systems (desert locust, tree locust, African Migratory Locust, etc.) and others need stand-alone systems (tse tse, FAW, quelea, etc.).

MINISTERIAL RECOMMENDATION (To be presented at the ministerial meeting)	GRANULAR RECOMMENDATIONS FROM TECHNICAL DISCUSSIONS (Technical Meeting Consolidated feedback)
b. Invasion countries (i.e., South Sudan, Kenya, Djibouti, and Uganda) ■ Develop capacity building modules and training packages and establish recurrent training sessions. ■ Harmonize the monitoring and surveillance tools used in the field for various transboundary pests, and have a common tool for reporting and sharing information ■ Develop national plans for strengthening data collection processes at the field level that ensures the availability of adequate logistics (transport, phone credit, capacity building, etc.) and coordination system. **c. Regional and/or Interregional collaboration** ■ Build on the FAO/CRC repository for data and information on desert locusts (expanded to other transboundary pests for invasion countries) establish sharing mechanisms to ensure availability of data to member states (MS) that aren't part of CRC. ■ Support IGAD to establish a regional information system, analytical capacity, and institutional mechanisms for food security, nutrition, and resilience to track the impact of drivers of food and nutrition insecurity, including desert locust and other transboundary pests.	Develop national plans for strengthening data collection processes at the field level that ensures the availability of adequate logistics (transport, phone credit, capacity building, etc.) and coordination system.
	Develop and implement a plan for cross border surveys, reporting and control operations, where possible, for desert locust and other transboundary pests.
	Establish a capacity building module and training packages, as a preparedness measure, that would be deployed rapidly before the onset of an invasion and strengthen the human resources at the national and regional levels.
	Build on the existing repository source for data and information on desert locust and other transboundary pests to help maintain institutional memory and develop national plans, including best practices of existing institutional structures, regionally and inter-regionally, that will support member states strengthen their efforts[20].
	Support regional information systems, analytical capacities and institutional mechanisms for food security, nutrition and resilience to track the impact of drivers of food and nutrition insecurity, including desert locust and other transboundary pests.
	Develop a plan to build and maintain institutional capacities (human, infrastructure, training programs, research, advocacy) at national and regional levels, where needed, to respond to the desert locust in frontline and invasion countries that would ensure adequate preparedness to respond in case of an invasion.
	Conduct capacity needs assessment of the invasion countries to have a better understanding of the level of knowledge among the ministerial staff,

[20] Some example of success practices include:

- Operational level: Ethiopia is establishing a migratory pest management unit with specialized units within: DL, FAW, Quelea, etc.,
- Strategic planning level: Kenya has a Multi-institutional Technical Team (MITT) started by MOA, which includes government, academia, international organizations, security services, etc. to oversee their response, and
- Specialization (of mission/expertise) works better for regional institutions. National experts could work at regional institutions given that some country (invasion) may not see another invasion for 20 years or more.

MINISTERIAL RECOMMENDATION (To be presented at the ministerial meeting)	**GRANULAR RECOMMENDATIONS FROM TECHNICAL DISCUSSIONS** (Technical Meeting Consolidated feedback)
	development agencies and academia.
	Provide teams within the Plant Protection Department (or other the national entity that manages migratory pests) with regular training sessions to have basic capacities at national level for responding to desert locust and other transboundary pests.
	Conduct capacity building training on available technologies (WhatsApp, E-Locust 3, and other apps and platforms) at national level, including the communities and trained locust scouts, to strengthen their knowledge to identify hot spots and collect/transmit real-time information to the national task force teams.
	Conduct regular refresher training activities for invasion countries (preferably in frontline countries) to maintain their capacity.
	Conduct regular capacity building activities on desert locust and other transboundary pests response operations at national level for civil society, focusing on youth.
3. Develop national and regional risk assessment and crisis management plans for desert locusts and other transboundary pests, considering the possible changes in DL gregarious distribution areas due to climate change leading to the development of more frequent upsurges, within and beyond the frontline countries: ■ Include a long-term and costed capacity building plan (covering 5-10 years – for example conducting regular simulation exercises for reporting, managerial and coordination staff at national and regional levels). ■ Support member countries to define areas of actions, assets/equipment required, cost implications, etc.	Support and build regional capacity on risk management of desert locust and other transboundary pests infestation including risk transfer and micro-insurance.
	Create a risk assessment and crisis management plan compiled from national plans and disseminate to all stakeholders.
	Develop Desert Locust Risk Management Plans that include conducting regular simulation exercises for reporting, managerial and coordination staff at national and regional levels.
	Develop national and regional contingency plans that would support member countries to define areas of actions, have a harmonized intervention on desert locust and other transboundary pests management.
4. Establish (and continuously update) a coordinated National and Regional communications plan by IGAD Member States while learning from the recent upsurge.	Establish a communication plan that has an outreach with the media and donor communities at the national and regional levels, and that can be

MINISTERIAL RECOMMENDATION (To be presented at the ministerial meeting)	**GRANULAR RECOMMENDATIONS FROM TECHNICAL DISCUSSIONS** (Technical Meeting Consolidated feedback)
The communications plan will include guidance for outreach with media and donor community, and effective communications campaign for civil society and affected populations.	mustered prior to the desert locust invasion to support early warning and action and mobilize resources.
	Establish effective communication campaigns on "how to respond and behave" along with civil societies and communities impacted by desert locust and other transboundary pests.
5. Establish public-private partnerships (PPP) agreements at national and regional level to maintain and strengthen the availability of the supplies and services needed to respond to DL or other pest outbreaks, while learning from the current upsurge about the role of the private sector as a key partner in the fight against desert locust and other transboundary pests. The PPP agreements will aim to: ■ Enhance locally produced bio-pesticides and good quality standards chemical pesticides ■ Harmonize the regulatory framework for pesticides across IGAD – member states ■ Establish standard operating procedures (SOP) and compliance standards for private sector operators ■ Maintain and continuously update an inventory of private sector partners to produce equipment (sprayers, chemicals and bio products, protective equipment, etc.) and services (planes, drones, data, etc.) to be immediately outsourced to member states and/or regional institutions (DLCO-EA) in case of outbreak/upsurge Of equal importance is the collaboration with civil society and affected populations that requires effort to be enhanced and maintained well beyond desert locust and other transboundary pests.	Conduct annual market studies and reviews of pre-identifying suppliers, pesticide stocks, equipment supply, production and marking chain across the Greater Horn of Africa and enhance logistic management to limit unused stocks and maximize triangulation.
	Mobilize private sector actors to locally produce biopesticides.
	Harmonize the regulatory framework for the use of pesticides.
	Strengthen public - private collaboration for the management of desert locust and other transboundary pests through establishing an MoU for planning and preparing necessary equipment, and tools (planes, drones, chemicals, protective equipment, data, etc.) to be outsourced to member states and/or regional agencies involved.
	Establish standard operating procedure (SOP) for private sector partners to ensure that their quality of work is in compliance with DLCO-EA and FAO standards.
	Establish accords and agreements with civil society, similar to the private sector, to strengthen the communities that are involved in gathering information and needed data.

b. Governance and coordination

MINISTERIAL RECOMMENDATION (To be presented at the ministerial meeting)	**GRANULAR RECOMMENDATIONS FROM TECHNICAL DISCUSSIONS** (Technical Meeting Consolidated feedback)
6. Review policies and regulations to support an effective response to desert locusts and other transboundary pests at national and regional (cross-border) level.	Identify policies/regulations at national level that need to be established and/or reformed to facilitate an effective response to a desert locust and other transboundary pests.
7. Recognize DLCO-EA and CRC as key partners in a sustainable management system for desert locust and other transboundary pests, and the role played by FAO/CRC in building and maintaining knowledge/capacity across their members. It is recommended to: ■ Conduct external and independent institutional assessment of desert locust and other transboundary pests through an established Task Force coordinated by IGAD that maps the technical, institutional, and financial sustainability (reviewing roles and mandates, identifying overlaps and synergies, etc.) or the related regional and inter-regional institutions (DLCO-EA and CRC) in consideration of the different needs of invasion and frontline countries. ■ Informed by the finding of the assessment, develop a comprehensive plan for the modernization/reform of existing and/or new regional institutions. ■ Informed by the finding of the assessment, develop a regional funding plan to secure/resume member states financial support/contribution. And possibly increase the available annual resource.	Conduct external and independent institutional assessment of Desert Locust related regional and inter-regional institutions (DLCO-EA and CRC) that maps their technical, institutional, and financial sustainability (reviewing roles and mandates, identifying overlaps and synergies, etc.)
	Conduct an assessment to identify the frontline countries (breeding areas) and the invasion countries and establish a clear-cut line between frontline and invasion among the countries and within countries.
	Conduct an assessment to identify the various structures needed (DLCO-EA, CRC, IGAD, others) for frontline countries and for invasion countries for the management of desert locusts.
	Establish a working group/task force to lead discussions on assessment of regional and inter-regional institutions and potential institutional arrangements.
	Establish national and regional strategic documents and action plans to ensure that regional and national organizations involved in DL and other transboundary pests have a wider mix of skills in their governing bodies, for example, research, logistics, agri-chemicals etc.
	Support DLCO-EA financially as the key regional organization in the management of desert locust and other transboundary pests upsurges.
	Develop a regional funding plan for IGAD member states to resume support for regional institutions and strengthen their capacities.
	Advocate for more funds to cover the cost of coordination and management of Desert Locust and other transboundary pests by regional institutions (DLCO-EA, CRC, IGAD).

MINISTERIAL RECOMMENDATION (To be presented at the ministerial meeting)	GRANULAR RECOMMENDATIONS FROM TECHNICAL DISCUSSIONS (Technical Meeting Consolidated feedback)
8. Establish an inter-regional platform to facilitate exchanges between frontline countries in the Horn of Africa and the Arabian Peninsula, and invasion countries. The platform will aim to enhance institutional arrangements and creating a joint/coordinated strategy for frontline and invasion countries, coordinate response, training plans, sharing of information, and conducting south-south exchange programs to promote experience sharing and learning.	Establish an inter-regional coordination platform for desert locust and other transboundary pests, bringing together member states, DLCO-EA, CRC, development partners, neighboring countries from the Arabian Peninsula (Saudi Arabia, Oman, Yemen) and Tanzania to lead discussions on potential institutional arrangements, response, training plans, sharing of information and conducting south-south exchange programs to promote experience sharing and learning.
	Establish a Memorandum of Understanding (MoU) between IGAD member states, DLCO-EA and neighboring countries from the Arabian Peninsula (Saudi Arabia, Oman, Yemen) and Tanzania to create a strategy between breeding and invasion countries and strengthen collaboration.

c. Research and innovation

MINISTERIAL RECOMMENDATION (To be presented at the ministerial meeting)	GRANULAR RECOMMENDATIONS FROM TECHNICAL DISCUSSIONS (Technical Meeting Consolidated feedback)
9. Commit to work with research institutions to conduct fundamental assessments and research on topics related to surveillance and management of desert locusts and other transboundary pests. This will be achieved through the following: ■ Create fundamental research opportunity, ■ Stock take and identify technologies – digital (for example, smartphones apps and e-platforms), high-res satellite imagery, bio-control solutions, drones, etc. and other improved models of equipment and tools for effective preventative, reporting, surveying, and management measures, designated for desert locusts and other transboundary pests, ■ Enhance the implementation of innovative preventative strategies, ■ Develop research agenda on the use of biopesticides, the utilization of desert locusts for food/feed, the gene isolation for the	Conduct an assessment to identify technologies – digital (for example, smartphones apps and e-platforms), high-res satellite imagery, bio-control solutions, drones, etc. and other improved models of equipment and tools for effective preventative, reporting, surveying, and management measures, designated for desert locusts and other transboundary pests.
	Conduct a study to find alternative ways for transmitting data from the field (for the purposes of reporting, surveying, etc.) in areas with low or no internet connection.
	Strengthen existing regional centers/forums to conduct fundamental research on various topics, such as, innovative preventative strategies, biopesticides, utilizing locust for food/feed, gene isolation for the identification of pheromone producing chemicals in locusts (similar to fall armyworms), etc.

MINISTERIAL RECOMMENDATION (To be presented at the ministerial meeting)	**GRANULAR RECOMMENDATIONS FROM TECHNICAL DISCUSSIONS** (Technical Meeting Consolidated feedback)
identification of pheromone producing chemicals in locusts (i.e. fall armyworms), etc.	Create fundamental research opportunities (not applied) to answer core questions that will help move from firefighting to prevention.
	Establish national training centers that focus on capacity building technical personnel on management, coordination, reporting and surveying, in addition to producing manuals, conducting Training of Trainers (ToT) activities, and training on collecting and disseminating information related to desert locust and transboundary pests.
	Update national level curriculums to ensure that training institutions/academia provide specialized training, both internally and externally and to ensure that trained individuals from the academic institutions can support response operations.
	Strengthen capacity of technical personnel and research institutions that are involved in the interpretation of weather products, situation reports, information gathered and analyzed by the plant protection departments, carrying out surveys for eggs for early locust detection, etc.