



Hunger in their wake

Inside the battle against
the Desert Locust



◀
A pesticide handler in Morocco takes a break during a dawn locust control operation.



WHAT'S AT STAKE WHEN THE LOCUST INVADE

WHAT DO A SHEPHERD IN NORTHWEST AFRICA, A PLANT PROTECTION EXPERT IN THE SAHEL AND A MINISTRY OF AGRICULTURE OFFICIAL IN EITHER REGION HAVE IN COMMON? THEIR LIVES AT THE MOMENT ARE DOMINATED BY AN INVASION OF HIGHLY MOBILE WINGED INSECTS THAT ARE MARAUDING OVER THEIR TERRITORIES.

In the following pages, people from all three groups – small-scale farmers and herders, technical experts and government officials – explain in their own words what is at stake for them, their communities and their countries during the worst Desert Locust upsurge in more than 15 years.

Nature of the pest

The Desert Locust is a pest of unusually destructive powers. A small part of an average swarm, about one tonne of locust, eats the same amount of food every day as 2 500 people. Swarms can travel up to 200 kilometres in a day. Female locust can lay a maximum of four times in their lifetimes, up to 70 eggs each time.

During long recession periods, Desert Locust exist harmlessly in small numbers in the desert. When favourable breeding conditions occur, as they did in West Africa in late 2003, the insects increase enormously in number. When weather and ecological conditions force the insects into a small area, they stop acting as individuals and start acting as a group. Within a few months huge swarms form and set out flying downwind in search of food. Locust that originate in West Africa can invade Northwest Africa and reproduce. Their offspring then return south in a cycle that can last years (see Portrait of a locust campaign, pages 4-7).

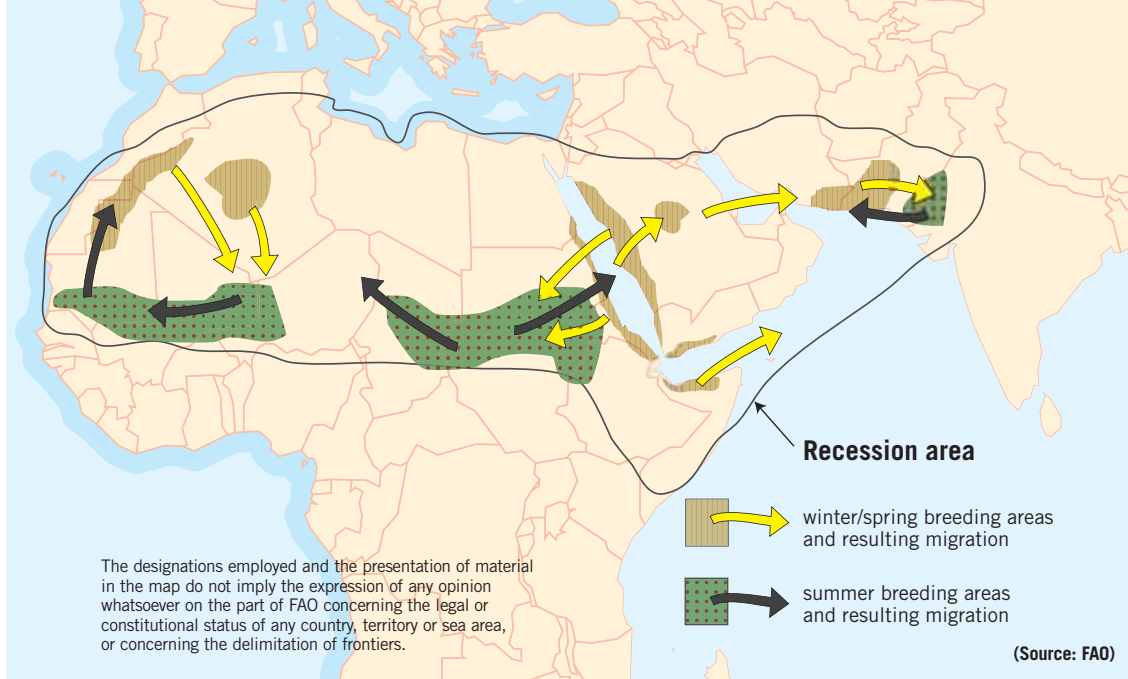
Defending agriculture

Here is what Morocco has to say about an invasion it has spent around €25 million (US\$30 million) to fight during the 2003-2004 campaign. It is defending an agricultural sector worth US\$7 billion in 2002, US\$1 billion of which is export earnings. Four million people work in the sector.

“We don't only consider the economic damage caused by the locust. Small parcels of land support whole families. If crops fail, people are going to migrate. There aren't very many jobs in the cities, and if people have no work how are they going to eat?” says Saïd Ghaout, Director of Morocco's National Centre for Locust Control.

“The locusts would have made it to Spain without all our efforts,” he maintains. “History is there to prove that the swarms can reach Europe. In the 1950s, Desert Locusts were found in the UK and in Rome, for example. It is true that our mountains are a barrier against a southern invasion but the locust get through in many places.”

Most of the affected countries of Northwest Africa – Morocco, Algeria, Tunisia and the Libyan Arab Jamahiriya – have major agricultural sectors that can justify expensive control operations. But the invading locust come from the Sahel, a much poorer part of Africa where agriculture is mainly at a subsistence level and resources for locust surveillance and control are woefully inadequate.



Desert Locust exist throughout the 30 countries shown inside the black line. They can remain harmless in small numbers in one region, while increasing in numbers and swarming in another region, for example, in Northwest and West Africa during the 2003-2004 upsurge.

“
The situation
is critical.
”

Mohamed El Hacem Ould Jaavar
Chief of Intervention
National Centre for Locust Control
Mauritania



Donors should accept the wisdom of spending money to stop the problem in the south, says Brahim Boudarine, Provincial Director of Agriculture in Figuig, the Moroccan region that straddles the main locust invasion corridor between the Sahara and the country's principal farming region.

“For each dollar spent on control in the Sahel, it saves \$3-4 being spent here in the north later on, (after the locust reproduce),” he says. “And it goes the other way too because they multiply here and return to the Sahel and then they have to spend \$10 on treatment during the following season.”

In the Sahelian countries hit by the 2003-2004 upsurge, agriculture contributes between 20 and 40 percent of Gross Domestic Product. Skies filled with Desert Locust cast a shadow over the lives of millions of farmers and herders (see Counting the human cost, pages 8-9).

A plea for international help

Officials in the affected countries all have the same message for the outside world: *We need help.*

“The situation is critical. We don't have the means to cope with the situation,” says Mohamed El Hacem Ould Jaavar, Chief of Intervention at Mauritania's National Centre for Locust Control. “We have only seven teams in the field and two aircraft for spraying. We can tap into reservists for personnel – they are already trained – but we need equipment and cash for pesticide.”

Back in Morocco, Mr Boudarine sums up a control campaign that lasted throughout the winter and spring of 2003-2004.

“We stopped them reaching the agricultural heartland in the north of the country this time, but if there is another invasion and they come in the same intensity or greater, they can get past us,” he says.

“We can treat them down here by plane because the population density is low. If they reach the north there are too many people and we would have to use vehicle-mounted sprayers. If there are huge numbers of locust we couldn't cope. It would be a catastrophe.”

▲
Spraying Desert Locust in northeast Morocco (top).

Moroccan farmer surveys locust damage to his onion crop (bottom).



PORTRAIT OF A LOCUST CAMPAIGN

▲
Worker in protective clothing pumps pesticide into spray plane in Bouarfa, Morocco.



NOUAKCHOTT, MAURITANIA - DESERT LOCUST SURVEY AND CONTROL TAKE PLACE ACROSS WEST AND NORTHWEST AFRICA, BUT THE STORY REALLY BEGINS DEEP IN THE SAHARA IN THIS VAST ARID COUNTRY.

In September 2003, the National Centre for Locust Control sent a two-vehicle team on a routine 3 500-kilometre survey into the centre and south – traditional locust breeding areas. This time they found something.

“We began seeing Desert Locust every 100 metres where there had been only a few the month before,” recalls Mohamed Lemine, an FAO locust expert based in Mauritania. “I reported that there was good potential for an outbreak.”

His report was shared routinely with neighbouring countries and the Locust Group at FAO headquarters in Rome.

“I treated the report with caution since such breeding patterns have been known to fizzle out,” says FAO Locust Forecasting Officer Keith Cressman. “Then in mid-October we got reports of exceptionally heavy rains in the western Sahara and I knew we were in for it.”

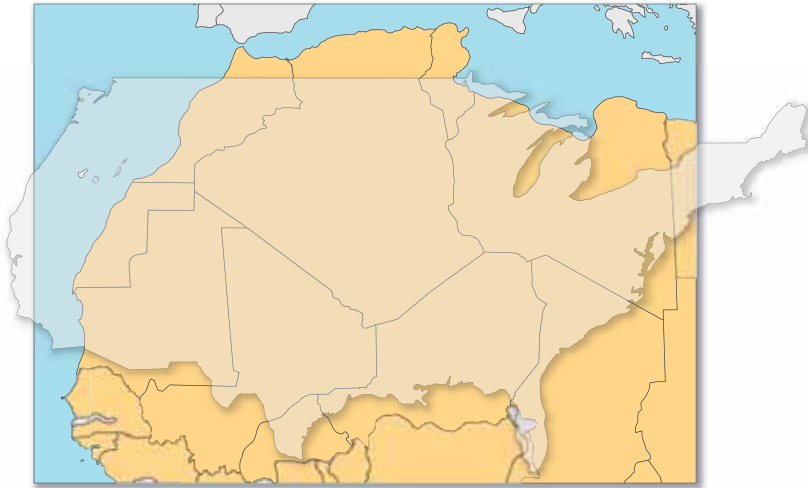
On 17 October, FAO issued a Desert Locust alert, followed quickly by field missions to Mali and Mauritania.

Mobilization

On the northern side of the Sahara, in countries such as Morocco, officials mobilized rapidly.

“We started getting information on activities from September, an improvement on the 1988 locust plague, when FAO was late warning us of activities,” says Abdelaziz Arifi, senior adviser on locust to the Moroccan Ministry of Agriculture and Rural Development. “We reacted early. We checked our stores of pesticides, rented planes, contacted donors and alerted the Government, which won’t act until they actually see the locust. It is critical to hit the locust fast before they start reproducing.”

Early warning has improved since the 1980s. Many of the affected countries now conduct more frequent and methodical surveys of locust breeding grounds and share their findings more widely using the latest communication technology. The science of locust forecasting is more sophisticated as well (see *New ways to tackle locust, pages 10-11*).



▲ Eight million square kilometres of territory must be monitored for Desert Locust during the current upsurge, an area shown here in relation to the continental United States.

But once a control operation gets under way, the marching orders are simple: find as many locust as possible and kill them.

“When we survey, we will follow a swarm even in the dark until it settles,” says Jacob Habab, a survey officer in Mauritania. “I use a GPS to determine the latitude and longitude of each corner of the infested area, then radio headquarters with the report. Sometimes we treat the locust with vehicle-mounted sprayers, but you need planes to treat big areas.”

Mr Habab bends down to dig in the sandy soil in the countryside near Kaedi, southern Mauritania. “You see that it is moist. It is good for egg laying and we know that in 10 to 15 days we have to come back and check if the locust have returned to lay their eggs.”

► Coordinators in Locust Campaign Headquarters, Rabat, Morocco.



Day in the life of campaign headquarters

RABAT, MOROCCO - A REGULAR SCHEDULE DOESN'T EXIST FOR THE MEN IN A SMALL ROOM WITH A LONG WORKING TABLE AT AN AIR BASE IN THE MOROCCAN CAPITAL. THEY STAY UNTIL THE WORK IS DONE, GRAB SOME SLEEP AND RETURN TO DUTY. THE MAP-FILLED ROOM IS THE NERVE CENTRE OF A DESERT LOCUST CONTROL CAMPAIGN THAT COORDINATES LOGISTICS FOR 2 000 PEOPLE, HUNDREDS OF VEHICLES, PLANES AND SPRAYERS AND MILLIONS OF LITRES OF PESTICIDE.

The daily cycle starts when survey teams from along the “red line” of defence across the south of Morocco start phoning in their reports late each evening.

“Last night we had to make a decision on a really large locust sighting in Ouarzazate,” says Oulghazi Driss, treatment coordinator. “After a discussion that included the meteorologist and pesticide coordinator, both sitting around this table, we decided to move another plane from Tata, 174 kilometres away.”

“Drums of pesticide were dispatched by truck from our depot in Agadir and the loaded plane took off around 4 or 5 this morning to spray,” he says. “We just got a report that the spraying was completed successfully, which goes into our operations report for today.”

Other coordinators return this morning to confront new problems.

Captain Nabil Taymi has lost so much weight from working nine months without a day off that his uniform looks two sizes too big. This morning he finds three messages from the east of the country, all about vehicle breakdowns.

“We have vehicles from 1988. You try to start them and they just

sputter,” he says. “We do have 60 new vehicles but the others are an average of 12 years old. We need another 100 four-wheel-drive pickups to do this job properly.”

Dr Taoufik Ayouché is responsible for the health of all campaign personnel. This morning he is coordinating the staffing of five new field survey camps with medics, and calculating distances between these camps and the nearest hospitals. Pesticide poisoning is the big danger, kept under control through protective clothing, masks and goggles and regular blood tests. The doctor must make sure survey teams are well fed and protected from everything from car crashes to scorpion bites.

An accountant counts the costs. A biologist studies survey reports. The pesticide coordinator checks that a new shipment has made it through customs. The air officer checks that planes at 60 airstrips across the country will have fuel for the coming days.

Finally, an archivist keeps track of operational details for posterity. While no one can predict when this upsurge will die out, whoever fights future battles against an ancient pest will want to know what has gone on in this room today.

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this job properly.”

Nabil Taymi
Equipment coordinator
Locust Campaign Headquarters
Morocco



In Mauritania, survey missions are self-contained, travelling for weeks in four-wheel-drive vehicles packed with camping equipment, fuel, food and water. In a country like Morocco, survey crews live in camps, inspecting a set area and returning to camp to radio in reports and spend the night.

Pesticide and planes

Pesticide handling and logistics are one of the trickier elements of a big control

◀
Survey operation in
Mauritania.

operation. Although research into more environmentally friendly pesticides and biocontrol agents is ongoing (see New ways to tackle locust, *pages 10-11*), organophosphate pesticides for the moment remain the only way to treat large infestations of locusts. In Morocco, once survey reports have pinpointed the next day's targets, pesticides are dispatched day and night from a warehouse on the Atlantic coast near Agadir. Trucks roll all night to arrive at airfields before first light, when planes will be loaded and take off to spray the insects at dawn.

“We order pesticide delivered by ship from the manufacturer in Europe on an as-needed basis. We do it this way to avoid having leftover pesticides at the end of the campaign, which can then become obsolete and a big headache to get rid of,” says Ahmed Mouhim, Assistant Director of the National Centre for Locust Control.

Mr Mouhim hasn't seen his family in Agadir for months. He has been in Bouarfa on the far side of the country, teaching 20 local technicians how to conduct surveys.

This morning, spray planes from Spain are prepared for takeoff, a mechanic calibrating the spray heads while the pilot enters target coordinates into the onboard GPS. The plane will be flying low this morning, 10 metres off the

FAO: 50 years in the locust business

FOR OVER 50 YEARS FAO HAS BEEN A WORLD AUTHORITY ON DESERT LOCUST, PROVIDING LEADERSHIP, CONTINUITY, GLOBAL INFORMATION AND FORECASTING, TECHNICAL SUPPORT, TRAINING, FUNDING AND A NEUTRAL FORUM MUCH NEEDED BY LOCUST-AFFECTED AND OTHER INTERESTED COUNTRIES. WITH OFFICES AROUND THE WORLD, FAO MONITORS DESERT LOCUST ACTIVITY IN 30 COUNTRIES FROM SENEGAL TO INDIA.

Many donors channel money through FAO for locust control because the Organization can coordinate actions among affected countries as well as among donors. Such coordination reduces the risk of duplicate purchases of goods and services in any given country – a possibility if funding comes from multiple sources.

“We receive all FAO's information and we follow closely the situation in Mali, Senegal, Mauritania and even as far away as Sudan,” confirms General Hammou Hajoui, Assistant National Coordinator at the Moroccan Locust Campaign Headquarters. “During the emergency we meet weekly with the FAO Representative here.”

“FAO gave us money for 300 GPSs and state-of-the-art radios, which were very much appreciated,” says Ahmed Mouhim, Assistant Director of the National Centre for Locust Control in Morocco. “The FAO Desert Locust Commission is very useful too because it provides continuity during locust recessions. It even facilitates joint surveys, during which,

for example, experts from two or three countries can do a survey together. I myself just spent two months in Mauritania under FAO's auspices and it helps me better understand locust reports from that area.”

“We prefer to go through FAO when we want to lend our experts to other countries. It's faster and they pay living expenses for the expert,” says Abdelaziz Arifi, senior adviser on locust to the Moroccan Ministry of Agriculture and Rural Development.

FAO's Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES) is trying to strengthen the weak links in the locust-fighting chain.

“Our aim is to avoid what is happening now,” says Mohamed Lemine, EMPRES officer for the Sahel based in Mauritania. “We can't do that if we don't have a surveillance and early reaction system in the Sahel. We are working to improve technical and operational capacity in Chad, Mali, Mauritania, Niger and Senegal.”



▲ Survey officer Jacob Habab surrounded by the object of his search in southern Mauritania.

“ We prefer to go through FAO when we want to lend our experts to other countries. ”

Abdelaziz Arifi
Senior adviser, Ministry of Agriculture and Rural Development Morocco

ground, back and forth over a 60-square-kilometre infestation.

The fine spray – one litre of pesticide covers one hectare – leaves the locust intoxicated and flying erratically close to the ground. They die within 24 to 48 hours. The vegetation or crops that remain will be safe again for livestock in 7 to 10 days and humans in 14 days.

Back at the airstrip, pesticide handlers and air crews line up for a regular blood test for pesticide poisoning. One worker has a reading that is a bit high. He is given 10 days off with pay, enough time for the reading to return to normal.

In Bouarfa, as elsewhere in the locust-affected countries, the day's spraying is done and operations pass back to the survey teams to find new targets to treat in a campaign that never sleeps.



◀ A mechanic and pilot show the strain of months of work without a break.

Routine blood test for pesticide poisoning (middle).

Vehicles for Moroccan locust campaign donated by the Republic of Korea (bottom).





COUNTING THE HUMAN COST

AIN BENI MATHAR, MOROCCO – DESPITE A MASSIVE NATIONAL CONTROL OPERATION THAT TREATED 2.7 MILLION HECTARES OF INFESTED LAND, THIS FARMING COMMUNITY GOT HIT BY DESERT LOCUST. IF SWARMS HAD REACHED THE RICH AGRICULTURAL NORTH, WHICH BEGINS JUST 100 KILOMETRES FROM HERE, THERE WOULD HAVE BEEN THOUSANDS OF SIMILAR TALES OF HARDSHIP.



▶ Farmer with pumpkin crop damaged by locust.

This Moroccan shepherd and his family have been hit hard by the locust invasion (top).

“A round two o'clock big, big swarms came in and when they saw the vegetation they landed,” recalls Lahbib Bouhabs, a farmer with a wife and eight children. “If it had been a month earlier it would have been disastrous as I had five hectares of wheat in the field. As it was they destroyed 104 almond trees and 70 olive trees, about 2 000 dirham (US\$200) worth of damage.”

“It is a lot for me because instead of spending the money on my family it is lost.”

Other farmers say that financial losses due to locust damage are forcing them to borrow money to send their children to school or cut meat out of the family diet. Importantly for local food supply, a couple of farmers say it is not even worth planting.

“If there is a risk next season I am not planting anything,” says farmer Miloud Berhil. “I lost my plum trees, 2 hectares of melons and my vegetables.”

“
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catastrophe.”

Amadou Binta Thiam
Farmer
Mauritania

Shepherds face destitution

The region's many shepherds are in even bigger trouble, for they own neither land nor livestock, but make their living by herding other people's goats and sheep.

Abderrahman Chergui lives in a traditional tent on the wind-blasted plain with his wife Naïma and three young children. When the locust denuded local grazing land, the herd owner arbitrarily cut Mr Chergui's salary, using the savings to buy feed for the animals.

“The owner cut my pay from 1 800 dirham (US\$180) per month to 1 000 dirham (US\$100) so we are surviving on bread and tea, as the saying goes, and maybe meat once a month. And that's chicken, not lamb,” says Mr Chergui. “For the children, no school.”

Ms Chergui is anxious. "I am worried about my children's nutrition. I can't stand to see them suffer," she says.

Farmers with working children at least may be able to count on their children's financial support if the locust problem continues for years.

"I know lots of young people who are leaving the community due to invasion after invasion," says Achour Bouhaf, a small-scale farmer who lost his entire apple and plum crop, worth 10 000 dirham (US\$1 000), over the course of three locust attacks. "For the moment, I have five children working locally – they quit school to go to work – but they would like to go to Spain. My wife and I are dependent on them for our income now."

Local officials and residents say the locust upsurge is already exacerbating rural exodus, with implications for nearby Spain, the preferred destination.

The community's beekeepers are also suffering, as their bees are poisoned by the widespread use of pesticide. Abdellah Chanigui, president of a beekeeping cooperative, reports that his 14 members, who depend totally on their bee income, lost 95 percent of their bees.

Ironically, in the rangelands of Bouarfa Province a couple of hundred kilometres to the south, herd owners recall the Arab proverb that the appearance of Desert Locust is a sign of an exceptional year (since the rains that bring the locust also turn the rangelands green). This means that for the moment there is enough vegetation for both locust and livestock. But when the swarms return from the Sahel in even greater numbers later in the year will there still be food for all in the rangelands? That is the question on everyone's mind.

“
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them suffer.”

Naïma Chergui
Shepherd's wife
Morocco



▲
Fruit crop destroyed by
locust in Morocco.



◀
Farming in southern
Mauritania.



◀
House obscured by
locust swarm in
southern Mauritania.

Fear in the Sahel

Two thousand kilometres further south, across the Sahara in Mauritania, farmers who are even poorer than their Moroccan counterparts are sowing their fields even as locust swarms up to 40 kilometres long arrive from the north.

"I can't just stand here with arms crossed – I have to plant my crops even if I know the locusts are going to come and eat them," says Jidhoum M'Bareck, a farmer near the town of Kaedi, who is working a small field with a horse and plough. "Between six and 10 people depend on this field."

Another farmer, Amadou Binta Thiam, 82, still tills his fields by hand. "I have a big family – 20 people depend on me. I have no children working outside who can send me money. If locusts get my field, it is a real catastrophe."

"We have had big damage in the oases already, especially to market vegetable gardens," reports Mohamed El Hacem Ould Jaavar, Chief of Intervention at Mauritania's National Centre for Locust Control. "There will be famine if the locusts wipe out the crops. It is what the people depend on."



NEW WAYS TO TACKLE LOCUST

▲ Desert Locust eat their own weight in food every day.

AGADIR, MOROCCO – IN THE LABORATORIES OF THE NATIONAL CENTRE FOR LOCUST CONTROL IN THIS BUSY PORT CITY, SEVEN FULL-TIME RESEARCHERS TRY TO UNLOCK THE MYSTERY OF THE DESERT LOCUST AND HOW TO CONTROL IT WITHOUT HARMING HUMAN OR ENVIRONMENTAL HEALTH. THE WORK GOES ON YEAR AFTER YEAR, DURING LONG PERIODS OF LOCUST RECESSION AND DURING UPSURGES AND PLAGUES, WHEN OTHER STAFF ARE BUSY FIGHTING THE INVASION.

► Global Positioning System (GPS), shown here in the cockpit of a spray plane, has greatly improved spraying accuracy.



“We have made progress over the years.”

Moha Bagari
Chief of Research
National Centre for Locust Control, Morocco ”

“We have made progress over the years,” says Moha Bagari, Chief of Research. “We know more about the insect now, about how upsurges evolve and about different invasion corridors. We understand their biology better.”

The Centre is testing biological control agents, made from plants that repel the locust or have a negative impact on their development. “There are plants that make the insects sick by interfering with their digestive and reproductive tracts,” he says. (FAO and other countries are actively seeking a safer replacement for conventional pesticides by testing a fungus that attacks locust in the field and a natural hormone that disrupts the insects’ normal behaviour.)

In Morocco, soil samples from lands sprayed with the organophosphate insecticides used in the current campaign are being tested in labs around the country. Results are pending.



▲ Laboratory at National Centre for Locust Control in Agadir, Morocco.

Communication revolution

A hand-held device that indicates within a few metres exact longitude and latitude has revolutionized the locust business in the last 20 years. The Global Positioning System (GPS) allows survey teams deep in the featureless desert to report the precise position of locust sightings. Experts in locust-affected countries and in FAO's Locust Group plot and compare the locust's exact locations with similarly georeferenced satellite images of weather, cloud cover and vegetation and historical data to try and forecast locust activity. FAO puts out a monthly Desert Locust Bulletin based on this analysis, supplemented by updates and warnings.

Spraying accuracy has improved too. Survey teams radio in exact positions of swarms, and pilots use the coordinates on their onboard GPS to ensure pinpoint treatment of the insects.

Monitoring environmental risk across the Sahel

WEST AFRICAN GOVERNMENTS HAVE A MAJOR CHALLENGE MONITORING THE RISK TO THE ENVIRONMENT AND HUMAN HEALTH FROM THE CHEMICALS USED TO CONTROL THE DESERT LOCUST.

In this task they are assisted by the Centre for Ecotoxicological Research in the Sahel (CERES/Locustox), located in Dakar, Senegal.

Established in 1991 with FAO assistance, the Centre helps governments put into place safety measures, check the health of workers and inhabitants and ensure the safe handling of leftover pesticides. Soil samples from across the region are analysed in the Centre's state-of-the-art laboratories.

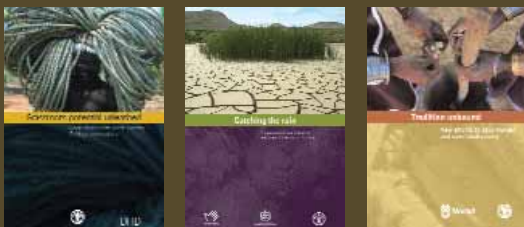
The Centre also trains national environmental monitoring teams and collaborates with national chemical laboratories and other centres of expertise, such as universities. The goal is that by 2005, all affected countries will have the capacity to monitor the safety of their own Desert Locust operations.

▶ A researcher uses RAMSES, a Geographical Information System that allows him to analyse data on Desert Locust and the environment.



Acknowledgements

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*Cover photo: A young farmer near Aleg, Mauritania looks at a dense swarm of locust.
Back cover photo: Workers unload drums of pesticide at an airstrip in Bouarfa, northeastern Morocco.*

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