

Feature

Environment

DEVIL'S TWINE IS DECIMATING CROPS OF THE SAVANNA

A noxious parasitic weed afflicting most Savanna crops, called striga, witchweed or devil's twine, is fast gaining in Africa. The weed affects the livelihood of 300 million people in Africa and farmers have only limited weapons against it.

The Rome-based UN Food and Agriculture Organisation (FAO) says two-thirds of the 73 million hectares devoted to cereal crop production in the continent are in the ecological zones where production may be seriously reduced by parasitic weeds.

It is predicted that over 40 per cent of weed-free areas may soon become infested unless immediate preventative measures are taken.

FAO estimates show that the uncontrolled spread of striga would produce yield losses averaging 40 per cent -- equal to an annual loss of seven billion dollars worth of cereals.

African governments, supported by international organisations, have formed the Pan-Africa Network on Striga Control. It aims to promote collaboration on research into and control of striga, and help disseminate and exchange information.

The striga parasite attaches itself to the root system of the host plant and develops a haustorium that siphons off the moisture and nutrient needed for it to grow.

In early germination and growth, striga can wipe out an entire crop. Each striga plant produces 40,000 -- 90,000 seeds that lie dormant in the

ground until conditions allow germination. The seeds can survive for 15 to 20 years.

Worst damaged are the savanna areas stretching from Cape Verde on the West Coast through west, central, east and southern Africa. Hardest hit is the Sahel savanna. There, even leguminous crops such as cowpeas and groundnuts are seriously affected.

Surveys in Nigeria in 1988 and 1989 showed that striga affected 94 per cent of farms inspected. Crops losses were estimated at 40 -- 100 per cent.

In Ivory Coast, the weed is reported to be spreading fast following migration of farmers and cattle from Mali and Burkina Faso. The parasite threatens rice, the country's most important cereal crop.

In Benin, infested areas have increased since 1982 when 15,000 hectares of crops were lost in the north. In Guinea, farmers are abandoning their farms because of high striga infestations.

The spread has been attributed to migrations of people and animals, imports of seeds from countries afflicted by striga, traditional farming practices, lack of rain and the reduction of fallow land. How far soil erosion, rampant in Africa, is contributing to striga seed dissemination has yet to be studied.

Experts agree that use of most improved varieties of cereals has increased incidence of striga. These tend to be more susceptible than traditional varieties.

Attempts to find resistant improved varieties have been

The livelihood of 300 million people in Africa is being affected by a weed that is spreading among cereal crops. Strenuous efforts are being made to fight the disease, but effective methods tried out in the United States are too costly for poor farmers. by Francis Mwanza

unsuccessful, says Dr N.A. Van der Graaf, Chief of the FAO Plant Protection Service.

Crops most seriously affected are millet, sorghum, maize, upland rice, tobacco, sweet potato, sugarcane and cowpeas.

To eradicate striga, says FAO, the complete stock of its seeds in the soil must be destroyed. This can be done by applying methyl bromide during dormancy.

Another method is to provoke artificial germination with ethylene gas. In the absence of any host plant, the germinated seed dies after four days. A single treatment destroys 90 per cent of seeds in the ground.

The United States has been using these chemical methods to try to eradicate striga in Florida, but 90,000 hectares are still infested. These measures are too costly for poor farmers, says FAO.

Of the 30 species of striga already recorded, 23 are in Africa. The most damaging and widespread species are *S. hermonthica*, *S. gesnerioides* and *S. asiatica*.

Eradication will be a long job. In an attempt to contain the plague at a level that will not result in increased migration and famine, FAO has worked out an integrated striga control package.

This involves using tolerant crop cultivars, combined with judicious use of pre-emergence banding herbicides, late inter-row cultivation, side pocket placement of urea nitrogen and spot treatment of striga shoots.

A new FAO report shows

some progress. Results of 100 on-farm demonstration trials in Gambia showed that the recommended package increased grain yield substantially over farmers' practices.

In Ghana, nitrogen rates of 90-180 kilograms per hectare reduced the incidence of striga, but the rates being used were considered too high and therefore expensive for small-scale farmers.

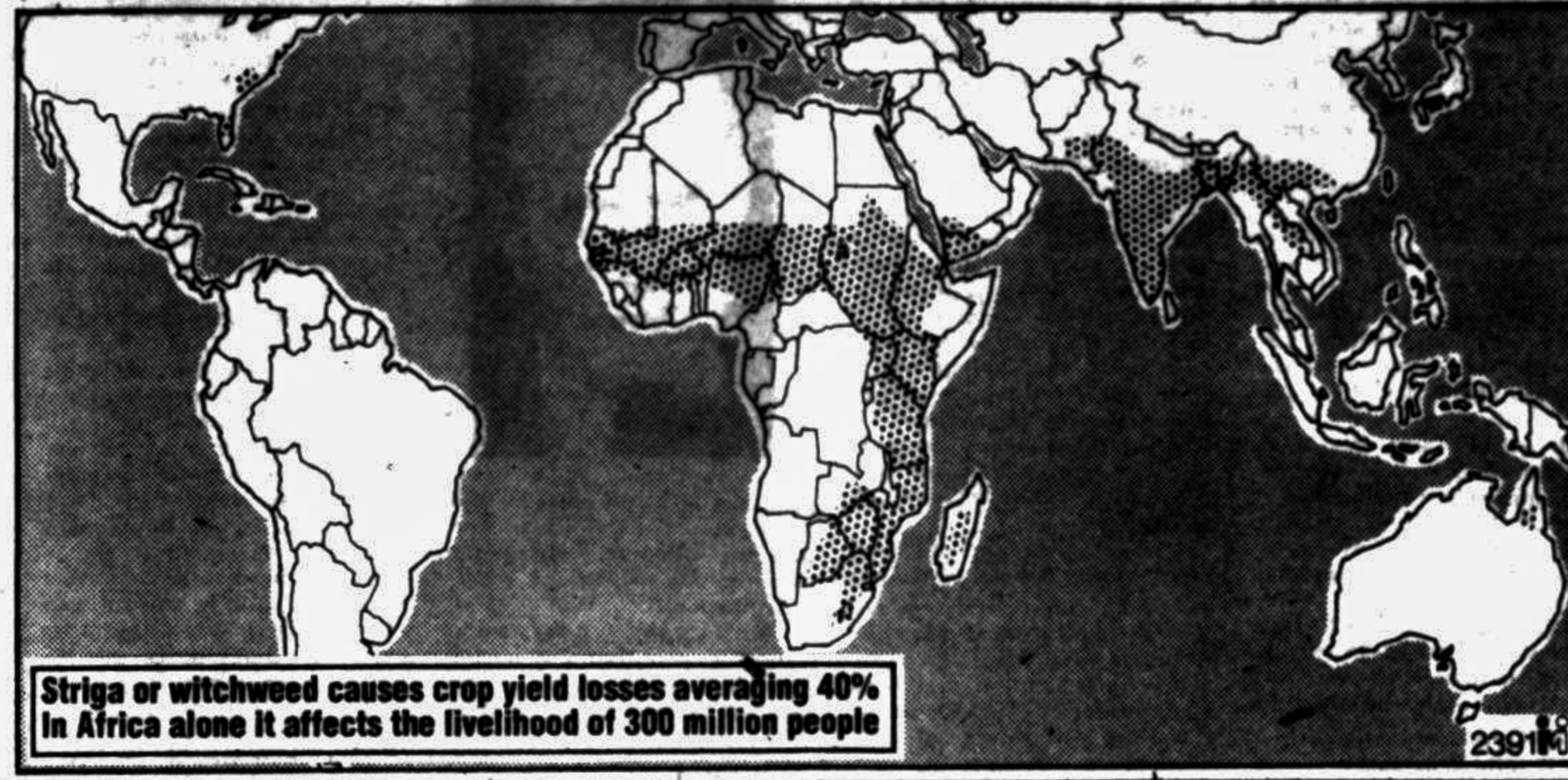
Meantime, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has found that the combination of high soil temperature (40 degrees centigrade) and 20 -- 30 per cent soil moisture kills the seeds of *Striga asiatica* in Vertisol (dark, clay soil).

Field tests in West Africa show that the large reservoir of seeds stored in the upper 100 millimetres of infested soils can be greatly reduced if fields are kept moist for two to three weeks in the off-season when soil temperature is high (above 45 degrees centigrade).

ICRISAT scientists in Mali recently controlled striga *hermonthica* in a heavily infested farmer's field through soil solarisation. After irrigation, one striga-infested plot was covered with a black polythene sheet for 35 days, another for 15 days.

The number of striga plants in both plots was reduced when a local sorghum variety was grown later in either plot and the reduction was greater in the plot that was covered longer, according to ICRISAT. GEMINI NEWS

The spread of witchweed



Striga or witchweed causes crop yield losses averaging 40% in Africa alone it affects the livelihood of 300 million people

New Space Programme for Meteorological Satellites

Weather satellites have certainly become indispensable. However, the vast amount of data received from them could become detrimental should a new space programme not be embarked upon.

Although meteorological satellites have become essential, the flood of data they transmit can, under certain circumstances, be detrimental to the weather forecast. Therefore, a new space program has become necessary.

Meteorological satellites from the Meteosat series, which is jointly operated by 16 European countries, have been continuously transmitting meteorological data to Earth since 1977.

Even though this information is imperative for forecasting the weather as well as for atmospheric and climatic research, this system still leaves much to be desired. Heinrich Woick of the European Organization for the Exploitation of Meteorological Satellites EUMETSAT in Darmstadt, recently documented where the shortcomings lie with regards to weather forecasting.

He maintains that in order to ensure reliable forecasts, supercomputer would have to be fed with an inconceivable amount of data from all over the world. Over North America, as well as over Europe, the observation density of meteorological stations with their accurate atmospheric measurements has become so dense that data acquisition of an almost total nature has become possible.

Several times a day, radio probes launched into the stratosphere provide a complete measurement profile without any delay from a height of up to 30, and sometimes even 50 kilometers. In addition, data from Meteosat are incorporated into the weather forecast, this can have a negative effect on the reliability of the forecast. Much

satellite information, for example regarding wind velocity, can only be determined indirectly by cloud movement. Measurements using an anemometer, whose rotating blades measure the wind velocity directly, supply much more accurate data.

Many "weather observers" have been orbited since Tros 1 was launched in 1960. However, this system of orbiting and geostationary meteorological satellites spanning the entire world does have substantial gaps. The American GOES satellite over the Atlantic has failed, resulting in a large observation gap. The Soviet Union's meteorological satellites GOMS is 10 years behind schedule, and the Indian satellite INSAT II does not make its data available to the international meteorological data network, but rather uses it exclusively for national purposes.

A shortcoming of all functioning geostationary satellites is the lack of a good vertical probing capability. High resolution measurement of individual atmospheric layers has, until now, been the exclusive privilege of the American NOAA satellites which, in their orbits over the poles, cover every region on earth twice a day. The problem involved in integrating a vertical probing capability of this kind into geostationary satellites has not yet been solved. The meteorologists' desire for a shortened image sequence seems to be something which may be fulfilled.

The Meteosat Second Generation (MSG) is to take over the work in space from

1998. Europe will then no longer receive an image of the hemisphere once every 30 minutes, but once every 15 minutes instead. With 8 to 13 spectral ranges, it will also be able to determine the humidity of the atmosphere with a considerable greater degree of accuracy.

The current Meteosat programme will continue until 1995 and end with Meteosat 6. Financing of the Meteosat programme is guaranteed through the 220 million DM annual budget of the Deutscher Wetterdienst (German Meteorological Service). How the observation gap between the European space programs is to be closed, however, is just as unclear as the overall financial framework. Even a "cheap solution" of the MSG series, comprising only three satellites, would cost at least 1.2 billion DM.

In addition, Eumetsat is planning a polar orbiting meteorological station as a supplement to the American NOAA system. The European Polar Platform (EPOP II) is to be launched in 1997. It will be the first European meteorological station to cover the entire globe twice a day at a height of 824 kilometers. Martin Boeckh (GRS).

Trying to grow more, with less damage to the environment

In 1984, A FAMINE SWEPT through the arid landscape of sub-Saharan Africa, leaving more than a million people dead. Hearing of the tragedy, Ryoichi Sasakawa, chairman of the Japan Shipbuilding Industry Foundation, remembered a similar famine in India some 20 years before. He also remembered how that famine had ended: through a green revolution that brought scientific farming to Asia and transformed agriculture around the world.

Sasakawa felt that a green revolution could benefit Africa as well. But this revolution would have to be different. Indeed, that first effort tapped synthetic -- and sometimes dangerous -- pesticides, herbicides and fertilizers. These agrichemicals had doubled farm productivity, but they had also, in some cases, tainted produce and contaminated the ground. Sasakawa's new efforts, on the other hand, would be based on more ecologically acceptable alternatives, including hearty new seeds, the latest advances in irrigation and plant rotation and safe new agrichemicals to spur plant growth and control pests and weeds.

Working with former American President Jimmy Carter and agronomist Norman Borlaug, the Nobel Prize winning pioneer of the first green revolution, Sasakawa funded the Sasakawa Global 2000 Agricultural Project. Since 1986, the project has helped the farmers of Ghana cultivate 65,000 acres of land, boosting yields by 400 percent and bringing that country to the verge of food self-sufficiency. The effort has also helped farmers in the Sudan, Zambia, Tanzania, Togo and Benin.

The Global 2000 Project is just one sign that a new -- and environmentally savvy -- green revolution is afoot. The push today is for genetically engineered crops that require less chemical intervention because they are more resistant to the ravages of the environment, pests and weeds. When crops do require agrichemicals, moreover, the new agriculture taps synthetic pesticides, fungicides and herbicides that can be used more selectively and in smaller quantities than before. Productivity has also been boosted by the use of scientific management techniques, including better irrigation methods and more precise timetables for crop rotation.

The new green agriculture has been embraced by scientists and the agribusiness

community. As Hanspeter Schelling, director of international research for Switzerland's Sandoz Agro Ltd. says "We must guard the earth now, or face the consequences. Environmental safety is the most crucial aspect of all our agricultural research and development today."

At the vanguard of the current green revolution is a generation of robust plants more resistant than their predecessors to heat and cold, drought, a range of pests and crop disease. Some varieties, including the sorghum and maize introduced in Ghana, have been produced through years of scientific breeding. Other plants have been created by the insertion of foreign genes.

France's Rhone-Poulenc, for example, is modifying tobacco with a technique known as chemical shielding in which the tobacco receives a gene that makes it resistant to bromoxynil, one of the most commonly used herbicides. Thanks to this technique, says William J. Klobey, director of Rhone-Poulenc's ethics and environment group in Lyon, farmers can spray a moderate amount of the herbicide on weeds without killing the tobacco plants themselves. In a similar effort, the U.S.-based Monsanto Agricultural Co. is using biotechnology to pro-

duce herbicide-resistant cotton.

COMPANIES ALSO ARE STUDYING WAYS to make the herbicides and pesticides themselves safer. Britain's Imperial Chemical Industries (ICI), for instance, has developed a fire-tuned an insecticide to kill destructive insects while per mitting harmless and helpful critters to survive. Dubbed Pirimicarb, the insecticide kills the destructive aphid; it does not, however harm the ladybug, a predator that helps control a range of destructive pests.

Monsanto, meanwhile, has developed a popular herbicide called Roundup, which works by blocking protein production in the encroaching weeds, effectively halting their growth. The herbicide breaks down once it has completed its job, eliminating the danger of ground and crop contamination.

Sandoz has taken a similar approach in developing fungicides to protect cereals, fruit, vines and vegetables from fungal diseases. Alto, one of the company's newest products, interferes with the growth of organisms that attack small grain plants. "Because the active ingredient in Alto is used in such small amounts," Sandoz's Schelling explains, "it does not have as

much of an impact on the environment."

New fertilizers and techniques for their application are being developed as an alternative to spreading vast quantities of fertilizer and the sometimes harmful nitrogen it contains. West Germany's BASF has introduced a time-release fertilizer called Basammon extra 25. Basammon slowly releases nitrogen through the duration of the growing cycle, so that the plant absorbs only what it needs when it needs it. Other life forms are barely affected.

But new environmental products are even more effective when used in combination with scientific farming techniques. One effective new irrigation technique has been developed by Italy's Ferruzzi Group, an international industrial company that operates in the chemical and agribusiness sectors.

The new process shows how interconnected all aspects of farming can be. "Today we must look at agriculture as a complete system, not isolated hectares," says Werner Schulte of BASF. Adds Robert Fraley, director of plant science technology for Monsanto in the United States, "From a scientific perspective, this is the most exciting time we have ever seen in agricultural research."

Environmental Specimen Bank

Results presented by the German Forschungszentrum Jülich (Research Center Jülich) show that overall pollution trends can be registered quickly and accurately with the help of the special "archives" of an environmental specimen bank. The bad news is that pollution of the North Sea with heavy metals and harmful organic substances has risen steadily in recent years. The good news, however, is that the burden placed on the air has clearly decreased since the introduction of lead-free petrol.

Environment, Nature Protection and Reactor Safety) bears the running costs.

The living and non-living specimens are stored at temperatures so low that any possible changes are minimized; this way, pollutants which might not yet be known can be traced in years to come. The tests, conducted since 1982, deal with the heavy metal content of brown algae in the North sea collected at selected locations at regular intervals.

The results showed that the mercury content in such plants in the Elbe estuary has increased from an average of 14 millionths of a gram per kilogram to approximately 28 millionths of a gram in 1988.

The fact that it can confirm correct decisions regarding the environment also highlights the important role of the environment specimen bank as an instrument of environmental policy. The marked decrease of lead in the atmosphere demonstrates the environmental benefit of the use of lead-free petrol. GRS.

Ten per cent of the dead penguins found by Dr Dee Boersma and her colleagues, are covered in oil. Yet there are no oil facilities near Punta Tombo in Patagonia where Boersma, a US researcher, has been studying Magellanic penguins for the last eight years.

It does not always require a maritime disaster such as the Exxon Valdez oil spill in Alaska to decimate wildlife. Increasingly, sea birds are dying from their encounters with oil on the high seas.

Around 80 to 120 dead or dying oiled penguins per mile of beach have been found by researchers from US-based Wildlife Conservation International (WCI). Argentine conservationists from Bio Bios have reported finding oiled penguins all along the coast from the Strait of Magellan to Peninsula Valdes where the rare Southern Right Whale breeds.

Although a relatively minor oil spill in 1987 killed 12 per cent of the penguin chicks and nine per cent of the adults at a small colony south of Punta Tombo, most penguin oilings are the result of tankers cleaning out their tanks in preparation for reloading.

It is not difficult to find the source of the oil. Crude oil is loaded at Comodoro Rivadavia, south of Punta Tombo and at San Sebastian in Tierra del Fuego and then transported to refineries at Bahia Blanca and Buenos Aires.

The tankers are supposed to draw well above the water at all times to minimise environmental damage in the event of an accident. But the area is poorly policed and tankers pass close to the shore. In August, two ship accidents near the Argentine coast discharged



Waste disposal into the rivers is one of the major reasons of environmental pollution. Picture shows what this can do to the river waters, vitiating the whole atmosphere around the region. Photo: UNEP

Penguin Deaths Point to Oil Threat at Sea

While the effects on the environment of huge oil spills are obvious, scientists are beginning to find evidence of the damage done by ships cleaning out their tanks at sea. Researchers working on the wild coast of Patagonia have found that ten per cent of dead penguins are covered in oil and sea birds often die after coming into contact with mini oil slicks. As Gemini News Service reports, these may be the first signs of an environmental disaster about which no one seems to be concerned.

oil into water near important seabird colonies.

On their return trip south, empty tankers fill their ballast tanks and cargo tanks with sea water. Facilities are available at Comodoro Rivadavia for taking the oily water off from the cargo tanks. The residual crude oil is recovered and the rest drained into the sea.

At least those are the regulations according to the International Convention for the Prevention of Pollution from Ships, to which Argentina is a signatory.

But regulations are sloppily adhered to both by ship captains and Argentine land operators. To save time many ship captains empty their cargo tanks when they empty their ballast tanks out at sea. At the oil terminals, dirty ballast is poorly cleaned. Sometimes it is not cleaned at all and simply dumped into the sea.

Argentine biologists and fishermen report that oil spills are common from around the oil terminals, often from careless work procedures. Poorly maintained loading pipes leak oil into the sea. Sloppy maintenance on off-shore drilling rigs is another cause of oil escaping into the water.

On Argentine ship recently struck a rock in Antarctica,

Over a year after the event, the ship is still leaking fuel oil into the Antarctic environment.

Argentine authorities had no procedures for dealing with such an event.

Argentina is slow in developing environmental awareness. In a land where wasting resources is part of the national culture, environmental protection laws are rarely enforced.

For instance, a serious oil spill at Comodoro Rivadavia would catch authorities without an adequate accident procedure. Asked about their emergency dispersal and containment policy, officials pointed to two 50-gallon (225 litre) barrels of dispersant and a 100-metre containment boom.

Wildlife colonies on Argentina's Atlantic coast are very important for some species. To the waters around Peninsula Valdes comes the Southern Right whale, once the most widespread of mammals and now one of the most severely endangered of whale species.

At Punta Tombo is the largest concentration of Magellanic penguins on the American mainland. Besides man-made disasters, penguins have suffered from climatic fluctuations. Torrential rain can flood

the nest burrows, drowning many chicks.

In 1985, over 95 per cent of the chicks had died by late January. It was a repeat of what happened in the previous two years. Dr Dee Boersma from Washington University, found that flooding and exceptionally cold weather had wiped out a generation of penguins at Punta Tombo. Chicks that had

hatched died of starvation because food-laden waters were diverted elsewhere.

Fortunately, in recent years the Magellanic penguin population has recovered. But their survival is precarious. Penguins have no vote and they cannot bribe anyone to look after their interests. Oil handlers and transporters are motivated by economic rather than environmental concerns.

In Argentina wildlife protection is the concern of too few individuals. Concern will no doubt be awakened after the environmental disaster which may just be beginning, but for some creatures it will be too late. GEMINI NEWS

About the Author: FRANK NOWIKOWSKI is a freelance journalist who has worked in Europe, Africa and Latin America. He writes on medical, environmental and Third World issues.