

Annex I: Terms of Reference

Independent Multilateral Evaluation of the 2003-05 Desert Locust Campaign Towards a More Effective Response to Desert Locusts and their Impacts on Food Insecurity, Livelihoods and Poverty

A. INTRODUCTION

1. The current upsurge¹ of the Desert Locust was not wholly unexpected. The first signs of an outbreak were recognized as early as September 2003, and FAO issued the first alert on 17 October 2003. However, it was largely towards the latter part of the summer of 2004, following repeated appeals for international assistance, that substantial assistance was mobilised. By that time a major Desert Locust upsurge was in progress. The evaluation will examine the extent to which the delay increased the costs of the campaign, if this permitted greater damage by locusts and whether this was an additional causal factor in the increased food insecurity in certain parts of the Sahel.
2. The eventual response to the locust upsurge has involved FAO in a major coordinating and implementing role, significant direct support to affected countries by several donors and major efforts by the affected countries themselves which included substantial assistance to other affected countries.
3. If future locust outbreaks and upsurges are to be combated more successfully, the strong and weak points of the present institutional and technical provisions need to be evaluated on the basis of recent experience for: monitoring and forecasting systems; rapid and flexible provision of emergency assistance; the control tactics and measures employed; and the assessment of locust damage to livelihoods and subsequent needs for follow-up support to the affected human populations.
4. In carrying out the evaluation, it will be essential to keep in mind the characteristics which distinguish a locust emergency from many other types of emergency, including: the potential for a rapid increase in the scale of the emergency; the mobility of the locust swarms which respect no national boundaries often in difficult and remote terrain; and the uncertainty of the duration of the emergency, depending upon seasonal weather conditions and the effectiveness of control measures. It will also be important to recognise that desert locust outbreaks and upsurges occur after lengthy recession periods (normally in excess of 10 years). This too has implications for the characteristics of the capacity which needs to be in place to respond. Climate change may also have implications for future Desert Locust activity.
5. During the special session of the Desert Locust Control Committee (DLCC) in December 2004, it was suggested that an independent evaluation of the whole Desert Locust campaign, including the activities carried out by FAO and all the other relevant institutions, should be organized. The Netherlands followed up in initiating the process and during a meeting of the stakeholders convened by the FAO Director-General on 29 August 2005, the evaluation was

¹ An **outbreak** is described as a marked increase in locust numbers due to concentration, multiplication and gregarisation which, unless checked, can lead to the formation of hopper bands and swarms.

An **upsurge** is described as a period following a recession marked initially by a very large increase in locust numbers and contemporaneous outbreaks followed by the production of two or more successive seasons of transient-to-gregarious breeding in complimentary seasonal breeding areas in the same or neighbouring Desert Locust regions.

endorsed by all parties concerned and a decision taken to put in place a Steering Committee for the evaluation with representation from all the partners in the Desert Locust campaign.

B. OBJECTIVES OF THE EVALUATION

6. The evaluation is designed to serve the needs of all partners in the campaign in order to strengthen future response capacity (i.e. affected countries; donors working directly with affected countries and donors working through FAO; Desert Locust organizations; and FAO). Based on a comprehensive evaluation of the efficiency, effectiveness and impacts of the roles and activities undertaken by all partners in the locust campaign, the evaluation will first and foremost provide findings and recommendations to be considered by all partners in strengthening future work to prevent and counter future locust outbreaks and upsurges. The evaluation will also provide accountability to all partners on the efficiency and effectiveness of resources deployed in the campaign.

7. The report of the evaluation together with the consolidated individual responses of the various parties to the evaluation will be provided for the consideration of the appropriate authorities and organs of the desert locust affected countries, desert locust organizations, donors and concerned international organization, including FAO².

8. The evaluation team will address the following issues and others it may identify as being pertinent:

- a) locust monitoring and early warning, including the role of national authorities, EMPRES and Desert Locust organizations for the early detection of outbreaks;
- b) capacities and arrangements for preventative control measures;
- c) institutional arrangements for rapid response in addressing locust outbreaks and upsurges, including the criteria for deciding on scale of justifiable response, launching an appeal and the rapid availability and deployment of adequate financial; physical and managerial resources (inter alia including need for pesticide prepositioning, maintenance of standing locust control infrastructures and options for ensuring adequate financial resources can be immediately available including the organization of international appeals);
- d) operational activities including coordination arrangements and implementation;
- e) the control strategy and measures employed, coordination of technical approaches and the availability of technical support;
- f) reduction of negative impacts from locust control operations, including those from use of pesticides (environment, human and animal health) and the potentials for the use of available alternative and safer locust control interventions that will help minimize environmental and health risks;
- g) assessment of locust damage and assessment of the implications for human livelihoods, poverty and any rehabilitation needs; and
- h) additional research needed to support further development of locust management, control and damage assessment and its implications (including biological control and the use of remote sensing).

C. COVERAGE OF THE EVALUATION

9. The evaluation will document the resources deployed and the roles played by the different groups of partners (affected countries, donors including developing countries assisting their neighbours, Desert Locust organizations, FAO). This will include detail of the financial resources, and inputs in terms of pesticides, logistics and human resources deployed and the funds made

² It is also envisaged that the report and consolidated comments will be considered by the Desert Locust Control Committee (DLCC) meeting in March or April 2006

available directly to countries and regional organizations (for aircraft hiring, pesticides, technical assistance, capacity-building, etc.).

10. It will examine efficiency, impacts, quality of work and cost and socio-economic effectiveness with respect to:

- a) **Social, economic and environmental costs and benefits**, including:
 - i) overall costs and benefits of the campaign (including impact on food security and sustainable livelihoods) and the cost-benefits of the campaign in comparison with other types of potential intervention;
 - ii) impact on the livelihoods of affected populations/communities with particular respect to, the poorest and most disadvantaged sections of those populations, including the gender dimension and the social structure/fabric (migration, conflicts between and among agricultural and pastoral/nomadic communities, effects on markets, etc.);
 - iii) cost and benefit implications of timing and timeliness in control measures;
 - iv) assessment of alternative approaches and techniques including locust control operations managed by farmers;
 - v) need for follow-up assistance to overcome food insecurity and maintain livelihoods, including any potential role for crop and livestock insurance;
 - vi) health and environmental concerns:
 - 1) implications for human health of various approaches to control including pesticide treatments, and use of different types of pesticides;
 - 2) implications for the environment of various approaches to control including pesticide application, and use of different types of pesticides (i.e. effects on biodiversity, pollinators, natural pest control, migratory birds, fish and water resources); and
 - 3) health and environmental considerations of locust operations managed by farmers.

- b) **Institutional and organizational aspects** including the roles played by national institutions, FAO, donors and locust organizations (CLCPRO, CRC, OCLALAV and DLCO-EA³) and the efficiency and effectiveness of all processes including:
 - i) coherence of strategies for locust management and control pursued by the various partners (donors, affected countries and FAO);
 - ii) coordination arrangements for the campaign;
 - iii) arrangements for ensuring availability of all types of information in easily utilisable form to partners and implementation units at all levels; including the role of FAO, regional Desert Locust organizations (CLCPRO, CRC, OCLALAV and DLCO-EA) and bilateral cooperation;
 - iv) the necessary flexibility, speed and inclusiveness, with respect to:
 - 1) ensuring monitoring and early warning;
 - 2) ensuring preparedness for outbreaks;
 - 3) contingency and response planning with particular relevance to rapid response capability (surge capacity) to mitigate outbreaks and potential upsurges;

³ CLCPRO: Commission de Lutte contre le Criquet Pèlerin dans la Région Occidentale (Commission for Controlling the Desert Locust in the Western Region); CRC: Commission for Controlling the Desert Locust in the Central Region; OCLALAV: Organisation Commune de Lutte Antiacridienne et de Lutte Anti-aviaire (Joint Anti-Locust and Anti-Avian Organization); DLCO-EA: Desert Locust Control Organization for Eastern Africa

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- 4) availability of local and national funds, emergency appeal and its relation to the UN consolidated appeal procedure, and possibilities for any form of standby or call-down funding;
 - 5) arrangements in FAO and donors for handling project formulation, revision, etc.;
 - 6) arrangements by all partners for contracting, procuring and deploying technical resources, as well as materials and supplies;
 - 7) operational activities, including those by FAO, bilateral donors, and affected countries in support to their neighbours and other countries;
 - v) arrangements for pesticide stewardship, including recovery and rehabilitation of excess left-over stocks and empty containers; and
 - vi) capacities and systems for assessments of locust damage and its socio-economic and livelihood and environmental implications and linking that to wider livelihood assessment.
- c) **Technical quality and adequacy**, including:
- i) locust detection and early warning activities;
 - ii) immediate reaction after detection;
 - iii) contingency plans in place for locust operations prior to, and during the current locust campaign;
 - iv) locust survey and control tactics during the upsurge including the treatment of different types of targets and the “work rate” of different control tactics, and their impact on various types of locust populations;
 - v) data collection and transmission of survey results;
 - vi) information on locust populations, areas treated and effectiveness in eliminating locusts;
 - vii) information to populations at risk from locusts/awareness-raising;
 - viii) pesticides:
 - 1) types of pesticides used, quantities, distribution and criteria for selection;
 - 2) pesticide storage and stock management, pesticide banks, management and disposal of empty containers, quality control of applications, handling and disposal of leftover stock and obsolete pesticides;
 - 3) applicability, effectiveness and efficiency of alternative locust control agents, such as insect growth regulators, entomopathogens (Green Muscle), and pheromones;
 - 4) availability of and capacity to implement techniques for assessing health and environmental risk and damage;
 - ix) assessment of crop and pasture damage and its implications on the food security and poverty situation.

D. THE EVALUATION REPORT

11. The evaluation report is the responsibility of the evaluation team and although the views of all partners in the locust evaluation should be sought by the team, the findings and recommendations of the evaluation will reflect the considered and independent views solely of the evaluation team.

12. The report will cover all the points detailed in these terms of reference including the points indicated under section B for the findings and recommendations. It may also include other issues identified as important by the evaluation team. The report will include an executive summary which will summarize key findings, conclusions and recommendations.

13. The conclusions and recommendations should be presented in clearly operational terms prioritising clearly the problems and issues to be addressed for future improvements of performance in prevention, monitoring between outbreaks, mitigation, control and follow-up to

locust outbreaks and upsurges that undermine the livelihoods of affected communities and pose serious threats to the environment. It should also address the link between locust damage and any necessary rehabilitation measures. Scenarios and alternatives for consideration should be presented as appropriate including attention to mechanisms for funding locust monitoring and prevention and early and coordinated response to locust upsurges and outbreaks.

E. THE EVALUATION TEAM

14. The evaluation team members will be selected on the basis of technical competence. Some of the team including the team leader should have competence in evaluation. No team member will be involved directly in the evaluation with respect to the actions of their own country or an agency from their country of origin. They will be required to cover the following areas of expertise as a group:

- a) organization, institutions and coordination;
- b) locust control operations management;
- c) programming, budgeting and project operations;
- d) monitoring, surveillance and early warning;
- e) environmental and health issues;
- f) communication and access to information;
- g) rural economics and economic analysis;
- h) social analysis and gender issues;
- i) implications for poverty;
- j) food security assessment; and
- k) rehabilitation and maintenance of livelihoods.

15. The team will be supported by research assistance for the desk reviews and questionnaires and some secretarial and operations support has also been budgeted. The team will divide into groups for visits and interviews.

F. EVALUATION WORKPLAN

16. The evaluation workplan and overall methodology will be presented in a timely way defined by the evaluation team leader to the steering committee for its approval. The team members will not all be employed continuously and teams for visits to affected countries and donors will split up. The evaluation will include the following activities:

- a) Desk review of documentation from FAO and other partners, including the main bilateral donors. This will include documentation of: actions taken by the various partners for the benefit of individual countries; an analytical review of the international appeal process; project document flows; pledge and receipt of resources; and timelines in contracting, delivery and operations (October-December 2005);
- b) Design and distribution of questionnaires to all partners (November 2005) and analysis of questionnaire responses (December 2005);
- c) Designation of countries for country studies and preliminary visit to organize field impact studies (December 2005);
- d) Stakeholder workshop to identify major issues (11 November 2005);
- e) Visits to all affected countries and field investigations in a representative sample, including visits to a sample of local surveillance and control teams in the field and discussions with locust-affected populations, including review of the results of impact studies (December 2005-January 2006);
- f) Contacts with donors for information and discussion (December 2005-January 2006);

- g) Preparation of a draft evaluation report, presentation of main findings and conclusions to a stakeholder workshop (and possibly a peer review) followed by circulation for comments (February 2006);
- h) Production of final evaluation report (March 2006); and
- i) Distribution of the report together with the consolidated comments of all parties to the evaluation (April 2006).

G. ORGANIZATION OF THE EVALUATION

17. A Steering Committee composed of representatives of the affected countries, the donors, concerned international organizations and FAO will provide oversight of the evaluation. Assistance in the coordination and organization of the evaluation will be provided by the Committee Secretariat (FAO Evaluation Service). The Evaluation team leader supported by the evaluation team will have full responsibility for the conduct of the evaluation, including full responsibility for the findings and recommendations of the evaluation report.

Annex II: Summary of Country Visit Reports

Algeria

Algeria has been able to effectively address the invasions of the Desert Locust using its own financial and human resources. The use of a system of data treatment and analysis incorporating satellite, terrestrial and meteorological data has facilitated the management of the Desert Locust control activities. The National Toxicology Centre has played a key role in monitoring the health status of all agents implicated in the control operations.

Algeria has supported in a significant manner, immediately at the beginning of the campaign, the Sahel countries affected by the Desert Locust.

Algerian authorities consider that a more effective application of a preventive control strategy in the Western Region would have reduced the extent of the 2003-05 invasions, resulting in a drastic reduction of the area to be treated. The Western Region is characterised by the presence of several seasonal breeding areas. It has also experienced the disappearance of OCLALAV. Consequently, the CLCPRO requires an immediate strengthening of its operational and technical capacities to endow the region with an effective regional coordination structure.

A pesticides bank at the regional level is indispensable to start treatments when needed; this would also avoid the accumulation of important leftover stocks. The recovery by local formulators of empty pesticide containers as practised in Algeria, constitutes an example to be followed in pesticide purchasing contracts.

In future, the control campaigns would benefit from appropriate contingency plans to manage the risk at the national, regional and international levels. This would avoid the urgency and pressures experienced in the course of the 2003-05 campaign.

Given the experience of the 2003-05 campaign, Algeria could benefit from utilising more extensively aerial treatments right from the beginning of the campaign. The Pesticide Advisory Group and the Technical Group of the DLCC should develop recommendations for the use of emulsifiable concentrates of insecticides and the necessary application equipment.

Burkina Faso

In Burkina Faso, notwithstanding the early alert by FAO of a possible invasion of the country by the Desert Locust, necessary steps have not been taken in time to address the first swarms. The initial teams were mobilised too late, after the arrival of the first swarms, were insufficiently equipped and had little experience.

With respect to the coordination of the campaign, several sub-regional structures fell over each other trying to control the management of the crisis by attempting to create special committees and seeking financial support from the donors. Burkina Faso has recently become a member of the CLCPRO, but the Regional Commission merits to become better known by the various sub-regional structures involved in agricultural development matters.

The absence of an acridology consultant for technical assistance and coordination activities at the FAO representation and the Plant Protection Direction was strongly felt during the crisis. Criticism were formulated by certain donors concerning both the way FAO managed the crisis and the lack of visibility of their contributions in FAO-managed projects.

Training provided after the crisis has been appreciated; however, reservations have been expressed concerning the choice of an FAO consultant recruited to lead a national workshop, but who did not master the French language. Training of staff on technical matters, as well as refresher courses should continue during the remission period.

The authorities consider that the chemical control operations have been carried out effectively with respect to human and environment protection aspects. An environmental impact study has been undertaken by an independent consultant.

A national budget should be reserved for locust control operations in the country. The maintenance of equipment should be handled by qualified staff. Efforts should also be undertaken by the government for the rehabilitation of the centre for the decontamination of empty pesticide containers, built under a Canadian project, and which is unique in its kind in the region.

Chad

Control of the Desert Locust has started under difficult conditions marked by insufficient material, human and financial means to manage the crisis appropriately. The few teams used for the operations were inadequately equipped, lacked sufficient protective clothing, and could only cover a few infested areas.

Lessons learned during the 2004 campaign have helped considerably to improve the management of the locust problem. Better organisation of the Desert Locust campaign was also achieved through the effective support by the FAO Representation. The improved distribution and exchange of information at the national and regional level has also benefited work in Chad. The efforts to train various staff should be continued especially with respect to the use and maintenance of spraying equipment and to environmental monitoring.

In a crisis situation the central command post should be staffed in a permanent manner. Insecurity problems require that military escorts be paid. The generosity of the donors, prompted largely by the way the Desert Locust invasion and its possible impact on the food security of the rural population had been publicised in the country, has made it possible to carry out various control actions and to equip, although belatedly, the country with means to carry out control operations against the Desert Locust under more effectively.

The different government representatives and the development partners encountered highlighted the coordinating role played by the FAO representation, due to the dynamism of its staff, in particular the representative and various consultants.

Generally speaking, the objectives aimed at for the campaign have been reached because the interventions have contributed to a reduction of the locust populations and have limited the losses caused to crops and pastures.

Egypt

Egypt has endowed itself with all the necessary means to control the Desert Locust in an effective manner. It has a series of central and decentralised autonomous structures each with the necessary operational budgets. These structures combine the functions of control, information, training, research and toxicological analysis and have well qualified staff and modern and well maintained logistical means.

About 200,000 ha have been treated in the course of the 2003-05 campaign. No cases of intoxication and contamination have been detected. However, the evaluation mission notes that notwithstanding the concerns of the government to reduce the negative effects of pesticides on human health and environment, systematic impact studies have not been carried out. Because of the complexity of the farming systems in Egypt aerial treatments are practically impossible. For that reason, treatments are only carried out through ground teams.

Only a limited amount of pesticides has been left over from the campaign. The empty containers, plastic and metallic, have either been completely destroyed or stored in secure places.

Libyan Arab Jamahiriya

Libyan Arab Jamahiriya has established in 1974 a National Locust Control Unit which has been transformed in 1987 into a national autonomous commission charged specifically with Desert Locust control.

The first mature swarms invaded Libyan Arab Jamahiriya in November 2003 in the border areas with Algeria. The swarms encountered favourable ecological conditions for egg laying and breeding took place on a significant scale. Hopper bands were formed, but the control operations undertaken in January 2004 delayed their development. New massive invasions occurred from July 2004 onwards. Certain coastal areas were invaded by the Desert Locust for the first time in twenty years. Significant losses have not been suffered because of the speed of the control interventions.

A large information campaign has been implemented through television, radio and posters to sensitise the local population with respect to the threat of the locust invasion, the necessity to inform the regional authorities after locusts had been spotted, and finally the potential side effects of pesticides and the danger to utilise empty containers.

Libyan Arab Jamahiriya has provided assistance to five African countries, Chad, Guinea Bissau, Mali, Niger and Senegal. In total 100,000 ha have been treated in these countries. This operation has not always been successful mainly due to the lack of appropriate logistical support, including the non-availability of aircraft fuel. These problems could have been partly avoided if there had been more effective coordination efforts with FAO and the CLCPRO.

The Libyan Arab Jamahiriya authorities consider that the locust warnings arrived too late. They also believe that the circulation of information between the neighbouring countries should be improved. More effective operations require that mandates for the teams operating in the border areas are extended beyond these areas.

Mali

At the beginning of the 2003-05 campaign, there was no operational control structure in place in Mali. Consequently, the potential importance of the Desert Locust outbreak has been underestimated, both by the national authorities and the donors, because of the lack of adequate information on the evolution of the Desert Locust.

In the course of the Desert Locust upsurge, a mobilisation of the national population, unique in its kind, has been undertaken in Mali. This mobilisation proved salutary for the start of the campaign while waiting for external existence. It has been accompanied by an important political engagement.

Given the importance of the seasonal breeding areas in the northeast of the country, Mali should equip itself with an effective and autonomous national unit for Desert Locust control, disassociated from the National Office for Plant Protection. It must be assured that this unit can follow permanently the evolution of the Desert Locust in the country and undertake preventive control measures in an effective and efficient manner. This would be the only way to completely master the threat of Desert Locusts in any frontline country.

Village brigades should not be involved in chemical control of the Desert Locust; they can play a decisive role in mechanical control and in monitoring activities. To reduce the negative impact of insecticides on human and animal health and on the environment, the control operations must be carried out solely by specialised teams using officially approved insecticides.

The authorities in Mali have taken a certain number of measures related to human health and environmental protection. To that effect, a structure has been established within the Ministry of Environment and Hygiene. Due to the delays experienced at the beginning of the campaign this structure has not been able to carry out in a systematic manner the necessary monitoring activities.

It has not been possible to obtain adequate data on the economic impact of the Desert Locust upsurge in Mali. This was due in particular to the fact that agricultural production has at the same time suffered severely from drought. An evaluation of losses caused has been undertaken in the middle of the campaign. It estimates the overall losses resulting from the Desert Locust invasion at 4 percent. However, the evaluation team was informed that more than one million people (10 percent of the total national population) have been seriously affected. In the area heavily infested by the Desert Locust farmers lost the totality of their cowpea crops; the other food crops have been destroyed between 67 to 83 percent. This resulted in an increased cost of staple food in the local markets in the affected regions.

The aeroplanes mobilised for the campaign in Mali have only been used for 33 percent of the time for which they were contracted. Some have not carried out any treatment. In the meantime, these planes could have been used in Mauritania where there was an urgent need. To carry out effective aerial control operations against Desert Locusts, which can move rapidly from one country to the other, the spray planes should only be mobilised under a regional contract.

Mauritania

Like the other countries, Mauritania was also taken by surprise by the extent of the Desert Locust upsurge. The logistic, human and financial means available at the beginning of the campaign did not allow the mobilisation of sufficient teams to cover the whole country. However, enormous efforts have been undertaken by the country to overcome the problems encountered. For this, the country has been helped by various development partners, especially the Maghreb countries which were among the first to provide assistance to Mauritania.

Virtually, the whole country has been affected by the Desert Locust invasion. The damage caused to crops and pastures has resulted in an important food insecurity situation which, according to FEWSNET data, has affected some 1,256,000 people, or about half of the total population,. The food shortages have been partly compensated by an upwards revision of the food aid and the provision of animal feed provided to the populations.

The new status of the National Locust Control Centre, now established as a public structure with administrative and financial autonomy, shows the interest accorded by the Mauritanian authorities to locust control. In fact this is considered as one of the highest priorities in the country's development policies. Experience gained by the staff of the Centre over the last ten years with respect to Desert Locust monitoring and control activities, has permitted in general the effective management of the control operations during the crisis, once the necessary resources had been acquired. However, additional training should be pursued, in particular for reserve personnel from other departments.

With respect to the health status of staff employed and protection of the environment, laudable effective efforts have been undertaken. No serious accidents have been reported. Pesticides were handled in an excellent manner with a very high recuperation percentage of empty containers (98 percent) which are destroyed according to international standards. The relatively important pesticide leftovers could create, however, a storage problem. Actions have been initiated to construct an appropriate pesticides store. Thought should be given to the creation of a pesticide bank for the sub-region.

The absence of an aerial strike force with a large autonomy and appropriate landing strips in many regions of the country is a major handicap to intervene in a rapid manner in an emergency situation in Mauritania. The possibility of acquiring at least one aeroplane with a large autonomy for locust monitoring and control should be considered. The experience of the air force should be used for the management and maintenance of such an aircraft. New landing strips should be identified and put into proper shape to assure speedy interventions and to improve the benefit/cost ratio of the operations.

The research station at Akjoujt has been identified as a regional station by the CLCPRO. It offers facilities to carry out research on Desert Locust under natural field conditions. This station could serve to promote Desert Locust research and to study alternative control means.

The role of the CLCPRO as a regional structure charged with the coordination of the control of the Desert Locust in the Western Region is not sufficiently known by the majority of the partners. Its role is currently overshadowed by the EMPRES programme and the direct involvement of the Locust Group of FAO in regional coordination. This situation risks that in the long term the Commission will lose its credibility notably with the member countries. Consequently, the CLCPRO should be endowed with a larger autonomy in the management and coordination of the control activities against the Desert Locust in the Western Region.

Morocco

Morocco has organised itself in an exemplary manner to address the Desert Locust invasions. This concerns both the communication and control operations, as well as the safeguarding of human and environmental health. Additionally, Morocco has provided a substantial aid to Sahel countries. Morocco has clearly proven that it is possible to master invading Desert Locusts through the establishment of a well-managed and efficient control system.

Moroccan authorities consider that a well planned and organised decentralisation of responsibilities of Desert Locust control from FAO headquarters to the Regional Commissions should be studied, in order to strengthen the interactions between FAO and the countries affected by the Desert Locust. A more effective monitoring and control system should be put in place in all the countries with the potential for seasonal breeding during recessions in the Western Region. The CLCPRO should be strengthened to be able to provide effective operational support to preventive control operations in the frontline countries.

Morocco has succeeded in purchasing pesticides at the lowest price (US\$ 2.95 per litre) thanks to a negotiating system linked to reference prices in the international market. A similar approach merits to be considered by FAO to reduce campaign costs.

The visit to the Souss valley, a region with a very high production potential for cash crops, clearly demonstrated to the evaluation team the enormous risks run in case Desert Locust invasions are not controlled in a rapid and effective manner. Some farmers have seen their crops wiped out overnight by the Desert Locusts.

At the end of this campaign, there is a large stock of pesticides in Morocco (4 million litres), as well as an enormous quantity of empty containers a large part of which has been crushed. The evaluation team considers that Morocco should take the necessary steps to develop a solution to this problem.

Niger

Niger, one of the frontline countries, does not have an autonomous national locust control unit. The “Centre National Antiacridien” (CNA) at Agadez created in 2000, and recently transformed into “Base de Lutte Antiacridienne d’Agadez” is responsible for monitoring of the seasonal breeding areas in the Air and Tamesna. A locust control unit in Niamey falls under the responsibility of the Plant Protection Service. Overlaps in roles and responsibilities noted by the evaluation team may have affected the management of the control operations. In this respect Niger, given its importance in the Western Region with respect to Desert Locust outbreaks and invasions, should create an autonomous and efficient national locust control unit, independent of the Plant Protection Service.

Such a “Centre National Antiacridien” must dispose of the necessary human and logistic means, as well as financial resources for the effective and independent operation of at least six permanent Desert Locust monitoring and control teams.

Niger has a “Fonds Commun des Donateurs” which is one of the tools of the Programme for the Prevention and Management of Food Crises. The use of this fund at the beginning of the control campaign was very useful. It has provided a contribution of US\$ 1.6 million at the start of the control operations before the mobilisation of external aid. Such a financing mechanism merits to be considered by the other frontline countries in the Sahel.

Niger treated 272,428 ha out of a total of 750,000 ha foreseen in the emergency plan for 2004. The difference is essentially due to a shortage of insecticides, insufficient logistical and human means, limited involvement of different national structures including other ministerial departments, the inadequate organisation of the campaign, as well as the late arrival and poor state of aeroplanes provided by FAO.

In the north of the country, all the monitoring teams are accompanied by a military escort because of security reasons, which has implications for their mobility and costs. Data analysis and the transmission of information, supported by the use of satellite images are carried out in an effective manner by the Centre in Agadez.

The cereal deficit for 2004 is estimated at 27 percent or about 223,487 tonnes. In addition, a reduction in grassland production of over 4,460,000 tonnes has been registered in the areas invested by the Desert Locust, leading to an early transhumance of nomads and their herds. It has been estimated that two-thirds of the production losses have been caused by drought and one-third by locusts. However, these estimates were carried out before the end of the Desert Locust invasions.

The donors consider that the operational support provided by FAO to the control campaigns in the affected countries could have been done in a more effective manner, in case more responsibilities had been entrusted to the CLCPRO. The Regional Commission should be better known in the region. A more intensive collaboration with regional structures, such as AGHRYMET, has also been proposed.

The phytosanitary brigades are a key element of the system established by the Plant Protection Service for pest control. Because of their lack of efficiency with respect to the areas treated (2 percent of the total) during the campaign 2003-05, and of the impossibility to ensure their adequate protection, their involvement in the locust control campaign is not supported by all parties in Niger.

The Ministry of Environment was not able to carry out a monitoring and evaluation programme of the possible impact of Desert Locust control operations. Notwithstanding the sensitisation efforts undertaken by the Plant Protection Service to avoid the risk of using empty containers for domestic purposes, only 30 percent has been recuperated.

Saudi Arabia

During the 2003-2005 campaign Saudi Arabia received the first wave of swarms on 26 October 2003, in the winter breeding areas located on the Red Sea coast, in particular the region of Jeddah and Makka. The control means mobilised consisted of 34 control teams, 8 monitoring teams and 4 aircraft. In total 33 swarms have been treated over an area of 22,155 ha between 2003 and 2004. In addition, treatment of hopper bands has covered 141,146 ha. The total costs are estimated at US\$ 3,201,418.

Since then, the Desert Locust situation has remained relatively calm. It may be concluded that Saudi Arabia has effectively stopped the upsurge in the Central Region. However, it does not seem possible to repeat the Saudi experience in most of the other countries of the region, because the quantity of means mobilised for monitoring and control is well beyond the capacity of those countries. However, it might be worth considering how the capacity available in Saudi Arabia could be used in support of operations to be carried out in the neighbouring countries within the framework of the Regional Commission for the Control of the Desert Locust in the Central Region.

Senegal

At the end of June 2004, Senegal experienced unprecedented Desert Locust invasions. The very limited locust control means available in the country were concentrated in the department of Matam, which was infested the heaviest at the onset of the invasions. However, these control means were insufficient to prevent the worsening of the situation. There was a crucial lack of a wide range of matters, including qualified personnel, vehicles, spraying and pumping equipment, GPS, maps, protective clothing, as well as pesticides and aeroplanes. As a result, Desert Locusts breeding occurred in the whole northern half of the country.

The control campaign was undertaken initially only with ground teams (53); aeroplanes were used in large numbers (20) in the course of the second half of October 2004. The aerial control means while arriving late have nevertheless made it possible to reduce substantially the important potential of the locust populations. However, significant crop and pasture losses have been registered especially on groundnuts, cowpea and millet in the centre and northwest of the country and in the regions of Louga, Diourbel, Thiès, Saint Louis and Dakar. Approximately 15-20 percent of the subsistence farmers living in the affected regions has lost their entire production, part of these have benefited from food aid programmes.

In general, the pesticides used, in particular fenitrothion and chlorpyrifos, have given satisfactory results, as shown by the mortality percentages transmitted in various messages. These were usually higher than 80 percent. Lack of the effective evaluation of the impact of the control operations does not permit to obtain reliable estimates on environmental effects.

The authorities consider that the campaign objectives have been reached. The intensive treatments have succeeded in limiting losses and to protect the major groundnut production area. Training efforts should continue to further improve future control operations. Special attention should be paid to the maintenance of equipment and the management of pesticide stocks and empty containers. From April 2005 to January 2006, pesticide stocks remaining from the Desert Locust campaign have decreased by more than 200,000 litres from 877,700 to 672,760 litres. The fate of these pesticides remains unknown. At the same time, the evaluation team noted also a significant number of empty pesticide drums for sale in the local markets. Chemical analysis of pesticides, in particular the current leftovers, should be carried out periodically to check their validity. The urgency to construct a pesticide store is stressed by the evaluation team.

Sudan

Joint efforts of the government of Sudan and the donor countries, in particular, Saudi Arabia, have permitted the country to effectively address the Desert Locust threat. The management of the control campaign is the responsibility of the Locust Service supported by the Anti-Locust Steering Committee. Notwithstanding the abruptness of the invasion, the migration into almost the whole country and the breeding of the Desert Locust in certain areas, such as Darfur, the Sudanese authorities have maintained their calm. FAO made it possible to undertake monitoring activities in the Darfur area, notwithstanding the insecurity situation.

Apart from the strong technical support provided by FAO, the slowness of its financial procedures has seriously affected, at the beginning of the campaign, the release of funds allocated within the framework of the emergency project for Desert Locust control prepared by the Sudanese government under the FAO TCP.

The management of pesticide stocks, both those of good quality and obsolete products, as well as empty containers, is done under adequate storage conditions. Under the unfavourable climatic conditions in Sudan, pesticides deteriorate in about three year's time because of high temperatures, which excludes long-term storage. Therefore the security stock in Sudan is maintained at a low level and will be used before the expiry date of the pesticides. The evaluation

team considers that for empty containers the new recycling method based on decontamination, compacting and melting in foundries merits to be used in Sudan.

In the national control strategy, priority is given to safeguarding crops and pastures through the use of pesticides applied essentially with aerial means. A unit for the appropriate utilisation of pesticides exists at the level of the Pesticides Directorate with a clearly defined mandate. However, it should be noted that this entity has not been very active in the course of the last control campaign. The Government of Sudan has an outstanding programme for the homologation and demonstration of alternative bio-pesticides to try to mitigate the extensive use of conventional insecticides.

The system for Desert Locust control in Sudan is well structured. In fact, the Locust Centre is staffed with a large number of permanent staff which is based in the main stations and sub-stations. Appropriate control means are available in these stations which cover all the important areas of the country. The Centre disposes of an adequate autonomous budget allowing it, to be operational the whole year.

Tunisia

The locust control operations in Tunisia are undertaken by the Sous-Direction du Contrôle Sanitaire Interne, which falls under the responsibility of the General Direction for the Protection and Control of Agricultural Products.

The strategy adopted in Tunisia for the control operations from March 2004 onwards, aimed at maintaining the greatest secrecy in order to avoid unfounded concerns. The instructions to maintain silence were such that in certain cases the campaign came to an end, without the inhabitants of the infested regions and the staff of the Ministries concerned having been aware of it. Initially, neither FAO nor the media had been informed of the threat.

The beginning of the campaign was characterised by a certain number of insufficiencies related to control and communication means, and the lack of GPS, resulting in monitoring difficulties and the impossibility to dispose of the geographical coordinates of the locust monitoring data. Also the capacity of the control teams left to desire; certain teams had never seen locusts and sometimes training on the spot had to be provided. However, in the autumn of 2004 the situation had considerably improved.

The total area treated has been estimated at 276,378 ha. The ground and aerial treatments proved to be effective, except in some rare cases where only partial mortality was noted. The losses caused to agricultural production were minimal and concerned mainly fruit trees (almonds and figs).

A study has been carried out by the "Centre International des Technologies de l'Environnement" at Tunis on the environmental impact of the chemical control operations, which revealed no visible effects on fauna and flora. Human health tests were also negative.

Yemen

The locust situation in Yemen has been relatively calm with the exceptions of small infested areas totalling 500 ha. The development of the Desert Locust upsurge has been stopped in time. These excellent results are essentially due, on the one hand to the meteorological conditions characterised by low and irregular rainfall, and on the other to the actions undertaken with technical and financial support from FAO, by the Locust Monitoring and Control Centre based at Sana'a.

The positive performance of the Locust Control Centre in Yemen has been confirmed by a recent evaluation mission of the EMPRES Programme for the Central Region, which placed the Centre among the best in the Region.

Nevertheless, the evaluation mission was informed of up to 20 percent of losses in some cereal crops. The families affected have not been identified, neither compensated. The Locust Control Centre admitted that all the infested areas had not been controlled, in particular those with insecurity problems and those where beekeepers opposed chemical control. Impact of pesticide treatments has not been monitored systematically.

The Locust Control Centre in Yemen is an autonomous structure with its own staff, but without a proper budget. For example, during 2005 most of the survey activities have been financed by either the FAO TCP or the EMPRES programme. The government has contributed in total US\$ 12,000. The lack of resources has resulted in the non-renewal of decrepit logistic means, the poor state of equipment and infrastructure, as well as a lack of staff motivation.

To address the insecurity problems the Locust Control Centre integrates into its field teams members of the clans occupying the regions that have to be monitored, to serve as guides or resource persons, and/or armed military people to protect members of the field teams. Recently, an agreement to monitor and control jointly the border zone between Yemen and Saudi Arabia has been developed with the support of the EMPRES programme, and has been signed at a high level in the two countries.

The tensions between the monitoring and control teams and the beekeepers have been reduced by negotiating the transfer of the beehives to regions not infested by the Desert Locust, with vehicles of the Centre. The experience by Yemen offers ways to address insecurity problems and the co-existence of players having sometimes contradictory objectives, as well as the strengthening of cooperation between neighbouring countries for the monitoring and control of the Desert Locust.

Annex III: Area treated during the 2003-05 Desert Locust Upsurge

It should be noted that "hectares treated" as reported by the DLIS is often derived from the quantity of pesticide sprayed divided by the recommended dosage rate, especially for ground spraying. When aircraft equipped with a DGPS track-guidance system connected to the flow-meter are used, a more accurate measure of the hectares treated is available.

Table 1a: Hectares treated against the Desert Locust as reported to FAO/ECLD DLIS

	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04
Burkina Faso	0	0	0	0	0	0	0	0	0
Cape Verde	0	0	0	0	0	0	0	0	0
Chad	0	0	0	0	0	0	0	0	0
Gambia	0	0	0	0	0	0	0	0	0
Guinea	0	0	0	0	0	0	0	0	0
Guinea Bissau	0	0	0	0	0	0	0	0	0
Mali	80	12,573	17,437	0	0	0	0	0	0
Mauritania	1,607	12,689	50,209	134,201	81,59	26,476	13,918	2,049	1,292
Niger	192	90	3,92	1	1,088	2,930	1,00	0	200
Senegal	0	650	0	0	0	0	0	0	30
Algeria	528	2,932	1,663	59	6,023	95,41	349,913	443,715	924,209
Libya	0	900	0	800	0	0	28,961	72,670	59,47
Morocco	0	8,873	13,796	26,622	97,354	446,936	346,02	452,593	736,750
Tunisia	0	0	0	0	0	0	0	79,943	NR
Cyprus	0	0	0	0	0	0	0	0	0
Egypt	203	613	13	0	895	2,704	43	1,433	1,672
Eritrea	0	0	0	0	1,920	0	0	0	0
Ethiopia	0	0	0	0	0	0	0	0	0
Israel	0	0	0	0	0	0	0	0	0
Jordan	0	0	0	0	0	0	0	0	0
Lebanon	0	0	0	0	0	0	0	0	0
Saudi Arabia	0	3,000	26,336	89,27	24,572	2,375	1,040	0	0
Sudan	4,836	12,000	1,836	542	308	959	596	6	0
Yemen	0	0	0	0	0	0	0	0	0
Total	7,446	54,320	115,082	251,952	213,619	578,121	742,273	1,052,409	1,723,300

Table 1b: Hectares treated against the Desert Locust as reported to FAO/ECLD DLIS

	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05
Burkina Faso	0	200	12,247	14,12	0	0	0	0	0
Cape Verde	16	0	500	497	1,874	450	80	0	0
Chad	0	0	8,801	8,423	0	0	0	0	0
Gambia	0	0	0	0	0	8,385	6,037	0	0
Guinea	0	0	0	0	0	0	3,900	5,450	15,000
Guinea Bissau	0	0	0	0	0	0	0	7,368	0
Mali	6,285	16,403	218,081	106,582	5,050	3,100	0	0	0
Mauritania	5,071	34,636	200,996	446,541	312,368	59,987	0	0	0
Niger	1,075	4,397	98,025	96,383	10,700	2,535	0	0	0
Senegal	3,673	56,948	211,397	378,536	60,542	52,484	5,921	4,200	210
Algeria	844,249	7,019	2,800	131,745	685,371	441,341	218,716	316,921	36,175
Libya	3,095	0	1,060	4,925	44,646	5,340	220	0	0
Morocco	724,913	5,433	505	459,033	1,075,260	384,796	68,412	6,110	570
Tunisia	NR	0	0	14,185	11,606	0	630	350	10
Cyprus	0	0	0	462	0	0	0	0	0
Egypt	1,793	0	6	60	50,000	47,675	1,941	11,042	2,053
Eritrea	0	0	0	0	0	0	0	0	0
Ethiopia	0	0	0	0	0	0	0	0	0
Israel	0	0	0	0	NR	0	0	0	0
Jordan	0	0	0	0	4,520	2,003	0	0	0
Lebanon	0	0	0	0	10	0	0	0	0
Saudi Arabia	0	0	0	60	1,100	20	0	0	0
Sudan	0	0	0	0	0	0	1,320	2,685	4,776
Yemen	0	0	0	175	0	0	0	0	0
Total	1,590,170	125,036	754,418	1,662,319	2,263,047	1,008,116	307,177	354,126	58,794

Table 1c: Hectares treated against the Desert Locust as reported to FAO/ECLC DLIS

	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05		Total
Burkina Faso	0	0	0	0	0	0	0		27,159
Cape Verde	0	0	0	0	0	0	0		3,417
Chad	0	0	4,272	1,320	0	0	0		22,816
Gambia	0	0	0	0	0	0	0		14,422
Guinea	0	0	0	0	0	0	0		24,350
Guinea Bissau	0	0	0	0	0	0	0		7,368
Mali	0	0	0	0	0	0	0		385,591
Mauritania	0	0	0	0	0	0	0		1,383,499
Niger	0	1,200	271	0	0	0	125		224,604
Senegal	0	0	0	0	0	0	0		774,591
Algeria	547	1,570	1,200	200	770	315	5,120		4,518,842
Libya	0	0	0	0	0	1,005	0		222,769
Morocco	0	47	6	0	0	0	0		4,854,211
Tunisia	0	0	0	0	0	0	0		106,724
Cyprus	0	0	0	0	0	0	0		462
Egypt	542	557	50	0	0	0	0		123,295
Eritrea	0	0	0	8,933	11,117	85	0		22,055
Ethiopia	0	0	28	45	158	0	0		231
Israel	0	0	0	0	0	0	0		0
Jordan	0	0	0	0	0	0	0		6,523
Lebanon	0	0	0	0	0	0	0		10
Saudi Arabia	2,707	5,155	600	0	0	0	0		156,692
Sudan	0	0	0	1,726	12,289	159	0		44,038
Yemen	0	0	0	0	0	175	0		350
Total	3,796	8,529	6,426	12,224	24,334	1,739	5,245		12,924,19

Annex IV: Training Activities undertaken by FAO in the Western Region

Multipurpose training treating various aspects: (i) the bio-ecology of the Desert Locust, (ii) locust survey and monitoring, (iii) locust control, (iv) preservation of human health and the environment, and (v) the management of a locust control campaign

First phase: the first regional training course of trainers on the major themes related to the management of the Desert Locust was held at the ICRISAT Centre at Niamey, from 14 March till 6 April 2005. It included a total of 21 participants from 11 countries affected by the Desert Locust, i.e. three participants from each of the four Sahel frontline countries (Chad, Mali, Mauritania, Niger) and from Senegal, one participant from each of the five Southern Circuit countries (Burkina Faso, Cape Verde, Gambia, Guinea, Guinea-Bissau) and one participant from Djibouti (within the framework of cooperation between the two Regions).

During the training course, in addition to the improvement and standardization of their respective knowledge and understanding of educational methods, with the support of a CD-Rom presenting the 5 above-listed modules, trainers developed their own national training programmes comprising three sessions of five days each, and to be organized in May 2005, before the starting of the summer campaign. Notwithstanding the very heavy programme, the participants enjoyed the training considering the proposed themes, the quality of the presentations made by four international consultants and the national professional officer of the EMPRES-WR Programme, and the overall organisation including the educational approach.

Second phase: a majority of the 20 new master-trainers (some have to dedicate themselves also to other tasks such as the preparation of the Desert Locust campaign) have carried out in May 2005 three national training courses, often with the help of an international consultant, assisting in these courses as an observer and resource person. These national courses were undertaken in ten Sahel countries and have permitted to strengthen the capacities of 600 national staff. They submitted joint reports on their training activities.

Third phase: (end 2005/early 2006) training sessions of two days, during which the master-trainers which had participated in the regional course at Niamey and taught later at national level, supervised an evaluation and monitoring exercise in the field with the staff previously trained. So far, these activities have been undertaken in eight countries (Cape Verde, Chad, Burkina Faso, Guinea-Bissau, Mali, Mauritania, Niger and Senegal). FAO staff attended two of these exercises, in Niger and Mali during January 2006.

Training related to the control of the quality of locust control treatments (QUEST)

First phase: FAO has organised from 13-23 April 2005 a regional workshop to train trainers. In total 21 persons from six Sahel countries participated, from Ministries of Health and Environment, and of Agriculture. The workshop dealt with the following matters: impact of locust chemical control operations on water bodies, fauna and flora, and the identification of the most vulnerable non-target species, which must be followed during the whole control campaign.

Second phase: national training sessions of five days each, organised between August and December 2005 in six countries (Chad, Burkina Faso, Mali, Mauritania, Niger and Senegal) bringing together about ten participants specialized in environmental health or plant protection. This training served as the basis for the establishment of the national teams charged with the control of the quality of the locust control treatments.

A regional technical workshop was organised from 5-15 December 2005 in Senegal involving 14 environmentalists/mathematicians. The workshop dealt with the recognition of species and treatment of data collected.

Other national training courses held in countries on specific topics

In the course of the 2003-05 control campaign FAO, with the help of various donor resources, contributed to the organisation and financing of the following national training courses related to various Desert Locust monitoring and control matters.

- Algeria: control strategy and transmission of locust data, 6-8 October 2003.
- Chad: monitoring techniques, July 2004.
- Guinea, spraying techniques for 16 participants from 23-26 November 2005.
- Libya: monitoring and control techniques, 27 March - 3 April 2004, and training sessions in various regions, March 2005.
- Mali: on the spot training on survey and data collection through a field mission carried out by two FAO staff. Courses of four days each, held between 26 February and 10 April 2005. In total 150 staff members have been trained in the bio-ecology of the Desert Locust and in monitoring and control techniques.
- Mauritania: management of locust information, August – October 2004.
- Morocco: monitoring of cholinesterase levels for the protection of control operators, 26 September - 1 October 2004.
- Niger: eight higher level technical plant protection staff members at the AGHRYMET Centre during 2004. On the spot training re survey and data collection through a field mission carried out by two FAO staff.
- Senegal: management of locust information (use of new technologies), 24-29 May 2004.
- Tunisia: monitoring techniques 11-12 October 2004, use of GPS, 30 November - 3 December 2004, and control of the quality of locust control treatments, 7-15 September 2005.

Annex V: Details of bilateral assistance provided to the 2003-05 Desert Locust Control Campaign

The Algerian assistance to the Sahel countries included 105 monitoring and control teams, 211,000 litres of pesticides, 800 knapsack sprayers and 800 monitoring and protection kits. This assistance involved the mobilisation of 300 staff members.

The assistance provided by Morocco included the sending of two ground teams to Mauritania in November 2003, and in addition eight aeroplanes and 20 vehicles, spraying and communication equipment, and some 350,000 litres of pesticides during 2004. Similar support, in qualitative terms, has been provided to Senegal. Flying hours and pesticides have also been provided to Cape Verde, and pesticides to Mali.

Among the beneficiary countries Mauritania has received an important support from neighbouring countries, in the form of ground intervention teams (Algeria, Gambia, Morocco, Senegal), pesticides and protective clothing (Algeria, Morocco and Tunisia) and spraying equipment and flying hours (Morocco). The approximate value of these gifts is as follows.

Country	Assistance	2004	2005	Total in US\$
Algeria	Pesticides and protective clothing	216,000		216,000
Morocco	Vehicles	200,000	250,000	450,000
	Radios	50,000		50,000
	Flying hours	317,500		317,500
	Sprayers and protection kits	195,796		195,796
	Pesticides	400,000	2,000,000	2,400,000
Tunisia	Pesticides	80,000		80,000
				3,709,296

Algeria, Libyan Arab Jamahiriya and Morocco have provided significant assistance to Senegal in the form of pesticides, spray planes and ground intervention teams.

Mali has mainly benefited from assistance by African countries in the form of:

- pesticides: South Africa (84,800 litres), Algeria (60,550 litres), Libyan Arab Jamahiriya (44,600 litres), Morocco (5,000 litres), and Tunisia (5 000 litres);
- flying hours; South Africa (200), and Libyan Arab Jamahiriya (300); and
- vehicles: Algeria (6 4x4, 6 lorries, 6 UNIMOG), Burkina Faso (3 4x4), Libyan Arab Jamahiriya (20 4x4, 2 lorries).

Chad has benefited from the following aid:

- Algeria: pesticides 10,000 litres and 100 knapsack sprayers and protective clothing;
- Libyan Arab Jamahiriya: pesticides 5,000 litres, monitoring teams and two aeroplanes; and
- Sudan: pesticides 6,800 litres.

A number of countries which are not members of the CLCPRO (Cape Verde, Gambia, Guinea Bissau and Guinea Conakry) have also received help from other African countries.

Important assistance has been provided from outside the sub-region in a bilateral manner to the countries affected by the invasion. Brazil (US\$ 269,000), China (US\$ 184,825) and France (US\$ 18,825) have provided assistance to Senegal. Morocco has received bilateral support from USAID (US\$ 3 million), Spain (US\$ 2,800,000), Netherlands (US\$ 1,800,000) and Korea (US\$ 1 million). Mali received assistance from the EC (US\$ 2,120,00). Seven countries in the Sahel received emergency assistance through the World Bank Africa Emergency Locust Project which totalled US\$ 11 million for the campaign.

The resources provided through FAO to the affected countries, in percentage of the total costs, included pesticides (44 percent), sprayers (4 percent), protective clothing (1 percent), communication equipment (5 percent), vehicles (4 percent), flying hours (22 percent), human resources (7 percent), and other inputs (14 percent).

Annex VI: Benefit/costs ratios

The objective of the control campaign was to protect crops and pastures to safeguard the food security situation and revenues of the communities affected by the Desert Locust invasions. For this purpose equipment, inputs and services have been provided. Different types of food aid for people and animals, and rehabilitation activities such as the distribution of seeds, and agricultural equipment and veterinary products, as well as the improvement of small vegetable parameters, have been undertaken for the relief of the affected communities. From this point of view, the cost of the campaign must include the totality of the expenses for the control campaign, as well as the additional economic effects of the invasions and the control campaign.

The control campaign has saved crops and pastures in the infested countries. Control capacities in these countries have been strengthened; infrastructures have been rehabilitated or set up, employment opportunities (increase of the number of monitoring and control teams, etc.) have been created, etc. In addition, local enterprises have obtained contracts within the framework of the control operations thus increasing their turnover. The equipment received has facilitated the work of the monitoring and control teams. The economic and social benefits of the campaign must ideally be calculated on the basis of the value of all the above factors. However, an important part of these benefits could not be evaluated and quantified due to lack of data. Consequently, benefit/costs ratios can only be calculated in an approximate manner, and two examples, based on data collected by the evaluation team, are presented in the following.

The 2003-2005 campaign has protected losses linked to the Desert Locust of:

- some 14,414 tonnes of cereals in Chad and about 37,603 tonnes in Burkina Faso. At a price of US\$ 0.30 per kilo their value would be about US\$ 4,323,780 in the case of Chad and US\$ 11,281,140 in the case of Burkina Faso;
- pastures for about 15,137 animals in Chad and 9,761 animals in Burkina Faso. With weight losses estimated at 150 gr/day/animal during five months of food shortage per year, and an average market price per living animal of about US\$ 1 per kilo, the equivalent of US\$ 2,886,702 for Chad and US\$ 2,220,627 for Burkina Faso has been saved.

Consequently, the value of the subsistence means saved is about US\$ 7.19 million for Chad and US\$ 13.50 million for Burkina Faso. These two countries have spent for the control campaign US\$ 4.7 million and US\$ 1.6 million respectively. Thus the benefit/cost ratio can be estimated at 1.5 for Chad and 8.4 for Burkina Faso. If one takes into account the food aid provided to Burkina Faso, which is evaluated at US\$ 8.28 million, the benefit cost ratio for this country would become 3.2.

The total cost of the locust control campaign 2003-05 was about US\$ 280 million. The campaign has permitted to protect the subsistence means of some of the affected communities. The above benefit/cost ratios show that in these cases benefits of at least 150 percent of the expenses have been realised. The benefits of the campaign are probably much more important than shown by this percentage, because they must also consider the development of the human capital following the various training activities undertaken during the campaign, as well as matters such as the new employment opportunities created, and the increased turnover of local businesses carrying out activities within the framework of the Desert Locust control campaign.