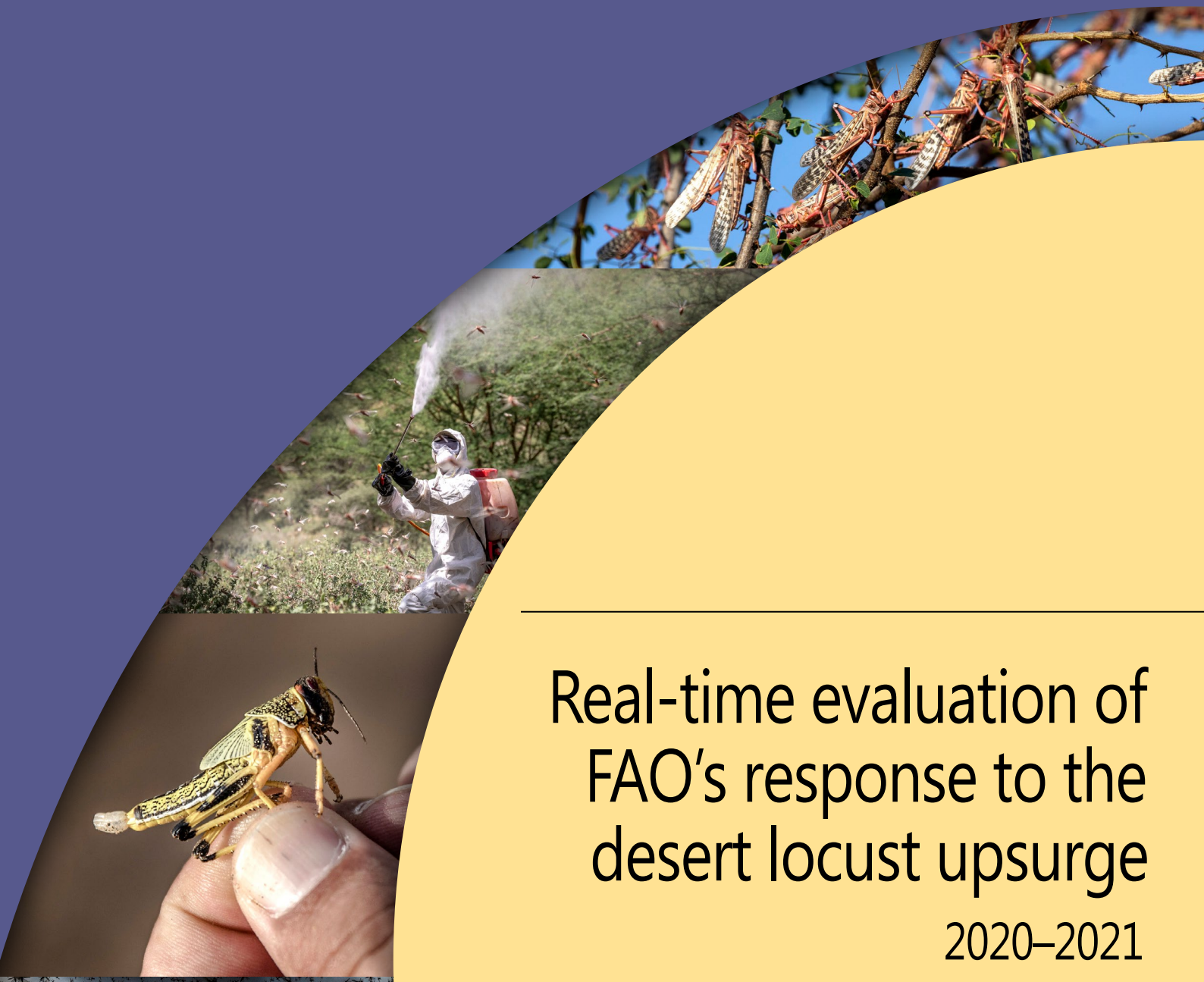
Food and Agriculture Organization of the United Nations

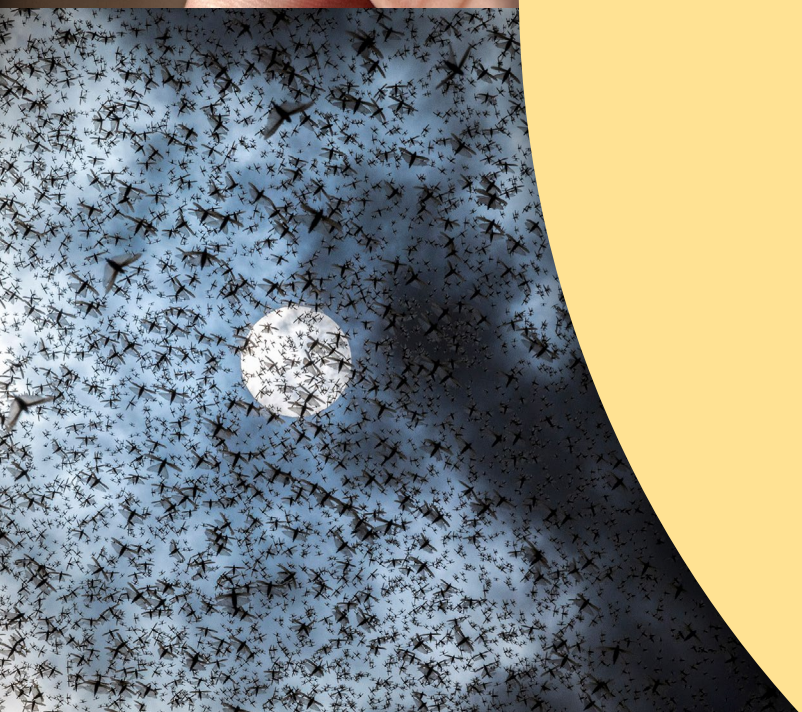
Programme Evaluation Series
10/2021



Real-time evaluation of FAO's response to the desert locust upsurge

2020–2021

Phase II



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Real-time evaluation of FAO's response to the desert locust upsurge 2020–2021

Phase II

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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Abstract

Over the course of 2020–2021, the most devastating desert locust upsurge of the past 25 years has spread across parts of the Middle East, the Greater Horn of Africa and Southwest Asia. The upsurge poses an unprecedented risk to livelihoods and food security in some of the most food insecure countries in the world. FAO and its partners have mobilized more than USD 232 million since January 2020. The response includes three key pillars: i) curbing the spread of desert locusts (including surveillance); ii) safeguarding livelihoods and promoting recovery; and iii) coordination and preparedness of the rapid surge support. In this context, the FAO Office of Evaluation (OED) has been requested by the Director-General to conduct a real-time evaluation, conducted across three phases spread over one year. Each phase will cover specific aspects of the response. Phase II focuses on results at field level, through the conduct of country case studies in Ethiopia, Kenya, Pakistan, Somalia and Sudan.

The evaluation highlights the significant contributions made by FAO across full spectrum of preparation, surveillance and control of locust swarms and livelihood protection in the Horn of Africa and Southwest Asia. FAO's support was generally well-tailored to national capacities and food security cases despite the challenges caused by political contexts in some countries. FAO also performed very well on the coordination of a highly complex and multi-actors response, building and maintaining good partnerships, including with foundations and private actors, despite the uniquely challenging external context. Some issues were observed in pesticides selection by individual countries, and procurement processes hampered FAO's effort to ensure timely supply of equipment and pesticides affecting the effectiveness of control operations. The response utilized a number of innovations in survey and control approaches combined with good information sharing between countries; however, there is room for improvement to strategically embed innovation and learning across contexts.

Six priority areas for recommendations emerge from this process, with distinct recommendations being made across each one: i) country level training and capacity development; ii) national locust control architecture; iii) procurement; iv) pesticide management; v) livelihoods support; vi) innovation and learning. For each priority area, the evaluation has made a range of recommendations targeting either FAO headquarters, donors and partners, or FAO country offices.

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Figure and table

Abbreviations and acronyms

DLCO-EA	Desert Locust Control Organization for Eastern Africa
DLIS	Desert Locust Information Service
EHS	Environment, health and safety
FAO	Food and Agriculture Organization of the United Nations
NGO	Non-governmental organization

1. Introduction

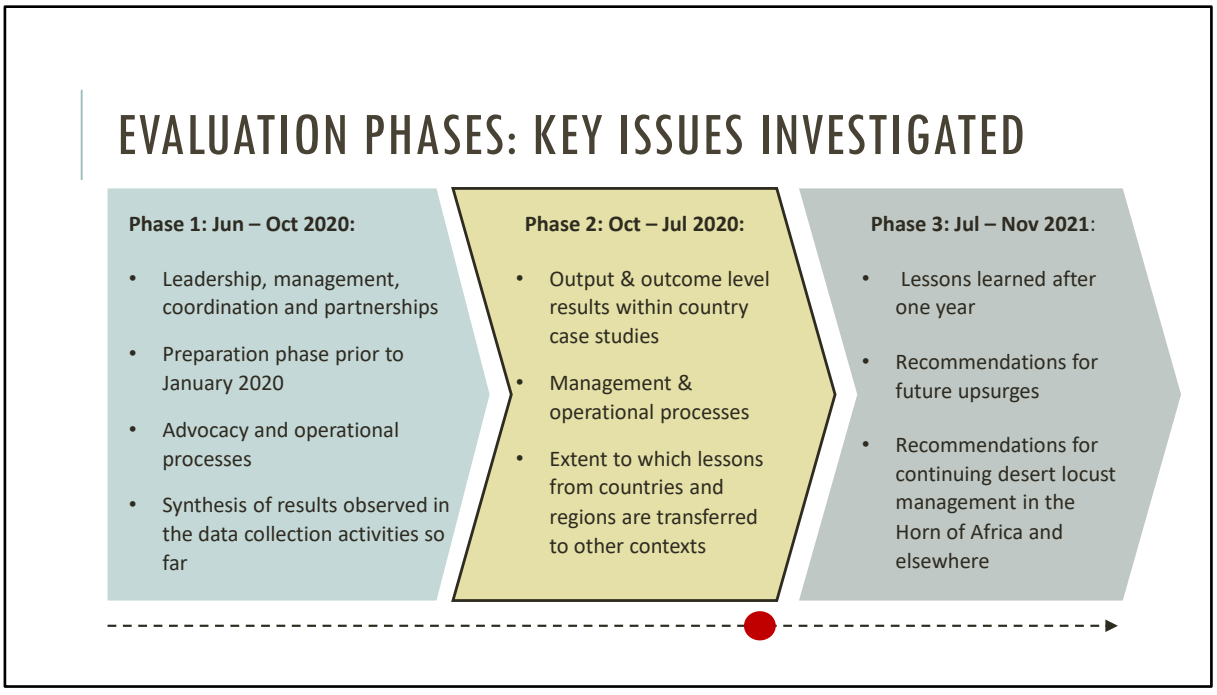
1. Over the course of 2020–2021, the most devastating desert locust upsurge of the past 25 years has spread across parts of the Middle East, the Greater Horn of Africa, and Southwest Asia. The upsurge poses an unprecedented risk to livelihoods and food security in some of the most food insecure countries in the world. Over the past few years, consecutive shocks, including poor rainfall, flooding, macroeconomic crises and armed conflict have contributed to a significant level of vulnerability across the countries most affected by the desert locusts. In 2020, this was exacerbated by the impacts of the COVID-19 pandemic, and the global response to it. In May 2021, 36.6 million people in locust-affected countries face crisis-level food insecurity (IPC 3+).

2. With a new generation of desert locusts breeding in Northeast Africa and Yemen in October 2020, the situation worsened through October-November in the Horn of Africa. Large-scale ground and aerial control operations continued throughout the region during November and December with an emphasis on control activities in Ethiopia and Somalia to reduce the potential of swarm formation that could spread locust populations more widely. This continues to be a rapidly changing situation and the Food and Agriculture Organization of the United Nations (FAO) has a unique mandate to respond.

3. FAO and its partners have mobilized more than USD 232 million since January 2020 (FAO, 2021). The response includes three key pillars: i) curbing the spread of desert locusts (including surveillance); ii) safeguarding livelihoods and promoting recovery; and iii) coordination and preparedness of the rapid surge support.

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

Figure 1. Real-time evaluation phases



Source: developed by the evaluation team.

2. Phase II purpose and scope

2.1 Evaluation purpose

5. This real-time evaluation has two dimensions:

   i. Mutual accountability: providing an independent assessment of what FAO and its partner organizations have achieved since January 2020, including timeliness and sufficiency of resourcing, efficacy of the operations, and the environmental impacts of control operations.
   ii. Learning for FAO and all partners and stakeholders on what has worked and what has not worked, and what should be done to adjust current and future operations.

6. Both of these objectives concern FAO activities, as well as activities by FAO partners in the desert locust response. Indeed, a wide range of actors contribute vital parts of the locust response, including donors, regional locust commissions, national governments, United Nations (UN) agencies, non-governmental organizations (NGOs) and research institutes. For this reason, the evaluation is taking a system-wide lens when assessing the response. But it should be noted that evaluation scope is limited to partner activities **to the extent that they are part and parcel of FAO's activities in response to the desert locust upsurge**. This principle has guided methodological design and the selection and focus of evaluation questions.

7. The aim of Phase II of the real-time evaluation is to provide accountability and share learning on the response at country level over the period January 2020 to April 2021, specifically on the relevance and effectiveness of locust surveillance and control operations and livelihood protection activities, as well as coordination and use of innovative approaches in the response.

8. On the basis of findings gathered, this evaluation will be able to make recommendations for operational adjustments in real-time. It will therefore complement and add to ongoing communication activities organized at the regional level, specifically aiming to encourage cross-regional learning on issues including, for example, innovation in surveillance, control and response to the upsurge.

2.2 Phase II scope

9. In line with the purpose of the real-time evaluation concept note, data collection activities have been designed to collect evidence relating to the five main evaluation questions:

   EQ1. To what extent did FAO's leadership, management and technical capacity support a relevant, timely and effective system-wide response to the desert locust upsurge?
   EQ2. To what extent was the response coherent with FAO's other operations and those of other actors?
   EQ3. What were the positive and negative, intended and unintended results of FAO's actions in terms of food security, livelihoods and resilience of affected households and communities?
   EQ4. What have been the enabling factors and limiting constraints on the effectiveness of FAO's response?
   EQ5. To what extent did FAO's processes support innovation and learning across the affected regions?

10. Appendix 2 to this document presents the full evaluation matrix, which includes evaluation questions, sub-questions, data collection tools and the phases of the RTE process in which each question is addressed.

11. Phase II activities have specifically focused on the key issues arising from the Phase I of the response. The evaluation team assessed FAO's activities across the following thematic areas:

i. Relevance and timeliness of operations at country level.
ii. Effectiveness of operations at controlling the locust upsurge and protecting livelihoods in the Horn of Africa and Pakistan.
iii. Factors enabling and constraining the achievements observed.
iv. Coordination of activities across the spectrum of actors involved in the response.
v. Innovation and learning between country operations.

12. As such, the evaluation methods outlined below focus primarily on data collection from country-based stakeholders in Kenya, Ethiopia, Somalia, Sudan and Pakistan. These included FAO country office teams, donors, regional technical bodies, multilateral organizations, national and subnational governments, NGOs, control teams and affected households.

2.3 Phase II method

2.3.1 Data collection activities

13. The methodology has been designed to fit the information needs outlined in the evaluation questions and key issues for investigation during Phase II, as well as the need for real-time feedback for FAO teams and partner organizations. Given the focus on results at field level, the evaluation team focused their activities on the implementation of country case studies deploying nationally-based desert locust and livelihoods experts to conduct field and site visits, key informant interviews (KIIs) and focus group discussions (FGDs) with the major stakeholders involved in the management of the scale-up appeal and its response. The team also conducted additional key informant interviews with strategic stakeholders at the global level and a survey of NGOs involved in the response.

14. A total of **488 individuals were consulted** during the course of Phase II interviews, including 475 through country case studies, and 13 at global level covering relevant FAO headquarters personnel, staff, regionally-based donors, the Intergovernmental Authority on Development (IGAD), the World Bank and members of the Regional Desert Locust Alliance (RDLA) of NGOs operating in the Horn of Africa. This was supplemented by an **online survey of 51 RDLA members**, of which 21 provided responses (see the Survey report in Annex 2). A full list of persons interviewed is presented in Appendix 1.

15. The findings of these outputs were synthesized across the evaluation matrix (Appendix 2) to produce the findings grid, from which the findings in this main report were drawn.

16. Case studies were conducted in Kenya, Ethiopia, Somalia, Sudan and Pakistan. These countries were selected on the basis of the locust presence during the period of the field visits, combined with security and access challenges in alternative countries (e.g. Islamic Republic of Iran and Yemen).

17. Each case study included interviews with FAO country office personnel engaged in the locust response, relevant donors and multilaterals in-country, staff of the ministries of agriculture and plant protection departments, control teams and pilots, affected communities, local government bodies and NGOs. Visits were conducted of control sites, storage facilities and samples of farming communities in receipt of livelihood protection assistance. Each national expert produced a minimum of one report. In Pakistan and Sudan, where livelihood operations were not being conducted at the time of the case studies, only one report was produced, focused on the survey

and control operations. In Kenya, two reports were produced: one covering locust survey and control, and the other covering livelihood protection. In Somalia, due to the mixed expertise of the national expert and the divergent country contexts, the national consultant produced two reports covering both locust survey and control and livelihoods protection, but treating Somaliland and Puntland as separate country studies. All country reports are available in OED's repository upon request.

2.4 Limitations

18. The major limitations faced during Phase II activities are linked to the remote data collection approach deployed. Travel restrictions arising from the COVID-19 pandemic meant that all key informant interviews had to be conducted by nationally-based evaluation teams which, whilst each team member is an expert in their field, introduced the potential for differential assessment approaches between countries. To a certain extent, this limitation was mitigated by the use of centrally-designed interview questionnaires and reporting frameworks, but differences in judgement will nevertheless inevitably exist between countries. The inability of the core team members to visit the field locations also limited the speed of data collection and interpretation during this Phase.

19. Delays were also incurred relating to both the recruitment and onboarding of suitable experts for the country missions, and the implementation of the field visits themselves, which were affected by insecurity, most notably in Puntland where the national expert was unable to conduct field visits.

3. Findings

20. The following section presents the real-time evaluation findings during Phase II. Findings are presented across each of the key themes of the Phase II data collection activities, in the following order: findings related to the relevance and timeliness of FAO's support, including the accuracy and usability of forecast data, appropriateness of equipment and pesticide provisions, and the timing and tailoring of livelihood protection packages; findings related to the effectiveness of operations, including the success in treating locust-affected areas and in supplying affected households with livelihood protection packages;, findings related to the enabling and hindering factors in the response are discussed, including issues around access and security, COVID-19 restrictions, as well as "internal" constraints around processes and procedures; coordination, with particular consideration of the coordination challenge involved in a response of this scale; and findings around the innovations used in the response and what was learned.

21. Each finding is provided a confidence rating, reflecting the evaluation team's confidence on the finding based on the evidence underlying it. The rating system has been adapted from the GRADE system of evidential strength assessments, as follows:[1]

VERY HIGH - The evaluation team is very confident in the evidence supporting the finding. Further research is considered very unlikely to change the finding or its importance.
HIGH - The evaluation team is confident in the evidence supporting the finding. Further research could potentially add nuance to the finding or its interpretation, but is unlikely to change the finding itself.
MODERATE - The evaluation team has only moderate confidence in the evidence supporting the finding. Further research is likely to improve the evaluation team's understanding of this issue.
LOW - The finding is very uncertain and requires more research.

22. The assignment of confidence ratings has been made by the evaluation team's own judgement, and is therefore subject to author bias. It nevertheless provides a consistent basis on which to interpret the findings.

3.1 Relevance and timeliness

23. The surveillance, control forecasting and communication efforts conducted by FAO and its partners increased the preparedness, pre-positioning and planning of locust survey and control efforts. Reports from across the country case studies provide strong evidence that FAO's support at country, regional and global levels contributed to improved preparedness, pre-positioning and planning of locust survey and control. Significant improvements were made to survey and control capacity at national level – both in terms of building up invasion country capacity where it didn't previously exist, and in terms of supporting and extending capacity in frontline countries where pre-existing national government capacities were stronger.[2] The provision of timely and accurate data by the Desert Locust Information Service (DLIS) was cited as having high added-value for

[1] The GRADE approach is a system developed by healthcare researchers for rating the quality of a body of evidence in systematic reviews and other evidence syntheses: http://help.magicapp.org/knowledgebase/articles/371159-the-grade-handbook

[2] Frontline countries are those that have regular desert locust breeding seasons and typically have, as such, greater pre-existing capacity to respond. Invasion countries are those without regular breeding seasons and thus, typically, without the same level of pre-existing infrastructure to respond.

locust control operations, while the provision of training, resources, pesticides and equipment for control and survey teams was also considered timely and relevant to need.

CONFIDENCE RATING: VERY HIGH

24. FAO supported surveillance and control capacities in a timely manner, both frontline and invasion countries in the Horn of Africa and Southwest Asia, which had clearly observable positive effects on the preparedness of countries to control the upsurge.

25. In Kenya, FAO conducted training for desert locust information officers and helped establish an information office within the Ministry of Agriculture to support country-ownership of the survey and control data production within the wider context of FAO's global monitoring and early warning system. Preparedness was also enhanced through the provision of equipment and resources across six bases established in the country, including airstrips, fixed and rotary wing aircraft, pesticide stocks, stock management systems, and a Joint Communication Control Centre to strengthen planning between FAO and the Government of Kenya. Surveillance and communication efforts improved greatly in Mandera, Wajir and Samburu counties. The availability of over 3 000 scouts trained on the use of innovative surveillance tools like eLocust3g and eLocust3m, has improved surveillance and reporting for the locust response. The improved surveillance capacity along the Mandera corridor – the frontline for swarm invasions in Northern Kenya – resulted in greater preparedness for desert locust control especially during the second wave of swarm invasions in early 2021 in Isiolo and Samburu counties, and improved planning in Wajir and Mandera (FAO, 2020a).

26. In Sudan, pre-existing resources and experienced locust scouting teams meant that the Government was already able to survey and control desert locusts within their normal breeding grounds, but FAO and its partners improved and extended this capacity. Financial and material resources provided by FAO enabled the survey operations to extend to other areas, including some parts of Darfur which had not been surveyed for 15 years. The timeliness of the support was also cited as critical, with almost all the surveillance, control and training activities conducted in Sudan from mid-March onwards being sponsored and supported by FAO and its partner donors (FAO, 2020b).

27. In Ethiopia, while the pre-January 2020 preparation was low and as a result some damage was sustained in various parts of the country, the 2019 upsurge did prompt better preparation in 2020. FAO contributed to better preparedness through active involvement and early resource mobilization; its role in the response coordination and joint planning with the national government; and, in some cases, the direct support of regional stakeholders and supply of airtime for surveillance operations (FAO, 2020c). As in Kenya, FAO provided training for desert locust information officers and helped establish an information office within the Ministry of Agriculture, with the aim of supporting country-ownership of the survey and control data production within the wider context of FAO's global monitoring and early warning system.

28. In Somalia, FAO is managing survey and control data directly through the DLIS, in lieu of a sufficient country-based capacity to manage survey and control data. In Somaliland, FAO's support to surveillance, communication and control activities was cited as contributing to a timely and appropriate control operation. Forecasting data was cited as particularly relevant, providing daily updates of sufficient quality for control teams to use in real-time, as well as supporting pre-positioning preparedness and planning of operations (FAO, 2020d). In Puntland, FAO mobilized resources and supported local planning and coordination capacity in a timely manner, although a one month delay then occurred before activities began on the ground. This delay, partly caused by access constraints, allowed the locust invasion to continue to cause more harm than would

otherwise have occurred (FAO, 2020e). In South/Central Somalia, surveillance and control operations were restricted due to access constraints.

29. In Pakistan, FAO was actively involved in supporting implementation of the Government's comprehensive National Action Plan for the desert locust response. FAO supported national capacity building including with the department of plant protection and its provincial agriculture departments and field teams. FAOs support for logistics, technical assistance and guidance were cited by government officials and field teams as contributing to the timely response (FAO, 2020f).

CONFIDENCE RATING: VERY HIGH

30. **The data provided by DLIS was used by control teams to help plan operations in real-time**. Ethiopian and Pakistani government sources cited DLIS data as extremely accurate and helpful to the response planning process (FAO, 2020c; FAO, 2020f) Kenyan ground and aerial control teams were supplied with forecasting data from DLIS twice a day through the joint communication control centre in Lewa. This data provided real-time information on swarm sighting, geo-reference points and treatment areas against swarm coverage; enabling control teams to operate more effectively during operations (FAO, 2020a). Forecast data provided by DLIS was likewise used to help plan control operations in Sudan, as well as to raise awareness of the locust threat evolution within the Sudanese Ministry of Agriculture. The detail and timeliness of the DLIS data was credited with paying a major role in urging the plant protection department to mobilize resources in response to the upsurge. This data was also cited as filling an information gap in the absence of direct data sharing between countries in the Horn (FAO, 2020b).

CONFIDENCE RATING: VERY HIGH

31. Delays were noticed in procurement and supply of equipment for control operations, which impacted the timeliness of ground operations in particular.[3] In both Pakistan and Ethiopia, the supply of camping and communication equipment delayed survey and control operations (FAO, 2020c; FAO, 2020f). In both Sudan and Somaliland, delays were observed in the handover of certain items, with time lapses occurring between the expected delivery date according to the issued purchase order and the final delivery date. In Sudan, for example, delays occurred with items such as motorized ultra low volume (ULV) sprayers and spare parts for different sprayers (FAO, 2020b; FAO, 2020d). In Kenya, aerial control operations were timely and effective. This was partly due to the timely procurement of equipment and pesticides by FAO and its partners; and partly to the availability of skilled agricultural spray pilots in the private sector, with pre-existing biosafety licences, which sped-up training processes for new pilots. Ground control operations, however, were slower to begin, due to low levels of pre-existing knowledge, capacity and community awareness. Purchase and training for the health and safety equipment also slowed ground operations initially (FAO, 2020a).

32. Procurement challenges were caused by a range of factors, extending from the last mile of contracting and delivery to preparatory processes and supplier constraints. Some delays were observed at the last mile, for instance with delays in the importation and delivery of sprayers, spare parts and ground control equipment in Ethiopia and Sudan. In these cases, the delay occurred after procurement had been completed and was due to a mixture of downstream constraints arising from supplier delays, import regulations or transport restrictions arising from COVID-19 (FAO, 2020b; FAO, 2020c). In other cases, delays were observed during the procurement process itself, for instance in the purchase of biopesticides for a limited trial in Ethiopia, where the

[3] The findings here relate specifically to the impact of procurement on timeliness of operations. Wider constraints and driving factors behind procurement issues are discussed in section 3.3 below.

Country Office needed to go through centralized procurement systems in Rome instead of purchasing directly from the supplier.[4] Lastly, some delays were noted even further upstream, such as where suppliers were unable to produce pesticides and equipment rapidly enough during COVID-19 lockdowns. In these cases, questions arose about the preparedness of the procurement and contracting model for future upsurges. A full discussion on this issue and the contributory factors to procurement delays are presented in Section 3.3 on enabling factors and constraints.

CONFIDENCE RATING: VERY HIGH

33. Some delays were observed in rolling out livelihood packages, which impacted desert-locust affected communities in some locations. NGO partners operating livelihood protection activities in the Horn of Africa reported that funding from FAO was slow. Three-quarters of NGOs surveyed by the evaluation team experienced funding gaps, especially regarding food security and livelihoods recovery activities. In two cases, this led NGOs to restrict targeting. Significant delays were observed across Kenya, due to a range of factors including: protracted and fragmented engagement of service providers for delivery of cash and livelihood goods; the absence of emergency procurement procedures in the FAO Country Office and the requirements for technical specifications approvals for inputs purchased; limited staffing capacity at country-office level (FAO, 2020a). Timeliness was also a concern regarding the livelihood protection packages in Somaliland, with some communities (such as Qoyta and Beer) having to wait longer than others (such as Shirwac, Hulluuq and Arabsio), although these delays were not considered critical (FAO, 2020d). In Ethiopia, delays to the livelihood packages significantly impacted the communities' resilience during the multiple cycles of locust swarms witnessed over 2019–2021. Cash distributions were made from October to December 2020, when people had started to get some harvest from their crops, instead of during the "food gap" period from July to September. A community focus group held in Amhara region made the point clearly (FAO, 2020c):

"We encountered three rounds of locust invasions. The 1st round was in June 2019 and this damaged our germinated crops. The 2nd round strike was in October 2019. This has damaged crops during seed bearing. While the 3rd round strike has happened during the months September to November 2020. This 3rd round was worst because it damaged all crops before they get harvested. Nobody has harvested any crop last season from this kebele as a result. However, the FAO cash transfer has come for us very late and recently (October–November 2020) after we lost all we produced." (FAO, 2020c).

CONFIDENCE RATING: VERY HIGH

34. **Livelihood packages were generally well-tailored to individual and community needs**. In both Somaliland and Puntland, livelihood protection packages were considered well-tailored to beneficiary community needs, according to community interviews conducted by the evaluation teams. Age, gender and livelihood categories were explicitly taken into account during the programme design stage (FAO, 2020d). In Kenya, the livelihoods package interweaved long-term concerns in the emergency and recovery work streams. Hence, rather than provide food rations, the intervention provided inputs such as seeds and fertilizer that would have a more longer-term benefit. Additionally, the targeting of beneficiaries was i) cognizant of their dominant livelihoods such as livestock keepers, crop farmers and agro-pastoralists; ii) targeted the most affected

[4] It should be noted that the choice of using centralized supply was a response to the real threat of competition between countries for limited supplies, and was moreover supported by the biopesticide supplier as it sought to meet demand despite the production constraints imposed by COVID-19 restrictions. Nevertheless, at individual country office level, this was felt to create a longer procurement process than needed. The tension between the need for centralization and the consequent need for increased resourcing for procurement is explored in paragraph 55.

counties, which also double up as some of the most food and nutrition insecure; iii) included both men and women; and iv) ensured inclusion of the most vulnerable in the affected communities, such as people living with disabilities, the elderly, female and child-headed households. Some questions were raised regarding the final selection of inputs in Kenya, however, in contrast to other countries. Examples were seen of NGOs and government providers supplying fertilizers in Garissa and Swiss Chard seed in Mandera, which were inappropriate for the types of soil in those locations – although these items were not provided by FAO directly. These examples stood in contrast to the observations in Ethiopia and Somalia, for which appropriateness was generally considered quite high (FAO, 2020a).

35. **Some challenges regarding coverage and appropriateness of livelihood support were nevertheless observed.** Some NGO partners noted that some geographic areas (including Tigray in Ethiopia, and Yemen) were not well covered due to access constraints. Regarding gender integration, only one-quarter of the NGO partners surveyed by the evaluation team considered that FAO supported them in integrating gender in the livelihoods and food security component of the desert locust response. In particular, it was felt that FAO could do more to encourage partners to identify gaps and promote needs-based interventions, in light of the differential impact the desert locust upsurge has on women and men. NGOs suggested that, to improve tailoring and targeting of livelihood responses in the future, FAO could invest more in consultation with local partners on the ground.

CONFIDENCE RATING: HIGH

3.2 Results observed

36. FAO made significant contributions across the full spectrum of preparation, surveillance and control of locust swarms in the Horn of Africa and Southwest Asia. This included direct provision of equipment and pesticides for ground and aerial operations; provision of timely and accurate data on swarm locations, size and forecasts; training and support to locust control teams on pesticide storage, transport, ground control and aerial control applications; coordination with the national and local governments of control operations to avoid duplication and reduce safety risks. The results of these activities were widely cited to include significant reduction of the swarm size and damage to crops and livelihood assets. FAO's own calculations suggest that 3.1 million tonnes of cereal were protected over one season, saving USD 933 million in cash value, and meeting the cereal requirements of 21 million people (FAO, 2021). Whilst continuing cycles of locust swarms develop, particularly in Yemen, the control operations in Ethiopia, Kenya, Somalia, Sudan and Pakistan all had significant positive results in reducing the size and density of swarm sizes over time.

CONFIDENCE RATING: VERY HIGH

37. **FAO also contributed to reducing the food insecurity of locust-affected households in the Horn of Africa**. FAO implemented an anticipatory approach, across a two-step process: i) by controlling the spread of desert locusts and associated damage to crops and rangeland, thus reducing the risk of a livelihood crisis and worsening food insecurity; and ii) distributing inputs and cash to compensate those farmers and herders that nevertheless lost crops and rangeland despite the control actions. A total of 300 000 households were reached with livelihood protection assistance, including cash assistance, supplementary livestock feed and farming re-engagement packages. Significant pre-existing food insecurity was present across the affected countries in the Horn of Africa, with large numbers of households in IPC 2 and 3 acute food insecurity phase classification. As of May 2021, none of the impacted countries have significant populations in IPC

4+, indicating that to date the desert locust upsurge has not triggered emergency level food insecurity in this region.

CONFIDENCE RATING: VERY HIGH

38. Control operations were successful in treating significant areas of at-risk pastoral and agricultural land in the Horn of Africa and Southwest Asia.

39. In Kenya, control operations covered over 80 percent of the 200 desert locust swarms observed in 2020, with 161 071 ha of pasture land treated. Swarm sizes have also declined over the control period, with lower locust density observed in 2021 compared to 2020 (FAO, 2020a).

40. In Sudan, precise figures for total coverage were not obtained through independent evaluation data collection, but field interviews with control teams and the national government suggest that the majority of the cropping and pasture areas in the country were treated (FAO, 2020b). FAO's own figures suggest 210 000 ha of land has been treated as of May 2021 (FAO, 2021).

41. Coverage in Somalia, as reported by FAO, reached 250 000 ha of land, including both Somaliland and Puntland (FAO, 2021). Interviews with control teams and affected communities suggest that the control operations were perceived to have been successful in checking the progress and magnitude of the locust invasion, even if significant swarms were seen throughout 2020 and into 2021. Interviewees in Puntland in particular cited the control response as being very successful, and attributed this success partly to the variety and level of FAO support to the line ministry. Insecurity in South and Central Somalia restricted control and surveillance greatly (FAO, 2020b).

42. In Ethiopia, control operations treated a total of 1.2 million ha by May 2021, according to FAO's own data and data provided by the aircraft-tracking service of 51 Degrees (FAO, 2021). Interviews with government stakeholders suggest that FAO and its partners contributed in meaningful and substantial ways to the Government control effort. FAO in particular played a key role in early resource mobilization and supply of essential resources including aircraft, ground application equipment, pesticides, some personal protective equipment, communication materials, and local capacity building support – including through the recruitment of international experts to support the response. Most respondents mentioned that had it not been for FAO's involvement and help in resource mobilization and supply, as well as in coordination and planning, the country would have faced a near catastrophic economic plunge (FAO, 2020c).

43. In Pakistan, FAO funds were allocated to carry out training of trainers (TOT) sessions and the procurement of surveillance and control equipment. FAO also helped in immediate operational support, forecasts, technical advice and capacity building, IT support and equipment for surveillance, monitoring, coordination support, and it facilitated the inter-regional dialogue and information exchange throughout the emergency period. Additionally, FAO mobilized resource for pesticide sprayers, vehicles, and surveillance equipment from FAO core funds and donors. FAO provided a total of 50 ultra low volume sprayers for control operations; 100 GPS system devices for surveillance activities; and 10 single cabin vehicles for surveillance and control activities.

CONFIDENCE RATING: VERY HIGH

44. Livelihoods packages were distributed across the Horn of Africa, reaching 300 000 households in desert locust affected communities (FAO, 2021). In Kenya, 33 579 households had been reached by the end of December 2020. This included 22 717 crop farmers receiving farming re-engagement packages, while none had received cash assistance at that point; 9 916 livestock keepers receiving in-kind livelihood assistance, while 946 had received cash assistance (FAO, 2020a). In Somalia (Puntland), approximately 70 000 households were reached with either livestock feed or farming re-engagement packages by May 2021 (FAO, 2021). Livelihood packages were credited with improving livestock weight, increasing production and improving the marketing of live animals (FAO, 2020e). In Ethiopia, 94 000 households were reached with livelihoods protection assistance, which was widely cited as having helped avoid the worst case scenario in that country (FAO, 2021; FAO, 2020c). Interviews with community stakeholders in locust-affected areas of Ethiopia suggest that the livelihood protection efforts reduced the adoption of negative coping mechanisms by affected households and individuals, contributed to the protection of assets and the recovery of income and production. Cash distributions were also cited as having an unintended positive effect on the community's access to social services in Amhara and Somali region (FAO, 2020c).

CONFIDENCE RATING: VERY HIGH

45. FAO worked with its partners to integrate environment, health and safety (EHS) concerns into the locust response, with mixed results.

46. In Kenya, FAO began providing specific EHS expertise in June 2020. Prior to this, pesticides had been used without FAO-standard practice being monitored. Once monitoring began, FAO worked with the Kenyan government and control teams to ensure that biosafety practices were carried out using ultra low volume sprayers and with formulations prepared and transported directly from manufacture to vehicle-mounted sprayers. Ground control operations were restricted to using Deltamethrin formulations, with Fenitrothion and Deltamethrin used in aerial control. Biopesticides have been included in limited trials with the support of the FAO Country Office (FAO, 2020a).

47. In Sudan, gaps were observed with the national government's own planning around EHS risk. Training of qualified staff within the Department of Plant Protection only began in 2021, with an expert from the Regional Commission (CRC) providing course instruction. Items including personal protective equipment, drum cleaners and crushers, and other EHS equipment was slow to arrive in Sudan and, as a result, much of the control operation took place without them. FAO provided three drum cleaning and crushing units to mitigate this risk in the short-term. But poor storage facilities and the accumulation of empty containers and obsolete pesticides represent a chronic concern for the locust control unit in the Red Sea coast at Suakin (FAO, 2020b).

48. In Ethiopia, despite a concerted effort by both FAO and the Government to follow established standard operating procedures, some instances of EHS damage were reported following control operations. In South Omo zone of Southern Nations, Nationalities, and People's Region (SNNPR), the application of Chlorpyrifos resulted in the death of a large colony of bees, which forced farmers to abandon their apiculture farming. Whilst these instances were infrequent in comparison to the large-scale control operation, there are suggestions that EHS standards were not adequately applied in Ethiopia. Training on the safe-handling of pesticides was lacking among many ground control teams. One batch of 50 drums of Chlorpyrifos supplied by FAO was reported to contain impurities to the extent that it resulted in the clogging of spray atomizer units on aircraft in Dire Dawa. And lastly, empty drums of pesticide were left in open fields without appropriate safe storage solutions in place, resulting in leakage and risk of harm to people and the environment (FAO, 2020c).

49. In Pakistan, FAO and its partners established standard operating procedures (SOP) and developed and promoted preventive locust control strategies, with the aim of minimizing the use of pesticides and favour the application of cultural and biopesticides early in the locust population development. FAO provided technical training on personal protective equipment and pesticide application directions for ground and aerial teams, which helped mitigate potential safety problems. Nevertheless, some problems were observed by the evaluation team, including empty containers lying in open areas and the mixing of empty containers, sprayers and pesticide in storage facilities. Some pesticide drums were seen leaking, and long-term storage units situated far from human habitation remain yet to be built (FAO, 2020f).

CONFIDENCE RATING: VERY HIGH

50. **Some unintended consequences of the control operations were reported, although these were mostly anecdotal and small-scale**. Some reports of low-level conflict over grazing land between households were recorded, arising from the pre-harvest interval restrictions during locust control activity (FAO, 2020a). In Ethiopia, unintended positive effects were observed regarding the increased community awareness about desert locusts and community-based control methods. Government officials have also now increased their understanding and focus on the threat posed by desert locusts in Ethiopia, and have now established a national migratory pest unit within the Ministry of Agriculture (FAO, 2020c).

CONFIDENCE RATING: MODERATE

3.3 Enabling factors and constraints

51. Coordination with national and local actors was cited as the most common enabling factor in the locust control and livelihood protection work in all country case studies. NGO survey respondents noted that FAO's regular coordination meetings, information sharing at both country and regional levels, the strength of partnerships with both government and local actors, and the involvement of a wide range of actors in the response was critical to the results achieved in control and livelihood protection efforts (FAO, 2020c). In Pakistan, for example, the strength of FAO's coordination with both federal and provincial level governing structures was critical to the results achieved in locust control, given the role of the latter in operational planning and implementation. FAO's prior experience, technical expertise, and involvement in developing the regional emergency preparedness plan with South West Asia Commission (SWAC) countries, all contributed to results achieved (FAO, 2020c). Likewise in Sudan, the national locust unit already had an action plan prepared, with contingency plans across different scenarios and a resource inventory with shortages pre-identified. By working with the national government, FAO was able to build on this pre-existing capacity and bring substantial extra resources to the table. In Ethiopia, Kenya and Somalia, stakeholders cited enabling factors associated with the long-standing presence of FAO and strength of relationships with NGOs operating in the food security and livelihoods sector in the Horn. Combined with the collaborative approach to the relevant regional bodies (including the Commission for Controlling the Desert Locust in the Central Region and the Intergovernmental Authority on Development), FAO was able to support capacity gaps where they existed and work with local organizations to achieve results in terms of locust control and livelihood protection (FAO, 2020g).

CONFIDENCE RATING: VERY HIGH

52. Surveillance capacity was enhanced through a combination of new technology, robust data-cleaning processes, and strategic and timely communication to partners. NGO partners noted the provision of high quality and timely data made a significant difference to the control efforts, including the partnership with 51 Degrees using the EarthRanger system to provide real-time field data of particular value in areas of constrained access. In Ethiopia, Kenya and Somalia, the use of new innovative ICT technology on eLocust3g and eLocust3m technology helped develop a surveillance capacity to identify breeding sites through identification of hopper stages and provide real-time response in ground control and aerial control. This has resulted in shortened response time for control operations, which was notably effective during the second wave in Kenya in January 2021, in which a huge swarm of mature adults invaded the coastal belt, unchecked, and laid eggs which hatched forming hopper bands (FAO, 2020g). In Pakistan, the provision of GPS units also greatly helped the surveillance activities.

CONFIDENCE RATING: VERY HIGH

53. **Challenges were noted around procurement of equipment, notably for ground control operations in the Horn of Africa**. In Sudan, procurement delays were seen for equipment and personal protective equipment partly due to a preference for international procurement over local-sourcing in order to meet FAO technical specifications. In some cases, delays reduced the effectiveness of operations. Acetylcholinesterase (AChE) blood test kits, for example, arrived too late for them to be used prior to staff began applying organophosphorus pesticides,[5] which meant no true baseline figures could be established (FAO, 2020b). In Ethiopia, even when procurement was carried out in a timely fashion, delays occurred in clearing equipment and pesticides for use after consignments arrived in the country. In some cases, for example with GPS and radio communication equipment, this constrained control operations from happening in a timely manner (FAO, 2020c).

54. Procurement delays were caused by a range of factors, covering the full spectrum of the supply chain.

55. In some cases, this related to constraints imposed by the suppliers themselves. Reliance on one producer for micron sprayers, for example, made it difficult to scale-up production quickly enough to respond to the locust upsurge as it evolved, particularly in the first half of 2020. Ultra low volume pesticide was also constrained by production during the initial upsurge. This was partly explained by export restrictions imposed during the COVID-19 lockdown of Wuhan, where some of the active ingredients were sourced. In both cases – sprayers and ultra low volume pesticides – supply was hampered by the absence of procurement options beyond the raising of individual purchase orders by FAO procurement teams, to which individual suppliers then responded. Options such as establishing wider lists of pre-qualified suppliers, or the use of framework contracts specifying either production capacity or the continuous maintenance of raw material stocks, were not implemented. Nor were buffer stocks of non-perishable items in place within the regional commissions prior to the upsurge. It should nevertheless be noted that, despite these delays, FAO was able to manage the existing supplies of pesticides in such a way that it did not disrupt control operations.

56. In other cases, procurement delays related to the FAO procurement process itself. FAO chose to organize pesticide procurement through central offices in Rome, in order to avoid forcing country offices into competition with each other for pesticide stocks. This allowed FAO to prevent price

[5] It should be noted, however, that AChE test kits can only be used with organophosphorus pesticides such as malathion, fenitrothion and chlorpyrifos. In Kenya, the bulk of pesticides used for spraying were synthetic pyrethroids.

inflation, prioritize countries on the basis of available in-country stocks, and ultimately to avoid shortages despite the upstream supply constraints highlighted above. Nevertheless, centralizing procurement through Rome headquarters arguably slowed down access to pesticides for individual cases, with some country offices arguing that they could have procured pesticides and biopesticides more quickly by directly contracting suppliers themselves (FAO, 2020d). To an extent, this may be an inevitable effect of a coordinated approach: country offices with greater pre-existing stocks had to "wait in line" whilst other countries with more limited stocks were prioritized for good reason. But there are good grounds to suggest it was also related to the level of human resources within the procurement team in Rome. Current resourcing is limited to a team of five people dedicated to the locust procurement work. The workload for this team doubled during the upsurge, while resources grew by two full-time locust procurement officers following the L3 declaration. Reports from FAO's own personnel suggest that human resources for procurement nevertheless played a role in the delays seen. Beyond Rome, moreover, procurement capacity in regional and country offices could also be bolstered in order to equip FAO with the same level of procurement resourcing it had at its disposal during the 2012–2014 Madagascar plague.

57. Beyond resourcing levels for procurement, some questions were raised about the organizational understanding of the urgency created by locust upsurges in particular. Both at country office level and headquarters, some stakeholders expressed concern that the Organization was using a system and approach designed for far slower onset threats than locust upsurges, where a delay of one week spent meeting technical requirements can have a significant negative impact on the effectiveness of operations due to the rate of growth of swarm sizes and densities.

58. Lastly – whilst the efforts of the procurement team were ultimately successful in avoiding disruption of operations on the basis of pesticide and equipment availability – the procurement process did struggle to deal with the timely processing of requests, partly due to the challenges of identifying and meeting technical specifications and national registration requirements for equipment and pesticides. Examples here included delays incurred by ensuring pesticides recommended for use by the Locust Pesticide Referee Group (LPRG) and certified for Good Manufacturing Practice are also registered at national level in the country of intended use. Matching these requirements against available suppliers requires time and technical expertise. Similar issues arose for procurement of services or hiring of aircraft for use in control and surveillance operations. Technical specifications including minimum number of flying hours were often missing when the procurement request arrived with the procurement team. In addition, the complications of modifying contracts to accommodate operational demands requiring the movement of aircraft across the area of operation in a smooth and efficient manner, was exacerbated in the 2020–2021 upsurge by national and subnational border restrictions on flights. In part this speaks to an absence of agricultural aviation expertise within the Rome office, but it also relates to questions about agreeing on the level of technical specifications to be made by country offices and emergency and technical divisions before the request reaches the procurement office, so as to reduce the time-lag between the initial request from the country office and the delivery of the item on the ground.

59. Some lessons from previous crises on streamlining procurement systems were not fully implemented prior to this upsurge, contributing to the problems observed. The Stakeholder Workshop on the procurement and supply of pesticides for locust control (Rome 2015) highlighted a number of areas for improvement in the procurement process. These included issues highlighted above about the difficulty of scaling-up pesticide production and supply without establishing pre-qualified supplier lists and framework contracts. The fact that, in 2020–2021, the procurement system remained largely unchanged from the 2012–2014 Madagascar

response – albeit with a reduction of human resources for procurement – most likely contributed to some of the delays described above.

CONFIDENCE RATING: HIGH

60. **Seed, multi-nutrient block and cash distributions were delayed by procurement negotiations with suppliers in some cases**. In Ethiopia, extended negotiations with banks delayed the delivery of cash assistance, while procurement of multi-nutrient blocks and seeds were also delayed by several months (FAO, 2020c). In Kenya and Somalia, livelihood protection operations were delayed in some instances by procurement and partnership arrangements taking longer than expected to be finalized (FAO, 2020a.; FAO, 2020d).

CONFIDENCE RATING: HIGH

61. **Stock management proved challenging in Kenya, Ethiopia and Pakistan.** In Kenya, pesticide storage was problematic, partly due to absence of storage tanks, a lack of safe disposal options for toxic waste, and an insufficient quantity and availability of drum crushers and drum recycling systems (FAO, 2020a). In Ethiopia, pesticide drums were observed lying on open ground at Godey, Jigjiga and Dire Dawa airports. Leakages were reported prompting serious environmental and human safety concerns (FAO, 2020c). In Pakistan, drums were also observed in unsafe storage facilities, with leakages observed in some cases (FAO, 2020f).

CONFIDENCE RATING: VERY HIGH

62. Human resources capacity also posed a persistent constraint on operations, although this was partially mitigated by the early-phase technical support provided to invasion countries. In Ethiopia, human resources were constrained by a number of factors, including staff turnover, lack of training, loss of senior staff, and the sheer scale of the 2020–2021 upsurge. Some stakeholders suggested that the best way to overcome this gap is for FAO regional personnel to engage directly in oversight of survey and control operations, as well as monitoring and evaluation of activities (FAO, 2020c). In Kenya, human resources were very low at the start of the upsurge in 2020, which slowed down the ability of control and surveillance teams to get operational. Significant effort was put into training new teams and building the human resources across Kenya during the first wave, which contributed to improvements by late-2020 (FAO, 2020a).

CONFIDENCE RATING: HIGH

63. **The regional architecture for locust survey and control operations struggled to respond to the upsurge in the Horn of Africa**. Regional and global oversight was important due to the nature of desert locusts as a migratory pest with the capacity to move quickly between countries and regions. However, the Desert Locust Control Organization for Eastern Africa (DLCO-EA) failed to provide any support to the locust response in several countries, including Sudan (which was largely mitigated by in-country capacity). The Organization suffered from many deep-lying problems, including financial, administrative and technical ones. Ultimately, the operational arm of the surveillance and control operation was carried out by the national governments of the countries of the Horn with support from FAO and its partners (FAO, 2020bi). Likewise, the Regional Commission struggled to respond to an upsurge reaching into non-Member Countries such as Kenya and Somalia.

CONFIDENCE RATING: HIGH

64. Insecurity and lack of access posed a significant constraint to operations in Ethiopia and Somalia, and to a lesser degree, parts of Northern Kenya. In Ethiopia, security restrictions in the North and in border areas with Somalia constrained access of survey and control teams during the upsurge, as well as severely limiting livelihood protection operations (FAO, 2020c). In Pakistan, insecurity limited survey operations in locust breeding grounds along the Iran-Balochistan and India-Sindh borders (FAO, 2020f). In Kenya, insecurity hampered survey, control and livelihood protection operations in Northwest Mandera and Suguta Valley, while network connectivity challenges hampered operations in remote areas including East Wajir, parts of Isiolo, Southeast Samburu. In these more remote areas, ability of teams to communicate survey data in a timely manner was hampered (FAO, 2020a).

CONFIDENCE RATING: VERY HIGH

65. **COVID-19 also constrained the desert locust control and surveillance activities in several countries**. In Sudan, four training courses on survey and control operations and three training courses for information officers were postponed until 2021 due to the COVID-19 pandemic. In addition, expatriate personnel were unable to enter the country to support national teams, and local personnel were forced to work from home, which slowed down processes and operational support systems to a degree (FAO, 2020b). In Somaliland and Puntland, COVID-19 restrictions impeded the operations of locust control and survey activities, by restricting the movement of people and goods throughout both regions (FAO, 2020d). In Kenya, the lockdown restrictions imposed in March 2020 included a ban on air cargo arrivals which had a significant impact on the procurement and delivery of pesticides, personal protective equipment kits and handheld sprayers. In addition, the production of Fenitrothion was delayed due to the lockdown in China, where some of its active ingredients are sourced. In this initial period, aerial spraying was reduced and locally manufactured products were used as substitutes. In addition, training operations were delayed due to restrictions on the number of persons able to congregate during the lockdown in Kenya, and the imposition of 14-day isolation periods for trainers and pilots entering the country further slowed this process (FAO, 2020a).

CONFIDENCE RATING: VERY HIGH

3.4 Coordination

66. The 2020–2021 locust response was a large and complex operation involving sizeable funding flows across multiple actors including multilateral organizations embedded within the Inter-Agency Standing Committee (IASC) mechanism, regional technical bodies associated with locust response, national and local governments, national and international NGOs and local community organizations. The complexity of the response architecture was met by the dynamic nature of the locust crisis itself, as multiple generations of locust swarms evolved and moved from country to country in response to patterns of weather, food availability and control efforts. This placed significant coordination demands on FAO and its partner organizations.

67. In this context, the evaluation assessed FAO's role in coordinating the survey and control operations in locust-affected countries, as well as the livelihood protection activities in the Horn of Africa. The evaluation assessed FAO's role against the normative framework provided by Knox Clarke, P. and Campbell, L. (2016). This framework was developed on the basis of robust evidence about the IASC coordination structure at a global level, and made recommendations about improving sector-wide coordination in humanitarian response including across and beyond the IASC mechanism. As such, it provides a useful normative framework for successful coordination in such a response.

68. Knox Clarke, P. and Campbell, L. (2016) identify six areas for improving coordination structures in humanitarian crises:

i. **developing context-relevant coordination systems** that build on existing government and civil society coordination mechanisms;
ii. **clarifying roles and decision-making procedures** in the coordination system;
iii. **building subnational coordination capacity**;
iv. **increasing the participation** and influence of national and local civil society organizations in humanitarian coordination;
v. **increasing mutual trust** among agencies, to allow for non-directive, voluntary coordination systems that work effectively;
vi. **improving information management**.

69. Each area includes a number of sub-recommendations to be considered for better coordination. The evaluation assessed the FAO response against each of these criteria and their associated sub-recommendations, scoring FAO's performance in each case with the framework presented in Table 1.

Table 1. FAO performance

Score	Interpretation
3	Evidence suggests that FAO's coordination activities met or exceeded each of the sub-recommendations made in Knox Clarke, P. and Campbell, L. (2016).
2	Evidence suggests that FAO's coordination activities met some but not all of the sub-recommendations made in Knox Clarke, P. and Campbell, L. (2016).
1	Evidence suggests that FAO's coordination activities failed to meet any of the sub-recommendations made in Knox Clarke, P. and Campbell, L. (2016).

70. Overall results suggest that FAO performed very well on coordination of what was a highly complex, multi-component and multi-actor response, scoring 83 percent for coordination as a whole (or 15 out of a possible total 18 points). Full results are presented below.

71. **Developing context-relevant coordination systems: 3 points.** Evidence suggests that FAO met or exceeded each of the sub-recommendations under this area of coordination, namely:

i. ensuring coordination mechanisms are context-relevant and adaptable;
ii. supporting and building on existing national and local coordination mechanisms rather than duplicating or replacing them;
iii. ensuring coordination is part of preparedness and planning work.

72. FAO scored very highly in this area, primarily due to the development of a unique regional coordination structure based in Nairobi with significant support from Rome. This structure allowed FAO to support and complement the existing coordination structure in the region (including the absence of a food security cluster in Kenya and the absence of Kenya from the CRC Desert Locust Commission) whilst providing a coordination hub in the Greater Horn of Africa where the initial desert locust swarms and associated food security risks were greatest. FAO also responded to the context-specific needs of the region by providing operational support to countries in the Horn of Africa where and when the Desert Locust Control Organization for Eastern

Africa was unable, such as in the provision of equipment, pesticides and training in Ethiopia, Kenya and Somalia. And by encouraging the use of pesticide triangulation in the first instance, and then supporting triangulation stocks directly where needed, FAO avoided duplicating existing regional resources. Government and NGO interviewed at country level across the Great Horn of Africa also noted the strength of the regional coordination structure, which at times proved more agile and adept at responding to urgent need than country level substructures (FAO, 2020a; FAO, 2020c; FAO, 2020d; FAO, 2020e; FAO, 2020b).

CONFIDENCE RATING: VERY HIGH

73. **Clarifying roles and decision-making procedures: 2 points.** The only sub-recommendation in this area is the improvement of role-clarity in the coordination structure. Evidence suggests that FAO achieved this goal for the locust surveillance and control pillar of its response, but not for the livelihood protection component.

74. For locust preparation, surveillance and control, stakeholders agreed that it was very clear who was responsible for each aspect of the response, with FAO taking a leading role in terms of strategic and technical coordination of national and regional efforts. Questions were raised about the absence of the DLCO-EA from the response, but this was largely due to systemic weaknesses in the funding model of that organization rather than a lack of clarity on roles and responsibilities. Donors and multilateral agencies all reported clarity on FAO's role in this aspect of the response, and respected the technical capacity and mandate that it has in this area. Regarding livelihood protection, some stakeholders argued that the roles and responsibilities were less clear. In particular, NGO stakeholders felt that the role of the food security cluster was less clear in this response although, again, this was felt to reflect an absence of specific engagement on behalf of the cluster rather than a duplication of effort at any point.

CONFIDENCE RATING: HIGH

75. **Building subnational coordination capacity: 3 points.** Evidence suggests that FAO met or exceeded each of the sub-recommendations under this area of coordination, namely:

i. identify the competencies and knowledge required for subnational coordination;
ii. build capacity for subnational coordination.

76. FAO's engagement here was strong, and varied in line with the competences of the governance structures in the countries of operation. In Pakistan and Somalia, where provincial government bodies had significant roles in the locust response, FAO engaged very closely with subnational structures, and this was credited by country-based observers as one of the contributory factors behind the achievement of locust control results in those countries FAO, 2020f; FAO, 2020d). In Ethiopia, Sudan, and to a lesser extent Kenya, FAO also prioritized its engagement with national ministries in line with their role and mandate in the response (FAO, 2020b; FAO, 2020c; FAO, 2020a). Regarding the livelihood protection activities, FAO's engagement was primarily with national organizations, although some area-based coordination did take place with international NGOs operating in different regions, e.g. in Ethiopia, where food security operations were coordinated with Save the Children in the Somali region and Trocaire in the SNNPR, in line with those organization's presence on the ground (FAO, 2020c). It should be noted, however, that NGO partners in the Horn of Africa perceived FAO's coordination to be significantly weaker regarding local government bodies compared to national, regional and donor organizations.

CONFIDENCE RATING: VERY HIGH

77. Increasing the participation and influence of national and local civil society organizations in humanitarian coordination: 2 points. Evidence suggests that FAO's coordination activities met some but not all of the sub-recommendations made in this area, namely:

i. increase the participation of national and local civil society in coordination mechanisms by ensuring they have the human resource to participate;
ii. increase the meaningful participation of national and local civil society by demonstrating the value of coordination mechanisms;
iii. ensure the involvement of local and national civil society in humanitarian coordination mechanisms is meaningful, fair and transparent.

78. NGO stakeholders reported significant difficulties with their meaningful participation in the response across the Horn of Africa at the start of the upsurge in 2020. With time, and with the creation and engagement of the Regional Desert Locust Alliance grouping together the key NGO actors working on the livelihood protection response, these issues were addressed, and stakeholder consulted across the region in 2021 considered that NGO coordination was now functioning well in each country. FAO did provide significant resources to NGO actors operating within the locust upsurge response, albeit with some delays, and as such they have been provided with the resource necessary to participate in the response and its coordination. Once up-and-running, the coordination mechanism was widely perceived to have done an excellent job at involving local and national civil society in the coordination mechanisms in a meaningful, fair and transparent manner (FAO, 2020a).

CONFIDENCE RATING: HIGH

79. **Increasing mutual trust among agencies: 2 points.** Evidence suggests that FAO's coordination activities met some but not all of the sub-recommendations made in this area, namely:

i. increase transparency of decision-making, prioritization and funding;
ii. clarify expectations around coordination mechanism decisions and process.

80. Country level stakeholders, including national governments, NGOs and donors reported fairly clear expectations around coordination mechanism decisions and processes, notwithstanding some confusion regarding the decision to delay livelihood protection activities in the first half of 2020. The transparency of decision-making likewise was reasonably robust for all stakeholders interviewed, although some examples were cited of unclear prioritization of resources in the procurement cycle for the locust control equipment and pesticides (FAO, 2020b).

CONFIDENCE RATING: MODERATE

81. **Improving information management: 3 points.** Evidence suggests that FAO met or exceeded each of the sub-recommendations under this area of coordination, namely:

i. increase the use of common definitions and indicators within humanitarian information management;
ii. fit information management processes and products more closely to operational needs.

82. FAO provided extensive common definitions and technical specifications throughout the locust survey and control operation. Survey data was specified on the basis of FAO advice, and the DLIS system was cleaned and validated by FAO throughout the upsurge. Whilst FAO did not retain control of the monitoring and evaluation systems for the livelihoods responses implemented by partner organizations, common definitions and indicators for food security and livelihoods protection work are used on the whole by all the principal actors in the livelihood response in the Horn of Africa, with some exceptions around donor and multilateral agencies distinctions in focus

and prioritization. Information management processes and products are again highly specific to the operational needs of locust survey and control, with the FAO desert locust watch site providing the primary reference point for locust response data globally.

CONFIDENCE RATING: VERY HIGH

3.5 Innovation and learning

83. FAO deployed innovative approaches to surveillance operations throughout the Horn of Africa and Pakistan during the locust upsurge, which had observable impacts on the quality and reach of survey data. The use of GPS units and mobile versions of the eLocust3 application helped survey teams to provide high quality, robust and reliably geo-located data on swarm presence and size. FAO's team in Rome was able to clean and consolidate this data in a timely manner such that control teams benefitted from daily (and sometime twice daily) updates on locust activity (FAO, 2020a; FAO, 2020d; FAO, 2020c). Unmanned aerial vehicles (UAVs) were also tested for survey operations in Sudan, with teams receiving training in January 2021 and implementing early-stage data collection thereafter. The UAVs have the potential to expand survey reach in remote and hard-to-reach areas in the region, which has significant relevance given the repeated cycles of breeding seen in such locations across the Greater Horn of Africa and Yemen (FAO, 2020b).

CONFIDENCE RATING: VERY HIGH

84. FAO helped to implement use of insect growth regulators (IGRs) and biopesticides in areas where it had not been used before, with particular success in Somalia and emerging results in parts of Kenya and Pakistan. FAO worked with authorities in Somaliland and Puntland who requested the use of biopesticides for all control activities during the response (FAO, 2020d). In Kenya, IGRs were applied in two farms in Isiolo county, while in Samburu Central, the biopesticide Novacrid (also Metarhizium acridum) was applied by UAV in infested wheat farms (FAO, 2020a). This was a dual mitigation measure for pest suppression and environmental health and safety concerns. In Pakistan, FAO signed a letter of Agreement with the University of Sindh Jamshoro to achieve biopesticide registration, and trials have been initiated at breeding areas in the region (FAO, 2020f).

CONFIDENCE RATING: VERY HIGH

85. **FAO deployed some innovative community-based control approaches in Pakistan**. FAO worked with local authorities to implement a range of community practices to control the locust upsurge, including: digging of trap ditches on the migratory routes of hopper bands, collection of adult locusts from infested areas through farming communities, and using the locust mass as poultry feed; and collection of locust mass for developing bio-compost through farming communities (FAO, 2020f).

CONFIDENCE RATING: VERY HIGH

86. **Less innovations were seen in the livelihoods response, although some new approaches were observed in Ethiopia**. FAO supported a project using a 'cash plus' approach, namely unconditional cash transfer in combination with seeds or feed or trainings. This was based on learning from an earlier European Commission humanitarian aid department (ECHO) project in the country. This approach has helped households better respond to the precarious situation created by the locust swarms, in part by tying in more regular in-kind and training components alongside the cash distributions. In addition, FAO's use of multinutrient blocks was well-received by communities in this response. In the past, the focus was mainly on supply of dry pasture at a time of feed shortage. But the use of multinutrient blocks was much appreciated by communities.

In Oromia for instance, the multinutrient block is welcomed due to presence of established experience, and there is high demand for its scale-up to the wider community (FAO, 2020c).

CONFIDENCE RATING: HIGH

87. FAO did make efforts to help country teams learn from each other throughout the reporting period, which was cited as encouraging learning and process improvement between teams during the upsurge. NGO partners, donors and FAO country office personnel all reported that FAO helped country teams to share learning from each other through the upsurge response. Weekly coordination meetings between FAO personnel were particularly valuable for those taking part, as were wider monthly coordination meetings hosted by the Office for the Coordination of Humanitarian Affairs (OCHA) with FAO in Nairobi.

CONFIDENCE RATING: VERY HIGH

4. Conclusions and recommendations

4.1 Conclusions

88. The following conclusions are drawn from the findings presented in Section 3, and are indexed against the five principal lines of enquiry of the Phase II activities.

EFFECTIVENESS

Conclusion 1. FAO made significant contributions across the full spectrum of preparation, surveillance and control of locust swarms and livelihood protection in the Horn of Africa and Southwest Asia. This included providing high quality forecast data to governments and control teams at both local and regional levels, which improved the capacity of control teams to anticipate and respond to locust swarms as they evolved. FAO trained control teams in countries across the Horn of Africa and Southwest Asia, working alongside ministries of agriculture and national plant protection specialists. FAO also directly procured equipment and pesticides for control teams to and supported regional commissions to facilitate availability of control assets to the relevant countries. In the Horn of Africa, FAO's contributions to the livelihood protection response helped local and international partners reach 190 000 food insecure households affected by the locust upsurge.

Conclusion 2. FAO contributed to the reduction of swarm size and damage to crops and livelihoods assets in the Horn of Africa and Southwest Asia; and helped to guard against the spread of locust movements into the Sahel. FAO's contributions ranged from the provision of equipment and pesticides for ground and aerial operations; provision of timely and accurate data on swarm locations, size and forecasts; training and support to locust control teams on pesticide storage, transport, ground control and aerial control applications; coordination with the national and local governments of control operations to avoid duplication and reduce safety risks. Secondary data sources suggest that these activities resulted in the training of over 1 300 nationally-based control and surveillance personnel, the protection of over 3.1 million tonnes of cereal over one season, a saving of USD 933 million in cash value, and the meeting of cereal requirements for 21 million people (FAO, 2021). Whilst continuing cycles of locust swarms develop, particularly in Yemen, the control operations in Ethiopia, Kenya, Somalia, Sudan and Pakistan all had significant positive results in reducing the size and density of swarm sizes over time. It should also be noted that, following the significant survey and control efforts of FAO and its partners in the region, the desert locust upsurge did not move westward towards the Sahel as originally feared. While external factors related to regional weather conditions are likely to have also contributed to halting the westward movement of the locust swarms, FAO's activities are widely agreed to have made a significant contribution in this regard.

Conclusion 3. FAO also contributed to reducing the food insecurity of locust-affected households in the Horn of Africa. A total of 300 000 households were reached with livelihood protection assistance, including cash assistance, supplementary livestock feed and farming re-engagement packages. Significant pre-existing food insecurity was present across the affected countries in the Horn of Africa, with large numbers of households in IPC 2 and 3 acute food insecurity phase classification. As of May 2021, none of the impacted countries have significant populations in IPC 4+, indicating that to date the desert locust upsurge has not triggered emergency level food insecurity in this region.

RELEVANCE AND TIMELINESS

Conclusion 4. Support was well-tailored to national capacities and food security contexts in most cases. FAO's support responded to the differing needs of frontline and invasion countries. In Kenya, where pre-existing surveillance and control capacity was extremely low, FAO – in coordination with the national government – supported the establishment from the ground up of a functioning locust control and surveillance capacity. This system is now demonstrating its capacity to control swarm sizes in 2021. In Pakistan and Sudan, FAO's contributions helped already well-established governments to expand their control operations and improve their effectiveness through the use of advanced surveillance technology and accurate close to real-time data for daily planning of control operations. Livelihood protection packages were designed primarily at national level, in coordination with a group of NGOs possessing a well-established combined local presence. Individual packages varied across the differing national and regional food security and agricultural contexts, although some examples of inappropriate selection of agricultural inputs were observed in some instances.

Conclusion 5. FAO faced some specific challenges in adapting its response to the political contexts in Ethiopia and Somalia. FAO's support to locust control and surveillance capacity took longer to yield results in Ethiopia and Somalia. The engagement of national and subnational governments in both of these countries proved more challenging, particularly in the first half of 2020, which resulted in a slower scale-up of control operations than would otherwise have been expected. Political economy and security contexts are uniquely challenging in these country contexts, and both experienced significant conflict and insecurity during the locust upsurge. Nevertheless, FAO has a longstanding presence in both countries which, combined with the challenges witnessed there, raises questions about the effectiveness of its operating model in these specific national contexts.

Conclusion 6. The decision to scale-up livelihoods operations in the third quarter of 2020, while based on good data regarding damage assessments in the region, did impact the utility and relevance of some of the support provided. The livelihood programme was initially planned to begin in June but, following good rains and successful control operations, damage assessments indicated reduced crop losses from initial estimates (which were measured at 50 percent maximal losses, instead of the expected 100 percent). As a result, FAO chose to commence livelihood interventions during the third quarter of 2020. This nevertheless meant that cash assistance often arrived too late for households whose food insecurity was greatest in the second quarter of the year. Farmer re-engagement and agricultural inputs, on the other hand, were provided in line with seasonal planting timelines.

ENABLING FACTORS AND CONSTRAINTS

Conclusion 7. Some issues were observed in pesticide selection by individual countries, which impacted the effectiveness of control operations. The use of deltamethrin in Kenya presented particular problems, with the effectiveness of aerial treatments being questioned and many targets having to be resprayed by control teams due to low effectiveness of initial sprays. Similar issues arose in Ethiopia with the use of malathion, which was exacerbated by the restriction of aircraft funded by one donor to malathion-only operations. The use of insect-growth regulators in Somalia was also delayed due to the initial decision to use biopesticides, which may have reduced the speed and effectiveness of control operations in that country.

Conclusion 8. The locust response took place in a uniquely challenging external context. Significant locust survey and control capacity challenges exist in the Horn of Africa, including very low levels of pre-existing capacity in invasion countries such as Kenya, and long-standing difficulties related to the operationality and financial sustainability of regional locust organizations such as the DLCO-EA. Political dynamics also present challenges in Ethiopia and Somalia, with varying levels of government engagement in the initial response, and significant insecurity challenges occurring in both countries later in the

response cycle. National and, in the case of Somaliland and Puntland, subnational barriers exist that inhibit the efficient movement of control teams, aircraft and resources between areas affected by locust swarms. The concurrence of the COVID-19 pandemic during the locust upsurge also impacted on the response context by placing restrictions on import and transit during the second and third quarters of 2020.

Conclusion 9. Procurement processes hampered FAO's efforts to ensure timely supply of equipment and pesticides for control operations. Delivery of appropriate and nationally registered pesticides, aircraft, aerial and ground spray equipment and ground control equipment and supplies were all affected by procurement delays at different points of the response to the upsurge in 2020–2021. This hampered efforts to survey and control the locust swarms as they evolved and moved between and within affected countries. Causal factors for the procurement delays reach far beyond the central procurement team in Rome and include problems surrounding the technical specifications provided to procurement teams, human resourcing for procurement following the L3 declaration in 2020, contracting models for suppliers of pesticides and equipment, and a lack of preparedness or pre-positioning of sufficient buffer stocks of non-perishable items within the regional commissions.

COORDINATION

Conclusion 10. FAO performed very well on the coordination of what was a highly complex, multi-component, multi-actor response, including most notably the transparency of its learning processes. FAO built a context-relevant coordination mechanism that responded to the unique coordination structures in place in the Horn of Africa and utilized pre-existing structures in Southwest Asia. It built upon and enhanced subnational coordination capacities by working alongside regional as well as national governments and the relevant food security coordination bodies. Information management outputs were widely appreciated by agencies and organizations involved in the response. Moreover, there was widespread appreciation of FAO's transparency regarding its learning processes during this upsurge. The sharing of preliminary findings from this real-time evaluation with key strategic partners, prior to finalization and during the emergency phase of operations, was notably raised as good practice by several of FAO's external partners, as were the engagement of FAO with the multi-partner learning exercise conducted with the French Development Agency (AFD) and the World Bank during Q1 2021.

Conclusion 11. FAO was able to build and maintain new partnerships in this response, including with foundations and private actors. The Bill and Melinda Gates Foundation, as well as the MasterCard Foundation, played a significant role in the donor contributions to FAO's desert locust response. Private sector actors and academic units also contributed to the data collection and analysis tasks carried out by FAO in monitoring and forecasting swarm and hopper band movements. These organizations represented new partners for FAO's emergency operations, and as such, the establishment and maintenance of this new relationship is of demonstrable strategic value both to this particular emergency response and beyond. The addition of new partners to this response increased, to a degree, the numerical complexity of FAO's coordination role. Nevertheless, evidence suggests that this was done successfully, with particular strengths noted around the regularity and transparency of FAO's communications with new partners in this response.

INNOVATION AND LEARNING

Conclusion 12. The response utilized a number of innovations in survey and control approaches combined with good information sharing between countries; but more could have been done to strategically embed innovation and learning across contexts. Some good examples of innovation and learning were observed in the response, including innovations in data collection and the deployment of some small-scale trials and learning around control treatments such as insect growth regulators, biopesticides and community-based control mechanisms. There was, however, a missed learning

opportunity in Somalia regarding use of bio-pesticide. The use of bio-pesticide on this scale was fairly groundbreaking, but there was virtually no follow-up on how effective it was or attempt to share lessons from its application more widely. The conduct of scientifically robust trials in safe locations with adequate resources and personnel to full monitor the effects from treatment to death could have answered any emerging questions on efficacy, particularly in neighbouring countries affected by the movement of swarms across Somalia.

Conclusion 13. Good efforts have been made to increase the strategic, medium-long-term learning across contexts and partners, as FAO emerged from the initial emergency phase in 2020. If continued, these efforts promise to improve the preparedness of the international community to future locust upsurges. FAO's engagement with the French Development Agency and World Bank multi-partner learning process have contributed to the evidence base on what worked and what did not in the response to the 2020 upsurge. Continued efforts to build on this learning and consider how best to prepare for future upsurges are vital, and provide the best opportunity to improve multi-partner preparedness for future upsurges.

4.2 Recommendations

89. The following recommendations are drawn from the conclusions presented in Section 4.1, as well as the country case study reports.

90. Six priority areas for recommendations emerged from this process, with distinct recommendations being made across each one:

i. country level training and capacity development
ii. national locust control architecture
iii. procurement
iv. pesticide management
v. livelihoods support
vi. innovation and learning

91. For each priority area, the evaluators have made a range of recommendations targeting either FAO headquarters, donors and partners, or FAO country offices. Notably, whilst several conclusions and evaluation findings relate to country capacity, no direct recommendations have been made to national governments of locust-affected countries, in line with the scope and mandate of this real-time evaluation. Nevertheless, where relevant, the evaluators have made recommendations to FAO country offices regarding the areas for future engagement with national governments to improve the country level capacity to respond to this upsurge and future ones.

92. In line with the scope of Phase II of this real-time evaluation, recommendations have been made primarily with a view to improving the medium-term response to this particular upsurge. Nevertheless, some recommendations are pertinent for improving the locust response system for future upsurges beyond the current one. For ease of reference, each recommendation has been coded either "**MEDIUM-TERM**" (i.e. through autumn and winter 2021) or "**LONG-TERM**" (i.e. beyond that).

PRIORITY AREA 1 - COUNTRY LEVEL TRAINING AND CAPACITY

Recommendation 1. Continue supporting national capacity for survey and control operations, while focusing on extending capacity to remote, hard-to-reach areas and including community groups. As outlined in Conclusions 1–3 above, FAO and its partners made significant contributions to the survey and control capacities of countries across the Horn of Africa, Yemen and Southwest Asia. This included both frontline countries with pre-existing capacity and invasion countries where little capacity existed prior to 2020. Much of this work has been tailored to national contexts, which diverge significantly across the Horn of Africa and Yemen. Moreover, it should be noted that the political economy of regional institutions in Eastern Africa is more complex than other areas. As such, the country-based capacity building model used to date should be continued. In particular, it is important to prioritize extending capacity to remote and hard-to-reach areas in some countries, and including community and farmer groups in others (see country-specific recommendations below). FAO and its partners should ensure sufficient financial resources and technical assistance are made available for this ongoing capacity strengthening throughout 2021, in order to avoid losing the gains made so far and protecting the region during the forecast evolution of the upsurge throughout autumn and winter 2021. Support and capacity-building for national surveillance systems should be extended to West Africa on the same basis.

MEDIUM-TERM

TARGET: FAO headquarters and donors.

Recommendation 2. In Ethiopia, increase the engagement of FAO Country Office technical personnel in field level monitoring during desert locust operations. The technical assistance provided by the FAO Country Office to date has had significant impact on improving capacity and processes for survey and control operations. This should be extended as the upsurge continues through autumn and winter 2021, with an emphasis on field level engagement to ensure environmental, health and safety standards, as well as improving quality and efficacy of survey and control operations. Depending on the evolution of the locust upsurge, support should be extended into the first quarter of 2022 as needed.

MEDIUM-TERM

TARGET: FAO Ethiopia Country Office

Recommendation 3. In Ethiopia, support technical capacity for survey and control operations within the regions, to ensure that regional governments are able to act more quickly in future emergencies. The linkage between federal and regional governments is looser in Ethiopia than that observed in the context of the Kenya and Pakistan locust response. FAO and its partners should focus technical capacity building to increase the availability of trained operational personnel at regional level, including in remote areas.

LONG-TERM

TARGET: FAO Ethiopia Country Office

Recommendation 4. In Kenya, support capacity for surveillance and control in remote areas, particularly in the Rift Valley and Western Kenya. FAO and its partners have significantly strengthened the capacity of national and regional authorities to conduct survey and control operations in Kenya, starting from very little pre-existing capacity. Most areas of Kenya are now served by increasingly robust survey and control operations, including most notably the Mandera corridor in the Northeast of the country, which was the frontline for invasions in Northern Kenya during 2020. Nevertheless, regional capacity could still be enhanced, particularly regarding awareness and reporting systems in remote areas in the West of Kenya. In light of the current low levels of infestation in these regions, FAO should work with the Kenyan authorities to consider sustainable options for improving survey capacity in this region, in order to improve early warning in the future. One option to consider here would to conduct regular awareness-raising activities to encourage rangeland herder communities and game wardens to report sightings to agricultural departments to allow the dispatch of trained scouts and feed early infestation data into the country-based desert locust information system.

MEDIUM-TERM

TARGET: FAO Kenya Country Office

Recommendation 5. In Pakistan, improve the technical capacity building and refresher training at both federal and provincial levels, with a focus on including community groups and farmers wherever possible, to ensure hatching sites and hopper bands are identified prior to swarm formation. Desert locust activity in Pakistan is now limited, but breeding areas remain in Balochistan, Sindh and Punjab. The emphasis in Pakistan must therefore be on surveillance and early response. The primary responsibility for field surveillance and early response must remain with the conduct of active field surveys in the desert regions by the Department of Plant Protection and in the Government. In addition to this, community and farmer groups in rural areas cooperated with the government response in 2019–2020, and have an important role to play in early-stage surveillance when and where breeding occurs on farmland and community spaces. FAO and its partners should continue to support the implementation of farmer field schools on desert locust surveillance, as well as improving and augmenting ongoing technical training and refresher courses for both federal and, crucially, provincial level government departments. The quality of community mobilization work in 2020 (e.g. in Balochistan, Sindh and Cholistan) could be further enhanced with FAO support, notably by increasing the involvement of research institutes, media, village leaders and civil society.

MEDIUM-TERM

TARGET: FAO Pakistan Country Office

Recommendation 6. In Somalia, support technical capacity at regional and district levels to enhance the capacity of localized survey and ground control teams. Significant gains have been made in 2020 in terms of national technical capacity. Nevertheless, continued training and technical assistance is required to ensure that environmental, health and safety standards are maintained in pesticide management, as well as improving efficacy and monitoring of control treatments where possible.

MEDIUM-TERM

TARGET: FAO Somalia Country Office

Recommendation 7. In Sudan, continue supporting technical assistance to field level teams as they deal with small-scale desert locust activity during autumn and winter 2021. Despite the significant capacity-strengthening already undertaken at the national departmental level, weaknesses remain at the field level, notably around the capacity of ground control and survey teams in areas such as environmental and health concerns, pesticide storage and empty drum disposal, as well as data collection with new technologies (elocust3m & dLocust drones). FAO should support improvements in these areas by engaging ground control and survey teams with more technical expert visits, practical training courses and discussion panels to share learning between teams. In addition, capacity should be developed in Sudan for the Locust Control Department to conduct their own training courses to train their staff in place of FAO expert visits. FAO can provide training materials for such activities (as detailed further under Recommendation 14).

MEDIUM-TERM

TARGET: FAO Sudan Country Office

PRIORITY AREA 2 - NATIONAL LOCUST CONTROL ARCHITECTURES

Recommendation 8. Support national and federal governments to build and embed robust governance structures and policies for locust response. With the support of FAO and its partners, locust survey and control capacity has increased in national governance structures throughout 2020. Immediate capacity gains made in the emergency phase of the crisis need to be maintained and embedded in national governance structures, to tackle the ongoing locust threat in 2021. In some countries, this means opening dialogues with national governments regarding the structure of locust response within national ministries and federal authorities. In others, it means working with newly developed locust response units to support their development and growth as they take on increasing responsibility in the response (see country-specific recommendations below). In all cases, FAO should ensure that countries are supported as they build national contingency plans, establish autonomous operational units with national DLIS capacity, and embed awareness and sensitization of the locust threat throughout governance structures.

MEDIUM-TERM

TARGET: FAO headquarters.

Recommendation 9. Open a dialogue with the Ethiopian Ministry of Agriculture regarding the establishment of an autonomous operational unit dedicated entirely to locust management. The unit should be established under the Ministry of Agriculture with regional operations units functioning underneath it. FAO and its partners could offer financial support and technical assistance to build the capacity of such a unit, with the ultimate aim of conducting scout and survey operations to continue at greater volume during recession periods.

MEDIUM-TERM

TARGET: FAO Ethiopia Country Office

Recommendation 10. In Somalia, continue supporting capacity within the Ministry of Agriculture to enhance national capacity for survey and control, while pursuing new avenues for disseminating locust information and awareness across national and regional authorities. FAO and its partners should look for solutions to improve the national locust information dissemination and awareness raising systems. This could include, for example, a desert locust resource centre within the Ministry, to generate primary data where possible, and disseminate secondary data and forecasts where not, across the Ministry and importantly across all levels of the relevant regional authorities. For this to occur, the Government should officially designate a specific Desert Locust Information Officer, who can be trained by DLIS and equipped with RAMSES for data management and analysis. One may be required in Hargeisa (Somaliland) and another at the new Locust Office in Puntland. In addition, regular surveys will need to be undertaken during breeding periods by designated national locust teams using eLocust3m.

MEDIUM-TERM

TARGET: FAO Somalia Country Office

Recommendation 11. In Sudan, maintain support for the operational costs of survey and control in the near-term, to ensure control operations are continuous, timely and unaffected by national budgetary constraints. The substantial and timely financial support provided by FAO and its partners in 2020 played a critical role in covering the operational costs of survey and control operations at a time when the national budgetary resources were constrained. FAO should be prepared to fill budgetary gaps in the national response as the upsurge evolves throughout autumn and winter 2021, in order to ensure that the gains made in 2020 are not lost. A provisional budget must also be elaborated based on observed need, while the necessary technical and financial support should be provided to ensure the autonomy of the NLCU.

MEDIUM-TERM

TARGET: FAO Sudan Country Office

Recommendation 12. Work closely with the Sudanese government to build a well-defined national contingency plan for locust response. Support provided throughout 2020 helped to build medium-term capacity within Sudan by improving the handling of empty pesticide containers, supply of equipment, and the introduction of new technologies including drones and eLocust3m applications. This has significantly strengthened capacity of the Ministry of Agriculture and Natural Resources to respond to the scale of the upsurge in 2020. However, regardless of the forecasts in Sudan and neighbouring countries, it is important to ensure that a strategic national contingency plan for the medium-term is developed in partnership with the national government. The plan should address any anticipated shortages or material needs in the medium-term, areas where training and human capacity can be enhanced, and options for improving the pesticide stock management systems and environment and health standards, particularly for ground control operations.

MEDIUM-TERM

TARGET: FAO Sudan Country Office

Recommendation 13. In Sudan, support the capacity and reach of the newly established national Locust Control Department. FAO and its partners should continue discussions with the Ministry of Agriculture and Natural Resources to give more financial and administrative autonomy to the National Locust Control Department. Such Department's capacity could be enhanced by building regional stations in Darfur, Kordofan and the Northern Region, in a similar manner to the station at Suakin on the Red Sea cost. Such structures could support timely response to infestations in remote areas and proper management of resources for survey and response.

MEDIUM-TERM

TARGET: FAO Sudan Country Office

Recommendation 14. In Sudan, support the newly established national desert locust training and applied research centre in the Red Sea coast. As noted above, ongoing training needs exist, especially for ground control and survey teams. At the time of writing, a nationally-owned centre for training and research is being established, which could provide sustainable improvements in the consistency and quality of field survey efforts across the country, as well as improving the efficacy, quality and safety of control operations. FAO should continue its engagement with the Sudanese government to establish and kick-start the operations of this unit.

MEDIUM-TERM

TARGET: FAO Sudan Country Office

PRIORITY AREA 3 - PROCUREMENT

Recommendation 15. Review the nature of the challenges around the supply chain and along the procurement process, to remove constraints on timely response to future locust emergencies. While FAO and its partners managed to work around process delays in procurement during the upsurge response, supply-chain constraints, bottlenecks and weaknesses represented one of the most significant challenges for timely response to the survey and control operations. Driving factors reported during Phase II of this evaluation reached far beyond the actions of the Procurement Function and touched on aspects of preparedness, adaptation to supply-side constraints, and the entire process of raising procurement requests through to last-mile delivery. FAO should review its approach to procurement for locust emergencies, to ensure future upsurges are not constrained by similar factors. Options should include:

i. Increasing capacity in the central procurement team during locust emergencies, indexed against the size of the operational response.
ii. Increasing technical capacity in agricultural aircraft deployment for anticipatory action and emergency responses, as part of the wider initiative to strengthen emergency response capacity in this area.
iii. Working with external providers or partners such as the International Civil Aviation Organization (ICAO) to streamline agricultural aircraft (asset) procurement during locust upsurges ensuring the technical soundness and regulatory framework.
iv. Exploring the possibility of future aircraft contracts to cover regional operations or otherwise include the ability to move between countries easily, so as to facilitate the movement of aerial assets as the upsurge moves and evolves, without the need for separate contracts in each country of operation.
v. Establishing an annual internal cross-divisional meeting mechanism aimed to conduct joint Desert Locust supply-chain and procurement risk analysis, aimed to identify solutions/mitigation measures to improve the effectiveness and efficiency of upsurge responses.
vi. Increasing – and annually reviewing – the pre-approved supplier lists for all aspects of the survey and control response including pesticides and control equipment. Annual reviews should aim to foster proactive regular engagement with suppliers during non-emergency periods, as a means to maintaining readiness for deployment in an emergency. This should include, *inter alia*, reviewing technical specifications and making updates where necessary, ensuring that suppliers have direct access to listed assets (such as aircraft), have relevant experience, and are able to meet technical requirements and new specifications as and when they are updated by FAO.
vii. Establishing long-term agreements with pre-approved suppliers for equipment and pesticides where suppliers have a demonstrated track record of delivery in locust emergencies and where the competition for supply contracts is restricted due to the specialization required.
viii. Pre-positioning of non-perishable items (e.g. atomizers for fixed wing aircraft, ground spray equipment, drum crushers) in a global storage facility, managed and maintained by FAO and partners to ensure appropriate periodicity of inspection and renewal.
ix. Streamlining the process and requirements around raising procurement requests to ensure that these are quickly processed during early stages of locust upsurge.

LONG-TERM

TARGET: FAO headquarters

Recommendation 16. Increase the flexibility of fast-track procurement rules and processes specifically for L3 emergency contexts relating to locust emergencies, to allow greater use and streamlining of procurement from pre-qualified suppliers rather than public tenders. In the specific case of desert locust emergencies, timely procurement can be hampered by the use of public tender procedures for specialized items such as pesticides, sprayers, or atomizers for fixed wing aircraft. Given the extremely small number of suppliers worldwide that are in a position to deliver such products to specification, the competitive value of public tendering diminishes. At the same time, the urgency created during the early onset of desert locust crises can result in a delay of two to three weeks for public tender, when weather conditions align and make effective locust control extremely difficult. To streamline its implementation in emergency contexts, FAO should consider increasing procurement of specialized items from pre-qualified suppliers during L3 locust emergencies for specific equipment and supplies for which the supply market is sufficiently small, and the urgency of delivery is high. In addition, procurement procedures under L3 fast-track rules should be further streamlined to reduce lead times resulting from internal clearances.

LONG-TERM

TARGET: FAO headquarters

Recommendation 17. Document lessons learned from the procurement issues highlighted in the 2020 upsurge, to improve preparedness for future responses. Document the lessons learned around the procurement challenges noted in this Phase II report, to identify areas where new templates and processes can be created that build the institutional memory from this response. Areas to be explored include the procurement of sprayers and triangulation of pesticide stocks, as well as the interplay between FAO units involved in the contracting, legal review, and technical specifications required for procurement of aircraft for locust control and lessons for future crises outlined.

LONG-TERM

TARGET: FAO headquarters

PRIORITY AREA 4 - PESTICIDE MANAGEMENT

Recommendation 18. Review pesticide management procedures at country level across the Horn of Africa, Middle East and Southwest Asia, and work with national governments to overcome country-specific constraints. Whilst significant work has already been done with national governments to improve the safety of pesticide stock management processes, the evaluation team was still able to observe several examples of unsafe pesticide storage during visits to the field. National governments in affected countries should review the stock management practices at country level, with an emphasis on improving infrastructure and environmental, health and safety compliance in remote field locations. FAO should support this work through the newly established Locust Pesticide Management System (Locust PMS), while donors should support the sustainability of the Locust PMS into the future. Donor partners should moreover ensure that funding is available for infrastructure improvements and technical assistance where it is required, while FAO country offices should follow the country-specific recommendations below.

MEDIUM-TERM

TARGET: FAO headquarters and donors

Recommendation 19. Improve country level dissemination and awareness of the published recommendations of the Locust Pesticide Referee Group. FAO already makes the Pesticide Referee Group's recommendations for pesticide registration widely available for countries to review, with FAO country offices supporting awareness of national governments. Nevertheless, some delays were seen with national registrations of appropriate pesticides during the upsurge. FAO should review the dissemination and communication lines with national governments, while looking for solutions to work more closely with national governments to ensure timely registration in response to the Pesticide Referee Group updates in the future.

LONG-TERM

TARGET: FAO headquarters and country offices in the Horn of Africa, Middle East and Southwest Asia

Recommendation 20. Work with Somalia and Ethiopian national and regional authorities to pre-position pesticide stocks in more accessible locations for control teams operating in remote areas. The aerial control operations in Ethiopia and Somalia were hampered by the long distances required for aircraft to travel between available pesticide stocks and affected land in more remote locations. Likewise, ground control teams were also delayed by a lack of pesticide availability in remote but active desert locust invasion areas, despite having stocks available in more central regions. FAO should work with national and regional authorities to improve the availability of pesticide stocks in remote regions. This may require, in some instances, the renovation of existing airstrips or construction of new airstrips, while also providing adequate training and human capacity to ensure that remotely-held stocks are maintained without compromising security, environmental, health and safety standards. FAO country offices should discuss their potential added-value with national and regional governments to identify how FAO can best assist with these improvements.

MEDIUM-TERM

TARGET: FAO Ethiopia Country Office; FAO Somalia Country Office

Recommendation 21. In Pakistan, work with federal and provincial authorities to improve the safe storage and disposal of pesticide stocks and empty containers. Most existing storage facilities in Pakistan are often located in town centres where full pesticide containers are stored in the same buildings as empty and leaking containers. FAO and its partners should work with the Pakistani authorities to support the construction of storage facilities in remote locations away from urban areas. In addition, FAO should support the training of pesticide warehouse personnel, to ensure safe practices are followed in the handling of pesticides and the use of personal protective equipment kits.

MEDIUM-TERM

TARGET: FAO Pakistan Country Office

Recommendation 22. Support Sudan in strengthening its pesticide stock management systems and finding safe solutions for pesticide disposal. Examples of constraints in the safe storage and disposal of pesticides were observed by the evaluation team in Sudan. FAO could address these constraints in a number of ways: by mobilizing resources to support the construction of new storage facilities, and repair and upgrade existing facilities where available. Such support should aim to enhance safe storage of pesticides in Sudan for the medium-term. For obsolete pesticide stocks, FAO and its partners should facilitate negotiations with the relevant international conventions' executive secretariats. For empty pesticide containers, FAO could either provide additional drum crushers where needed, or facilitate negotiations with manufacturers, to target the recovery of empty containers.

MEDIUM-TERM

TARGET: FAO Sudan Country Office

PRIORITY AREA 5 - LIVELIHOODS SUPPORT

Recommendation 23. Continue the current level of livelihood support, while working with implementing partners to increase diversification and decentralization of the supply process within countries. As noted in Conclusion 4, the roll-out of livelihood support did not begin at full-scale until October 2020, which impacted the timeliness of the initial support for some stakeholders. Nevertheless, since then, support has been generally understood to be of good quality and has made significant contribution to supporting the livelihoods of locust-affected communities in the Horn of Africa. Questions have been raised about the diversity of livelihood support packages available, and the relative merits of centralized versus decentralized supply chains in-county, particularly for livestock assets. This was true despite the flexibility offered to individual country partners to select from a wider regional menu of intervention options. FAO should therefore work with its partners in individual countries to encourage greater diversity of livelihood support and decentralization of supply where appropriate.

MEDIUM-TERM

TARGET: FAO Regional Resilience Hub, East Africa; implementing partners involved in the livelihood protection assistance

Recommendation 24. In Kenya, increase the availability of livelihood recovery expertise within the FAO Country Office. FAO is a technical institution that recognizes the need for a people-centred development paradigm. There is therefore the need to ensure that capacities on livelihood recovery are strengthened to provide direction and guidance on activities that are likely to accelerate the quick recovery of the affected communities and to enhance stability in post-disaster recovery by conducting regular post-distribution monitoring and post-recovery assessments. FAO Kenya should therefore consider the engagement of personnel expertise in this area.

MEDIUM-TERM

TARGET: FAO Kenya Country Office

Recommendation 25. In Kenya, conduct continuous needs assessments for the ongoing livelihood response. In large-scale emergencies such as the desert locust invasion, needs are constantly changing as affected communities progressively recover from the initial shock and following the immediate assistance provided. Therefore, there is need to undertake continuous recovery monitoring to determine the evolving needs in relation to the disaster experienced.

MEDIUM-TERM

TARGET: FAO Kenya Country Office

Recommendation 26. In Ethiopia, improve coordination of the livelihood response through increased NGO participation and decentralizing the supply procurement for agricultural and pastoralist inputs to the regional level. FAO should aim to engage NGOs in all stages of the project cycle for livelihood operations, beginning with project design. NGOs should be given adequate time and space to ensure coherence of desert locust livelihood packages with their pre-existing and ongoing projects and programmes in the livelihoods space. Likewise, FAO should seek to support the national and regional governments to ensure coherence with similar crisis responses with their own ongoing projects and programmes, thereby increasing synergies and complementarities prior to implementations. Lastly, in order to simplify procurement processes and increase relevance to regional contexts, FAO should consider decentralizing the supply process to the regions, with implementing partners having adequate say in the process.

MEDIUM-TERM

TARGET: FAO Ethiopia Country Office

Recommendation 27. In Ethiopia, improve diversification of livestock asset suppliers and seed types. Local regional suppliers of livestock assets should be identified and given priority to ensure quality and reduce costs, whilst FAO should also continue advocating for the opening up of the agricultural input market in order to increase diversification. FAO and its partners could also provide veterinary services to protect animals from the effects of feed shortages on disease exposure. Diversity of seed type and quantity of seed provided per household should also be increased as the response continues into autumn and winter 2021.

MEDIUM-TERM

TARGET: FAO Ethiopia Country Office

PRIORITY AREA 6 - INNOVATION & LEARNING

Recommendation 28. Develop a dedicated mechanism for sharing learning and fostering innovation between countries as the response evolves throughout autumn and winter 2021. Several examples of innovation and learning were observed in the response during 2020 and early-2021. Moreover, FAO's own coordination and communication mechanisms have been consistently strong throughout the locust response. More could be done in future to capitalize on these strengths, share learning between countries, and encourage the transfer of innovations between country contexts, e.g. through establishing a dedicated platform to coordinate innovation and learning in locust survey and control across all countries of operation, as well as livelihood protection in the Horn of Africa.

93. Such a mechanism should sit at the global level to ensure lessons transfer between regions, and should have the capacity to:

    i. build a strategic approach to guide country offices as they seek to encourage national governments and regional bodies to innovate in the response;
    ii. foster and develop relationships with international research institutes and private sector actors;
    iii. share and coordinate the pre-existing lessons learning from innovative methods piloted in field contexts; and
    iv. address the dissemination, uptake, and usage of innovation in locust-affected countries.

94. Opportunities for research could be progressed through a cross-country learning platform to avoid duplication of effort and ensure widespread and timely sharing of lessons learned. Opportunities for engagement with national governments and regional bodies could include increasing opportunities for the scientific study of innovative approaches including, for example, increased use of biopesticides and novel chemical pesticides in control operations, or wider use of drones and electronic data collection technologies during survey to enhance forecasting.

    MEDIUM-TERM

    TARGET: FAO headquarters

Recommendation 29. Across all locust-affected regions, work with research institutes and the private sector to support innovation in the areas of surveillance, forecasting and control. When suitable populations of desert locust are present, FAO in collaboration with research institutes in the region could conduct field trials with new chemical pesticides and biopesticides to provide field data on mortality rates and time response under a range of conditions. FAO could consider increased support for the use of dLocust drones for surveillance operations in remote and hard-to-reach locations.

MEDIUM-TERM

TARGET: FAO country offices throughout region

Recommendation 30. Support research and communication efforts around innovative monitoring and forecasting methods for future upsurges. FAO through the DLIS partnering with the best global expertise, should continue to support research and improvements in the use of remote sensing and geographic information systems to monitor desert locust activity, combined with the use of predictive models for swarm movements, to a point where they can be fully implemented by government institutes.

MEDIUM to LONG-TERM

TARGET: FAO headquarters

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Appendix 1. People interviewed[6]

Last name	First name	Institution/agency	Role
Ethiopia			
Administrator	1	Kebele 1: Kalu Woreda	Administrator
Beneficiary	1	Kebele 1: Erer Woreda	Beneficiary
Beneficiary	2	Kebele 1: Erer Woreda	Beneficiary
Beneficiary	3	Kebele 1: Erer Woreda	Beneficiary
Beneficiary	4	Kebele 1: Erer Woreda	Beneficiary
Beneficiary	5	Kebele 1: Erer Woreda	Beneficiary
Beneficiary	6	Kebele 1: Erer Woreda	Beneficiary
Beneficiary	7	Kebele 1: Erer Woreda	Beneficiary
Beneficiary	1	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	2	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	3	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	4	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	5	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	6	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	7	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	8	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	9	Kebele 1: Kalu Woreda	Beneficiary
Beneficiary	1	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	2	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	3	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	4	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	5	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	6	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	7	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	8	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	9	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	10	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	11	Kebele 2: Erer Woreda	Beneficiary
Beneficiary	1	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	2	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	3	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	4	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	5	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	6	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	7	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	8	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	9	Kebele 2: Werababo Woreda	Beneficiary

[6] The table presents the full list of 488 persons interviewed during Phase II of the evaluation. These include: i) **global interviews** conducted by the central evaluation team and covering issues relating to the locust response across the Horn of Africa, Yemen and Southwest Asia; ii) **country case study interviews** conducted by the country case study evaluation teams and focused on issues related to the locust and livelihoods response in the country in question. Most of the interviews conducted during the case studies focused on either the locust control and surveillance response, or the livelihoods protection activities.

Last name	First name	Institution/agency	Role
Beneficiary	10	Kebele 2: Werababo Woreda	Beneficiary
Beneficiary	11	Kebele 2: Werababo Woreda	Beneficiary
Abdi	Faysal	FAO, Ethiopia	FAO Somali Hub coordinator (Jigjiga)
Adan	Abdi	Somali Region government	Crop Production and Protection Directorate, Director (Jigjiga)
Aderaw	Askale	Trocaire	Responsible Officer
Aho	Tadel	SNNPR- Bureau	Crop protection expert
Akkasa	Temesgen	Oromia Regional State	Lowland Agronomist and Focal person
Alemu	Shumye	FAO, Ethiopia	Amhara Region - Crop Officer (Bahir Dar)
Amdneh	Ejigu	FAO, Ethiopia	Livelihoods Program Officer
Anagaw	Abebe	Amhara Regional State Bureau	Protection expert
Anteneh	Anteneh	Veterinaires Sans Frontieres Germany	Project Staff, Afar
Aouzu	Patrick	Delta II Aviation	Pilots/Field Manager Delta II (Dire Dawa)
Aragay	Getachew	Kalu Woreda Agriculture	Agronomist
Asaminew	Dereje	FAO, Ethiopia	SNNP Region- Field Office Coordinator and Crop Officer (Hawassa)
Aseffa	Eniyi	Amhara Bureau of Agriculture	Crop production specialist and focal person
Aston	Robert	FAO	Desert Locust Country Emergency Coordinator and Field Operations Expert
Ayele	Ephrem	Somali Regional Bureau of Agriculture	Crop Production Advisors (Godey)
Bashir	Hassan	Berhano Woreda Agriculture	Crop Production Officer (Godey)
Bedal	Abdullahi	Somali Regional Bureau of Agriculture	Crop Production Advisors (Godey)
Bekele	Samson	Federal Ministry of Agriculture	Extension Supervisor (Godey)
Belay	Merkeb	Veterinaires Sans Frontieres Germany	Program Manager
Beyera	Desta	FAO, Ethiopia	Oromia Region- Field Office Coordinator (Addis Ababa
Budin	Mohammed	Somali Region Bureau	Regional Animal Feed and Rangeland Management Directorate Director
Dirago	Abera	SNNP Region Bureau	Program manager
Eshetu	Ahmed	Werababo woreda Agriculture	Crop production and protection team lead
Fantanehu	Belay	Federal Ministry of Agriculture	Pest Surveillance and Management Case team leader (AA)
Getachew	Serkalem	Care Ethiopia	Emergency advisor
Hashim	Mohammed	Erer woreda	Head of Woreda Livestock Office
Hordofa	Shibiru	Oromia Regional State	Director
Kahasay	Hagos	MCMDO	Regional project coordinator
Kahasay	Lijalem	Tigray National Regional State	EW and response coordinator
Lansberg	Isgak	Farmland Aviation	Pilots/Aviation Engineer (Jigjiga)

Last name	First name	Institution/agency	Role
Lemma	Hiwot	DLCO-EA	DLCO-EA Regional Director; Dire Dawa
Mahamud	Hussen	Save the Children	Program manager
Mohammed	Abdulrazak	Dire Dawa City Administration Council	Plant Protection Expert (Dire Dawa)
Mohammed	Ahmed	Somali Region government	Crop Production Case Team Coordinator (Godey)
Mohammed Budal	Abdi	Godey Woreda Agriculture Office	Extension Desk Head (Godey)
Mulat	Mr	Plan International Ethiopia	Regional program Director
Mulatu	Bayeh	FAO, Ethiopia	Integrated Pest Management Expert
Mwangi	George	Farmland Aviation	Pilots/Aviation Engineer (Jigjiga)
Nigussie	Belayneh	Federal Ministry of Agriculture	Director, Plant Protection (AA)
Od'fe	Cudennec	Delta II Aviation	Pilots/Field Manager Delta II (Dire Dawa)
Prata	Devide	COOPI	Responsible Officer
Rashi Omar	Hassan	Godey Woreda Agriculture Office	Office Coordinator (Godey)
Refera	Alemayehu	Fed. MOA	Plant Protection expert (Based in Dire Dawa)
Salato	Zebdiwas	Federal Ministry of Agriculture	Advisor to the Ministry/Ex-Director, Plant Protection (AA)
Sheriff Abdi	Ahmed	Somali Region government	Crop Protection Case Team Leader (Godey)
Shumet	Ayalew	Afar Regional State	Livestock officer and focal person
Simachew	Kebadu	Veterinaires Sans Frontieres Suisse	Program Officer
Steuemagel	Jens	Caritas Switzerland	Responsible Officer
Tourneux	Max	Delta II Aviation	Pilots/Field Manager Delta II (Dire Dawa)
Versfeld	Marius	Farmland Aviation	Pilots/Aviation Engineer (Jigjiga)
Yifru	Mr	Plan International Ethiopia	Project Coordinator, Addis Ababa
Yusuf	Guled	Somali Region government	Focal Person for Shinille Zone (Plant Protection expert)
Kenya			
Abdi	Mohamed	GOK-Wajir South	Wajir County and Sub County Agricultural Officer
Abdi	Abdirahman	Lagdera Farmers Group	Group Chairman
Abdi	Noor	Matagala CBO	Group Chairman
Abdi	Omar	Matagala CBO	Member
Abdi	Mohamed	Somali Lifeline Organization (SOLO)	Project Officer
Abdikar	Aden	Raya Pastoral Group	Group Chairman
Abdullahi	Haruq	Matagala CBO	Member
Abdullahi	Gubhey	Matagala CBO	Member
Abdullahi	Isnino	Matagala CBO	Member
Abdullahi	Aden	Matagala CBO	Member
Abdullahi	Muline	Nanighi Farmers CBO	Member
Abukut	Ruth	Kapese Agrinutrition Farmers	Member
Adan	Ibrahim	Government of Kenya, Mandera County	Officer Mandera South

Last name	First name	Institution/agency	Role
Adan	Abdi	Government of Kenya, Wajir County	Officer-Wajir West
Adan	Abdirahman	Government of Kenya, Wajir County	Officer -Wajir West
Adan	Hassan	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Adan	Hussein	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Adan	Bishar	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Adan	Abdirahman	GOK-Wajir Buna	Wajir County and Sub County Agricultural Officer
Adan	Hassan	GOK-Wajir headquarters	Wajir County and Sub County Agricultural Officer
Adan	Abdi	GOK-Wajir West	Wajir County and Sub County Agricultural Officer
Adaw	Hussein	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Aden	Dunia	Raya Pastoral Group	Member
Aden	Dakan	Raya Pastoral Group	Member
Agira	Ebson	Marsabit County Government	Marsabit Base Manager
Agutu	Fredrick	VSF (partner FGD)	Project Officer
Ahmed	Abdow	GOK-Wajir East	Wajir County and Sub County Agricultural Officer
Aigai	Mary	Kapese Agrinutrition Farmers	Member
Akabonyo	Hellen	Kapese Agrinutrition Farmers	Member
Akoru	Margret	Kapese Agrinutrition Farmers	Member
Aleso	Maslah	GOK - Mandera North	Mandera County and Sub County Agricultural Officer
Ali	Mohamed	Government of Kenya, Wajir County	Officer -Wajir East
Ali	Mohamed	GOK-Wajir headquarters	Wajir County and Sub County Agricultural Officer
Ali	Rehema	Nanighi Farmers CBO	Member
Aline	Everlyne	Kapese Agrinutrition Farmers	Member
amo	George	FAO, Kenya	Young Professional
Amodoi	Simon	Achukule Irrigation Farmers	Member
Arii	Lokeya	Achukule Irrigation Farmers	Member
Arot	Winny	Kapese Agrinutrition Farmers	Member
Arte	Abdi	Matagala CBO	Member
Atabo	Sarah	Kapese Agrinutrition Farmers	Member
Babo	Abdi	Nanighi Farmers CBO	Member
Baluku	Sait	Nanighi Farmers CBO	Group Chairman
Barisa	Mohamed	Nanighi Farmers CBO	Member
Dagane	Fatuma	Lagdera Farmers Group	Member
Dakane	Yosef	Matagala CBO	Member
Dilow	Nuru	Nanighi Farmers CBO	Member
Dirbu	Rehema	Nanighi Farmers CBO	Member
Diribu	Salima	Nanighi Farmers CBO	Member
Dirivo	Rukili	Hanti Wanag CBO	Member

Last name	First name	Institution/agency	Role
Dokata	Mohammed	Government of Kenya, Isiolo County	Director, Livestock
Doki	Vivian	Kapese Agrinutrition Farmers	Group Chairlady
Dube	Lisho	Nanighi Farmers CBO	Member
Ebenyo	Eregae	Kalemun gorok	Member
Echakan	Esinyen	Lopeipuke farmers	Member
Echarat	Regina	Kapese Agrinutrition Farmers	Member
Edodok	Kalimapus	Kapese Agrinutrition Farmers	Member
Eigadeli	Titus	Kalemun gorok	Member
Eipa	Marko	Kalemun gorok	Group Chairman
Ekaale	Daviour	Kapese Agrinutrition Farmers	Member
Ekadeli	Josephine	Kalemun gorok	Member
Ekadeli	Rodah	Kalemun gorok	Member
Ekalo	Nkiyon	Upper Hill Women Group (FGD)	Treasurer
Ekidap	Akoda	Achukule Irrigation Farmers	Member
Ekidor	Edung	Achukule Irrigation Farmers	Member
Ekidor	William	Kalemun gorok	Member
Ekiru	Anna	Kapese Agrinutrition Farmers	Member
Ekiru	Veronicah	Kapese Agrinutrition Farmers	Member
Ekopir	Emuria	Lopeipuke farmers	Member
Ekutan	Ekiru	Kalemun gorok	Member
Ekutan	Hellen	Kalemun gorok	Member
Ekuwom	Ruth	Kapese Agrinutrition Farmers	Member
Eleman	Kebo	Lopeipuke farmers	Member
Eloiloi	Auyongorot	Kapese Agrinutrition Farmers	Member
Emanman	Hellen	Kapese Agrinutrition Farmers	Member
Emas	Lobuin	Lopeipuke farmers	Member
Emekwi	Nachotoi	Kalemun gorok	Member
Engolan	Jacinta	Kapese Agrinutrition Farmers	Member
Epakan	Hellen	Kapese Agrinutrition Farmers	Member
Epet	Kuya	Lopeipuke farmers	Member
Epete	Ewoilaar	Lopeipuke farmers	Member
Eporon	Ekitela	Lopeipuke farmers	Member
Eregae	Akal	Kapese Agrinutrition Farmers	Member
Ereng	Anjeline	Kapese Agrinutrition Farmers	Member
Erupe	Tereza	Kalemun gorok	Member
Esekon	Lokusi	Kalemun gorok	Member
Esinyen	Nakorot	Achukule Irrigation Farmers	Member
Esinyen	Dinnah	Lopeipuke farmers	Group Chairlady
Etabo	Hewdry	Lopeipuke farmers	Member
etich	Ambrose	FAO, Kenya	Unknown
Ewoi	Lobor	Kalemun gorok	Member
Ewoi	Narukeny	Kapese Agrinutrition Farmers	Member
Garat	Abdullahi	Government of Kenya, Wajir County	Officer -Wajir Eldas

Last name	First name	Institution/agency	Role
Garat	Abdullahi	GOK-Wajir East	Wajir County and Sub County Agricultural Officer
Gatimu	James	DLCO EA	Director
Gedi	Mumin	Raya Pastoral Group	Member
Geti	Horun	Hanti Wanag CBO	Member
Githinji	Joseph	GOK - Mandera	Mandera County and Sub County Agricultural Officer
Godana	Godfrey	CARITAS	Deputy director/ Head of Programs
Golicha	Ismail	GOK -Mandera-Banisa	Mandera County and Sub County Agricultural Officer
Gotante	Harira	Nanighi Farmers CBO	Member
Gureit	Hussein	Hanti Wanag CBO	Member
Haji	Diisow	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Hamisi	Ibrahim	Hanti Wanag CBO	Group
Hamisi	Halima	Nanighi Farmers CBO	Member
Hashum	Rowa	Matagala CBO	Member
Hassan	Adan	GOK-Wajir-Eldas	Wajir County and Sub County Agricultural Officer
Hassan	Mohammed	Matagala CBO	Member
Hilale	Omar	Hanti Wanag CBO	Member
Homa	Ali	Nanighi Farmers CBO	Member
Husein	Abdullahi	Government of Kenya, Mandera County	Officer Mandera Lafey
Hussein	Abdullahi	GOK - Mandera-Lafey	Mandera County and Sub County Agricultural Officer
Hussein	Ibahim	Hanti Wanag CBO	Member
Hussein	Sharifa	Raya Pastoral Group	Member
Ibrahim	Fardosa	FAO, Kenya	Young Professional
Ibrahim	Amina	FAO, Kenya	Young Professional
Ibrahim	Abdullahi	Government of Kenya, Wajir County	Officer -Wajir Buna
Ibrahim	Abdullahi	GOK-Wajir West Athibohol	Wajir County and Sub County Agricultural Officer
Ibrahim	Fatuma	Raya Pastoral Group	Member
Ibrahim	Muktar	VSF (partner FGD)	Administrator
Ikai	Kolok	Achukule Irrigation Farmers	Member
Ikal	Regina	Achukule Irrigation Farmers	Member
Ilmothi	Halima	Upper Hill Women Group (FGD)	Chairlady
Iman	Yakub	Matagala CBO	Member
Interview	FAO	Government of Kenya, Wajir County	Officer -Wajir West
Isa	Salima	Nanighi Farmers CBO	Member
Isaac	Bishar	Government of Kenya, Mandera County	Officer Mandera East
Ismail	Mohamed	Matagala CBO	Member
Ismail	Halima	Matagala CBO	Member
Ismail	Halima	Nanighi Farmers CBO	Member

Last name	First name	Institution/agency	Role
Issack	Fatuma	Raya Pastoral Group	Member
Itachan	Lokwale	Kapese Agrinutrition Farmers	Member
James	James	Kalemun gorok	Member
Jillo	Abdullahi	Nanighi Farmers CBO	Member
Joseph	Githinji	Government of Kenya, Mandera County	Officer Mandera West
Juma	Nuru	Nanighi Farmers CBO	Member
Juma	Salma	Nanighi Farmers CBO	Member
Kajuju	Ester	Government of Kenya, Isiolo County	Agriculture Officer / M&E
Kala	Alio	GOK -Mandera -Katulo	Mandera County and Sub County Agricultural Officer
Kamau	Christine	Kapese Agrinutrition Farmers	Member
Kapolon	Loreng	Lopeipuke farmers	Member
Kariuki	Tekla	FAO, Kenya	Young Professional
Kassim	Saadia	Raya Pastoral Group	Member
Katelo	Patrick	PACIDA	Executive Director
Kerio	Esther	Achukule Irrigation Farmers	Member
Keya	Omar	Nanighi Farmers CBO	Member
Kibayan	Zeinab	Upper Hill Women Group (FGD)	Member
Kimathi	Esmond	FAO, Kenya	Young Professional
Kithuva	Charles	Government of Kenya, Mandera County	Officer Mandera/Banisa
Kithuva	Charles	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Kokuro	Peter	Kalemun gorok	Member
Kuli	Ahmed	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Lagat	Kennedy	FAO, Kenya	Livelihoods Recovery Expert
Leguuto	Isiah	Government of Kenya, Isiolo County	Scout
Leisegor	Daniel	Government of Kenya, Samburu County	Officer
Lekeni	Patrick	Government of Kenya, Samburu County	Director
Lekitacharan	Sandry	Beneficiary	Beneficiary
Lekitacharan	Sandry	Government of Kenya, Isiolo County	Scout
Lekitima	Lenasawa	Kipsing Farmers (FGD)	Member
Lekopir	Titi	Kipsing Farmers (FGD)	Member
Lekuye	Janet	Kipsing Farmers (FGD)	Member
Leluai	Domina	Beneficiary	Beneficiary
Lemergoroi	Patrick	Mercy Corps	Director
Lemokor	Tyson	Government of Kenya, Samburu County	Officer
Leperesian	Lenoosenke	Beneficiary	Beneficiary
Leribe	Saliki	Government of Kenya, Samburu County	Scout

Last name	First name	Institution/agency	Role
Lesharani	Patrick	Ministry of Agriculture	Officer
Lesingarani	John	Government of Kenya, Isiolo County	Scout
Lesingarani	John	Government of Kenya, Isiolo County	Storekeeper
Lesingiran	Mark	Government of Kenya, Samburu County	Officer
Lesuutia	Namarat	Government of Kenya, Samburu County	Scout
Letoole	Moses	Government of Kenya, Samburu County	Scout
Liban	Mohamed	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Likana	Julius	Government of Kenya, Isiolo County	Director
Likaria	Julius	Isiolo County Government	Deputy County Director of Agriculture - Crops
Limbe	Lydia	FAO, Kenya	Communications
Lina	Christine	Kipsing Farmers (FGD)	Member
Lobei	Akadeli	Kalemun gorok	Member
Lochu	Etereku	Kapese Agrinutrition Farmers	Member
Lodir	Lanipi	Government of Kenya, Samburu County	Scout
Lodoket	Ikalale	Kapese Agrinutrition Farmers	Member
Lokale	Rebbeca	Kapese Agrinutrition Farmers	Member
Lokope	Akeny	Lopeipuke farmers	Member
Lokuno	Ikal	Achukule Irrigation Farmers	Member
Lolchuraki	Joseph	Government of Kenya, Samburu County	Principal Coordinator
Lolim	Ruth	Kalemun gorok	Member
Lolubo	Jeremia	Lopeipuke farmers	Member
Lomer	Janerose	Achukule Irrigation Farmers	Member
Lomongin	Euyongorot	Kalemun gorok	Member
Lomongin	Nakua	Lopeipuke farmers	Member
Lomonyang	Rose	Kalemun gorok	Member
Lopeyok	Longor	Lopeipuke farmers	Member
Lopurcho	Nasuge	Kapese Agrinutrition Farmers	Member
Lore	Peter	Kalemun gorok	Member
Maah	Sucdi	Raya Pastoral Group	Member
Maalim	Husein	Government of Kenya, Mandera County	Officer Mandera/Banisa
Machuchu	Douglas	VSF (partner FGD)	Project Officer
Maina	John	GOK -Mandera-Lafey	Mandera County and Sub County Agricultural Officer

Last name	First name	Institution/agency	Role
Malu	Mohamed	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Marro	Sabdio	Upper Hill Women Group (FGD)	Member
Matamul	Mwanajuma	Nanighi Farmers CBO	Member
Mboga	Amadi	Ministry of Agriculture	Permanent Secretary, Agriculture
Migow	Amina	Nanighi Farmers CBO	Member
Mohamed	Liban	Government of Kenya, Mandera County	Officer Mandera East
Mohamed	Abdi	Government of Kenya, Wajir County	Officer -Wajir headquarters
Mohamed	Mohamed	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Mohamed	Ibrahim	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Mohamed	Ahmed	GOK-Wajir East	Wajir County and Sub County Agricultural Officer
Mohamed	Abdi	GOK-Wajir West Arbajahan	Wajir County and Sub County Agricultural Officer
Mohamed	Adow	Lagdera Farmers Group	Member
Mohamed	Mohamed	Lagdera Farmers Group	Member
Mohamed	Kirlow	Matagala CBO	Member
Mohamed	Shidiya	Matagala CBO	Member
Mohamed	Rehema	Nanighi Farmers CBO	Member
Mohamed	Halima	Nanighi Farmers CBO	Member
Mohamed	Bajila	Nanighi Farmers CBO	Member
Mohamed	Amina	Raya Pastoral Group	Member
Mohammed	Malu	Government of Kenya, Mandera County	Officer Mandera North
Mohamoud	Mohamed	Government of Kenya, Mandera County	Officer Mandera North
Mohomud	Hussein	Government of Kenya, Wajir County	Officer Wajir headquarters
Mohomud	Hussein	GOK-Wajir South	Wajir County and Sub County Agricultural Officer
Moses	Echoto	Achukule Irrigation Farmers	Member
Motoka	Regina	Achukule Irrigation Farmers	Member
Mugo	Paul	GOK-Wajir East	Wajir County and Sub County Agricultural Officer
Mugo	Winston	GOK-Wajir East	Wajir County and Sub County Agricultural Officer
Mugow	Abdikarim	Hanti Wanag CBO	Member
Muhoro	Ziporrah	Government of Kenya, Isiolo County	Program Manager
Mumin	Mohamed	Government of Kenya, Wajir County	Officer-Wajir West
Mumin	Mohamed	GOK-Wajir Tarbaj	Wajir County and Sub County Agricultural Officer
Munya	P	Ministry of Agriculture	CS Minister of Agric.
Musa	Dena	Nanighi Farmers CBO	Member
Muse	Medina	Hanti Wanag CBO	Group Chairlady

Last name	First name	Institution/agency	Role
Mutia	Thecla	FAO, Kenya	Environmental Health and Safety Assessments
Mwanamwinyi	Mish	FAO, Kenya	Young Professional
Mwangi	Jason	GOK-Wajir Eldas	Wajir County and Sub County Agricultural Officer
Mwongela	Lawrence	Government of Kenya, Isiolo County	Officer
Nachukul	Samuel	Kalemun gorok	Member
Natome	Rosemary	Kapese Agrinutrition Farmers	Member
Naukot	Ruth	Kapese Agrinutrition Farmers	Member
Ngasuge	Eregae	Kalemun gorok	Member
Ngasuge	Loter	Kalemun gorok	Member
Ngoletum	Chegem	Kalemun gorok	Member
Nguyo	Hassan	GOK-Wajir North	Wajir County and Sub County Agricultural Officer
Noor	Adan	GOK -Mandera East	Mandera County and Sub County Agricultural Officer
Nyaboke	Lilian	FAO, Kenya	FAO officer, Procurement
Ochieng'	Linox	FAO, Kenya	Young Professional
Odha	Hadija	Nanighi Farmers CBO	Member
Omar	Sabdow	Government of Kenya, Wajir County	Officer -Wajir South
Omar	Sabdow	GOK-Wajir headquarters	Wajir County and Sub County Agricultural Officer
Omar	Hakim	Nanighi Farmers CBO	Member
Omar	Ebla	Raya Pastoral Group	Member
Omiti	George	Government of Kenya, Wajir County	Officer -Wajir Tarbaj
Omiti	George	GOK-Wajir Eldas	Wajir County and Sub County Agricultural Officer
Omoru	Milicent	FAO, Kenya	Young Professional
Ong'amo	George	FAO, Kenya	Locust Expert
Onkeo	Edwin	GOK-Wajir North	Wajir County and Sub County Agricultural Officer
Onyiego	Evans	Government of Kenya, Samburu County	Director
Orro	Ntotoyo	Upper Hill Women Group (FGD)	Member
Osman	Amina	FAO, Kenya	Young Professional
Osman	Mwanahamisi	Nanighi Farmers CBO	Member
Otundo	Robert	FAO, Kenya	M&E officer and Resilient food systems
Owuor	Catherine	VSF (partner FGD)	Consortium Manager
Paul	Isiah	Beneficiary	Beneficiary
Paul	Etoot	Achukule Irrigation Farmers	Group Chairman
Ramadhan	Hussein	Nanighi Farmers CBO	Member
Ramadhan	Asli	Nanighi Farmers CBO	Member
Ramadhan	Idris	Nanighi Farmers CBO	Member
Ramadhan	Mohamed	Nanighi Farmers CBO	Member
Rosana	Eric	VSF (partner FGD)	Project Officer

Last name	First name	Institution/agency	Role
Russo	Andrea	FAO, Kenya	Operations Officer
Salat	Mohamed	GOK-Mandera East	Mandera County and Sub County Agricultural Officer
Salat	Fatuma	Raya Pastoral Group	Member
Salim	Maria	Nanighi Farmers CBO	Member
Samal	Yohana	Kalemun gorok	Member
Shora	Ramadhan	Nanighi Farmers CBO	Member
Sulaw	Hassan	Government of Kenya, Mandera County	Officer Mandera South
Suleiman	Salima	Nanighi Farmers CBO	Member
Talison	Philip	Kipsing Farmers (FGD)	Group Chairman
Teluai	John	Kipsing Farmers (FGD)	Member
Tesfayohannes	Mehari	NDLC	Director
Tutana	Salad	Government of Kenya, Isiolo County	Officer
Unknown	Nick	Earth Ranger 51˚Ltd	Pilot
Unknown	Diego	Earth Ranger 51˚Ltd	Pilot
Wahome	Geoffrey	Isiolo County Government	Sub-county Agricultural Officer
Wamba	Josephine	Beneficiary	Beneficiary
Wamboi	Margaret	Beneficiary	Beneficiary
Warutei	Abdullahi	Hanti Wanag CBO	Member
William	YUSUF	Government of Kenya, Isiolo County	Scout
Williams	Hamisi	FAO, Kenya	Assistant FAO representative/Programs
Yele	Rebecca	Kapese Agrinutrition Farmers	Member
Yele	James	Lopeipuke farmers	Member
Yunu	Alinasir	GOK -Mandera	Mandera County and Sub County Agricultural Officer
Yussuf	Issa	Raya Pastoral Group	Member
Yusuf	Abdul	Nanighi Farmers CBO	Member
Somalia			
Beneficiary	5	Arabsio Community	Beneficiary
Beneficiary	1	Beer Community	Beneficiary
Beneficiary	2	Beer Community	Beneficiary
Beneficiary	7	Godobjiraan Community	Beneficiary
Beneficiary	9	Godobjiraan Community	Beneficiary
Beneficiary	8	Hadhwanaag Faremer Community	Beneficiary
Beneficiary	4	Huluuq Community	Beneficiary
Beneficiary	3	Qoyta Community	Beneficiary
Beneficiary	6	Shirwac Community	Beneficiary
Abdi	Mohamed	Ministry of Agriculture	RAC
Abdillahi	Ibrahim	ADO	Project Manager
Abdirahman	Mukhtar	Ministry of Agriculture	Lead Locust Officer
Ahmed	Adam	Ministry of Agriculture	PP Officer
Ali	Zahra	FAO	Associate Admin

Last name	First name	Institution/agency	Role
Ali	Kalid	FAO	Desert Locust Coordinator for Puntland/FAO Somalia
Ali	Abdulkadir	HADMA	Director of planning, Policy and Monitoring and Evaluation
Awil	Mohamed	IR	Head of Office
Dhimbil	Omer	SOSTA	E.Warning Officer
Dini	Ahmed	NADFOR	Director
Dualeh	Abdi	CHE	Project Manager
Elmi	Abdillahi	SRCS-Harg	DRM Director
Goulam	Mustafa	NRC	Food Security Specialist
Hassan	Abdillahi	SAYS	Proj Officer
Hussein	Abdinasir	SCF-Borama	Proj Officer
Ismail	Bashir	Garasho	Project Officer
Jama	Mohamed	Ministry of Agriculture	RAC
Khadar	Mr.	SRCS-Burao	Field Coordinator
Liban	Bouh Sh.	SAO	Agriculture Officer
Moamed	Amina	FAO	Lead Officer RBA
Mohamed	Ibrahim	WV	Project Officer
Mohammed	Ahmed	FAO	Livestock Officer/Emergency
Mohamoud	Mohamed	MEACC	Head of Crop Pest and Disease Management
Munchai	Joan	FAO	Head of Livestock component/Emergency Programme
Muse	Mohamed	WHH	Agriculture Officer
Nur	Hared	FAO	DL Coordinator
Nur	Hared	FAO	Field Plant Protection Officer-Desert Locust (Former Plant Protection Officer, Puntland) /FAO Somalia
Nur	Mohamed	MEACC	Director of wild live and biodiversity
Oyik	Kenneth	CWW	Program Officer
Said	Mohamed	Ministry of Agriculture	Director P. Protection
Samatar	Abdulkadir	MEACC	PP Officer
Yusssuf	Abdikarim	WFP	Prog Policy Officer
Sudan			
Abdelhadi Adam	Ishraga	Ministry of Agriculture & Natural Resources	Head of Info. & Forecasting Section
Ali Ibrahim	Haythan	Survey and control team, Red Sea State	Survey & Control team leader – Aiterba
Daldoum	Mohamed	FAO, Sudan	Program Officer
Eldeen Mohammed Elsayid	Ala	DLCO-EA	Base Manager, Khartoum
Gumaa Mohammed	Ibrahim	Survey and control team, Red Sea State	Survey & Control team leader – Toker
Hannan Korina	Hayder	Red Sea State Government	Head of DL Control Unit
Ismail Adam	Abdalla	FAO, Sudan	Program Officer
Musa Mohammed	Mahgoub	Ministry of Agriculture & Natural Resources	Director of Locust Control Department

Last name	First name	Institution/agency	Role
Salah Saeid	Bashir	Survey and control team, Red Sea State	Survey & Control team leader – Tahamyam
Suliman Obaid	Kamal	Ministry of Agriculture & Natural Resources	Director General of Plant Protection Department
Pakistan			
Ahmad	Imtiaz	FAO, Pakistan	Capacity Development Officer
Ahmed	Rashid	CropLife Pakistan	Executive Director
Ahmed	Mubarak	FAO, Pakistan	DL National Coordinator (Karachi)
Ahmed Khan	Dr. Shakeel	FAO, Pakistan	Head of programme, Focal Point Pest against Crops (FPaC)
Ahmed Khan	Rauf	FAO, Pakistan	Entemologist
Ali	Akhtar	Federal Department of Plant Protection	Mounted vehicle driver and motor cleaner
Anjum Ali	Muhammad	Agriculture Extention Government of Punjab	Director General
Anwarul Hassan Bokhari	Syed	Ministry of Food Security and Research	Additional Secretary
Bux Junejo	Rasool	Agriculture Extention Government of Sindh	Director Agriculture Extention, Sukkur region
Dars	Hussain	Department of Plant Protection	Entomologist and locust outpost in charge Mirpurkhas
Dayo	Riaz	Agriculture Extention Government of Sindh	Additional Secretary
Elahi Dasti	Noor	Department of Plant Protection	Entomologist/Locust outpost in charge - Sukkur
Hussain	Syed Faiz	Department of Plant Protection	Desert Locust Focal Person
Hussain Lashari	Imtiaz	Cholistan Development Authority	Desert Locust Focal Person
Huzaifa	Mr	Pakistani Army	Brigadir
Ishaque Mastoi	Muhammad	Pakistan Agricultural Research Council	Director Plant Protection
Jalil	Hamid	Federal Planning and Development	Director
Khalid Sandhu	Jamshed	Agriculture Extention Punjab	Director Bahawalpur region
Khan	Tarique	Federal Department of Plant Protection	Director Technical
Khan Kandhro	Loung	Village, Lal Bux Magsi	Agriculture Farmer
Mal	Chetan	Agriculture Extention Government of Sindh	Director Agriculture, Mirpurkhas
Maqbool	Nauman	Pakistani Army	5 Corps and coordinator PLCC
Mari	Aluddin	Agriculture Research, Sindh	Assistant
Muhammad Baloch	Noor	Agriculture Research, Sindh	Director General
Muhammad Shareef	Rai	MPA Punjab	Farmer and provincial elected member
Nawaz Channar	Ali	Agriculture Extention Sindh	Director Technical / focal person Sindh
Raheem Soomro	Abdul	Agriculture Extention Government of Sindh	Secretary
Saleem	Rana	Cholistan Development Authority	Desert Locust Focal Person
Shah Kakar	Arif	Agriculture Extention Balochistan	Director General

Last name	First name	Institution/agency	Role
Soomro	Mustaque	Agriculture Extention Government of Sindh	Additional Director Agriculture Khaipur District
Sultana	Dr. Riffat	University of Sindh Jamshoro	Professor
Ullah Chajiro	Hidayat	Agriculture Extention Sindh	Director General
Waheed Anwar	Muhammad	FAO, Pakistan	Research Assistant
Waseem Ul Hassan	Syed Faiz	Ministry of Food Security and Research	Commissioner
Zaman	Fakhar	Federal Department of Plant Protection	Entomologist and DL Regional Incharge (Bahawalpur region)

Appendix 2. Evaluation matrix

The following matrix maps each of the evaluation questions and their associated sub-questions addressed across the three phases of the real-time evaluation. These are mapped against data collection tools deployed and the evaluation phases in which they are addressed.

		Lit rev.	KIIs	Secondary data	Survey	Phase I	Phase II	Phase III
EQ1	**To what extent did FAO's leadership, management and technical capacity support a relevant, timely and effective system-wide response to the desert locust upsurge?**							
1.1	To what degree did FAO's strategic positioning support a rapid and timely scale-up of the donor and partner response?	X	X		X	X		X
1.2	To what extent were donor and partner organizations successful in scaling-up the response in a timely manner with sufficient support for surveillance, control and preparedness activities?	X	X	X		X		
1.3	To what extent were the early surveillance, control, forecasting and communication efforts supportive of increased preparedness, pre-positioning and planning in both frontline and invasion countries?	X	X			X	X	
1.4	How have FAO's organizational structures and decision-making processes helped or hindered effective preparation and response?	X	X			X		
1.5	To what degree have the actions of FAO and its partner organizations supported a targeted and appropriate response for different stakeholder groups including pastoralists, agriculturalists, refugee populations, all genders, ages and abilities, and those facing specific protection risks?	X	X			X	X	X
1.6	How have FAO and its partners integrated learning from previous outbreaks, and evaluations and studies thereof?	X	X			X		
EQ2	**To what extent was the response coherent with FAO's other operations and those of other actors?**							
2.1	How successfully did the response to the desert locust upsurge complement pre-existing pest management operations in affected countries?	X	X				X	X
2.2	To what degree have the actions of FAO and its partners support successful integration of emergency relief, development, sustaining the peace and stewardship of the natural environment?	X	X			X		X
2.3	How effectively did FAO's partnership approach support the response of the regional commissions, national governments, NGOs and other relevant actors responding to the upsurge?	X	X		X	X	X	
2.4	How well did FAO coordinate its activities with those of other actors?	X	X		X	X	X	X
EQ3	**What were the positive and negative, intended and unintended results of FAO's actions in terms of food security, livelihoods and resilience of affected households and communities?**							
3.1	How has FAO contributed towards reducing food insecurity in affected countries?	X	X	X		X	X	X
3.2	How has FAO contributed towards protecting livelihoods of farming communities affected by the locust upsurge?	X	X	X		X	X	X
3.3	How has FAO contributed towards building resilience of affected countries, communities and households in affected regions?	X	X	X		X	X	X
3.4	To what extent did FAO succeed in integrating – and encouraging partners to integrate – health, safety and environmental concerns in the response to the desert locust upsurge?	X	X		X	X	X	X

		Lit rev.	KIIs	Secondary data	Survey	Phase I	Phase II	Phase III
3.5	What additional, unintended consequences can be observed in relation to FAO's actions?	X	X	X		X	X	X
EQ4	**What have been the enabling factors and limiting constraints on the effectiveness of FAO's response?**							
4.1	What factors have enabled FAO to respond in a more timely and effective manner to the upsurge?	X	X		X	X	X	X
4.2	What constraints have been faced by FAO in the areas of data collection and analysis, procurement, stock management and human resource capacity?	X	X			X	X	X
4.3	How did the COVID-19 pandemic and insecurity in locust-affected countries affect the locust response operations, and how did FAO and its partners mitigate these impacts?	X	X	X		X	X	X
EQ5	**To what extent did FAO's processes support innovation and learning across the affected regions?**							
5.1	How effective were FAO's learning mechanisms in transferring lessons across countries and regions?		X		X	X	X	X
5.2	What challenges were faced by FAO and partner organizations in deploying, using and scaling-up innovative solutions to the desert locust upsurge in 2020–2021?	X	X				X	X

Annexes

Annex 1. Country case study frameworks

http://www.fao.org/3/cb6268en/cb6268en.pdf

Annex 2. Survey analysis

http://www.fao.org/3/cb6269en/cb6269en.pdf

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