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# Worldwide Report

ENVIRONMENTAL QUALITY

No. 387

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23 February 1983

# WORLDWIDE REPORT ENVIRONMENTAL QUALITY

No. 387

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SWEDISH SCIENTISTS STUDY BALTIC EUTROPHICATION PROCESS

Stockholm DAGENS NYHETER in Swedish 8 Jan 83 p 20

[Article by Birgitta Nyblom: How Harmed Is the Baltic?"]

[Text] The water in the Baltic has for a long time been harmed by an excess supply of nutrients and discharge of poisons into it. DDT, PCB and other poisons are concentrated in birds and fish. DAGENS NYHETER has visited Asko Laboratory near Trosa, where researchers are working to determine the extent of the harm.

Daylight is now returning and December storms are behind us. The archipelago lies as a system in the flow of waters between the Baltic and the mainland. Here, in the forces from sea and shore, conditions are created especially good for a rich production in nature and society.

How, then, do things look in the water?

AnnMari Jansson has looked into the interplay in the algae chains. She is a researcher at Asko Laboratory near Trosa, operated by Stockholm University. For a long time efforts have been underway at the laboratory to discover how the Baltic functions and how great the damage is.

On a square centimeter of rock surface may be found 3 kilometers of green algae filaments. The filaments are covered by a thick layer of microscopic silicon algae, grazed by thousands of small crustaceans, worms, and larvae. These are eaten in turn by small fish inhabiting the seaweed.

Light Stolen

In the untouched ecosystem the animal world of the filament algae and the seaweed form an effective team for fixing sunlight and recirculating important nutrients. When the balance is disturbed through an oversupply of nutrients the filament algae gain predominance. They steal light from the bladder kelp, which grows more slowly. Bladder kelp is an important species in the Baltic.

Bengt-Owe Jansson, professor at Asko Laboratory, shows us four fish from the seaweed belt. One of them is a seaweed stickleback that builds nests of

weed algae, another is a ringbelly with the ventral fin transformed into a suction disk. By means of the suction disk the fish resists the wave wash. Further there is the filamentous butterfish, found in shoals in the seaweed belt during the summer. And then there is the pike. It is the real hunter of the seaweed forest.

#### Room for Garbage

If the bladder seaweed were to disappear, these fish lose their natural habitat.

Seven bordering countries are directly dependent upon conditions in the Baltic. They all contribute to its pollution.

The Baltic is used as an inexpensive garbage dump. Releases of poisonous substances--DDT, PCB and heavy metals--are concentrated in fish and birds in life-threatening amounts. There is no longer room for seals in the archipelago. They have been poisoned. Female seals can no longer give birth to viable young.

"This should be a warning signal to us humans," says AnnMari Jansson. International agreements on reducing pollution have produced some results. But even if all pollution could be stopped, the poisons would remain for a long time in the Baltic's ecosystem.

#### Plenty of Fish

"But the Baltic still produces plenty of fish, for the time being more than usual," says Bengt-Owe Jansson. "The rich supply of herring and cod is due to the rich supply of growth-producing substances such as phosphorus and nitrogen. That increases the plankton production, providing more food for the herring, producing in turn more food for cod.

"At the same time, however, the fish requires clean bottom water for propagation. The eutrophication of the Baltic worsens the bottom water. In years when the oxygen content is especially low, reproduction may completely fail. We experience increasingly great variation in the fish stock between different years."

"Most of the states seem to have difficulty in reducing fertilizer use if they are to reach production goals in agriculture," says AnnMari Jansson.

#### "All Must Be Willing"

"Improving the Baltic requires willingness on the part of all surrounding countries to make efforts. The question is whether we shall have the funds and the time.

"It would be desirable if the energy and the funds today spent on building up a submarine arsenal equipped with nuclear weapons were instead spent in the struggle to save this sea as a living natural resource for future generations," says AnnMari Jansson.

## Largest Brackish Water Sea

The Baltic, of 365,000 square kilometers, is the earth's largest brackish-water sea, meaning that the water is diluted by fresh water. In geologic terms it is a young sea.

Since the end of the ice age the salt content has changed several times due to the connection with the North Sea being more or less open.

Today, water exchange with the North Sea is slow. It is estimated that it takes 25 years for all water in the Baltic to be exchanged. Salt water penetrates along the bottom during heavy storms, like those we had this December. Atop the salt water lies the fresh water which descends upon the Baltic and is carried into it by rivers and brooks. This causes poor supply of oxygen to the bottom water. To the countries around the Baltic it is an important transportation link, a fishing resource and a sea for swimming and outdoor activities. But the ecosystem has for a long time been affected by discharges of poisons and eutrophication.

Since the 1960s the depths of the Baltic have been full of hydrogen sulfide.

Leningrad has a population of 4 million. Complete purification of Leningrad waste water seems impossible to attain. Hydrogen sulfide is now spreading over the Gulf of Finland. Large agricultural areas in the south drain into the Baltic. In addition, much of the pollution comes from afar with the air.

11,256

CSO: 5000/2533

PEOPLE'S REPUBLIC OF CHINA

MINISTER PREDICTS CLEANER ENVIRONMENT

OW310441 Beijing XINHUA in English 0247 GMT 31 Dec 82

[Text] Nanjing, 31 December (XINHUA)--The Chinese people will have a cleaner, and more beautiful environment in which to live and work by the year 2000, according to Li Ximing, minister of urban and rural construction and environmental protection.

The minister said this at a national environmental protection meeting which has just concluded in Nanjing, capital of Jiangsu Province.

"China will never achieve economic growth at the expense of the environment," Li Ximing said. By the year 2000, he predicted, the nation's environmental pollution and ecologic damage will be largely controlled.

"We are confident of controlling the present serious pollution of urban environment, rivers, lakes and seas and preserving the ecologic balance," the minister said.

He attributed his confidence to the environmental protection laws and regulations formulated by the state since 1979 and inclusion of environmental protection in the state national economic and social development plans.

"The new constitution has clearly defined provisions on environmental protection and the country's sixth 5-year plan (1981-85) has an environmental protection chapter," the minister said.

The most effective method for controlling China's industrial pollution is to make multi-purpose use of industrial waste and purify pollutants, while effecting technical transformation and streamlining enterprises, Li Ximing said.

"Environmental protection organizations have been established across the country and in various departments, with about 100,000 people engaged in environmental monitoring, management, research and education," he said.

Li Ximing said that the emphasis of the nation's environmental protection by the end of this century will be on controlling industrial pollution and ecologic damage.

CSO: 5000/4128

NATIONAL CONFERENCE ON TREE-PLANTING HELD

OW091950 Beijing XINHUA in English 1459 GMT 9 Jan 83

[Text] Beijing, 9 January (XINHUA)--Delegates to the national conference on the nationwide tree-planting drive visited Nankou and the Ming tombs in Beijing's northern suburbs today to view afforestation efforts on wasteland and denuded hills.

Last year more than 300,000 pagoda tree saplings were planted on the gravel-studded wasteland at Nankou, an ancient river course covering 2,800 hectares. Survival rate of the trees, planted by more than 70,000 workers, students and soldiers in one-meter wide and 80-centimeter deep ditches totalling 340 kilometers long, is 80 percent, an official of the city's greening committee said.

The 1.5 million cedars and cypresses planted near the Ming tombs by 200,000 cadres of the party Central Committee also thrived, the official said.

Last year more than 4 million people took part in the voluntary tree planting in the capital, and planted 15 million trees. [sentence as received] Beijing was named a pace-setter by the central greening committee.

Chang Pu, director of the Beijing greening office, in his report to the delegates, said that 1 million trees and shrubs were planted in the urban area last year, in addition to 810,000 square meters of grass. Maiden hair trees, cedars, willows and various flowers line 35 kilometers of city streets.

A unified plan for greening the capital was mapped out by the municipal government through discussion with 200 experts in afforestation and horticulture soon after the decision on greening was made by the fourth session of the Fifth National People's Congress, Chang Pu said.

The planting campaign went well last year, he said, and 1983 will see equivalent efforts.

CSO: 5000/4128

CONFERENCE ON VOLUNTARILY PLANTING TREES

HK250647 Taiyuan Shanxi Provincial Service in Mandarin 2300 GMT 23 Jan 83

[Summary] A provincial work conference on the voluntary planting of trees by all the people was held in Taiyuan from 20 to 23 January. The conference was sponsored by the provincial forestation committee. At the conference, Comrade Deng Xiaoping's important instructions and Comrade Wan Li's speech were relayed by (Liu Shengquan), head and chairman of the provincial forestry bureau and forestation committee respectively.

Experiences were exchanged, prizes awarded to advanced collectives and individuals, and the problem of how to create a new situation in planting trees was discussed at the conference.

According to statistics, in 1982, there were 10.31 million people in the whole province participating in the activity of voluntarily planting trees, which made up 73.3 percent of the civilians that are out to participate in the voluntary activity. A total of 64.69 million trees were voluntarily planted, with an average of 6.2 trees per person. At the same time, 62,700 mu of land was forested and 9,500 mu was planted with seedlings.

Zhao Lizhi, vice governor and vice chairman of the provincial forestation committee, delivered a report.

"He said: To carry out a movement of voluntarily planting trees by all the people is a great cause for building socialism and benefitting future generations. It is a major national policy of our country to plant trees and make the environment green. It is also major strategic measure to bring mountains and rivers under control and to maintain and improve the equilibrium of ecology.

"He demanded that the party committees, people's governments and forestation committees at various levels throughout the province earnestly strengthen leadership and do the preparatory work in ideological mobilization and organization well. He also demanded that a good job be conscientiously done in planning according to local conditions and that people strive to fulfill or overfulfill the task of voluntarily planting 56 million trees, planting the quota of 20,000 trees, foresting 2.5 million mu of land and raising 1 million mu of seedlings in 1983."

Responsible comrades of the provincial CPC committee, people's government, government, CPPCC and military command attended the conference and awarded prizes to outstanding models and advanced collectives.

"Luo Guibo, second secretary of the provincial CPC committee, governor and chairman of the provincial forestation committee delivered an important speech after the award of prizes. He raised some of his opinions on how to do a good job on the voluntary planting of trees by all people this year:

1. It is necessary to further propagate the great significance of the movement of voluntarily planting trees. Comrade Wan Li has raised this problem to a great level. We must constantly and frequently carry out ideological mobilization and propagation. For this sake, the provincial CPC committee and people's government have decided to start an activity of voluntarily planting trees month drive throughout the province in March, and carry on this activity in combination with the civic courtesy month drive.

2. It is necessary to grasp focal points. He demanded that all localities have their own focal points and have their focus of work every year. Viewed from the whole province, the focus of voluntarily planting trees, foresting and beautifying the environment should be in cities. We must make great efforts to do a good job in planting trees in the major cities and counties, such as Taiyuan, Datong, Xiaxian, (You Yu), Lin Fen, Yu Ci and so on. The focus in rural areas should be to set up a network of forest in farmland and plant trees around house sites.

3. It is essential to do planning work well. Provincial, prefectural and county levels should all have their own planning. In addition to annual planning and the sixth 5-year plan, the provincial level must also have 10 to 20 years of long term planning.

4. It is necessary to raise seedlings well. We must mobilize the forces in all fields, including state farms, rural production teams, peasants and specialized households to raise seedlings.

5. It is necessary to do a good job in the work of checking and accepting, and appraising, awarding and punishing.

In his speech, Comrade Luo Guibo emphasized: voluntarily planting trees is a movement that affects thousands of households and families and is participated in by millions of people. We hope that the party committees and people's government at all levels will take this work as a matter of prime importance and earnestly grasp it well. We must firmly grasp well the preparatory work of voluntary planting trees for this year, implement it to every basic level and strive to achieve a solid and effective result better than last year."

CSO: 5000/4127

PEOPLE'S REPUBLIC OF CHINA

SHANGHAI AIR QUALITY IMPROVES STEADILY

OW221230 Beijing XINHUA in English 1058 GMT 22 Jan 83

[Text] Shanghai, 22 January (XINHUA)--Intensified anti-pollution work has made Shanghai's air progressively cleaner since 1973, though it still lags behind standards of the nation's environmental protection law, the Shanghai environment monitoring center reported.

In this China's biggest industrial city, the amount of sulphur dioxide in each cubic meters of air dropped from 0.17 milligrams in 1973 to 0.09 milligrams in 1982, the center said. The corresponding figures for suspended dust in the air indicated a drop from 0.43 milligrams to 0.03 milligrams.

The municipal government has in the past few years allocated 71 million yuan to control industrial wastes. As a result, chemical plants now treat 80 percent of the waste gas they discharge.

All steam boilers with a capacity exceeding 0.5 tons have been fitted with dust removers, the monitoring center said. Nine of the 17 chimneys at the city's major metallurgical plants have stopped emitting yellow smoke.

But Shanghai still has some way to go to meet air pollution control standards set in China's environmental protection law.

In 1982, sulphur dioxide content in each cubic meter of air averaged 0.12 milligrams in industrial areas and 0.08 milligrams in business streets. The figure ranged from 0.06 milligrams to 0.03 milligrams in residential areas and around the municipal zoo--the cleanest place in the city proper, the center said.

Air pollution is monitored by 15 atmospheric monitoring stations working round the clock, the center said. Since 1980, these stations have been part of a worldwide atmospheric monitoring network operating under the World Health Organization (WHO) of the United Nations.

CSO: 5000/4128

PEOPLE'S REPUBLIC OF CHINA

BRIEFS

HEILONGJIANG CONFERENCE ON ENVIRONMENT--The Harbin City Environmental Protection Conference ended on 8 January. In view of the serious pollution in Harbin, the conference formulated tentative plans for environmental protection in Harbin for the coming 20 years and made arrangements for environmental protection work in 1983. The conference stressed that 1983's environmental protection work should be focused on preventing industrial and air pollution, developing central heating systems and disposing of dust pollution. The conference also called for preventing pollution in Songhuajiang and reducing the amount of discharged polluted water. The conference also called for controlling sound pollution in residential areas. It also urged communes and brigades to use standard polluted water to irrigate vegetables to guard against poisonous pollutants. [SK092236 Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 8 Jan 83]

CSO: 5000/4127.

CBW SYMPOSIUM SUMMARY REPORT

OW291033 Hanoi VNA in English 0705 GMT 29 Jan 83

[Text] Hanoi, VNA, 29 January--The "International Symposium on Herbicides and Defoliants in War and the Long-Term Effects on Man and Nature" held in Ho Chi Minh City from 13 to 20 January 1983 adopted seven summary reports and one final report on its findings about the effects of the toxic chemicals used by the United States in its war against the Indochinese countries (1961-75).

The symposium was attended by more than 160 scientists and experts from 21 countries as well as observers of FAO, UNEP and UNESCO.

The following is the final summary report entitled "Cancer and Clinical Epidemiology":

1. Overview Literature

TCDD is one of the most toxic organic compounds, producing a wide range of organ and metabolic dysfunctions, fetotoxicity, teratogenicity and carcinogenicity at the PPT-PPB range. There is a general consistency between the pattern of chronic toxicity induced in animals by TCDD and TCDD-contaminated chlorophenolic compounds and those observed in exposed human populations. Such toxicity includes: Chronic hepatitis disturbances in immune function and in lipid- and porphyrin metabolism, and neurological abnormalities sometimes associated with a toxic neurasthenic syndrome. Studies by Ton That Tung on herbicide-exposed Vietnamese populations in the second Indochina war have produced suggestive evidence of an excess of primary liver cancers and other evidence of chronic toxicity. A series of Swedish epidemiological studies, confirmed by more recent U.S. mortality studies, have demonstrated an excess of phenoxy herbicides and chlorophenoxy compounds. Chloracne is not an obligate effect of TCDD exposure in either sensitive animal species or in humans.

2. Vietnamese and Other Data

Morbidity studies of civilians in Tay Ninh and Ben Tre and in [as received] Vietnamese veterans in the north have demonstrated consistent and strong associations between herbicide-exposure and chronic neurasthenic symptoms. Two preliminary case-control study [as received] of primary liver cancer in Hanoi demonstrated a strong association with herbicide-exposure. Another similar

study at Cho Ray hospital with a limited number of cases evidenced a slight excess of risk of liver cancer in exposed persons, but this association was not large enough to achieve statistical significance.

### 3. Evaluation of Vietnamese Data

These studies have established suggestive evidence of an association between herbicide-exposure and chronic toxic effects including neurasthenic symptoms and primary liver cancer. It is planned to expand these studies with particular reference to the following: Definition of past and present exposure to toxic herbicides including dioxin from direct and indirect sources; methodological considerations including the need for larger sample sizes, random sampling, the use of multiple controls and avoidance of reporting bias; incorporation of objective clinical and laboratory studies, such as associations between chronic neurasthenic symptoms and disturbances in nerve conduction velocity and lipid- and porphyrin metabolism; and study of the role of Hepatitis B in studies for the association between primary liver cancer and exposure to toxic herbicides. The working group recognises the major problems in conducting complex epidemiological studies of this type, even under ideal conditions, and congratulates their Vietnamese colleagues for their scientific contributions under difficult conditions.

### 4. Future Scientific Cooperation

While primary consideration has been directed to Vietnam, the working group recognises the existence of similar problems and needs in Laos and Kampuchea following the second Indochina war. Greatly expanded initiatives should be developed in the following general areas: Collaborative programs based jointly in Vietnamese and foreign laboratories; visiting consultant programs involving foreign scientists to work in Vietnam; scholarship programs allowing young Vietnamese scientists to receive specialised training in foreign countries; development of standardized protocols for epidemiological, clinical and laboratory studies; and foreign reference centres for specialised purposes such as RCDD [as received] analyses and histopathology review. Attempts should be made to integrate such initiatives with worldwide studies on groups occupationally exposed to dioxin and dioxin-contaminated chlorophenoxy compounds, including foreign veterans of the second Indochina war, and to develop such initiatives in parallel with programs to improve the overall public health and nutritional status of the Vietnamese population. Recommendations for specific collaborative program include expanded case control studies designed to investigate the relationship between past exposure to toxic herbicides and present disease in standardized populations and also designed to study associations between subjective disease and objective clinical and laboratory findings and to study the relation between such associations and present dioxin levels in soil, water and vegetation of areas exposed to toxic herbicide, retrospective case-control studies on soft tissue sarcoma; and subject to available resources, longterm prospective epidemiological studies on exposed Vietnamese populations.

### 5. Recommendations for Practical Action

The working group recognises that all recommendations are meaningless in the absence of a workable plan for implementation.

The following recommendations are therefore proposed:

1--Funding should be sought to support further research, diagnosis, and treatment of the effects of exposure to herbicides in Vietnam, Kampuchea and Laos.

2--We should immediately establish practical mechanisms for scientific collaboration. In particular, these mechanisms should include international scientific commissions or committees for collaborative research.

3--The participants in this symposium should make every effort to increase the availability of medical supplies to Vietnamese, Lao, Kampuchea researchers, also scientific journals, laboratory reagents and equipment.

4--Research concerning the treatment of exposed persons should be part of the overall research program.

(?5--) Who should be approached concerning the expansion of their IARC-dioxin project to incorporate and support herbicide-effects research in Indochina.

CSO: 5000/4310

'SECOND' CBW SYMPOSIUM SUMMARY REPORT

OW291844 Hanoi VNA in English 1457 GMT 29 Jan 83

[Text] Hanoi, VNA, 29 Jan--Following is the second summary report of the International Symposium on Herbicides and Defoliants in War held in Ho Chi Minh City from 13 to 20 January 1983:

Reproductive Epidemiology

The working group accepts without dissent the animal evidence proving the teratogenicity of dioxin when administered to females, but remains unaware of any acceptable evidence of the transmission of this toxicity through the male.

Although there have been many studies of the medical effects of agent orange and related compounds, together with their contaminants, they have been inconclusive as regards reproductive effects and therefore the study of these in Vietnam, where there has been such extensive exposure, seems to be of the greatest interest and importance, not only to Vietnam but also to the rest of the world.

Recognizing, and indeed deeply cognizant, of the extraordinary difficulties necessarily associated with any such retrospective study, especially when it is being carried out some 15 years after the time of exposure, we have been very much impressed by the seven Vietnamese studies that have been reported to us. These evaluations of the possible teratogenic and or mutagenic effects of herbicide exposure are being made in three major ways:

1. Changes in the frequency of miscarriages and still births relative to normal deliveries.
2. Changes in the frequency of congenital malformations.
3. And changes in the rate of occurrence of hydatiform mole.

Changes in miscarriages still births and congenital anomalies have been studied not only among exposed women (necessarily in the southern part of Vietnam) but also in the children of unexposed women whose husbands have been exposed.

The authors of all these investigations, well aware of the many obstacles to a completely satisfactory study, have proffered them as preliminary reports even when they already include an immense amount of laboriously acquired information.

The most complete, and perhaps consequently the most impressive and persuasive studies, relate to an increase in the unfavorable outcomes of pregnancy in North Vietnamese women whose husbands served in the south and were therefore at least potentially exposed to herbicides compared to fellow villagers whose husbands had stayed in the north, providing the following criteria have indeed been met, a properly carried out blind study, an absence of bias (especially in selection) maximum validation of data other than by self-reporting, and strict adherence to the properly prepared protocol (and we have no specific reason to doubt any of them), then a statistically valid increase in these unfavorable outcomes has been shown for the wives of exposed fathers in one study and strongly suggested in another which additionally indicates a reversal of the usual increase in the frequency of such disasters with progressive pregnancies.

However, it is agreed by all that in such investigations, especially when they show results contrary to previous experimental evidence, one or even two or three investigations are not enough to provide complete proof of their conclusions, and further similar work is needed. [Sentence as received]

As regards congenital anomalies, there are several studies apparently indicative of a generally higher rate of their frequency among exposed women, but these changes are often hard to prove beyond any doubt, the absolute rate of reported congenital anomalies in Vietnam seems generally very low. Although the reasons for this are not fully understood, they may include the low sensitivity of the information system, reduced exposure to toxic chemicals and inherent ethnic differences.

We are much impressed by the large number of reported cases of the following categories of congenital anomalies:

1. Anencephaly and other neural tube defects, which in this case are associated with a remarkably low incidence of spina bifida.
2. Deformities of the sense organs such as anophthalmia.
3. Deformities of the limbs including phocomelia.
4. Conjoined twins.
5. Orofacial cleft defects.

In most other countries these malformations are either not very common (anencephaly, orofacial clefts) or even rare (deformities of limbs, anomalies of sensory organs and conjoined twins).

In order to appropriately further pursue this important field of inquiry, at least two things are essential: a more precise identification and classifica-

tion of reported anomalies, and a determination of the expected rate of such deformities in Vietnam either by the recovery of accurate pre-spraying figures or, second-best, the use of data from closely related populations available through WHO for the years 1962-1963 for India, Hong Kong, Malaysia and Singapore, or, minimally, by determination of the worldwide reported range of frequency.

Hydatiform moles again seem to show an increase in frequency in exposed women but more work is needed if this is to be proved. Recognizing the relatively high frequency of this lesion in southeast Asia, information should be obtained as to any recent changes reported elsewhere in the area.

We feel that the general design of the studies reported is excellent but that additional numbers are needed, controls made somewhat stricter, possible variables carefully scrutinized and protocols rigidly adhered to. Until now exposure index has rarely been included and no sort of dose-response curve has been constructed. Consideration should be given to comparing the possible results of direct exposure compared to exposure via the Diet. Search should perhaps be made for other possible toxins such as heavy metals or DDT.

Finally we would point out that even if all of these studies, as designed, were to yield unequivocally positive results even then only the increased defects resulting from exposure would have been proved, not the specific association with dioxin, which would remain presumptive until the casual relationship was confirmed by separate investigations. These would be made much easier if the newest methods of chemical analysis can, indeed, still demonstrate residual dioxin at variable levels in human tissue.

The group agrees that the remaining problems of the possible teratogenesis of herbicides requires extensive continued study by the scientists of Vietnam in which they could be appropriately aided by the international community, especially with respect to laboratory experimental investigations.

CSO: 5000/4310

FIFTH REPORT OF SYMPOSIUM ON HERBICIDES IN WAR

OW311812 Hanoi VNA in English 1656 GMT 31 Jan 83

[Text] Hanoi, VNA, 31 January--The following is the fifth summary report of the international symposium on herbicides and defoliants in war held in Ho Chi Minh City from 13-20 January 1982:

Terrestranimal Ecology

Chemical defoliants were sprayed in high concentrations and over large areas of forest in South Vietnam from 1961 to 1971, damaging the forest environment and causing the death of countless animals. The working group reviewed two papers reporting the results of 2 years of study of the effects of massive herbicide-spraying in a Luoi Valley, Binh Tri Thien (formally Thua Thien and Quang Tri) Province. This 10,000 Ha Valley was 800/0 tropical forest supporting a rich fauna, but was degraded to grassland. A research team led by Professor Vo Quy of Hanoi University interviewed a cross-section of the inhabitants of ten villages in the valley who witnessed the immediate results of chemical spraying. These people consistently reported that spraying was followed within a few days by the deaths of large numbers of both wild and domestic birds and mammals. There have been no studies investigating the contribution to this mortality from direct toxic effects of chemicals versus indirect effects such as starvation or disease that would follow the destruction of the forest environment of animals.

An important comparison between a Luoi Valley and two control forest areas of numbers of bird species, by Professor Vopquy, and numbers of mammal species, by Dr Dang Huy Huynh was presented and discussed. Only 24 species of birds and five species of mammals were found in a Luoi Valley, while 145 and 170 bird species and 30 and 55 mammal species were censused in the control forests.

Two other studies were reported. Dr L.N. Medvedev stated that termite abundances were lower in a sprayed forest site compared to an unsprayed forest site of similar forest structure. Dr Tran the Thong reported higher incidences of reproductive problems and birth abnormalities among domestic pigs in a village subjected to chemical spraying compared to an unsprayed village.

Visits to defoliated forests and examination of aerial photographs of sprayed and unsprayed forest have shown that tropical forest has been transformed by

chemical warfare to two types of degraded vegetation. First, forest repeatedly or intensely defoliated over large areas was often subsequently burned leading to the establishment of grassland. Examples are a Luoi Valley and large areas within and to the north of Ma Da forest reserve, Dong Nai Province. Second, over large areas of forest less frequently sprayed, plants of the upper layers of the forest were killed, resulting in a forest of low stature relatively poor in animal species. Thus in defoliated areas tropical forest supporting a rich fauna of invertebrates and vertebrates has been destroyed, together with the animals dependent on the microclimatic conditions, food resources, and physical structure of the forest. Populations of animals requiring forest of well-developed structure and high plant species diversity have been reduced and subdivided into isolated areas. These species are now more susceptible to local extinction as a result of the reduction and division of their forest habitat. This phenomenon was specifically investigated during surveys of endangered species for example. *Rhinoceros sondaicus*, *bossauvali*, *pygathrix namaeus* and *lophura edwordei* and of economically important vertebrates in seven forest areas of South Vietnam by Vo Quy and Colle Qvs.

We suggest the following objectives for further research on the ecological impact of chemical warfare on forest animals. First, thorough ecological and zoological studies are necessary, especially to quantitatively document differences in animal species richness and abundances in sprayed and unsprayed areas of different types of forest. Second, field ecological studies should be combined with laboratory investigations of particular animal taxa to discover species useful as bioindicators of herbicides and or ecosystem, and to investigate if long-term reproductive problems have resulted from genetic damage to wild and domestic animals surviving chemical poisoning. Third, the distribution of any residual chemicals in the ecosystem should be assessed. Fourth, long-term research plots in forest recovering from chemical spraying should be established to monitor changes in their animal communities. Fifth, more surveys should be conducted to identify and categorize the remaining forests of Southern Vietnam and their animal components.

We stress that recommendations from animal ecologists for forest rehabilitation must be integrated with economic studies of how best to utilize these altered lands for the economic and social needs of the people. We have two immediate recommendations to offer. First, we suggest establishing a system of rational biological reserves to protect and manage what remains of the rich diversity of animal life in the forests of Southern Vietnam. Second, we are especially concerned about further reductions in forest cover caused by the spread of grasslands. This process was set in motion by chemical warfare. We suggest that efforts be devoted to reafforesting grassland to rejoin small patches of forest that are now isolated from one another and form barriers to animal [word indistinct].

Finally, we suggest that biological institutions within Vietnam seek expert assistance and funds from international agencies such as the Food and Agricultural Organization (FAO), the United Nations Development Program (UNDP), the International Union for the Conservation of Nature (IUCN), United Nations Environmental Program (UNEP), UNESCO, (especially its man and the biosphere (MAB) program, and the World Wildlife Fund (WWF). Our working group wishes to emphasize that the complexity of and interrelationships among these ecological problems require cooperation among botanists, zoologists, soil scientists and aquatic biologists to aid in the rehabilitation of the fauna of forests devastated by chemical warfare.

SIXTH SUMMARY REPORT OF CBW SYMPOSIUM HELD IN SRV

OW311550 Hanoi VNA in English 1453 GMT 31 Jan 83

[Text] Hanoi, VNA, 31 Jan--Following is the 6th summary report of the International Symposium on Herbicides and Defoliants in War held in Ho Chi Minh City from 13-20 January 1983:

Soil Ecology

The use of herbicides in the Vietnam war has caused heavy damages and long-term consequences on soil ecosystems and this may affect agricultural and forest production and ultimately men's health. This response of outrage to large scale wartime use of herbicides for crop destruction and forest defoliation should not deny the benefits of their use to farmers and workers in the forest during times of peace.

The soil working group was concerned with the effects of the wartime use of herbicides on the chemical, physical, and biological properties of soil.

The effects of herbicides on soil may be indirect or direct. Their indirect effect occurs through changing the vegetation, and its influence upon soil properties. Their direct effect occurs when they enter the soil becoming part on soil organic matter degradation processes or affecting the microbiology of soil. The magnitude of changes induced upon soil properties will vary depending upon other variables which influence the soil ecosystem, for example, the geologic conditions, the topography, and the degree of development of the soil.

Our group heard and discussed papers which dealt with three main soil topics.

1) The changes in soil properties that have occurred since herbicides were applied during the Vietnam war. 2) The effect of the herbicides on the ecosystem of soil micro-organisms. 3) The fate of herbicides entering the soil in the processes of degradation and their resulting products.

The major points made in these reports are:

1. A large proportion of the elements of site fertility are contained in the trees relative to the soil in undisturbed tropical forests. Herbicides bring about a sudden return to the soil of the foliage of vegetation with its elemental content, rapid decay of this detritus brings a flush of organic matter,

nitrogen compounds and associated mineral elements to the soil. This changes soil properties with the increase in these materials. This may be temporary or long lasting depending upon many factors such as rate of recovery of original vegetation. Amount of conversion to other types of vegetation, or land uses and the topograph and degree of erosion.

2. Loss of soil fertility elements may occur depending upon the intensity and duration of vegetation change induced by herbicides. Repeated application resulted in greater opening of forest and conversion to other types of land use. The fertility content of the site in soil and vegetation became less with the sequence from forest to grassland or bamboo. Soil fertility elements most susceptible to loss are potassium and nitrogen, with a drop in available phosphorus due to incorporation in insoluble forms.

3. A study made in the Aluci Valley, V.H. reported changes in soils collected 12 years after herbicide use had converted forest to imperata grassland. Periodically man caused fires occur and maintain this grassland. Where topography is steep the changes in soil properties were lower organic matter content, lower nitrogen content, less available phosphorous and lower calcium, magnesium and iron on the soil cation exchange complex. The soil increased in acidity and aluminum content. Where topography was flat as in the valley bottoms with alluvial soils, there were increases in the soil organic matter and nitrogen content.

A study of mangrove forest soils at Ca Mau showed soils in areas cleared of mangroves increases carbon and nitrogen contents, lower soil Ph, available phosphorus was less, and soil potassium was lowered when compared with uncleared forest, where cleared soils were used for agriculture there was a drop in nitrogen contents but organic matter remained high. Deturation due to acid sulphate soil formation has occurred in some of these mangrove areas such as U Minh and Camau.

4. Herbicides and pesticides directly entering the soils and transmitted through the plant to root exudates may affect the species composition of soil microorganisms. There may be a selection for those species which can decay the unique organic compounds (xenobiotic) applied. These organisms will aid in the decomposition of the herbicides but also could possibly form degradation compounds which are toxic.

5. Two,4D and 2,4,5T have been used as herbicides and plant growth regulators for 40 years. If essential combination of microflora are present 2,4D and 2,4,5T are fairly quickly degraded to non toxic products.

However picloram is more stable in soil, being detectable for up to 3 years. Arsenic from cacodylic acid may remain in soil in a fixed condition. Decomposition rates of pesticides in soil will vary depending upon soil physical properties, acidity, microflora composition, and adherence to clays.

One study reported long time persistence as herbicides based upon phenol analysed. This persistence of herbicides may be related to fixation in soil organic matter or clay minerals in the soil.

## Recommendation

Our group makes these final proposals for international long-term cooperation of interested scientists.

1. Total ecosystem studies are needed to understand the role of herbicides and pesticides (xenobiotics) in geochemical cycling and their effects upon soil fertility.
2. A survey should be made of land use in herbicide treated areas and the resulting sequence of vegetation change. The survey should include locations of any areas of intensive land deterioration due to erosion.
3. Techniques of restoration of soils deteriorated by adverse aspects of herbicide use and subsequent land use should be developed and applied. Special attention is needed for acid sulphate soil reclamation.
4. Studies are needed in the persistence of herbicides in soils and their processes of degradation. The role of microorganisms in decomposition and degradation of herbicide materials needs study. Studies of effects upon microflora composition and selected indices of herbicide presence such as nitrogen fixers, cellulose decomposers and mycorrhizal and plant microflora associates are needed.
5. Studies on special soil topics related to herbicide use are needed such as the possible catalytic effect of clay minerals on photo-oxidation and degradation of herbicides, and the effects of herbicides on processes of soil laterization.
6. Studies should be made on persistence of dioxin contaminants of herbicides in soil and their possible movement in the food chain to man.
7. We recommend that the international organizations (UNESCO, UNEP, UNDP, FAO) and the international scientific community help in collaboration with Vietnamese scientists in the studies of these problems associated with the use of herbicides in the Vietnam war.

We recognize that there are far broader aspects of herbicide use in a global context and that we have confined our discussion to the effects of herbicide use during wartime in Vietnam on soil conditions. Related materials are in the reports of group dealing with agriculture, forestry, mangroves and the chemistry of herbicides.

CSO: 5000/4310

FINAL REPORT OF CBW SYMPOSIUM

OW300821 Hanoi VNA in English 0714 GMT 30 Jan 83

[Text] Hanoi, VNA, 30 January--Following is the final summary report of the working group on experimental toxicology and chemistry of the International Symposium on Herbicides and Defoliants in War: the long term effects on man and nature, held in Ho Chi Minh City on 13-20 January:

Final summary report of the working group on experimental toxicology and chemistry:

Chemical warfare agents of the herbicide and defoliant category were used in South Vietnam between 1961 and 1975 and on a massive scale in the mid to late 60's. A diverse group of chemicals was used including agent orange and its analogs as well as agent white and blue.

According to the U.S. National Academy of Sciences the quantity of herbicide and defoliant used in Vietnam was about 90,000 tonnes. Westing has also reported a similar tonnage. Vietnamese scientists however, believe that the quantity used was greater than this and that the amount exceeded 100,000 tonnes. This higher estimate includes harrassing agents such as CS.

All of the chemical warfare agents used were sprayed over an area of approximately 38,000 square kilometers. The concentration of chemicals used varied from between 15-20 kg/hectare to 300kg/hectare in unusual circumstances (average about 30kg/ha). Agent orange and its analogs made up approximately 80 per cent of the herbicides and defoliants employed in South Vietnam. Agent orange and its analogs contained the highly toxic contaminant 2,3,7,8 tetra-chloro-dibenzo-p-dioxin (TCDD). According to official US figures quoted by westing approximately 57,000 tonnes of agent orange and its analogs were sprayed and this quantity of herbicide contained not less than 170 kg of TCDD. Some participants of the working group agreed with this figure, but a majority came to the conclusion based on some published data that the total amount of TCDD sprayed over Vietnam was greater than 500 kg.

Some delegates did not agree with this assumption. Based on analytical data from samples left over from the spraying programme in Vietnam and the amounts of 2,4,5 -T produced in different factories, in different years, and subsequently sprayed, they arrived at a total figure of about 170 kg.

Due to the toxicity of 2,3,7,8-TCDD and the large variation in toxicity between different isomers the analytical method used in dioxin analysis should have good reproducibility, a very high sensitivity (in the 10-12 gram range) and they should allow the quantification of specific isomers especially the 2,3,7,8-TCDD isomer.

The date 2,3,7,8-TCDD has been found in several different types of samples like formulations, soil, sediment, vegetation, fish and animal tissue, bovine and human, milk, human blood, liver, kidney and adipose tissue.

Although 2,3,7,8-TCDD is the impurity found in agent orange it should be pointed out that other dioxins such as 1,3,7,8- and 1,3,6,8-TCDD; 1,3,7-TRI-CDD; 2,7- and 2,8-DI-CDD have also been reported together with a series of dibenzofurans.

TCDDs have also been found in other chemical products. Of special interest is the existence of 1000 PPM of TCDDs in diphenyl ether herbicides used in rice fields. The major isomers are 1,3,6,8- and 1,3,7,9-TCDD has not been found. Secondary formation of TCDD after spraying has also been discussed (photochemical and pyrolytic formation). The ecological situation is very complex, however experimental data do not indicate any extensive secondary formation of the dioxin. Burning of 2,4,5-T salts results in high yields of TCDD.

The degradation of TCDD in soil is very slow, a half-life of greater than 10 years has been reported. The metabolism/excretion of TCDD from primates seem to be quite slow with a half life of about 1 year. In small rodents the degradation is reported to be much faster.

Analysis of the parent phenoxy herbicide (2,4,5-T, 2,4-D) in various samples can be done by standard methods (HRCC), however the presence of trace levels should be confirmed by an additional technique, E.G. mass spectroscopy.

For the analysis of arsenic atomic absorption and X-ray spectroscopy are the methods with the best sensitivity and reproducibility.

Recommendations: the working group recognized two analytical studies of samples from Vietnam. In fish samples from the early 70's Baughman found up to 800 PPT of TCDD. In a recent study Olie identified small amounts (up to 30 PPT) in soil and sediment samples from Vietnam. The working group recommends further research on critical samples like soil, sediments, fish and other aquatic animals, human milk and human tissue samples. The first phase of such a project should include a brief screening of "grab samples" followed by systematic sampling in the presence of international organizations like UNESCO and, or, UNEP. After coding the samples together with control samples should be sent in a "round robin" study to different laboratories, E.G.

Amsterdam  
Hanoi, Ho Chi Minh City  
Lincoln, Nebraska

Modvö  
Umeå, Sweden

#### Genetic effects of herbicides:

Vietnamese scientists using standard non-banding cytogenetic techniques and sister chromatide exchange methods for investigations on chromosome aberrations have reported an increase in chromosome aberrations and sister chromatid exchange on adults and their children directly exposed to herbicides in South Vietnam. These people are still living in the sprayed area. A control group was selected from South Vietnam.

The abnormalities reported include chromatid breaks, chromosome breaks, translocations and polyploid cells. Some of these are rarely seen in human beings, especially ring chromosomes, translocations with quadriradial figures, and endore-duplications have been found many years after the chemicals had been sprayed. According to the Vietnamese scientists similar aberrations have been reported for victims of radiation exposure in Japan following the dropping of atomic bombs. And the Vietnamese scientists believe that their findings indicate that there has been a long term health effect on the victims of herbicide exposure.

The above information has been extended by other Vietnamese scientists who reported an increase of chromosome aberrations on spermatogonia and primary spermatocytes caused by 2,4,5-T in the vivo tests on the white mouse (*mus musculus*).

Delegates discussed papers indicating absence of mutagenicity in drosophioxins in the bacterial ames test, but the presence of mutations when dioxin was tested in a mammalian cell transformation assay.

#### Comments on Findings of Vietnamese Scientists.

In the opinion of the group the work of the Vietnamese scientists is interesting, but because of the controversial nature of the published literature on the genetic effects of these herbicides further studies by additional laboratories are needed.

#### Carcinogenicity

One delegate presented evidence on the carcinogenicity of 2,3,7,8-tetrachlorodibenzodioxin (dioxin) in rodents. The paper considered alongside the 5 already published in the scientific literature indicates that there is now sufficient evidence to class dioxin as a carcinogen in a number of animal species. It is not yet clear, however whether dioxin acts direct or in D. [as received] to cause cancer. However, the work presented in the group on the mutagenicity of dioxin in a cell transformation assay suggests that this chemical is an initiator and can cause cancer. Evidence was also presented for the carcinogenicity of the herbicide 2,4,5,-trichlorophenoxyethanol in rodents.

Toxicology: One delegate presented evidence for the toxicity of herbicides (2,4-D and 2,4,5-T) in fruit flies at 1,000 ppm and 300 ppm respectively. The toxic effects included total failure of the life cycle of the fly at these doses, and proportionate survival at lower doses with a developmental delay

which was not teratogenic. But which caused changes in the duration of the life cycle, the sex ratio of the emergent population, and the time of maturation of the flies.

It also included behavioural modifications in the choice of media for egg laying. Media without herbicide were preferred for egg laying over those with either 2,4-D or 2,4,5-T, or a mixture of these (the dioxin content of the 2,4,5-T tested is not known) the other delegates reviewed the scientific evidence on the cytotoxic effects of halogenated hydrocarbons and on the toxicity (including delayed toxic effects) of chemical warfare agents in general.

The mode of action of the chlorinated pesticides, polychlorinated dibenzofurans and dioxins was discussed with reference to their action in the liver. Chemical warfare agents were reported to have delayed toxic effects in humans and it was recommended that a considerable research effort was required to find out more about this problem. In particular, it was suggested that workers employed in the manufacture of chemical weapons be studied for any long term health problems.

#### Recommendations

We would like to see:

- 1) More in vitro studies using eukaryotic organisms with different doses of herbicides to determine different frequencies of chromosome aberrations and gene mutations.
- 2) Continued monitoring of the population exposed to herbicides to detect any mutagenic and carcinogenic effects in this, and subsequent generations.
- 3) Cooperation between laboratories on an international basis to facilitate this work.

CSO: 5000/4310

LAST OF SYMPOSIUM REPORT ON HERBICIDES IN WAR

OW011220 Hanoi VNA in English 0703 GMT 1 Feb 83

[Text] Hanoi, VNA, 1 February--Following is the 7th and last summary report of the International Symposium on Herbicides and Defoliants in War held from 13 to 20 January 1983 in Ho Chi Minh City.

Coastal, Aquatic and Marine Ecosystems

During the second Indochina war, extensive areas of forests were defoliated in the southern part of Vietnam. In particular mangrove forests were periodically defoliated during the period of years between 1961 and 1971 and resulted in the complete destruction of a significant percentage of the forests in the provinces of Tien Giang, Ben Tre, Cuu Long, Hau Giang, Minh Hai and Ho Chi Minh City (Rung Sat). A U.S. National Academy of Science study team concluded in 1974 that the affected mangrove areas were so intensively damaged that natural recovery might take as long as 100 years, due in part to the loss of seed sources. The destruction at the mangrove forests in the affected provinces resulted in a significant potential loss of timber, firewood, tannin and other forest products and presumably led to a decrease in estuarine and nearshore fishery yields. In essence, a significant percentage of the mangrove ecosystem, including its associated estuarine fauna and flora, experienced a significant productive loss.

The use of defoliants in the upland areas of the Vietnam was more extensive, but the subsequent damage was variable compared to that in the mangrove forests. However, the disturbance in the watersheds and the introduction of defoliants into aquatic ecosystems has been associated with aquatic biological changes that are considered to be serious.

This working group on aquatic, coastal and marine ecosystems has reviewed the available information and data and recommends that countries and international organizations supporting the development of the Socialist Republic of Vietnam provide assistance for the: (1) Assessment and monitoring of any possible chronic effects, due to residual defoliants, during the process of ecosystem recovery, and (2) the evaluation of productive alternatives for the utilization of the altered habitats for economic and social benefit.

## Coastal Mangrove Ecosystems

The data and information that are available for the mangrove ecosystem indicated that the effects of defoliation are long lasting and widespread within the affected areas. The relatively good quality of the available information makes it suitable for the definition of the basic research programs required to assist in the restoration of the habitat, and its fauna and flora, and the directions that should be taken in developing new economic opportunities. The trial plantations of a high-value species of mangrove (*rhizophora apiculata*) in its former habitat, could accelerate the recovery of the mangrove ecosystem. However, unsuitable and degraded habitats will require the evaluation and selection of alternative economic uses.

Whereas it is doubtful that toxic residues persist in significant concentrations, there is a reasonable probability that the defoliated and altered watersheds continue to have an impact on the downstream coastal mangrove forests. Altered hydroperiods, excessive erosion and deposition, and introductions and deleterious materials could have a significant effect on the fauna and flora of the mangrove ecosystem and estuarine areas. Insufficient quantitative data exist to assist in evaluating these possible impacts.

## Inland Aquatic Ecosystems

Compared to the existing knowledge of the mangrove ecosystem, defoliant effects are reported in (?fewer) documents for the potentially affected inland aquatic ecosystems. However, some data and informant reports have been assembled by qualified Vietnamese scientists. These suggest that the existence of defoliation induces adverse effects including the loss of freshwater vertebrate and invertebrate species and causes anomalous deformations among species of the local freshwater algae. Because many questions remain to be answered concerning this topic, a statistically valid assessment study is warranted that determines the characteristics of the altered environments and aquatic components, particularly those that have economic importance.

## Marine Ecosystems

Vietnamese scientists also confirm earlier reports of declining marine fishery stocks and the disappearance of certain species. Although similar problems are being reported in other countries of the region, the Vietnamese situation cannot be attributed to over fishing and related exploitive fishing practices. It is therefore urgent that fishery stock assessments be undertaken and that local training be provided in fishery management and capture techniques.

## Recommendations for Research Cooperation

Due to the ecological and economic value of Vietnam's coastal, aquatic and marine ecosystems and because Vietnam's opportunities for natural resource development are limited, this working group recommends that:

- (1) Vietnam participate in UNESCO's regional coastal and marine programme by creating a coordinating national mangrove committee and sending participants to

Bangkok, Thailand, for training in mangrove biology and management. The national committee should also serve as an ad-hoc advisory body to monitor the reclamation and restoration of altered ecosystems.

(2) Vietnam should solicit cooperation with the Czechoslovakian Academy of Sciences concerning the use of indicator species in monitoring the recovery of inland aquatic ecosystems.

(3) Vietnamese scientists and natural resource managers should actively solicit library materials, methodological handbooks and training aids on relevant scientific and management subjects.

#### Recommendations for Restoration of Natural Resources

(1) Vietnam should undertake statistically-controlled studies of each altered ecosystem for the purpose of explaining why certain ecosystems appear to be slow in recovering, to lay a scientific basis for accelerating the recovery processes.

(2) Vietnam should evaluate all alternative potential uses of the altered ecosystems, with emphases on aquaculture and the harvesting of species not previously utilized in Vietnam.

(3) Vietnam should incorporate socio-economic considerations in its natural resource development plans to ensure that maximum benefits are obtained.

It is necessary to strengthen international cooperation with Vietnamese scientists for effective assistance in overcoming the consequences of the war in Vietnam.

CSO: 5000/4310

## ROMANIA

### HARMFUL EFFECTS OF PESTICIDES ON FOOD, HEALTH

Bucharest MUNCITORUL SANITAR in Romanian 16 Oct 82 pp 1, 3

[Article by Dr. G. T. Nitu]

[Text] The draft Law on the protection of cultivated plants and forests and on use of pesticides, submitted to public debate, focuses on increasing the quantity of agricultural food products and their adequate quality, avoidance of loss and maintenance of the quality of the soil, and also environmental protection and the protection of public health.

In organizing and unfolding the activities for familiarization with and implementation of this law, special tasks also are allotted the health workers: studying the effects of pesticides on the human body for the purpose of preventing any adverse consequences that might result from the circuit of these substances in nature: supervising and inspecting compliance with the maximum allowable levels legally established in terms of pesticide residues in agricultural food products: expanding cooperation between biological research and technological research with the aim of achieving innocuous chemical and biological products: popularizing the measures with respect to prophylaxis of pesticide poisoning and making the public assimilate the first-aid measures.

A large amount of pea (seeds) was transported at the processing enterprise (IPILF). After the conservation of the product picked, somebody recalled the specific odor noticed while passing the spot where the pea had been stored in the field. The Bucharest Institute for Hygiene and Public Health was requested to make a toxicologic tests of the finished product. The result was positive: traces of pesticides were detected.

In another case, an engineer from an agricultural production unit ordered the driver who had transported pesticides to the field to load the bags involved with wheat. The driver refused but the engineer insisted (!?) and, in the end, the driver obeyed an irresponsible order. The wheat that reached the mill yielded a flour with a specific odor. The toxicologic test did not leave any doubt regarding the source of the odor. Both agricultural food products were destroyed.

These two cases can suggest the danger spelled by pesticides (chemicals used in agriculture to combat plant pests) to public health. However, it must be emphasized that among the means that are being used all over the world to continuously boost productivity in agriculture, hence to increase the quantity of agricultural food products, those intended for plant protection against pests, diseases and weeds play a particularly important role.

Up to 10,000 out of the 700,000 species of insects known annually cause immense damages to farm crops. Without mechanization, irrigation and chemicalization one cannot conceive a modern agriculture that provides higher and higher outputs per unit of surface. Moreover, chemicalization in agriculture means utilization of both synthetic fertilizer and pesticides.

The risk of poisoning with pesticides exists not only for the direct handlers but also for a far greater number of people, because of soil and water pollution and of residues in food. In this context, in terms of the relation between agrochemistry and human pathology, more exactly between the protection of edible plants and the protection of public health, we noted the views of some experts from the Bucharest Institute for Hygiene and Public Health.

The last decades have even seen the appearance of a new pathology and some distinct clinical entities: poisoning with organophosphorous substances, with thiazine herbicides, and so on.

[Question] Are pesticides really so dangerous?

Aurel Ichim, chief researcher, Laboratory of Pesticide Chemistry and Toxicology: In my view, it is interesting that environmental chemical pollution was noticed for the first time precisely because of the pesticides found as far as the waters of the Arctic Ocean. As a matter of fact, all the chemical pollution of the environment may be classified in two large groups: one including all the other chemical substances and the other, the pesticides. The last-named inevitably are pollutants and are being dumped in nature intentionally, and this also characterizes them, also differentiating them from all the other chemicals known.

However, in answer to the question, we may state that highly toxic pesticides do not spell danger to human health, especially if they also are biodegradable in the environment. But very hazardous are some substances that cause remote toxic effects in time. For instance, thiazine herbicides have a very low toxic level,  $DL_{50}$  for these products being at the level of grams, but the value of the ppm index is 20 mg per kg, a level at which laboratory animals become sterile. Hence, only 20 mg of these substances for a kilogram of corn meal eaten over a longer period of time would have extremely harmful effects on humans, even though the amount of substance is practically unnoticeable. Therefore, the studies conducted in our laboratory specifically focus on the chronic toxicity of pesticides and their mutagenic, oncogenic and other effects that might occur in time.

Dr. Manole Cucu, head of the Section of Environmental Hygiene: ....levels that were determined with maximum scientific strictness and which are rigidly monitored by a uniform methodology in all the laboratories for food hygiene and only in these laboratories. A subsequent stage might even see the switch to standardization of these methods, so that they may even become factors of legal reference.

Aurel Ichim: These maximum allowable levels, however, will not resolve the problem of pollution, but are guidelines in preventing accidental situations.

The matter of pesticide toxicity, more exactly that of protection of public health, can only be resolved by utilization with great strictness and under rigid standards.

The activities of agricultural diagnosis and prognosis and selection of the most effective substances are -- or ought to be -- of great importance. However, agronomists request a pesticide for each pest and this does not benefit anyone: not agricultural economy, not public health. For instance, I do not understand why, when we have 1,200 organophosphorous insecticides available, predominately used is parathion whose DL<sub>50</sub> is only 0.9 mg or even another insecticide with DL<sub>50</sub> of 0.9 mg, a veritable poison gas ?!, when another, less poisonous pesticide can be selected from among the 1,200 ones. Comprehension and handling of this matter would considerably simplify toxicologic and analytic inspection problems. Why should we not use a smaller number of pesticides with a broader range of action, permitting us to control the specificity level by variation of the substance level?

Dr. Manole Cucu: The wish to have a specific pesticide for each pest also demonstrates ignorance as to some ecological aspects. There is a specific balance among species in nature. By destroying a species completely we may encourage the development of other, far more aggressive species. The broader the effect of the pesticide used, the easier it will be to maintain this balance. We can control these maximum allowable levels in order to protect the population against the danger of harmful effects, but the problem of pollution is of topical importance and we are required to also protect the health of future generations.

[Question] What is the role of health workers in the context of the activities of prophylaxis of acute or chronic pesticide poisoning?

Dr. Nicolae Orza, Laboratory of Food Hygiene: All the physicians in the health network are required to notify food hygiene laboratories under the sanitary-antiepidemic centers of every case of accidental pesticide poisoning or the suspicion of contamination of food products with pesticides. This relation between the physician of the unit that provides medical assistance and his colleague in the laboratory, generally speaking, exists, but it is very weak. When a toxicologic test is requested, the note that accompanies the product involved often reads: Look for pesticides -- but there are more than 3,500 pesticides! Which one should be detected swifter? If only one symptom, such as myosis, was mentioned in this note, naturally the toxicologist would have from the onset focused on organophosphorous substances. Of course, physicians in communal medical centers play a special role in preventing accidents. They can, and they must, monitor the way in which pesticides are stored, handled and used by workers in the agricultural units in the area of the locality involved. Another matter involves the health education of the public. Frequently, and not very seldom as we would wish, elementary hygiene standards are not followed. Various kinds of containers that served for pesticides are used in households for foods: milk, flour, pickles, and the like, and it is easy to imagine the consequences.

Aurel Ichim: In the activities to prevent poisoning conventional hygiene standards are irreplaceable. In this context, we believe that even more can be done by our health workers. Moreover, every physician in the basic care units must be thoroughly acquainted with the problem of pesticides, their action, the semeiology of poisoning, and emergency therapeutical management. There is no explanation whatsoever for the administration of morphine by a physician in a case of organophosphorous poisoning. It is inadmissible and nonetheless...

In conclusion of these views we may state that resolution of the problem of pesticides in terms of their toxic potential and the protection of public health also depends on the level of professional responsibility and the conscience of each of us.

11710

CSO: 5000/44

# COMPANY'S CLEARING OF TOPSOIL IGNITES CONTROVERSY

Nassau THE HERALD in English 30 Dec 82 pp 1, 2

[Text] **ECOLOGY CONSCIOUS Bahamians this week accused New Providence Development Company of denuding the soil at their vast expanse of property, located on the western end of New Providence.**

THE BAHAMIANS, who are farmers, charge that the company, in its pursuit of top soil, is making their vast expanse of land, believed to total several thousand acres, a barren waste land for future generations of Bahamians.

"THIS is raping and ravaging the land of its natural resources," observed one farmer. "This is prime agricultural land. The vegetation is lush, the soil is rich and there is an abundant supply of fresh water. It is ideal for agricultural purposes.

"INSTEAD, what is being done is that the land is being robbed of its natural nutrients in this company's pursuit of material gain. After the top soil has been removed, this land is only good for one thing — the construction of homes by future generations of Bahamians."

REPRESENTATIVES from The Herald visited the land in question and observed tractors and other earth moving equipment at work scraping at and carting away the soil.

IN almost all instances HERALD staff members observed the land was in as poor a condition as the farmers had charged. In many cases, even weeds were unable to grow, presumably because of the removal of the top soil and the

exposing of the quarry rock with its high alkaline content.

THE chief concern of the farmers who brought their concern to the attention of The Herald is that nothing is being done to replenish the resources taken away from the land.

"THEY are just leaving the land barren," the farmers argue. "When this land is sold in years to come, it will be worthless. Even if someone decides to build a house on the land, they will have to purchase soil all over again — presumably from New Providence Development or some other company which sells soil."

BUT, several sources within the civil service argue that New Providence Development is making a contribution to the country as it supplies the government with some two million gallons of water per day and with substances to construct roads in New Providence.

"BESIDES," they argue, "it is the only private company in New Providence which has become involved in the construction of low-cost housing with their creation of

Mount Pleasant Village near to Lyford Cay and the land from which the top soil is taken belongs to the company."

BUT is this enough? What about the future generations of Bahamians to whom this land

will belong, even if the land belongs to the company?

SOME PEOPLE have suggested that what might be done is to establish a system similar to that in operation in Jamaica, where companies involved in the mining of bauxite have to replenish the land after it has been mined.

BAUXITE occurs in Jamaica as often in forest areas as it does in farming areas and in the company's pursuit of the substance craters are oftentimes created.

GOVERNMENT REGULATIONS in Jamaica stipulate that the land destroyed has to be made better after the mining operation has been completed. The advantage of this is that bauxite as a mineral resource will expend in Jamaica within the next 10 to 20 years and farming will have to fill the breach.

IF NEW PROVIDENCE DEVELOPMENT were to embark on such a programme, additional job creating programmes could spin off. In Jamaica, the bauxite companies have left roads which were created as a result of their mining operations. These roads have been resurfaced by the government and are now in full use. In addition there is the public relations aspect of it, which serves to bolster the company's image.

THERE ARE no simple answers to the problem, but the relevant government agency

and New Providence Development will take note of these suggestions and criticisms made, and will make an attempt to rectify the problem.

NEXT WEEK, we will feature comments from an executive of New Providence Development and hopefully comments from The Bahamas National Trust.

CSO: 5000/7536

WRITERS REVIEW ENVIRONMENTAL HAZARDS IN BANGLADESH

Dhaka HOLIDAY in English 28 Nov, 4, 11 Dec 82

[Article by M. I. Choudhury and Syed Safiullah]

[28 Nov 82 pp 5, 7]

[Excerpt] An important association with environment is pollution. What constitutes a pollutant is not easily defined. One could associate the term with man-made materials entering the environment with harmful effect especially on living organisms for example sulphur dioxide from combustion of sulphur-containing fuels or hydrocarbons that contribute to smog.

However, these and other pollutants would be present even in the absence of man, sometimes in considerable amounts (sulphur dioxide is emitted in profuse quantities during volcanic eruption). We shall consider a pollutant any substance not normally present or which is present in larger concentrations than normal.

Bangladesh

Two human activities in developed countries which are strongly connected with pollution are waste disposal and energy production. While these two have relevance in Bangladesh the problem of pollution here is not entirely similar to that in the west, mainly because the nature of economic activities is vastly different.

While the pollution occurs mainly due to industrial activity in the west, the cause of pollution in Bangladesh should be analyzed in the perspective of predominant agricultural production and growing industrialization, which is again agro-based.

Add to this population and indiscriminate and rapid urbanization mainly concentrated in Dhaka and Chittagong.

As stated earlier pollution must be understood in the context of environment. And that immediately leads us to focus the main feature of the environment we live in.

We are a river people, meaning that three drainage systems, the Ganges, the Brahmaputra and the Meghna have not only formed the delta we live in but the soil composition and characteristics of the drainage area are also largely determined by the chemistry of the river water in the concerned area.

For example the Ganges water has a high value of calcium and magnesium content and accordingly the soil in the command area of the Ganges is high in calcium, while a low value of calcium in the Brahmaputra water makes the soil of its drainage area poor in calcium.

The river, by its morphological activity has also formed the topography of the deltaic plain. For instance, meandering action coupled with the changing course of the river has given rise to innumerable oxbow lakes in the flood plains of Bangladesh. These are locally known as bills and haors.

The area covered by these shallow basins and oxbow lakes is no meager sum, it is to the measure of 14,000 square miles and constitutes one of the most important sources of fish production.

The chemical environment in respect of bio-mass in these basins is intimately connected with that of the riverine system that has given rise to these shallow basins.

Finally, the estuarine region is the final destination of the motor action of the rivers; so what happens in the upper reaches is bound to affect the estuarine area.

In addition, of course there is presence of saline water in the estuary. Estuarine region consisting of the continental shelf of the Bay of Bengal has an area of about 40,000 square miles.

Nutrients discharged by the rivers flowing through the flood plain make this area an excellent place for primary production, which eventually in the hierarchy of ecological food chain gives rise to one of most fertile yet only partially explored and exploited fishing grounds in the oceans.

The potential of the estuarine region both as an area of intense land accretion and aquatic food source is just beginning to be realized. Hence the problem of ecological balance in this area is just as important as it is in the deltaic plains of Bangladesh.

As mentioned earlier, problems of pollution arise mainly out of anthropogenic interference and therefore generally due to man's economic activity. In the context of Bangladesh this can be divided mainly into two sectors: (a) agriculture, (b) industry, in order of importance.

[4 Dec 82 p 5]

[Text] Even before the mid-fifties the land in Bangladesh produced enough food for its population by traditional agricultural practice, i.e. without

input of agrochemicals. But with population growing to explosive proportions the situation changed drastically.

This, coupled with the world-wide wake of green revolution, has significantly increased the use of chemical fertilizers such as urea, phosphate and potash.

And to this day the quantum of such chemicals put into the fields is about 900,000 tons annually. This has increased crop production by no small measure. But then such inputs, if applied conscientiously, although they promise bounty, also carry a spectre of barrenness through ecological imbalance, if applied indiscriminately for blind profit.

Let us examine the case of three major fertilizer inputs in respect of their possible role as pollution hazards.

#### Nitrogenous Fertilizers

The principle nitrogenous fertilizer that is produced in Bangladesh based on our natural gas and used extensively is urea. The total annual production is about 500,000 tons and most of it goes into indigenous use. Urea is highly soluble in water, so when it is used under conditions of irrigation or during the monsoon, a significant percentage (probably 40%) of it is washed away into the riverine system, oxbow lakes and shallow basins.

Therein lies the real hazard. Urea being a chemical compound with high nitrogen content, goes in to help explosive growth of aquatic vegetation such as algae, water hyacinth etc. This in turn depletes the dissolved oxygen content in the water and as a result useful fish population suffers adversely.

This is not the end of the story, at certain stages when aquatic environment cannot support the algaec growth, huge amounts of unnecessary biomass start decomposing. And decomposition of some of the algae produces deadly poisonous cyanide containing compounds. In addition to that, decomposition of sulphur containing proteins produces obnoxious hydrogensulphide gas.

#### Phosphate Fertilizers

Phosphate fertilizers, if leaked in excessive amounts into the riverine system, create the same kind of unwanted nutritive environment for the growth of micro-organism. Viewed this way, the pollution effects of the phosphate and nitrogenous fertilizers act synergetically on each other, i.e. effect of one enhances the other. These two agrochemicals are the main cause for entrophic conditions in many shallow basins and oxbow lakes.

Another group of agrochemicals that can cause serious pollution of the rivering aquatic environment are insecticides. Pest control is a necessary measure in agriculture.

The use of insecticides has substantially increased during the last ten years. Pesticides are broadly divided into three kinds: (a) Organochlorines

such as D.D.T., (b) Organophosphates such as Malathion, Parathion etc., (c) Carbomates such as Baygon.

The mode of action for pest control varies from one group to the other. For example D.D.T. and Dieldrine probably act by forming carbamate compounds in the nervous system of the target organism, while organophosphates act by blocking the nerve transmission and are generally more poisonous.

In fact, a little modification of the chemical structure of the organophosphate insecticides, can give rise to deadly poisonous nerve gas weapons.

So it is necessary that the insecticides should be biodegradable and at the same time their toxicity should be such that they do not adversely affect the useful organisms in the soil.

Unfortunately the most widely used insecticides, i.e. the organochlorine compounds are extremely resistant to bio-degradation, so they constitute a veritable hazard to ecology.

Gradual accumulation of these compounds in the bone marrow of higher animals can give rise to carcinogenic conditions.

Although the use of organochlorines has been largely restricted in the developed countries, their indiscriminate use goes on unabated here in Bangladesh.

Of all the insecticides, the carbamates have drawn favorable attention both because of their bio-degradability and less toxicity.

#### Depletion

In addition to the macronutrients the plant body needs minute to reasonable amounts of metals such as zinc, magnesium, manganese etc. These are called micronutrients.

Excessive use of phosphate renders many of these essential metals unavailable to the plant. Few years ago, the farmers in the districts of Khustia and Rajshahi complained that in spite of the use of a judicious combination of nitrogen, phosphate and potash, crop yields were low, down to the level of barrenness.

Later on the affected areas was found to be dangerously deficient in zinc, an essential micronutrient. This could be attributed both due to excessive use of phosphate as well as to another anthropogenic interference--the Farraka barrage in the upper reaches of the Ganges.

Due to diminished flow of water, the amount of nutrients carried by the river would be proportionately low, resulting in a general depletion of soil micronutrient. This hypothesis, however, needs to be confirmed by objective and systematic study.

## Industrial Waste

The rate of industrial development in Bangladesh is still slow. Consequently pollution due to industrial waste disposal has not apparently come up as a major concern.

Nevertheless whatever industry we have at present is hardly equipped with any pollution control measure; as a result, waste disposal already seriously threatens the local riverine environment in which these industries are located.

To illustrate further let us examine some of the cases.

Sulphite liquor is the waste product of Karnaphuli Paper Mills. This contains sulphite which is highly reducing, that means when disposed into the river, it consumes much of the dissolved oxygen leaving little for the fish population.

As a result there is serious depletion of fish population in the downstream and estuarine regions of the Karnaphuli.

Similarly waste disposal from the news print mill at Khulna, which is based on soda process, builds up an unacceptably high level of alkalinity in the Rupsa River.

Caustic soda is produced by electrolysis of brine which uses mercury cells. So any loss of mercury from washing operations or otherwise probably finds its way along the Karnaphuli to its estuary and thereby causes potential threat of pollution from this deadly poison.

Tannery industry along the bank of the Buriganga uses basic chromium sulphate. Chromium in aqueous system under oxidative condition is transformed into chromate.

Chromate is highly poisonous to both fish and other vertebrates. It is no wonder that the Buriganga contains hardly any fish and who knows how much of this destruction has been caused by chromium.

Washing water from storage tanks of urea factory disposed into the river causes over-nutrition problem as stated earlier. In addition, the spent catalyst and used copper compounds for the removal of carbon monoxide even if instead of being directly thrown into the river are dumped on the ground will eventually find their way into the river through seepage and cause inevitable pollution.

And this process is probably well set in; because none of the fertilizer factories seems to be adequately equipped for any waste treatment, either for washing water or spent metal.

## Biological Reasons

Poor sanitary conditions and general lack of hygienic sense have created a general pollution problem from pathogens and other harmful microbes. And in the riverine system this situation is endemic.

With gradual social awareness this problem can however be largely solved. But then rapid urbanization and the failure of the city administration to provide with minimum sanitary conditions in the slums will eventually give rise to unmanageable pollution problems.

The solution to this problem is socio-economic and multidimensional and is beyond the scope of this article. But suffice it to say that rapid growth of urban population cannot be controlled unless the economic condition in the rural areas improves.

The flood plains of Bangladesh are the result of the geomorphological action of the various river systems that originate in the Himalayas and end in the Bay of Bengal.

The main ingredient in this accretion process is the silt that is carried and deposited by rivers.

In this sense it is debatable whether silt can be termed as an environmental hazard. Every year rivers carry about 2 billion tons of suspended load commonly known as silt. Useful though it is, siltation of the rivers does have its attendant hazards, such as hindrance to navigation and occurrence of flood.

## Siltation

Silt and sediments are derived from erosion of the sloping surfaces of the hills and mountains over which the rivers flow. Surface runoff of the catchment area and river bank erosion also contribute a lot of the materials.

During flow tide siltladen water from the sea penetrates deep inland, causes obstruction to river flow and accelerates sedimentation.

Recently with the rapid growth of population, clearing of forest in the hills and mountain slopes has become rampant and the surfaces are becoming denuded of vegetation.

As a result, erosion has become accelerated. Sediment loads of river are increasing day by day causing more siltation in the valley bottom.

Hazards from this have also increased. During the peak of the flood season (July-Aug-Sept) the sediment load carried by the rivers is the maximum and during the receding months, the load gradually falls.

During the high monsoon season, although the current is more but load being saturated, siltation occurs in the river bed (the Padma and the Jamuna).

Again, during the receding months, when the current gets gradually slower, siltation takes place. As a result, siltation occurs during the whole year. Silt and sediment also carry organic materials along with them.

Silt by itself is neither pollution, nor it causes any environmental hazard, but by siltation some environmental hazards may be posed.

[11 Dec 82 p 5]

[Text] Bangladesh is crisscrossed by a network of rivers. Two of the river systems, viz the Ganges and the Brahmaputra, are among the largest in the world.

These rivers have large discharges during the monsoon period but have very low discharges during the lean period.

When the discharge is large they carry enormous quantity of silt and sediment and spread them over the low lying areas which then inundate, deposit in the beds of the rivers themselves and choke them, carry some to the sea and deposit them in the continental shelf along the coast and the rest is spread further away from the coast in the shape of tongues or fingers pointing their tips towards the watch of no ground.

The quantity of silt carried by these rivers is enormous. It is estimated that over 2 billion tons of sediment are carried by these rivers annually to the sea.

Siltation and sedimentation at various places of the course depend upon many factors of which decrease in velocity of current, overburden of the load, differences in densities of water masses, wider areas in the estuaries and seas etc. are important.

Constant changes in river courses, changes in the shapes of their channels and their gradients are occurring as they flow over this flat alluvial deltaic plain.

Consequently erosion and siltation are constant phenomena which are bringing about morphological changes in the features and the general topography of the country.

Changes, environmental and consequently ecological, are the inevitable results from which some environmental hazards occur.

#### Navigation

Navigable rivers which are silted up cause hindrance to navigation. Many of the areas which were connected by river communication lines before have now become disconnected.

At the confluence of the Padma and the Jamuna at Aricha big motorized ferries which used to ply freely between the two banks are now often obstructed.

Many of the inland rivers have been choked up and many others have already dried.

In some cases, river mouths have been silted up and the rivers have become stagnated bodies of water changing to bils or swamps.

Again, because of the choking up of river beds and some being completely dried up, flood intensity has also greatly increased. Thus, areas which used to be normally not inundated have now become prone to floods; the environment has been totally changed.

During floods with onrush of water coarser materials are transported and spread over fertile agricultural land and reduce the fertility.

In some cases, by depositing only coarser sand, fertility is totally lost. The environmental hazards from siltation and deposition of debris are thus increased.

When excessive siltation occurs on one bank of the river, erosion tends to be aggravated on the other bank thus devouring habitable villages with fertile agricultural lands.

Environmental hazards from siltation, thus force migration of population and ultimately disturb the socio-economic equilibrium.

This is the indirect effect of siltation caused by erosion but in the newly-accreted lands habitation or cultivation of land is not readily possible.

In the sea, where the rivers discharge their major loads of silt and sediment, erosion and accretion are constantly going on. Thus, the insular and coastal environment is constantly changing there.

Accretion of new lands and loss of lands through erosion are constantly posing environmental hazards to the people of these areas.

Siltation poses socio-economic hazards too. In an area where formerly people used to depend on fishing, because of siltation of bils and rivers the people may change to other professions. Thus skilled fishermen may now take to unskilled jobs. This may be hazardous.

In conclusion, this may be said that hydrological changes occur in a cycle and one is related to the other. Only siltation is not a factor in causing physical changes in environment and causing hazards but a number of factors are interrelated and it is true that siltation is one of the important factors which poses environmental hazards.

#### Coastal Pollution

The extent of pollution in the coastal region of Bangladesh is still unmonitored. But to a first approximation it seems that pollution due to economic activities of man, both agricultural and industrial, has not as yet posed a great problem.

This is mainly because the pollution causing industries, for that matter industries in general, are not located in the coastal region. The estuarine region of the river Karnaphuli may be excluded from this general consideration. Possible reasons of pollution there have already been discussed.

Secondly, the concentration of the pollutants gradually decreases as the rivers flow on into the sea. This occurs generally through dilution and sedimentation effect.

Nevertheless bio-mass production in the estuarine region needs to be properly studied. Recently our study of "Carbon transport by the major rivers of Bangladesh," in collaboration with Hamburg University, F.R.G., indicates that about  $4 \times 10^{11}$  gms of carbon are carried to the continental shelf at a time of the year when conditions of bio-mass production are not favorable.

In other words huge amounts of carbon go into the sink--the sea--without being involved in the fixation process as useful bio-mass (phyto-plankton etc.).

Preliminary study also indicates that the biotic level in the Bay of Bengal in respect of dissolved oxygen is not uniform either throughout the year or area-wise. Before concluding our remarks in this regard, we would emphasize again that this vital area of economic benefit needs to be properly and objectively studied.

#### Remedial Measures

It is not easy to list all the remedial measures for environmental pollution. There is no single panacea. By now it should be clear that the problem of pollution is multidimensional; it has on one side socio-economic, legal and esthetic aspects and on the other hand there exist the chemical, biological, geographical and technological implications.

Therefore social awareness toward the problem of pollution is perhaps the vantage point from which one can think about possible solution.

Recently, feeble and haphazard attempts through television for creating this awareness are the only efforts that are visible. And that too in the context of air pollution in Dhaka City.

On a more comprehensive and extensive scale control of pollution from agricultural and industrial practice could be initiated on the following general lines.

(a) Popularize the use of more organic manure and put an end to the modern myth that agrochemicals are magic powders. Useful though they are, their indiscriminate use can be dangerously harmful to the environment.

This point should be impressed upon the farmers through simple but effective media work. Use of organic manure has an added bonanza of retaining the essential nutrients because of its inherent chemical properties.

Use of Nitrogen fixing azzola as green manure should be given serious consideration. China is already applying 200,000 tons equivalent of Nitrogen fertilizers through azolla culture and thereby protecting environment and saving at least 100 million dollars worth of agrochemicals. [as published]

The method is cheap and virtually requires no extra effort. On the technical side, we should devote some research and a little money for the development of bio-degradable and slow release fertilizers.

(b) It will not be easy to find a total substitute for chemical insecticides. But considering the pros and cons, the carbamate insecticides should be popularized while restriction on organochlorines should be immediately imposed.

Biological control and the use of juvenile hormones and sex attractants like pheromones and such other exotica are just beginning to seem practical and economic.

Nevertheless we should watch these developments keenly and if possible collaborate for field experiments.

(c) In the Industrial sector we are fortunate in one sense that industrialization has not as yet started in real earnest. So for the newly-set up industries, pollution control measures can be planned and installed along with the production process. That will be really putting the cart behind the horse and not before it, as did happen in many industries in the west.

Apart from this, some novel but natural pollution control measures can be given due consideration. One such possibility exists in water hyacinth.

This aquatic vegetation which grows extensively in Bangladesh has little economic value. And more often than not it is considered a nuisance, but this plant has a very high metal uptake capacity and therefore is potentially useful as an antipollutant.

One could go on mentioning such other possibilities fairly elaborately. But then the study of human environment with respect to pollution, be it riverine, coastal or otherwise, is so extensive that to explain the causes and the solution in one article and feel that all is told that should be told is frightfully frustrating.

What we have attempted in this article is just a bird's eye-view of a subject that is truly gigantic and has many ramifications.

We, in Bangladesh, occupy a small but a very verdant part of this globe and in keeping with the consciousness of a global society let us on our part keep it clean, that is environmentally. That will be good for us and good for Space ship Earth.

CSO: 5000/7027

## EGYPT

### DANGERS OF POLLUTION WITH PESTICIDES EXAMINED

Cairo AL-MUSAWWAR in Arabic No 3038, 31 Dec 82 pp 23-27

[Article by Sulayman 'Abd al-'Azim: "Danger of Use of Pesticides in Egypt; Foreign Pesticide Firms Use Third World Countries as Experimental Grounds for Their Tests on Pesticides and Their Effect on Man; There Has to Be Law to Protect Egyptian Citizen from Danger of Pesticides; Use of Pesticides in Egypt Has Led to Changes in Structure of Hereditary Materials [Genes] of Man, Animal and Plant; We Purchased 79,600 Kilograms of Galkron Pesticide and When Pesticide Was Proven Dangerous, We Returned 16,400 Kilograms to Company and Used Rest; So That Tragedy May not Recur, Do not Use Pesticides in New Societies"]

[Text] This report raises an extremely important issue, namely the use of pesticides in Egypt. The stunning admission made by CIBA, a Swiss drug company, that it had sprayed a number of unprotected Egyptian children with the Galkron pesticide, which is used to control the cotton pest, has exploded the issue.

After this experiment, the firm announced that there is a connection between this pesticide and cancer incident. Dr Tharwat Mustafa, the chairman of the CIBA Firm Crop Protection Section, has admitted to AL-MUSAWWAR that the firm had sold the Ministry of Agriculture 79,600 kilograms of this pesticide and that when the pesticide was proven to be dangerous, the firm took back 16,400 kilograms only and the Ministry disposed of the rest either by spraying [crops] or by destroying it! The issue of pesticide use in Egypt is an issue that involves numerous elements and entwined sides. Each element throws the blame on the others. The fact that raises its head amidst all these accusations is that Egypt has become an experimental farm for the pesticides of foreign firms. A total of 38,000 tons of pesticides are used in Egypt annually. So far, there is no law that defines the doses of pesticides (allowable) in crops and preserved foods. Some officials warn as of now against the use of pesticides in the new societies and in the reclaimed lands. The foreign pesticide firms resort to registering their products in third world countries, such as the Congo, and then introduce them into Egypt without the authorities concerned verifying their suitability for the Egyptian environment. Tens of other fearful facts have been gathered by AL-MUSAWWAR from several official authorities in Egypt in search of the truth in the issue of the use of pesticides in Egypt.

The Central Laboratory for Pesticides has tested three markets in al-Duqqi, al-'Atabah and Heliopolis. The test includes analyzing samples of fresh and canned fruits and vegetables offered for human consumption. The purpose was to measure the degree of the contamination of man's food with pesticides. The results proved that the contamination degree amounted to 30 percent [sic]. This was the first and last test for the past 4 years and it has not been conducted again despite the increased use of pesticides in Egypt year after year.

The issue has raised numerous questions, beginning with the question of how the contamination has reached this disturbing level and who is behind it and ending with the position of the people in charge.

The elements involved in the issue are numerous. However, they are united in the fact that each blames the other. A group blames the farmer for not knowing how to use the pesticides, another group hangs the bell around the agricultural guidance's neck for its absence from the agricultural sphere and a third group screams, saying that Egypt has become such an experimental farm for the use of the pesticides produced by foreign firms that 38,000 tons of pesticides costing nearly 65 million pounds paid by the Ministry of Agriculture to import this quantity are used in Egypt annually.

The issue does not end here. Three million children and youths gather at the beginning of every April to roam 1.5 million feddans of land every 3 days during which they pick off several billion boll weevils, each of which contains 50-1,000 eggs.

The question that imposes itself is: On what side does victory stand in the struggle between man and the pest that devours his livelihood?

AL-MUSAWWAR has sought the answer to this question and the questions preceding it in numerous scientific places: The Central Pesticides Laboratory, the National Research Center, the agricultural colleges, the Cancer Institute, the Agricultural Research Center and the Ministry of Agriculture experts.

What does each of them say?

What Do Officials in Charge of Pesticides Center Say?

To start with, Dr Mahmud Muhammad al-Sayyid, the director of the Central Pesticides Laboratory, says: Each September, 3 scientific and technical committees study and test the pesticides used in Egypt for the degree of their harm, beneficiality, toxicity, durability and the residues they leave behind. Should argument develop over the usability of a certain pesticide, the Pest Control Committee meets immediately and its members begin comparing the benefits and harm of this pesticide and consider whether there is an alternative pesticide or not. In case no alternative, the decision depends on whether the scales are tipped in favor of the benefits or of the harm. If there is no available alternative, we are compelled to use the pesticide

cautiously, as in the case of (Demlin) which prevents the development of the larvae in the boll weevil. International arguments have arisen, confirming or denying that this pesticide causes cancer even though there hasn't been a single proof to the effect. Even though the U.S. Environmental Protection Agency continues its research and studies on this pesticide and even though the agency's final verdict on the pesticide will not be issued until 1984, we are still using it.

Dr Mahmud al-Sayyid adds: Very regrettably, the farmers cultivate vegetable and fruit crops amidst the cotton fields. This is extremely dangerous to the health of man and of animals because cotton pesticides are characterized by a high degree of toxicity.

But why don't we look for means of control other than pesticides?

Dr Zakariya al-'Aqqal, the head of the pesticide products research section at the Plant Protection Research Institute, says that we should use the pesticide after all the other means of manual, agricultural and biological control fail. But what happens is that we follow the wrong system of pest control. We are still using (Andirin) even though most countries of the world have stopped using it, especially since we have ascertained that its traces have been found in the soil 17 years after it was used and even though there is an alternative with limited side effects.

Dr Zakariya al-'Aqqal adds: So that the tragedy may not recur I warn against the misuse of pesticides in the new societies and the reclaimed lands so that this virgin environment may not become polluted.

Dr al-'Aqqal also demands that a register be established to record and observe the pesticides in use so as to shut the door in the face of the foreign pesticide-producing firms which register their products in the Congo and other countries and then introduce them into Egypt before the authorities in charge ascertain their suitability for the Egyptian environment.

Dr al-'Aqqal wonders: How can there be no law defining the doses of pesticide allowed to remain in crops and preserved foods whereas the U.S. law does not permit the presence of any trace of D.D.T. in dairy products, even though the internationally permitted level is 7 parts per million. In Egypt, a high level of (Andrin) exists in the vegetables and preserved foods--a level that is manifold higher than that permitted in Europe and the United States.

He further adds: The cotton pest infestation rate in the past 3 years did not require the Ministry of Agriculture to spray the crop with the enormous quantities of pesticides the ministry has used, especially since cotton pesticides constitute nearly 70 percent of the total amount of pesticides [used in the country] and since every single cotton spraying throughout the republic costs more than 12 million pounds.

## They Adulterate Pesticides

A complaint is always raised about the ineffectiveness of the pesticide. This is a constant complaint by the farmers. Dr Nabil Zaki Sulayman, the head of the pesticide analysis research section of the Agricultural Research Institute, conducts a chemical analysis on samples of the imported pesticide to verify its compatibility with the specifications set by the Ministry of Agriculture and the World Health Organization. A total of 5,000 samples are collected by representatives of the section in all the governorates and are sent to the section before the pesticide is used. The section excludes the pesticides proven to be damaged due to long storage, to poor storage or due to being adulterated by some agricultural engineers. The section's work is not confined to just analyzing the imported pesticide but extends to include the local pesticide, produced by a single Egyptian company. When we determine the pesticides that fail to comply with the specifications, we notify the Alexandria Customs Authority of the extent to which the samples comply with the specifications and requirements and supply the authority with an official certificate to the effect. At the same time, we notify the minister of agriculture and the ministry undersecretary for pest control affairs. Thus, no unsuitable pesticide can enter into Egypt without the official certificate.

## Egyptian Soil for Foreign Pesticide Testing

Dr 'Asim Muhammad 'Ali, a professor of microbiological and chemical heredity at the National Research Center, believes that the technological progress in the advanced world has led to the occurrence of a chemical pollution whose fearful effects appear in the developing countries, including Egypt, and whose dangers are smaller in the rich countries.

Dr 'Ali asserts frankly that the use of pesticides, chemical fertilizers and other substances in Egypt has reached the extent whereby Egypt can be considered an experimental farm for testing pesticides. This large-scale, and indiscriminate, use of pesticides in Egypt has caused changes in the structure of the hereditary substances [genes] of man, animal and plant, thus leading to the occurrence of abnormal mutations, in addition to abnormal embryos and cancer of all sorts. What makes the problem more difficult and complex is that when the components of a pesticide enter the body of a living organism, their traces remain in the body or turn during the photosynthesis process into other compounds that may be more harmful to man's health, causing him to develop cancer. Not only this but, moreover, the interaction of these compounds with each other, if they are varied, and their interaction with the other living organisms leads to the creation of more harmful substances. The cancerous effects of pesticides are not confined to the presence of the pesticide in high concentrations but can also result from low concentrations.

The solution lies in developing rapid and inexpensive methods to determine the impact of the numerous chemicals introduced into the Egyptian environment every year.

Dr Muhammad 'Abd al-Jawad 'Azzazi who works at the land and water utilization laboratory of the National Research Center warns of the danger of the increased use of pesticides by farmers to spray their crops because the danger of the pesticide lies in its impact on the physiological processes of the plants and minute living organisms present in the soil and responsible for enhancing its fertility.

Scientific research confirms that the effective substances in the pesticides are organic substances with a long chain of carbonic compounds that affect the activity of the microbes found in the soil for a limited period of time. The microbes (stabilizing the lancpholic nitrogen in the atmosphere) are the ones most severely affected by the damage caused by the pesticides in the early stages of spraying. In case the microbes succeed in breaking down the components resulting as a residue from the use of the pesticide, then the outcome is in the interest of the farmer because another source is thus added to the capability of the soil microbes--a source that enhances their productivity. But in case there are no active and effective microbes in the soil, the inevitable result is the accumulation of the pesticides' chemical compounds. Consequently, the soil loses its fertility, vitality and qualities.

Regarding the danger of the pesticides to the soil, Dr Sa'id Badr al-Din says: Scientifically, we cannot speak of the harm of pesticides without the presence of a scientific field study proving the presence or non-presence of such harm. I have studied the impact of pesticides on some of the soil's biological and chemical qualities. I selected a group of pesticides including (Cotran, Tami, Drosian and Zenith) and have found out that these pesticides have damaging effects on the soil microbes, especially the microbes connected with the soil's fertility. I have also discovered that these pesticides frustrate or reduce some vital processes in the soil, such as the transformation of nitrogen. This is in addition to their weakening the soil's enzyme activity. Despite this, pesticides are still used in Egypt.

#### It Is Required to Protect New Lands

If this has happened in the old cultivable lands, then what should be done in the new lands?

Dr Ahmad 'Abd al-Wahhab 'Abd al-Jawad, the professor of environmental pollution at the Mushtahir Agriculture College, says that 70 percent of the pesticides which the Ministry of Agriculture imports from Germany, the United States, France, Britain, Switzerland and Japan, estimated at 38,000 tons [annually], are used to control the cotton pest. Cotton is cultivated in an area of 1.2 million feddans.

This urges me to warn the agriculture officials in Egypt not to let the newly reclaimed lands in the new societies to be "exposed" to the same thing that has happened to the old lands.

We must avoid some pesticides which stay on the surface of plants for long years, as has happened in the old lands, and must use instead alternative pesticides whose traces stay for a few days only.

We must avoid polluting the new agricultural environment as we have polluted the old agricultural environment where 370,000 metric tons of pesticides were used in the period from 1961 to 1975.

Dr Ahmad 'Abd al-Wahhab adds that scientists have found the traces of pesticides in the milk of [nursing] mothers. This will have an impact on the coming human generations. Moreover, it has been proven that despite the precautions taken and laws issued by the advanced countries to curtail the pollution of air and water with pesticides, the traces of the pesticides can be transported from one country to another country that doesn't use them. An example of this is that British scientists have found that rain-water is polluted with the residues of pesticides never used in England. It has also been proven that the residues are also transported by way of foodstuffs, such as meats, fish, fruits, vegetables and dairy products when imported from other areas. Considering that plants are living organisms and that pesticides are considered, scientifically, poisons, then the part most vulnerable and sensitive to the pesticide is the minute roots. Moreover, some sensitive plants, such as broad beans and tomatoes, [of studies] have proven that the root of some plants does not exceed one centimeter in length whereas this root reaches 18 centimeters in [the same kind of] plant when treated with pesticides.

It has been proven by decisive evidence--evidence that has not been refuted by scientific research throughout the world--that when using pesticides to control weeds, bugs, (acarosa) or nematoda, the pesticide traces reach the fruits or the seeds. The degree of contamination varies according to the pesticide used, the quantity applied, the type of soil involved and nearly 33 other factors. Consequently, it may seem that some plants do not contain traces of pesticides. But under all conditions, the traces are found in all fruits and seeds, even if the pesticide cannot be dissolved in water. The most immediate example of this is D.D.T. Moreover, there are numerous cases which confirm the presence of the traces in canned and preserved foods despite the temperature factors undergone by such foods during the canning or preservation process. Usually, the advanced countries set a minimum [presumably meaning maximum] limit for the allowable residue levels of any pesticide in any foodstuff. The research laboratories of these countries collect samples of such foods before they are marketed to determine the allowable levels. If the [pesticide] concentration reaches a high level exceeding the permissible level, the foods are destroyed immediately. This is not done in Egypt yet.

The solution is extremely simple, according to Dr Ahmad 'Abd al-Wahhab. Instead of having the Ministry of Agriculture spray all the cotton fields 4 or 5 times a year, the infested areas can be determined and sprayed, thus reducing the pesticide volume used. Consequently, the pollution caused by the pesticides can be reduced. The means used to determine the infested areas is a modern technological means called remote sensors.

But has the Ministry of Agriculture made sure that the imported pesticides are registered in the countries where they are produced so that there may be no place for tampering with these toxic and important products?

Dr Mustafa 'Abd al-Sami' al-Harawi, the head of the section that determines the toxicity of pesticides to mammals at the Central Pesticides Laboratory, replies that any pesticide used by Egypt is supposed to be registered in the producing country and to have been in use for a period of time in another country. However, we are still using numerous pesticides even though they are not registered in their countries of origin. Another source of danger is that no research has been conducted so far on the imported pesticides to determine their effectiveness against various pests and to set the levels at which they should be used under the Egyptian conditions. Moreover, no tests have been conducted to determine the extent of their impact on man and animal, the level of their stability and concentration in the soil and the level of their residues on fruits and vegetables after they are used.

But why haven't such tests been conducted yet?

Dr Mustafa al-Harawi answers that the reason for this is that we are compelled, as a result of the country's urgent need to use a certain pesticide at a certain time, such as cotton pesticides, not to conduct the tests even though the harm of the pesticides may exceed the benefits we reap from using them. Added to this is the fact that the cost of analyzing a simple pesticide sample is 70 pounds. This cost is an obstacle in the face of conducting these analyses.

Dr al-Harawi believes that the use of aircraft to spray pesticides in Egypt is unsuitable because there are no separating borders between cultivable lands, populated areas and livestock corrals. This kind of spraying leads to catastrophes and to constantly intensifying environmental pollution because man's food, air and whatever he uses is exposed to pollution.

Pesticides cause cancer by varying degrees, with the disease appearing at various speeds, depending on the degree of the individual's susceptibility to the disease. Egypt is considered one of the countries susceptible and prepared to develop the disease very fast, especially in the countryside where more than 80 percent of the population is afflicted with bilharzia which makes it extremely easy to develop cancer, particularly liver and bladder cancer. What is strange about these 2 types of cancer is that not only one or 2 generations are affected but that the effect of the pesticide dose used at present may extend to the third and fourth generation.

The (pyrothroid) group is the latest in the world of pesticides. It is considered the fourth generation of pesticides. So far, the world has not found a means to eliminate this group of pesticides and the Ministry of Agriculture has been using spraying aircraft and ground pumps to spray the pesticides. These pesticides are sold in numerous places spread throughout the rural and urban areas, exactly like cigarettes and groceries.

This is not all. Matters have gone beyond to the use of pesticides which the entire world has discovered, after using them, have a harmful impact. Yet, Egypt stands waiting for the "official order" to stop using them.

#### Our Livestock and Fish Wealth Is in Danger

If the 1960's witnessed a constant rise in the use of carbo-hydrogen pesticides and if the pests gained immunity against them, the 1970's were the period in which the phosphoric fertilizers, considered the most dangerous of all pesticides, flourished.

Those pesticides affects the livestock and fish wealth, according to Dr 'Adil 'Abbas, the head of the parasites and animal diseases laboratory of the National Research Center. If the livestock and fish are exposed to small doses of the pesticides for a long period of time, the residues of the pesticides accumulate in the animal tissues, without symptoms of the disease showing at the beginning. But when this accumulation reaches a certain level, the side-effects begin, depending on the type of pesticide, to show in various forms, such as inflammation in the animal's liver, the development of cancer and malignant tumors or chronic poisoning.

Dr 'Adil 'Abbas adds: There is another direct effect caused by pesticides to the livestock wealth. It is well known that livestock's ideal feed is green fodder which is usually loaded with pesticide residues. This explains to us the phenomenon of perishing livestock in some governorates. There is also a major danger threatening our fish wealth. This danger is embodied in the farmer's dumping of pesticides in the water canals and ditches, thus causing the poisoning of fish. Moreover, some fishermen use pesticides to catch fish which float on the surface of the water [after they are killed by the pesticide].

If the rate of contamination in man's food, including fruits, vegetables and canned foods, has reached 30 percent [sic], then has this rate risen above what it was 4 years ago?

Dr Husni al-Sawwah, the head of the food health research at the Veterinary Laboratories [Department], says: We make it conditional that preserved foods, vegetables and fruits be completely free of any traces, regardless of how small, of pesticides. But what is our fault if the farmers disregard this, either out of ignorance or out of their wish to take quick advantage embodied in harvesting the crop and marketing it as quickly as possible?

The high-cost pesticides are characterized by a high degree of safety reaching 3,000 degrees, meaning that their toxicity is low and causes no danger if man or animal come in touch with them. The opposite goes for the low-cost pesticides.

Dr 'Abd al-Basit al-'A'sar, the professor of cancer biology at the National Tumors Institute, says that one of the characteristics of carcogenous

substances, which are numerous and include pesticides, is that their effect is not always accompanied by symptoms of sickness, such as poisoning and other symptoms. This is why man cannot obviate the situation at the right time by avoiding the source of cancer. It is in this particular point that the danger of these substances lies because, even with very low concentrations, they can affect the natural course of the cell, causing it to swerve from the natural and normal process of cell division. This may be the result of either direct or indirect impact on the cell components, especially the (amino-acid) which regulates all the cell's activities, carries its hereditary characteristics and regulates its division rate. The cell begins purposeless division and this biological change results in a change in the task of the cell itself. The cell may lose the task for which it is created and turns into a cell on the early path of mutation and of becoming a malignant cell that ultimately kills the patient.

I am sorry to say that Egypt's pollution level is one of the very high levels when compared to other countries of the world. We still don't know when to use a pesticide, how to use it, the quantity to be used and what precautions to take in order to insure safety when using the pesticides.

I have seen how those who spray the pesticides cover their faces with protectives masks or use gloves to protect their hands because they are exposed to severe dangers and because these substances have the characteristic of penetrating the skin into the body. This is why pesticides must be used within the narrowest limits, considering that they not only pollute the environment but also cause liver and bladder cancer to man. An example of such pesticides is the acetylaminoflorin whose production has been stopped. Now that we have warned that smoking causes cancer, then pesticide packages must bear similar warning.

Dr Mahmud al-Marzabani, the professor of tumor biology, says that the danger of the pesticides is embodied in the direct exposure of those suffering from bilharzia to their effect and, consequently, their developing cancer. Medical research has proven that the capability of a liver infected with bilharzia to get rid of toxic substances is 20-80 percent less than that of a healthy liver, depending on the chemical used.

Why don't we do what Germany does, namely not use any pesticide before it has been used in its country of origin for a period of 2-3 years so as to guarantee that Egypt is not turned into a testing ground for the pesticides of foreign firms.

Because the Egyptian farmer does not know how to use the pesticide in an ideal manner and doesn't know where and when to use it and because he still cultivates vegetables and fruits within the cotton fields, we have had to interview the officials in charge of agricultural guidance.

Dr Ahmad al-Rafi'i, the director of the Agricultural Guidance Research Institute of the Ministry of Agriculture says that some people will perhaps think that my opinion is biased because I have been serving in the field of

agricultural guidance all my life. However, I will say that agricultural guidance is always the "hanger" on which the mistakes of others are hung. The majority of the farmers know a lot about the various kinds of pesticides and the methods to use them and there is no doubt that the source of this knowledge is the agricultural guidance. If there are relatively few mistakes, they always appear in an exaggerated manner. If the performance rate amounts to 99 percent and the mistakes to one percent, the error percentage will appear much bigger than it is.

I admit here that agricultural guidance has reached only 50 percent of Egypt's villages and that there is no actual interaction between the farmer masses and the guidance agencies. I also admit that not everybody working in the guidance field is up to the proper level of performance and skill. We encounter a major problem in our field of work for the following reasons:

Five percent of the farmers do not respond to us. We call them the "fossilized ones" and they prefer their personal experiences to our scientific agricultural expertise.

Five percent of them respond to us quickly and we call them the "innovative ones."

Nearly 40-45 percent of the farmers do not apply the agricultural guidance directions until the innovative begin carrying out our directions and recommendations. We call these farmers the "early adoptees."

As for the rest, ranging from 40-45 percent, they apply directions only if they see the results immediately.

#### When Will Egypt Get Rid of Imported Pesticides

The question is: When will we establish the controls and laws that make the use of pesticides beneficial to us? When will we get rid of the domination of the foreign pesticide firms over agriculture in Egypt?

Dr 'Abd al-Latif 'Isa, the expert on pests in the Ministry of Agriculture, answers that there is only one pesticide company--a public sector company--in Egypt, namely the Kafr al-Zayyat Pesticides Company. It is not a producing company, considering that it only imports the raw materials and mixes them together. This is why the company has tried to reach agreement with foreign firms to manufacture the imported pesticides [locally]. The Egyptian company has made numerous such attempts but has been turned down constantly by the foreign firms.

It is true that pesticides are one of the main elements in environmental pollution, especially under our local circumstances. But at the same time, we cannot do away with pesticides. They are an "inevitable evil." This creates a difficult equation. To overcome this dilemma, we must move in 2 directions simultaneously: The first is to find alternative means of [pest] control to replace pesticides or to reduce their use. An example is found in changing the corn cultivation dates from the Nile flooding time

to summer time, a change which has enabled us to avoid the problem of loss in the corn crop. This measure led in the past to reducing the area treated annually with pesticides from 700,000 feddans to no more than 1,000 feddans. Moreover, the corn crop nearly doubled in volume as a result of this change in times.

The second direction lies in avoiding as much as possible importing unsafe pesticides and in having the Ministry of Agriculture educate the farmer as to the method and means of use, the right doses and the right time with the aim of reducing pollution.

Concluding this report, AL-MUSAWWAR has one more question which may seem strange for the first instant whereas it is in fact very logical, namely: Have the pesticides won their battle against pests that they may enter into a battle with man?

[Box on Page 25] Chairman of Pesticide Pollution Section of Cairo Agriculture Says: Three-Year Tests Have Proven Success of Galkron in Destroying Eggs of Cotton-Leaf Boll Weevil

Dr Husni Salamah, the chairman of the Pesticide Pollution Section of the Cairo Agriculture College, says that the Galkron pesticide has passed through 3 stages of testing, each lasting one full year. These tests were conducted for the pesticide before it was marked commercially in Egypt. The first stage consisted of field and laboratory tests. The tests conducted in 11 experimental stations throughout the republic were successful. The second stage was the stage of chess squares testing. These tests were conducted in 8 stations, each divided into small plots of one-quarter feddan each to insure the full similarity of field conditions so that the results may be more realistic. The third stage was the semi-expansion and expansion stage. The tests, lasting 3 years, proved the success of Galkron in destroying the eggs of the cotton-leaf boll weevil. The Ministry of Agriculture purchased large quantities of the pesticide to spray 1.25 million feddans cultivated with cotton only once. The spraying was actually done and the CIBA Firm asked the ministry in September 1976, at the end of the cotton season, to withdraw the remaining quantities of Galkron controlled by the ministry and to send them [back] at the firm's expense. Galkron was not the first pesticide to be withdrawn from the market. Other pesticides had been withdrawn for various reasons and because they were proven to have ill effects, such as causing paralysis.

It has been proven that if all of Egypt's population, amounting to 45 millions, were exposed to a certain dose of Galkron for a period of 1,500 days, the likelihood of the occurrence of cancer tumors would be one person per 5 millions, meaning that 9 or 10 persons out of Egypt's population would develop cancer as a result of exposure to this pesticide.

CIBA Firm took a courageous stance when it asked that Galkron be put out of circulation. A number of firms whose tests had proven that their pesticides

have carcogenous effects on man asked that their products be withdrawn only after the passage of long years on their use.

Dr Salamah has also said: We purchased large quantities of Galkron enabling us to spray 1.25 million feddans cultivated with cotton only once. I supervised the experimental station of the agriculture college which conducted the tests on Galkron and there was no proof at the time that Galkron has side effects such as cancer.

[Box on Page 26] CIBA Official: We Have not Supplied Egypt With Single Liter of Galkron Since 1976

Dr Tharwat Hasan Mustufa, the head of the Crop Protection Section of GIBA (Gaigi), a Swiss firm, has stated that Galkron was not in the experimental stage in 1974 and 1975 and that that period witnessed commercial demand for the product because it had been proven effective against pests, especially the cotton-leaf boll weevil. The Ministry of Agriculture and the Egyptian colleges of agriculture also conducted preliminary tests on this pesticide which proved its success in wiping out boll weevils.

Dr Mustafa added: This pesticide was developed and marketed as of 1966 but had been used as a pesticide for a type of spider called (Ocarus). In 1974, the firm's scientists and researchers discovered a new quality in this pesticide, namely its effectiveness against the cotton boll weevil. As a result, it was used by the United States and also by the Egyptian Ministry of Agriculture which expanded its use when it faced a shortage in agricultural labor. The company offered to conduct a preliminary test on the pesticide in Abu Hummus area of al-Buhayrah Governorate. It used spraying aircraft to spray large areas with extremely small quantities and the test proved to be successful.

Dr Mustafa has also noted that the ministry decided to conduct some research and to continue the testing in order to find out the residual traces of the pesticide in adjacent fields, water and canals. Some medical tests were also conducted on the workers in the areas exposed to the spraying. Those tests proved that there was no change in the workers' health condition.

Dr Mustafa has further added that the tests conducted on 10,000 feddans in Abu Hummus area during the 1976 cotton season included various kinds of pesticides. There were no children in the area and the tests were supervised by the Ministry of Agriculture and veterinary doctors. Engineer 'Abd al-'Azim Abu al-'Ata, an ex-minister of agriculture and irrigation, inspected the area and found no incidents [of contamination]. The tests on Galkron were so encouraging that the Ministry of Agriculture decided to purchase large quantities of the pesticide.

He has further noted that the outcome of the tests was recorded in two directions: The effect on pests in the 10,000-feddan area and, second, the effect on those exposed to this pesticide and to others. The results were very normal during the tests. But in 1976, new research conducted by

the firm's laboratories in Switzerland proved that cancerous tumors had developed in mice injected with a daily dose of the pesticide for a period of 15 months. Dogs and rats subjected to the same test were not affected by the pesticide.

Dr Mustafa further said: When the firm found out that Galkron had effects on some laboratory animals but not on others, it decided to stop its use and notified the Egyptian Ministry of Agriculture of the decision. The firm also expressed its willingness to take back the remaining quantities of the pesticide which the ministry had and to pay for them. The ministry returned the remaining quantities to the firm so that it may conduct new tests on them at its headquarters in Switzerland.

Dr Mustafa has pointed out that the firm did not receive from the Ministry of Agriculture the entire quantity which the ministry had purchased. We only received the quantity that was still tightly sealed. The quantity purchased by the ministry was 59,600 kilograms, of which the firm took back only 16,400 kilograms. The ministry used part of the remaining quantity in the experimental field and destroyed the rest. Since 1976, the firm has not supplied Egypt with a single liter of this pesticide even though it obtained in 1978 the approval of the U.S. Environmental Protection Agency and of the World Health Organization for the use of Galkron. The firm has not tried to use the pesticide in Egypt because its use requires some precautions that are impossible to make in Egypt.

Galkron was registered in Switzerland in 1966 as a spider pesticide. It was also registered internationally in the United States. Because there is no cotton cultivation in Switzerland, it was registered abroad as a cotton pesticide. It is now in use in the United States, Israel, Pakistan and India. The firm further developed the pesticide last February, producing new compounds that allow its effective substance to be released on the surface of cotton leaves but not on man's skin. This has made it possible to prevent the pesticide's effective substance from causing any cancerous harm to man. An expert in the firm offered the Ministry of Agriculture the pesticide in its new form but the ministry officials have expressed their reservations on the offer.

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CSO: 5000/4604

## ENVIRONMENTAL CONGRESS SEMINAR OPENS IN DELHI

New Delhi PATRIOT in English 29 Dec 82 p 12

[Text] The breakdown of environmental infrastructure the world over cannot be arrested unless there is a radical change in the world and domestic economic patterns, leading environmentalists urged at a seminar in the Capital on Tuesday.

Addressing the three-day seminar of the Indian Environment Congress Association, United Nations Environment Programme executive director Dr M K Tolba pointed out that while the demands of a minority of rich nations to squander away their environmental wealth, the poorer countries, paradoxically, were forced to exhaust the resources on which their prosperity and even survival depended.

Simultaneously, Dr Tolba pointed out, the wasting of resources, which were not always renewable had begun to destabilise the world economy. The gradual depletion of natural resources, he said, was a fundamental, though unrecognised cause for the world economic depression.

Pointing out that even the industrialised rich nations could not remain unaffected by 'an environmentally induced eco-

conomic collapse' in the developing world, Dr Tolba emphasised that there was a need to adopt a just, less consumptive economic order and to restore the balance between man and environment.

Dwelling on the achievements in environment protection over the past decade after the Stockholm conference, Dr Tolba said the world now was even further away from those goals.

Quoting a barrage of dismal statistics, Dr Tolba pointed out that tropical forests were disappearing at the rate of 12 million hectares every year. Worldwide, an estimated 70,000 sq km of prime agricultural land had been lost to the march of cities.

While several Governments expressed concern over the deteriorating environment, Dr Tolba deplored that this had not been accompanied with the readiness to put adequate means at the disposal of UNEP for solution.

In the Indian context, Deputy Minister for Environment, Digvijay Singh pinpointed three of the most pressing environmental problems for India—depletion of fire-wood used as fuel in rural areas, increasing pressure on grazing lands by large number of domestic animals and water

pollution.

Mr Singh noted that many of India's environment problems were attributed to under-development, and that these would assume more serious proportions if development was not made commensurate with basic human needs.

Calling for a movement of 'economic ecology', renowned scientist and director-general of the International Rice Research Institute Dr M. S. Swaminathan said that the long-term implications of the depletion of natural resources were being overlooked in favour of immediate gains.

He urged stepping up research activities in fields like erosion control, developing means to ensure survival of young saplings, watershed management and breeding of quick fuelwood species, like bamboo.

Dr Swaminathan who is also president of the Environmental Congress Association said, there was often a "mismatch" between the rigid attitudes of the bureaucracy and the flexible requirements of local problems. He said there should be a greater flexibility in project formulation and implementation so as to achieve the quickest and best results in varying circumstances.

CSO: 5000/7026

EXTENT OF DEFORESTATION IN WESTERN GHATS TOLD

Madras THE HINDU in English 22 Dec 82 p 11

[Text]

CALICUT, Dec. 21.

A recent study conducted by the Zoological Survey of India here reveals the appalling rate at which forests are cleared in the Western Ghats.

According to Mr. G. Unnikrishna Kurup, officer-in-charge, ZSI, Western Ghat regional station, it is estimated that half a square kilometre of forest is being cleared every day. In the period from 1943 to 1970, when maximum deforestation took place, an average of 69 sq. km. of forest was cleared a year causing 20 per cent of the State's forests to disappear. In neighbouring Karnataka, which contains an important section of the Western Ghats, the rate of forest loss was 113 sq. km a year,

amounting to eight per cent loss for that State.

At this rate, it is estimated that forests in Western Ghats could be wiped out in a mere 125 to 150 years, assuming no increase in the rate. But the trend so far has been for the rate to double itself in 20 years, and if this trend is allowed to continue, Western Ghats forests will last only for another half a century, says the survey report.

The major causes for deforestation are expansion of plantations, creation of hydro-electric and other developmental projects and encroachment by settlers. Kerala leads in these respects. It has the largest percentage of forest area under plantations, 33 per cent, compared to eight per cent in Karnataka.

CSO: 5000/7024

## HARYANA SAID TO FACE SALINITY IN 50 YEARS

New Delhi PATRIOT in English 27 Dec 82 p 10

[Text]

Haryana is likely to encounter an unmanageable saline ground water problem in another 50 years if corrective action is not taken immediately. UNI quotes Dutch experts.

A team of Dutch experts has undertaken three related research projects in the field of soil salinity, drainage and energy components.

According to them, the salinity problem in Haryana is getting worse because of more irrigational water being brought into use. Already 30 to 40 per cent of Haryana is affected by salinity.

They explained that Haryana is like a bowl. The outflow of the water accumulated during the monsoon is limited. When more and more of river water is brought in for irrigation, the salinity problem is accentuated.

The Dutch experts, who are experienced in tackling the problem of soil salinity in the Netherlands, are of the view that through vertical and horizontal tube drainage the problem of salinity could be dealt with.

The Dutch experts are also exploring the possibility of creating an artificial lake with

the pumped out saline water for growing shrimps. Another possibility of utilising the saline water is to produce salt from it.

The problem is not unknown to Indian experts. The agricultural university in Hissar and Soil Salinity Research Institute in Karnal are already doing research in this field.

Another research project in which the Dutch experts are involved is the area development in Kuttanad in Kerala and the Tarai region.

The conditions in Kuttanad are identical to the Netherlands. The Kuttanad area has to be protected from floods by raising bunds and dykes. With the experience the Dutch experts have in handling low lying lands, they want to study the water balance and the quality of water for drinking purpose and agriculture use.

In the Tarai region of Siliguri, Cooch Behar and Jalpaiguri, in West Bengal, the Dutch experts will assist in minor irrigation and soil improvement schemes.

Two Dutch expert teams have recently visited Kerala and West Bengal. Some of the Indian experts also visited the Netherlands to study their projects.

CSO: 5000/7025

# IMPACT OF DROUGHT IN LEBOWA, GAZANKULU DESCRIBED

Johannesburg THE STAR in English 13 Jan 83 p 2

[Articles by Jon Qwelane: "Drought Stretches the Work Lines"]

[Text] It is early morning on a weekday, and already there are hundreds of people queueing at the tribal offices at Matoks Village in Lebowa. Many are men — aged from the early 20s to the mid-40s.

Though it is still early the heat is already unbearable, and the queues snake their way to whatever shade is available.

It is January, when many migrant labourers renew the permits which will enable them to work for one more year in the cities and bigger towns of the Transvaal.

Of greater significance, says tribal elder Mr William Phosa, is that many of the men are seeking them for the first time.

He explains that these are victims of the drought — the worst the village has experienced in living memory.

It is the first time the fields have not been ploughed, and the first time that livestock have died in such great numbers.

The Dwars River just outside Matoks village is where all the livestock amble to seek refuge from thirst. Ironically, the dry riverbed is where many of the animals have died.

The vegetation round the village is thornbrush, cactus, and tufts of tough grass — which is sparse.

In the Gazankulu homeland the drought has been at its most severe.

Individual tribesmen have lost hundreds of animals. The reality of the situation is obvious as soon as you enter the capital, Giyani.

Carcasses of donkeys litter the sides of the main road, and deeper in the homeland the situation is best described in the words of a public servant: "Terrible and sad."

So desperate have the cattle become that many can be seen nibbling at sisal plants along the roadsides.

Sisal is a tough plant whose fibres are used for

making canvas, and it is normally not eaten by cattle.

The fields have not been worked and villagers say that even if rain

comes now it is too late for them to do anything before winter arrives.

Mr M S Malungane and Mr Maxon Hlongwane are among the villagers hit hardest by the drought. Each has lost more than 200 of his animals and has few left.

Residents in many of the Gazankulu villages carve up the carcasses of the dead animals and eat whatever flesh there is.

Mrs Mamaela Hlongwane, sitting in the shade of her mud hut, was carving up the head of the latest of her husband's cows to have died.

She said that with the cattle diminishing fast, she did not know what the future was for her village.

Miss Dolly Malungane looked at a truckful of hides which her father had collected over the veld in the past few days

— hides from some of the more than 200 of his cattle which have died.

Julian Baloyi, a well-known medicine man in the homeland, and well informed because of his many clients, said many had told him they had lost hundreds of their beasts and were still los-

ing them.

"Some have taken their animals to the Balobedu Mountains in the east, the territory of Modjadji IV, the Rain Queen, because a little rain has fallen in her area and the grazing has improved.

"Those who cannot take their animals there just have to hope for the best," he said.

Many cattle were seen lying by the wayside, alive but unable to rise. They had endured enough, and were now resigned to the slow and agonising death that is certain to come in days

— or a few hours.

Many rivers have gone dry and villagers obtain their drinking water by digging the sandy riverbeds and waiting for water to seep through.

It is an exercise which demands patience, but there is no alternative.

The mountains of the Rain Queen at Modjadji village, named after her, are green with vegetation. And the grass grows greener, though not yet in any abundance.

The Queen herself may not be seen by any outsiders unless permission is granted by the magistrate at Duiwelskloof.

One of her subjects, driver Mr Gabriel Sethaba, said that even the valleys between the mountains that had some rain had been affected by the drought and cattle were dying there.

Since the rains a few weeks ago the position had changed.

## Horror Tale of the Pastures

Black livestock owners in Lebowa and Gazankulu, two homelands in the Northern Transvaal, have lost hundreds of cattle and many donkeys as a direct result of the drought and stand to lose many more if the rains do not fall soon.

Many fields in reserves and settlements have not been ploughed.

In many villages visited by The Star in the two homelands the story was the same: overburdened pastures coupled with very poor grazing resulted in the animals starving, and the scarcity of water was compounding the problem.

In Matoks, a village in Lebowa, situated along the Zimbabwe-South Africa highway, the Batlokwa tribe under Chief EL Machaka have not ploughed any of their many fields.

The carcasses of many cattle were found in the outskirts of the village, mainly along

the sandy bed of the dry Dwars River.

In one sandy area along the river eight carcasses were found in a stretch not more than 300 m long.

Chief Machaka said the Lebowa Government was providing boreholes. He added that it was the first time in his memory that his tribe had never tilled the soil and planted crops.

One of his tribe's elders, Mr William Phosa, said many of the tribe's livestock owners did not know exactly how many cattle they had lost because stock counts were not made regularly.

In Mogalakwena, a district to the west of Potgietersrust, many cattle and donkeys have died because of insufficient grazing and water, but many were on the path to recovery following slight rains a few days ago.

Villagers in Garmokgwathi, which bor-

ders Lebowa and Gazankulu in the east, said many of their cattle had died and they feared the toll would rise even higher if relief did not come immediately.

Gazankulu is by far the worst affected by the drought, and many fields have not been planted.

The roadside along the main way from Mooketsi, near Duiwelskloof, to the capital Giyani, is strewn with carcasses of animals, mainly donkeys.

Villagers in the many settlements said the toll in animal lives was very heavy, and in some instances hundreds of beasts had been lost.

Cafe-owner Mr MS Malungane, of Siyandhana Village about 5km from Giyani, has lost more than 200 head of cattle.

His daughters Dolly and Evelyn said their father had started collecting the hides and

bones of his animals to sell, and was now left with only several dozen cattle.

Mrs Mamaela Hlongwane and Mrs Mpepu Hlongwane, two wives of migrant la-

bourer Mr Maxon Hlongwane, said their husband also lost more than 200 cattle and was left with less than 10.

The story was the same in Sikhunyané, Dzumeri, Ditsusini and Shawela.

Mr Julian Baloyi, one of Gazankulu's best known herbalists, said many of his clients reported hundreds of cattle lost, and said many had taken the remaining beasts to the Balobedu Mountains near Duiwelskloof to seek refuge with the subjects of Modjadji IV, the Rain Queen, where pastures were better than elsewhere. A suggestion that Nkhensani Hospital in Giyani contained kwashiorkor cases could not be confirmed.

## BRIEFS

**DROUGHT AFFECTS ECONOMY**--South Africa's present drought could mean a negative growth rate for the economy in 1983, the director general of public finance Mr Joop de Loor, said yesterday. He told an agricultural outlook conference that the economic growth rate would remain very low because of the present international recession. "Here we have to add the destructive effect of the extensive drought which could easily depress in weakish growth rate into negative figures." Economists have predicted between a 1/2 percent rise and a one percent fall in gross domestic product this year after an estimated rise of 0.7 percent last year. De Loor said it was possible the drought would have more of an effect on the economy than a gold price increase would. Despite a slight improvement in exports, which would lead the next economic upswing, De Loor said: "We are not really at the real low in our economic cycle," but added this point could be reached before the end of the year. He said the country could have a small current account deficit of R940-million on an annualised basis in the third quarter of 1982, while economists have forecast a surplus of R600-million to R1-billion for this year, depending on the behaviour of the bullion price. De Loor also told the conference there would be no general salary increases for public servants in April this year. [Text] [Johannesburg THE CITIZEN in English 20 Jan 83 p 24]

**APPEAL FOR DROUGHT AID**--Pietersburg.--The Chief Minister of Lebowa, Dr C N Phatudi, has appealed for urgent financial aid from the South African Government as thousands of domestic and wild animals succumb to the drought in the national state.--Sapa. [Text] [Johannesburg THE CITIZEN in English 19 Jan 83 p 10]

**DURBAN WATER SUPPLY**--Durban residents could face water restrictions at the beginning of February unless heavy rains fall shortly? [as published] The circle engineer for the Department of Water Affairs, Mr K Munro, said yesterday water restrictions could be inevitable at the beginning of next month unless there were heavy downpours. The heavy rains earlier this month had done little to improve the water levels in the two dams supplying the city, the Midmar Dam and the Albert Falls Dam. Also a call on Durban residents to introduce voluntary restrictions on the use of water had shown no results, he said. If water restrictions were imposed residents would only be allowed to water their gardens on two days in each week for a period of four hours. There would be a complete ban on the use of hosepipes and

sprinklers. The last time water restrictions were enforced in Durban was in 1966. Water restrictions will come into force in the Pietermaritzburg area on Monday. [Text] [Johannesburg THE CITIZEN in English 20 Jan 83 p 8]

DROUGHT BROKEN IN MASHONALAND--Harare--Good rains fell in parts of Mashonaland this week and are expected to continue for at least the next two days, but other parts of the country have still had little or no rain. While most of the country had less than 10mm from 6 am on Sunday until 6 am on Tuesday, 83,8mm of rain fell at Harare airport, 73,5mm at Mhondoro, 34,3mm at Belvedere, and 30,4 mm at the Henderson Research Station. Chinhoyi had 17mm of rain. A spokesman at the meteorological office in Harare said the rain would continue for at least another two days, and the drier parts of the country could also expect some rain over the same period.--Sapa. [Text] [Johannesburg THE CITIZEN in English 20 Jan 83 p 11]

NATAL DROUGHT AGGRAVATED--Four scorching days of heat has aggravated the drought situation in Natal and it now appears that water restrictions have come to stay unless heavy rains fall shortly. Temperatures in most regions of the province and Zululand have been averaging between 35 and 38 degrees Centigrade daily. Yesterday the Biyala Farmers Association in Northern Zululand applied to the Government to declare the area drought stricken. Mr L de Jager, chairman of the Local Farmers' Association, said yesterday that although cattle were still in a fairly good condition there was simply no grazing left. Also, it was costing farmers a considerable amount to transport water hundreds of kilometres to their herds. Yesterday the Pinetown Regional Water Board also announced water restrictions in the following areas: Gillits, Everton, Pinetown, New Germany, Umlaas Road and Farningham Ridge. Water restrictions are already being strictly enforced in Pietermaritzburg, and Durban's turn comes on Tuesday. The searing heat is also playing havoc with the many market gardens on the North Coast belonging to Indians. The severe drought conditions are expected to send the prices of vegetables rocketing on the Pietermaritzburg and Durban municipal markets. [Text] [Johannesburg THE CITIZEN in English 28 Jan 83 p 8]

DROUGHT INCREASES FOOD PRICES--The price of fruit and vegetables has increased as a direct result of the drought. The Director of the Fresh Produce Market, Mr Pat du Preez, said the price of vegetables was high because of a short supply caused by high temperatures in December and this month. Pumpkins have doubled in price since last year--from R4 to R8 a crate. Hubbard squash rose from R3.50 to R8 a pocket and beans increased from R10 to R15 a pocket. Carrots cost R10 more a crate than last year, while cucumbers and gem squashes have also risen. Tomatoes remain more or less the same as last year. Mr Danie van Resburg, general manager of the Potato Board, said potatoes were in shorter supply and prices were higher, especially in the Johannesburg and Pretoria region, because of the drought in the Eastern Transvaal. He said farmers planted seven percent more potatoes than they did last year but the yield a hectare would be half the normal yield. The prices of most fruit have not increased greatly. Mr Du Preez said the drought had cut supplies but there was no shortage. However, he could not predict what the situation would be in three weeks' time. The price of water melons has risen by R1 each and of sponsspek by R4 a crate. [Text] [Johannesburg THE CITIZEN in English 28 Jan 83 p 15]

DROUGHT AREA DECLARED--Ten districts in the Transvaal and most of the north-western Cape have been declared drought-stricken areas. A spokesman for the Division of Financial Assistance of the Department of Agriculture said the areas were receiving a rebate of 75 percent on the transport of fodder by the railways. The district in the Transvaal are Barberton, Messina, Pilgrim's Rest, Soutpansberg, Witbank, the southwestern parts of Delareyville, the northeastern parts of Ellisras, Letaba, the northwestern parts of Pietersburg and the northwestern parts of Potgietersrus. Virtually the whole of the northwestern Cape has been declared a drought-stricken area. In the Free State four districts--two in the north and two in the south--now fall under the same category. In Natal, Utrecht in northern Natal is receiving aid and Mount Currie in south Natal has applied for drought assistance. Applications for assistance have been received from most of the eastern Cape.

[Text] [Johannesburg THE CITIZEN in English 27 Jan 83 p 10]

CSO: 5000/87

WATER OFFICIAL WARNS ON DROUGHT

Mbabane THE TIMES OF SWAZILAND in English 10 Jan 83 pp 1, 16

[Text]

UNLESS the country receives sustained rainfall during the next two months, the dry season could be critical for many irrigators.

This warning came from the Senior Water Resources Engineer in the Ministry of Works, Power and Communications, Mr. Tom Brook during an interview with The Times.

Mr. Brook told The Times: "The whole of southern and eastern Africa is affected by drought in varying degrees. Some places are worse than others.

"All the river flows are lower than they have been for many years and the situation is very serious indeed."

Mr. Brook said last week's rainy spells had improved the situation slightly "and we hope the rains will continue." Mr. Brook continued: "If the rains do not continue, we are in trouble; everywhere in the region, without exception, irrigators will be in trouble." He said the rains we just had had eased the situation and there was enough water to go around. But, he pointed

out, Mnjoli Dam was at only 60 percent capacity. Sand River Dam was down to about 12 percent its normal capacity.

"Dams in South Africa are at similarly low levels if not lower than ours. On the Komati River, South Africa has already released to us 10.5 million cubic metres from Vygeboom Dam over several occasions since the beginning of August last year. They have stated that the position is now becoming very serious."

Mr. Brook said the Vygeboom Dam was now reported to be down to 60 percent of normal capacity.

It could therefore be very difficult for South Africa to help Swaziland very much in the future, Mr. Brook said.

"On the Usutu catchment, South African dams are at extremely low levels and we can't expect much help from them on that river," Mr. Brook told The Times. He pointed out that the flow in the Ngwavuma River was only sufficient to irrigate properly about a third of the normal acreage. He said the conditions at Ngwavuma were the same as on the

other rivers at this time of the year.

"Irrigators in Ngwavuma cannot expect to do their normal acreage unless there is a change in the weather conditions," Mr. Brook said. He promised that the irrigation water situation would be reviewed and analysed at the end of this month when the seriousness of the crisis, would be more apparent. Mr. Brook said the rainfall figures for the highveld last month were 57 percent of normal average.

Matsapha had 32 percent of normal rainfall and Big Bend recorded 57 percent of average rainfall during December, Mr. Brook said. Mr. Brook would not comment on the drought situation on Swazi Nation land where farmers depend entirely on rainfall for good yields. He referred enquiries to the Director of Agriculture, Mr. Victor Phungwayo, who has already warned that unless there were good rains immediately the country would go begging for food.

The General Manager of Swaziland Irrigation, Mr.

Dave Clark, told The Times: "The drought situation since my last statement has not altered. General rain has not fallen on the irrigation scheme although up to 30 millimetres were recorded on December 23 and 30 on some estates. The river flows did increase due to local storms in Swaziland in the catchment of the Komati River, but the river flow has not been maintained due to the local storm and the river today has receded rapidly once again to the level before the local storm in Swaziland.

Mr. Clark said rain was urgently required in the upper catchment of the Komati River. He added: "Rationing of the irrigation water will continue indefinitely while curtailed watering of domestic gardens to two hours per day has had to be introduced."

The General Manager of Ubombo Ranches in Big Bend, Dr. Jeremy Gosnell, told The Times: "We are fortunate at the moment that there is enough water in the Great Usutu River for irrigation requirements of the Big Bend area."

FIFTEEN COMPANIES POLLUTING KAFUBU STREAM

Lusaka SUNDAY TIMES in English 16 Jan 83 p 7

[Excerpt] Copperbelt Province water engineer Mr John Makwaya has identified 15 companies which are polluting the Kafubu stream from which Ndola district council draws drinking water for its residents.

Mr Makwaya said analyses proved there was high chemical pollution in the stream which resulted in the council pumping stinking water containing foreign matter.

The affected companies would be prosecuted under section 55 of Cap 312 of the Laws of Zambia because he had discovered they had no right from the Water Development Board of Zambia to discharge their effluent into public waters or areas. He did not name the companies.

"We have collected fresh samples from the companies affected for our final analyses to prove the list we have and which I sent to the chairman of the water board last Wednesday."

Most of the companies had promised the council they would build pre-treatment tanks for their effluent before it could be discharged into the stream. None of them had done that, Mr Makwaya said.

"This is a case the council should have brought to us immediately it was discovered. But it decided to by-pass the laws of Zambia in favour of their by-law which they claim have not been approved.

Effluent allowed for discharge into any stream should be of a specific nature as approved by the board.

Section 55 of Cap 312 of the Laws of Zambia says in part: "Any person who willfully or through negligence pollutes or fouls any public water so as to render it harmful to man, beast, fish or vegetable shall be guilty of an offence."

Mr Makwaya said the council had enough chemicals and treated the water normally but the stench resulting from effluent from the companies was highly concentrated and chlorine failed to kill it.

CSO: 5000/86

## DROUGHT WIPES OUT COOPERATIVES IN SEKE

Harare THE HERALD in English 15 Jan 83 p 5

[Article by Peta Thornycroft]

[Text] **DROUGHT** has wiped out some co-operative ventures in Seke, but not the spirit of the groups of women who are "co-operating".

This week the Herald travelled around the Seke communal land in what is traditionally the lushest month of the year, and found a well-planned, vegetable-growing co-operative garden scorched by the sun, the produce withered before it had the chance to reach maturity.

Reafforestation projects in the area — stripped of trees for firewood — have been undertaken by various groups of women. Some of last year's fledgling plantations are in danger, and others planned for this year have only been half completed.

However, the spirit of the women who have, under the guidance of veteran community worker Mrs Rachel Chivanga, opted for co-operative self-help remains buoyant.

Mrs Georgini Noripi, who has been involved in one of many co-operative gum-tree planting operations in the area, said they had embarked on the project because they knew that "trees are our life".

The women planted 164 trees, starting last August. Because of the lack of rain they were unable to complete the project, and are now slog-ging about a kilometre per trip, carrying buckets

of water to the saplings twice a week.

"If we can keep them alive, during this drought, then next year they will be all right," Mrs Noripi said.

Mrs Chivanga took us to a vegetable co-operative, which early on in the season, when there was some rain, produced half a tonne of rape for marketing. It has been beautifully laid out and fenced. The sale of the rape paid for the seed for the next crop, which should have been ready for sale about now.

It is a 2 ha field, and all the vegetables have been watered by bucket from a shallow well, but that is now almost dry, and the crop is a write-off.

An Agritex worker, Mr Stephen Chekarumuronzi, showed the Herald an in-operative borehole about 2 km from the garden. He said it was drilled in 1957, tested a year ago and found to be full of water.

But it needs a pump. However, if it was put into operation, Mr Chekarumuronzi said the women would be able to move their garden nearer and could then produce vegetables all year round.

Water supply is so critical in this section of Seke that a natural spring

near the desolate vegetable garden is being used by both people and cattle for drinking.

There were happier faces at a poultry co-operative where seven women have combined forces and have already sold their first lot of birds and have three other batches fattening. However, in order to keep feed costs down, they had intended to use their own grain in addition to prepared feed, but the drought has drastically reduced their yield.

These women have sorted out many of the problems of poultry farming which other co-operatives have faced.

They have a ready market for everything they can produce within walking distance of the farms.

None of the women we spoke to, despite the drought, said they would revert to operating on their own.

Mrs Chivanga deserves much of the credit for inspiring the women to get together for their own upliftment. She and her co-workers are employed by the Department of Women's Affairs and Community Development.

"With the drought, we can't do much farming co-operatively now and so we

are looking for other ideas."

Seke, overcrowded because of its colonial past, is in parts a near-desert, and the scrub which should be fresh and green, has wilted to premature autumn colours.

CSO: 5000/84

## DROUGHT HITS HARD IN MWENEZI, CHIREDDI

Harare THE HERALD in English 16 Jan 83 p 7

[Article by Davison Maruziva]

[Text] PEOPLE in Mwenezi and Chiredzi have not been able to grow any crops and the extent of the drought in the whole of the Masvingo Province is disastrous.

"The few crops in Chibi are a complete write-off and really there is no grass to talk about. My fear is what the animals will be grazing on in two months' time," the Mwenezi District Administrator, Cde Kumurai Mugoni, told the Herald last Friday.

Animals had begun to die because of the seriousness of the situation, livestock in the area was being moved to nearby grazing land that is in better shape than the communal lands.

The desperation of Cde Mugoni was echoed by the Deputy District Administrator for Chiredzi, Cde Clayton Sanjoko. He said that animals in the Gonarezhou game reserve were perishing because most of the drinking points had dried up.

"The state of those animals is appalling. They now have to travel more than 15 km to get a drink and even then you find that only preying animals live at the drinking points.

"On one occasion, I saw a herd of about 800 wild animals that looked in a terrible state and unable to trot, when scared off. Further on I met another 600 animals in a similar state. Many of them have died because of the drought, but we do not know how significant that number is," Cde Sanjoko said.

In neighbouring Sengwe, Mupakati and Chikombezi communal areas the people had less cattle after the war and this minimised the severity of the crisis there. But their animals were only able to survive because of boreholes.

Cde Sanjoko said that the people in the Mupakati area of Chiredzi had been able to plant crops, but after that the rains never came. In Sengwe it had rained only once in November.

The seriousness of the drought and the lack of water is best illustrated by the case of the new Dinhe Magamba dam on the Mwenezi River, which the Deputy Minister of Local Government and Town Planning, Cde George Chinengundu, officially opened last Friday.

What now remains of the Mwenezi River is a sand-filled meandering

landmark. There is no water and the new dam is August-dry.

The local people who helped in providing all the labour for the \$41 000 dam live on hope — that maybe when the rains come, the dam will be able to contain enough water for themselves and their animals' needs.

"The dryness of the dam indicates the magnitude of the problem," Cde Mugoni said.

Hope is also what the commercial farmers in the area are living on. They pray for more diesel so that they can be able to pump underground water for their animals, which they say are dying.

Fifteen representatives of the commercial farmers told Cde Chinengundu during a closed meeting at Mwenezi administrative centre that they desperately needed mealie-meal for their workers.

Cde Sanjoko also said that mealie-meal was a headache for Chiredzi. "You get a bag of mealie-meal, which sells for \$7 being sold for \$12."

Because of the situation, the maize meal was being snatched before it ever got on to the store shelves. The area gets its supply of maize meal from Triangle, but Cde Mugoni said he had made arrangements for the maize meal

to be delivered direct from Harare.

Meanwhile, a spokesman for the Commercial Farmers' Union said the organisation was closely monitoring the drought situation throughout the country through its farmers and commodity associations.

"There are plans for the union to meet the Minister of Agriculture, Senator Denis Norman at the end of January to discuss the drought situation," the spokesman said.

The Minister of Labour and Social Services, Cde Kumbirai Kangai, said on Friday that every effort was being made to assist those affected by the drought and that they should not panic.

The Government, he said, was expanding the drought relief committees at provincial and district levels to ensure an efficient distribution of food to those affected.

There were more than three million people who received drought relief assistance and the country had sufficient food supplies for the drought relief

## But New Dam Promises Relief

THE Ministry of Local Government and Town Planning last week began moves to transform the lives of people in the Maranda and Matibi areas of Mwenezi by opening the Dinhe Magamba dam in the area.

The Deputy Minister of Local Government and Town Planning, Cde George Chinengundu, said at the official ceremony marking the dam's opening, that it was aimed at expanding the water resources and supplies in the country.

"Once the entire programme becomes a reality, it will stem the tide of underdevelopment in Mwenezi. Most of the water facilities in the area have changed dramatically in the past six months."

Five dams — Gwamatenga, Bonda, Boterere, Mlelezi and Dinhe — were all built in the past six

months. Efforts to increase water in the area had also seen the sinking of 77 boreholes.

Cde Chinengundu said the water project should not be seen as being aimed at the communal farmers only. They took into consideration the needs of the neighbouring commercial farmers.

In constructing the Dinhe Magamba dam, the builders had attempted to address the problems of increasing water supplies and at the same time avoiding the likelihood of siltation.

The reduction of siltation was being tackled through the installation of perforated and protected pipes. This process provided a form of filtration.

The dam was constructed by the ministry's District Development Fund with the local people providing labour.

Cde Chinengundu said that the Government was keen to assist the people in developing the area, but warned them to be vigilant as there were some people bent on destroying development projects in order to make the people suffer.

"It is the Government's avowed policy that development will continue in every part of Zimbabwe and any person who attempts to sabotage this development will be dealt with, not only by the army, police and other law enforcement agencies, but also by the people themselves."

The opening ceremony was also attended by the Deputy Minister of Defence (Paramilitary Training), Cde William Ndangana.

MONITORING OF DDT IN PRODUCTS REPORTED

Harare THE HERALD in English 19 Jan 83 p 5

[Text] The use of DDT for agricultural purposes was temporarily cut off last season because of the foreign currency situation, the director of Research and Specialist Services Department, Dr Philip Chigaru, said yesterday.

He said the department had recommended that no foreign currency be allocated to import DDT for agricultural use in order to keep within the limits of the allocation.

"However," Dr Chigaru said, "this should not be interpreted as a ban on the use of DDT in the sector.

"But I can give an assurance that no farmer had access to DDT."

Dr Chigaru made these comments to the HERALD in reply to a letter from Mr W. M. Greaves, of Bulawayo, who questioned whether the controversy regarding DDT had been swept under the carpet.

Mr Greaves contended that there was evidence indicating serious contamination in the top-of-the-food chain throughout the country.

As he saw it, there was no need for the use of DDT in agriculture.

Dr Chigaru said the tone of the letter had surprised him as Mr Greaves, after having contacted the department previously in connection with submitting samples, had not bothered to do so when the price for sampling had been quoted for him.

"We have, as a continuing exercise, been monitoring DDT in butter, cheese, margarine, cooking oil and milk," said Dr Chigaru.

"Our results so far show there are very, very low quantities of DDT in these products. The quantities are at the limit of detection, very small indeed.

"So far we are satisfied that there is no danger to the population as far as these foodstuffs are concerned."

He said the only people using DDT at the moment were in the Department of Veterinary Services who were spraying tsetse fly, and the Ministry of Health which was controlling malaria.

In addition, the department had mounted a study together with a London-based organisation of international repute.

One of the organisation's experts was in Zimbabwe monitoring the use of DDT on tsetse flies in the Zambezi Valley, and Dr Chigaru's department is responsible for analysing samples from this exercise.

The aim is two-fold: to see the effect on the environment arising from using DDT to control tsetse fly, and to gauge the effect on Kariba of water flowing from areas where DDT is being used.

Dr Chigaru said: "We feel it is very important that we come up with evidence on the effects of DDT on the environment."

CSO: 5000/88

## BRIEFS

WATER CRISIS HITS MUTARE--Unless there is a dramatic change in the drought situation Mutare City Council may consider rationing water consumption in the city. A municipal spokesman said yesterday morning the situation was critical and the Provincial Water Development Engineer and the City Engineer were meeting on Monday to decide whether rationing should be introduced at this stage. The national drought relief committee announced it is reassessing the situation in the country and plans to expand its services to affected areas. The country had adequate food supplies for the drought relief programme and the Government was appealing to the affected people not to panic, a spokesman said. Just over 3 million people were recipients of Government assistance on the drought relief programme. The spokesman said drought relief committees had been set up at provincial and district level in all affected areas. Over 75 percent of the crops in the Midlands are so badly scorched from the drought that they are beyond recovery, the acting Provincial Officer for Agritex, Mr Abraham Chitenje said in Gweru yesterday. He said, however, that if the province got significant rainfall before the end of this month "we might be able to get some yield from the cotton crop although it will be low." Rainfall recorded in the past few weeks had been negligible and ineffective, he said. Cattle deaths have been reported in most areas of the Midlands with the southern areas being the most seriously affected. Nearly 4 000 deaths had been reported during December in the Mberengwa, Zvishavane and Mvuma districts alone. "Because we have had two successive droughts, very little grazing is available at present especially in communal areas where there is virtually no grass," Mr Chitenje said.--Herald Reporter, Herald Correspondent, Ziana. [Text] [Harare THE HERALD in English 15 Jan 83 p 1]

DROUGHT RELIEF--The country has adequate food supplies and more than three million will benefit from the Government's drought relief programme, a Government minister has said. The Minister of Labour and Social Services, Cde Kumbirai Kangai, said: "The Government appeals to the affected people not to panic. "Co-operation between the public and officials engaged in food distribution is paramount to the success of the programme." He said drought relief committees had been set up at provincial and district levels. "The public can be assured that everything possible to assist those affected will be done."--ZIS. [Text] [Harare THE HERALD in English 17 Jan 83 p 1]

BEITBRIDGE WATER RATIONED--Because of the drought and high consumption, water is being rationed in Beitbridge. Residents will not be able to water

their gardens, wash their cars or fill their swimming pools until further notice. To ensure that these measures are well enforced, regular patrols will be mounted by the staff of the Mwenezi Beitbridge Rural Council and the Ministry of Water Resources and Development. Violators will have their water supply cut off immediately. The acting Provincial Water Engineer in Matabeleland, Mr Pompe van Meerdervoort, said the Dulibadzimu Dam--the only source of water in the area--has only 2 1/2 months' supply left at the present rate of consumption.--ZIS. [Text] [Harare THE HERALD in English 17 Jan 83 p 1]

DROUGHT IN MATABELELAND--Bulawayo. Cattle beginning to pick up condition after the ravages of the drought in Matabeleland are ailing again as water resources dry up and vegetation withers in the fierce January heat. In Plumtree, one of the areas worst affected by the drought, the Assistant District Administrator, Cde Augustine Gumede, said it was feared that many farmers would lose stock and money if the drought continued. "Some of them might lose everything if there is no improvement," he said. People urgently needed water, a problem on which the district administration was working. Drought relief supplies to peasants had been doubled since late December, but the food situation was now very serious, he said. In Binga, another area badly ravaged by the drought, neither humans nor livestock had enough water. Cde Kenneth Dapoka, the district council's assistant executive officer, said streams and wells had dried up and people were again walking up to 5 km to collect water, much of which was salty. More people were asking for drought relief food as their supplies ran out and crops withered in the heat. Cde Kapoka said drought relief supplies were not enough to feed the number of people who now needed assistance. [Text] [Harare THE HERALD in English 15 Jan 83 p 5]

OPERATION CATTLE RESCUE--Operation Cattle Rescue, mounted last year in a bid to buy up to 150 000 head from the communal sector, achieved half its objective. The latest Cold Storage Commission newsletter says that by last month, 74 100 had been bought, with the parastatal taking 57 877 for \$9,8 million. Many communal farmers had been reluctant to sell stock for "a variety of reasons with which one has every sympathy". "But the net result is that tens of thousands of animals that could have been converted into beef for the nation and cash for their owners have died," the newsletter said. It said lessons that had been learnt so far were that: Losses were severe in overstocked areas; Fodder banks should be built to counteract drought; and There should be a co-ordinated campaign to promote the concept of animals being healthy when slaughtered as they are while alive. [Text] [Harare THE HERALD in English 19 Jan 83 p 3]

CSO: 5000/88

## LOWER VOLGA REGION SOIL EROSION DISCUSSED

Moscow PRAVDA in Russian 2 Oct 82 p 3

[Article by A. Vostryakov, professor; V. Zayonts, docent; F. Koval'skiy, candidate of geological and mineralogical sciences, Saratov: "Gully at the Threshold--Man and Nature"]

[Text] Frequently upon arriving in some village or at some farmstead after an absence of several years, you see that a once far off gully has come right up to the porch of the last house. Unfortunately, it is only after the fact that the residents begin to look for ways to stop the growth of the gully. This is no simple matter. It is significantly simpler to take preventative measures.

The growth of gullies is, after all, determined not only by geological and climatic factors, but by the people's economic activity as well, as for example, the exploitation of forests or the complete plowing of a territory. Scars show up very rapidly on the face of the earth along roads. And just look how they are plowing up the slopes. More often than not it is from top to bottom. They say it is more convenient that way. However, if we seriously want to prevent erosion, plowing must be done only along contour lines.

Recently an unusual map was compiled by a group of scientists from the Geology Department of Saratov University, along with specialists from production organizations from the RSFSR Ministry of Geology. The map shows the intensity of gully erosion, surface washout and landslides over an expansive territory encompassing Kuybyshev, Penza, Saratov, Volgograd and Astrakhan Oblasts and the Kalmytskaya ASSR.

In the Volga Basin, linear erosion (washing away of topsoil and earth by surface waters) is most strongly manifested. This results in the formation of washouts, ruts, and then gullies. The density of the latter in the Right Bank area around Saratov and Volgograd is extremely high. On the average, their growth rate is 15-20 meters year, sometimes up to 50-60 meters/year. If they were stretched end to end, all the gullies in Saratov Oblast would be more than 30,000 km long, while in Kuybyshev Oblast they would be 25,000 km long. It is not difficult to understand how much topsoil and agricultural land erosion has removed from rotation.

This unfavorable process continues. But the battle with gullies as a whole, is being conducted in the Volga Basin on a small scale and is not very effective even though practice shows that relatively simple measures taken to check erosion are usually adequate. Thus, in the Krasnoarmeyskaya rayon of Saratov Oblast, building embankments on the crests of hills with the aim of dispersing water flow, planting forest strips along contour lines and construction of the simplest dams, etc., were perfectly effective.

Washout of land of water from snow melt and rain also causes considerable damage to agriculture. It was necessary to observe, for example, how during a single summer rainstorm water carried away a layer of soil up to 5 cm thick. That means that it is necessary to carry out the requirements of agricultural technology particularly carefully--to know where and how to plow, what to sow.

Wind erosion also causes considerable damage to the lower Volga Basin. At times, all it takes is to disturb the turf cover for the sand massif to be set in motion and a dust storm to start. These processes develop both in the summertime and during winters when there is little snow, particularly in the south of Saratov, Volgograd and Astrakhan Oblasts.

The winds are most violent in Kalmykiya. Thus, during the last ten years, the rate of displacement of the sand massif around the village of Ulan-Khol is on average about 100 meters/year. It is necessary to constantly clean many sections of the highways. It must be noted that man himself is guilty for causing this misfortune. The origins of eolation and blowing away of sandy soils are as a rule associated with sectors where overgrazing of cattle occurs and with zones where the turf cover has been destroyed during construction of pipelines and the development of useful minerals.

Filling in the cascade of Volga water storage basins caused destruction of the banks by waves. Thus, during the high spring floods of 1979, individual sections of the Kuybyshev water storage basin receded by 15-20 meters (in the southern part). The banks of the Tsimlyanskoye "Sea" are receding by 2-4 meters/year in many sections. The speed of this process around the mouth of the Yeruslan River reaches 5-7 meters.

Other undesirable phenomena are also associated with water storage basins. In particular, landslides have become more noticeable not only along the banks of the Volga, but along the valleys of the majority of its tributaries as well. In many locations on the Left Bank of the Volga, the rise in ground water level has caused swamping and salinization of soils, particularly when in certain irrigation networks the scientifically based order of flooding is not observed, where there is no drainage and where canals are poorly maintained. In our view, it would be necessary to setup a monitoring hydro-geological service in land reclamation zones. This service, having adequately broad authority and rights, would be able to prevent destruction of similar type.

The rise in the ground water level within the boundaries of cities and large settlements causes great damage. This results in so-called self-inundation [samopodtopleniye]. For practical purposes, this is noted in all oblast centers of the lower Volga Basin. This is first of all associated with significant leakage from pipes and the sewage system, as well as with the unbroken asphaltting of a territory, the lack of reliable rain sewers and the hurried elimination of natural filter-gullies. Ill-thought out development, when the deep foundations of buildings "blockade" the movement of ground water currents, causing their pooling, also makes its "contribution."

In our view, these processes are being studied at an intolerably slow pace. The development of concrete recommendations to combat unfavorable consequences is also being retarded.

The questions arise: Which service, which department should realize the monitoring function in these sectors of environmental protection? Who will study the processes taking place on the Earth's surface and within its depths and prevent undesirable results? Unfortunately, there is as yet no such service.

Until 1957 the Ministry of Geology was called the Ministry of Geology and Preservation of Mineral Resources. With time, the second half of this name was undeservedly lost. The Earth's mineral resources were "orphaned" since the organs of state hydraulic engineering supervision control the activity of mining enterprises only within the bounds of river diversion contours. However, as we have shown, various unfavorable physical-geological processes are developing everywhere.

We think that the USSR Ministry of Geology should once again take upon itself the function of protecting mineral resources. It would be worthwhile for it to assign coordination of the work connected with the study and realization of proper environmental protection measures. This problem is complex, and research should be conducted in close collaboration with other interested ministries and departments; as well as with institutions of the USSR Academy of Sciences. A close union of geologists and hydraulic engineers, soil scientists, climatologists and other specialists is necessary. It is also necessary to develop a broad network of stationary points for observation of the course of erosion and other processes. The lower Volga Basin in particular could be a good natural laboratory for setting up such research.

This problem is important. The manifestations of intense erosion and surface washoff result not only in a decline in soil fertility or reduction of soil area; these phenomena also exert a negative influence on the state of other components of the environment. Thus, soil erosion by wind causes contamination of the atmosphere, while intense soil washoff, erosion and the washing away of river banks leads to pollution of rivers and reservoirs.

We wish to recall that the famous Russian scientist, soil scientist and agronomist V. V. Dokuchayev organized a network of stationary observation on the growth of gullies in many regions in the European part of Russia. Many zemstvos compiled cadasters of gullies, indicating the growth rate of each of them, and worked out recommendations for combating this phenomenon based on his initiative. Revival of the classification of gullies, sectors of surface washoff and regions of soil erosion is today's urgent problem.

Geologists are searching and exploring for useful mineral sources and are compiling special geological, hydrogeological and other types of maps. In our opinion, the study of the results of economic operations on the environment should also occupy an equal place in this set of tasks.

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CSO: 5000/19

REPORT ON OVERALL ENVIRONMENT SITUATION

Helsinki HUFVUDSTADSBLADET in Swedish 9 Dec 82 p 18

[Article: "Acidified Lakes by Better Air"]

[Text] There are in Finland 5 hectares of forest per inhabitant, and in recent years forest resources have grown. Since 1972, air quality has somewhat improved in industrialized locations; since the end of the 1970s waste water has improved up to 90 percent by biological or even more effective methods, and water quality in lakes has improved. But in southern Finland the first acidification in lakes has been noted, and in 70 locations in the country pine forests have been damaged by air pollution.

This and much else can be read about Finland's environment in a publication yesterday presented by Professor Martii Markkula, chairman of the Environment Council, to Minister for Domestic Affairs Ahde. This is the second report on the environment; the first was issued in 1972, prior to the first International Conference on the Environment.

This year's edition, entitled "Suamin Ympariston Tila" [Finland's Environmental Situation] is of 328 pages. Professor Markkula summarizes it in seven positive and nine negative points.

The Positive:

Increasing forest resources, due to forest improvement and somewhat reduced use of wood.

Improved air quality in Helsinki and in Industrial locations.

More effective purification of waste water.

A certain improvement of water in watercourse. Best results have been obtained in the dirtiest areas.

Doubling of the nature protection areas. At the end of the 1970s they amounted to 700,000 hectares, 2 percent of the area of Finland, approximately.

Use of DDT was strictly limited in 1971 and banned in 1975. Methyl mercury, which had proved especially harmful to the environment, was no longer used during the 1970s.

Use of PCB compounds was reduced during the 1970s and ceased completely in 1979.

#### The Negative:

Air pollution damaged vegetation. In 70 areas, encompassing 1,200 square kilometers, damage to pine forests were observed.

Acidification of lakes due to sulphur compounds was observed for the first time in southern Finland.

Increased road traffic and new roads, in particular in heavily populated areas and close to main roads, increased noise pollution.

Several animal and plant species are threatened.

Many types of old buildings and areas of standardized building construction were reduced in number or disappeared.

Damage caused by lead occurred, especially around lead smelters and close to heavily trafficked roads.

At the coasts of Finland 16 accidents to ships occurred, resulting in oil being spilled into the sea. The amounts of oil were small, however, amounting at most to several hundred tons. Accidents on land involving oil polluted local ground and subsoil water.

Garbage from communities increased by 3-5 percent annually. Garbage was either taken to dumps or burned. Both of these ways of handling it led to trouble for the environment.

Handling of problem waste was poor and still awaits solution.

#### One Car for Every Four Persons

The environment report provides a picture of Finland today. Following the great population shifts in the country there are now 113 persons per square kilometer in Nyland County and only 2 in Lappland County.

Industrial production increased threefold for 20 years, but was somewhat reduced during the 1970s.

Of the total area 87 percent is forest and 9 percent cultivated land. Lakes cover 9 percent of Finland's area. Forests, crop land, and water thus account for over 100 percent, but it should be remembered that all land capable of bearing crops is not used for crops.

During the 1960s energy consumption increased by 7.4 MTOE (millions of tons of oil equivalents), but dropped some during the 1970s to 6.5 MTOE. Among domestic energy sources, hydroelectric energy was effectively exploited. Wood and peat amounted to 10 percent of consumption.

Housing construction reached record levels during the 1970s, at 50,000 to 70,000 units annually. A little over one half were highrise apartments.

The need of industry for land grew somewhat, in particular in the chemical industry.

The number of automobiles increased during the 1970s by one half million, and today amounts to one car per four persons.

#### New Edition Promised

The book also contains information on environment protection legislation.

Chief editor of the Environment Report is Olli Kolehmainen. A new edition is promised, possibly in 5 years.

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GREECE

REPORTED RADIOACTIVE URANIUM POLLUTION DENIED

Athens TO VIMA TIS KYRIAKIS in Greek 24 Oct 83 p 1

[Text] The management of the Public Power Corporation [DEI] is taking a series of measures to prevent environmental pollution from lignite ashes at DEI's electricity production centers. The measures aim at improving the situation the current DEI management has "inherited" and at creating healthy conditions for those working in these electricity generation centers or living nearby.

The statements were made to the Vima Tis Kyriakis by a top DEI official after the concern expressed and the debate that followed the announcement by the Panhellenic Conference for the Peaceful Applications of Nuclear Energy. The announcement stated that the burning of lignite at DEI's electricity generation plants results in the emission of radioactive uranium in the atmosphere.

The same DEI official pointed out that his company is following up the matter attentively. He said that a permanent network of air, dust, water and soil sampling stations has been installed in areas of plants using lignite as fuel.

Studies that were conducted by the Greek Atomic Energy Committee have shown that radioactivity in those areas is much lower than the acceptable maxima and that it is actually at the same level with radioactivity in areas where no lignite fueled plants are in operation.

The DEI representative said the following about the measures taken for preventing environmental pollution from floating lignite ashes.

--Fifteen million drachmas have been allocated for the purchase of machinery that absorbs the coal ashes preventing them from spreading around. Such equipment has been installed and is already in operation in all of DEI's thermal stations.

--An international bidding has been proclaimed and bids will be submitted by 11 November for the installation at the Ptolemais, Megalopolis and Aliveri plants, of automatic machines which will clean the plants' environment continuously. Their total cost is estimated at 60 million drachmas.

--DEI's appropriate services are studying the gradual replacement of the electrostatic filters which accumulate ashes at the Ptolemais station. The level of effectiveness of those machines is 93 percent. By their replacement DEI wants to increase the level of effectiveness to 99.6 percent and bring them up to the level of international standards and specifications. The expenditure is expected to reach the level of 600 million drachmas, which have already been budgeted for 1983.

At the same time, coordinated efforts are being made to secure European Economic Community financing of the project.

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END