

JPRS 69358

5 July 1977

TRANSLATIONS ON ENVIRONMENTAL QUALITY

No. 140

**DISTRIBUTION STATEMENT A**  
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Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

BIBLIOGRAPHIC DATA SHEET	1. Report No. JPRS 69358	2.	3. Recipient's Accession No.
	4. Title and Subtitle TRANSLATIONS ON ENVIRONMENTAL QUALITY, NO. 140		5. Report Date 5 July 1977
7. Author(s)		6.	
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201		8. Performing Organization Rept. No.	
12. Sponsoring Organization Name and Address  As above		10. Project/Task/Work Unit No.	
		11. Contract/Grant No.	
15. Supplementary Notes		13. Type of Report & Period Covered	
		14.	
16. Abstracts The serial report contains translations from the world press of articles and press commentary on environmental pollution and its effects and pollution control technology, organizations, and programs.			
17. Key Words and Document Analysis. 17a. Descriptors Worldwide Pollution Environmental Control Meteorology Ecology			
17b. Identifiers/Open-Ended Terms			
17c. COSATI Field/Group 4, 6, 18G, 18H			
18. Availability Statement Unlimited Availability Sold by NTIS Springfield, Virginia 22151		19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 46
		20. Security Class (This Page) UNCLASSIFIED	22. Price PCA03

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SOUTH KOREA

BRIEFS

INDUSTRIAL WASTE--Seoul, 8 Jun (HAPTONG)--The government will dispose of, at its own expense, industrial waste oil left unclaimed after it was brought into the country from Japan, it was learned here today. A fund of 161.3 million won (322,600 U.S. dollars) was appropriated for the disposal of the imported industrial trash oil piled at customs warehouses and bonded areas. Such unclaimed waste totalling 3,279 tons will be disposed of either by burial or incineration, government sources said. It was inevitable for the government to handle the trash, as many of the importers simply disappeared when it became the object of heated debate some time ago. Ten persons have been put under arrest in March in connection with the import of waste oil from Japan since February 1974. They were charged with importing it under false declarations in violation of the trade law. The government decided to intervene in the disposal on the advice of an expert panel who warned that an inadequate handling of the trash oil could cause an enormous pollution, the sources said. [Text] [Seoul HAPTONG in English 0820 GMT 8 Jun 77 SK]

CSO: 5000

PAPER CRITICIZES LAKE POLLUTION

Sofia STURSHEL in Bulgarian 6 May 77 p 1

[Article by Rusi Rusev, STURSHEL Burgas correspondent: "Complaint About Vaya"]

[Text] Ever since scientists and specialists assigned to Vaya Lake near Burgas the role of a buffer between the Black Sea and the developing industry, it became clear that there would be no lake. Years ago such a statement would have been accepted, put mildly, as a poor way of thinking. Today, however, after one-third of the lake is already dead, it turns out that it is far better for a person to have a poor way of thinking than not to think at all. Otherwise, that lake would have hardly turned into the garbage dump of Burgas industry, even though we continue to indicate it on the maps as a lake.

State Losses From the Pollution of Vaya Lake

Frankly, losses to the state are high. However, in order for us not to appear very old fashioned, let us ignore the flora and fauna as poetic concepts and take a direct look at statistics. According to statistical data Vaya Lake is the biggest fresh water basin in our country, covering an area of 22,000 decares. At its deepest points the water is only one meter deep while the mire is 19 meters deep. It is precisely this mire that is the puzzle which makes the lake one of the richest natural fish breeding ponds in the world. Should we set out now to develop such a facility we would need capital investments of at least six million leva, thousands of decares of land, and as many thousand tons of fodder. Naturally, we would make such an investment without blinking an eye. Now, however, when nature has given us everything ready made, we are in a hurry to destroy it. In the past few years alone over 1,200 tons of fish and 1.5 million pieces of breeding stock have been poisoned. The day is not far when life in the lake will disappear completely due to the lack of oxygen. A working group of the Bulgarian Academy of Sciences described Vaya as a rapidly dying water reservoir. Its report stated that unless urgent measures are taken the lake will come to an end not only as a fish breeding area but as a buffer whose waters will be directed toward and pollute the entire Burgas maritime bay.

After all this, it is entirely natural to ask the following question: who is troubling the water in the lake?

It is almost as difficult to answer the question as it is to do something to rescue the lake. The enterprises whose waters are released into the lake are not one or two but over 40. Imagine: these are 40 directors or chiefs and every one of them cites several objective reasons proving that he is less to blame than the others. Naturally, after each case of fish poisoning the corresponding authorities draw up a statement. The fines are paid most accurately and the waste water continues to fill the lake. This vaguely leads us to believe that the time has come to shift our sight from the director's office and look higher--at the level of a ministry, let us say.

Thus, for example, one of the enterprises polluting the lake is the Druzhba Railway Station at the Petrochemical Combine. At the present time the Ministry of Transportation has initiated the building of treatment installations. However, the construction workers cannot work due to lack of full equipment and documents and a reworked general cost. Whereas for a given director this may be an objective reason, we could hardly say the same of a ministry. The treatment installation at the Burgas Railway Depot was completed as early as 1975. The acceptance commission signed it most authoritatively. However, after it left it became clear that the equipment was not operational because of an error in the equipment design.

Following the long road of data gathering we found out that the Ministry of Agriculture as well plays a substantial role in the pollution of Vaya Lake, even though the lake is under its administration.

We do not know the way you would react were you to go to a tailor who would cut out a piece of your trousers to mend your coat. Yet, no one reacted to effect that the ministry is building plants instead of treatment equipment. True, along with the reconstruction of the Tolbukhin grain-fodder and oil extraction combine funds were allocated for treatment systems as well. However, such funds were subsequently "curtailed" and used for the reconstruction.

In all likelihood, all this will be repeated in one year, following the completion of the sugar refinery in Kameno. Its completion is scheduled for September 1978, yet there is still no plan for the biological treatment of the waters. This is the way the ministry is muddying its own waters.

The Ministry of Chemical Industry has not even a minimal program for protecting Vaya Lake from pollution. All it has is a maximal program which stipulates that so many million leva will be allocated for the building of treatment stations at the Petrochemical Combine. Also stipulated quite precisely is the number of years after which they will be built. At the present, however, the so-called conventionally clean water is continuing to pollute the lake quite specifically.

Generally speaking, all enterprises and departments polluting Vaya Lake are formulating programs always for the future. Well and good, but would there be a Vaya Lake then? When a body begins to agonize it needs urgent aid rather than elegant treatment programs in a sanitorium.

Is there first aid for nature? What is the telephone number?!...

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SCIENTISTS STRESS ROLE OF PLANTS AS AIR PURIFIERS

Sofia VECHERNI NOVINI in Bulgarian 4 Jun 77 p 4

[Interview with Professor Velcho Velchev, director of the Bulgarian Academy of Sciences Botany Institute, and Senior Scientific Associate Emil Prokopiev of the Forests Institute of the Ministry of Forests and Forest Industry: "The Only Producer of Oxygen"]

[Text] In the second part of our conversation we shall acquaint our readers with the views of Professor Velcho Velchev, director of the Botany Institute, Bulgarian Academy of Sciences, and of Senior Scientific Associate Emil Prokopiev of the Forests Institute, Ministry of Forests and Forest Industry.

The question of the natural vegetation seems to be the most acute in the problems of pollution. Vegetation is the basic component of ecological systems whose disturbance leads to extremely adverse consequences. But let us speak more concretely! Plants are the only producer of oxygen. They maintain the normal composition of the atmosphere and the air we breathe. The vegetation is the most powerful factor for neutralizing pollutants, yet, at the same time, it could be very easily destroyed by them. We must break this magic circle by creating conditions for the vegetation to manifest its positive role.

Editors: Comrade Prokopiev, what is the role of the vegetation as an air filter in industrial areas, and what measures are being taken for the planting of suitable species?

Senior Scientific Associate Emil Prokopiev: In valleys such as the Sofia Plain, where conditions for considerable pollution exist, plants play a very big treatment role. The air temperature is considerably lower in the settlements. However, a forestation with white and black pine turned out

entirely unsuitable, for they are very sensitive and are effected by pollutants very strongly. In addition to the fact that they are not sufficiently effective as treatment agents if planted at an unsuitable altitude, such species are not sufficiently viable which makes them even more vulnerable.

Editors: What are the main pollutants in the Sofia area?

Sulfur dioxide, the only one in the past, along with chlorine, fluorine, and other substances now.

We assess the pollution level on the basis of averaged data which usually mislead us and fail to reflect the real condition. Such data do not show cases of gas discharges due to breakdowns which could cause destructive damages and destroy all vegetation around them in a single day. Such cases occurred in Pernik and at the Kremikovtzi Metallurgical Combine. In the area of the Georgi Damyanov Plant some 12,000 decares planted in white and black pine, growing on the steep slopes, were hit. This resulted in soil erosion and now the plant is building supports to control landslides. Nature answers each strike with a double strike. Damages have been noted in orchard trees as well. No visible damages may be noted. A close look, however, could reveal damages to the stigmas and the areas where the pollen should have penetrated are blocked. The leaves are green yet there is no fruit. Let me tell you that on the basis of studies initiated as early as 1953 our institute has suggested several times that durable species be planted. We have a list of such species used in the landscaping of industrial areas. Before indicating some of them let me tell you that the species indicated as resistant in some countries may turn out undurable in our country. We must adopt a specific approach for each separate area in our country as well. Now, particularly for our country, all oak types are the most durable--pedunculated and common oak, Blagun and, particularly, the red oak which is a fast growing species. In Pirdop, Zlatits, and Kremikovtzi all coniferous plants have been damaged while oaks are in an excellent condition and we are particularly engaged in growing oak trees. We raise saplings which we are now planting in the Kremikovtzi area. We are planting both red and pubescent oak. The ash tree is also very durable. It has turned out that all silver leaf forms are more resistant than the common types, the silver linden and silver ash, for example.

A plant can also serve as an indicator--lichens and mosses, for example. Vetch and beans have the same qualities.

The main question is how to increase the resistance of existing plants. Particularly in the case of industrial areas, we should think in the future of upgrading fertility through the use of fertilizers. We recommend in the case of new plantings the type of soil preparation in which all precipitation from the surface flow would go into the subsoil waters through grooves, and perist grooves, in order to tap the entire moisture.

Two years ago we conducted studies at Kremikovtsi. Unfortunately, errors were made and most unsuitable species continued to be planted there. We formulated a suggestion and an order was issued to block the seeding of white pine.

The question of recategorizing forests exists for the industrial zones. Social protection functions must be given priority.

Editors: Professor Velchev, what damages have been caused to the natural and grass vegetation and could it carry out its filtering role properly at present?

Professor Velcho Velchev: Large areas have been planted in cultivated crops which are insufficiently good filters, for they perform such a function for a few months only and are strongly affected by pollution.

As to grassy vegetation, it has been greatly affected by man. It developed in the areas of destroyed forests and its origin is anthropogenic. It consists mainly of highly productive species of low functional effectiveness.

The extensive pollution calls for a review of the condition and role of the vegetation for the entire Sofia area and even within a rigor radius. The important problem of the preservation of the natural vegetation in the area remains unresolved. Few areas are properly protected and subjected to a special regimen. New such areas should be developed.

Editors: Vitosha, declared a national park, is in the Sofia area. In the past it was stated more frequently that Vitosha is Sofia's lung.

I am strongly in favor for Vitosha to be called a "natural" park for this name would give it another meaning. Currently that mountain is treated as a national park yet its status is not sufficiently clear. This makes it possible to engage in actions harming nature. Beaches are being replaced with spruce. The bushes around alleys have been cut out and replaced by cultivated decorative plants in many areas. Over 1,500 species of superior plants are growing in Vitosha, i.e., one-half of the species growing in Bulgaria. They include rare species (the laurel willow may be found only on Vitosha). Over 1,500 species grow here yet they are considered as park vegetation. Marshes are being destroyed. This lowers the level of subsoil waters as a result of which large areas dry out and lead to the disappearance of moisture loving plants. Let us not forget that Vitosha is a powerful water supply source for Sofia and that it could easily lose this importance. The condition of Lyulin, the neighboring park, is no better.

Damage has been caused also as a result of the gathering of medicinal plants. Usually the assistance of our institute is not sought as to when and how to pick them. For example, in picking bear berry, it is easier to pull out the entire plant even though only the leaves are used.

Recently the State Council passed a special decision on medicinal plants. In this connection our institute has begun charting the medicinal plants. We have developed measures for the protection of the natural vegetation in connection with the territorial structure of the country. The Sofia area has been mapped as well. Our task is to make a map of the potential vegetation and submit suggestions for improving its condition. We are also working on the preservation of entire vegetal communities which should be taken out of the endangered areas. We are also drawing up a "red book" of threatened plants. The charting of the potential vegetation of the country is an important future task.

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CONCERN OVER 'DYING' NATURAL ENVIRONMENT IN CELJE

Ljubljana DELO in Slovenian 29 Apr 77 p 10

[Article by Drago Hribar]

[Text] Celje, 28 Apr--The Executive Council of [Celje] Opstina's Assembly devoted its recent debate to the assessment of the ecological situation prepared by the commission for the restoration of the environment. The assessment is encouraging in the sense that it is a first presentation of a comprehensive review of the ecologic situation in the opstina, but, perhaps for precisely the same reason, the data in the report is that much more alarming and, at least some of it, foreboding a catastrophe.

Such is, first of all, the finding that the inhabitants of Celje, of whom there were 34,300 in 1976, consume 2.25 million cubic meters of water for household use, while the industrial users consume 9.65 million cubic meters of water yearly. This means a total of 11.9 million cubic meters of drainage. In other words, every second 600 liters of impure water is discharged into the ground. The lower parts of the streams Voglajna and Hudinja have not been supporting life for the last 15 years. The Store Iron Works discharges 100 liters per second of effluent into Voglajna, and the zinc factory discharges 130 liters per second of effluent to Hudinja and Voglajna. In the Savinja River the concentration of iron oxides was as high as 50 milligrams per liter. Among the other larger polluters are the EMO factory, Libela, Klima, LIK Savinja, and, of course, the municipal sewer with its effluent reaching 220 liters per second.

A cause of concern is the new finding that in Celje easterly winds prevail instead of westerly winds as has hitherto been thought. If the change turns out to be correct, the new industrial construction is going up at an inappropriate location where industrial gases will threaten the city instead of being blown away from it. Pollution in the atmosphere has caused the mortality in the city to reach a critical value, which can be reduced only by cleaning up the pollution. Mortality, as has been shown abroad, can increase by as much as one half if the climatic conditions, such as inversion present also at Celje, do not allow the poisonous gases to rise. Appropriate analyses of this problem have still not been

performed by the public health institutions, although it is known that they have a great deal of data that has not been included in the environmental impact statement.

In this area, too, the principal polluters are the zinc factory which emits the largest quantities of SO<sub>2</sub>, SO<sub>3</sub>, and aerosols in concentrations from 1,500 to 3,000 milligrams per cubic meter of air. A close second is the EMO factory with toxic fluorine, nitric compound gases and sulfur oxides, followed by the brick factory Ljubecna with emissions of fluorine, and, to a lesser extent, the rolling mill Jeklovek and the old Martin Bessemer converter in the Store Iron Works. Other significant polluters are boiler plants and furnaces.

To normalize the situation the Executive Council adopted the proposal of the Environmental Protection Commission, according to which a social agreement will be adopted in which various specific and common assignments of various parties ranging from the assembly to the bank will be defined. Priority will be given to installation of cleaning equipment in all TOZD's [Basic Organizations of Associated Labor] that are polluting the environment through discharges of their effluents and sewage, construction of dumping reservoirs and so on. In addition appropriate regulations will have to be drawn to provide for record keeping and for the handling of exceptional cases.

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SANTA CATARINA COMBATS RIVER POLLUTION

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 24 Apr 77 p 32

Text To eliminate dyes and other pollutants released into the waters of rivers, there will be an alternate installation of prototype equipment of German origins in several industries in Blumenau. Within 90 days it will be ready to be used in tests in interested industries. It will cost nearly 500,000 cruzeiros and will be installed at the waste outlets with a capacity for treating two cubic meters of water per hour as published.

The technology of the German company Thiers, was granted to the Bombas Hoh firm of Blumenau, which after the initial experience intends to install a plant for producing the equipment on a commercial scale. The Hering Company will also participate in the undertaking. At this time those interested analyze the alternatives for the creation of the company. According to Vitus Hoh Junior and Gustavo Zimmermann, directors of Bombas Hoh, Thiers is particularly interested in the profitability of the investment, for which reason it asked for royalties of up to 10 percent to provide the technology despite the fact that Brazilian laws allow the payment of only 5 percent.

The equipment has a number of innovations which makes it more viable with respect to others already existing. Instead of using microorganisms in the treatment of water, a more expensive process, it uses chemical products depending on the type of pollutants to be eliminated. Aluminum sulphate and caustic soda will probably be most frequently used, which are easy to find on the market. Another advantage of the equipment is its small size, sometimes less than that of others already known, which will make it easy to install in any industry.

To make its experimental use viable, the prototype is being mounted on a dolly in some companies. During the tests, the capacity of the equipment needed in each industry, as well as the type of reagents most indicated, will be determined.

Present prices considered, the industries should invest up to 2 million cruzeiros in each unit capable of treating 50 cubic meters of water per hour. According to the directors of Bombas Hoh, the government will finance the purchase of the equipment, which could facilitate its being placed on the market.

As soon as it is ready, the prototype equipment will be installed at the waste outlets of industries. Polluted water will be discharged into a reservoir where it will remain for a period of 6 to 8 hours for the homogenization of the pH (alkalinity factor), which varies considerably according to the type of pollutant. Then chemical products will be added to cause a reaction in the pollutants making them rise to the surface in small floccules. Then a flocculator will separate wastes from the clear water. The scum formed by the pollutants will be skimmed off and pressed, being reduced to a dried mass which can be burned or buried.

The period of homogenization being ended, the treatment process lasts only a half hour. At the end the water is almost crystalline with 80 percent or less of pollutants and can thus be dumped into rivers without any great danger to the environment.

That would be the first phase of a more sophisticated process which could remove the remaining 20 percent of pollutants, but which is considered uneconomical. In a second phase, not yet applied, not even in Europe, an electrolytic treatment can be made to eliminate the dye and the still remaining particles of pollutants. There would also be the possibility of a third state, when the water would be chlorinated for subsequent human consumption.

The initiative of manufacturing the prototype equipment was that of the Hering Company of Blumenau, taking into consideration its needs for water for industrial reuse in future expansions. Other companies are also interested but, according to Hans Prayon, vice president of the Spinning and Weaving Union of Blumenau, a series of details must first be defined officially: what is pollution, who did the polluting, which are the rivers that may or may not receive industrial wastes and at what levels. In addition to that, Prayon believes it is necessary to open a line of credit for financing the equipment. The industrialists believe that the companies interested in controlling pollution should even receive a number of fiscal incentives which would encourage them to avoid polluting the environment.

Artex, also of Blumenau, has already developed a prototype equipment, another type of process, which despite being more expensive, is better adapted to conditions. It could be installed at any time but its cost

reaches 5 or 6 million cruzeiros. According to Gert Frischknecht, manager of the Artex Research Department, in the process already tested, the polluted water remains for some time in settlement tanks where nitrogenous precipitates are removed, reaction being caused by commercial iron sulphate and calcium oxide. In the final phase, the decanting process is accomplished and the clear water runs out through a channel where it receives a dosage of chlorine to eliminate bacteria.

The project is for treating from 200 to 400 cubic meters of liquid per hour. That technology could be provided to any interested industry but because of difficulties of installation it will not be developed on a commercial scale.

Simultaneously, experiences with the prototype German technology could be installed in another project for the purpose of a better use of energy, reducing the consumption of fuel in factories by up to 50 percent, according to Dieter Hering. The waste water would be collected before treatment in a collecting tank and then a heat exchanger would use the heat from it, recovering the energy from it and heating the water for fueling the industry.

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## ECOLOGICAL BALANCE IN NORTHERN RIO DE JANEIRO STATE THREATENED

Rio de Janeiro O GLOBO in Portuguese 15 May 77 p. 20

[Text] More than 20 lakes and at least 4 tributaries of the Paraíba do Sul River have dried up over the last 2 years, disfiguring the landscape and contributing toward the disappearance of part of the fauna and flora native to the region. Regions where schools of traira and robalo, alligators and jaguars once flourished have been transformed into stretches of swamp. Hunting, fishing and the fruit and wood industries, on which thousands of persons living in an area of 50 kilometers surrounding Campos depended, have come to an end. The cause of these conditions is the Baixo Paraíba Basin reclamation plan drawn up by DNOS [National Department of Public Works and Sanitation] in 1975 for the purpose of creating an area of 180,000 hectares to be given over to the planting of sugar cane. Although the Department argues that the state's economic development is more important than the preservation of lakes, environmental specialists have found that implementation of the plan threatens the ecological balance of the region.

The problem of the drying up of the lakes began to be discussed in August of last year when Professor Haroldo Strang, at that time Director of the Department of Renewable Natural Resources of the Office of the Secretary of Agriculture of the state of Rio de Janeiro, and currently president of the Brazilian Foundation for the Preservation of the Natural Environment, prepared a lengthy document denouncing the IBDF [Brazilian Forestry Development Institute] for having caused the devastation of Feia Lake in Campos and Ribeira Lake in Quissama. The report stated that the two lakes were being drained by DNOS and turned into pastures and cane fields by the planters from neighboring areas. Many, he said, were taking advantage of the situation, extending their plantings into the rapidly-drying lake beds.

The document together with a request to send a specialist to the region came into the possession of IBDF regional delegate in Rio, Jose Carlos Horta Barbosa. Maria Sartori, a forestry engineer with graduate training in the United States and Europe and responsible for demarcation of the Institute's natural reserves, was appointed to the task. No one really understood the seriousness of the problem at the time. When Maria Sartori traveled through the lake region of northern Rio de Janeiro during a three-day visit, what she found was "a truly calamitous situation." She examined thoroughly the lake sources and spoke with planters and local residents, and concluded that the lakes in the areas of Campos, Quissama and Casemiro de Abreu were not going through a process of natural decay; they were being emptied by means of canals dug by the dredges of the DNOS.

Maria Sartori drafted a report and forwarded it to the legal department of IBDF; it remains in that office today. But her observations at Lakes Feia and Ribeira led her to conclude that the action of the DNOS was "simply criminal."

"The minimum that one can say about what is happening to the lakes is that DNOS has committed an act of vandalism, an assault against the ecological balance. When I arrived at Quissima and saw that Lake Ribeira had been turned into a cane field, I immediately sought out the DNOS resident engineer in Campos to bring to his attention the denunciations of Professor Strang. I was surprised when he threw at me the portfolio which I had just delivered to him. 'Only an imbecile would have written something so ridiculous,' he shouted at me. And he threw the report in my lap most discourteously. With an effort I restrained myself and tried to make him understand that the problem was very serious, but he believed that the lakes were of no importance whatsoever when economic development was at stake."

Maria Sartori could see that the planters were invading the beds of the lakes which she visited; some were even hoping that the lakes would dry up for good and had placed barriers wherever possible. In addition, "the immense variety of birds which inhabited the region has completely disappeared."

"For someone who knew Campos, Quissama and Casemiro de Abreu 3 years ago, to travel through the plantations is a real surprise. The landscape is disfigured; the fauna almost extinct. To get an idea of the situation, one needs only to glance at the two maps which hang on the wall of the DNOS office in Campos: the first shows the lakes as they were 5 years ago; the other shows them as they are today. The lakes are unrecognizable; they have been

turned into irrigation canals constructed to provide infrastructure for the development plan for sugar cane cultivation in that region. The economic development of northern Rio de Janeiro is causing disaster to the environment. This situation makes it possible to forecast a worsening of the ecological condition in the remainder of the state within a short time."

What Maria Sartori did not know at the time of her visit was at that time the DNOS was utilizing 45 drag lines and 2 floating dredgers (small ships with 20-man crews; the men were transported to the lakes in 10 trucks); as well as hundreds of workers and engineers in order to drain all the lakes on both sides of the Paraiba do Sul River. By August of last year the DNOS had dredged 1,065 kilometers of canals and had moved more than 12 million cubic meters of earth in order to create an integrated drainage system and to dry the region. One hundred fifteen kilometers of earth dikes (6 million cubic meters) and 19 kilometers of dikes of masonry were constructed. In addition, 6 canal locks, 3 reservoirs and 54 bridges were built.

The project in northern Rio de Janeiro being carried out by the DNOS under the supervision of Acir Campos, director of the Sixth Sanitation Region, envisions for this year the dredging of 190 additional kilometers of canals and the construction of 55 dikes, 4 canal locks, 17 bridges and 1 dam. All these works were projected in the Special Program for Northern Rio de Janeiro signed on December 16, 1974, by Joao Paulo dos Reis Veloso, Minister of Planning; Rangel Reis, Minister of the Interior; Alysson Paulinelli, Minister of Agriculture; and Severo Gomes, Minister of Industry and Commerce. In the statement of purpose presented by the Ministers, who requested from the Office of the President of the Republic funds amounting to 120 million cruzeiros annually for a 4-year project, it was explained that the northern part of the state, which includes 14 municipalities totaling 14,650 square kilometers and constitutes a major agro-industrial center, merits special attention. Among the works of major importance for the region, the statement stressed reclamation of hydrographic basins, to include drainage projects and reclamation of land for agriculture and livestock.

Acir Campos, DNOS director in Rio, explained that the drainage project is based on the Dutch system of defense against floods in lowlands and envisions creation of a model area of 180,000 hectares given over to the cultivation of sugar cane. As late as the first part of this year, about one-third of that area was covered by lakes and small rivers which functioned as a wildlife reserve for all the flora and fauna of that part of the state. The Baixo Paraiba do Sul

basin included 22 lakes in all, among which the most important were Lakes Feia, Cima and Campelo, all located in the Campos area and making up a single hydrological system. Of these three lakes, those which have not yet dried up should be completely dredged by the end of this year, since completion of the project is scheduled for the first part of 1978. Lake Feia-- the lake with the largest water surface in northern Rio de Janeiro--and Lake Campelo will be maintained as regulating locks for the canal system constructed by the DNOS which will serve as a means of irrigation for the cane fields.

The Special Program for Northern Rio de Janeiro was implemented with mathematical precision. All of its phases--aerophotogrammetric studies, engineering projects, funding--were carried out exactly on schedule.

It was exactly this rapid pace which alarmed the residents of the lake region. These residents engaged in hunting and fishing for 9 months of the year, and for the rest of the year worked in the sugar mills. Dependent on a primary-sector economic activity linked to the lakes, they watched apprehensively as the lakes dried up overnight. At the several-square-kilometer Lake Oncas located near the Copersucar Outeiro plant, about 400 persons earned their livelihood from lake fishing. Today the lake is a cane field and the resident families have moved to the banks of Lake Feia, refusing to work for the firm because they consider harvesting to be a low-paying job. At Lake Feia, however, they suffered an even greater disappointment: the lake, which in 1975 registered an average depth of 10 meters has had its depth reduced to less than half a meter.

Previously it took about 3-1/2 hours to cross the lake by motorboat. Today it is possible to walk across it, except at one point called Boqueirao where the depth reaches three meters. In addition, the lake has retreated several kilometers and the fences which the planters have placed in the lake bed encroach on its boundaries.

"We do not know what else we can do to live," explained Joao Dias, a fisherman from Ponta Grossa dos Fidalgos on the lake shore. "Before, it was possible to catch 15 or 20 kilos of fish per day. There were robalo, traira and even alligators. There is nothing left because the fish have either died or crossed the Flexa Canal which connects the lake with Furado Beach on the coast. And no one can give an explanation of what is happening. There is over there some kind of dredge which is swallowing up everything, but no one knows where it is nor why it is killing the lake. I think that if the lake dies, we will die too."

For Pedro Feliciano de Jesus, 48, a fisherman from Barra da Ribeira also on Lake Feia, the situation now is one of "misfortune and pain, because the lake is going away, causing everything to die."

"People were happy here," said Pedro Feliciano. "Most of them did not need to work at cane cutting, and I lived from making canoes and from fishing. Just a few years ago the lake was surrounded by a white sand beach and many tourists came in the summer. We rented out boats and sold fish. Everything was all right. Then came the dredge, and the party was over. How can I take up cane cutting at my age? And moving will not do any good, because the lakes are drying up everywhere. There can only be suffering."

Humberto Peixoto, a hunter, had been crisscrossing the lake region for over 30 years in search of pacas, capybaras, teals and even the jaguars which inhabited the Lake Oncas region. Today Humberto works for the State Water Authority in Campos as a chauffeur, and he does not hide his pain at seeing the destruction of the lakes: "I always heard that the hunter was a scourge of nature. This caused me pangs of conscience, but I hunted anyway. Now the DNOS men have come and have destroyed everything once and for all. Throughout my life I crisscrossed the Paraiba do Sul lake region and knew more than 10 species of teals, herons, armadillos, capybaras, pacas and jungle cats. I killed some 5 jaguars and several wild pigs. With the end of the lakes, the animals have disappeared and you no longer see any of the great birds. Two weeks ago I found a capybara which had fallen in the middle of the jungle; it had died of hunger and thirst. The lakes used to be so clear that you could kill a large fish with a rifle shot."

For Janilton Araujo Gomes, professor of chemistry and director of the State Water Authority treatment facility in Campos, the death of the lakes began long before the arrival of the DNOS dredges "because the sugar mills emptied all the residue which accumulated from the production of sugar cane syrup into the rivers and lakes." He explained that the residue is an organic byproduct which when introduced into a body of water causes burning of oxygen, thus destroying whatever life forms there are. "The rivers possess a regular proportion of oxygen, usually 9 milligrams per liter of water. The introduction of the residue into the lakes drastically reduces this quota, causing the death of the microscopic plant life and also affecting the higher life forms such as the fish and birds which live in harmony with the lake. However, the bodies of water can recover and recoup their quota of oxygen within a short time. The major problem arises when the sugar mill operators decide to turn the lakes and canals into garbage dumps, which happens with shocking frequency. Now, with the drainage and drying up of almost the entire Paraiba basin, the ecology of this part of the state is seriously compromised, perhaps permanently.

Nevertheless, the drainage and land reclamation project will not be restricted to the Paraiba do Sul basin. DNOS plans to extend it to the Sao Joao and Macae basins, where the entire process will be repeated. The region of Lakes Marica, Saquarema, Araruama and Cabo Frio will be affected by a plan to turn the area known as the Costa do Sul into a single navigable system of lakes and canals. A timetable for completion of these works has not yet been set, but when they are completed, the physical map of the state of Rio de Janeiro will be fundamentally altered. Instead of rivers and lakes lying in all directions, there will be canals of 150 meters in length and 6 meters in depth, forming lines similar to highways.

The DNOS engineer Acir Campos explained that the works being carried out in northern Rio de Janeiro and the projects planned for the remainder of the interior have 2 definite purposes: economic development and basic improvements.

"In the Campos region, drainage will permit a substantial increase in land available for sugar cane cultivation," the engineer stated. "We are reclaiming for cultivation more than 70,000 hectares of land, in addition to establishing a permanent irrigation system which will eliminate the problems caused by prolonged dry spells and prevent the now common overflowing of the Paraiba. By next year that region should be producing 24 million sacks of sugar, and that is an economic factor which cannot be ignored. There are those who accuse us of destroying the environment, but I am convinced that the sugar cane industry is much more important than a half-dozen lakes and some schools of fish. In addition, it is necessary not to forget that Baixada dos Goitacazes, where the Paraiba basin is located, was one of the most malaria-infested areas of the country. The disease began to be controlled in 1940 when a somewhat disorganized drainage project was carried out in the region. Those who accuse us of devastation are forgetting that the progress of the state is an uncontrollable process. Thus it is better to create an infrastructure of support for the economy today than to wait for worse disasters arising from disorderly growth."

The arguments of the DNOS director are at variance with the opinions of environmental specialists. Ricardo Silveira, FEEMA /State Foundation for Environmental Engineering/ engineer and biologist, believes that such a large-scale operation in the state's lakes could dangerously alter the ecological balance, with incalculable consequences. "The death of countless life forms," he stated, "is the logical road to ecological modification, and we must not forget that living beings, including man, are part of a very fragile natural chain: when one link of this chain is broken, an uncontrollable process of alterations is begun." For Iara Verocai

Dias Moreira, FEEMA architect responsible for the Rio de Janeiro coast population survey, a technical solution for environmental problems always exists, even when conditions for economic development must be created: "But the technical solutions depend on political directives; these cause a policy of preservation of the environment to be abandoned in favor of immediate results."

The Special Secretary for the Environment, Paulo Nogueira Neto, during a visit to Rio last Thursday stated that his office was concerned about the Rio lakes problem. He said that several Rio mayors had consulted his office and that he was keeping up with the situation. Lizimar Aguiar, former director of SERLA /State Office for Rivers and Lakes/ and present Secretary for Science and Technology of the Office of the Special Secretary for the Environment, argued that "there is a federal code which prohibits the draining of the lakes, which has often been disregarded." According to him, the Office of the Special Secretary for the Environment is aware of a series of clandestine land-filling incidents in the lakes near the coast and in the northern part of the state.

FEEMA informs also that even in the Marica, Saquarema and Araruama Lakes region there are serious ecological problems. In Lake Araruama, the largest lake in the state, there has been a constant shrinkage of the water surface caused by both natural ebbing and countless clandestine land fillings. In addition, the waters of the lake are severely contaminated by the pouring of sewerage and chemical refuse into the lake. Indeed, according to DNOS, the salt beds are practically condemned. At Lake Saquarema, the situation is much more serious: the waters of the lake have diminished by almost 30 meters over the last two months. The depth has decreased to less than half and huge numbers of fish died. Last month the Office of the Mayor of Saquarema interdicted the lake because of the death of 48 tons of fish resulting from an increase in the temperature of the water. The principal cause of the problem is an obstruction in the Barra de Saquarema Canal. Funds amounting to 350,000 cruzeiros were allocated for repairs, but in spite of the low cost of the work, the state government has postponed it for two years.

The Situation in the Baixo Paraiba do Sul Basin

Lake Salgada: - on the left bank of the Paraiba do Sul River, salt water, formed by the waters of the rivers of the lowland leading to the coast: completely dry.

Lake of Jesus - small hydrological formation: completely dry.

Lake Limpa - formed by the Muriae River; the local residents believe it to have medicinal properties: should be dried up within the next few years.

Lake Salgada - on the right bank of the Paraiba do Sul River, salt water: completely dry.

Lake Jacares - an appendage of Lake Feia; known to be a refuge of alligators: dry.

Lake Feia - formed by the Ururai River; the largest lake in northern Rio de Janeiro; is to be preserved as a water source for regulating the irrigation system constructed by the DNOS: at the moment it has a depth of only half a meter.

Lake Cima - has been harmed by constant land clearings along its banks; but is the only lake which has not been polluted or drained; is to be preserved as a water source for regulating the irrigation system.

Lake Vigario - belongs to the Campos urban perimeter; should not be affected by the dredgings; but is completely contaminated by sewerage and refuse from the city's slaughterhouses; the Campos public health authorities have warned that its waters should not be utilized for cooking, drinking or bathing.

Lake Pau Grande - formed by the Andrezza Canal: completely dry.

Lake Acu - formed by the Acu River: completely dry.

Lake Pau Fincado - formed by the Pau Fincado River: completely dry.

Pitangueiras Pond - formed by the Pitangueiras River: completely dry.

Lake Agua Preta - formed by the Doce River: completely dry.

Lake Campello - formed by the Paraiba do Sul River; one of the largest lakes of the Campos region: the surface of the lake has been reduced by half, but it is to be preserved as a water source for regulating the irrigation system.

Lake Taigrande - formed by the Taigrande River: completely dry.

Lake Oncas - known to be a refuge for jaguars and medium-sized animals, and was abundant in fish: completely dry and turned into a canefield.

Lake Pedras - formed by tributaries of the Paraiba do Sul River and replenished by the annual floods of the Paraiba: has been drained and is completely dry.

Lake Brejo Grande - formed by floods: has been drained and is completely dry.

Lake Braganca - small-sized lake formed by the Braganca River and the Madureira Canal: completely dry and turned into grazing land for the cattle of the region.

Lake Pau Fundo - formed by the Ururai River: completely dry and turned into a cane field.

Lake Ribeira - located in the municipality of Quissama; the fourth largest lake in the region; known to be a refuge for herons and aquatic birds: completely dry and turned into a cane field.

Lake Maramba - formed by the Maramba Stream: completely dry.

Lake Carapebus - located in Barra de Macae near the coast; situated in the outflow area of the DNOS canals; will interconnect the canal system: practically dry.

Lake Iquipari- located on the coast near Praia do Acu, salt water: completely dry.

In addition to the lakes listed above, the Paraiba do Sul basin contains several swamp areas and temporary lakes formed by flooding. The hydrographic system of the basin will be altered by the dredging and modification of water course operations carried out by the DNOS.

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BRAZIL

### PARIABA RIVER POLLUTION PRESENTS NO THREAT TO RIO RESIDENTS

Rio de Janeiro O GLOBO in Portuguese 22 May 77 p 15

Text The maximum concentration of detergents found in the water of the Guandu River by an analysis made during a year in the laboratories of the State Water Company CEDAE, was .0007 milligram per liter, less than one thousandth of the maximum allowed, which is half a milligram per liter as published.

According to the secretary for state projects, Hugo de Matos, pollution of the Pariaba River, whose waters are reroute to the Guandu, has not yet reached a degree that could affect the health of the Rio de Janeiro population. He believes that it is unlikely that this danger will arise because of the mechanism installed in Rio and Sao Paulo to prevent the increase in water pollution.

#### Treatment

The Guandu treatment station through which most of the water used by the city passes, it is said, is a true chemical plant which changes a raw material--the raw, murky, muddy and polluted water of the river--into a finished product of better quality which can be consumed without fear by the population.

To produce 2.6 billion liters of potable water per day, the station uses nearly 40 tons of aluminum sulfate, 12 tons of hydrated lime and five tons of chlorine per day in an activity that involves the constant work of 393 persons, according to the chief of the station, pharmacist Dirceu Alvarenga Meneses.

Hugo de Matos says that the analysis of the untreated water of the Paraiba River made by the State Foundation for Environmental Engineering FEEMA with samples taken from the Funil dam at the boundary with Sao Paulo to the mouth of the river at Sao Joao de Barra, show that the maximum concentration of detergents found is .35 milligrams per liter, still below the maximum allowed for human consumption (.5 milligrams per liter).

"As the president of the Brazilian Sanitary Engineering Association, I know the standards of quality of water consumed in almost all of Brazil. I can declare, on the basis of this knowledge, that the water distributed to the Carioca population is of the water which receives one of the best treatments. Rio is also the city with the largest per capita water consumption rate in the country."

Because it is unnecessary, the Guandu treatment plant does not have equipment for treating the detergent contained in the water. Hugo do Matos believes that there are no reasons for fearing the consequences of a large spill of detergents by some industry located on the banks of the Paraiba River.

"The formation of foam would be so great that there would be enough time to close the gates that allow water to flow into the Guandu intake. After the critical mass of water with detergent passed by, they would be opened once more, reestablishing supplies. For that purpose the CEDAE is equipped with an efficient system of radio and telephone communications.

To control the pollution of Paraiba, the Secretariat of Works, through FEEMA, signed an agreement in April of last year with the State Company of Technology for Environmental Improvement and Control [CETESB] of Sao Paulo. The two bodies will take periodic samples to evaluate the rate of pollution of the Paraiba River and its tributaries and they have a listing of all the industries and other polluting sources of the valley and even an analysis of the wastes from each of them.

From this survey the two bodies are making an extrapolation of information in order to learn the situation that would be reached in the future with maintenance, growth or decrease in the present rate of pollution.

These elements will also serve as a means of orienting the industries for the installation of pollution control equipment. The FEEMA signed an agreement with the Rio de Janeiro State Economic Development Bank--BD-Rio--for financing the purchase of pollution control equipment in the entire state.

#### Improvements

The secretary recalled that the greater or lesser rate of pollution is the result of the dilution of pollutants in the mass of water. The capacity for dilution of the Paraiba River will increase even more beginning next month when the dams built on the Paraibuna and Paraitinga Rivers--tributaries of the Paraiba--in the state of Sao Paulo go into operation. The main purpose of the two dams is to regulate the flow of the Paraiba River, impounding the water during periods of rain to prevent flooding and releasing them during dry periods to maintain a constant volume of flow.

Hugo de Matos said that even before regulating the flow of the river its rate of pollution is still tolerable. For the maintenance of aquatic life, fish as well as microorganisms, a minimum of four milligrams of oxygen dissolved in the river water is necessary. In the Rio de Janeiro stretch of the Paraiba River, the minimum ratio found through an analysis was 5.8 milligrams of oxygen per liter. Hugo de Matos said he knows that in Sao Paulo the quantity of oxygen dissolved in the Paraiba went down to 3.7 milligrams per liter, but the CETESB took measures to control the wastes that caused that reduction.

#### Station

The treatment of the water at Guandu begins at the intake where gratings hold back tree limbs and other large-sized materials. Then the water runs through a small tunnel and enters a battery of canals called "sand removers" which remove all the sand. At the entrance of the water pipes into the treatment station there is a laboratory that operates uninterruptedly, making an evaluation of the color, murkiness and alkalinity of the water so as to establish the ideal dosage of aluminum sulphate to cause flocculation. The sulfate solution is prepared in the chemical building where there are supply bins, grinders, tanks and mixers. The solution is spread through the water through regulated openings, a chemical reaction taking place which turns the sulphate into aluminum hydroxide. The organic material contained in the water clings to the hydroxide forming floccules. The mass of water then passes to the settlement tanks where it remains until all the solids sink to the bottom. Then the water passes through a series of 72 sand filters and is disinfected through chlorination with a dosage of four parts of chlorine per million parts of water. The addition of aluminum sulfate in the flocculation phase makes the water acid, lowering the pH (hydrogen potential or degree of acidity or alkalinity) from 6.6 to 6.8 to 5. This acidity is corrected at the end of the treatment where hydrated lime is added to the water which makes it become alkaline with a pH of 7.5 to 8.3. An electronic device of Swiss manufacture installed at the main laboratory of the treatment station makes it possible to make an instant reading of the pH of the water, allowing an immediate correction when it goes out of established limits. The laboratories make constant physical, chemical and bacteriological analyses of the water.

After this treatment, the water distributed to the population is once more chlorinated at the outlets of the reservoirs of Engheno de Dentro, Macacos and Acari because while running through the aqueduct the microorganisms consume a large part of the chlorine added at the treatment plant. The CEDAE has a control system that reports through radio, hour by hour, on the amount of residual chlorine in the water, through which an evaluation is made whether there are microorganisms in the water or not.

POLLUTION CONCERNS ALL; ANTIPOLLUTION CENTER

Libreville L'UNION in French 7 Apr 77 pp 1, 5

[Article by Charles Minko Mbele]

[Text] Pollution, that word (or that evil) that comes to us directly from the industrialized countries, designates the act of dirtying, soiling certain localities by making them dangerous or unhealthy from the accumulation of wastes and toxic substances. The latter are most often the result of industrial operations or human activity. Is there a pollution problem in our country, where industrialization is still in an embryonic stage? If so, how does it manifest itself? These are the questions we shall try to answer in the article that follows.

Man, by his many activities, produces simultaneously useful consumer goods and wastes, the latter being residues with neither market value nor capability of being reprocessed into anything of value. If no care is taken in connection with the discarding of these wastes, they will befoul the environment and cause noxious effects of all sorts (odors, contamination of streams, noise, etc.). So much so that in the end normal living is no longer possible in such places. That is what is meant by pollution of the environment.

Since pollution increases concurrently with industrial progress, it is quite natural that it is worse in the present than it was a century ago. Also, that it should prevail on a larger scale in the highly industrialized countries than in the developing countries such as ours. Thus in France, for the year 1972 alone, there were 11 million tons of household wastes, 2 million tons of commercial waste, 11 million tons of industrial waste, 117 million tons of refuse from extractive industries and 800,000 automobiles out of commission.

## Pollution in Gabon

If pollution may be said to be the totality of poisonous wastes resulting from human activity, it stands to reason that Gabon, due to its recent industrialization, already has some polluted zones and micro-zones.

### Illnesses Caused

The following will be encountered:

--Pollution of the atmosphere, which is none other than the dust from our laterite-covered roads. With the movement of motor vehicle traffic this dust rises and may be the cause of certain respiratory diseases (coughing, bronchitis). It is easy to take note of the filthy appearance of the vegetation and grass that grows along the edge of these roads.

In the sawmills and carpentry shops fine particles of sawdust can cause diseases of the lungs and eyes among the workers. The sawmills at Libreville and Port-Gentil dump their sawdust in certain places, thus causing rubbish pollution.

### Industrial Wastes

#### --Water Pollution

Certain industrial production units (SOBRAGA [Gabon Breweries Company] for example) discard their waste water on the open ground. The result is a succession of nauseating pools. A walk through certain parts of Libreville is sufficient to get the picture.

The railroad ties one sees on our beaches are not there for decoration. Besides, the rinsing out of the cooling system of oil tanker engines and the voiding of ballast from the tanks are further sources of sea pollution. This becomes plain to see when a film of crude oil is floating on the sea surface, or when swimmers find their feet covered with crude oil or tar.

The great quantity of household wastes that abounds in the different sections of Libreville is equally noxious, and pollutes the environment.

Water used in the manufacture of paper-pulp contains organic compounds (wood fibers) and chemicals (dyes, sulfur, caustic soda), and when discarded into a stream it makes the stream muddy and turbid. The water in the stream then becomes toxic, and the fish and plant life therein die. This is known as aquatic pollution, an evil which the formation of SOGACEL [Gabonese Cellulose Company] risks bringing about.

### The CNAP, Agency To Fight Pollution

The examples given above prove that pollution does indeed exist in our country, negligible though it be when compared with industrialized countries.

PROBLEMS OF DRINKING WATER SUPPLY DISCUSSED

Libreville L'UNION in French 29 Apr, 30 Apr-1 May 77

[Article by J. P. Koweit: "How Can the City Get Its Drinking Water Supply?"]

[29 Apr 77, pp 1,3]

[Text] Coastal cities often have problems getting an adequate drinking water supply. This is, first of all, because of their large populations. Secondly, it is due to the high intensity of business and industry in those areas. And lastly, it is due to their natural environment (the ocean).

The drinking water supply is a prime necessity for the survival of both the local population and the large-scale industries which have been set up in the area.

Thus, according to SEEG (Gabon Energy and Water Company) statistics, industrial consumption of drinking water for the city of Port Gentil has reached 971,000 cubic meters per year, while domestic consumption has risen to 1,334,232 cubic meters. This is out of an annual production of nearly 3 million cubic meters of water. To these figures should be added the 304,000 cubic meters of industrial consumption and the 43,000 cubic meters of domestic consumption which are used by the water company, itself--that is, the SEEG.

In addition, it should be pointed out that 223,000 cubic meters and 12,000 cubic meters were used up by public fountains during this same period. And this is not counting the drinking water supplied to the ships which dock at the port.

In regard to the infrastructure for collecting and conveying the drinking water, it should be emphasized that enormous difficulties exist in collecting the water from the wells. In Port Gentil, the water is drawn from the underground water level, 6 meters below the surface. Two different methods of water collection are used:

The first method is a siphoning system, which consists in drawing the water by creating a vacuum in a pipe which is inserted into the layer of water. The water collected by this method, which is used in 106 wells in the Port Gentil region, is conveyed by a water pipe to the treatment center.

The second method, which seems to be a less costly one, uses water wells. Currently, 8 wells are drawing 200 cubic meters of water per day in the Port Gentil zone. And in the Tchengué region, 22 wells are producing 200 cubic meters of water per day, which are piped to the center in case of emergency.

### Treatment and Storage

As far as water treatment is concerned, it should be pointed out here that the water treatment is passable, as it is in other treatment centers the world over, despite the decrepitude of the equipment, which dates from the years 1952-1953.

The water here is treated by flocculation. This is a chemical process which purifies very turbid water, using a mineral composition of 100 grams of lime, 100 grams of aluminum sulphate, 8.5 grams of calcium hypochlorite and 0.50 grams of purifloc N 17 per cubic meter. A very pure water is obtained with this process, using a device called a pulsator. It should be pointed out that the water is filtered under pressure. It is the rotation of water in the filters that actually makes the water drinkable. After this process, the mineral density is reduced, and then the water is distributed. It should be emphasized that no more than 0.06 grams of iron, 0.4 grams of chlorine and 7.6 grams of pH acidity remain per liter.

It should be noted in passing that the process that the water goes through in the treatment center has one problem, which is the difficulty in completely eliminating the iron salts suspended in the water. This results in water which is often somewhat discolored. But according to those in charge, this water is in no way dangerous to drink. Moreover, it is given to be understood that the water is as clear as Evian water when it leaves the center, despite the treatment problems. But according to other sources, the bad quality of the water is due to the fact that the piping system is poorly maintained, taking into consideration the decrepitude of the water pipes, which are already rusted. Port Gentil specialists report that, as a consequence, we are drinking too much iron.

After being treated, the water is stored in two water towers. The main tower holds 1,000 cubic meters and the other holds 600 cubic meters. Both towers are intended to supply the Elf Gabon buildings.

As this water is in reserve, it is distributed according to the needs of the system, which covers 102 kilometers, thus taking in the entire city.

USSR

WATER MANAGEMENT IN KAZAKHSTAN; ENVIRONMENTAL PROTECTION MEASURES

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 1, Jan 77 pp 84-87

[Article by T. Aliyev, deputy chief, Technical Administration of the Main Administration of Rice Sovkhoz Construction, USSR Ministry of Land Reclamation and Water Management: "Improved Water Conservation Management"]

[Text] The economic potential of Kazakhstan in the 10th Five-Year Plan has grown immeasurably. This further rise specified by the "Basic Trends in the Development of the National Economy of the Country for 1976-1980" requires the wide mobilization of natural resources, including water.

Intensified efforts in the water management balance and in the condition of water resources predetermine the need for a radical improvement in water conservation activities and, in particular, the management of water conservation.

Dumping of impure sewage water into rivers and lakes in the last five-year period decreased from one million cubic meters to 300,000 daily. The capacity of various sewage treatment plants at modernized and newly constructed branch enterprises for this period rose almost by 33 percent. The volume of water used in repetitive cyclic systems increased by 150 percent. And all that has been done, we can say, is just the first step. As before, the situation in conservation is not at the required level. Consumers are not always thrifty in their use of water allocated to them. In a number of cases they permit the dumping of impure and insufficiently purified sewage, and the control over this is not being carried out to its fullest extent.

At the organs under the republic's ministries and departments, as well as at various large-scale enterprises, special subelements have as yet not been set up to resolve the problems of conservation and the efficient use of water. In a majority of cases this work is concentrated in administrations and branch departments of the chief power engineer or chief mechanic. Technical documentation is being drawn up that not always responds to requirements and the measures outlined in these instances are inefficient.

The sludge tanks built at the Aktyubinsk Chemical Combine according to a plan of the Kazakhstan State Planning Institute for the Surveying and Planning of Outdoor Water Supply, Sewer Systems and Hydraulic Engineering Structures [Kazvodokanalproyekt], do not provide the necessary protection to the Ilek River from pollution. Urgent measures had to be taken for the fundamental reconstruction of the sewage system and to eliminate the old tank. This led to substantial additional expenditures.

At the Dzhambul Phosphorous Plant still in the construction stage, it has been noted that the measures being realized are insufficient for the effective protection of water sources from contamination.

Often when new industrial capacities are turned over for operation a lag in the construction of water conservation projects is observed. There are such instances at the Karaganda Metallurgical Combine, the Zyryanovsk Meat Combine and at other enterprises. At times there is a lack of services to make these facilities operational. For example, that is the situation at the primary wool treatment factory and the sugar combine in Dzhambul, and at the meat combine in Karaganda.

Analysis indicates, however, that those authorized state organs and water users are far from providing purity to rivers and lakes. The basic insufficiencies in this matter are the unclear organization in the service of management, the lack of scientifically substantiated planning methodology of water conservation and the complexity of decisions being used within the confines of the basins.

The statute of the Ministry of Land Reclamation and Water Management [Minvodkhoz] states that the Kazakh SSR Minvodkhoz, within the limits of its jurisdiction on questions of conservation and the complex use of water, issues orders, instructions and directives obligatory for all ministries and departments independent of subordination and checks on whether they are being carried out. These rights of the ministry are fixed by article 9 of the Kazakh SSR Water Code.

In places these functions are carried out by water inspectorates. The operational control is realized by them only in part and amounts to record keeping, control and responsibility in part for the condition of pollution and depletion of water supplies. The means for water conservation are disbursed to various ministries and departments. In connection with this effective coordination of measures within the limits of the various water projects is practically impossible.

Portions of the basin are in the realm of servicing of the ministry's subordinate inspectorates. Within the limits of the Kazakh SSR, there are three inspection teams on the Ural River, two on the Irtysh, etc. In carrying out mostly control functions, the inspection teams do not cover questions touching on planning and the complexity of decisions adopted within the limits of the basins. Water conservation planning by the Minvodkhoz is

conducted without accounting for the condition of water projects on the whole. Consequently, adequate substantiation is not always on hand and this often leads to inefficient expenditures of state funds.

As is well known, water does not lend itself towards local use. Within the limits of major river, lake and sea basins they form a specific physical and economic unit. If we violate the rules of consumption, let's say, of a river at its upper reaches then this will affect the river's condition in its lower flow. Failure to account for this, water users find themselves with uneven conditions. Therefore, it is apparent that the structure of the republic's inspection organs must be based on the foundation of a basin principle.

The "Basic Trends in the Development of the USSR National Economy for 1976-1980" calls for the development and realization of measures for environmental protection and the efficient use of natural resources. To carry out this work in the section on water conservation, I think that it is necessary to be guided by a coordinated work program that is interconnected throughout the entire basin and which embraces questions of science and technology, production and the organization of the management service. But this is possible only within the framework of management over the basins with the affiliation of the oblast industrial sectors.

The establishment of industrial sectors will allow for having a base of operation information to adopt measures of a water conservation nature in a timely manner that are under the republic's area of responsibility. This will contribute to combining overall governmental and local interests to more fully guarantee qualified management within the limits of the water basins on the whole.

It would be advisable to subordinate the management of inter-republic water basins directly to the USSR Minvodkhoz in imitation of the Caspian Sea water inspection organization Kaspvodnadzor.

Proceeding from the functional obligations and the important tasks entrusted to the inspection organs, labor payments for managers and engineering and technical workers in the basins being managed should be made equal to the wages of the workers of the water management organizations--those managing canals, irrigation systems, etc.--and not to those in the fishing industry as is now the case.

At present water sources have essentially been transformed into an integral part of production technology. But the methods of economic activity within their limits and at production facilities is all too varied. At the enterprises production efficiency is being augmented that includes automated technological processes. Water sources are not looked upon as industrial projects of the national economy (except for reservoirs, canals, and others), and the water in them is considered a free blessing.

Regulation of the complex interrelationships on 25,000 water users and more than 25,000 mighty rivers, lakes and other sources subject to their influence, naturally requires a sufficient number of personnel in the republic's Minvodkhoz system. The present 120 staffed inspection units, it must be recognized, cannot adequately control the condition of these water sources, the action of the water users, run a notification and dispatch service, and plan and carry out systematic accountability and bookkeeping.

Here, as in other spheres of the national economy, it is obviously necessary to establish cost accounting subelements. The basis for these cost accounting rates, I think, can be payment for water use.

The extent of the rate must be determined originating from the sum of the funds necessary for maintaining the basin management apparatus, for stimulating labor and expenditures for fulfillment of interdepartmental measures. The volume of the water extracted, the amount of discarded sewage and its makeup must be specified by projects that include the most up-to-date technological solutions that require minimal consumption and removal for a unit of production and perfected methods for purifying waste products.

It is advisable for the Minvodkhoz subelements, called upon to regulate the efficient use and conservation of water as well as to implement interdepartmental measures, to be isolated in a branch with a financing plan removed from land reclamation.

It is necessary to clearly distinguish between the terms "water management--system" and "water management--branch." The first is understood as the sum total of natural and man-made sources used by the various branches of the national economy and by the populace, and by the complex of facilities and devices for water intake, for conveying water to its point of consumption, for bringing it up to technical specifications satisfactory to the consumers, etc.

Under the second term a branch of the national economy has functions that include:

--water conservation and economic activities management, including planning, operational regulation of the efficient use and conservation of water, control, accounting and bookkeeping, as well as information supply;

--implementation of interdepartmental water conservation measures.

It is to be kept in mind that interrelationships with other national economic branches is to be realized on cost accounting principles. The water allotted is looked upon as a raw material prepared by the branch, the receipt of purified water--as the processing of a utilized raw material supplied by the users. Direct use of water sources by special types of water use within the limits of a water sector is looked upon as leasing "water management" from the branch.

From what has been stated it follows that the fundamental improvement in water conservation affairs can be achieved through regulated "water management" branches that include specialized cost accounting subelements with its own financing plan removed from land reclamation.

Moreover, it is necessary that every water source having a multipurpose designation be considered a branch industrial project.

Throughout it all the principles for managing socialist economy must be disseminated.

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CSO: 5000

ENVIRONMENTALISTS MAKE EFFORTS IN BEHALF OF STORKS

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 28 May 77 p 8

[Text] Schleswig, 26 May (DPA)--In the stork country of Schleswig-Holstein, the storks have occupied their nests again, but Adebar's [popular name for the stork] friends are not content. The number of pairs of white storks keeps falling. If 40 years ago some 2,000 pairs were still nesting in the country, now only a little over 400 are doing so. The main cause of the drop is an increasingly cultivated and drained landscape, which to a far-reaching extent deprives the bird of its nourishment--particularly marsh fauna such as frogs. Pesticides and insecticides used in agriculture are also decimating small animal life.

If the stork is to survive, it needs above all the collaboration of the population in the rural areas. The main concern is the preservation of moist areas, including ponds, pools, ditches, leas and marshy lowlands. In the "stork community" of Bergenhusen, the municipality is making available 1.5 hectares of land to be flooded alternately, and this area is to be expanded further.

Because of the drought, a food-stocking operation had to be organized in the past 2 years: last summer fishermen fishing for pleasure inhabiting the lowlands of the Sorge and the Treene north of the Eider donated almost 60 centners of fish in order to save Adebar from starving to death. In Bergenhusen, people are optimistic this year: a lot of rain in April created a sound basis for sufficient nourishment.

A further prerequisite of the stork being saved is its being able to find an abode when it returns from the south. In Bergenhusen, Rudolf Wendt has spent many of his leisure hours on overhauling damaged nests and building new ones. There are 38 nests on houses and poles in this stork village. In the spring there arrived 19 pairs of storks and 3 "loners"--3 pairs fewer than the year before.

Only a few kilometers from Bergenhusen, in Suederstapel, the veterinarian Dr Wulf Hansen has fixed up a stork reception center. Last summer 22 injured birds, both old and young, were treated successfully. Special

experience was gathered in bringing up and caring for kicked-out stork chicks, and it was also possible to make observations contributing to behavior research. Among other things, it was proved unequivocally that "ready nests" represented a decisive contribution to the preservation of the stork.

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CSO: 5000

AMERICAN CRAYFISH CONTRIBUTES TO NORTH EUROPEAN ECOLOGY

Hamburg DER SPIEGEL in German 6 Jun 77 p 89

[Article: "Like Cannibals"]

[Text] Breeders of a freshwater crab imported from the United States are combining environmental protection and business in an ideal way.

Walter Scheel knows what the *pacifastacus leniusculus* is all about. He looked into the matter of the crustacean while he was still minister for development aid, and in 1976, as federal president, during a state visit to Finland, he spoke to his counterpart, Kekkonen, about the freshwater crab while still en route from the airport to the presidential palace.

While corresponding with his friend Reinhard Spitzzy in the Austrian backwoods, the president also time and again brings up the subject of the *pacifastacus*. Spitzzy, as it were, is one of the foster fathers of the crustacean, which comes from the United States, and has made propaganda for it for years--as an ecological factor and one yielding a profit at that.

Spitzzy would like to settle the *pacifastacus*, generally called crayfish, in lieu of the European crayfish, which has almost died out, as a result of a dangerous disease called crayfish pest. Crayfish keep lakes and rivers healthy, eating everything that comes their way and thus, e.g., preventing the overweening, oxygen-consuming growth of plants.

In 1969, 58,000 crayfish were imported from the United States, mostly from Lake Tahoe, to Sweden. In the meantime, in the 200 lakes and rivers of that northern country they have multiplied to 1 million. Clearly, they are immune to the crayfish pest. In the Swedish breeding lakes, hundreds of thousands of young crayfish are bred each year and passed on by container to customers in other European countries.

The crab, "which we have been seeking for years" (fish breeder Theo Staehler from Niederzeuzheim in Hesse), has meanwhile also settled in

numerous German bodies of water--the fishponds of Count Axel Douglas in the Franconian castle domain of Langenstein, for example, Staehler's Westerwaelder Fischzucht [Westerwald Fish-Breeding Enterprise], the excavation pools and fishing ponds of fish breeder Friedrich Steigler of Jedelhausen, or Ritterhude in Lower Saxony. Steigler also sold 70,000 to Uganda "so that they can eat clear an overgrown lake area down there."

European breeders believe that they can raise large crayfish cultures in climatically suited areas of Asia and Africa--e.g., in manmade lakes which then would supply not only energy but valuable albumen.

Fishery biologist Dr Erich Schweng advocates "the use of American crayfish wherever German crayfish used to settle," because no other aquatic creature can replace the "crayfish as water police." Wherever the *pacifastacus* is at home, he acts like a "cleaning machine" at the bottom of the body of water, Dr Schweng says.

Apparently the American crayfish thrives in virtually any body of water, be it a manmade or mountain lake, a meadow brook or an industrial canal. What it needs is a summer temperature of at least 15 degrees Celsius, sufficient cover against adversaries in the form of rocks and roots. Then, according to Spitzzy, the underwater crab, is a profitable proposition, thanks to its "enormous fertility, rapid growth and great weight" (up to 600 grams).

Customers--mostly hotels and high-class restaurants, pay DM 45 a kilogram for crayfish. In their nets equipped with bait, breeders catch up to 2,000 crayfish (a market weight of 100 kg) per hectare of lake area. Since crayfish need not be fed and since wage expenses arise only during the catch, a profit of DM 3,000-4,000 is entirely realistic.

The only obstacle in the way of a sizable spreading of the crayfish is their own way of life and the appetite of fish. Young crayfish are "caviar for any other aquatic creatures, including larger crayfish, which are veritable cannibals," Spitzzy says.

The Federal president is also familiar with the problem. "Large stock crayfish," Walter Scheel recently wrote to his friend in the backwoods, "have something in common with politicians: faced with stark reality, they have a big dropout ratio."

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END