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Conservation Practices
Applied Relative To
Three Foreign Development Projects
Supported By World Bank Loans B-161470

*BY THE COMPTROLLER GENERAL
OF THE UNITED STATES*

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APRIL 4, 1974

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ABBREVIATIONS

FELDA	Federal Land Development Authority
GAO	General Accounting Office
SJSB	Sharikat Jengka Sendirian Berhad



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-161470

The Honorable Henry S. Reuss
House of Representatives

Dear Mr. Reuss:

This is our report on our observations concerning the conservation practices being applied relative to three foreign development projects. We made our survey in response to your request dated May 15, 1973. The projects, supported by World Bank loans, are in Malaysia, Kenya, and Zambia. Under separate cover, we are including some pertinent GAO photographs taken during our visit to the project sites.

As you are aware, the Bank in 1970 established an environmental office to review and evaluate every investment project on its potential effects on the environment and public health; however, because the Bank is outside our direct audit authority, we do not know how effective it has been in recent years in carrying out this mandate. For the three projects initiated in 1968 and 1969, the Bank did not conduct formal ecological impact studies or prescribe other specific measures to insure the environmental integrity of the forests.

According to your request, we have not obtained comments from the World Bank or from the U.S. agencies having responsibility for the U.S. participation in the Bank.

We believe that this report would be of interest to certain committees and Members of Congress. However, we will release the report only after you agree or publicly announce its contents.

Sincerely yours,

A handwritten signature in cursive script that reads "James B. Stacks".

Comptroller General
of the United States

D I G E S T

WHY THE REVIEW WAS MADE

Congressman Reuss asked GAO to survey three foreign development projects involving timber harvesting. The projects, supported by International Bank for Reconstruction and Development (World Bank) loans, are in Malaysia, Kenya, and Zambia.

GAO was asked to look into

- how much timber is being harvested,
- whether this harvesting is being conducted according to sustained-yield principles,
- whether the natural diversity of trees in the forests is being maintained,
- what measures have been taken by the World Bank to insure that the forests' environmental integrity is protected, and
- to what extent the economic benefits of these projects are being obtained by the governments and people of the three countries. (See app. I.)

FINDINGS AND CONCLUSIONS

MALAYSIA

Volume of timber harvested

The forest-industry complex has been

removing about 182,000 forest-tons (1 forest-ton is equal to 50 cubic feet of timber) a year from the land-clearing operations in the Jengka Triangle settlement areas. It expects to obtain a sustained yield of 125,000 forest-tons a year from the adjacent forest reserve. The logging operation will gradually move from the Jengka Triangle to the adjacent forest reserves during 1974.

Sustained-yield management

Forest reserves will be harvested using a sustained-yield forest management system based on selective logging and natural regeneration supplemented by enrichment planting, when necessary.

After the commercially valuable timber in the Jengka Triangle settlement areas has been removed, the trees that remain are cleared and burned. The land is then planted in a single species.

Natural diversity of trees

The natural diversity of trees in the forest reserve will not be maintained. The logging operation will remove or destroy an estimated 40 percent of the standing timber. This timber will be replaced by natural seeding and enrichment planting of marketable species, thereby increasing the proportion of marketable species in the forest reserve.

World Bank measures to insure the environmental integrity of the forest

Project officials informed GAO that the World Bank had not prescribed any specific measures to insure the environmental integrity of the forest.

Economic benefits

The Jengka land settlement programs have provided, or will provide, increased income to the 10,000 settler families and the programs will help Malaysia maintain its world market share of natural rubber and palm oil. The settler's estimated income is above that of the average rural Malaysian.

The forest-industry complex employs 1,000 Malaysians, thereby generating foreign exchange and demonstrating modern industrial techniques and sustained-yield forest management for other firms.

KENYA

Volume of timber harvested

As of August 1973, no trees financed by the World Bank had been harvested, because the earliest plantings were only 3 years old. Nationwide, timber harvesting amounted to over 200,000 forest-tons during 1972.

Sustained-yield management

All harvesting is to be done according to sustained-yield principles. Currently, the Forest Department is planting enough trees to allow a substantial increase in sawwood production within the 30-year rotation schedule. Plantings for pulpwood are currently equal to

expected requirements for the paper-mill's initial capacity.

Natural diversity of trees

The natural diversity of trees in the forests will not be maintained. The Forest Department is carrying out a systematic reforestation program using fast-growing softwood pine and cypress species.

World Bank measures to insure the environmental integrity of the forests

Bank officials informed GAO that the World Bank had taken no specific measures to insure the environmental integrity of the forest.

Economic benefits

The primary economic benefit to be obtained from the forest program and related forest industries is the savings and generation of foreign exchange through reduced paper imports and increased sawwood exports.

About 7,000 people were employed in March 1973 in jobs directly related to the World Bank forestry project. In addition, establishing the wood-related industries is expected to generate substantial employment.

ZAMBIA

Volume of timber harvested

No trees financed by the World Bank have been harvested, because the earliest plantings are only 4 to 5 years old. However, about 18,000 forest-tons of timber were expected to be harvested during 1973 from the first eucalyptus plantings of the midsixties.

Sustained-yield management

According to Forest Department plans, harvesting is to be done according to sustained-yield principles. Pine plantings will be on a 30-year-rotation basis whereas eucalyptus plantings will be on an 8-year rotation.

Natural diversity of trees

Natural diversity of trees will not be maintained. Since the mid-sixties, the Forest Department has been engaged in a systematic re-forestation program establishing pine and eucalyptus plantations.

World Bank measures to insure the environmental integrity of the forest

The GAO survey disclosed no specific measures taken by the World Bank to insure environmental integrity of the forests.

Economic benefits

At present, Zambia is a net importer of wood products. The increased lumber forest plantations provide is

expected to meet much of the internal demand for wood and wood products.

Foreign exchange savings and diversification for Zambia's one-commodity economy should result. In addition, development of wood-related industries should provide increased employment opportunities.

The World Bank authorized the above programs before the Bank established its environmental office in 1970 which has the mandate to review and evaluate every investment project from the standpoint of its potential effects on the environment and on public health.

Even before establishing this office, the countries themselves were undertaking conservation practices to accomplish their objective.

AGENCY ACTIONS

In accordance with the request of Congressman Reuss, GAO has not obtained comments from the World Bank or from U.S. agencies having responsibility for the U.S. participation in the Bank.



CHAPTER 1

INTRODUCTION

At the request of Congressman Henry S. Reuss (see app. I), we surveyed three foreign development projects involving timber harvesting. The projects, supported by International Bank for Reconstruction and Development (World Bank) loans, are located in Malaysia, Kenya, and Zambia. His concern was with the forest conservation practices being applied. We were asked to look into

- how much timber is being harvested,
- whether this harvesting is being conducted according to sustained-yield principles,
- whether the natural diversity of trees in the forests is being maintained,
- what measures have been taken by the World Bank to insure that the environmental integrity of the forests is protected, and
- to what extent the economic benefits of these projects are being obtained by the governments and the people of the three countries.

The World Bank was established in 1945, after World War II, to help finance--through loans to governments or their agents at conventional interest rates--reconstruction and economic recovery in war-devastated countries and to finance economic development in countries where private capital was not available on reasonable terms. For many years, the latter function has been its principal one.

The U.S. Secretary of the Treasury, one of the Governors of the Bank, is responsible for managing U.S. participation in the World Bank. The National Advisory Council on International Monetary and Financial Policies advises him.

SCOPE OF REVIEW

Our efforts depended on cooperation by the World Bank and the foreign governments involved because the World Bank, as an international organization, is outside our direct audit authority. Through the Department of the Treasury, we obtained some data on the Bank's involvement in these development loans. Through the Department of State, during August and September 1973, we visited the project sites and obtained other information by discussions with officials of the foreign governments involved.

CHAPTER 2

JENGA TRIANGLE PROGRAM IN MALAYSIA

The Jengka Triangle is about 150 miles south of the Thailand border near the geographical center of West Malaysia in an area sparsely populated and largely underdeveloped. (See the following map.) It covers about 300,000 acres, of which 136,000 acres are already occupied or reserved, while the remaining area is available for development. The Jengka Triangle program, the largest of its kind ever attempted in Malaysia, consists of two parts. The first part is converting about 100,000 acres of jungle into oil palm and rubber tree plantations to be settled by 10,000 families. The second part is establishing a forest-industry complex to exploit timber cleared from the settlement area and the adjacent 300,000-acre forest reserve.

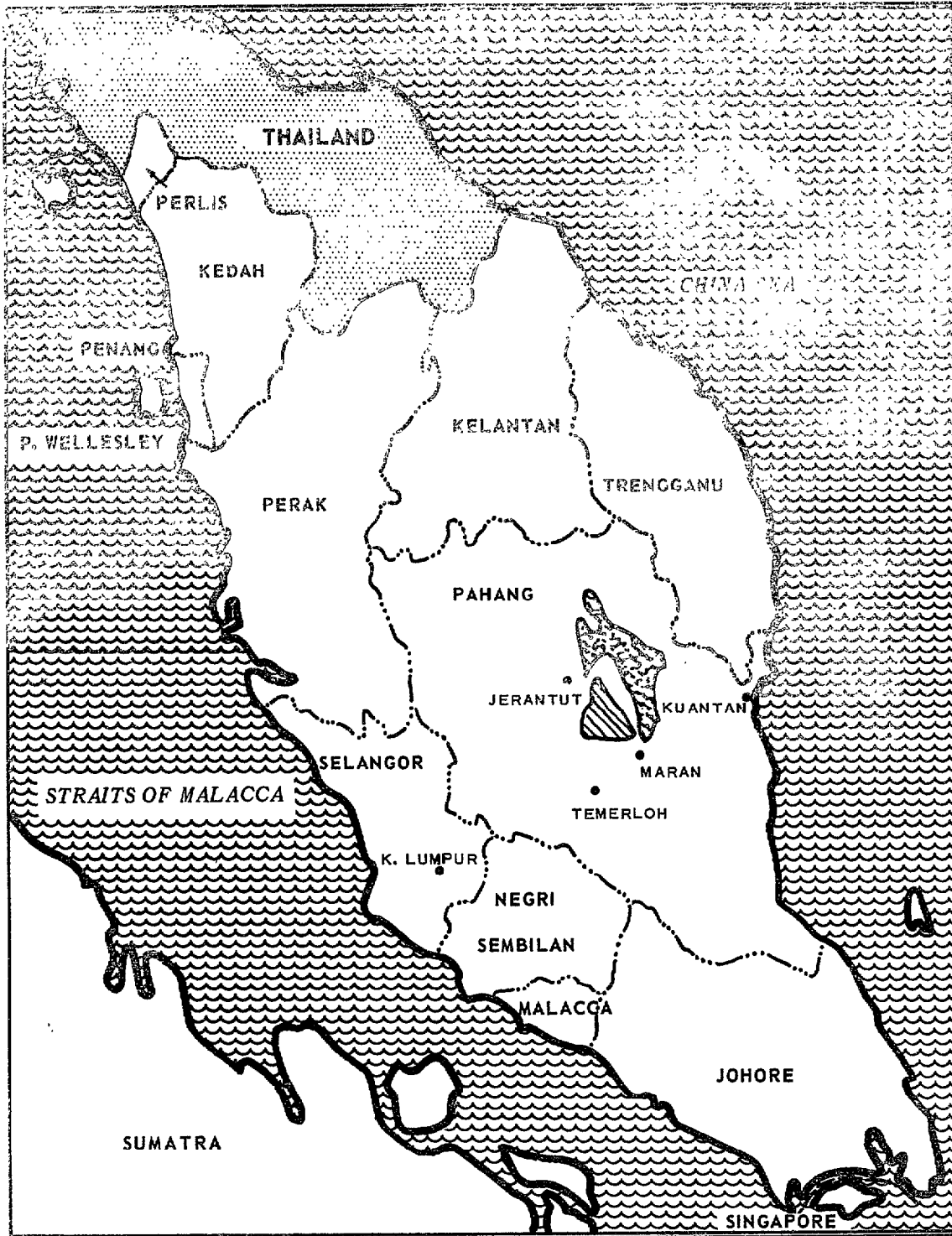
The World Bank has loaned \$60.5 million to Malaysia for the program since 1968. These loans cover about 50 percent of estimated program costs. The following table shows the status of the loans as of March 31, 1973.

<u>Loan number</u>	<u>Year</u>	<u>Purpose</u>	<u>Amount</u>	<u>Undisbursed</u>
			(millions)	
533	1968	First land settlement	\$14.0	\$ 3.8
672	1970	Second land settlement	13.0	8.5
673	1970	Forestry	8.5	.8
885	1973	Third land settlement	<u>25.0</u>	^a <u>25.0</u>
			<u>\$60.5</u>	<u>\$38.1</u>

^aSigned March 1973.

The Government of Malaysia has established a policy of converting suitable tropical rain forest into productive agricultural land. The Jengka Triangle program, financed in

MAP OF WEST MALAYSIA



FOREST RESERVES



JENGA TRIANGLE LAND SETTLEMENTS

Source: Food and Agriculture Organization (FAO), United Nations, Kuala Lumpur, Malaysia.

part by the World Bank, is a result of this policy. The program objectives are

- to expand palm oil and natural rubber production,
- to give landless or poor smallholder families ownership of economically viable individual holdings which will provide them with an adequate income,
- to reduce the income disparity among regions and between rural and urban areas,
- to investigate new cash crops, and
- to provide sustained-yield forest management and improved timber use.

These objectives are part of the Malaysian Government's development strategy.

The Federal Land Development Authority (FELDA), a Malaysian Government agency responsible for developing and settling new agricultural land, runs the land settlement program. The forest-industry complex is operated by Sharikat Jengka Sendirian Berhad (SJSB), a subsidiary of Majlis Amanah Ra'ayat, a Government corporation responsible for developing rural areas.

LAND SETTLEMENT IN THE JENGKA TRIANGLE

FELDA has received three loans totaling \$52 million from the World Bank for land settlement in the Triangle. This is FELDA's first large-scale land settlement project, although, between 1956 and 1968, FELDA had developed 74 areas totaling over 237,000 acres. The typical FELDA development area is 5,000 acres and involves about 400 settler families.

The Jengka land settlement area is split into three subdivisions of seven to eight sections, each with a village. Each subdivision covers from 33,000 to 47,000 acres, but an individual section covers about 4,000 to 6,000 acres. Each settler is allotted about 10 acres for crops and a house on a 1/4-acre plot. Each section is

developed individually, and the pattern of development is the same for the 23 sections.

The multiphased plan used for developing the Triangle is designed to optimize the economic gains and the agricultural potential of the land. The principal phases are:

- Removing the marketable timber.
- Clearing the land.
- Preparing the land for planting.
- Planting trees and building villages.
- Settling the area and harvesting the crop.

As discussed in greater detail in a later section concerning the forestry complex, all marketable species of trees are removed, on the basis of FELDA's procedures which provide against wasting valuable timber. According to SJSB forestry officials, FELDA allows sufficient time to remove this timber. SJSB uses clear-cutting logging techniques to harvest the timber since all timber will be destroyed in preparing the land for village sites and for planting rubber and palm oil trees.

FELDA contracts with a private firm to cut and burn all vegetation in the areas under development including the tops of steep hills. Cleared areas look very devastated. A FELDA official said that clearing the tops of steep hills was ill advised, since crops grow slowly there, resulting in erosion; however, it is nearly impossible to avoid clearing these areas and eventually the crops do grow enough to stop the erosion.

After the clearing operation, FELDA has the area sown with a leguminous cover crop, such as ivy. This cover crop grows fast, thus protecting the barren soil from the sun and rain. It also returns nitrogen to the soil.

Oil palm or rubber trees are planted about 1 year after the land is cleared, during the optimum planting period. Each section has only one crop which is determined by the type of soil. In addition to the palm and rubber crops, each section is established with a residential and village area which is provided with roads, water supply, a school, community hall, a mosque, post office, etc. FELDA

contracts for constructing settlers' houses and the community infrastructure is provided through FELDA or other government agencies.

Settlers enter the development about 2 years after the clearing phase. FELDA screens the settlers according to established criteria, including selection from rural people who either possess no land or have insufficient land to obtain an adequate standard of living. On arrival, each settler signs a loan agreement for his house and lot and an agreement to develop the pertinent section under FELDA's direction for about 5 to 7 years, depending on the crop, palm oil or rubber, respectively. After this initial period, the settler can sign another loan agreement for title or leasehold to his allotted 10 acres. FELDA processes and markets the crops for the settlers and pays each settler after deducting payments for loan principal, interest, and services.

As of July 31, 1973, only subdivision one had been fully implemented. Subdivisions two and three are still at various levels of implementation and will not be completed until 1975 and 1977, respectively.

Economic gains

The Malaysian Government and the World Bank believe that the land settlement programs offer definite economic gains. First, the programs will provide employment and satisfactory income for about 10,000 unemployed or underemployed settlers. The estimated average annual income of a settler in the program is about \$900 to \$1,000--three to four times higher than that of small landholders or underemployed urban workers.

Second, most of the production will be exported and will earn foreign exchange, thus helping Malaysia maintain its world market share of natural rubber and palm oil. The World Bank estimates a rate of return on investment of about 18 percent for palm oil and about 13 percent for rubber. The rates would only drop 2 percent with each 10-percent reduction in export prices. Malaysian Government officials stated that the World Bank's estimates are conservative.

Research activities and ecology

After the commercially valuable timber species have been removed, the remaining standing timber and brush are cut down. When the debris has dried sufficiently, a firing team is brought in and a more-or-less controlled fire is set. About 2,500 acres, or one-half of a section is burned at a time. A good burn is one in which everything less than 6 inches in diameter is reduced to ashes. These fields are then left for planting, except for the areas set aside for housing or other community structures. These areas are bulldozed and cleared completely. Thus the forest with its trees, plants, and animals is gone forever.

No research has been done to date on the ecological impact of the Jengka program. FELDA and the World Bank do not expect any long-term adverse ecological effects because they reason that tree crops will replace the natural forests.

According to FELDA officials, the flooding and soil erosion observed have not been detrimental to the program. One such official said FELDA expected some flooding and soil erosion because the forest cover was removed but he did not know of any serious environmental effects. FELDA has requested a United Nations agrometeorological expert to advise it on the effects of rainfall on crops. However, the research is only for improving crop production.

FELDA has not been concerned about the wildlife inside the development because an adjacent forest reserve can accommodate it. However, officials stated that, to have progress, the wildlife must move. We understand that about 30 elephants were stranded inside the Triangle, but an elephant trainer had been hired to assist in herding them out of the Triangle.

FELDA conducts basic research near the Triangle primarily to improve the productivity of the palm oil and rubber crops. Several other potential crops have been planted at the research center but, to date, only cocoa shows any promise. Over 2,000 acres of cocoa will be planted in the Triangle on a trial basis. The Malaysian Government is aware of the need to diversify crop production, but

opportunities for large-scale production are limited to palm oil and rubber, at present.

FORESTRY COMPLEX

In May 1970 the World Bank approved an \$8.5 million loan for the foreign exchange cost of developing a forest industry complex consisting of a logging unit, a sawmill, a plywood mill, and related facilities. The complex was established to extract, process, and market lumber from the Triangle and, after the midseventies, from adjacent forest reserves.

The forestry project's primary purpose is to fully exploit the marketable timber in the land cleared in the Jengka Triangle and to provide sustained-yield management for the adjacent forest reserves. This has led to different types of operations with different ecological effects.

Jengka Triangle

Timber from the second and third subdivisions of the Jengka settlement program initially meets the raw material needs of the forest-industries complex. Currently, about 182,000 forest-tons a year are being removed. SJSB has a contract with FELDA to remove all marketable timber from each section before a certain date, on the basis of FELDA's land-clearing schedules, and SJSB is financially penalized if it fails to meet the schedules or remove all marketable timber.

SJSB uses clearcutting logging techniques to harvest the timber in these areas since all timber will be destroyed in preparing the land for village sites and planting rubber and oil palm trees. It removes 51 species of marketable timber of all diameters and sells those it cannot use to private sawmills.

SJSB is building its own logging roads which its officials claim are designed according to specifications in the U.S. Bureau of Land Management's Manual for Logging Roads. The location of the roads is based on FELDA's needs, not those of the logging operation.

During our field visits to SJSB logging operations in the Triangle, the roads appeared to be designed to prevent land slides and streams were being bridged. We saw no evidence that logging was causing silting of the streams and rivers in the area although we were advised that the extremely loose nature of the soil almost certainly leads to silting once the trees are removed.

Forest reserves

SJSB will begin logging operations in the 300,000-acre forest reserves adjacent to the Triangle in early 1974, following extraction of the timber in the settlement areas. It plans to implement a sustained-yield forest management system based on selective logging and natural regeneration supplemented by enrichment planting, where necessary.

The initial cutting cycle will be 30 years with an average annual cut of 125,000 forest-tons. The road system completed during the first cutting cycle will allow alteration of the cutting sequence in relation to the market and to stand conditions.

All marketable trees 22 inches or more in diameter will be removed during the logging operation, except when certain trees are required as a seed source or for soil protection. Some unmarketable species will be poisoned to provide room for the marketable species. The poison kills the trees slowly, thus preventing the growth of underbrush while the marketable seedlings can grow large enough not to be strangled by the underbrush. SJSB estimates that the logging operation will remove or destroy 40 percent of the standing timber in each area logged. SJSB's inventory indicates enough small trees will remain after logging to insure another harvest after the first cutting cycle and these same trees will provide a source of seed for new trees.

Periodic regeneration surveys will be conducted after logging to determine the size of the seedling stock and measure the growth rate of the trees. Enrichment planting (planting additional trees) will be initiated in the understocked areas and the cutting cycle will be adjusted to conform with the growth rate. SJSB will plan and conduct

surveys and silvacultural treatments, with the approval of the Malaysian Forest Department.

SJSB will locate its roads according to logging needs, using the U.S. Bureau of Land Management's design criteria and SJSB's topographic maps.

The United Nations Food and Agriculture Organization and SJSB officials informed us that the potential ecological effects of logging are unknown because no research has been done in these forests. They do know that the soil is subject to rapid erosion from the time the trees are removed until the seedlings are large enough to provide cover. Other trees in the area, in their opinion, will probably catch most of the silt.

SJSB officials said the World Bank had not presented any specific measures nor provided them with any guidance providing for maintaining existing forests which would then insure the environmental integrity of the forests. However, we understand that no such information was requested of the Bank. SJSB officials emphasized that production would be their primary concern but that they would use good soil and water conservation practices in their own self-interest to hold down operating costs and increase the productivity of their forest reserves.

Sawmill and plywood mill

The forest-industry complex, constructed between 1970 and 1972, is the largest of its kind in Malaysia and is of modern design. The complex has the capacity to use a total annual input of 140,000 forest-tons of round logs. Because it is estimated that the forest reserves can only provide 125,000 forest-tons using a 30-year cutting cycle, SJSB hopes to get access to the 58,000-acre forest reserve inside the Triangle to make up the shortfall.

The sawmill produces finished boards and molding. The plywood mill produces a variety of plywood.

We observed one undesirable environmental product of the sawmill and plywood mill: the flyash from the waste burner. However, we also noted certain positive aspects:

the complex is not located on any river or stream and the sawmill does not use a log pond.

The complex employs about 1,000 Malaysians. Although we were not provided with any details, we understand that the complex is a profitable operation and it earns foreign exchange since it exports most products to Europe.

The Malaysian Government hopes that the forest industry complex will serve as an example to others in sustained-yield forest management and more modern manufacturing. A United Nations Food and Agriculture Organization expert said that this was already occurring.

CHAPTER 3

THE FOREST PLANTATION PROGRAM IN KENYA

In November 1969 the World Bank authorized a loan designed to support Kenya's ongoing forest regeneration program by providing 65 percent (\$2.6 million) of the cost of a \$4 million program (excluding interest) for establishing and maintaining sawwood and pulpwood plantations. The cypress plantings and two pine varieties are to be harvested after a 30-year rotation for sawwood and after 15 years for pulpwood. Cypress will be used for sawwood and pines will be used for both sawwood and pulpwood. Costs to be financed in the 6-year program (1970-75) include costs to cover labor, equipment, vehicles, and office operations.

The project is located in the Kenya Highlands--a block of alternating plateaus and mountain ranges in northwest Kenya. The principal forest areas are in these areas of high elevation and favorable rainfall. The plantings will be in 5 of Kenya's 13 forest districts.

Kenya's Forest Department is responsible for the management, protection, and regeneration of forest areas. Over the past 50 years, the indigenous commercially valuable species have been largely cut from the forest areas. These species are slow-growing and take over 60 years to produce timber of usable size. The Forest Department had investigated the problems of regenerating Kenya's indigenous forest and recognized that regeneration with indigenous species was of limited economic value. Conversely, regeneration with exotic, fast-growing, softwood pine and cypress species has proved economically successful. Consequently, since 1945, the Forest Department has been carrying out a systematic reforestation program in the cut-over indigenous forests using exotic species.

The economics of land use is important in Kenya because of the limited availability of good land. Much of Kenya is arid or semiarid and, if the forests were not economically productive, the land would probably be used for agriculture or some other purpose. Kenya's forests do not meet the country's needs. This fact, coupled with the pressure agricultural interests exert on land, makes it imperative

that forest lands be managed to increase yields. Therefore, the choice for Kenyans was either exotic forests or increased dependence on imports.

THE PLANTING PROCESS

The planting process begins by selecting seeds to be used in the nursery. Silviculturalists from the Forest Department select all seeds from Kenyan seed stands. After initial germination in planting beds, seeds are placed into polyethylene tubes for about 8 months.

Tree planting is carried on in former indigenous forest areas, harvested exotic forest areas, agricultural crop land, and grasslands. The World Bank forestry project uses two different planting methods. The "shamba" system is used in all the World Bank-financed project areas except Turbo (the pulpwood area). Under the shamba system, after the removal of commercial species of timber, a plot of indigenous forest is temporarily handed over to a resident worker. The worker receives a monthly wage, at the present time between \$7 and \$15, which is paid only during 9 months of each year when he does plantation work for the Forest Department. During the 3 months in which he is not paid, he is required to clear his plot on which he is then free to grow agricultural crops during that and the following 2 years. The crops he produces are his recompense for clearing the area. In the third year, the agricultural crops are interplanted with trees. The system has some social advantages and reduces Forest Department outlays.

In the Turbo District, a Forest Department official described the planning method used as a mechanized version of the shamba system. Essentially it is the same as the shamba system except that the crop planting is mechanized and the labor is provided through a contract with a local industrial firm. In the second or third year of crop planting, one row of trees is planted to every two rows of the crop. This permits mechanized harvesting of the agricultural crop.

Harvested timber will be used for sawwood and pulpwood. The sawwood will be used to meet increased internal demand, with the surplus for export. Pulpwood will be used in a new

papermill located at Webuye (formerly Broderick Falls). The mill, which is scheduled to start production in mid-1974, has been jointly financed by the Government of Kenya, the International Finance Corporation, a private Indian firm, and private Kenyan interests. Production is expected to be 165 tons of paper a day, which will meet some of Kenya's internal needs.

Plantings financed by the World Bank loan started in 1970 and are scheduled until 1975. Total plantings by 1975 will amount to 48,000 acres of sawwood and 23,000 acres of pulpwood. As of August 1973, sawwood plantings were on schedule, whereas pulpwood plantings were about 2,225 acres behind schedule. This delay has partly resulted from a problem in acquiring land in the pulpwood area. Land in this area is in demand, primarily for agriculture, and its purchase for forest plantations has been slow. However, Forest Department officials assured us that this was a short-term problem and adequate land would eventually be found.

TIMBER HARVESTING

As of August 1973, no World Bank-financed trees had been harvested, as the earliest plantings were only 3 years old. All harvesting being done is for sawwood, as the new Webuye mill has not yet begun harvesting pulpwood. Timber harvesting for sawwood has increased from about 7.4 million cubic feet in 1968 to over 10.4 million cubic feet (over 200,000 forest-tons) in 1972, as shown in the chart below.

Log Intake by Sawmills

<u>Year</u>	<u>Exotic timber</u>	<u>Indigenous</u>	<u>Total</u>
	—————(thousands of cubic feet)—————		
1968	4,389	3,052	7,441
1969	6,765	2,938	9,703
1970	7,514	2,484	9,998
1971	6,637	3,326	9,963
1972	6,884	3,532	10,416

Future timber harvesting depends on the internal and external lumber demand. At the present rate of exotic plantings of sawwood, the annual yield is expected to be at least 64 million cubic feet (based on a 30-year rotation cycle). This planting schedule allows for a substantial sawwood production increase and provides nearly 50 percent more sawwood than the demand the World Bank predicted in the loan proposal for the year 2000.

Private companies harvest timber for the private sawmills, as well as for the Webuye mill, under a Government concession. The Forest Department approves annual harvesting plans and checks on harvesting amounts and methods. Pulpwood harvesting for the mill will begin in late 1973. At full production (expected to be reached in 1974) it will require about 16 million cubic feet of wood annually, which is about equal to the current planting schedule (considering a 15-year rotation schedule). Tentative plans call for a 67-percent increase in the mill's capacity by the early 1980s, which will result in an equal increase in required pulpwood if the plant operates at full capacity. Current sawwood plantations, we understand, will be converted to pulpwood plantations to provide the necessary raw material if the mill expands its capacity.

All harvesting is done in accordance with sustained-yield principles, as indicated in the Kenya Forest Policy:

"It is a basic principle of the Government's policy that all forests shall be managed in accordance with specific plans, more or less detailed as the objects of management require in each case. These plans shall be in accordance with this statement of policy. Forests shall be managed on the principle of the sustained yield. It should be noted that in this sense sustained yields includes increasing yields and this is normally an object of management."

The Kenya Forest Department is planting enough trees to provide six times more sawwood than is being harvested. This obviously allows for a substantial increase in sawwood production within the 30-year rotation schedule. Pulpwood plantings equal expected pulpwood requirements for the

mill's initial capacity. However, if the expected expansion is implemented, existing pulpwood plantations will be insufficient to meet the plant's needs. In this case, sawwood plantations will be converted to pulpwood. This would result in using about one-sixth of the existing sawwood plantations for pulpwood.¹ Even if part of the sawwood plantations are used for pulpwood, the supply of wood is still ample to allow a 500-percent increase in sawwood production over the 1972 level and still maintain a sustained yield. If part of the sawwood plantations are used for pulpwood, the supply of wood is still within the World Bank estimates of Kenyan demand for sawwood.

ECOLOGICAL IMPACT

The natural diversity of trees in the forests will not be maintained. The Forest Department is carrying out a systematic reforestation program using fast-growing softwood pine and cypress species. Bank officials informed us that the World Bank did not conduct formal ecological impact studies of the forestry project and that Kenya officials did not request such studies. However, Kenya's forest policy provides moderate attention to the environmental aspects of the forest. During our site visits and in our discussions with Forest Department officials, we noted several indications that many sound silvacultural practices were being followed under the World Bank project as well as the overall Kenya forestry program. Examples of these practices include prior Forest Department approval before any harvesting, road building, or other work in the forests and specific clear-felling regulations which prevent clearing areas near streams, on top of hills, or on extreme grades. The project used labor-intensive methods and did not use large trucks and equipment that might damage the forest environment.

We also looked into possible adverse ecological effects of the new mill at Webuye. The mill is situated near a

¹This considers only one planting; actually, pulpwood will yield two harvests to sawwood's one and will result in a greater yield over time, but planting schedules would need to be increased. In addition, in estimating the amount of sawwood plantations' need for pulpwood, we assumed they would first use thinnings, then the oldest sawwood plantations.

small stream from which water will be drawn for use in the mill. The stream flows into Lake Victoria about 70 miles away. Officials, both in the Forest Department and those managing the mill, were strongly considering environmental protection. According to these officials, the International Finance Corporation had stressed the importance of wastewater treatment when approving the loan. They said the water pollution control devices to be installed at Webuye will be within current U.S. environmental standards.

According to U.S. Department of Agriculture forestry officials, every timber-harvesting project causes some damage to forest resources. To minimize adverse environmental effects of timber harvesting, it is most important to use the expertise of resource specialists in planning and developing forest projects. The Kenya Forest Department has a number of qualified specialists.

The Forest Department is broken into forest districts, each ranging in size from 47 to 1,601 square miles. Each district is headed by a district forest officer. All of these district forest officers are college graduates with forestry degrees, many of which were obtained in the United States and Canada. The Forest Department also employs specialists with advanced degrees in silvaculture, entomology, pathology, and forest use. Even though the Forest Department has no soil conservationists, it may use the services of such specialists connected with the Ministry of Agriculture. Almost all professionals in the Forest Department are Kenyans.

ECONOMIC BENEFITS

The primary economic benefit Kenya will obtain from the forest program and related forest industries is the savings and generation of foreign exchange through reduced imports of paper and increased exports of sawwood. It is estimated that significant foreign exchange can be generated through the export of Kenyan cypress, especially to other East African countries and to the Near East region. The Webuye mill will produce enough paper to partially satisfy Kenya's internal demands. In 1972, Kenya had a deficit trade balance of \$14 million in paper and paper products. In

addition to foreign exchange savings, developing the timber is important to Kenya's program of economic diversification.

Benefits to the people of Kenya are primarily related to generating employment by the forest project itself, as well as by developing timber and timber-related industries. About 30,000 persons make their living from the forests-- 17,000 in the public sector and 13,000 in the private sector. This includes all aspects of forestry from administration and management to the forestry-related industries. About 7,000 people were employed in March 1973 in jobs directly related to the World Bank forestry project. Included in these employment figures is the employment of resident workers under the shamba system.

In addition, employment generated by establishing wood-related industries was expected to be substantial. For example, the Webuye mill has planned to employ 1,000 people, 800 of which are to be Kenyans. The other 200 will be expatriates filling the Kenyan technical expertise gap.

CHAPTER 4

THE FOREST DEVELOPMENT PROGRAM IN ZAMBIA

The World Bank loan is providing 48 percent (\$5.3 million) of an \$11.1 million program to establish, by 1993, 30,000 acres of eucalyptus and 75,000 acres of pine plantations. The plantations are within the Copperbelt, about 175 miles north of Lusaka, the capital. One of the main reasons for the project is to replant forest areas that were cut for use in the mines. The World Bank loan proposal stated that the indigenous source of timber was expected to be exhausted by the late seventies.

The 8-year portion of the project (1969-76) financed by the Bank was authorized in October 1968 and covered the foreign-exchange portion of the program financing, including such things as vehicles, equipment, land preparation contracts, and expatriate staff salaries. Originally, the planning schedule called for establishing 5,000 acres of trees a year. However, this had been increased to 6,000 acres, apparently, in part, because of slow planting progress in 1969.

Zambia (formerly Northern Rhodesia) became an independent republic within the British Commonwealth in October 1964. Most of the country consists of savannah shrub land having a general elevation of between 3,000 and 4,500 feet. The copper industry is the mainstay of Zambia's economy.

Some 22,000 square-miles (14.1 million acres) of Zambia's total land area of 290,000 square-miles are forest reserves directly administered by the Forest Department of the Ministry of Lands and Natural Resources. Apart from a limited area of *Baikiaea* (Zambian Teak) forests in the Southwest and recently planted areas in the Copperbelt, the main forest resources of Zambia consist of low-yielding woodlands.

The Forest Department of the Ministry of Lands and Natural Resources is responsible for managing, protecting, and regenerating the Zambian forests necessary to supply forest products required by industry, housing,

farming, and other wood consumers. In addition to these functions, the Department's responsibilities include a research program connected with growing, exploiting, and using indigenous and plantation wood; operating a Forestry Training School; and controlling floods and erosion. About 8 years ago, a special Industrial Plantation Division was created within the Department. This division was charged with implementing the afforestation program. The World Bank project is supporting this division of the Forest Department.

The establishment of exotic tree plantations on a large scale in Zambia is a fairly recent development. The Industrial Plantation Division, established to manage exotic plantations, was not organized until 1965. Much of the staffing for this division was obtained from other countries. Forest Department officials explained that there is a shortage of trained Zambian manpower, not only in forestry, but in most other fields.

THE PLANTING AND HARVESTING PROCESS

Forest areas are cleared and prepared for tree planting by private contracting firms. Most of the land is covered with shrubs and trees of limited commercial value. After removing the commercially valuable species, usually only one or two an acre, tractors clear the area. This process occurs from January to April, during the rainy season, and consists of uprooting all trees and stumps and pushing them into piles. These piles are burned from August to October at the end of the dry season. The area is then cultivated for planting which commences in November at the start of the rainy season. During the first year of tree growth, the area around the trees is weeded. Possibilities of erosion are greatest during this first year. Forest Department officials explained that originally they weeded around the trees for 2 years; however, they have since found that the second weeding is not needed. Officials said that, in addition to saving labor, the elimination of second-year weeding lessens the effect of possible erosion and other damage to the soil. While all former indigenous growth is eliminated in the clearing process, giant termite hills are allowed to remain. These hills, often 20 feet high, cover as much as 25 percent of the land area. According to Forest

Department officials, the cost of removing these hills is not economically justified by the increased planting area which would be created.

The Industrial Plantation Division recently started harvesting the eucalyptus planting. Firm harvesting amounts were not available for 1972 or 1973, but at least 18,000 forest-tons were expected to be harvested in 1973. These harvests are to be from the first eucalyptus plantings of the midsixties which were not World Bank financed.

According to Forest Department plans, these harvests are being and will be done in accordance with sustained-yield principles. Accordingly, the Forest Department is planting 30,000 acres of eucalyptus and 75,000 acres of pine and expects to maintain these acreages. Yields per acre of pine will be 7,100 cubic feet (on a 30-year rotation), whereas eucalyptus yields will be about 3,000 cubic feet (on a 12-year rotation).

The plantations' proposed output is to supply the bulk of Zambia's future needs in industrial wood, including those of the mining industry. The supply of indigenous timber near the copper mines was expected to be exhausted by the late seventies and some of the mine's demand for timber would be met by the first eucalyptus harvests. However, despite the availability of eucalyptus timber, the mining industry is not using it, primarily because the industry is reluctant to change from traditional indigenous woods. According to Forest Department officials, this is a good example of the need to educate consumers to the values of eucalyptus.

The eucalyptus is being used in a government-owned plant in the Copperbelt. Most of the items are manufactured experimentally. However, transmission poles, fence posts, and roof trusses are being marketed commercially. Officials said the plant can produce all of Zambia's transmission poles. In addition, a large modern sawmill is being constructed near the plant. Annual intake of wood will be about 1 million cubic feet. Plant officials said the sawmill will use eucalyptus and/or pine. However, if pine is used, it will be until the mideighties before enough wood

can be harvested (primarily from thinnings) to fully use the mill.

The plantation timber is also expected to be used in various industries which should develop. To encourage this development, the Forest Department has purchased land in the Copperbelt for use as an industrial park for such industries. Tentative plans call for establishing, by 1980, several timber-using industries including a paper mill. Originally, the World Bank loan proposal stated that some wood-using industries might be established by 1973. However, in view of splitting problems encountered with the cut eucalyptus and the fact that pine will not be initially harvested until the 1990s, it is unlikely that these industries will develop soon.

ECOLOGY AND RESEARCH ACTIVITIES

Zambia's forest policy is centered around preserving and establishing the forest for economical as well as ecological purposes. In part, the policy states that the Forest Department should:

"carry out all necessary research work on the ecology, protection, management and restocking of indigenous forest areas, on the establishment, protection and management of plantations and on the protective role of forests."

In implementing this policy, Zambian officials are establishing exotic plantations rather than replanting indigenous forests.

We found that the World Bank did not conduct formal ecological impact studies of the forestry project or take other specific measures to insure the environmental integrity of the forest. Also, we understand that Zambian officials had requested no such information. However, the entire question of environmental integrity and natural diversity of Zambia's forest should be viewed in context with the present environment in the Copperbelt. As explained earlier, low-yielding indigenous forests cover much of the area. Most accessible, commercially valuable wood has been cut, and much of the land has suffered the

effects of shifting agriculture--a practice environmentalists severely criticize. Shifting agriculture is a process in which landless people clear and burn areas of the forest. The ash from the burning provides enough fertility to grow agricultural crops for 1 or 2 years. The nomadic farmers then move on, leaving the land to regenerate into forests. Often it takes 20 to 25 years before the land can recover from this process.

The fact that growing anything in an area that has a 7-month dry season is difficult was the major factor in determining what species of tree would grow here. After extensive research, including the failure of several species of trees, the Forest Department found two varieties that would grow well, pine and eucalyptus. Therefore, since the midsixties, the Forest Department has systematically planted these two species.

Environmentalists might criticize the Forest Department land-clearing methods used in Zambia. These practices, previously described in the section on planting and harvesting, would raise criticism because of the potential damage from soil exposure to the sun. According to environmentalists, this not only strips nutrients from the soil but also subjects it to wind and water erosion. However, we did not see any significant erosion and the exotic plantations were thriving.

According to U.S. forestry officials, forestry programs should be managed by competent resources specialists to minimize ecological damage. The Zambian Forest Department has several such specialists with considerable expertise, including an ecologist. During our project visit, we met and discussed Zambia's forestry program with many of these specialists.

Because of limited experience in growing exotic trees in Zambia, there is considerable continuing activity in research, both in raising and using the exotic trees. Zambian officials explained that research is needed because species in different countries have different properties. For example, when first planted, it was expected that the eucalyptus would be harvested on a 12-year rotation; however, because of faster growth, the rotation cycle has been decreased to 8 years.

Eucalyptus' best asset is its extraordinary growth, growing to as much as 50 feet in 3 years and producing about 3,000 cubic feet of wood in its rotation period.

The Division of Forest Products office is doing extensive research with modern equipment. The office is trying methods to reduce splitting in the cut eucalyptus, as well as other types of research. Forest Department officials stated that, in addition to the splitting, one of the biggest problems with marketing eucalyptus is that it has not been widely used in Zambia as a commercial wood. Education of consumers to the values of eucalyptus is needed before eucalyptus will gain acceptance.

To work on use and marketing problems, the Forest Department is operating a modern forest products plant in the Copperbelt, which is manufacturing various eucalyptus wood products. This is the only plant in Zambia using eucalyptus, and most of it is being used experimentally. Forest Department officials said they only want to operate the plant until use problems are solved. Officials explained that the plant eventually will be turned over to a large quasi-government/private Zambian corporation.

ECONOMIC BENEFITS

At this time, it is difficult to assess any economic benefits derived specifically from harvesting World Bank-financed timber. Zambia is a net importer of wood and wood products, including paper, with a negative trade balance of \$15.7 million (11.2 million Zambian kwacha) in 1970. It is expected that the increased lumber the forestry plantations provide will be able to meet much of the internal demand for wood and wood products, and the paper mill, if developed, will meet much of the internal demand for paper. This will result in foreign exchange savings and provide some diversification for Zambia's one-commodity economy.

In addition, developing wood-related industries will provide increased employment opportunities. In 1970, almost 8,000 people were employed in timber and timber-related industries. The Forest Department does not use large, labor-intensive work forces; instead, it relies on

machinery. Therefore, the bulk of labor opportunities generated will be in the wood-related industries.

Also, the Forest Department has developed panels for prefabricated houses. Large-scale production of these panels could provide increased housing opportunities for many Zambians.

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JOINT BUDGET COMMITTEE

DONALD L. ROBINSON
ADMINISTRATIVE ASSISTANT

May 15, 1973

Mr. Elmer B. Staats
Comptroller General
General Accounting Office
441 G Street, N. W.
Washington, D. C. 20548

Dear Mr. Staats:

I would appreciate a General Accounting Office investigation and report concerning three foreign development projects involving timber harvesting and supported by World Bank loans. The projects, located in Zambia, Kenya, and Malaysia, are described briefly in the attached fact sheet titled "World Bank Involvement in Forestry Projects in Tropical Countries".

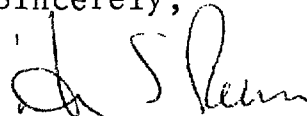
My concern with these projects is the adequacy of the forest conservation practices being applied. Could you please determine: 1) how much timber is being harvested, 2) whether this harvesting is being conducted in accordance with sustained-yield principles, 3) whether the natural diversity of trees in the forests is being maintained, 4) what measures have been taken by the World Bank to insure that the environmental integrity of the forests is protected, and 5) to what extent the economic benefits of these projects are being obtained by the governments and people of the three countries?

While the Budget and Accounting Act of 1921 as amended gives you no specific authority to investigate foreign timber harvesting projects, or loans made by international banks to support these projects, there is nothing in the law prohibiting you from doing so. Mr. Eugene C. Wohlhorn, the Assistant Director of GAO for studies of international organizations, informs me that his staff will proceed with this investigation to the extent that the project managers, foreign governments, and the World Bank cooperate.

APPENDIX I

I enclose herewith the "World Bank Involvement in Forestry Projects in Tropical Countries" fact sheet, and an article by Mr. Ned Andrews, titled "Tropical Forestry: The Timber Industry Finds a New Last Stand", from the April, 1973, Sierra Club Bulletin. This article provides more information on the forestry project in Malaysia.

Sincerely,



Henry S. Reuss
Member of Congress

cc: Mr. Eugene C. Wohlhorn,
Assistant Director, GAO

Enclosures

OFFICIALS RESPONSIBLE FOR
ADMINISTRATION OF
U.S. PARTICIPATION IN THE WORLD BANK

	<u>Appointed or commissioned</u>
SECRETARY OF THE TREASURY:	
George P. Shultz	June 1972
John B. Connally	Feb. 1971
David M. Kennedy	Jan. 1969
Henry H. Fowler	Apr. 1965
 ASSISTANT SECRETARY OF THE TREASURY FOR INTERNATIONAL AFFAIRS:	
John M. Hennessy	Feb. 1972
John R. Petty	May 1968
Winthrop Knowlton	Aug. 1966
 U.S. REPRESENTATIVE OF THE WORLD BANK:	
Charles O. Sethness	July 1973
Robert E. Wieczorowski	Nov. 1969
Covey T. Oliver	Nov. 1968
Livingston T. Merchant	July 1965