

MAR 20 1979

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM: AFR/DR, <sup>John W. Koehring</sup> John W. Koehring

SUBJECT: Upper Volta Forestry Education and Development (686-0235)

Problem: Your approval is required (a) to approve life-of-project grant funding of five million, nine-hundred fifty-eight thousand dollars (\$5,958,000) from the Sahel Development Program appropriation (SH) to the Government of Upper Volta (GOUV) for the Forestry Education and Development project (686-0235), and (b) to authorize a grant of seven hundred thousand dollars (\$700,000) in FY 1979 to begin the project.

Discussion:

A. Project Description:

The purpose of this project is to improve the GOUV's capability for promoting rational water and land resource use through anti-desertification programs (i.e., reforestation, soil conservation and restoration, forest and wildlife management, fisheries, etc.). The project provides for the expansion and improvement of the Dinderesso training center for junior level forestry extension agents and the development and execution of a model forest management plan for the 6,000 hectare national forest adjoining the training center. The forest management element of the project will have two major objectives:

1. The rational development and exploitation of the underutilized natural resources of the Dinderesso forest to the benefit of those living and working near it. The plan developed will be a model for the management of all national forests in Upper Volta (and those in other Sahelian countries).
2. The provision of a practical learning environment for the students at the Dinderesso training center.

This project addresses itself to the need for trained forestry agents who will work primarily at the village level. The hypothesis of the project is that sufficient numbers of properly trained forestry agents can play a major role in reducing and possibly reversing current patterns of over-use of Upper Volta's natural resources.

If Upper Volta is to make progress toward the rehabilitation and more ecologically sound utilization of its natural resources, change must occur at the village level. Forestry programs must be responsive to villagers' needs and constraints. Trained forestry extension agents can play a vital role in this process by promoting alternative conservation-oriented technology at the village level.

The project fits well into the AID country strategy for Upper Volta since it concentrates on human resource development. It also responds to the priority concern of the GOUV for the training of adequate numbers of junior level forestry agents to work in the many forestry projects supported by other donors.

The immediate beneficiaries of the project will be the forestry agents trained at the Dinderesso school and the villagers who live in and around the adjacent forest.

B. Financial Summary

	(\$000)	
	<u>FY 1979</u>	<u>LCP</u>
Technical Assistance	120	2,610
Training	5	78
Commodities	192	1,939
Construction	<u>383</u>	<u>1,331</u>
TOTAL	700	5,958

Of these amounts, an estimated \$412,000 will be provided in local currency in FY 1979 and \$2,206,000 (37%) over the life of the project. The GOUV contribution to the project will be approximately \$1,929,000.

C. Socio-economic, Technical and Environmental Aspects:

1. The project is sociologically sound. It is designed to train forestry agents who will understand and be responsive to the needs of villagers living in and near Upper Volta's forests. The trainees will develop their skills through on-the-job practice in the Dinderesso forest in contact with the farmers and herdsmen. A Standing Evaluation Committee set up to monitor the project will pay special attention to ensuring that the Dinderesso forest management plan responds to the needs of the villagers in the area. In addition, as the school develops, graduates who return for refresher courses will contribute to the training program by sharing from their field experiences with new students.

2. A number of steps have been taken to ensure the project will be carried out in an economically feasible and financially viable fashion, keeping in mind the fact that it will be primarily institution-building and environmentally-oriented in nature. The PP includes examples of several methods of economically exploiting wood production and other forest resources such as understory forage (livestock browse), edible fruits, nuts, leaves, game meat, honey, medicinal products, dyes, etc. While developing a model forest management plan for Dinderesso, alternatives for the rational exploitation of the forest will be investigated, and, before any components of the plan are implemented, their economic

feasibility will be fully investigated. In addition, the Grant Agreement will contain a covenant whereby the GOUV will agree to take steps to eliminate any price controls and regulations on forest products to encourage greater production. Although numerical values have not been assigned to the "environmental services" that the project will provide, such as restoration of soil organic matter and fertility, erosion control, preservation of fisheries, etc., they all will contribute to improving the quality of life for Voltaics.

The PP includes a preliminary financial analysis of the proposed forestry school which indicates that the GOUV should be in a position to absorb the operating costs following termination of AID support. The grant agreement will contain covenants whereby the GOUV will agree (a) to finance post-project operating costs from the revenues generated from the Dinderesso forest and (b) to carry out a study of the actual operating costs of the school which will result in a plan, agreed to by AID, for their financing. The study will be undertaken concurrently with the economic feasibility studies of the various components of the forest management plan, and after the school is in operation. In addition, the GOUV will agree to designate at least 30% of the revenues generated under the forest management plan to the Ministry of Environment and Tourism to help ensure the continued funding of forestry activities at Dinderesso.

3. The technical aspects of the project have been fully examined and determined by the Project Committee to be sound.

4. An IEE has been prepared which recommends a negative determination (see page 41 of PP).

5. There are no human rights issues concerning Upper Volta which would preclude authorization of this project.

6. Section 611A memorandum from a REDSO/WA engineer and a Section 611E certification from the Mission Director, USAID/Upper Volta, are included in the PP with which the Project Committee concurs.

D. Major Conditions Precedent and Covenants, Waivers and Implementing Agencies:

1. The attached PAF, Part II contains the following significant covenants, all of which are mentioned above:

- (a) The GOUV will agree to set aside at least 30% of the revenues generated from the sale of forest products produced at Dineresso under the project for the Ministry of Environment and Tourism to ensure that adequate funds are available to support activities

outlined in the forest management plan. At present, most revenue is turned over to the Ministry of Finance (Covenant C.4).

- (b) The GOUV will agree to prepare a mutually-acceptable plan to finance the operating costs of the training center from Dinderesso forest revenues (Covenant C.5).
- (c) The GOUV will agree to study existing price controls and regulations on forest products with a view toward removing controls which will prevent maximum utilization of forest resources (Covenant C.5).
- (d) The GOUV will agree to establish the Standing Evaluation Committee (Covenant C.6).

2. No procurement waivers are requested at this time. The Mission may request a waiver for proprietary procurement of Caterpillar equipment after investigation of alternative U.S. supply possibilities. Since Upper Volta is an RLDC, the source and origin of all goods and services, other than ocean shipping and motor vehicles, will be Geographic Code 941 countries and Upper Volta.

3. The GOUV implementing agency for this project will be the Ministry of Environment and Tourism.

E. Bureau Action and Congressional Apprisement:

1. A Project Review Meeting, chaired by the Chief, AFR/DR/SFWAP, was held January 10, 1979 at which it was decided to recommend this project for your approval. Subsequent to the meeting, the PP was revised to reflect agreements reached by the Project Committee during its review process concerning the requirement for economic feasibility and financial viability studies during project implementation, the enhanced role of the Standing Evaluation Committee, and the fact that a single contract will be sought for provision of long-term technical assistance. Funds were added for technical assistance in school administration, and certain cost estimates were revised in the final budget proposal.

2. The possibility of increasing the FY 1979 funding level of \$700,000 was discussed with AFR/SFWA, but it was decided to proceed as currently planned in view of the tight SDP budget this year. A major obligation of \$2,000,000 is planned for FY 1980. In the FY 1979 Congressional Presentation, \$700,000 was identified to initiate this project (Volume on Africa, page 157).



PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS PART II

COUNTRY: Upper Volta  
PROJECT: Upper Volta Forestry Education and Development  
PROJECT NUMBER: 686-0235

Pursuant to Part I, Chapter 1, Section 121 of the Foreign Assistance Act of 1961, as amended (the "Act"), I hereby authorize a Grant to the Government of Upper Volta ("Cooperating Country") of not to exceed Seven Hundred Thousand United States Dollars (\$700,000) to assist in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The project consists of assisting the Cooperating Country to expand and improve the Dinderesso training center for lower level forestry agents by provision of trained instructors, a revised and expanded curriculum, construction of new classrooms and other school buildings and the provision of teaching supplies, vehicles, equipment, furnishings, administrative and support personnel; and to develop and execute a management plan for the national forest (6,000 hectares) adjoining the training center (hereinafter referred to as the "Project").

I approve the total level of A.I.D. appropriated funding planned for the Project of not to exceed Five Million Nine Hundred Fifty Eight Thousand United States Dollars (\$5,958,000), all of which will be grant funded, consisting of the amount authorized above for FY 79 and additional increments of funding during the period FY 80-FY 82, subject to availability of funds and in accordance with A.I.D. allotment procedures.

I hereby authorize initiation of negotiations and execution of the Grant Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following terms, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services.

Except for ocean shipping, goods and services financed by A.I.D. shall have their source and origin in countries included in Code 941 of the A.I.D. Geographic Code Book or the Cooperating Country, except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Grant may be procured in any eligible source country except the Cooperating Country.

b. Conditions Precedent.

1. Prior to the first disbursement of funds under the Grant, or to the issuance of commitment documents with respect thereto, the Cooperating Country shall assign an official of the Ministry of Environment and Tourism (MET) to act as the GOUV Project Manager, who will be the counterpart and primary contact for the AID Project Manager.

2. Prior to the disbursement of funds for any construction activity financed under the Grant (except disbursement of funds required to prepare plans and specifications), or to the issuance of any disbursement documents with respect thereto, the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D., the following:

a. Plans, specifications, bid documents and time schedules for such construction activity.

b. An executed contract for construction services for such activity with a firm acceptable to A.I.D.;

c. A description of the arrangements for a public agency of the Cooperating Country, or other arrangements satisfactory to A.I.D., to provide construction supervision services for such activity; and

d. Evidence that GOUV has acquired any permits, licenses, privileges, easements, or rights of way necessary to provide utility services to the construction sites.

3. Prior to the disbursement of funds for each procurement of equipment and commodities from the US, the GOUV will provide to AID in form and substance satisfactory to A.I.D.:

a. An executed contract for the services of a procurement agent or other arrangements satisfactory to A.I.D. for securing such services.

b. Detailed specifications for any equipment.

c. An executed contract for such equipment and commodities.

c. Covenants.

The Grant Agreement shall contain covenants providing in substance as follows:

(1) The Ministry of Environment and Tourism shall have overall responsibility for the project on behalf of the Cooperating Country, including responsibility for marketing forest products from the Dinderesso forest reserve produced during the course of the project.

(2) The Cooperating Country will provide sufficient GOUV personnel (including a Director, faculty, and staff) to the Dinderesso Forestry school as they will be required throughout the project. An employee of GOUV with appropriate technical background will be assigned to act as a counterpart

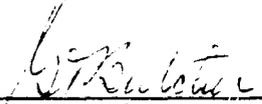
to the U.S. Forest Manager financed under this Grant, such assignment to be made before or upon arrival of the U.S. Forest Manager.

(3) Forest products produced under the Project from the Dinderesso Forest Reserve will be sold at prevailing market prices. The GOUV agrees to study the current price controls and regulations on forest products in Upper Volta with view toward removing those controls which act as a disincentive to increased forestation.

(4) Not less than thirty percent (30%) of the gross revenues generated by the sale of forest products produced on the Dinderesso forest reserve shall be made available to finance harvesting, marketing, training, and other management activities within the Dinderesso Reserve not otherwise financed from this Grant. This percentage will be adjusted as necessary by mutual agreement between AID and the Cooperating Country so as to ensure that the MET will have adequate resources to support project activities. Semi-annually, the GOUV will provide a report to A.I.D. listing the volume of forest products harvested during the immediately preceding six-month period, the revenues received from the sale of such products, and the uses of these revenues.

(5) To ensure the continued financial viability of the Dinderesso Training Center, the Cooperating Country shall undertake a study of the Center's operating costs, not later than the beginning of project year three, which will result in a plan for the financing of these costs with the revenue generated from the sale of Dinderesso forest products.

(6) The Cooperating Country shall establish a Standing Evaluation Committee, the membership of which will be mutually agreed upon by A.I.D and Cooperating Country, to monitor project implementation. Special attention will be paid to curriculum content in relation to the needs of the technical services of the MET, to the administration of the training center, and to ensuring that the forest management plan is responsive to the needs of those living near and depending upon the Dinderesso forest.

  
\_\_\_\_\_  
Assistant Administrator for  
Africa  
3/27/79  
\_\_\_\_\_  
Date

AGENCY FOR INTERNATIONAL DEVELOPMENT  <b>PROJECT PAPER FACESHEET</b>	1. TRANSACTION CODE <div style="border: 1px solid black; display: inline-block; padding: 2px;">A</div> A ADD C CHANGE D DELETE	PP  2. DOCUMENT CODE <div style="border: 1px solid black; display: inline-block; padding: 2px;">3</div>
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3. COUNTRY ENTITY <b>UPPER VOLTA</b>	4. DOCUMENT REVISION NUMBER <input type="checkbox"/>
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5. PROJECT NUMBER (7 digits) <div style="border: 1px solid black; display: inline-block; padding: 2px;">686-0235</div>	6. BUREAU/OFFICE A. SYMBOL <b>AFR</b> B. CODE <div style="border: 1px solid black; display: inline-block; padding: 2px;">06</div>	7. PROJECT TITLE (Maximum 40 characters) <div style="border: 1px solid black; display: inline-block; padding: 2px;">Forestry Education and Development</div>
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8. ESTIMATED FY OF PROJECT COMPLETION FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">8</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">3</div>	9. ESTIMATED DATE OF OBLIGATION A. INITIAL FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">7</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">9</div> B. QUARTER <div style="border: 1px solid black; display: inline-block; padding: 2px;">1</div> C. FINAL FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">8</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">2</div> (Enter 1, 2, 3 or 4)
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10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) -						
A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L. C.	D. TOTAL	E. FX	F. L. C.	G. TOTAL
AID APPROPRIATED TOTAL	288	412	700	3752	2206	5958
GRANT	283	412	700	3752	2206	5953
LOAN						
OTHER U.S.						
HOST COUNTRY		1 127	1 127		1 929	1 929
OTHER DONORIS						
<b>TOTALS</b>	<b>288</b>	<b>1539</b>	<b>1 827</b>	<b>3752</b>	<b>4135</b>	<b>2837</b>

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY <u>79</u>		H. 2ND FY <u>80</u>		K. 3RD FY <u>81</u>	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	GRANT	J. LOAN	L. GRANT	M. LOAN
(1) SH	600 B	635		700		3156		1416	
(2)									
(3)									
(4)									
<b>TOTALS</b>				<b>700</b>		<b>3156</b>		<b>1416</b>	

A. APPROPRIATION	N. 4TH FY <u>82</u>		O. 5TH FY <u>83</u>		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED  MM   YY <div style="border: 1px solid black; display: inline-block; padding: 2px;">08   81</div>
	D. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
(1) SH	636				5953		
(2)							
(3)							
(4)							
<b>TOTALS</b>	<b>636</b>				<b>5953</b>		

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1

 1 = NO  
 2 = YES

14. ORIGINATING OFFICE CLEARANCE	15. DATE DOCUMENT RECEIVED IN AID/W OR FOR AID/W DOCUMENTS. DATE OF DISTRIBUTION
SIGNATURE 	<div style="border: 1px solid black; display: inline-block; padding: 2px;">MM   DD   YY</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">1   2   15   7   8</div>
TITLE <b>Mission Director</b>	
DATE SIGNED <div style="border: 1px solid black; display: inline-block; padding: 2px;">MM   DD   YY</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">1   0   13   7   8</div>	

PD-AA6-155

UNCLASSIFIED

Upper Volta Forestry Education

and

Development (686-0235)

PROJECT PAPER

UNCLASSIFIED

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**Note :** Additional background information and technical details are available upon request in Supplementary Annexes to this Project Paper. These annexes include:

- I. Detailed Forest Management Plan
- II. Detailed Curriculum
- III. The Cost of Doing Nothing
- IV. GOUV Contribution
- V. Job Descriptions
- VI. People and Places Contacted
- VII. Bibliography

## I. DESCRIPTION OF THE PROJECT

### BACKGROUND

As has been pointed out by many observers, throughout Upper Volta and the Sahel region in general, forest, wildlife, and fisheries resources are under ever increasing pressures to meet the demands of a rapidly growing population. The forest resource is diminishing as it is exploited for fuel and construction wood, overgrazed by domestic animals, cut down for additional crop land, and intentionally burned to facilitate hunting, farming or grazing. Wildlife is disappearing as forest and grassland habitats diminish and as people, pressed for food and livelihood, continue to hunt the few remaining animals. Fisheries resources also are decreasing not only from over-exploitation, but also from a decline in quantity and quality of water resources. The loss of forest and other vegetative cover is a prime reason for the increased scarcity and lower quality of water resources. Without an adequate plant cover, the soil mantle is lost and with it the capacity of the land to quickly absorb rainfall; as the vegetation becomes less dense, runoff increases and less water percolates down into the ground. Thus, deforestation eventually leads to impoverished soils, decreased growth of plants that remain, diminished groundwater supplies, and silted reservoirs and water courses which are less productive of fish.

Maintaining a hospitable and reasonably productive environment is an absolute necessity if the current human population levels are to be sustained in Upper Volta and the Sahel. At present, the environment is becoming inhospitable and unproductive at an alarming rate, while the human population increases rapidly. It is doubtful that general environmental degradation can be halted or reversed while the human population continues to grow. But an all-out effort must be made to slow the destruction, and actually reverse the degradation in selected areas. Only with an all-out effort can there be hope of saving enough of the original environment to rebuild and regenerate on a larger scale, once the human population either stabilizes or diminishes.

Desertification and environmental degradation are widespread throughout Upper Volta, and indeed, throughout the Sahel. Typically, the emphasis of agricultural and livestock projects has been placed on increased production often with only secondary consideration at best for long-term environmental implications. The role of protecting and rehabilitating the environment falls upon the thinly-staffed, under-financed Ministry of Environment and Tourism. The development hypothesis of this project is that sufficient numbers of properly trained forestry agents, supported by appropriate and adequate funding can play a major part in reducing and possibly reversing current patterns of over-use (over-farming, over-grazing, over-cutting). In the longer run they can also be instrumental in slowing, if not rolling back, the

inroads of desertification.

A number of forestry projects have been implemented in Upper Volta during the 1970's (see Annex M, Forestry Projects). Most have dealt with reforestation and expansion of nurseries for increased production of tree seedlings. The training component of these projects has been limited to scholarships for short-term, specialized training of selected project personnel, and field instruction to counterpart personnel.

As a result of a multi-donor meeting on the forestry sector of Upper Volta held in February and March 1978, a variety of projects have been identified dealing primarily with village reforestation and forest management, and also with soil conservation, agro-forestry and wildlife management which will be financed by Germany, Switzerland, the World Bank, France, the Netherlands and UNDP/FAO.

At the multi-donor meeting, AID expressed an interest in financing the forestry school project proposal (UPV D301)(see reporting cable, Annex M, p. 91)(see also p. 6, Relationship to AID Country Strategy).

The new forestry projects will place large demands on GOUV forestry agents who are already in very short supply and often poorly trained. Part IV, Technical Feasibility, indicates the quantitative and qualitative training needs for forestry agents in Upper Volta for the next few years. It should be recognized that the long-term demand for increasingly well-trained forestry agents will continue to grow as Upper Volta responds more fully to the necessity for expanded and intensified programs of integrated natural resource management and environmental conservation.

There is little doubt that forestry activities will remain an important part of development projects in Upper Volta. At the recent Club du Sahel meeting in Amsterdam, major emphasis was placed on reforestation and the increased production and more efficient use of firewood. The CILSS Council of Ministers has requested the CILSS Ecology and Forestry Team to develop an expanded and much more ambitious forestry program for the Sahel.

The Forest Service of Upper Volta recognizes that a major constraint in expanding their efforts is the lack of adequate numbers of well-trained forestry agents. In fact, other donors have in some cases made the funding of their projects contingent upon the expansion and improvement of the Dinderesso Forestry School. For these reasons, Upper Volta is particularly anxious to see the Forestry School project financed and executed.

The purpose of this project is to improve the GOUV implementation capability for rational water and land/resource use projects, (reforestation, anti-desertification, soil conservation/restoration, forest and wildlife management, fisheries, etc.) through the expansion/improvement of the Dinderesso training center for lower level forestry agents, and the development/execution of a

management plan for the national forest (6,000 hectares) adjoining the training center. The forest management element of the project will have two major objectives:

1. The rational development/exploitation of an underutilized natural resource and the creation of a model for the management of other national forests in Upper Volta and other Sahelian countries;

2. The provision of a valuable first-hand practical learning environment for the forestry students at the Dinderesso training center.

The training center will contribute to better GOUV implementation capability for forestry projects by providing more and better-trained forestry agents. It is recognized that this project does not address the training of higher-level forestry<sup>1</sup> technicians and engineers who are needed to plan and direct rational water and land/resource use projects. These persons are being trained by other projects including the Agricultural Human Resources Development Project (AID 686-0221) which will train (among others) forestry "engineers". This project addresses a more basic need for trained "forestry agents" who will primarily work at the village level. After all, if Upper Volta is ever to make progress towards the rehabilitation and a more ecologically sound utilization of its natural resources base, change must occur at the village level. For this change to occur, forestry programs must be responsive to villagers' needs and constraints. As a first step, information concerning these needs must be collected, key constraints must be identified, and appropriate adapted technology must be introduced to the villagers which will provide them with an alternative to the destructive exploitation of their environment and still meet their essential, daily needs. This project will produce the change-agents who will play a vital role in the above-described sequence of events.

It is obvious that significant change does not occur overnight. This project will provide a certain number of "change-agents" and a model forest management plan. More importantly, for the long run strategy to exploit Upper Volta's natural resource base in a rational manner, this project will develop the infrastructure necessary to continue to train change-agents beyond the 5-year life of the project. There is, therefore, a possibility that a phase II project will ultimately be designed to enhance the prospects of continued efficient activity at the Dinderesso School (e.g, continued technical assistance, but at a reduced level; further expansion of dormitory capacity; provisions for specialized training in forestry for level B students). A phase II project would be consistent with the CILSS concept of second generation projects.

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<sup>1</sup>Note that "forestry" in Upper Volta since colonial times has encompassed the management of soil and water as well as forest/range resources, and the conservation of fisheries and wildlife.

## PROJECT ELEMENTS : SCHOOL AND FOREST

### School

The project will substantially increase the educational infrastructure at the Forestry School to be located in southwestern Upper Volta at Dinderesso (see map next page). The current school buildings (one classroom and dormitory capacity for 10 students) are 25 years old, dilapidated, mud-brick, tin-roofed structures. To date, the school has not had a full-time director or teaching staff. The new school will consist of several classrooms and a lab/workshop equipped with teaching materials, dormitories, library/study hall, cafeteria, assembly hall, administrative building, teacher housing and vehicles garage/maintenance shed. The school will include a director, three instructors and four teaching assistants; initially, five short-term specialists will assist in course development, teacher training and teaching. (For details see Table I Budget Annex C, and Annex L, Itemized Technical Equipment List.)

Students will be trained at the junior high school (1-year course) and high school (2-year course) levels. Graduates will hold GOUV civil service grades/levels D and C, respectively. In addition, the school will provide much needed in-service training of existing and future forestry service personnel (see Part IV Technical Feasibility, for further discussion).

Without question, this project can fund the construction and equipment of the Dinderesso school. The ultimate success of the project, however, hinges on the ability to recruit qualified, motivated, energetic expatriate and GOUV personnel to teach at the school (see Part V Administrative Feasibility; upon request, detailed job descriptions are available in supplementary Annexes to this PP).

The general thrust of the training program will place heavy emphasis on practical training (see Part IV Technical Feasibility). The students' success as "change-agents" will be a function of their technical abilities, which can only come from a familiarity and understanding of techniques, problems, and solution gained from a training program oriented to the practical, and with time spent in the field as well as the classroom. To be effective the training program must also prepare its graduates to deal with the ecological diversity found within Upper Volta; this cannot be done without traveling beyond the immediate vicinity of the school.

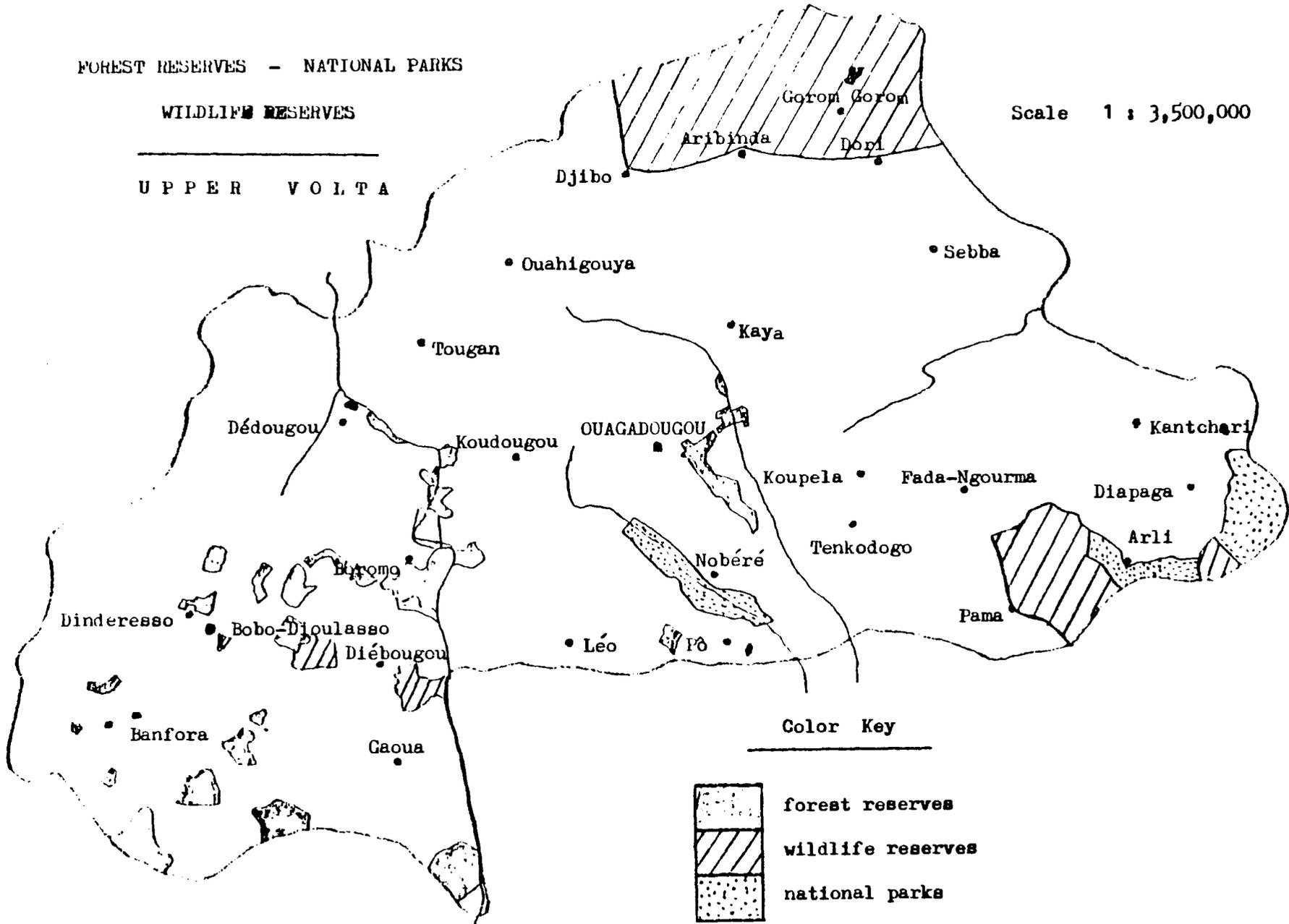
More than half of the students' time at Dinderesso will be spent outside the classroom doing practical work/study in the Dinderesso Forest. As these students will eventually be expected to work in the field, it is not only appropriate, but essential that their training be "in the field". In addition, students will spend two to three months per year on field trips throughout Upper Volta (second-year C-level students will travel to neighboring countries as well). These trips will include training exercises which cannot be effectively done in a classroom or in the Dinderesso Forest, as well as an exposure to the various ecological

FOREST RESERVES - NATIONAL PARKS

WILDLIFE RESERVES

UPPER VOLTA

Scale 1 : 3,500,000



and geographic zones of Upper Volta.

The decision to expand the forestry school at Dinderesso was taken after a thorough review of alternative means to improve the capacity of Upper Volta to train low-level forestry agents. The chief alternative was the reinforcement of the Matourkou school for agricultural extensive agents. The important considerations which caused the team to decide against the Matourkou option are:

- (1) Forestry training and agricultural training fall under the separate ministries; the Ministry of Environment and Tourism specifically requested that the Dinderesso School be reinforced, in order to facilitate its control over the training program, school training staff, etc. Also, past experience has demonstrated the difficulty of implementing projects which fall under two or more ministries.
- (2) The Dinderesso site has the obvious advantage of the surrounding Dinderesso Forest Reserve being close at hand. This is particularly important inasmuch as much of the training will be outside the classroom and with an emphasis on the practical skills needed by low-level forestry agents.
- (3) There is no "surplus capacity" at Matourkou for additional students. Whether the training facilities were expanded at Dinderesso or Matourkou, more dormitories, classrooms, teacher's housing, and a library would have to be built. There would be relatively little savings resulting from common use by forestry and agricultural students of existing buildings at Matourkou.
- (4) Matourkou is oriented towards training at level B and C, while the forestry school training program is aimed at levels C and D. (This is in line with the request of the government and the joint desire of AID and Upper Volta to address forestry-related problems at the village level.) The two programs are complementary and coordinated to the extent that most level C trainees at Dinderesso will have first taken the "core-curriculum" at Matourkou and will receive more specialized training at Dinderesso. This coordination between the two schools should be facilitated by the recent designation of a single person under the Ministry of Environment who is responsible for the Dinderesso Forestry School and any forestry-related training at the Matourkou School.
- (5) A forestry manpower and training study by the FAO (deMontalembert, 1977, see p. 20) evaluated training needs in Upper Volta and recommended that the Dinderesso School be expanded and upgraded to a Forestry Training Center. The FAO originally funded the Matourkou School.

## Forest

The inputs for the development/exploitation of the Dinderesso Forest are described in Parts IV Technical Feasibility and Annex L, Itemized Technical Equipment List. In essence, this element of the project will focus on the development and implementation of a model forest management plan, including resource inventory maps, vegetation analysis, management guidelines, and exploitation strategies.

Past forestry projects have spent considerable effort and money to establish plantations of fast-growing, exotic tree species in Upper Volta. There has been little exploitation of these new and younger plantations, nor has there been continued effective management and utilization of older plantations. The forest management plan will address various ways to exploit these resources, which were developed at significant cost but have yet to yield substantial economic benefits. In addition, management of the Dinderesso Forest will include experimentation with the development of heretofore largely neglected indigenous species, and new silvicultural techniques which may be more cost-effective and more adapted to current constraints on improved forest management.

An effective management plan for the Dinderesso Forest can have a very substantial and positive spread effect, to the extent lessons learned at Dinderesso can and will be applied to other forests in Upper Volta and in other Sahelian countries. At present there is a Sahel-wide need for the development, testing and demonstration of new approaches in forest management, and the work done at Dinderesso could stimulate and substantially contribute to the activity needed in this area.

## BENEFICIARIES

The villagers from Dinderesso and other villages surrounding the forest will benefit from this project in several ways (see Part II Social Soundness Analysis and Annex I, Results of Village Interviews). Those who are farmers will be allowed to cultivate food crops in the forest plantations as soon as the trees are one year old and ending when the growth and development of the trees (different periods of time depending on species) preclude agriculture. Herders will also benefit by being allowed to graze their livestock in the forest under certain conditions; currently livestock grazing is totally prohibited. Herders will not be allowed to damage trees (e.g. cutting off branches for their animals' browsing) and herders must prevent their animals from entering young plantations. It is felt that selective grazing in the forest can serve two important functions: (1) It can provide important grazing for livestock and will involve local herders in the management of the forest, including the concept of establishing forage reserves to be utilized during periods of drought; (2) It can

reduce the threat of fire. Employment in the forest (and during the construction and operation of the school) will also benefit the villagers in and surrounding the forest. Other immediate, short term beneficiaries will include the students who will receive valuable vocational education. In addition, it is planned to use the school facilities for periodic workshops, seminars, and regular refresher courses for all agents working in reforestation and national resource management. (At present, Upper Volta can provide little or no in-service training/refresher courses for its forestry personnel). Although priority would naturally be placed on training Voltaics, especially in the near future, it is conceivable (and desirable) that the school facilities eventually serve to train other Sahelians (particularly agents from Niger and Chad, where present training infrastructure is also very inadequate). Ultimately, of course, all of Upper Volta will benefit from an improved forestry service which will spread better resource management strategies to the rural population.

#### RELATIONSHIP TO AID COUNTRY STRATEGY

Although the DAP (written in 1974) does not cover the aspects of this project's proposed forestry agent training and natural resource development/conservation, the Mission did prepare in 1977 a forestry/conservation situation and activity option paper which clearly points to the drastic needs in both training of personnel and more intensified management of existing forest reserve areas. In addition, this project fits nicely into the overall Mission development strategy as it dovetails with the Agricultural Human Resources Development Project, (Ag HRD) in that both address the issue of human resources development and the Ag HRD project will ultimately be the major producer of teachers for the Dinderesso School.

Of all the constraints to economic development in Upper Volta, none is more critical than the paucity of properly trained and motivated personnel. The main thrust of the AID program in Upper Volta is distinctly human resources development. This thrust is most clearly apparent in the Ag HRD project, but it is also an important component of virtually all of Upper Volta's AID projects because each includes a training element and some (Eastern ORD Integrated Rural Development and Training Women in the Sahel projects) include a relatively major non-formal education program.

The project also responds directly to a priority concern of the GOUV with regard to overall development of the forestry sector. As indicated earlier, many forestry projects (involving other donors) are underway and additional ones are in planning stages. This project will address perhaps the most crucial constraint to the ultimate success of all of these projects; the lack of well-trained forestry agents who are sufficiently competent and confident of their abilities to do the jobs required of them. The high priority the GOUV places on this project is also indicated by its inclusion in the list of projects prepared in collaboration with CILSS for submission to the donor community (see CILSS project sheets UPV D 301, Forestry Training Center-Dinderesso, and A 304 Forest Management-Koulima which was changed to Forest Management-Dinderesso to complement the training center project. See also Annex N GOUV Application for Assistance). Furthermore, the importance attached to this project by other donors is apparent as indicated in Annex M, Table II. It should

be stressed that other donors are counting heavily on this project to produce forestry agents to implement forestry projects throughout Upper Volta. In fact, the project was identified in a multi-donor context, and during project design, other donors' project documents, and personnel were closely consulted (see supplementary Annexes, VI and VII).

## II. ECONOMIC FEASIBILITY

The proposed project is primarily institution-building and environmentally oriented in nature. Its chief outputs are an improved and expanded forestry school and a forest management plan. The latter should be conceived less in terms of a document than as a process for managing resources and for demonstrating the principles of multiple-use and sustained yield.

The following discussions will be limited, first, to the economic aspects of the Dinderesso Forest Reserve and its proposed management plan, and secondly, to the cost analysis for the Dinderesso Forestry School.

### ECONOMIC RETURNS FROM DINDERESSO FOREST

Forest resources in Upper Volta can be managed for a variety of outputs, the most important being firewood, service or construction wood, understory forage and livestock browse, and various non-woody minor forest products (such as edible fruits, nuts, leaves, game meat, honey, medicinal products, tannins, dyes, etc.). In addition, invaluable "environmental services" such as restoration of soil organic matter and soil fertility, erosion control and groundwater recharge, and protection or preservation of fisheries and wildlife habitat can be promoted. While all the above outputs contribute to the quality of life for people in Upper Volta and are all relevant to a project such as this, focusing on "environmental conservation", the available data only permit wood products to be included in an economic analysis.

Within the government-controlled forest reserves of Upper Volta, there exists a number of different approaches to profitable wood production. Natural forest stands can be made more productive by protection from bush fires (production will double, from 1-2 steres/ha/yr to 2-4 steres/ha/yr, on reasonably well stocked land); by improvement cuttings, cleanings and thinnings (which yield marketable firewood and accelerate the development of a higher-value crop of pole or even sawlogs); by enrichment plantings with more valuable or faster growing species (using direct seeding or seedlings); and by selected treatments (scarification, prescribed burning, grazing) to cause the regeneration or increased stocking of desirable species.

Throughout Upper Volta and within the Dinderesso Forest Reserve in particular, there has been little experimentation with the above cited approaches to improve production. The management of the Dinderesso Forest will explore

these and other approaches and determine the economic feasibility of each during the course of project implementation.

To date the most common approach to increased wood production has been the establishment of relatively high-yielding plantations of fast growing exotic species like Eucalyptus, Cassia, Gmelina, Neem, and to a lesser extent, Teak. Establishment costs are high, varying between 100,000 and 150,000 FCFA/ha, but production is also impressively high approaching 15m<sup>3</sup>/ha/yr in some instances. However soils must be relatively deep and fertile and rainfall above 300mm in order to obtain growth rates above 5m<sup>3</sup>/ha/yr (about 10 steres/ha/yr).<sup>1</sup> Where soil and rainfall combine to produce yields of less than 5m<sup>3</sup>/ha/yr, firewood prices must be over 2000 FCFA/m<sup>3</sup> (or +1000 CFA/stere) to recover the relatively high "establishment" and tending cost.

Firewood is presently supplied to urban markets for 500-750 CFA/stere. While it is expected that firewood prices will continue to rise in the near future, it is not certain that the wood produced from intensively-managed high yielding plantations will be able to compete in the marketplace with wood collected (often illegally) from the bush, even at a considerable distance from the point of consumption.

High growth rates can only be maintained with prompt and careful weeding during the first year of growth and continued tending for 3 to 5 years. Mechanised weeding is only feasible with large plantations extended over a relatively homogenous, level site. Such sites are difficult to find, especially near urban areas where demand is concentrated. Without mechanisation, a labor bottleneck occurs early in the rainy season when local labor is fully occupied with field preparation and crop seeding. This seasonal shortage of labor effectively limits the size of plantations, even if large parcels of land can be found. Outside the forest reserves, near large villages and urban areas, most land is subject to existing use rights of many smallholders for farming, grazing, and wood collection, and therefore, cannot easily be assembled into large sites for high-yielding plantations. Where land is available and mechanisation seems feasible, it can be argued that the intensive use of the site for wood production is competitive with and not complementary to food production.

The existing stands of recently-planted, fast-growing exotics (principally eucalyptus) in the Dinderesso Forest Reserve will be managed to recover their establishment costs. They should yield 5-10m<sup>3</sup>/ha/yr over three rotations of about eight years each.<sup>2</sup> In addition, the older plantations (principally cassia, teak and gmelina) should be thinned and cleaned, or even leveled and replanted with more vigorous plants. These operations

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<sup>1</sup>1m<sup>3</sup> equals volume of solid wood (cubic meter, with no air space). It is approximately equivalent to 1 steres: a stere is 1 cubic meter of stacked wood, including air space.

<sup>2</sup>They are planted on relatively deep, fertile soils; average annual rainfall of the Dinderesso Forest is 1131mm (see Annex B, IEE).

should yield enough firewood and poles to pay for themselves, and will lead to better utilization of the site potential. In an effort to both determine the most economically sound management techniques and to provide a practical training opportunity for the Dinderesso students, many alternatives will be explored, carefully documented, and evaluated with respect to their economic feasibility before they are fully undertaken.

It should be noted that conversion of wood to charcoal has been viewed in the past as a means to lower transportation costs of wood-derived fuels (by volume and weight reduction for a given energy value), and to thereby permit firewood plantations to be established at distances greater than 40-50 kms from the source of consumption. A recent energy resources study by the Club du Sahel has concluded, however, that the energy lost in converting wood to charcoal is significant enough to argue against charcoal conversion and in favor of locating more (and possibly smaller) firewood plantations closer to areas of concentrated demand, such as Bobo-Dioulasso.

This same study also concluded that the Sahel will remain dependent on wood for most of its energy needs in the foreseeable future, as diminishing supplies, rising prices, and the scarcity of foreign exchange to purchase imported fossil fuels in the Sahel. In view of the progressive liquidation of forest "capital" and the surging demand for wood products, much greater efforts are warranted to ensure adequate supplies of firewood and other forest products.

The many unknowns and constraints which presently surround the economics of wood production in Upper Volta suggest a basic reorientation from large-scale, intensively-managed, fast-growth plantations to lower-investment, lower risk village woodlots; in general, it would seem wise to explore a wide variety of approaches to firewood production, including the improved management of natural woodlands, and much more emphasis on "agro-forestry" (e.g., wood production from windbreaks, fallowed fields, farm trees like Acacia albida, Parkia bignobosa, Butyrospermum parkii and other sources which complement and serve to increase crop, fruit, and forage production). As indicated above, the Dinderesso Forest Reserve management plan will provide for the systematic evaluation of the economic feasibility (and social soundness) of many different approaches to wood production, with close attention to other heretofore unquantified outputs such as minor forest products, grazing, and "environmental services".

A "plan" for developing the forest management plan is presented in outline form in Annex J and in supplemented Annex I. Essentially, the project will develop a working management plan by (1) inventorying and evaluating the productive capability of the forest; (2) examining existing and potential uses of the forest with particular regard to the needs of the communities surrounding the forest and the Dinderesso Forestry School; (3) assessing the economic feasibility of various production strategies which are in harmony with the productive capacity of the forest and with the management goals as defined by the principal users of the forest; and (4) preparation of a schedule of planting, harvesting and other silvicultural treatments designed to maximize the desired outputs from the forest.

## COSTS ANALYSIS FOR DINDERESSO FORESTRY SCHOOL

For national planning purposes, an estimate of the detailed costs of the educational program must be calculated. Capital and recurring costs are usually separated. The capital costs include buildings, furniture, equipment and supplies expected to last several years. Land value was not included. Recurring costs arise each year and the largest item is usually teachers' salaries. The unit costs were calculated on the basis of 40 students the first year, and 50 students thereafter. It should be noted that capital costs were calculated using an oversimplified method. Recurring costs were calculated for years 1, 2, 4 and 5 of the project. The costs for year 3 would be on board the first year of the project. The figure used for maintenance, repair and operation was estimated.

The capital costs involved in the school amount to about \$1,100 per student per annum. The recurrent costs are extremely high during the initial years when expatriate salaries have to be covered, but drop to \$2,040 by the fifth year of the project when all the teaching is done by local staff. Thus in the fifth year of the project, total costs per student are expected to be less than \$3,200 per annum. This amount should include not only an average cost for the D and C level students, but also a period of retraining for graduates.

The question will be posed whether such training could be given elsewhere at lower cost. It is possible that additional facilities could have been built at Matourkou<sup>1</sup> at a lower cost. However, there are several arguments against such a decision. The students require access to various forestry activities for their practical training, and this could not have been provided at Matourkou. If the Forest Service is to be revitalized and given a spirit of its own, it would be unlikely that this could be developed at an agricultural school where the number of students in agriculture would greatly exceed the number in forestry. There would also be a tendency to view the Forest Service in its historic protective function or within the limits of "plantation forestry", rather than with its multiple-use forestry and integrated natural resource management.

Each year, the 40 graduates of the school will be hired immediately by the Forest Service.<sup>2</sup> The 30 graduates in the D category will receive a salary of \$1,800 per year and the 10 graduates in the C category will earn about \$2,000. The employment positions in which they are placed should utilize all the skills and knowledge which they acquired at the school. They are not expected to be "over trained". The number

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<sup>1</sup>Site (10 km south of Bobo-Dioulasso, i.e. 22 km from Dinderesso) of agricultural training school for C level and B level (junior college) students.

<sup>2</sup>In fact, at the time of enrollment in the Dinderesso training program, each student becomes a civil servant "trainee".

to be placed in the service per year is clearly in line with needs. If they function effectively to conserve the natural resources of Upper Volta, neither the cost per student educated or graduate employed seem out of line. Student costs are analyzed in Tables I and II.

TABLE I

CAPITAL COSTS

	<u>Construction</u>	<u>Furniture</u>	<u>Equipment Supplies, Books</u>	<u>Total</u>
Total costs in \$	1,116,000	121,000	239,000	
Imputed life in years	50	15	10	
Cost per annum	22,320	8,067	23,900	
Cost per student (50)	446	161	478	1,085

TABLE II

RECURRENT COSTS

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 4</u>	<u>Year 5</u>
Expatriate personnel	500,000	500,000	100,000	
Local personnel	25,000	49,000	49,000	49,000
Maintenance	20,000	20,000	20,000	20,000
Training expenses	8,000	8,000	8,000	8,000
Student scholarships	20,000	25,000	25,000	25,000
Total	573,000	602,000	202,000	102,000
Recurrent cost student	14,325	12,040	4,040	2,040

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As the school is constructed and the training program well underway, a better estimate of annual operating costs will be made. This information will be taken into consideration in the establishment of the forest management plan in terms of how the revenue generated by the forest can best ensure the continued operations of both Dinderesso forestry activities and the school.

### III. SOCIAL SOUNDNESS ANALYSIS

#### SMALL-SCALE INTERVENTIONS IN COLLABORATION WITH VILLAGERS

Except for a few national parks and forests, the bulk of Upper Volta's natural resources are under village-level control, except where population densities are relatively low. Overfarming and overgrazing are perceived as problems among neighbors, who find that their needs have grown, but not their land base. Overcutting is both a local and a regional problem, given urban demands for firewood. These problems cannot be resolved simply by national legislation; they require involving the rural population in saving what is their own resource base.

The key to effective management of natural resources in Upper Volta lies in going beyond forest and wildlife protection to take advantage of every possible opportunity to intervene at the local rural level to improve soil and water management, upgrade wildlife and fisheries, and encourage sustained-yield wood lots, windbreaks and erosion control.

The project seeks to produce this change in emphasis, and to do it from below, by stimulating and supporting action among the base-level agents themselves. Several mechanisms built into the training elements of the project will bring about this effect:

1. The American teachers in the school will be experienced in small scale interventions at the community level, and will themselves be "hands-on" technicians who lace their teaching with actual physical demonstration of the use of tools and techniques. The willingness of Americans to do labor themselves is widely-known and respected by West Africans. In daily interaction this role-model of the working technician is bound to rub off onto the students.
2. The field visits will bring the students into direct contact with local conditions all over the country, and in particular with numerous projects attempting village reforestation and resource management. Assuming the site visits are well-planned, this should build an esprit de corps, induce a sense of national mission, and provide a breadth of understanding and practical training that few civil servants ever get when they enter national service.
3. The management of the Dinderesso Forest will engage the communities around it in a series of trials of farming, grazing, and employment opportunities within the forest itself. More than being a test-case for potentially replicable methods of community development, the forest will be the training ground for the "new breed" of agents at the school. The students will gain first-hand experience of trying to work out mutually agreeable objectives among the Forest Service and the surrounding farmers and herdsmen. This interaction will be the concrete basis of a transformed service: if young agents can gain confidence that they can work positively

with villagers both to conserve resources and to improve villagers' lives, then these graduates of the training courses will have an impact on the rural environment of Upper Volta. See Annex I, Summary of Village Visits.

### A TECHNICAL MODEL FOR FOREST SERVICE REVITALIZATION

The Forest Service now lacks dynamic policies for change. With severely limited funds, an inheritance of merely managing forest reserves and parks, and a dearth of agents at any level, it has not had room to maneuver up to the present time. Donor interest in resource conservation, anti-desertification, etc., has provided the first bit of elbow-room in the form of funds for new local initiatives. Support of the Dinderesso Training School (and the related support of higher level technical training elsewhere) provides the means for institutionalizing new roles for environmental personnel. The Dinderesso forest management plan completes the basis for a shift in the Forest Service orientation by testing multiple-use, sustained-yield packages that are replicable in other national forests of the country (and in similar ecological zones across West Africa). By demonstrating that surrounding communities can use the forests and fisheries, without a resulting decline in their productivity, this project can show to the central directorate of the service a way to increase access by villagers to national forests and involve them in natural resource management.

The management plan provides for experimentation with forms of forest use that the service has never been able to try. For example, it will allow herders, most of them from several sedentarized Fulani communities around the forest, to graze legally inside the forest under certain regulations. Herders will need to keep their animals away from young plantations, and rotate out of forest areas determined by the forest managers to be sufficiently grazed.

The plan will allow farmers to cultivate areas within the forest with certain limitations as well. This element of the plan will require careful elaboration. It must ensure (a) that farmers do not just come in to use fresh soils carelessly and for short periods because they see them as a windfall of usage rights; (b) that usage rights are allocated to people who need them and will utilize them on a long-term basis; and (c) that the lands thus allocated will be protected from the activities of forestry agents and students and from browsing livestock.

The management plan also will bring the forestry student agents into direct contact with villagers. Under the supervision of both school and forest management personnel, students will witness methods by which communities can be brought into conservation plans, and to test local ideas for small-scale projects. The give-and-take that thus occurs is a truly instructional experience for the students. The forest will be their laboratory, and the interaction with the community will provide the test of their capacities to stimulate and support conservation measures that are necessary throughout the country. For a more detailed description of the forest management plan

and the roles of the forest manager and his/her assistant, see supplementary Annexes 1, V-2, and V-3. To ensure that the management plan is responsive to the educational needs of the school and to the needs of the villagers living in and around the forest, periodic review and approval of the plan will be the responsibility of an Evaluation Committee (see Part IX, Evaluation Arrangements for the Project).

### BENEFICIARIES

The beneficiaries of the project include: (a) the forestry agents themselves, who will be trained and equipped in new methods and will go on to jobs in which their improved knowledge should provide them both a solid confidence and a higher-than-average chance of civil service advancement, (b) the farmers and herders around the forest who are allowed "in" to use resources previously denied them, and (c) the workers who are hired on a daily or other wage basis to do the preliminary jobs of school and fire-lane construction, and then the ongoing task of firebreak clearance. These workers will be relatively few in number, but the work will mean local dry-season employment for people who would, otherwise migrate elsewhere to earn cash. (The forest manager should ensure that these laborers come from the local area.)

It should be stressed that the forest management plan will specifically address the needs of the users of that forest. In this case, the users include not only the GOVT Forest Service and the Dinderesso School, but also and especially the villagers living in and on the outskirts of the forest. The major incentive for the participation of the villagers in the formulation of the plan is that they stand to benefit directly from their involvement. In fact, the villagers are interested in deriving greater benefits from the forest (see Annex I, Summary of Village Visits). In addition, from a wood production standpoint, the forestry plan stands to benefit from greater involvement of the villagers, particularly concerning fire control.

Insofar as the project contributes to the general conservation and upgrading of Upper Volta's environment, women as well as men will benefit from project interventions. To the extent that the project is effective in developing supplies of wood located in closer proximity to villages than existing supplies, in decreasing soil erosion, and in increasing the infiltration of rainwater and the recharge of ground water supplies, a village woman's burden will be lightened. At present, it is the village women who must walk long distances in search of firewood and water when local supplies are exhausted or diminished. As the school broadens the concept of appropriate roles for a "forester," it is likely that there will be more and more roles which women will be asked to handle. Village women impact the forested environment in many ways, and they too will be involved in programs to manage more rationally the productivity of that environment.

Ultimately, the instruction received at Dinderesso will be spread by the Forest Service throughout the country. Thus, in the long run, all of Upper Volta stands to benefit from an increased capability to develop rational water and land/resource uses which can increase agricultural, forest, and animal production--and protect the environment at the same time.

#### IV. TECHNICAL FEASIBILITY

Upper Volta is one of the eight countries commonly grouped together to form the "Sahel" region of West Africa. In fact, only the northern portion of Upper Volta falls within the zone of true sahel vegetation (found between 100-400 mm.); these areas are dominated by the Acacia and Balanites thorn bushes which typify sahelian vegetation. Most of Upper Volta is covered by sudan-savanna vegetation, consisting of widely-spaced, medium sized trees, with an understory of woody shrubs and grasses. The landscape reflects the extensive use of land for farming and grazing. Where soils are shallow, droughty or badly-eroded, the vegetation is often sparse or non-existent. Throughout the southern half of the country, seasonal "bush fires" contribute to the maintenance of dry, open woodlands with heavy growth of tall grasses.

Roughly 14 percent of Upper Volta can be considered forested.<sup>1</sup> The most densely wooded areas and the majority of the land classified as forest are generally found along seasonal watercourses and within the limits of national forest reserves. No figures or estimates are available for the percentage of land forested 50 or 100 years ago, but indications from conversations with older villagers are that forests were considerably thicker and more extensive as little as 20 years ago; one has only to protect an area from cutting and grazing to observe that the climatically determined "climax forest" is indeed much denser than that which one finds at present.

As a consequence of population growth and subsequent land use pressures, the area of forest is decreasing and the vegetative cover of the country in general is deteriorating from overuse. Resources are being exploited faster than they can regenerate; the forest "capital" is being utilized to the point of disappearance. Where once there was dense tree cover, shrubs and grasses, now there is bare ground. As these patches of denuded land and the area of impoverished soils expands, the pressure on the remaining woodland and fertile soils increases. The short term result is acceleration of the trends of overuse and destruction of soil, forest and water resources; the long term results will be absolute poverty and hardship for a country of subsistence farmers and herders who are directly dependent on the productivity of the natural resources around them for their well-being and survival.

Two essential goals of development are sustaining the quality of life and possibly raising the level of living for people, and nurturing a capacity to solve problems and to increase productivity on a continuing basis. In Upper Volta at the present time, both the quality of life and level of living are threatened by environmental deterioration. At the village level,<sup>2</sup> more time and efforts must be spent gathering or providing for life's necessities (e. g. more land must be cultivated to get a given yield of food grains firewood, water and forage are more difficult to obtain), and per capita food consumption is not making headway in the face of population growth and declining soil fertility. It could be argued that many of our development efforts have missed their mark, because they did not give enough attention to protecting and enhancing the productivity of the country's renewable forest, soil and water resources. These natural resources are now and will remain for some time, the basis of the essentially agrarian and pastoral economy of Upper Volta. Without greatly expanded efforts to protect and conserve them they are likely to be irreversibly degraded, and hopes for economic development will be frustrated.

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<sup>1</sup> These "forests" are more properly termed dry, sudan- and guinea-savanna woodlands. The true, tropical high forest can only be found in wetter regions, south of Upper Volta.

<sup>2</sup> Urban populations see the consequences of continuing overuse and resource degradation in terms of higher prices in food, fuel and other necessities. It has been recently estimated that the average urban household must spend 20 percent of its income on firewood purchases alone.

To date, there have been few large-scale interventions designed to address directly problems of environmental deterioration. Some plantations of fast-growing trees have been established, but the protection and more intensive management of existing forest have been overlooked or handled inadequately. Efforts have been made to develop suitable fertilizers, selected seed, improvements in cultivation practices and in protection of crops from insects and disease, yet these inputs required money from a farmer who cannot get ahead enough to save any, and good crop development remains dependent on having a soil deep enough to hold the soil moisture required for plant growth. Erosion has not been significantly checked, and the farmer remains unable to extricate himself from the vicious circle of erosion, poor yields, no money, no inputs, continued soil impoverishment, and poorer yields. Likewise, many wells have been dug and cemented in a seemingly direct attack on the problem of inadequate rural water supplies. But, lacking efforts on the ground to cause increased infiltration of rainfall and to slow runoff, aquifers are not recharged and deeper wells go dry sooner. Small dams have been built to water livestock and facilitate irrigation, but failure to protect the watersheds from deforestation, overgrazing and erosion has caused reservoirs to silt up and rapidly lose their ability to store water. Livestock development has emphasized animal health and the provision of new, year-round watering points, and by and large neglected the need for grazing control, limitations on herd size and the introduction of range management concepts. The short-term result has been sharp but unsustainable increases in herd size, achieved by liquidating rangeland "capital" with the long-term cost being the lowering of the carrying capacity of the range. If development activities remain on a sectorial basis, and continue to ignore the essential need to husband the productivity of the natural resource base, the end result will be disappointing at best, and at worst catastrophic.

Development clearly cannot proceed in the face of environmental deterioration. Assuming population growth can be slowed and that the Voltaic population eventually stabilizes, environmental deterioration can be halted by a program which succeeds in: (a) having an impact over large areas, bring conservation techniques and non-destructive alternatives in resource use to the rural population and not confining itself to forest reserves, pilot projects, etc., (b) bringing about basic changes in attitudes towards natural resources, including a respect for controls designed to prevent overuse in the common, long-term interest and (c) building the institutional and technical capability to identify and respond to overuse problems by using resource management plans to harmonize the need to use and consume a resource, and the need to preserve and protect its continued productivity. The concept of "integrated rural development" has been introduced in recent years to Upper Volta, and the time is ripe for this concept to be expanded to include the principles of sustained-yield, multiple-use resource management.

Essentially three inputs are required to halt environmental deterioration: (a) technical competence; the knowledge of what to do, (b) appropriate tools and adequate financial support, and (c) people capable of making efficient and effective use of the first two inputs. Although one can always ask questions to which no one has the answers, and although we will always need and want to know more about the best way to solve a given problem, much has already been learned in the field of natural resource conservation

and development in the Sahel. Many hours and dollars have already been consumed by problem analyses, the elaboration of strategies and technical studies. Much of the knowledge gained has yet to be translated into concrete benefits for rural populations.

Upper Volta has historically been able to devote only small amounts of material resources to resource management and conservation. As a consequence of increases in development assistance triggered by the 1968-1973 drought, there have been large increases in the amount of technical assistance, equipment, and operating funds made available to "fight desertification" (cf. CIILSS Regional Program in Forestry/Ecology).<sup>1</sup>

As more studies are completed and more knowledge gained, and as more projects are proposed and financed, the third essential input--people--looms as a chief constraint to efforts to reverse environmental deterioration and to promote the wise use of natural resources. As stated by E. F. Schumacher in Small is Beautiful, "Development does not start with goods; it starts with people and their education, organization, and discipline. Without these three, all resources remain latent, untapped potential."

By statute, the Forest Service is the agency responsible for the health and productivity of the rural environment -- of the land base of Upper Volta. This includes the renewable forest, soil,<sup>2</sup> water, wildlife and fisheries resources, both inside and outside designated forest, park and wildlife reserves.

To meet its responsibilities, the Forest Service had at its disposal in 1976 a total of 298 persons. These people have concentrated their efforts on forest protection (administering cutting permits, stopping bush fires); wildlife protection (administering parks and hunting regulations, stopping poaching); and fisheries protection (administering fishing regulations). Limited but increasing efforts have been made to establish village woodlots, improve park management, and promote fish culture and fisheries production; the service was also involved in one large-scale soil conservation project in the early 1960s.

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<sup>1</sup> See also Tables I and II in Annex M for listing of ongoing and planned forestry projects.

<sup>2</sup> As recently as 1972, the chief of the Forest Service carried the title of "Director of Waters, Forests, and Soil Conservation"; there now exists a separate (but very small) soil conservation service, attached to the agricultural and rural development agencies.

The Forest Service Budget for 1972 was as follows: (Million FCFA)

<u>Revenues</u>		<u>Expenses</u>	
Cutting permits, etc.	7.3	Personnel	78.1
Parks/wildlife hunting	15.1	Material; supplies	8.1
Fines, infractions	1.5	gas/oil	3.2
Total Revenues	23.9	vehicle maintenance	1.3
		Total Expenses	90.8

The national budget directly pays salaries (and occasionally new vehicles) and provides about 10 - 12 million FCFA (\$48,000) annually to the service for operational expenses. In addition, in the recent past, 1 - 4 million FCFA per year have been made available to the service by counties (collectivités rurales) to help offset the cost of forest nurseries small tree-planting projects, and surveillance activities by "county foresters" (i.e. forest service personnel assigned to the collectivité).

As has been pointed out by many professional foresters working in the Sahel, and as should be evident from the above information, the use of the term "forester" should not cause one to think that this person will only be working in a forested environment and only be involved with the intensive exploitation and regeneration of forests for wood production. This is indeed a priority activity, in order to simultaneously meet the concentrated demands of urban populations and slow the rate of deforestation. But, this activity will be focused on and indeed limited to a very small percentage of the land. From a base of 3.3 million hectares of land in forest reserves and parks, one must subtract the 1.60 million hectares of the Sahel Sylvo-pastoral Reserve, and 1.55 million hectares of parks and wildlife reserves. Of the remaining 645,000 hectares, only a fraction has deep, fertile soils conducive to profitable, intensive firewood production. Thus, something less than two percent of the land area of Upper Volta can be considered as more or less free of village-use rights (farming and grazing) and available to the government for large-scale, mechanized reforestation for firewood production.

Clearly, foresters must be trained to better manage the other 98 percent of Upper Volta's environment. Better trained foresters could play a key role in lowering erosion rates from the present level of 5 - 20 metric tons of soil lost/hectare/year.<sup>1</sup> Foresters could also become involved in protecting and enhancing the capability of the savanna "bush" to restore soil fertility on exhausted farmland or in regenerating overgrazed rangeland. Foresters are needed to round out (and perhaps modify) development efforts to insure that they are ecologically sound and adequately address the fundamental need to husband the productivity and renewability of (would-be) renewable resources.

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<sup>1</sup> Estimated by CTFT research, quoted in Forest Service Annual Report, 1972.

Agricultural production throughout Upper Volta has been faced with declining yields due to shortened fallow periods. This has created a need for conservation measures to restore soil fertility by adding soil nutrients and organic matter. Use of commercial fertilizer is not economically possible, except for selected cash crops, and does not replace organic matter. However, training forestry agents in integrated resource management techniques, such as prevention of soil erosion and means of restoring its fertility by planting trees like acacia albida,<sup>1</sup> can have an important impact when the agents make this information available to small farmers in a palatable manner.

Two other areas where the output of more comprehensively trained forest technicians can be expected to have a beneficial impact in the long run are wildlife management and fish culture. Most of wildlife in Upper Volta is found in the national parks. Wildlife conservation will sustain whatever hopes the GOUV has for the future for tourism. If the wildlife now existing is decimated by poaching, it will be next to impossible to reestablish. The future potential for fish culture may be limited, but certainly production could be improved from existing reservoirs and other surface water bodies.

Spoilage losses are frequently high from present catches because preservation practices are poor and inadequate. Improved methods of sun-drying and salting could be more widely demonstrated. Improvements in wildlife management and fish culture would both add badly-needed protein to the Voltaic diet.

The ultimate aim of environmental protection/rehabilitation is, of course, sustained enhanced production of renewable resources. For the forest and rangelands of the Sahel, this means continued production of fuel wood for cooking, poles for roofing, branches for fencing, pasture for livestock, and a variety of non-woody, minor forest productions with nutritional, medical, forage and other economic values. These "forest products" are collected and consumed directly, or purchased in rural markets. No doubt, they do not enter into calculations of "gross national product." Although their contribution to the rural quality of life has never been adequately assessed, few would deny it is substantial. Unfortunately, if the Forest Service and its foresters do not look after the natural "bush" and safeguard its productivity, no one else will.

At present, five categories of Forest Service personnel are recognized in Upper Volta (see Table I). Training for levels A-1 and A-2 is available at the "Institut Supérieur Polytechnique" of the University of Ouagadougou (ISPO). The core curriculum for "ingénieurs" has been in the process of developing since the creation of ISPO in 1974-75; the specialized training and research opportunities for those students specializing in forestry has been planned and recently financed, and should take form in the near future.

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<sup>1</sup>Windbreaks reduce soil erosion and Acacia albida plantings have a nitrogen-fixing capability and other qualities which enrich the surrounding soil.

Table I

CATEGORIES OF GOUV FOREST SERVICE PERSONNEL

<u>Level</u>	<u>Title</u>	<u>U. S. Equivalent</u>	<u>Principal Tasks</u>
A-1	Ingenieur des Eaux et Forêts	B. S. or M. S. /Forestry University Education	At both A-1 and A-2 levels conceive, organize, ad- minister FS programs both within government reserves, and in context of rural de- velopment programs.
A-2	Ingenieur des Travaux des Eaux et Forêts	A. A. or B. S. /Forestry High School plus vocation- al technical training.	Mostly administration and reporting - head quarters and forest region offices. Some project planning and technical guidance.
B	Controleur des Eaux et Forêts	A. A. /Forestry: primary school plus 4-5 years of high school/vocational technical training.	Administration and reporting forest region and district level primarily. Supervisory and technical responsibility.
C	Agents Techniques des Eaux et Forêts	Forest Technician: primary school plus 2-3 years high school/voca- tional technical training	Some administration and reporting at district and post level. Chiefly in- volved in program execut- ion : supervision and technical guidance in the field.
D	Préposé des Eaux et Forêts	Crew Chief: primary school plus 1 year voca- tional training.	Same as level C, but less technical competence demanded, and less res- ponsibility. Either super- vises work crews or functions as "Warden".

Training for level-B technicians and specialized training in fisheries and wildlife and park management has been provided in the past schools in the Camerouns, Ivory Coast, and Mali, as well as various European schools. It is possible that personnel aiming for level-B positions in the Forest Service will be able to enroll in the core curriculum offered at the Centre Agricole Polyvalent (CAP) at Matourkou, but their specialized practical training in forestry would, most logically be provided by the facilities at Dinderesso.

No training facilities, programs or formal retraining possibilities current exist for level-C personnel. Attempts have been made to provide retraining sessions for D-level personnel seeking promotion to level C, but the sessions have never materialized because of a lack of means: no classrooms, no instructors, no teaching materials, no transportation to project sites, etc. For the time being, D-level agents are either not promoted to C-level or are promoted and individually receive additional training "on the job". The result has been a gradual erosion of morale and commitment on the part of older C (and D) level agents, and little actual difference in technical competence between the two lower levels.

#### Dinderesso Training Center

The current training program for level D agents has changed little since it was first set up by the French in 1953. The National Forestry School, consisting of one classroom and several mudbrick dormitories built over 25 years ago, is located at Dinderesso, about 16 km. northwest of Bobo-Dioulasso. It was originally conceived to train forest guards who would police land set aside as forest reserve. Although generally, only thinly populated because of basic impediments to settlement, (no water, disease, poor soils), a constant vigilance by forest guards was nonetheless needed to prevent woodcutting, hunting, grazing, burning and shifting cultivation, all of which were prohibited within the reserves. With independence, and the need to more fully staff a Forest Service, the school undertook the training of "préposés" or agents de base" (low-level, field representatives) of the service. Their mission was primarily "protection de la nature" (nature protection) and this was reflected in the curriculum. The emphasis was (and is) on formal, theoretical training in botany, silviculture, fisheries and wildlife management. The current program of studies covers 12 months, and includes the following courses: General Botany, Plant Systematics, Silvics and Silviculture, Wildlife Management, Fisheries and Fish Culture, Geology, Soil Science, Forest Legislation, Biogeography, and Administrative and Military Training. Some instruction is given in surveying,

nursery and planting techniques, and forest management, but it does not succeed in producing competent technicians who are confident of their ability to survey and manage a forest, set up and run a nursery, or establish a village tree plantation. (See Annex H, Question 2.) Additionally, no opportunities have been available for "re-training" workshops or short refresher courses.

Every year 10 students who have obtained their primary school certificate (CEP), and passed a competitive entrance exam, are recruited for the entering class of the school. While in school they are given a \$35/month scholarship to pay for food, clothing and essentials. The school has never had a full-time director; the regional forester based in Bobo-Dioulasso has been responsible for its administration and staffing. Before independence, the school was staffed by French professors who were assisted by Voltaic forestry personnel. From 1960-1976, one French professor and several Voltaic training assistants taught at the school. More recently, the teaching has been entirely shared by various agents within the Bobo-Dioulasso regional office. In addition to their regular administrative duties, each of these agents gives morning lectures one or two days a week to the students. A forest technician is assigned to the school as "surveillant" (on-the-ground supervisor) and is responsible for organizing practical training in the nearby nursery and plantations on Thursdays and Saturdays. When possible, specialists and other forest service personnel are encouraged to teach for limited periods at the school.

As described in Annex H (questions 1, 11), the school's infrastructure is presently inadequate. The dormitories and classroom are inadequate; there are no facilities for laboratory work, studying, or eating; there is no library, no running water, no electricity. The school presently has the use of two (65 and 95 HP) tractors; there are also a few hand tools available for nursery work. Because there are no available vehicles, nor funds to operate them, the students have not been able to do any fieldwork beyond walking distance from the school.

Recognizing the unsatisfactory state of affairs at Dinderesso, and the priority need for qualified personnel, the GOUV has drafted a succession of proposals to improve and expand the Dinderesso forestry school. In addition to the needs presented in these project proposals, overall training needs in forestry have been enumerated and emphasized in a comprehensive FAO/CILSS forestry manpower and training study,<sup>1</sup> and in the responses to a questionnaire distributed by the AID design team for this project (see Annex H, questions 3, 5-10).

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<sup>1</sup> "Evaluation des besoins en formation forestière dans le Sahel et Propositions d'Action." M. R. de Montalembert, July 1977. CILSS/FAO.

Table II has been compiled from data published in the FAO/CILSS report, and from other documentation and information made available to the design team by the GOUV forest service.

Table II

FORESTRY PERSONNEL REQUIREMENTS

<u>Level</u>	<u>IN-SERVICE</u>	<u>ADDITIONAL REQUIREMENTS TO 1930</u>		<u>Total Personnel Requirements</u>
	<u>Presently In-Service</u>	<u>Administrative Staffing</u>	<u>Project Personnel</u>	
A-1	2	1	2	5
A-2	9	3	10	27
B	15	3	14	32
C	30	30	40	100
D	144	56	100	300

Basic figures for personnel requirements through the years 1930 and 1990 were calculated by the FAO consultant Montalembert on the basis of national targets for: (1) reforestation, plantation projects (x numbers of level A, B and C agents needed to survey, plant and maintain y number of hectares); (2) inventory and management projects (x numbers of each level needed to intensify the management of natural stands in y numbers of reserves and over z hectares of savanna woodland); (3) staffing of forest service administrative positions; (4) recruitment of personnel for national parks and wildlife management projects.

Not included were specific needs for research and training projects, and for fisheries and fish culture projects. To cover the need for forestry personnel involved in integrated rural development and extension programs, a fraction of those needs calculated for forest management and reforestation projects was added to arrive at a figure for "total personnel requirements". In the case of Upper Volta, it was estimated in this manner that the Forest Service would need 400 lower level (C and D) technicians by 1980, and 850 technicians by 1990.<sup>1</sup> Note that these estimates are a lower limit (given the validity of the project and service requirements), because no allowance has been made for replacement of personnel presently in service but due to be lost through attrition (retirement, job change, illness, death), and because the Dinderesso training program is already falling behind schedule.

It is proposed to reorganize and expand the school at Dinderesso to make possible the training of 30 D-level and 10 C-level agents per year. This would produce 100 new level C and 300 new level D agents by 1990. The training program would be characterized by: (1) development of new, expanded curriculum emphasizing practical, basic skills and knowledge relevant to the tasks facing level C and D agents (see Annex K);

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<sup>1</sup> Montalembert, p. 6.

(2) avoidance of long, exhaustive treatment of general subjects; (3) training in "forestry" in the broadest sense, as it relates to village quality of life and rural development, as well as to intensified forest management for wood production and to traditional forest service responsibilities; (4) concentration of training in the field with daily fieldwork exercises; (5) exposure to development and implementation of a model forest management plan on the adjacent Dinderesso forest reserve; (6) involvement of teachers and students with extension activities in the vicinity of the school; (7) extensive field trips (2-3 months per year) to familiarize students with the diverse environments in which they will be working, and to improve the quality of their field training (see map, Annex K); (8) development of a qualified, energetic teaching staff; (9) opportunities for graduates to return for retraining and advancement, and as far as feasible for other foresters, development agents and non-Voltaics to participate in seminars, refresher courses, etc. organized by the school.

To implement this program, the following inputs are deemed necessary: (see also Financial Tables, Annex C and Itemized Technical Equipment List, Annex L): (1) a competent and sufficient teaching staff, consisting of three full-time instructors, four full-time assistant instructors, five part-time specialists, one part-time field trip coordinator (also serves as assistant forest manager for the Dinderesso reserve), and a school director who will also do some teaching; (2) a revised and expanded curriculum for the one-year D-level program and a completely new curriculum for the two-year C-level program (see Annex K); (3) a substantial improvement in school infrastructure, including the construction of three classrooms, a laboratory/workshop, a library/study room, a cafeteria, three dormitories, a guest house (six bedrooms), student union/recreation building, a garage, and eight housing units for the teaching staff/school director; (4) the provision of teaching supplies, vehicles, administrative equipment, furnishings, administrative and support personnel, etc. necessary to make the school functional.

Initially, the personnel requirements for the school are substantial in part because of the need to develop new course material, and in part because the instructors will be teaching other assistants and instructors as well as students. The success of the training offered by the school also depends on a high student-to-teacher ratio (see below). Likewise, assistants and counterparts are needed to insure continuity once the expatriate teaching staff has departed. Furthermore, the program of studies is not limited to training strict-sense "forest technicians", but, as per Forest Service responsibilities noted elsewhere, it must train technicians competent in wildlife and fisheries management as well. More significantly, the school must also produce forest service personnel qualified for the immense and complex tasks related to achieving multiple-use, sustained-yield (or integrated) natural resources management over the whole of Upper Volta. Lastly, the staff will be called upon to instruct students at two levels: D and C, the former with an emphasis on basic skills and practical knowledge, and the latter emphasizing more advanced basic skills and including more instruction in the theoretical basis for many techniques introduced at the D level.

The inclusion of teacher housing in the construction program was judged to be necessary on the basis of: (a) a relatively heavy daily teaching schedule for most instruc-

tors, making it less convenient to attempt to "commute" to Bobo-Dioulasso between classes, etc. (32 kilometers round trip over dirt roads); (b) a need for the instructors to be available beyond their designated classroom hours for frequent fieldwork, and the desirability of instructors "sitting in" on one another's classes; and (c) the crucial importance of frequent and close student-instructor interaction, to adequately (fully, repeatedly) communicate new philosophical outlooks and attitudes, in addition to new techniques, methods and factual knowledge.

The combination of the nature of an institution-building project which involves substantial investments in infrastructure, and the desirability to minimize recurrent costs<sup>1</sup> by providing for long-term purchases in the project budget, have acted to raise the cost of the project, especially relative to the outputs expected within the five-year funding period. But it should be recalled that this is not a project to train only the (30 x 4 years) D level and (10 x 3 years) C level students who will graduate from the school by September 1973: as discussed above, it is a project to establish the capability of Upper Volta to continue training forestry agents in order to meet substantial long-term personnel requirements.

Since the subjects taught are chiefly practical in nature, the training is likely to be most effective if students are well-supervised in small groups and there exists the possibility of continuing, individualized evaluation and encouragement. Additionally the training must be to a certain extent repetitive and demonstrative, relying on the frequent use of audio-visual aids such as slides, movies, wall posters, charts, models, etc., as well as instructions and practice in the field.

Appropriate procedures for assessing the progress of students will play an important role in insuring the success of the training program. At the level of individual students, rather than relying exclusively on written final exams, heavy use should be made of evaluations of daily housework and fieldwork, and of responses to questions posed both inside and outside the classroom. At the completion of each course both theoretical and practical knowledge could be tested; this would diminish the importance of a single comprehensive exam in deciding whether or not a student satisfactorily completed the training program.

Finally, for the school's training program as a whole, it would be advisable to have periodic review and evaluation performed by a 'comité de perfectionnement' or advisory committee, as discussed in Part IX, Evaluation Arrangements

### DINDERESSO FOREST RESERVE

The expansion and improvement of the Dinderesso Forestry School and the training, demonstration and experiments done in the adjacent forest reserve will be important steps towards mobilizing efforts to protect and rebuild what is left of the natural environment. Logically it is best to start with areas of the environment that have

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<sup>1</sup> It is also planned to effectively lower recurrent costs by paying for some school operating costs out of revenue earned from the management of the Dinderesso forest reserve.

suffered the least degradation and can be most easily protected and managed. The forest reserves established by the French during the colonial era offer a tremendous opportunity for effectively increasing protection and rational utilization of the natural forest environment. Not only is there hope of maintaining or reestablishing large islands of healthy forests and grasslands, but also of increasing the sustained yields of those reserves to benefit the human population.

But without properly trained and motivated personnel, the Forest Service cannot possibly meet its objectives in environmental protection and resource utilization, even on the 3.8 million hectares of forest and wildlife reserves, not to mention the remainder of the environment of Upper Volta. Furthermore, a training program for C and D level personnel will only be successful if it provides ample opportunities to learn by doing and to become familiar first-hand with forestry problems and ways to deal with them. Thus, it is only appropriate that the school takes full advantage of its proximity to the forest reserve and uses the reserve as a site for fieldwork and practical training. The students, the teaching staff, and the field foresters will all benefit from a close, cooperative, interactive relationship; the students can participate in the development of the forest management plan and help implement it; the teachers have a training, demonstration and research resource at their disposal; and the field foresters themselves can both offer and receive knowledge helpful to forest management.

The development of a comprehensive management plan for the Dinderesso Forest Reserve will serve as an example for the development of management plans for forest reserves throughout Upper Volta. Without management plans, efforts to protect, manage and utilize the forest reserve have been and will undoubtedly remain disorganized, incomplete, or even misdirected and mistaken. In the case of Dinderesso, the management plan will include a complete inventory of the forest resources and infrastructure, policies with respect to their protection and utilization, an economic analysis and guidelines on maximizing the educational benefit of the forest. Because of the special situation at Dinderesso, the plan will attempt to provide for as many different management situations and techniques as possible, many more in fact, than would normally be the case with other forest reserves. Particular attention will be given by the assistant forest manager to maximizing the educational benefits of the forest. In addition to helping the expatriate forest manager develop and assist in the implementation of the forest management plan, this technician will be responsible for coordinating the field trips of the students (see supplementary Annexes V-2 and V-3).

The following are some of the possibilities and key functions of the Dinderesso Forest which will be elaborated in its management plan:

1. Training ground and example for basic inventory and land capability classification procedures, including mapping and describing vegetation, soils and other natural features as well as plantations, roads, firebreaks, and other improvements, with and without the use of aerial photos.

2. Demonstration area for presenting the concept of multiple-use, sustained-yield, management; the forest will be managed to protect its long-term productivity, while still providing for as many local needs as feasible. Management policies will evolve from an understanding of what is socially desirable, economically feasible and ecologically sound; the latter to be decided on the basis of land capability classification resulting from the inventory process (i. e. analysis of ecological limitations and potentials).
3. Focus for model extension program, with the dual objectives of (a) local participation in resource use decisions, to insure their interests are served, and (b) constant dialogue with surrounding populations to gain their cooperation in achieving management objectives, and to increase their comprehension of the management program in order to encourage its replication outside the forest, on surrounding lands.
4. Example of economically viable forest management operations, with operating funds being provided by a return of a given percent of revenues earned from forest products sales and permits.
5. Site for effective retraining of Forest Service agents, to teach them what they never had a chance to learn; alternatively techniques in fire management, silviculture of natural stands, tree farming and tree improvement techniques for local species, forestry extension techniques, soil and water conservation techniques, harvesting and utilization techniques, charcoal production techniques, implementation of multiple-use, sustained yield policy, elements of project administration, work-planning and reporting, etc.
6. Experimentation with new directions in forest management, with the aim of making it more effective, more appropriate, and more relevant to the forestry situation in Upper Volta and the Sahel in general (see also special note on technology below). Together, the school and the forest could explore, develop and disseminate: (a) new approaches to plantation establishment and aftercare, (b) techniques in fire control, (c) improvements in charcoal production technology, (d) knowledge of the silviculture of economically important, well-adapted local tree species, for wood and "minor forest products" (e.g. Nere, Konier, Detarium). The management plan could conceivably include a program in species selection, genetic improvement and seed production for reforestation projects, especially those using local species on a small-scale at the village level; then the school's graduates could depart not only with their diplomas and technical knowledge, but also with a supply of improved seed to start nurseries, etc.

All the above will contribute importantly to facilitating the transformation of the Forest Service from an agency which vainly seeks to protect the fast-degrading resources of Upper Volta, to an effective force for resource conservation and development. Given a revitalized, expanded forestry school and implementation of the management plan for the Dindresso Forest, the Forest Service can then gradually build Upper Volta's capacity to supply its forest products needs in a non-destructive manner, and can participate positively in the country's efforts to achieve food self-sufficiency and to secure a satisfactory level of living for its people.

It goes without saying that to the extent the GOUV Forest Service is successful in these respects, foresters in other Sahelian countries facing similar challenges and constraints will benefit. Already, a considerable exchange of ideas and experiences results from periodic regional seminars in forestry and travel outside one's own borders; in the future, the Dinderesso School itself could play a role in training non-Voltaics particularly in the case of forestry students from Niger and Chad.<sup>1</sup>

A detailed outline for the preparation of a management plan for the Dinderesso Forest is available upon request in Supplementary Annexes to the PP. A summary is included in Annex J. An itemized technical equipment list for the forest is attached as Annex L.

It should be realized that if the majority of forest reserves in Upper Volta and the Sahel are to be managed, little or no sophisticated, heavy equipment will be available for the task. This being the case, it will be unwise to rely too much on the use of heavy equipment in the Dinderesso Forest since this will have a "negative demonstration effect" for the students at the forestry school, encouraging them to believe nothing can be done without such equipment.

Emphasis should be placed on the development of management techniques for fire control, plantation establishment/maintenance, and harveting that utilize local resources to their best advantage. These resources would include local labor, local transport, local tools, draft animals, etc. Even if the employment of lower technology local resources vs. high technology, imported, heavy equipment result in higher forest management costs (it is doubtful that it will) the benefits of putting unemployed laborers to work and keeping expenditures within the local economy should far outweigh any extra monetary costs.

As part of the educational program at the Dinderesso Forestry School, efforts should be made to develop improved hand implements and intermediate technology tools which will maximize the productivity of local laborers with a minimum of capital investment. This will also eliminate many problems inherent in heavy equipment use such as costly and delayed repairs, high fuel consumption, etc., all of which places great strains on a weak economy.

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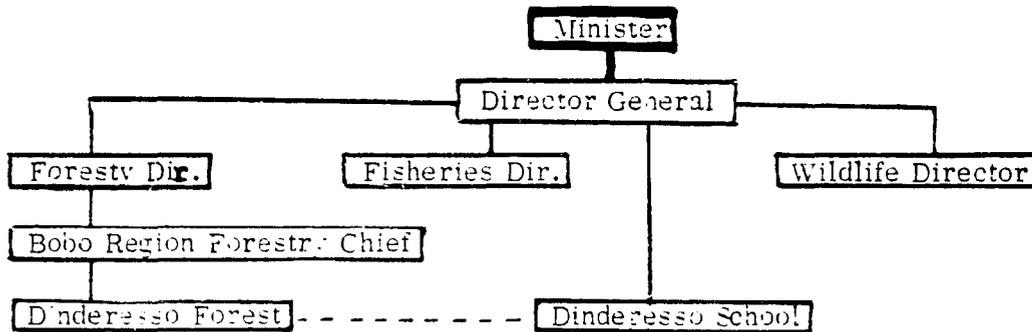
<sup>1</sup> These countries lack an adequate training infrastructure for forest service agents.

V. ADMINISTRATIVE FEASIBILITY

This project will be implemented through the GOUV Ministry of Environment and Tourism. An abbreviated organization chart of the Ministry is shown in Table I (as proposed for the project).

Table I

Ministry of Environment and Tourism



There will be a USAID project manager who, along with his/her GOUV counterpart (whose designation will be a condition precedent), will be primarily responsible for general project administration and implementation.

General GOUV supervision of the Dinderesso School will come from the Directors of Forestry, Fisheries, and Wildlife. Their inputs will be coordinated by the Director General and channeled to the Director of the School. Supervision of the Dinderesso Forest will come from the Director of Forestry and will be channeled through the Forestry Chief for the Bobo-Dioulasso Region. Currently, Mr. Casimir Ziba is both the Chief of the Bobo Region and the Director of the School. However, once the expansion of the school has begun, a new Director, whose only job is direction of the school, will be assigned. In addition, a member of Mr. Ziba's staff will be designated as the counterpart to the U. S. forest manager.

In terms of the availability of resources, the GOUV has put valuable land/wood resources and scarce personnel resources at the disposition of the project. It is, however precisely due to the lack of capital and technical expertise that the United States has been requested to finance the major capital investment called for and to provide appropriate technical assistance.

The GOUV Ministry of Environment and Tourism is blessed with several young, well-educated, energetic technicians. The real success of this project will hinge on the quality, motivation, and authority of both GOUV and expatriate technicians assigned to this project. It will, therefore, be essential during the negotiations of the project agreement and subsequent amendments that insistence be made for qualified.

motivated GOUV personnel (see Part X, Conditions, Covenants, and Negotiating Status). In addition to GOUV personnel who are already available for assignment to the training center, a number of GOUV technicians are currently being trained under other projects both inside and outside Upper Volta. Of particular relevance here is the Agricultural Human Resources Development project which is expected to produce the bulk of the future teachers for the Dinderesso School.

Sufficiently well-qualified, motivated, energetic practical let's-get-down-to-work American technicians do exist who, if chosen will be the most important U.S.-financed input. These technicians could be recruited from the pool of former Peace Corps Volunteers with Bachelor's or Master's degrees in forestry, fisheries, and wildlife management, who have served in the Sahel, speak French, are familiar with ecological and bureaucratic parameters in the Sahel, and who possess the drive and enthusiasm needed to make this project work. At issue here is not only a transfer of technical skills, but, perhaps more important, a transfer of motivation towards, understanding of, and pride in protecting/improving/rationally exploiting the natural resource base of Upper Volta (detailed job descriptions are available upon request in Supplementary Annexes to this PP).

The AID project manager will be responsible for project negotiations, coordinating, the inputs of project technicians, ordering project commodities (some of them through an American procurement agency) and overseeing construction. For the latter, the project manager will be assisted by REDSO engineers who will review and approve construction design and bid documents as well as inspect the actual construction from time to time.

## VI. ENVIRONMENTAL CONCERNS

As stated in the Initial Environmental Examination (IEE, Annex B), inasmuch as the project is primarily of an institution-building and training nature, direct environmental impacts will be slight. The construction of the school and the implementation of the forest management plan pose no significant threat to the environment.

It should be recalled that the entire orientation of the project is one of environmental conservation and rehabilitation. The project seeks to strengthen Upper Volta's ability to deal with problems of resource overuse and to reverse patterns of overexploitation and resource degradation. To the extent that the project is successfully implemented, it will have substantial positive effects on the environment (see also Annex B, Part C, Identification and Evaluation of Environmental Impacts).

Note that the PID Approval Cable, STATE 085061 (Annex A), stated that an Environmental Assessment did not appear necessary, but more information was needed in the IEE. This information has been provided in Annex B.

## VII. FINANCIAL PLAN

The project has two major elements, (1) the school and (2) the forest. The overall budget (see Table I, Annex C) is broken down to show the financial support proposed for each element.

Support to the school will include three long-term technicians (3 years each) and 60 person-months of short-term consultants to teach at Dinderesso. In addition, 4 person months of short term consultants for project evaluation will be financed. Other support to the school will include vehicles, camping equipment, audio-visual equipment, lab and survey equipment, tools, POL, office machines, books, teaching and medical supplies, and furniture. Short-term third country training for teachers, in-country refresher courses for existing forestry agents and student field trips throughout Upper Volta will also be financed. Finally, a large portion of the support to the school will consist of construction of school buildings, housing for instructors, and the installation of electricity, water, and telephone services.

Support to the forest will include 7 person-years of forest managers, supported by 3 person months of short-term forestry consultants and 2 person months of project evaluators. There is to be a close coordination between forest and school activities so that the forest will provide the students with valuable on-site practical training and the forest management will benefit from student inputs.

Other support to the forest will include vehicles, machinery, survey, fire control, and experimental equipment, fencing, POL, tools, and nursery equipment. The project will also include short-term third country training, construction, local laborer's salaries, and aerial photography.

Table I, Annex C, indicates which commodities are to be procured from the United States. In such cases, 62% of the U.S. cost of these commodities was added to cover transportation to Upper Volta (55%), and the U.S. procurement agency's commission (7%). These percentages were suggested by the president of the Afro-American Purchasing Center (AAPC). In addition, prior to the 62% adjustment, a stock of spare parts for each vehicle (15%) was calculated in view of difficult vehicle operating conditions in Upper Volta and the lack of American vehicle service facilities in Upper Volta, and an inflation factor of 10%, compounded annually, was also included.

Construction costs are based on current construction costs in Upper Volta and are estimated at \$250/m<sup>2</sup>. These costs have been judged as reasonable by a REDSO/WA engineer (see Annex F, BIIA, Certification). At the suggestion of the REDSO/WA Chief Engineer, construction costs were adjusted upward by 31% to cover contingencies (10%), inflation (15%) and the cost of preparing final construction plans (6%). Construction will be undertaken by a Voltaic construction firm and will be supervised by GOV engineers from the Department of Public Works). In addition, REDSO engineers will review/approve all final construction bid documents and plans as well as inspect periodically the construction.

Table I

COST SUMMARY

U. S. Contribution

	<u>Forest</u>	<u>School</u>	<u>Total</u>
Personnel	890,000	1,720,000	2,610,000
Commodities	1,134,000	805,000	1,939,000
Training	6,000	72,000	78,000
Other Costs	<u>215,000</u>	<u>1,116,000</u>	<u>1,331,000</u>
Total	2,245,000	3,713,000	5,958,000

GOUV Contribution (CFA)

Teachers & Staff salaries	58,272,000
Student Scholarships/Salaries	112,913,960
Wood Value	184,962,000
Land Value	60,000,000
Buildings Value	<u>27,600,000</u>
Total	443,753,960 CFA
	= <u>\$ 1,929,000</u>
Grand Total	<u>\$ 7,389,000</u>

The GOUV contribution to this project is estimated at \$1,929,000 or slightly more than 2% of the total project amount (a detailed breakdown is available upon request in Supplementary Annexes). This contribution includes the salaries of GOUV personnel to be assigned to the project as well as the scholarships/salaries of the students who will go to school at Dinderesso. This contribution of scarce personnel and budget resources is an indication of the strong GOUV commitment to the project.

The GOUV contributions also includes reasonable, conservative estimates of land value (6,000 hectares), existing buildings (which a REDSO engineer inspected and for which he suggested values - see Annex F 611A Certification), and reasonable estimates of the value of the wood which could be marketed from the Dinderesso Forest Reserve during the life of the project. For example, as detailed in supplementary Annex IV (Government Contribution), a value for the inventory of standing timber has been estimated and added to the basic value of the land, as well as the estimated value of the "production" or annual increment of wood which can be expected to accrue over a period of five years. In summary:

Land	6,000 ha	10,000 CFA/ha	60 million CFA
Wood Inventory	4,000 ha natural stands		96 million CFA
Production (L.O.P.)	600 CFA/stere		54 million CFA
	90,000 steres		

If one were to strictly interpret "government contribution" to include only the value of the wood which is harvested and marketed in order to directly contribute to the project, a minimum value would be 30% of the L.O.P. production value, or 16.2 million CFA.

Annual recurrent costs which will have to be borne by the GOUV at the end of the project are estimated at \$102,000 for the school (see Part II Economic Feasibility, Table II) and \$36,000 for the Forest (see Table II below) for a total of \$138,000.

Table II

Annual Recurrent Costs-Forest

POL/Maintenance	\$ 10,000
Labourers	10,000
Personnel (drivers, mechanic, mechanic's aid, forest agents, forest manager)	<u>16,000</u>
	\$ 36,000

It should be pointed out that already, before the end of the project, the GOUV will be funding \$90,000 of the total \$138,000. That is, incremental annual recurrent costs after the withdrawal of U.S. funding support will only be \$48,000. As explained above, it is conservatively estimated that the Dinderesso Forest will annually produce about \$49,000 worth of forest products. (i.e., 54 million CFA equals \$245,000; value of net annual forest growth over 6,000 hectares during L.O.P.). This estimate does not include the potential revenue from the cashew plantations, nor does it assure that growth and yields will be increased by forest management activities. It also assures a constant price of 600 FCFA/stere for firewood, and that all the wood produced will be marketed as firewood, and not as higher value poles or sawlogs (N.B. - The annual firewood demand for Bobo-Dioulasso alone is roughly 10 times the estimated current annual wood production of the Dinderesso Forest).

In fact, the implementation of an efficient fire control plan alone will probably double wood production from natural stands (increases from 2 to 4 steres/ha/yr, based on CTFT estimates). It is also anticipated that improvement cuttings, thinnings, and other silvicultural treatments will produce marketable firewood as well as higher production rates for the forest. Even if no more than 30% of the revenues which result from the intensified management of the forest are reserved for project operating costs, such revenues will substantially defray those costs. Clearly, given the revenue-producing capability of the forest and the importance the GOUV attaches to producing more, better-trained, better motivated practical forestry agents, the GOUV will be able to pick recurrent costs at the end of the project.

Annex C includes Tables II and III which show the obligation and use schedule for project funds during the life of the project, and the breakdown between local currency and foreign exchange costs.

It is clear that the Fixed Amount Reimbursement (FAR) method of financing construction is inappropriate for this project. It is precisely due to the lack of GOUV funds that U.S. assistance is sought.

### VIII. IMPLEMENTATION PLAN

A detailed implementation schedule is included in Annex P. It should be emphasized that efficient timely implementation is directly correlated with the timing of key inputs--particularly in this project, the arrival of the Project manager who can insure that other important inputs arrive on schedule. Of major importance early in the project is the ordering of commodities (particularly vehicles), the start of construction, and the recruitment of project technicians.

Host country contracting will be used for construction elements of the project and local procurement. Otherwise, in view of the GOUV's lack of expertise and knowledge concerning U.S. procurement of technicians and commodities, such U.S. procurement will likely be handled respectively by USAID/AID/W (PIO/T's) and by a U.S. Procurement Agency such as the Afro American Purchasing Center (AAPC) (PIO/C's). There will be one contract for the provision of U.S. technical assistance, see Supplementary Annexes, Annex V, p. 54 for job descriptions and qualifications desired. Construction will be phased because of funding constraints but will be scheduled to focus first on those buildings most essential for the expansion of the capacity of the school (i.e. dorms and classrooms). REDSO engineers will be called upon to review and approve construction plans and bid documents. In addition, they will periodically review the construction.

The vehicle fleet will essentially be renewed late in the project so that at the end of the project, the school will be able to continue its extensive program of field trips which should be well-established by that time.

Annex C, Table I Budget indicates those items expected to be procured from the U.S. and elsewhere (see also Annex L, Itemized Technical Equipment List). Commodities from non-U.S. sources are expected to be locally grown or manufactured, to be procured from Code 041 countries. Upper Volta qualifies for Code 041 procurement as it is on the list of least developed countries, see AID to CTRC A-316 S-3 (77), to be procured as shelf items, or to be procured through Mission Director waiver authority.

### IX. EVALUATION ARRANGEMENTS FOR THE PROJECT

Early in the project implementation, an Evaluation Committee will be organized to review periodically the progress of the Dinderesso school and forest during the project. Review will be especially relevant during the early years of the project when vital curriculum and strategy decisions will be made. It is suggested that this committee meet every six (6) months.

The Evaluation Committee will include representatives of a number of organizations, notably: senior GOUV forestry agents, those responsible for implementing other donor forestry projects, school teachers, short-term consultants, and the AID project manager. A covenant will be included in the grant agreement whereby the GOUV will agree to establish the Committee with appropriately high level membership.

The Committee will evaluate progress with the development of the training program, paying particular attention to practical training and field trips. They will also evaluate course content in relation to the needs expressed by the three technical services (Forestry, Wildlife, and Fisheries). The Committee will give advice on any organizational and technical problem encountered by the school.

Special attention will be given to ensuring that the forest management plan and the training program are responsive to the needs of the local population. This will include periodic review and approval of the management plan by the Evaluation Committee.

Various evaluation techniques will be utilized: the school Director will prepare a progress report; teachers and students will be interviewed; there will be visual inspection of practical work done by students (e.g. nursery seedbeds, maps and inventories completed, surveyed land with boundaries marked, village level survey results, plant collections, herbarium sheets, notes from field work, exercises and field trips, completed "forest management plans" done by C-level students, etc.). At the same time, the management of the forest should be evaluated: number of hectares of here planted, number of hectares exploited, number of kilometers of firebreaks, number of hectares of grass reserves, number of hectares fenced for experiments, etc.

Periodic in-depth evaluations are also scheduled for September 1981 and March 1983. The first major evaluation will follow the first full year of school activities and expatriate staff efforts. The second major evaluation will occur near the end of the project to assess lessons learned. TDY services of all short-term consultants (range management, wildlife management, fisheries management, soil and water conservation fire prevention) as well as project evaluation officers are scheduled at the time of the second evaluation to enable a thorough broad evaluation of the project.

In depth evaluations will, in addition to looking at the above-discussed activities performances, address such issues as the performance of school graduates in the field, the evolution of externally-assisted projects, the number of forest reserves for which new management plans have been developed and are being implemented, activities in fisheries and park management attributable to new graduates of the school, the number and quality of local forestry projects initiated by forestry agents, etc. Such major evaluations will include site visits, examination of protected natural forests stands, industrial wood plantations and national parks, attitudinal surveys of student and recent

graduates (a revised version of the Questionnaire included in Annex H might prove helpful), school graduation figures, interviews with villagers in areas served by graduates as well as with users (Project directors, etc.) of graduates, inspection of the Dinderesso forest and its plantations, natural stands, firebreak system, and marketing practices, interviews with local farmers and herders in the Dinderesso area, etc.

#### X. CONDITIONS, COVENANTS, AND NEGOTIATING STATUS

The elements and terms of this project have been elaborated, discussed with, and agreed to by the GOUV. Nonetheless, certain conditions will be required to ensure the likelihood of a successful project implementation. Project funds are scheduled for obligation in fiscal years 1979, 1980, 1981 and 1982. Every effort should be made in the negotiating of Project Agreement amendments to ensure that the GOUV is doing its best to implement the project. The negotiating of the Project Agreement and conditions precedent will be the responsibility of USAID/Upper Volta. As indicated earlier in Part V, Administrative Feasibility, the probability of a successful project hinges most importantly on motivated GOUV and expatriate technicians.

See PAF, Part II, for Covenants and CPs.

ANNEX A

PID APPROVAL MESSAGE

ZCZCNIC786VV FGN 308EHV263  
RR RUFHYOG  
DE RUEHC #5061 0940625  
ZNR UUUUU ZZH  
R 031826Z APR 78  
FM SECSTATE WASHDC  
TO AMEMBASSY OUAGADOUGOU 6241  
BT  
UNCLAS STATE 085061

AIDACN

E.O. 11652: N/A

TAGS:

SUBJECT: FORESTRY EDUCATION AND DEVELOPMENT (686-0235)

1. COMMITTEE REVIEW OF THE SUBJECT PID HELD MARCH 17. RECOMMENDED APPROVAL.
2. THE CONCERNS RAISED BY THE COMMITTEE WERE LISTED AS FOLLOWS:
  - A. DEVELOPMENT OF THE PP WILL REQUIRE ASSURANCES THAT THE PRIMARY REASONS FOR THE POOR MANAGEMENT OF THE EXISTING NATIONAL FORESTRY SERVICE ARE ADEQUATELY ASSESSED, AND THAT THE PROJECT DIRECTLY RESPONSIVE TO THE NEEDS/CONSTRAINTS AS IDENTIFIED.
  - B. TRAINING PROGRAM ENVISAGED WOULD NEED TO PROVIDE FOR PRACTICAL SKILLS AND EXPERTISE AS APPROPRIATE TO PERSONNEL AND JOB RESPONSIBILITIES THAT CURRENTLY EXIST IN THE NATIONAL FORESTRY PROGRAM.
  - C. METHODOLOGY/PLANNING FOR INVOLVEMENT OF RURAL VILLAGES/COMMUNITIES IN STRATEGY FOR FIRE PROTECTION ASPECTS OF PROJECT WILL BE NEEDED.
  - D. TO THE EXTENT THE RURAL SETTING FOR THE PROJECT WOULD BE APPROPRIATE, NATIONAL CONSIDERATION BE GIVEN TO ANY POSSIBILITY FOR INTEGRATION OF AGRO-FORESTRY ACTIVITIES (I.E. APPROPRIATE USE OF TREES, ETC. FOR LOCAL NEEDS AS RELATED TO PRODUCTION OTHER AGRICULTURAL CROPS.).
  - E. DESIGN STRATEGY SHOULD INCORPORATE WHERE APPLICABLE SUCCESSFUL APPROACHES ADOPTED IN OTHER AID OR OTHER DONOR PROJECTS, E.G. HONDURAS PROJECT.

F. DINDERESSO AND MATURKU CURRICULUM PACKAGES SHOULD BE EVALUATED TO AVOIDANCY DUPLICATION OF EFFORT.

G. RECURRENT COSTS OF THE RESULTANT ONGOING PROGRAM TO THE GOUV SHOULD BE MINIMIZED TO ENSURE THE CONTINUATION OF THE PROJECT BEYOND THE PERIOD OF AID'S INVOLVEMENT.

H. WITHIN CONTEXT COMMONALITY SAHEL FORESTRY NEEDS AND GIVEN MAGNITUDE OF PROPOSED INVESTMENT FEASIBILITY USING PROPOSED SCHOOL AS A REGIONAL TRAINING CENTER SHOULD BE EXPLORED.

3. WITH RESPECT TO THE IEE, AN EA DOES NOT APPEAR TO BE A REQUIREMENT AT THIS TIME. ADDITIONAL INFORMATION IS REQUIRED, HOWEVER, AS ACTIVITIES IDENTIFIED HAVE SIGNIFICANT IMPACT ON THE ENVIRONMENT, I.E., SECTION ON LAND USE PARTS 1 (A,B, AND C) AND 5 OTHER FACTORS; SECTION F SOCIO-ECONOMIC EMPLOYMENT PATTERNS; AND SECTION H GENERAL (HUMAN/LEARNING ENVIRONMENT REQUIRE FURTHER NARRATIVE DISCUSSION IN IEE. COPIES IEE FACESHEET WITH APPROPRIATE FORMAT FOR THIS INFORMATION AND CONCURRENCE BY MISSION DIRECTOR (OR HIS DESIGNEE) HAS BEEN FORWARDED WITH COULTER FOR COMPLETION BY THE MISSION ASAP.

4. CURRENT FY 79 OYB FOR PROJECT ESTABLISHED AT DOLS 700,000 AS PER FY 79 OP.

5. THE PP DESIGN TEAM SHOULD (1) EXAMINE ALTERNATIVES TO ACHIEVING PROJECT OBJECTIVES THROUGH ALTERNATIVE TECHNOLOGIES, INCLUDING ALTERNATE PROJECT IMPLEMENTATION STRUCTURES; (2) DETERMINE WHETHER CONSTRUCTION OF PROPOSED SEPARATE TRAINING FACILITIES BEST AND LEAST COST ALTERNATIVE TO TRAINING NEEDED MANPOWER AND WHETHER COMMODITY RANGE AND MAGNITUDE OF CONSTRUCTION REALISTIC FOR TRAINING ONLY 20 LEVEL D (ONE YEAR TRAINING) AND 10 LEVEL C (TWO YEAR TRAINING) DURING LCP; (3) DETERMINE WHETHER 60 STUDENT DORMITORY CAPACITY REALISTIC FOR ABOVE NUMBER OF STUDENTS; (4) ANALYZE PROPOSED EQUIPMENT FOR OTHER HOUSING UNITS AND THEIR UTILIZATION; (5) IN CONJUNCTION WITH GOUV EVALUATE INTENDED PURPOSE OR FUTURE UTILIZATION OF TRAINING CENTER AFTER END OF PROJECT; AND (6) ADDRESS THE MANAGERIAL/ADMINISTRATIVE CAPABILITY OF RESPECTIVE GOUV INSTITUTION RESPONSIBLE FOR IMPLEMENTATION.

6. ADDITIONAL GUIDANCE MESSAGE FOR CONSIDERATION BY DESIGN TEAM WILL BE FORTHCOMING. VANCE

BT

#5061

ANNEX B

Face Page: Initial Environmental Examination

Project Location:

National Forest of Dinderesso Upper Volta:  
12 km northwest of Bobo-Dioulasso and  
360 km southwest of Ouagadougou.

Project Title: Forestry Education and Development (686-0235)

Funding: \$5,958,000 (FY 79 - FY 82)

Life of Project: 1978-1983

IEE Prepared by: Robert Winterbottom      Date: 8 May 1978

Environmental Action Recommended:

This project will not have a significant effect on the environment, and therefore a negative determination is appropriate.

No environmental assessment is required beyond the initial environmental examination (IEE).

Concurrence: \_\_\_\_\_ USAID/Mission  
Upper Volta

Assistant Administrator's/Director's Decision:

Approved \_\_\_\_\_

Disapproved \_\_\_\_\_

Date \_\_\_\_\_

I. Examination of Nature, Scope and Magnitude of Environmental Impacts.

A. Description of Project

1. General

This project proposes to expand and improve the training facilities of the Upper Volta national forestry school at Dinderesso. After completion of either a 1 or 2 year training program, the school's graduates will be assigned to posts throughout Upper Volta, where they will be involved in either natural resource development and conservation projects (e.g. producing tree seedling at nurseries; reforestation for village woodlots, shade tree plantings and large-scale plantation near urban areas) or administrative and resource protection duties (e.g. wood cutting permits; and control of bush fires, poaching in wildlife preserves, deforestation and illegal fishing methods). In the near future, it is anticipated that fewer graduates will be involved in protection activities per se and more will be involved in a wider range of development projects, including reforestation, forest management, soil conservation, park management and fisheries development projects, as well as regional, integrated rural development projects which include tree-planting and anti-desertification activities.

In addition, the project provides for a substantial reorientation and intensification of the management of the natural forest within which the school is located. This activity will serve to:

1. better utilise the forest as a practical training and demonstration site for the forestry students;
2. develop model approaches to the improved management of Upper Volta's national forests, with an emphasis on local participation in the definition of natural resource needs and of optimum, multiple-use/sustained yield management policies; and
3. pursue a variety of experiments and research in silvicultural and forest management practices suitable for dry tropical savanna forestlands.

2. Activities

Expansion and improvement of the school's infrastructure and training program will involve the construction of buildings and a restructuring of the curriculum to include much more field work and teaching outside the classroom in the surrounding forest and on field trips. It will also result in a substantial increase in the number of students, teachers, visitors and vehicles present in the vicinity of the village of Dinderesso: an enrollment increase from 10 to 30 students/year; increase of teachers, from 2 to 3; more visitors; and 5 new vehicles (initially).

The development and implementation of a multiple use/sustained yield management plan for the natural forest will result in:

1. increased contact with and involvement of local populations of farmers and herdsmen;
2. increased level of silvicultural treatments over most of the 6000 ha. area of the forest, including harvesting of old plantations (over 1000 ha), selective cutting and coppicing of natural stands (over 4000 ha), and considerable weeding, thinning and cleaning operations (general TSI) throughout the forest.
3. improved protection of the entire forest from uncontrolled burning by bush fires, through a system of firebreaks, the construction of 2 small watch towers, and the intensification of a campaign with surrounding villagers to seek their cooperation in fire management. Smaller areas of the forest would be fenced and more completely protected as preserves, control plots, etc.
4. experimentation and demonstration on as large a scale as feasible, both inside and outside the national forest, of new technologies for charcoal production, new techniques of regeneration and stand establishment, new approaches to plantation aftercare and firebreak maintenance, tree farming of economically important local tree species (as well as their "plus-tree" selection and genetic improvement of growth, yields, etc.), and widely practicable soil conservation and anti-erosion techniques (contour dikes, small check dams, windbreaks, etc.).

## 7. Ecological Setting of the Project

1. Location: 11°11' latitude and 40° 35' longitude.
2. Climate: Southern Sudan type  
26.9° C- mean annual temperature  
11.7° C- average minimum temperature  
1101 mm mean annual precipitation (1961-70)  
112. 1024 mm - at Ndiarasso in 1977, and  
1415 mm - in 1976.  
93 days - average number of days of rainfall  
2147 mm - mean annual evapotranspiration  
(Penman index- data from Loupne and Atlas Jeune Afrique)
3. Geology: no outcrops of basement complex (metamorphic rocks); area is principally underlain by slightly folded sedimentary rocks, with the sandstones of the Soba-Dioulasso Formation outcropping most frequently (see reports and maps by Sarlio, Louppe).

4. Soils: of basically 3 types:
- lowland alluvial soils (clays) of moderate fertility, but poor internal drainage (impermeable) compactible, and with excess water during a portion of the year.
  - deep sandy soils on lower slopes (ferrallitic): of low to intermediate base status, deep (several meters), permeable and/somewhat acidic.
  - shallow, gravelly (lateritic) soils on upper slopes: form over outcrops of ironstone/olinhite (cemented laterite). Shallow, low fertility, erodible clay fraction.

According to preliminary soil surveys available, approximately 200 ha. have "deep" soils and 4000 ha. have "gravelly" soils over laterite.

5. Vegetation: The region of Togo-Bioulasso is within the belt of Sudano-guinean or sudan savanna vegetative type, characterized by the Nere tree (Parkia biglobosa). Within the forest, the most common species are:

on upland, shallow soils: Isoberlinia sp.  
Combretum sp.  
Terminalia macranthera  
Detarium senegalense  
Daniella oliverii  
Dichrostachys glomerata

deeper, sandy soils: Isoberlinia, Daniella, Terminalia,  
as well as: Pterocarpus erinaceus  
Butyrospermum parkii

along watercourses: Azelia africana  
Khaya senegalensis  
Mitracyna inermis

occasionally: Borassus aethiopicum (Roiier)

6. Topography and Hydrologic Feature: Elevations range from a low point of 340 m along the Kou Stream, (along the western edge of the forest to a high point of 480 m on a knoll at the eastern edge of the forest. The terrain is gently to moderately sloping, except in the vicinity of several small knolls or hoback-like ridges.

The only source of permanent surface water is the Kou Stream which flows northward through the western section of the forest. Tributary drainage channels of the Kou cross the forest from east to west, and are marked by the increased density and height of the "gallery forests".

7. Land Uses and Socio-Economic Characteristics: Chiefly an area supporting subsistence farming populations of Togo, Bioula and some Mossi groups. The area also includes 2 groups of Fulb herders, who, in addition to raising cattle, also cultivate small tracts of sorghum.

Roughly 2% of the area is cropland, supporting crops of sorghum, cowpeas, millet, corn, as well as a cash crop of cotton or peanuts. Farming activities are limited to the rainy season (May-October). In addition to cash crops and sale of surplus food grains, some income is derived from minor forest products collected locally (fruits, leaves, seeds), and from the sale of mangoes, wood, and livestock and poultry (sheep, goats, chickens). Mean annual per capita income is less than \$200; some villagers now considerably augment their income by working in the national forest, or by trading and marketing in the dry season.

#### 2. Identification and Evaluation of Environmental Impacts.

A completed Impact Identification and Evaluation Form was submitted as part of the ID.

##### 1. General.

In as much as the primary purpose of the project is related to training and education one would presume environmental impacts will be slight. In fact, the direct negative environmental impacts are insignificant (including potential adverse impacts associated with the national forest management). Furthermore, because of the nature of the subjects being taught at the school and demonstrated in the forest, the project should result in a significant positive impact on the environment of poor "oligotrophic" forestland, rangeland, and agricultural land will be better managed, with less soil erosion, and higher yields of crops, wood, grass, honey, water and nutritious caterpillars of "minor forest products" (edible seeds, fruits, larvae; medicinal plants; raw materials for local handicrafts and utensils - fence items, etc.).

Techniques demonstrated in the program of studies of the school and utilized in the management of the national forest will be as practicable but the emphasis on non-mechanized, labor-intensive, intermediate technologies. There will be no large-scale application of chemicals; some small amounts will be used in the nursery and to protect certain plantations vulnerable to termite attacks. (A maximum of 200 kg/ha of treated against termites).

The bulldozers will be used to clear and prepare the planting site for plantations of fast-growing exotics (e.g. Eucalyptus, Casahuate) as well as for some road and firebreak maintenance. The planting activities will be concentrated on the deeper soils less susceptible to erosion and infiltration. It is intended to continue planting exotics on a much reduced scale (500 kg/ha yr., essentially for research and demonstration purposes, and to rely much more on improved management of natural stands as the primary means of hardwood production.

It is estimated that an improved system of firebreaks maintained by a variety of techniques, (including grazing, prescribed burning, cultivation for food crops, planting of fire-tolerant, wide-canopied tree species which are closely spaced, as well as clearing by graders, bulldozers and paid workers) will cover approximately 8% of the total area of the natural forest (500 ha out of 6000 ha.).

## 2. Significant Impacts .

As discussed above, any overall long-term impacts of the project will be positive. In the short-run, 5 yr. life of the project, the following impact areas were cited in the PID (IIE Form) as being "slightly" (L) or "moderately" (M) impacted:

LAND USE: Increase in Population -- as mentioned in the project description above, an influx of students, teachers, school personnel, school visitors, and perhaps a small number of area-villagers seeking employment can be expected to occur. Adverse impacts of the influx of people can be avoided by dealing sensitively with the surrounding local population; adequate measures for sanitary waste disposal need to be taken as well. Note that the cost estimate of \$350/m<sup>3</sup> for the school buildings includes the construction of a suitable sanitary waste disposal system. The approving engineer will ensure that these systems are sited a sufficient distance away from the Kon Stream.

Extracting Natural Resources -- approximately 1000 ha of old plantations will be harvested, yielding perhaps 10-50 steres/ha of firewood or poles. Regeneration will be assured by sprouting, reseeding, replanting or protecting natural regeneration.

Additionally, roughly 200 ha/yr. of natural stands will be harvested at sufficiently long intervals to permit a sustained yield to protect site productivity. Expected yields: 2-4 steres/ha/yr. over 15-25 year rotations.

Land Clearing -- for 20 school buildings, 2 fire-towers and 2 forest technician posts.

Forest Management -- positive impact of rational exploitations of forest, with higher yields of wood, grass, water and protection of long-term site productivity.

## SOCIOECONOMIC:

Changes in employment patterns/rural employment -- the silvicultural activities on the forest will require a workforce of up to 200 persons, with the bulk of the work concentrated in the dry season when people are freed from farming labors. This "change" or opportunity for employment is looked upon favorably by the surrounding villages. It is expected that they will furnish all or nearly all of the forest workforce.

GENERAL: Educating/Learning Environment -- As detailed in the indicative forest management plan and project description, the national forest will become the site for practical training and fieldwork by the school's students. The quality of their education will be vastly improved by the opportunity to learn-by-doing, on-the-ground, in the adjacent forest.

### III. Recommendations for Environmental Actions.

The foregoing examination has indicated that the immediate, direct effects of the project will be insignificant; that is, no significant impacts are expected as a result of the project. Owing to the objectives of the project, and its institution-building and training nature, it is expected to have a substantial, positive long-term impact on the environment of Upper Volta.

In view of the above, a negative determination is recommended.

ANNEX C

FINANCIAL TABLES

TABLE I

BUDGET

(U. S. Contribution, Dollars)

SCHOOL

I. U. S. Personnel <sup>1/</sup>

A. Long-Term :

1. Specialist in surveying, mapping, the practice of silviculture, forest harvesting/utilization 3 years x 120,000	360,000
2. Specialist in ecology, botany, biogeography, management of natural stands. 3 years	360,000
3. Specialist in forest economics, extension work, rural sociology 3 years	<u>360,000</u>
SUB-TOTAL	1,080,000

B. Short-Term:

1. Range manager - AgroSylvopastoral 18 months x 10,000	180,000 180,000
2. Wildlife specialist, 12 mos.	120,000
3. School management/admin. consultants 12 mos	120,000
4. Fisheries ecologist, limnologist, 6 mos.	60,000
5. Soil & Water Conservation, Forest hydrology 6 mos.	60,000
6. Fire management Specialist. 6 mos.	60,000
7. Evaluation. 4 mos.	<u>40,000</u>
64 mos. SUB-TOTAL	640,000
Personnel TOTAL	1,1,720,000

<sup>1/</sup> \$120 per person year estimate is used as average cost during LOP. Current average cost is lower and \$120,000 will be adequate throughout project life. Therefore, no inflation factor included.

II. COMMODITIES <sup>1/</sup>

A. Vehicles (U. S.) :

2, 35-seat buses	125,000
4, 9-seater carryalls (4-wheel drive)	116,000
2, small utility ( $\frac{1}{2}$ ton) pick up trucks	39,000
2, compact liaison cars	<u>30,000</u>
SUB-TOTAL	310,000

B. Other (U. S.) :

Camping equipment (blankets, sheets, cots, mosquito nets, mess kits, etc.)	42,000
Audio-visual equipment (projectors, cameras, etc.)	22,000
Survey equipment (compasses, tapes, mensuration equipment, transits, levels, rods, range poles, plane table & alidade, etc.)	44,000
Lab equipment (microscopes, magnifiers, soil testing equipment, etc.)	22,000
Tools (handtools/vehicle tools)	18,000
Garage shop equipment tools	<u>20,000</u>
SUB-TOTAL	168,000
U.S. COMMODITIES TOTAL	478,000

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<sup>1/</sup> All prices include inflation factor (10%, compounded annually). In addition, transportation (55%) and a procurement agency commission (7%) are included for all U.S. procurement. All vehicle prices also include 15% spare parts.

C. Other (Non U. S.) :

POL/maintenance	135,000
Office machines (typewriters, mimeograph, calculators, etc.)	7,000
Books and subscriptions	28,000
Teaching supplies (paper, notebooks, pens, etc.)	28,000
Medical supplies	8,000
Furniture	<u>121,000</u>
SUB-TOTAL	327,000

Commodities TOTAL 805,000

III. TRAINING

Short-term third country and in-country training (staff)	
\$500/month x 40 months	20,000
In-country refresher courses (forestry agents)	20,000
In-country field trips (students)	<u>32,000</u>
Training TOTAL	72,000

IV. OTHER COSTS

A. <u>Construction (\$350/m<sup>2</sup>)</u>	
3 dorms, 20 students each, 6m <sup>2</sup> /student, 360m <sup>2</sup>	126,000
3 classrooms (40m <sup>2</sup> + 40m <sup>2</sup> - 100m <sup>2</sup> ) = 180m <sup>2</sup>	63,000
1 library/study hall, 100m <sup>2</sup>	35,000
1 student union/recreation room, 80m <sup>2</sup>	28,000
1 lab/workroom, 60m <sup>2</sup>	21,000
1 cafeteria/assembly hall/kitchen, 200 m <sup>2</sup>	70,000
1 administrative building, 120m <sup>2</sup>	42,000
8 housing units (5 x 100m <sup>2</sup> - 3 x 120m <sup>2</sup> ) = 360m <sup>2</sup>	301,000
1 guest house (6 bedrooms), 200m <sup>2</sup>	<u>70,000</u>
SUB-TOTAL	755,000

Contingency 10% - Inflation 15% - Construction design 6% = 31%	<u>235,000</u>
SUB-TOTAL	991,000

B. Utilities

Electricity and water and telephone installation	100,000
Contingencies 10% - inflation 15%	<u>25,000</u>
Sub-Total	125,000
Other Costs Total	1,116,000

FOREST

I. U.S. Personnel

1, Forest Manager, 4 years x 120,000	480,000
1, Assistant Forest Manager, Field Advance man 3 years	360,000
3 months short-term consultants (Forest Management)	30,000
Evaluation, 2 months	<u>20,000</u>
Personnel Total	890,000

II. Commodities <sup>1/</sup>

A. Vehicles (U.S.):

1, 95 HP, 4-wheel drive tractor w/accessories, dump wagon, water tank trailers, etc.	102,000
1 grader w accessories	147,000
1, Bulldozer (type D6) w accessories (angle blade, brush blade, ripper)	261,000
6, 4-wheel drive pick-ups (1/2 ton) (3,000 @)	180,000
4, 3 ton, 4-wheel drive trucks (30,000 @)	<u>300,000</u>
Sub-Total	920,000

B. Other (U.S.):

Parts/accessories for existing equipment	13,000
Forest survey and mapping equipment	2,000
Fencing Materials	53,000
Fire lookout Post equipment	3,000
Experimental tools, equipment	<u>20,000</u>
Sub-Total	101,000
U.S. Commodities Total	1,021,000

<sup>1/</sup> See footnote for school commodities.

C. Other (Non-U.S.):

2 tanks (2000 l) diesel fuel, gasoline	5,000
4, Mobylettes	4,000
POL Maintenance	82,000
Stand improvement/reforestation equipment (handtools)	6,000
Nursery equipment	<u>16,000</u>
Sub-Total	113,000
Commodities Total	1,134,000

III. Training:

Third-country and in-country short-term training	<u>6,000</u>
Training Total	6,000

IV. Other Costs:

<u>Construction:</u>	
Garage (\$175 m <sup>2</sup> x 200 m <sup>2</sup> )	35,000
2, guard posts/watch towers	10,000
2, forestry agents' houses (\$175/m <sup>2</sup> x 200 m <sup>2</sup> )	<u>35,000</u>
Sub-Total	80,000
Contingency 10% - inflation 15% - Design fee 5% = 31%	<u>25,000</u>
Sub-Total	105,000
Laborers (to cut wood, make firebreaks, etc.)	50,000
Aerial Photography	<u>30,000</u>
Sub-Total	110,000
Other Costs Total	215,000

RECAPITULATION

	<u>FOREST</u>	<u>SCHOOL</u>	<u>TOTAL</u>
Personnel	390,000	1,720,000	2,610,000
Commodities	1,134,000	805,000	1,939,000
Training	6,000	72,000	78,000
Other Costs	<u>215,000</u>	<u>1,116,000</u>	<u>1,331,000</u>
TOTAL	1,245,000	3,713,000	5,958,000

GOLV Contribution (CFA)

Teachers and Staff salaries	58,272,000
Student Scholarships Salaries	112,913,960
Wood Value	184,938,000
Land Value	50,000,000
Buildings Value	<u>27,600,000</u>
<b>Total CFA</b>	<b>443,753,960</b>
	= \$ <u><u>1,929,000</u></u>

TABLE II  
Project Funding Forecast  
(\$000)

	FY79	FY80	FY81	FY82	FY83	TOTAL
<u>OBLIGATIONS</u>	700					5,460
<u>USES</u>						
<u>I. U.S. Personnel</u>						
Long Term - School		720	360			1,080
Long Term - Forest	120	480	240			840
Short Term - School		220	200	140		600
Short Term - Forest		10	20			30
Evaluation		30		30		60
SUB-TOTAL	120	1,460	860	170		2,610
<u>II. Commodities</u>						
Vehicles - School	30	57		173		310
Vehicles - Forest	50	385	321	164		920
Camping equipment	13			24		42
A-V, Survey, lab equip.	2	40	48			90
POL Maintenance	-	62	81	74		21
Tirts Accessories	18					18
Tools, Shop Equip.	24	20				44
Office Machines		7				7
Books - Subscriptions		13	7	3		28
Teaching Supplies		13	7	3		28
Medical Supplies		3	3	2		8
Furniture		121				121
Fencing Materials		20	33			53
Fire/ Experimental Equipment		28				28
Gas Tanks		5				5
Mobvlettes		2		2		4
Nursery Equipment		3	3			16
	192	764	508	455	-	1,939

TABLE II, Cont.

	FY79	FY80	FY81	FY82	FY83	TOTAL
<b>III. TRAINING</b>						
3rd Country - Staff	5	8	3	4		20
In-Country Refreshers		5	10	5		20
In-Country Field Trips		10	10	12		32
3rd Country - Forest		2	2	2		6
	5	25	25	23		78
<b>IV. OTHER COSTS</b>						
Construction :						
Dorms	110	55				165
Classrooms	45	38				83
Library		46				46
Student Union		37				37
Lab/Work room	27					27
Cafeteria	92					92
Admin. Bldg.	55					55
Housing		304				394
Guest House		92				92
Garage	46					46
Watchy Towers		13				13
Agents' Houses		46				46
Utilities Installation		125				125
Laborers	8	26	23	23		80
Aerial Photography		15		15		30
	383	587	23	38		1,331
<b>TOTAL</b>	700	3,156	1,416	686		5,958

TABLE III

Foreign Exchange and Local Currency Costs  
(\$000)

	FY79		FY80		FY81		FY82		FY83		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
<u>I. U. S. Personnel</u>												
Long Term	192	13	1,020	130	510	90	-	-	-	-	1,632	238
Short Term	-	-	207	23	234	26	126	14	-	-	567	63
Evaluation	-	-	27	3	-	-	27	3	-	-	54	6
SUB-TOTAL	192	13	1,254	206	744	116	153	17	-	-	2,253	357
<u>II. Commodities</u>												
School	116	-	117	194	43	71	197	62	-	-	478	327
Forest	70	2	433	40	354	35	164	32	-	-	1,021	113
SUB-TOTAL	186	2	550	234	402	106	361	94	-	-	1,499	440
<u>III. Training</u>												
School	-	5	-	23	-	23	-	21	-	-	-	72
Forest	-	-	-	2	-	2	-	2	-	-	-	6
SUB-TOTAL	-	5	-	25	-	25	-	23	-	-	-	78
<u>IV. Other Costs</u>												
School	-	329	-	737	-	-	-	-	-	-	-	1,115
Forest	-	54	-	100	-	23	-	38	-	-	-	215
SUB-TOTAL	-	383	-	837	-	23	-	38	-	-	-	1,331
<b>TOTAL</b>	<b>238</b>	<b>412</b>	<b>1,304</b>	<b>1,352</b>	<b>1,146</b>	<b>279</b>	<b>514</b>	<b>172</b>	<b>-</b>	<b>-</b>	<b>3,752</b>	<b>2,206</b>

ANNEX D

Logical Framework

GOAL	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>To accelerate the development of rational water and land/resource use in Upper Volta thereby contributing to increased agricultural, forest, and animal production while safeguarding if not improving the environment.</p>	<ol style="list-style-type: none"> <li>1. Total agricultural forest and animal production increases.</li> <li>2. Environmental protection and improvement activities are underway.</li> </ol>	<ol style="list-style-type: none"> <li>1. National agricultural, forest, and animal production figures.</li> <li>2. Examination of protected natural forest stands, industrial wood production, national parks.</li> </ol>	<ol style="list-style-type: none"> <li>1. Upper Volta's natural resources will sustain increased and expanded agricultural, forest, and animal production on a long-term basis if rationally exploited.</li> <li>2. The GOUV (with donor support) has the means to supply and support increased numbers of forestry agents - the GOUV has the political will to obtain these means and the moral will to have forestry agents working in worthwhile jobs.</li> </ol>

**Logical Framework (continued)**

PURPOSE	E. O. P. S.	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>To improve the GOUV implementation capability for rational water and land/resource use projects through the expansion/improvement of a training center for lower level forestry agents and the development/execution of a management plan for the national forest adjoining the training center.</p>	<ol style="list-style-type: none"> <li>1. On-going practical training program for D and C level forestry agents graduates 40 students per year.</li> <li>2. Graduates assigned to field posts throughout Upper Volta are participating in technical, administrative, and extension activities which utilize skills taught at Dinderesso and which are responsive to needs of local populations.</li> <li>3. A forest management plan exists and is being implemented at Dinderesso and includes participation of local population.</li> </ol>	<ol style="list-style-type: none"> <li>1. (a) Attitudinal survey of students and recent graduates. (b) Curriculum analysis (including analysis of field trips and practical work). (c) Annual number of graduates.</li> <li>2. (a) Attitudinal and activity survey of school graduates. (b) Interviews with villagers in areas served by graduates.</li> <li>3. (a) Interview Forest Manager. (b) Inspection of forest (plantations, natural stands, firebreaks, marketing practices, etc.). (c) Interviews with local farmers and livestock raisers in Dinderesso area.</li> </ol>	<ol style="list-style-type: none"> <li>1. Improved, practical training of forestry agents will be translated into action projects designed to protect and to exploit rationally Upper Volta's natural forestry, water, and wildlife resources.</li> <li>2. Forestry agents will embrace non-repression activities if given a chance (appropriate funding and support).</li> <li>3. Selective grazing in forest reserve by local livestock is socially and technically feasible.</li> <li>4. Adequate markets will exist for Dinderesso forest products. This will include social acceptance by local woodcutters; firewood merchants.</li> </ol>

Logical Framework (continued)

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OUTPUTS	OUTPUT INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>1. School infrastructure provided and functioning.</p> <p>2. School fully staffed with competent teachers and support personnel.</p> <p>3. Program of practical work/study and field trips underway.</p> <p>4. Graduates from Dinderesso School.</p> <p>5. Forest management plan.</p>	<p>1. All buildings and equipment in place and in use.</p> <p>2. Eight qualified full-time teachers assigned to and teaching at Dinderesso; support personnel include chauffeurs, secretary, mechanic, cook, and accountant.</p> <p>3. First year students spend 2½-3 months on field trips throughout Upper Volta. Second year students spend two months on field trips throughout Upper Volta and neighboring countries. More than 50% of training at Dinderesso is outside the classroom and involves practical work/study.</p> <p>4. Forty students graduate each year from Dinderesso.</p> <p>5. Forest management plan exists.</p>	<p>1. School site inspection.</p> <p>2. (a) Interview with teachers and staff. (b) Interviews with students. (c) Interviews with "users" (forestry agents, other donors, etc.) of new graduates.</p> <p>3. (a) Review of field trip and practical study programs. (b) Interviews with teachers and students.</p> <p>4. Graduation records.</p> <p>5. Examination of forest management plan.</p>	<p>1. Incentives and conditions of employment will be attractive enough to recruit and retain qualified and motivated teachers and support staff at Dinderesso.</p> <p>2. Improved school and forestry program will attract more, better-motivated, energetic, trainable students.</p>

Logical Framework (continued)

INPUTS	BUDGET SCHEDULE	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>USAID</u></p> <ol style="list-style-type: none"> <li>1. Long-term technical advisors in practical Forestry, forest management, ecology/biogeography and forest extension work.</li> <li>2. Short-term technical advisors in forest management, wildlife management, range management, limnology, fire management, and soil and water conservation.</li> <li>3. Buildings, equipment, vehicles, operating funds.</li> <li>4. Training of Voltaic staff and counterparts.</li> </ol> <p><u>GOUV</u></p> <ol style="list-style-type: none"> <li>1. Personnel</li> <li>2. Land/Forest.</li> <li>3. Operating Costs.</li> </ol>	<p>Budget schedule.</p>	<p>Project Agreement.</p>	<ol style="list-style-type: none"> <li>1. USAID will provide motivated, energetic people with necessary technical, linguistic and practical skills to implement project.</li> <li>2. GOUV will provide motivated, energetic people with necessary technical and practical skills to staff school and to manage forest.</li> </ol>

-b0-

ANNEX E

STATUTORY CRITERIA CHECKLIST

A. General Criteria for Country

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights? yes.
  
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully? No.
  
3. FAA Sec. 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba? No.
  
4. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement? Yes.
  
5. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizens has exhausted available legal remedies and (b) debt is not denied or contested by such government? No.

6. FAA Sec. 620(e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No.
7. FAA Sec. 620(f); App. Sec. 108. Is recipient country a Communist country? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos? No.
8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? No.
9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measure to prevent, the damage or destruction, by mob action, of U.S. property? No.
10. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason? N/A
11. FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters. N/A
  - a. has any deduction required by Fishermen's Protective Act been made?
  - b. has complete denial of assistance been considered by AID Administrator?

12. FAA Sec. 620(g); App. Sec. 504. (a) Is the government of the recipient country in default on interest or principal of any AID loan to the country? (b) Is any country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default? No.
13. FAA Sec. 620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).) The total GOUV operating and capital budget for FY 1978 was 30,580,000,000 FCFA (approx. \$128.9 million) of which 5,230,000,000 or 17% was spent on defense. Of the total amount spent on defense, 4,840,000,000 or 93% was spent for salaries of military personnel.
14. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No.
15. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? Not in arrears.
16. FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism? No.
17. FAA Sec. 665. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA? No.

18. FAA Sec. 669. Has the country delivered or received nuclear reprocessing or enrichment equipment, materials or technology, without specified arrangements on safeguards, etc.? No.
19. FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate? No.

FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria

- a. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively involving the pcor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment. Yes, see Country Development Strategy Statement (CDSS).
- b. FAA Sec. 201(b)(5), (7) & (8); Sec. 208; 211(a)(4), (7). Describe extent to which country is:
- (1) Making appropriate efforts to increase food production and improve means for food shortage and distribution. See CDSS as cited above.
- (2) Creating a favorable climate for foreign and domestic private enterprise and investment. The country actively attempts to promote domestic and foreign investment but with limited success due to small domestic market and limited local capital.
- (3) Increasing the public's role in the development process. The GOV has created a system of Regional Development Organizations that decentralizes the decision-making process and gives rural people a greater participation in rural development.

- (4) (a) Allocating available budgetary resources to development. Upper Volta allocates its available budgetary resources to development whenever possible.
- (b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations. A minimal amount of the country's resources are used for military expenditures.
- (5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise. Upper Volta has a freely-elected, democratic government which has established the framework for a multi-party system. The country returned to civilian rule in 1978 after open and freely contested elections. The country is reforming its current laws as it feels appropriate to the needs of its people. Human rights are well-respected (a fuller description of the human rights situation can be found in Country Reports on Human Rights Practices (Joint Committee Print, SFFC, HIRC, 2/3/78)).
- (6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help enterprise. Within the constraint of its resource base, the GOUV has made a determined effort to take effective self-help measures.
- c. FAA Sec. 201(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made? N/A
- d. FAA Sec. 115. Will country be furnished, in same fiscal year, either security supporting assistance, or Middle East peace funds? If so, is assistance for population programs, humanitarian aid through international organizations, or regional programs? N/A

2. Security Supporting Assistance Country  
Criteria

- a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? Is program in accordance with policy of this Sector? N/A
- b. FAA Sec. 534. Is the Assistance to be furnished to a friendly country, organization, or body eligible to receive assistance? N/A
- c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? N/A

ANNEX E

STATUTORY CRITERIA CHECKLIST

B. GENERAL CRITERIA FOR PROJECT

1. App. Unnumbered; FAA Sec. 653 (b)  
(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; (a) This project was included in the FY 79 CP at page 157.  
(b) Is assistance within (Operational Year Budget, country or international organization allocation reported to Congress (or not more than \$1, million over that figure plus 10%). (b) Yes
  
2. FAA Sec. 611 (a) (1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U. S. of the assistance. (a) Yes; see Annex F  
(b) Yes; see Annex F
  
3. FAA Sec. 611 (a) (2). No legislative action is required.
  
4. FAA Sec. 611 (b); App. Sec. 101 N/A
  
5. FAA Sec. 611 (e). See Annex G
  
6. FAA Sec. 209, 619. Project is not susceptible of execution as part of regional or multilateral project.
  
7. FAA Sec. 601 (a) and Sec. 201 (f) N/A
  
8. FAA Sec. 601 (b). Information and conclusion on how project will encourage private U. S. participation in foreign assistance programs (including use of private trade channels and the services of U. S. private enterprises). The bulk of commodities to be financed by this project will be purchased from U. S. suppliers.

9. FAA Sec. 612 (b); Sec. 636 (h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U. S. are utilized to meet the cost of contractual and other services.

Upper Volta is acknowledged as one of the world's poorest LDC's. The GOUV has difficulty in meeting its recurrent budget. An indication of the importance the GOUV places on this project is its agreement to pick up personnel costs of 40 graduates per year (compared to 10 currently) to staff the Dinderesso School.

10. FAA Sec. 612 (d). Does the U. S. own excess foreign currency and, if so, what arrangements have been made for its release?

The U. S. has no excess local currency.

## B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria  
a. FAA Sec. 102 (c); Sec III; Sec 251a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions.

The project is designed to address the needs of the surrounding rural population with respect to grazing local livestock and providing employment opportunities in the Dinderesso Forest. Ultimately, the project will make an impact on the rural population throughout Upper Volta by providing Forestry agents with practical skills designed to help villagers exploit their natural resources in a rational, non-destructive manner.

(b) FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available? Include only applicable paragraph -- e.g. a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project include relevant paragraph for each fund source).

Project is funded under Sahel Development Account, section 101. The project falls within manpower and forestry development sectors of the multibonor Sahel development plan.

(c) FAA Sec. 110 (a); Sec. 298 (c). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity?

The GOUV is contributing (in kind and money) \$1,029,000 or 26.1% of the cost of the program.

with respect to which the assistance is to be furnished or has the latter cost-sharing requirement been waived for a "relatively least-developed" country?

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on: (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political and social development, including industry free labour unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

f. FAA Sec. 281 (b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

g. FAA Sec. 201 (b) (2)-(4) and -(8); Sec. 201 (e); Sec. 211 (a) (1)-(3) and -(8)  
Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development

The project will provide more and better trained forestry extension worker-power for Upper Volta.

Some of Upper Volta's existing intellectual resources (teachers, students, and training institution) will be expanded and developed by this project. Furthermore, the project was developed in cooperation with rural people and government officials of the host country after the GOV specifically requested U.S. assistance in upgrading and increasing the training of its forestry agents.

Yes

- |  |     |
|--|-----|
| activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness.   | Yes |
| h. <u>FAA Sec. 201 (b) (6); Sec. 211 (a) (5), (6).</u> Information and conclusion on possible effects of the assistance on U. S. economy, with special reference to areas of substantial labor surplus, and extent to which U. S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U. S. balance-of-payments position. | Yes |
| 2. <u>Development Assistance Project Criteria (Loans only). (a-f)</u>  | N/A |
| 3. <u>Project Criteria Solely for Security Supporting Assistance</u>   | N/A |
| 4. <u>Additional Criteria for Alliance for Progress</u>  | N/A |

UNITED STATES GOVERNMENT

ANNEX F

# Memorandum

611 A Certification

TO : Donald Clark, CDO/Ouagadougou  
Design Officer

FROM : *John J. Bennett*  
John Bennett, REDSO/WA  
Engineer

DATE: May 11, 1978

SUBJECT: 611A certification, Forestry Education and Development Project  
686-0235

On may 9, 1978 I departed Ouagadougou on AIR VOLTA for Bobo Dioulasso with Don Clark Design Officer AID. We stopped in Bobo Dioulasso and met with Mr Casimir Ziba, Chef d'Inspection des Eaux et Forêts and told him of our planned visit to the project site. He then brought us over to his offices where I was able to examine current architectural design work in progress. It was comparable in quality to that done by I. TRAORE, Architect in Ouagadougou. It was indicated that the buildings to be done for the AID project would be similar in construction details to those shown on Drawing HERB4(dortoir) that is planned for the site. The buildings will be of reinforced concrete frame and block infill, having reinforced concrete slab and galvanized roof with drop ceilings. Due to the prevalence of flies and mosquitos the buildings should be screened.

We went out to the site and I examined the existing buildings and found them to be of value. They should be incorporated into the project base.

The location for the buildings was examined and it will be located on the higher ground having good drainage. I advised both Ziba and Clark that the present standing teak trees should be used for shading and landscaping until replacement trees are grown. The water and electricity sources are near to the site and should be available at a reasonable cost.

The situation of the buildings will not create any enviromental hazards.

The construction planned consists of the following units:

- 3 dormitories - 120 M2 each
- 3 classrooms - 180 M2 total
- 1 library - 100 M2
- 1 student Union - Rec. Room - 80 M2
- 1 laboratory work room - 60 M2



- 1 cafeteria/assembly hall/kitchen - 200 M2
- 1 administrative building - 120 M2
- 8 housing units - 860 M2  
(5 x 100 M2 - 3 x 120 M2)
- 1 guest house 6 bedrooms - 200 M2
- 1 garage - 175 M2
- 2 guard posts/fire watch tower
- 2 forestry agents houses - 200 M2  
(2 x 100 M2)

The estimated cost of \$350.00 per square meter is a reasonable figure and is based on current costs in Ouagadougou. I would urge that the use of burnt clay tile be utilized as infill material. It is available in Ouagadougou and there is rail service to Bobo-Dioulasso.

Upon return to Bobo-Dioulasso I examined Drawing HER B 4 and found the drawing to be of satisfactory quality and I advised D. Clark of the following :

A provisional 611 A is hereby given for the project based on the type of construction outlined above, relatively same amount of square meters (covered) constructed and provided that completed final design drawings are approved by a RELSO Engineer prior to the issue of bidding documents. It was suggested to D. Clark that the specifications used for Kamboinsé laboratories could be used for Dinderesso with very little change to incorporate special details.

ANNEX G

611(e) CERTIFICATION

FORESTRY, EDUCATION AND DEVELOPMENT

Certification Pursuant to Section 611(e) of the Foreign Assistance Act of 1961, as amended.

I, John A. Hoskins, USAID Mission Director for Upper Volta, having taken into account, among other things:

- A. The continuing degradation of Upper Volta's environment;
- B. The requirement for additional better-trained, motivated, practical forestry, fish, and wildlife agents in order to spread appropriate intermediate environmental technology to the rural population of Upper Volta;
- C. The importance the Government of Upper Volta (GOUV) places on rural development;
- D. The existence of qualified GOUV personnel (1) to manage the project, (2) to manage the forest, and (3) to teach at Dinderesso;
- E. The construction/equipment elements of the project which will develop necessary educational and forest management infrastructure;
- F. The important role that U. S. technicians can play in developing a strong practical education and forest management program at Dinderesso;

do hereby certify that in my judgement, the GOUV will have with help of this project the financial and human resource capability to maintain and utilize effectively the educational and forest management infrastructure and programs developed by the project.

  
\_\_\_\_\_  
JOHN A. HOSKINS  
Mission Director  
Ouagadougou, Upper Volta



10. Where must the practical studies be carried out? Should trips be made to see different regions and works? If answer is yes, state place and duration.
11. What kind of infrastructure is needed in Dinderesso? Be specific (example, dormitories, library, water, electricity, etc.)
12. In the field of water and forestry, what priority works must be carried out in Upper Volta? What are the obstacles? What do you suggest to overcome them?
13. Other comments.

### Summary of Responses

Question 1 : In general, the responses made references to the deterioration or increasing inadequacy of the forestry school. Attention was drawn to:

1. Course instruction. Little modification of the curriculum or course contents over the years. Teaching staff small, weak, absent, or unable to give the students adequate practical training.
2. Living conditions. Study environment deficient. Dormitories run down. Eating arrangements difficult.

Question 2 : Of the 16 persons responding to part one of question 2, nine stated categorically that their training did not prepare them well for their jobs; two stated it did prepare them well, and five hedged by saying "yes and no".

The most commonly cited deficiencies in the training received at Dinderesso were:

- Lack of practical training (8 responses)
- Lack of field trips (5)
- Lack of trips to parks to observe wildlife (5)
- Lack of trips to gain practical experience in fisheries (3)

Other deficiencies cited by more than one student were: insufficient number of professors, especially for fieldwork; poor quality instruction in surveying and in the military duties and functions of forest service personnel.

Question 3 : Most respondents agreed that the following courses were basic and should be emphasized in the training of forest service personnel:

Silviculture/reforestation/nursery techniques and management. Graduates should know how to set up and manage a forest nursery, and establish and tend a plantation (11 responses).

Cartography and surveying. Both compass work, along boundaries, and transit work,

for levelling, contour mapping (9).

Wildlife management (cynegetique). Graduates should be familiar with the wildlife of Upper Volta in order to protect it and manage it in parks (8).

Botany. A knowledge of the flora of Upper Volta, including scientific and common names, uses and economic importance was cited as being basic to an education in forestry (7).

Fisheries and fish culture. Graduates should be able to identify common freshwater fishes, and be familiar with the techniques to construct and manage fish culture ponds (6)

Some mention was also made of the need to know: forest laws and legislation (4), administrative training and operations planning/management (4), techniques of conservation education and extension work at the village level (2), and the basic military duties and training (2).

Level D personnel were seen as the on-the-ground technicians who carried the burden of implementing projects and executing the work of the forest service. Their training should emphasize the basics and involve mostly practical training in silviculture/forestry, surveying, fisheries and wildlife management, botany and "forest ecology" and forest law.

Level C personnel could perhaps begin to specialize in either forest, fish or wildlife management, and as a minimum, should broaden their knowledge in each area. They should also have more training in administration and operation planning/management.

Question 4: Currently there are about 180 Forest Service agents at levels C and D.

Estimates of the needs of the forest service varied from 60 to 500 for level C and from 38 (two per "sous-prefecture") to 1000 for level D.

Suggested annual recruitment levels carried from 10 to 50 for level C and 20 to 60 for level D (totalling 40 to 100 new agents/year brought into training).

The majority of responses suggested a ratio of 2 : 3 or 1 : 2 between level C and level D. Only one person thought there should be a higher level of recruitment for level C than level D. No one suggested only recruiting for level C training.

Question 5: Only one respondent mentioned a subject other than those basic to the forestry school curriculum. The most frequently cited areas for retraining were: Practical surveying, fieldtrips, field botany, silviculture and forest management operations, fieldwork in fisheries and fish culture, and practical knowledge of administrative procedures reporting, and office management. (NB. This is a reflection of the inadequacy of their initial training).

One novel suggestion was the organization at the school of periodic "debates" on these problems specific to each region or administrative area of Upper Volta. These debates would presumably familiarize the students with regional problems and permit them to discuss those problems with experienced Forest Service personnel.

Question 6 : How to organize training in three areas: reforestation/forest management; fisheries/fish culture, and park/wildlife management.

There was general agreement that every student should be exposed to the basics in each of the three major divisions of "Eaux et Forets". It was pointed out that surveying and mapping are useful in all three areas; also, all should be well-trained in plant and animal ecology (knowledge of flora and fauna) and in forest economics.

Students starting to specialize in fisheries should spend more time on fieldwork in fisheries technology (boats, nets, pond construction, organization and supervision of fish "stations") and perhaps spend more time on trips to Bouake, Ivory Coast, and to Mopti, Mali (regional school/project for higher level fisheries training).

Wildlife students should spend more time in the parks, and be taught more about animal ecology, the national park system. They might take special field trips to Garoua, Camerouns (regional school for higher level wildlife training).

Those specializing in reforestation might go on to advanced training in France (Nogent-sur-Marne), and have a more comprehensive instruction in surveying, forest management, plant ecology, and economic botany.

Question 7 : Six respondents suggested that all the existing courses be retained. Courses which were mentioned as being specially basic were: botany, surveying, silviculture, wildlife ecology, fisheries, and forest law.

The following new courses were suggested (by the indicated number of respondents):

Math, health and personal hygiene, forest mensuration (2)  
Driving (cars and tractors) (3)  
Foreign language, plant pathology, mechanics/machine maintenance, masonry, law, animal husbandry, hydrology (1)

Four respondents stated no courses should be dropped; several noted that the general botany courses should either be dropped, or simplified and made more practical and field/forestry oriented.

Question 8 : The average of 15 responses was 6.6, with the responses clumped around 4 or 5 and 8 professors.

The most frequently cited disciplines were botany, silviculture, surveying, wildlife, fisheries, with special instructors to assist with fieldwork and practical demonstrations.

Question 9: Ten out of 12 respondents suggested that at least 50 percent of the program of study should be devoted to practical fieldwork. Seven respondents suggested 60 percent or more (see also question 2). The majority of the respondents suggested a long excursion of 1-2 months. Several cited mid-February to mid-April as a good time to visit the parks and observe wildlife (hunting season closed, less grass/better visibility, and water supplies more limited/animal population less dispersed).

Question 10: The most frequently cited areas for practical training were:

The national parks, including Arly and Park W (12)  
Fish stations such as Berekadougou, Loumbila, Mares aux Hippopotamus (9)  
Project sites (FAO, Germans, etc.) (8)  
Different regions (north, east, south) (7)  
Ivory Coast, including Bouake (5)

Mention was also made of Garoua (Cameroon), Mopti (Mali), areas where desertification is a problem, and a variety of sites close to Dinderesso, including a specially designated "demonstration area".

The kinds of subjects listed as being best taught with an emphasis on the practical were: Surveying and mapping (8), forest planting, nursery work (9), Pond construction (4), Botany/ecology (4).

Question 11: The following were specified as need improvements to the Forestry School:

Dormitories (14)	Assembly room (with a-v equipment) (6)
Running water (14)	New classrooms (5)
Electricity (14)	Housing for school staff (4)
Cafeteria/Kitchen (12)	Housing for teachers (4)
Library (11)	Laboratory (4)
Athletic field (8)	Study room (3)
Transport for students (8)	Toilets (2)
Dispensary/health facility (6)	Married student housing (2)

Question 12: The most frequently cited "priority tasks" for the forest services were:

Reforestation (16)	Recruit Forest Service personnel (3)
Conservation education (7)	Improve Forest Management (3)
Protection of Wildlife (7)	Greenbelt/antidesertification projects (3)
Fisheries development (5)	Park development (2)
Fire control (6)	

Other tasks mentioned were watershed protection, soil conservation, 5-year moratorium on hunting, review of forest laws, expansion of nurseries, control of farming (to prevent excessive new land clearing), adequate financing of the forest service.

The chief obstacles facing the Upper Volta Forest Service were seen to be:

Budgetary constraints (7)	Uncontrolled fires (2)
Lack of personnel (6)	Overuse and resource abuse by man (2)
Inadequate forestry school (6)	
Lack of political support for forestry (4)	
Lack of comprehension of conservation needs at the village level (4)	
Lack of adequate sanctions/enforcement of forest laws (1)	
Lack of a combined directorate for "Eaux et Forets" (forestry, wildlife, fisheries depts. (1)	

Question 13 : "Additional comments" frequently elaborated on the priority tasks or obstacles mentioned above facing the forest service. Several respondents reiterated the shortcomings and needs of the forestry school. One mentioned that students should receive a diploma at graduation.

ANNEX I

SUMMARY OF VILLAGE VISITS

-Population pressure from farming communities is causing pastureland and cropland to be in short supply.

-Farmers want to farm in the national forest.

-Herders want to graze cattle in the national forest.

-Neither farmers nor herdsman are terribly interested in conservation/forestry projects within their villages on their own land, as a cooperative venture with school students; but better outlook for extension work among Fulani herdsman than among Bobo-Finn farmers.

-Firewood and water are not now locally-scarce resources.

-Fires set by farmers and probably by herdsman as well; herdsman stand to gain more by stricter controls on bushfires.

-Likely to encounter some problems with grazing or cultivating firebreaks to maintain them: until other methods are worked out, more practical to use machinery or paid workers to clean double alleys, and use prescribed burns to eliminate fuel in median strip.

-Both farmers and herders very conscious of protected status of forest, and somewhat resentful of the "locked up" status of the forest.

-Herdsman not interested in working in forest (e.g. cutting grass), but farmers very interested in work opportunities in the forest -- especially for the dry season.

-Forest is treated much as the surrounding bush with respect to gathering minor forest products; some local income derived from collection and sale of cashew fruits.

April 25, 1975 : Meeting with village chiefs at Dinderesso Forestry School

Present at meeting : Village chiefs and elders of Dinderesso and Kokoroue (6 - 7 men)  
2 Forest Service agents, 5 members of design team

The villagers' interest in the forest centers on land for farming and employment opportunities. Good farmland is in short supply, but they did not react positively to cultivating for short periods of time in the plantations of the forest.

They are happy to be able to work there. Presently young people in the village leave to find work in Bobo-Dioulasso and the Ivory Coast, and it was stated that fewer would leave if more could work in the forest.

When asked about what assistance they would like to have from the Forest Service, the Dinderesso Chief replied he would like to have help planting Teak trees - for firewood, construction wood, and for sale.

When asked about grazing rights, they replied they can find enough grass for their goats and sheep outside the forest; they weren't interested in grazing animals in the forest.

For medical help or medicine, they presently go to the seminary at Nasso; they felt the students could go there as well (NB, The present school director reports the seminary would prefer to give medicines only to villagers--not to forestry students).

When discussing fire, it became clear, that they were aware of a conflict between the Forest Service wishing to protect plantations from fire and the farmers' desire to use fire for field clearing (and hunting). This may be one reason for their negative reaction to farming within the forest--they presume they couldn't use fire to assist with fieldwork.

The chief use of fire seems to be hunting of small animals. Large game is sometimes seen, but causes less crop damage than domestic animals. Cattle cause the largest amount of crop damage. The farmers don't raise cattle; they feel that is the work of the Fulani.

Firewood is not in short supply; adequate supplies are easily available. They do not produce or use charcoal.

The villagers would like to be assisted with planting fruit trees (mangoes, Nere) if enough good land could be found. Students could help.

April 26, 1973 : Meeting at Fulani Camp #1 - Flasso

Present at Meeting : 2 Forest Service agents; Village Chief and 6-7 older men (later joined by young men); 5 members of AID design team plus the AID chauffeurs.

(Late morning visit to sedentarized Fulani; roughly 50 people in 15 huts; camp several kms. north of Bana, west of the Dinderesso forest. Translated by Forest Agent.)

The Fulani herds are predominantly tsetse-resistant Ndama. Their cattle return to camp every night, and graze within the radius of 10 km. Water is available year-round near the camp. There isn't enough grass closeby the camp; they would like to graze within the forest but know the Forest Service does not permit it.

They felt the herds could be adequately handled by even the younger herdsman, which would make it possible, therefore, to graze near new plantations without damaging newly planted seedlings.

When questioned about the possibility of using hay cut in the forest, they responded

positively, saying they could either bring the herds to the hay piled near the forest, or it could be brought to their camp and stored there for the cattle. (They cannot spare the time from herding to cut the hay themselves; nor do they have the means to transport cut hay).

If the grasses are cut at maturity, after flowering, they remain palatable and reasonably nutritious through the dry season, until June, when fresh forage can be found.

On the subject of fires, they said they do not set fires; rather, the farmers set them. They did admit the cattle preferred fresh green grass shoots to dried hay.

They would be interested in cooperating with the forest manager on model "range management" projects. Trees species cited as being valuable for forage were: *Khaya senegalensis*, *Pterocarpus erinaceus*, and *Azelia africana*.

April 29, 1978 : Meeting with Villagers of Nasso

Present at meeting : 2 Forest Service agents Village Chief and 5-6 village men ;  
4 Design Team members and AID chauffeur.

(Late morning visit; Translated by young villager.)

Nasso is located 1.5 km. south of the Forestry School and Dinderesso Forest. Includes roughly 300 families, mostly Bobo-Finn ethnic group; sedentary, subsistence farmers.

Discussion began with a brief explanation of our visit and the reasons for asking questions. Essentially we wanted to learn what use they make of the forest at present, and how it could be managed in their interest in the future.

The strongest point made by the villagers was that they were not eating well; there was a shortage of good farmland. The village had grown, the area now being cultivated was losing its fertility, and there was insufficient new land or rested farmland in the vicinity of their village. They made it known that the land of the forest was once farmed by them.

They are primarily interested in having a portion of the forest opened to them for farming and working in the forest to earn money to buy food, etc.

They presently walk up to 6 km. to some of their fields, so distance to the Dinderesso forest is not a problem. They are available for work all day long in the dry season, but could only work a portion of the day (or not at all) during the rainy season.

They could clear grass from firebreaks or weed plantations (or thin, or harvest, etc.) in the dry season. The idea of cultivating and planting firebreaks in the rainy season did not meet with much enthusiasm! one problem cited was the potential damage from wildlife as the fields would be difficult to guard adequately.

Regarding fire, they didn't want to admit setting fires, but did admit that fire was a good thing: to burn grass growth after the rainy season, and to hasten the decomposition of leaf litter in general; to flush out and kill wildlife; and to provide fresh sprouts for livestock.

They felt both farmers and Fulani livestock herders benefited from fires although, they mentioned that if the Fulani burned before their harvest was complete, fires could result in damage to their crops.

April 29, 1978 · Meeting at Fulani Camp #2

Present at meeting · 1 Forest Service Agent; Village Chief and 4-5 elders and children  
4 Design team members and AID chauffeur

(Noontime meeting at sedentarized Fulani camp, several km. northwest of Dinderesso. 38-40 in 9-10 huts. French translated into Dioula by Forest Service agent. Chief could understand some French, but always replied to questions in Dioula. Questions generally posed by Fred Weber).

Weber : Greetings, thank you for water and welcome. Have come to learn from you, and to talk about the forest. Is it good or not?

Chief : Yes, a good thing.

Weber : What good is it to you?

Chief : What is good for the state is good for the Fulani (e.g. a forest reserve). Also, we can collect dry, dead wood there, and can collect fruits, medicinal plants, etc.

Weber : What can be done so the Fulani get more from the forest? Like construction wood (poles)?

Chief : We're interested in ways to get grass from the forest.

Weber : By grazing or as hay cut by hand?

Chief : Both -- for cattle and for roofing, etc.

Weber : Are the grasses in the forest good for grazing?

Chief : Yes, throughout the forest.

Weber : Why are you interested in getting grass from the forest--to increase the size of your herd, or because there isn't enough grass elsewhere?

Chief : Mostly because there isn't enough grass elsewhere. Too many farmers.

At the end of the rainy season, and after the bushfires have burned up the grass, we must go 9 km. each day to find grass -- 9 km. to grass along a river valley.

Weber : Is there a disease problem near the river? (Several Fulani chuckle)

Chief : (Cattle) disease is a problem everywhere.

Weber : What did you do during the drought years?

Chief : We shifted our camp to the site near the river -- 9 km. from here.

Weber : Do many Fulani move down into this area from the north when the rains fail? Is it a problem -- a conflict of too many herders.

Chief : Yes, when there is drought, more herders come, but without conflict.

Weber then proposed the possibility of opening at least some areas within the forest to grazing. At present, no grazing is allowed within the forest. Weber emphasized that grazing would only be allowed on a planned, controlled basis: for a certain number of animals, at a particular time of the year, in a given area. The exact plan would be worked out to the mutual benefit of the herders and the forest.

The Fulani agreed in principle to the need to manage grazing and avoid overgrazing.

Weber : Do your cattle browse trees or graze grass more?

Chief : More grass is grazed than trees are browsed. When the grass is finished, our cattle browse trees. But they lose weight if only browsing trees.

Weber : What trees are good for cattle?

Chief : Leaves of (local name of): Pterocarpus erinaceus, Khaya senegalensis, Azelia africana. Plus the seed pods of (tree with leaves like Nere; looks like Prosopis africana). The northern Zebu cattle do better on browse than our southern (tsetse-resistant), Ndama breeds.

Weber then asked several questions about the grazing pattern of the Fulani. They keep old and young cows, calves, and bulls together in a mixed herd. The herds are always guided by someone. Every night the animals return to the camp. The calves are then tied up, to permit the cows to be milked in the morning. Except during dry years, water is available year-round 2 km. from the camp (Kou stream).

The Fulani Camp #2 was set up about 30 years ago--after the establishment of the forest. Before the forest was classified, there was one Fulani camp within it.

Now there are two Fulani camps on the periphery of the forest. The Chief felt the two

could agree together on the terms of grazing within the forest. He agreed that everyone could not graze as many cattle as he would like. It would have to be limited to prevent overgrazing. He would understand if it was only opened to grazing for the two Fulani camps, and not additional nomadic herds. They were receptive to a proposal for a "grazing reserve" to be set aside, protected from fire and made available during drought years when forage was scarce.

On the subject of hay from the forest, they would gladly use it, but cannot (would not) cut it themselves. Their work is tending the herds (and some cultivation for food grains).

On the subject of forage needs in the future, the Chief hadn't thought much about it, but was aware of the trends of lots of grass in the past, and less and less every year, (primarily due to extension of farming over larger and larger areas). They noted in particular the loss of good, dry season grazing in the river valleys as the introduction of animal traction permitted the use of heavier lowland soils.

Weber : Is fire good or bad?

Chief : Fire is not good; it burns up our supply of grass.

Weber : Do you set fires?

Chief : No.

Weber : Don't your animals like the green grass shoots which follow a fire?

Chief : Yes. That is true -- but it is better not to set fires.

Apparently most fires are set by the farmers who use it to hunt small game and to clear their fields. Since the Fulani have no land of their own, but are only able to stay with the permission of the farming population, they are in a poor position to tell the farmers not to burn.

Weber then asked if they knew about the Forestry School and whether they thought it was a good thing. The Chief said it was good -- students could learn about "forestry". Weber asked if it was possible for the students to visit the camp from time to time, to learn from the Fulani. The Fulani doubted they had anything to teach, but said the students would be welcome. We insisted the Fulani had a good knowledge of grasses, plants, and their surroundings in general, which the foresters should learn. The possibility of the students working with the Fulani to help them do work around the camp was suggested (e. g. re-vegetation of over-grazed areas; delineating a forage reserve outside the forest for drought years; experimenting with cutting and stocking hay). At first the Chief said they had no work to do, but eventually said they might do such work if the farmers would agree to let the Fulani use the land for a forage reserve, etc. Once they acquired landuse rights, they would agree to maintain firebreaks around their reserve. The meeting closed with a generous gift of eggs to the team.

ANNEX J

FOREST MANAGEMENT PLAN

(Plan below is a summary of the Detailed Forest Management Plan which is available upon request in Supplementary Annexes to this PP.)

- I. Review of Existing Reports and Maps of the Forest
  - A. Forest Boundaries
  - B. Vegetative Surveys and Descriptions
  - C. Topographic Maps and Descriptions of Physical Features
  - D. Soil Survey and Description
  - E. General Background Reports and Maps
  
- II. Preparation for the Management Plan
  - A. Meet with Forestry Service Personnel
  - B. Familiarization with Physical Features of Forest
  - C. Familiarization with Vegetative Cover
  - D. Visit Local Villages
  - E. Examine Distribution of Basic Soil Types in Forest
  
- III. Prepare Detailed Maps for the Forest
  - A. Boundary Map
  - B. Vegetative Survey Map
  - C. Map of Physical Features and Topography
  - D. Land Use Maps (past, present, future)
  - E. Map of Fire Protection Scheme
  - F. Aids to Map Preparation
  
- IV. Describe and Evaluate Forest Characteristics
  - A. Vegetative Associations
  - B. Forest Boundaries
  - C. Physical Features and Topography
  - D. Main Soil Categories
  
- V. Describe and Evaluate Forest Uses and Exploitation Goals
  - A. Plantations
  - B. Natural Forest Associations
  - C. Water Resources - Possible Uses

Annex J (Cont'd.)

- VI. Describe and Evaluate Vegetative Management Techniques Needed to Meet Exploitation Goals while Maintaining a Sustained Yield and Healthy Forest Environment
  - A. Plantations
  - B. Natural Forest Associations
  - C. Grasslands
  
- VII. Develop Management Plan for Tree Nursery
  - A. Physical Reorganization
  - B. Reorientation of Production
  - C. Evaluate Manpower Requirements and Availability to Meet Production Levels
  
- VIII. Develop Forest Protection Plan
  - A. Fire Control
  - B. Grazing Control
  - C. Wood Harvesting Control
  - D. Hunting Control
  
- IX. Describe and Evaluate Social and Economic Impacts of Forest Management Policies
  - A. Impact When Forest Reserve was Established
  - B. Present Local Influence of Forest Reserve
  - C. Future Influences of Forest
  
- X. Outline and Describe Experimental and Special Management Projects
  - A. Harvesting Law
  - B. Regeneration Trials
  - C. Natural Forest Succession and Plant Ecology Studies
  - D. Charcoal Production
  - E. Selected Tree Species Propagation
  - F. Soil Conservation
  - G. Site Preparation Methods for Establishing Plantations
  - H. Cashew Exploitation
  - I. Aerial Photograph Interpretation
  
- XI. Describe and Evaluate Educational Uses of Forest
  - A. Surveying
  - B. Plant Identification
  - C. Soil and Geology Studies
  - D. Hydrological Studies

Annex J (Cont'd.)

- E. Silviculture and Plant Ecology
- F. Fire Control Methods
- G. Tree Nursery Management
- H. Agro/Forestry Land Management
- I. Plantation Establishment and Maintenance
- J. Fisheries and Wildlife Management
- K. Student Experimental Projects

**XII.**     Develop Timetable of Forest Activities

- A. Seasonal
- B. Yearly Goals

**XIII.**    Establish Forest Management and Production Records

- A. Record Practices Carried out on each Management Unit
- B. Record Production of Forest Products Per Management Unit
- C. Distribution of Revenue from Forest Production

sketch map of the  
**DINDERESSO FOREST RESERVE**



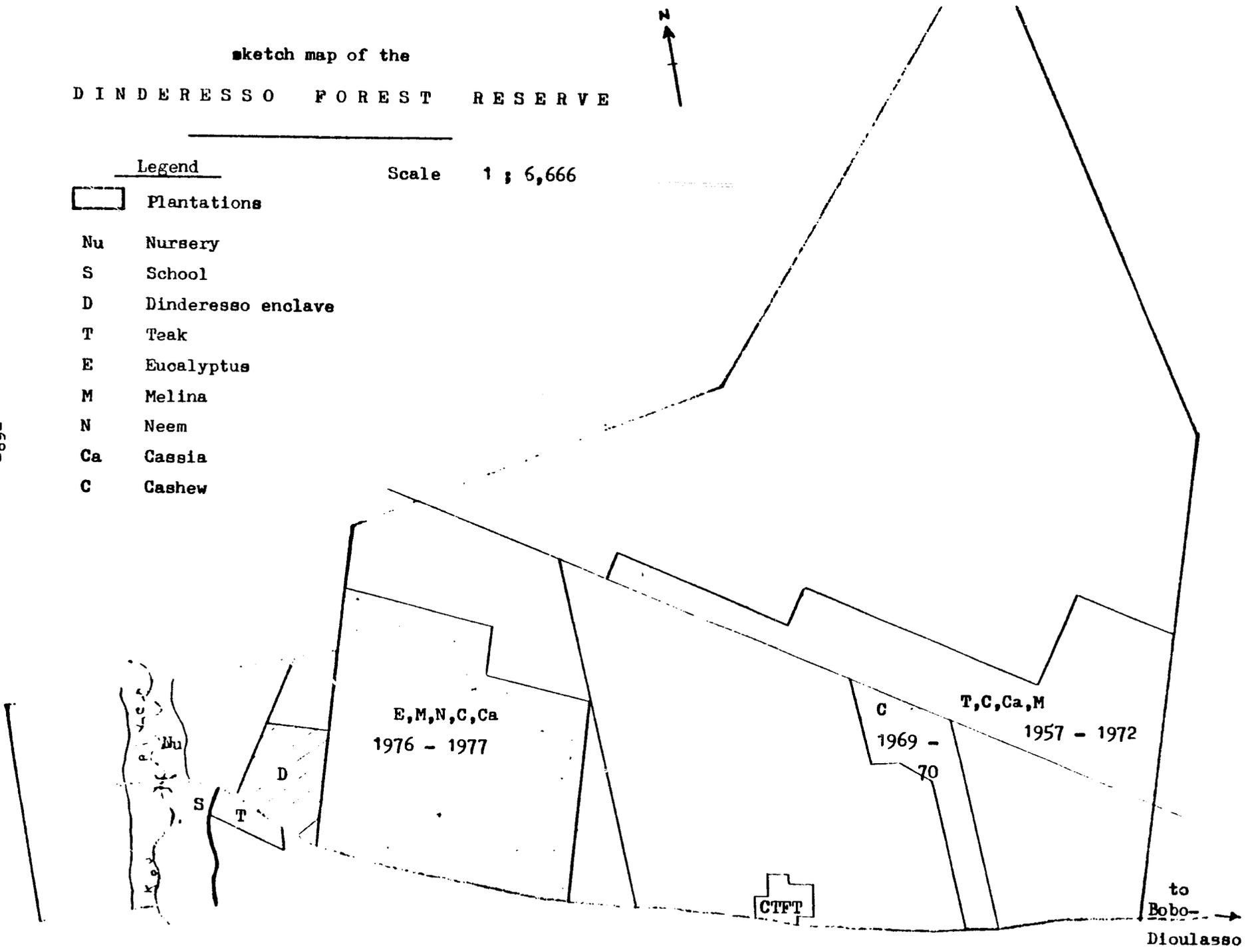
Legend

Scale 1 ; 6,666

 Plantations

- Nu Nursery
- S School
- D Dinderesso enclave
- T Teak
- E Eucalyptus
- M Melina
- N Neem
- Ca Cassia
- C Cashew

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ANNEX K

SCHOOL CURRICULUM

A detailed school curriculum is included in Supplementary Annexes to this PP and is available upon request. It describes in considerable detail the proposed curriculum for D and C level students, including criteria for selection of students, the general teaching approach which will emphasize practical training, the major components of each course, teaching assignments, and a program of field visits and tasks. Below, in very summarized form, is a list of the courses and field trips planned for both D and C level students.

D-Level Training (duration 1 year)

Students will possess, at a minimum, a primary school certificate (6 years of education). Courses will include:

1. General Botany
2. Plant identification and uses
3. Basic ecology and biography
4. Nursery and Plantation techniques
5. Silviculture
6. Forest, soil and water conservation techniques
7. Mensuration and inventory
8. Basic surveying and mapping
9. Parks and Wildlife management
10. Fisheries and fish culture
11. Machine and tool maintenance
12. Forest economics, harvesting, utilization
13. Basic administration and accounting
14. Forest legislation and conservation education
15. Military training, first aid, and hygiene

C-Level Training (duration - 2 years)

C-level students will have one of the following backgrounds:

- a) 2 years of basic courses at Matourkou Agricultural Training Center (courses included in Supplementary Annex), equivalent of 10 years of education;
- b) BEPC (high school certificate after 10 years of education)
- c) Experienced and outstanding D-level agents.

C-level training involves basically the same courses as D-level training but at a higher level of sophistication. These students have a higher level of education at the start of their program and will spend two years in training (as opposed to one year for D-level students).

First year courses include:

1. Plant identification and use
2. Ecology and biogeography
3. Nursery and plantation
4. Silviculture
5. Surveying, mapping and photo-interpretation
6. Forest legislation and conservation education
7. Military training, first aid, and hygiene

Second year courses include :

1. Forest, soil, and water conservation
2. Forest mensuration and inventory
3. Forest and range management
4. Administration and accounting
5. Forest economics, harvesting and utilization
6. Machine and Tool maintenance
7. Fisheries and fish culture
8. Parks and wildlife management

Field Trips (see map at end of this Annex)

An extensive program of field trips is planned in order to familiarize students with the different ecological and geographic zones of Upper Volta and to expose them to on-going forestry, range, wildlife, and fisheries projects (see Supplementary Annexes for details). Specific subjects to be covered will include:

A. Forestry

1. Management of natural stands
2. Plantation management
3. Fire control
4. Silvicultural research
5. Plant identification
6. Conservation education efforts
7. Mensuration, inventory work
8. Village plantations
9. Nursery work
10. Windbreaks, live fencing
11. Surveying, mapping, photo-interpretation
12. Site evaluation

B. Range and Soils

1. Soil and water conservation work
2. Irrigation techniques

3. Construction of windbreaks
4. Sand dune fixation
5. Range management
6. Soil conservation; contour dikes, small check dams
7. Fire control
8. Soil sampling and site evaluation
9. Plant identification
10. Conservation education efforts

C. Wildlife

1. Animal identification
2. Animal tracking
3. Animal census techniques
4. Poaching control
5. Plant identification
6. Fire control
7. Train construction
8. Conservation education efforts

D. Fish

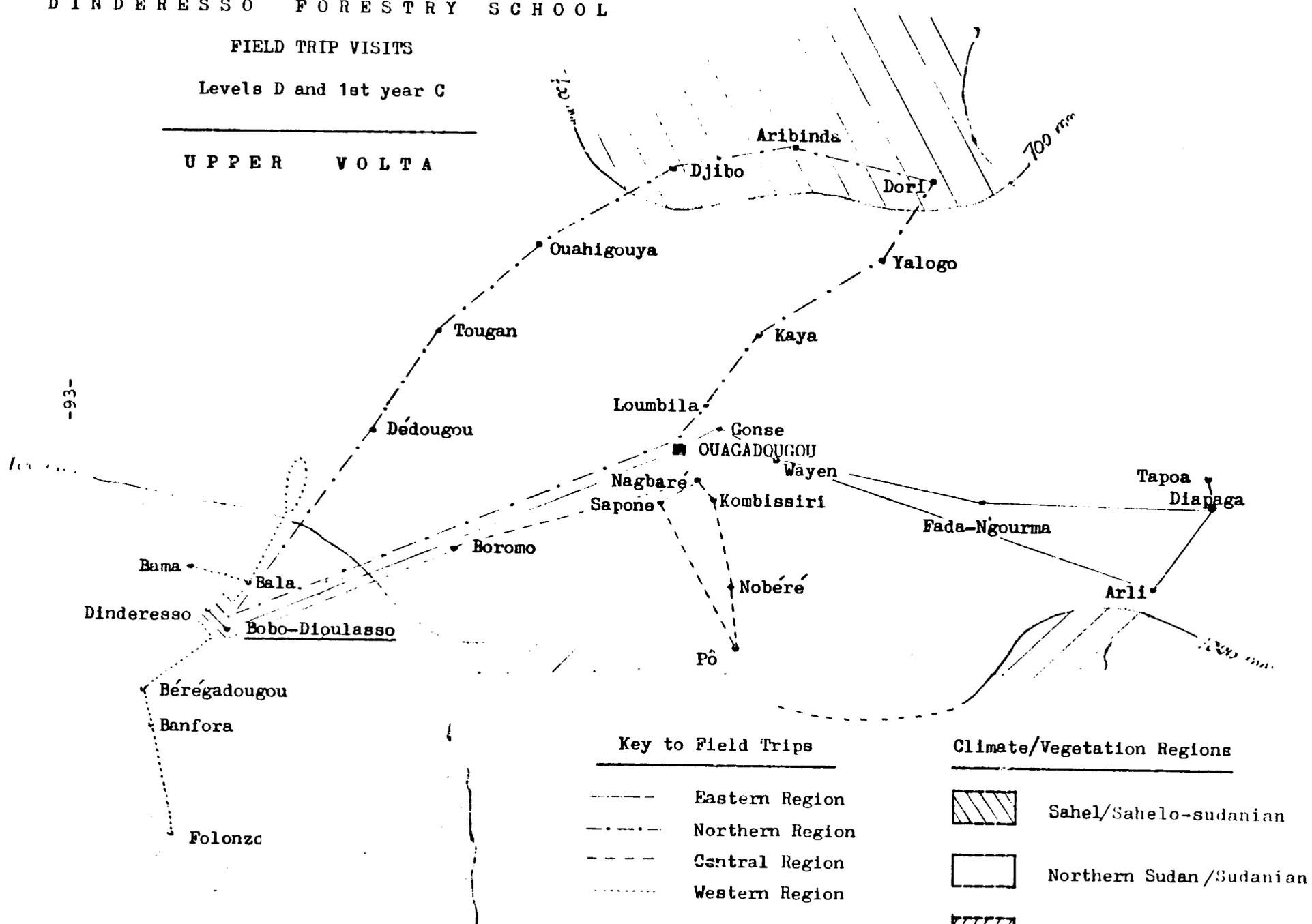
1. Fish identification
2. Fish census techniques
3. Fishing techniques
4. Fish processing
5. Fish marketing
6. Fish farming
7. Conservation education efforts
8. Site evaluation.

DINDERESSO FORESTRY SCHOOL

FIELD TRIP VISITS

Levels D and 1st year C

UPPER VOLTA



-93-

Scale 1 : 3,400,000

ANNEX L

ITEMIZED TECHNICAL EQUIPMENT LIST

I. SCHOOL

A. Several per student or for the group.

Camping Equipment

- 60 cots
- 60 mosquito nets
- 120 sheets
- 60 blankets
- 60 mess kits
- 10 tarps (15 ft x 24 ft)
- 50 pipe poles (tent poles)
- 200 feet of nylon rope (1/4 inch)
- 10 general first aid kits

Hand Tools

- 30 dabs (local hoes)
- 30 shovels
- 30 machetes
- wheelbarrows

Training equipment to be given to every student every year

- 160 handlenses (40 x 4)
- 160 compasses (40 x 4)
- 160 basic drawing kits (40 x 4)
- 160 wirebound notebooks

B. School Equipment

To be used in surveying, mapping, photointerpretation, mensuration and inventory courses

- 4 transit-levels - plum bobs, type contractor
- 4 stadia rods
- 4 range poles
- 5 staff compasses type Suunto
- 5 hand compasses type Suunto

- 4 50-meter fiberglass measuring tapes
- 4 Suunto clinometers
- 2 plane tables and alidades
- 15 pocket stereoscopes
- Several sets of aerial photographs of Upper Volta, at different scales
- 5 drawing kits (protractor, straight edge, scales, T-square, compasses, etc.)

For staff use

- 50 notebooks
- 2 drawing tables
- 30 drawing boards (30 ft x 24 ft)
- 5 tree measuring metal calipers
- 5 metric diameter tapes
- 5 30-meter fiberglass measuring tapes
- 2 Biltmore sticks

For general use

- Stationery supplies for 4 years
- 2 camping stoves
- 5 fieldglasses (Zoom 8 to 17 x 50 mm)
- 5 fieldglasses (3 x 50 mm)
- 2 35-mm cameras
- 1 telephoto lens (Zoom 50 to 200 mm)
- 1 telephoto lens (Zoom 200 to 600 mm)
- Film supplies for 4 years
- 1 slide projector, easy bulk-loading, gravity feed and spare bulbs
- 1 16-mm movie projector (with sound), type Bell and Howell, and spare bulbs
- 1 opaque projector 100 watts, type Projection Optics, and spare bulbs
- 2 microscopes with various (3) objectives to give a range from 25 to 300 x and accessories (glass blades)
- 10 hand lenses
- 1 soil test equipment kit (for PH, moisture content, particles dimensions, soil sampling augur)
- 1 water test equipment (PH, transparency, bases)
- 1 weather instruments kit (rain gauge, dry and wet thermometers, wind gauge, insolation gauge)

- 30 basic dissection kits (razorblade knives, scissors, tweezers)
- 2 fishing nets (to be made locally)
- 2 fishing rods (to be made locally)
- Basic herbarium supplies (strops, boards)
- Academic slides, movies, posters, charts
- Basic laboratory equipment (2 gas burners, pickling solution, chemical products, specimen jars)
- Textbooks in French (should be bought for basic courses)
- Library books (mostly in French)
- Subscriptions to forestry and ecology magazines
- 4 current transformers ( I KNVA 110 to 220 volts)
- 2 mimeograph machines, type Gestetner black-ink, electric and hand operated
- 4 typewriters (2 with extra large carriages)
- 2 calculators

NB - All instruments must be in metric units, and otherwise in grads (there are 400 grads in a full circle). This country does not work with 360-degree instruments.

Generally, all Forest Management equipment will be available for school training.

#### Comments

This material is the minimum necessary to have a good training of 30 D-level, 10 C-level 1st year and 10 C-level 2nd year students.

There are also seven permanent teachers, five part-time specialists and the Forest Manager, his assistant and the director, who will in various ways need to use material and instruments for their work.

II. FOREST

<u>Equipment Use Code</u>	<u>Code Description</u>
F	Fire control
P	Tree planting/site preparation
S	Surveying
N	Nursery
St	Special studies
H	Harvesting
M	Plantation Maintenance
R	Road maintenance
T	Transportation of personnel

<u>Quantity</u>	<u>Description of Equipment</u>	<u>Use Code</u>
1	Agricultural tractor w/front loader 95 h.p. 4 wd, diesel	F, P, N, H, M, R
1	Hydraulic dump trailer - 4 ton capacity, single axle, A-frame for tractor or truck use	F, N, H, R
2	Water tank trailers - 400 gal. single axle, A-frame, military surplus, for use with tractor or truck	F, N, R
1	Rome plow - 3.5 width for use with tractor (cultivating between plantations rows spaced at 4 m)	P, M
1	Weed and brush mower - 3.5 width, for use with tractor	F, P, M
1	Road-grader - Cat. Model 120 G with ripper	F, P, N, R
1	Bulldozer - Cat. Model D6C with angle blade, brush blade and ripper	F, P, R
4	Stakebody trucks - 3 ton, 4wd, 15 ft. bed	F, N, H, R
4	Pick-up trucks - 1/2 ton, 4wd, 8 ft. bed	F, N, St, H, T,
4	Mobylettes	T
	Parts for existing equipment - Ag tractors	

<u>Quantity</u>	<u>Description of Equipment</u>	<u>Use Code</u>
	<b>Handtools</b>	
100	Shovels, round-point, long handled	F, P, N, St,
100	Dabas (local hoes)	H, M, R
100	Machetes	
20	15 gal. water jugs	
50	pick-axes	
10	pick-ax handles	
10	Bow-saws, 30 inch	
10	Bow-saws blades	
10	Files, for sharpening bow-saws	
100	local axes	
25	rakes, steel, garden	
	Sub-Total	
	<b>Surveying Equipment</b>	<b>S</b>
2	Suunto hand compasses (in grads)	
2	50 m. fiberglass tapes (additional surveying equipment will be borrowed from school)	
	<b>Nursery Equipment</b>	<b>N</b>
5	Pruning shears	
12	Watering cans	
12	Buckets, 20 qt metal	
2	pumps, water - 25 h.p., diesel and parts	
2	intake hoses for pumps - 30 m	
2	discharge hoses for pumps - 100 m	
5	wheel barrows - heavy duty	
	<b>Fencing Materials</b>	<b>N, St</b>
140	Rolls of heavy weight sheep and cattle fence - 330 ft/roll, 45 inch height	
75	Rolls of 4 point barbed wire - 400 m/ rolls	
4,700	Steel fence posts - 7 ft, height, T-cross section	
2	Post drivers for metal posts	
2	Post hole diggers	
150	Gallons of wood preservative	
	<b>Fire Lookout Equipment</b>	<b>F</b>
2	Alidades & plotting tables	
1	Base station radio and antenna	
2	Radios for fire lookouts - 10 watt	
2	Mobile radios for forest manager's vehicle & asst. manager's vehicle	

<u>Quantity</u>	<u>Description of Equipment</u>	<u>Use Code</u>
	Labor for forest work and special projects	F, P, N, S H, M, R
	Special Projects	
	Charcoal production and	
	fish culture	
	fish processing	
	development of intermediate technology	
	forestry tools	
	other projects	
	Sub-Total	
2	Fuel tanks with pumps for gas and diesel (shared equally with the school)	

UPPER VOLTA FORESTRY PROJECTS

TABLE I

Upper Volta Forestry Projects

Title	Objectives	Financing
1. Kombissiri Reforestation (1974-1976)	a) Produce 1,000,000 seedlings at Nagbangre. b) Plant 100 ha (Firewood) at Zamse	USAID (R/R) 24,000,000 CFA
2. Reforestation (1976-1977)	a) Creation of regional seedling nurseries at Yalgo and Fada b) Plant 200 ha (Firewood) in Sahel (Markoye)	USAID (R/R) 28,000,000 CFA
3. Reforestation (1974)	Plant 50 ha at Sapone	Belgium-Canada 24,000,000 CFA
4. Reforestation (1975)	a) Plant 75 ha at Komsilga b) Plant 68 ha at Zamse	Belgium-Canada 16,000,000 CFA
5. Nursery/ Plantation (1973)	a) Development of Nagbangre Nursery b) Plant 15 ha at Zamse	Israel
6. Youth Plantations (1975-1976)	a) Plant 50 ha at Bazoule b) Plant 50 ha at Kamboinse c) Plant 50 ha at Sambtinga	Ministry of Youth
7. Pilot Cashew Plantation (1971-1976)	Study of Cashew Plantation Feasibility - 500 ha at Dinderesso	FAC (France) 26,000,000 CFA

Title	Objectives	Financing
8. German Forestry Mission (1975- )	a) Reforestation 3,000 ha at Gonse b) Greenbelt around Ouaga c) Forestry Station at Dori	Germany 248,000,000 CFA
9. UPV 72/029 (ongoing)	a) 3,000 ha reforestation b) 250 ha village plantations	FAO - UNDP \$1,082,971 GOUV 5,935,000 CFA
10. Sahelian Reforestation (1975-1976)	a) Construction of forestry bases at Kaya and Dedougou b) Each base will produce 500,000 seedlings/year c) 150 ha administrative reforestation/year d) 300 ha village plantations/yr.	FAC (France) 45,000,000 CFA
11. Village Plantations 1973-78	Village Plantations Yatenga ORD	Cathwell, Africare, Ecumenical Council of Churches

TABLE II

CILSS Multi-Donor Forestry Mission Reporting Cable  
Ouagadougou 1134

SUBJECT: CILSS Multi-Donor Forestry Mission, Ouagadougou Feb. 21 -  
March 9, 1978.

1. Subject mission chaired by CILSS attended by Germans, Dutch, French, IBRD, USAID, and Canadians (observer only). Collaboration between GOUV, CILSS, and Donors was very good and helpful throughout Mission. Following are donor interests for forestry projects in Upper Volta:
  - a. Reforestation/management - firewood for Ouaga (7,000 hectares).
  - b. Seedling nursery to supply village plantations.
  - c. Creation of a forestry station in Sahel at Dori with plantations planned for Dori, Djibo, Gorom-Gorom, Aribinda, and Sebba.
  - d. A two-year pilot (Phase D) integrated agro-sylvo-pastoral project in the Sahel.
  - e. 18,000,000 CFA for student scholarships, building repairs, and tools for Dinderesso forestry school.
2. Germans - Currently German forestry projects in Upper Volta total 4.2 million dollars. They are primarily involved in:
  - a. Reforestation/management - firewood for Ouaga (7,000 hectares).
  - b. Seedling nursery to supply village plantations.
  - c. Creation of a forestry station in Sahel at Dori with plantations planned for Dori, Djibo, Gorom-Gorom, Aribinda, and Sebba.
  - d. A two-year pilot (Phase D) integrated agro-sylvo-pastoral project in the Sahel.
  - e. 18,000,000 CFA for student scholarships, building repairs, and tools for Dinderesso forestry school.
3. Dutch - Definitive commitment from Dutch should be forthcoming shortly. At this time, it appears they will finance:
  - a. Village plantations in Kaya and Dedougou ORDs.
  - b. An urban green belt, 500 hectares, around Kaya or Dedougou.
  - c. 5,000,000 CFA for equipment, teaching materials, etc. for Dinderesso forestry school.
4. French - Representatives of FAC and the Caisse Centrale de Cooperation Economique interested in financing:
  - a. Creation of forestry stations at Koupela and Djibo.
  - b. Participation in study-design and ultimately implementation of GOUV forestry fund which will basically exploit/commercialize natural and planted forests and retain a percentage of proceeds to finance forestry projects.
  - c. There is currently a project underway at Wayen (AVV) for the reforestation of 7,000 hectares; the Caisse is interested in participating with others in

a Phase II of this activity beginning in 1980.

d. Provision of technical assistance, likely one professor, to teach at Dinderesso forestry school.

5. World Bank - Interests are:

a. Village plantations as part of integrated rural development projects the bank is designing for Koudougou and Diebougou ORDs.

b. Five-year project starting January 1980 with following elements:

(1) Reforestation - Firewood, posts, charcoal, 3,000 hectares in Maro forest reserve 65 km east of Bobo along railroad.

(2) Village plantations, Bobo ORD, 300 hectares.

(3) Forestry fund, subject to further study.

(4) Reinforce/protect existing FAO reforestation plantations.

(5) In the Event AID does not fund Dinderesso school, or not all of it, Bank may be interested in funding some of the infrastructure - i. e. buildings, though they are not particularly interested in funding the operation of the school.

6. USAID - We indicated our interest in funding the construction of the Dinderesso forestry school and the development/implementation of a forest management plan for the adjoining 6,000-hectare national forest. The project proposed to fund construction, technical assistance, equipment, training and operating costs. A PID for this project has been prepared and was handcarried to AID/W by Carey Coulter.

7. Donors expressed interest in virtually all forestry projects submitted by GOUV with exception of wildlife and park management for which there were no takers.

MINISTÈRE DU TOURISME  
ET DE L'ENVIRONNEMENT

ANNEX N

REPUBLIQUE DE HAUTE-VOLTA  
UNITE - TRAVAIL - JUSTICE

GOUV Application for Assistance

N° H. U. C. S. M/T/E./D.A.F.R.

Ouagadougou, le 22 AOÛT 1978

000618

*Le Ministre du Tourisme et de l'Environnement*

à Monsieur le Directeur de la Mission US.AID  
B.P. 35 à OUAGADOUGOU

Réf. :

Monsieur le Directeur,

C'est avec un grand intérêt que j'ai examiné les propositions du projet intitulé "Education et formation forestière/ Aménagement de la Forêt de Dindéresso" -

Ce projet fait partie de nos programmes prioritaires inscrits au Ministère du Plan et au CILSS.

Je considère d'autre part que la formation de nos cadres est une condition essentielle pour la réussite de nos programmes forestiers.

Aussi, je souhaiterais vivement que l'US.AID examine favorablement ce projet très important.

Dans l'attente, je vous prie d'agréer, Monsieur le Directeur, l'assurance de ma haute considération.

  
A. TAMEGOURA.

ANNEX O

DRAFT OF PROJECT DESCRIPTION TO BE USED IN THE  
PROJECT AGREEMENT

The purpose of this project is to improve the GOUV implementation capability for rational water and land/resource use projects (reforestation, anti-desertification, soil conservation/restoration, forest and wildlife management, fisheries, etc.) through the expansion/improvement of the Dinderesso training center for lower level forestry agents<sup>1</sup> and the development/execution of a management plan for the national forest (6000 hectares) adjoining the training center.

The development hypothesis of this project is that sufficient numbers of properly-trained, dedicated, energetic forestry agents, supported by appropriate and adequate funding can play a major part in reducing and possibly reversing current patterns of overuse (over-farming, over-grazing, over-cutting).

Specific project elements will include the following:

1. Expansion/improvement of the Dinderesso School to allow for greater student enrollment and development/implementation of a more comprehensive, expanded curriculum plan with an emphasis on practical training.
2. Vehicles and support costs to enable student field trips throughout the various ecological and geographical zones of Upper Volta, thereby giving them a greater appreciation of the scope and magnitude of the various environmental protection, rehabilitation, and rational use activities and needs in Upper Volta.
3. Nine person-years of U. S. technical assistance (three years x three instructors in ecology, forest extension work) to teach, train Voltaic instructors, and develop curriculum at Dinderesso.
4. Sixty Person-months of short-term consultants (two to six months per year in range management-agrosylvo-pastoral specialities, wildlife management, fisheries ecology, soil and water conservation, fire management), school management to teach and develop curriculum at Dinderesso.

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<sup>1</sup>"Forestry Agents" is taken here to mean forestry, wildlife, and fisheries agents.

5. Refresher training and seminars/workshops at Dinderesso for existing forestry agents.
6. Short-term third country training of school faculty.
7. Seven person-years and three person-months of U. S. technical assistance (forest management) to develop/implement a forest management plan and to support/provide practical training of forestry students.
8. Technical equipment, vehicles, machinery, operating costs to develop/implement the forest management plan.
9. Short-term third country training of forest management staff.

AID will also provide a Project Manager who will work closely with a GOUV counterpart. The AID Project Manager will be responsible for supervising all AID project inputs and coordinating with the GOUV to insure that the project is implemented in a timely and satisfactory manner. The GOUV will cooperate with the Project Manager and will provide appropriate required additional personnel to teach and to staff the Dinderesso School.

ANNEX P

IMPLEMENTATION SCHEDULE

(See Annex C, Table II, Project Funding Forecast, Annex J, Forest Management Plan, and Annex K, School Curriculum)

<u>DATE</u>	<u>ACTION</u>	<u>RESPONSIBLE AGENCIES</u>
12/78	PP submitted AID/W	USAID
01/79	PP approved	AID/W
03/79	AID project manager arrives Upper Volta	AID/W
03/79	ProAg signed	USAID/GOUV
04/79	Recruit Forest Manager	USAID/AID/W
04/79	Procurement agency selected and commodities ordered	USAID/GOUV/ AID/W
05/79	Construction bid documents prepared	USAID/GOUV
05/79	Construction bid documents approved	REDSO
03/79	Request for construction proposals	USAID/GOUV
06/79	Contractor selected for construction	USAID/GOUV
10/79	Forest Manager arrives	USAID/AID/W
10/79	First vehicle arrives	Procurement Agency (PA)
07/79 )	Recruit three long-term technicians for school	
09/79 )	and Assistant Forest Manager	USAID/AID/W
10/79	Initial Construction completed	GOUV
10/79	School and Forest partially equipped	PA/GOUV
10/79	Commodities ordered	USAID/GOUV
10/79	ProAg Amendment (FY80 Funds)	AID/W/USAID/GOUV
10/79	Contractor selected for construction	USAID/GOUV
10/79	D-Level Students begin classes	GOUV
11/79	Utilities installed	USAID/GOUV
12/79 )	Firebreaks constructed/maintained	USAID/GOUV
01/80 )		
12/79 )	Arrival 3 long-term technicians for school and	AID/W/USAID
02/80 )	Assistant Forest Manager	
01/80	Aerial photography of Forest	USAID/GOUV
03/80 )	Wildlife Specialist TDY	AID/W/USAID
04/80 )		
03/80 )	Range Management TDY	USAID/AID/W
09/80 )		
03/80	Cashew Harvest starts	GOUV
03/80	Soil and Water conservation TDY	USAID/AID/W
04/80	Additional Construction Completed	GOUV
04/80	C-level students begin classes	GOUV
04/80	Eastern Upper Volta field trip	USAID/GOUV

<u>DATE</u>	<u>ACTION</u>	<u>RESPONSIBLE AGENCIES</u>
04/80	Forest Management Plan in operation	USAID/GOUV
05/80	Northern Upper Volta field trip	USAID /GOUV
07/80	Fisheries Specialist TDY	USAID/AID/W
08/80	Soil and Water Conservation TDY	USAID/AID/W
09/80	All construction completed and approved	USAID/GOUV/REDSO
09/80	First class of 30 D-level students graduate	GOUV
09/80	School fully equipped	PA/GOUV
10/80	Classes start	GOUV
10/80	ProAg Amendment (FY 81 Funds)	AID/W/USAID/GOUV
10/80	Commodities ordered	USAID/GOUV
11/80 )	Firebreaks constructed/maintained	USAID/GOUV
01/80 )		
11/80 )	Eastern Field trip	USAID/GOUV
12/80 )		
11/80 )	Fire Management TDY	USAID/AID/W
12/80 )		
12/80	Soil and Water Conservation TDY	USAID/AID/W
11/80 )	Wildlife Specialist TDY	USAID/AID/W
02/81 )		
11/80 )	Range Management TDY	USAID/AID/W
05/81 )		
12/80 )	Fisheries Specialist TDY	USAID/AID/W
01/81 )		
02/81	Northern Field trip	USAID/GOUV
03/81	Cashew Harvest begins	GOUV
03/81	Soil and Water Conservation TDY	USAID/AID/W
06/81	Forest fully equipped	PA/GOUV
06/81	Fisheries Specialist TDY	USAID/AID/W
06/81 )	Central field trip	USAID/GOUV
07/81 )		
08/81 )	Project evaluation	AID/W/USAID/GOUV
09/81 )		
09/81	Graduation second class 30 D-level students	GOUV
10/81	ProAG (FY 82 Funds)	AID/W/USAID/GOUV
10/81	Commodities (replacement vehicles)ordered	USAID/GOUV
11/81 )	Eastern field trip	USAID/GOUV
12/81 )		
11/81 )	Fire Management Specialist TDY	USAID/GOUV
12/81 )		
11/81 )	Firebreaks constructed/maintained	USAID/GOUV
01/82 )		
11/81 )	Wildlife specialist TDY	USAID/AID/W
02/82 )		

Annex P (Cont'd.)

<u>DATE</u>	<u>ACTION</u>	<u>RESPONSIBLE AGENCIES</u>
11/81 )	Range management TDY	USAID/AID/W
02/82 )		
12/81	Fisheries Specialist TDY	USAID/AID/W
02/82	Northern Field trip	USAID/GOUV
02/82	First class of C-level students graduate	GOUV
03/82	Cashew harvest begins	GOUV
03/82	Soil and Water conservation TDY	USAID/AID/W
06/82 )		
07/82 )	Central field trip	USAID/GOUV
09/82	Graduation third class 30 D-level students	GOUV
10/82	School fully staffed by Voltaiques	GOUV
10/82	Classes start	GOUV
11/82 )		
12/82 )	Eastern field trip	GOUV
11/82 )		
01/83 )	Firebreaks constructed/maintained	USAID/GOUV
12/82	Aerial Photography of Forest	USAID/GOUV
12/82 )	Departure 3 L. T. technicians and Assistant	
02/83 )	Forest Manager	USAID
12/82	Fire Management TDY	USAID/AID/W
12/82 )		
03/83 )	Range Management TDY	USAID/AID/W
02/83 )		
03/83 )	Wildlife Specialist TDY	USAID/AID/W
02/83	Northern field trip	GOUV
02/83	Graduation second class 10 C-level students	GOUV
03/83	Cashew Harvest starts	GOUV
03/83	Fisheries Specialist TDY	USAID/GOUV
03/83	Soil and Water Conservation TDY	USAID/GOUV
03/83	Fire Management Specialist TDY	USAID/GOUV
03/83	Project Evaluation	AID/W/USAID/GOUV
06/83	Departure Forest Manager	USAID
06/83	Classes and forest management continue	GOUV

## SUPPLEMENTARY ANNEXES

To Forestry Education and Development PP 686-0235

(Reference in these annexes is made to sections of the Project Paper).

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ANNEX I  
Detailed Forest Management Plan

1. Review of existing reports and maps of the forest

A. Forest boundaries

1. Maps by D. Louppe
2. Maps by P. Sarlin
3. Topographic map of Bobo-Dioulasso region showing the Dinderesso Forest
4. Records of the meets and bounds at the UVFS regional office in Bobo-Dioulasso.

B. Vegetative surveys and descriptions

1. FAO project report by D. Louppe - 1978
2. Maps of plantations by D. Louppe - 1976/1977
3. Map of Dinderesso Forest Reserve by D. Louppe - 1978
4. CIFF reports

C. Topographic maps and descriptions of physical features

1. Maps by P. Sarlin
2. Topographic map of Bobo-Dioulasso region
3. FAO project report by D. Louppe

D. Soil survey and descriptions

1. Cartes Pedologique - Dinderesso - by P. Sarlin - 1968
2. FAO project report by D. Louppe

E. General background reports and maps

1. Climatic data
  - a. FAO project report by D. Louppe
  - b. Les atlas Afrique - Haute Volta
2. Bibliographie du Programme Propose pour l'Equipe "Ecologie et Environnement au Sahel" by M. Buchet Frimigacci (CILSS) - 1977

11. Preparation for the management plan

A. Meet with forestry personnel

1. Casimir Ziba, regional director of UVFS in Bobo-Dioulasso
2. Forest rangers in Dinderesso
3. Researchers at CIFF
4. Dominique Louppe

B. Familiarization with physical features of forest

1. Surface area - 6,000 ha.
2. Topography
  - a. Low point - 340 m. at the Kou River
  - b. High point - 430 m. at abandoned water reservoir on knoll at eastern edge of forest

3. Hydrologic features and drainage patterns
    - a. Permanent feature - Kou River
      - (1) Western end of forest
      - (2) Northward flow
    - b. Drainage pattern - east to west towards Kou River
  4. Geology
- C. Familiarization with vegetative cover
1. Natural forest associations - 4,300 ha.
    - a. Upland, shallow soil associations
      - (1) Isoberlinia spp.
      - (2) Combretum glutinosum
      - (3) Terminalia macroptera
      - (4) Daniella oliveri
      - (5) Detarium senegalense
      - (6) Dichrostachys glomerata
    - b. Deeper, sandy soil associations
      - (1) Daniella spp.
      - (2) Isoberlinia spp.
      - (3) Terminalia spp.
      - (4) Pterocarpus erinaceus
      - (5) Butyrospermum parkii
    - c. Associations along water courses
      - (1) Azelia africana
      - (2) Khaya senegalensis
      - (3) Ficus platyphylla
      - (4) Nitramma inermis
  2. Plantations - exotic species - 1,700 ha.
 

a. Teak	- 280 ha.	(1939-1963)
b. Cassia	- 292 ha.	(1943-1977)
c. Peltophorum	- 7 ha.	(1943-1958)
d. Neem	- 74 ha.	(1944-1977)
e. Dalbergia	- 1 ha.	(1956-1957)
f. Melina	- 117 ha.	(1957-1977)
g. Eucalyptus	- 195 ha.	(1958-1977)
h. Cashew	- 725 ha.	(1969-1977)
i. CTFM experimental plantations	- ? ha.	( ? )
- D. Visit local villages
1. Farming villages
    - a. Dinderesso
    - b. Bana
    - c. Kokoroe
    - d. Nassc
  2. Livestock herders' villages (Peul)
    - a. Flasso
    - b. Unnamed village

E. Learn distribution of basic soil types in forest

1. Upland, shallow soils - 4,000 ha. estimated
  - a. Gravelly over laterite
  - b. Low fertility
2. Deeper, sandy soils - 1,900 ha. +
  - a. Several meters deep
  - b. Slightly acidic
  - c. Best soils - site of all plantations
3. Alluvial soils along water courses - 100 ha. or less
  - a. Poorly drained
  - b. Periodically flooded
  - c. Moderate fertility

III. Prepare detailed maps for the forest

A. Boundary map

1. Show boundaries with azimuths and distances
2. Major roads and access points
3. Kou River

B. Vegetative survey map

1. Plantations of exotic species
  - a. Include boundaries of plantings by species and year planted
  - b. Include hectares of each planting
  - c. Assign reference number to each planting for easy cross-reference with report
2. Natural forest and plant associations
  - a. "Gallery forests" along water courses
  - b. Heavily stocked "woodland"
  - c. Lightly stocked "rangeland"
3. Abutting vegetation
4. Major roads and access points
5. Kou River

C. Map of physical features and topography

1. Topography: relief and landform
2. Hydrological features
  - a. Kou River
  - b. Drainage patterns
  - c. Water resources - wells etc.
3. Soils
  - a. Alluvial soils
  - b. Deep sandy soils
  - c. Upland shallow soils

D. Land use maps (3)

1. Past use prior to the classification of the forest (map')

2. Present uses (map 2)
3. Possible future uses (map 3)
4. Include on each map the following use zones
  - a. Wildlife habitat
  - b. Farming
  - c. Grazing
  - d. Wood cutting
  - e. Fruit, nut, and medicinal plant gathering
  - f. Hunting
  - g. Fishing/water resource use
5. Include surrounding villages on each map (see 11. D.)
6. Include major roads and/or trails

E. Map of fire protection scheme

1. Indicate presently existing firebreaks
2. Indicate abandoned firebreaks
3. Indicate possible locations of future firebreaks
4. Indicate locations of fire lookouts (2)
5. Indicate past effects of fire throughout the forest (3 categories)
  - a. Severe effect
  - b. Moderate effect
  - c. No effect

F. Aids to map preparation

1. Aerial photos (if available)
  - a. At least partial coverage exists
  - b. Check with UVFS in Bobo-Dioulasso
  - c. Check with Public Works for overlapping coverage from the Bobo-Dioulasso to Ouagadougou road construction project
  - d. Check with "AVV", the Volta Valley management project
  - e. Finance new photos from forest budget
2. Maps and reports by D. Louppe and P. Sarlin
3. Drafting equipment
  - a. Casimir Ziba's office at UVFS in Bobo-Dioulasso
  - b. New Dinderesso Forestry School

IV. Describe and evaluate forest characteristics

A. Vegetative Associations

1. Plantations - evaluate by species and age
  - a. Overall vigor
  - b. Suitability of species to site/climate
  - c. Effects of spacing
  - d. Effects of thinning
  - e. Effects of cultivation/competing vegetation removal
  - f. Effects of site preparation
  - g. Effects of fire

- h. Estimated growth rate in  $m^3/ha./yr.$  (est. range 1-10  $m^3$ )
  - i. Estimated volume per ha. in  $m^3$
  - j. Insect or disease damage
  - k. Rate of mortality
  - 2. Natural forest associations - evaluate by forest management units
    - a. Overall vigor
    - b. Species mix in approximate percentages
    - c. Stand densities
    - d. Effects of cultivation, grazing, or competing vegetation removal
    - e. Effects of fire
    - f. Estimate growth rate in  $m^3/ha./yr.$  (overall est. of 1-2  $m^3$ )
    - g. Estimate volume per ha. in  $m^3$
    - h. Insect and disease damage
    - i. Percentage of mortality
  - 3. Grasslands - evaluate by forest management units
    - a. Distinguish main varieties
    - b. Estimate shade tolerances
    - c. Estimate soil requirements
    - d. Determine grazing preferences - visit with Peuls
    - e. Effects of fire
  - 4. Vegetation immediately outside the forest boundaries
    - a. Compare with vegetation inside boundaries
    - b. Explain vegetative differences from outside to inside the forest (i.e., effects of fire, grazing, etc.)
- B. Forest boundaries (see 111. A.)
- 1. Describe meets and bounds of forest
  - 2. Describe boundary demarcation
    - a. By artificial markers or firebreaks
    - b. By physical features or vegetation
- C. Physical features and topography (see 111. C.)
- 1. Topography
    - a. Gradually sloping from east to west
    - b. Somewhat steeper near the hill in the S.E. corner and the hog-back to the NE
    - c. Elevations (see 11. B. 2)
    - d. Effects of topography on forest management
  - 2. Hydrologic features and drainage patterns (see 11. B. 3)
  - 3. Geology (see 11. B. 4)
- D. Main soil categories (see 11. E.)
- V. Describe and evaluate forest uses and exploitation goals (see 111. D.)
- A. Plantations
- 1. Estimated uses and productivity before destruction of natural forest
  - 2. Current uses and rate of exploitation

3. Variety of potential products and benefits
    - a. Firewood
    - b. Construction wood - Teak is the preferred species
    - c. Fruits, nuts, leaves, bark (not too important)
    - d. Wildlife habitat (somewhat sterile environment)
    - e. Soil conservation (i.e. protective cover)
    - f. Grazing
    - g. Inter-cropping
  4. Projected exploitation rate for each plantation, by product
  5. Expected revenues from exploitation (current values listed)
    - a. Firewood - (1 m<sup>3</sup> = 2 steres)
      - (1) Cutting permit, 40 CFA/stere
      - (2) Selling price in Bobo-Dioulasso, 600 CFA/stere
    - b. Construction poles
      - (1) Price limited by law to about the same as firewood
      - (2) Law expected to change to allow higher price
    - c. Sawlogs - none at present
    - d. Cashew nuts and fruit
      - (1) No commercial exploitation at present
      - (2) Need to develop processing and marketing - profit/cost ratio unknown
  6. Educational uses
    - a. Experiments and research
    - b. Student training and teaching
    - c. Demonstration sites
- B. Natural forest associations
1. Written description of past, present, and future uses as corollary to use maps
  2. Current uses and rate of exploitation
  3. Variety of potential products and benefits
    - a. Firewood
    - b. Construction wood (less straight wood available than in plantations)
    - c. Fruits, nuts, leaves, bark (Néré is especially useful)
    - d. Wildlife habitat (more diverse than in plantations)
    - e. Soil conservation (no disturbance caused by site preparation)
    - f. Grazing
    - g. Inter-cropping
  4. Project exploitation rate for each management unit, by product
  5. Expected revenues from exploitation (see V.5)
    - a. Firewood
    - b. Construction poles
    - c. Utensil and tool wood
    - d. No exploitable quantity at present for sawlogs
    - e. Néré seeds - high local value - commercial value unknown
- C. Water resources - possible uses
1. Fish farming experiments
  2. Irrigation - tree nursery is presently irrigated from the Kou River

VI. Describe and evaluate vegetation management techniques needed to meet exploitation goals while maintaining a sustained yield, and healthy forest environment

A. Plantations

1. Thinning and clearing
  - a. Density reduction needed in many stands to reduce unhealthy competition
  - b. Clear stands which do not respond well to thinning
2. Pruning - initially on a trial basis to stop development of multiple stems
3. Crop tree selection - select and favor most vigorous and well formed trees for retention until final harvest
4. Weed and grass control - try various methods for 2-3 yrs. after planting
  - a. Inter-cropping in stands 2 years or younger by local farmers
  - b. Closely controlled grazing
  - c. Hand mowing of grass
  - d. Mowing of grass with tractor
  - e. Cultivation with tractor
  - f. Hand cultivation (no crops)
5. Regeneration techniques - try various methods
  - a. Coppice cutting - should get rapid resprouting with most species - problems with multiple stems
  - b. Inter-planting either with seedlings or by direct seeding - for changing a plantation over to a more shade tolerant species - or beginning plantation of natural species before final cutting of exotics
  - c. Patch cutting with natural reseeding
  - d. Seed tree cutting - leave scattered, high quality seed trees to provide seed source
  - e. Clearing and replanting with seedlings

B. Natural forest associations

1. Harvesting cycles
  - a. 5 year - low environmental impact, low per hectare yield per harvest
  - b. 10 year - moderate environmental impact, moderate per hectare yield per harvest
  - c. 20 year - higher environmental impact, higher per hectare yield per harvest
2. Harvesting techniques
  - a. Selective cutting - allows removal of mature, diseased, or otherwise unwanted trees w/o drastically altering the forest character
  - b. Patch cutting - allows for removal of small patches of forest for regeneration by a variety of methods
  - c. Clear cutting - most likely employed prior to the establishment of a plantation

3. Regeneration techniques (see VI. 5)
4. Forest stand improvement techniques
  - a. Weeding/grass control
  - b. Thinning
  - c. Enrichment plantings - to increase species diversity

C. Grasslands

1. Controlled grazing
2. Hand cutting
3. Controlled burning
4. Increasing density of forest canopy
5. Grass vs. tree regeneration

VII. Develop a management plan for the tree nursery

- A. Physical reorganization
  1. Reduce to manageable size
  2. Reconstruct irrigation ditches and seed beds
- B. Reorientation of production
  1. Reduce total outputs from 1976 - 1977 levels
  2. Switch main thrust of production away from exotics to native species
- C. Evaluate manpower requirements and availability to meet production levels

VIII. Develop a forest protection plan

- A. Fire control
  1. Fire-breaks
    - a. Systematic protection pattern
    - b. De-vegetated strips
      - (1) Hand cultivated for food crops
      - (2) Machine cultivated
      - (3) Graded - also allows passage of vehicles
      - (4) Hand cut/weeded
      - (5) Burned
      - (6) Grazed
    - c. Fire resistant vegetation
      - (1) Cashew - dense and ever-green
      - (2) Other species which could be planted in strips to develop a dense canopy for shading out grasses
  2. Controlled burning
    - a. Along roads
    - b. Along fire-breaks - to improve the effectiveness of the breaks

- c. Around perimeter of forest (in conjunction with fire-breaks)
  - d. Burn twice per year - June and October
  - 3. Fire spotting
    - a. Fire lookout posts (2)
      - (1) Site 1 - at abandoned water reservoir on hilltop in SE corner of forest - 480 m elev. +/-
      - (2) Site 2 - on hogback to NE of forest - 460 m elev. +/-
    - b. Radio communications between fire lookouts, base station and mobile radios (2)
    - c. Local informants
  - 4. Local education and cooperation
    - a. Encourage dry season reserves of grass, thus discouraging burning
    - b. Encourage alternate methods of hunting small game than by use of fire
- B. Grazing control
- 1. By permit only
  - 2. Self-controlled or policed
  - 3. Presently no grazing allowed
- C. Wood harvesting control
- 1. By permit
  - 2. Self-controlled or policed
  - 3. Organized cutting crews
- D. Hunting controls
- 1. By permit
  - 2. Policed
  - 3. Presently no hunting allowed

LX. Describe and evaluate the social and economic impacts of forest management policies

- A. Impact when forest reserve was established
- 1. Displacement of villages
  - 2. Loss of farm land
  - 3. Loss of grazing
  - 4. Loss of hunting
  - 5. Loss of unregulated fuelwood supply
- B. Present local influence of forest reserve
- 1. Importance of products obtained
    - a. fuelwood

- b. Fruits, nuts, bark, leaves
    - c. Wood for utensils and tools
    - d. Construction wood
    - e. Others
  - 2. Impact of forest as a wildlife reservoir
    - a. Crop damage
    - b. Illegal hunting and utilization of gamemeat
    - c. Host for disease vectors dangerous to livestock
  - 3. Land use restrictions
  - 4. Village placement restrictions
  - 5. Employment opportunities created or eliminated by the forest reserve
- C. Future influences of the forest
- 1. Possibility of limited reserve for dry season grazing
  - 2. Increase of wood production in all categories
  - 3. Yields of fruits, nuts, barks, and leaves
  - 4. Employment effects of increased management
  - 5. Possibility of limited farming opportunities
  - 6. Focus for school training activities with associated demonstration and extension activities
- X. Outline and describe experimental and special management projects
- A. Harvesting - study several methods to be used in regular harvesting program
- 1. Time-cost studies
  - 2. Productivity of forest associations
  - 3. Manipulation of natural forest species composition
- B. Regeneration trials (see VI. 5.)
- C. Natural forest succession and plant ecology studies
- 1. Up to 100 ha. fenced off into 10 ha. parcels
  - 2. Fence construction
    - a. Heavy duty cattle and sheep fence
    - b. Metal posts at 3 m intervals
    - c. Two strands of barbed wire above sheep fence
  - 3. No fire, human, or animal use allowed in any parcel
  - 4. Include range of natural forest associations
    - a. "Gallery forest" - 1 parcel
    - b. Deep, sandy soil forest associations - 3 parcels
    - c. Upland, shallow soil forest association - 4 parcels
    - d. Other or supplementary locations - 2 parcels
  - 5. Study plant community successions to determine ecological basis for silvicultural interventions designed to maximize a given forest management goal
- D. Charcoal production
- 1. Technical feasibility
    - a. Local methods; evaluate possibilities for improvement

- b. Portable metal kiln; experiment with different types
- 2. Economic feasibility
- 3. Tree species best suited for charcoal production
- E. Selected tree species propagation - native species
  - 1. Parkia biglobosa
  - 2. Borassus aethiopicum
  - 3. Butyrospermum parkii
  - 4. Detarium Microcarpum
  - 5. Others?
- F. Soil conservation
  - 1. Revegetation of lateritic sites
  - 2. Accelerated forest fallows
  - 3. Riverbank stabilization
  - 4. Erosion control measures
- G. Site preparation methods for establishing plantations
  - 1. Strip clearing with natural forest windbreaks
  - 2. Minimum disturbance methods
- H. Cashew exploitation
- I. Aerial photograph interpretation
  - 1. Mapping
  - 2. Tree species and forest type recognition
- XI. Describe and evaluate the educational uses of the forest
  - A. Surveying
  - B. Plant identification
  - C. Soil and Geology studies
  - D. Hydrological studies
  - E. Silviculture and plant ecology
  - F. Fire control methods
  - G. Tree nursery management
  - H. Agro/forestry land management
  - I. Plantation establishment and maintenance
  - J. Fisheries and wildlife management (limited study)
  - K. Student experimental projects

XII. Develop a time table of forest activities

A. Seasonal

1. Planting
2. Prescribed burning/vegetation control
3. Fruit harvesting

B. Yearly goals

1. Fire-break construction and maintenance
2. Establishment of plantations
3. Harvesting volumes
4. Special projects

XIII. Establish forest management and production records

A. Record practices carried out on each management unit

1. Description of practice
2. Area covered
3. Dates of work
4. Site conditions
5. Cost of practice
6. Recommendations/comments

B. Record production of forest products per management unit

1. Dates produced
2. Description of product
3. Area harvested
4. Volume harvested
5. Revenue from harvest
6. Recommendations/comments

C. Distribution of revenue from forest production

1. Reinvestment into forest management
2. Deposit into school special projects fund
3. Deposit into government forestry fund (Escrow account)
4. Returned to national treasury.

ANNEX II  
Detailed Curriculum

NEW CURRICULUM SUGGESTED

The following curriculum is suggested by the design team to meet the training needs of D and C level students at Dinderesso. The curriculum emphasizes practical training, both at Dinderesso and on field trips to other interesting parts of the country (classified Forests, Wildlife Parks, sites of ongoing forestry projects, etc.)

FORMATION OF D LEVEL "PREPOSES DES EAUX ET FORETS"

("CREW CHIEFS").

General assumptions :

Education time span : 1 year or 52 weeks  
 Selective training and immersion = 2 weeks  
 Theory and practice at Dinderesso = 34 weeks  
 Field trips = 11 weeks  
 Legal holidays = 5 weeks  
 TOTAL = 52 weeks

Eligible students will be those possessing a CEP (Primary school Certificate); they will be selected for initial training on the basis of a written exam.

The course will begin with a period of two weeks of Selective training and immersion. During this time, the students will be on probation. After that period, there will be a staff meeting to decide which students will be invited to continue in the training program. For that reason, the written exam should admit 20% more student than the ideal number of 30.

The field trips will occur during the academic year. The time will be chosen depending on site and project activities and on ecological conditions.

It is expected that Christmas, Easter and other religious and legal holidays will take five weeks out of the academic calendar.

D LEVEL COURSE TITLES AND LENGTH IN HOURS

COURSE TITLE	COURSE LENGTH IN HOURS				TOTAL	(APPROX) AVERAGE HRS. PER WEEK	
	Theoretical Presentation	PRACTICAL WORK Dinderesso	Field Trips	Sub Total		Theo. Training	Pract.
Selective training immersion	-	35	35	70	70		
General Botany	10	20	10	30	40	0.2	0.7
Plant Identification and uses	30	70	30	100	130	0.7	2.2
Basic Ecology and Biogeography	70	100	40	140	210	1.1	3.1
Nursery and Plantation	30	80	40	120	150	0.7	2.7
Silviculture	10	30	10	40(1)	50	0.2	0.9
Forest, soil and water conservation techniques	35	100	40	140	175	0.8	3.1
Park and Wildlife Management	30	20	70	90	120	0.7	2.0
Fisheries and Fish Culture	35	40	45	85	120	0.8	1.9
Mensuration and Inventory	10	40	-(2)	40	50	0.2	0.9
Basic Surveying and mapping	40	80	-(2)	80	120	0.9	1.8
Basic Administration and Accounting	20	20	10	30	50	0.4	0.7

Forest Legislation and Conservation Education	40	80	30	110	150	0.9	2.4
Forest Economics, Harvesting, Utilisation	15	15	10	25	40	0.3	0.6
Machine and Tool Maintenance	10	30	-(2)	30	40	0.2	0.7
Military Training and First Aid and Hygiene	20	40	-(2)	40	60	0.4	0.9
TOTAL	405	800	370	1170	1575	8.5	26.2
PERCENTAGE	26%	51%	23%	74%	100%	TOTAL = 34.7	

NB - (1) Many aspects of silviculture will be Seen in For. Soil and water conservation techniques

(2) Basic skills likely to be used in many other courses

**General Comments :**

The Education time is to be divided grossly into 25% theoretical teaching, 50% practical training at Dinderesso, 25% practical training in fieldtrips.

Each week will have 35 hours of which about 9 hours will be used for theory and 26 for practical training.

That will make an average of about 6 hours a day on a 6-day basis.

This seems to us to be a perfectly normal school week for students at their level.

It must be recalled also, that the kind of individual, demonstrative and repetitive training which will be given at Dinderesso and in field trips requires a lot of energy from the personnel and long training hours.

We recommend the following scheme for the academic year at Dinderesso.

OCT 1 to 15

OCT 15 to SEPT 30

Selective  
training

Theory & practice & holidays & field trips

Selective training and Immersion

At the beginning of the training program, a special session will be set up for D level and first year C level students. This will consist of a period of 2 weeks for D level students and of one month for C level students. The purpose of this "immersion" session is to provide the students with the opportunity to prove their will and interest in doing the work expected of Forest Service Field personnel.

- ex :
- living in bush conditions with tents
  - nursery and plantation work
  - firebreaks construction and maintenance
  - soil and water conservation field work
  - park and wildlife management work
  - any other jobs necessary to be completed at the students arrival time.

Special attention will be given to student's attitude and interest during these training sessions. It is expected that the majority of the teaching

staff will participate in these sessions and in the selection process. Students should be divided in small groups to make it easier for the school staff to know and judge them.

At the end of the selective training and immersion session, an admission committee will review the case of every student and decide whether or not they should continue with the training program.

The evaluation of students should emphasize the following items :

- begin the session on time ( the first day)
- punctuality to arrive at work every morning and afternoon
- respect for superiors
- interest shown in tasks they will be asked to do
- good spirit in individual and group work
- ability to communicate orally and in writing
- reactions to physical and psychological constraints

The relative importance of each item needs to be established.

### General Botany

Theory : plant anatomy, morphology and physiology

Practice : - collecting material in the field  
 - plants study in laboratory ( with hand lens) or field  
 - projection of slides or movies

Comments : this should be a simple course with emphasis on the basics of plant anatomy, development and reproduction.

### Plants identification and uses

Theory : - description of families, genus, species of common or important woody and herbaceous plants

Practice : - work done mainly in the field  
 - descriptions emphasize plant's special characteristics, common names and principle uses and economic values  
 - learning includes field activities with local people (farmers, herdsman, villagers)  
 - each student has to prepare a plant collection  
 - long field trips

### Basic ecology and biogeography

Theory : - principles of ecology  
 - man and the ecosystem : desertification problems  
 - study of abiotic factors affecting forest : climatology, hydrology, geology and soil science

- silvics : behaviour and needs of local and imported tree species
- vegetation zones of Western Africa
- forest types in Upper Volta
- plant associations and site indicators
- range management
- Practice :**
  - outdoor trips to grasp the ecological reality (ex. discussing ecological process evident on a forested stream bank.. etc); models of ecosystem structure and function.
  - study plant associations and successional patterns of importance to resource management
  - rock collection, to recognize basic rock types, minerals
  - soil studies : "on the spot" soil profile description and classification; particle composition, texture, structure, properties as related to wind and water erosion problems ; quality as related to natural forest stands or plantations
  - hydrology : water cycle, floods, drought, explained with slides and/or movies
  - long field trips for Silvics, Biogeography : the students should recognize and know something about the different vegetative communities of their country

#### Nursery and Plantation techniques

- Theory :**
  - nursery establishment and maintenance: site selection, seedbed layout, seed treatment, care of seedlings, lifting procedures, special germinating techniques, record-keeping, water supply and irrigation
  - plantation and reforestation techniques : site selection and classification, plantation layout, hole-digging and soil preparation, transport, care and planting of seedlings, weeding, thinning, tending, management of work crews, basic operation planning, record-keeping
- Practice :**
  - work in both nursery and plantations.
  - each student is in charge of planting and taking care of an area at the nursery, including necessary record-keeping.
  - work at the plantation in Dinderesso and during the long field trips in different parts of the country
  - personnel handling : have a crew of workers under him

#### Silviculture

- Theory :**
  - basic silvicultural techniques and stand treatments
- Practice :**
  - emphasize ways to keep the stands growing well,

- respecting the management plans descriptions and producing the desired outputs; mainly selective cutting and clear cutting, management of soil fertility, range management considerations
- this course is also heavily related to forest protection: erosion, fire, wind, man, animals, disease
  - Dinderesso forest management unit: place for most work
  - Field trips will show some examples

### Forest, soil and water conservation techniques

- Theory :
- fire protection : prevention, detection, fighting
  - soil problems : wind and water erosion, grazing of domestic animals, cutting of trees
  - water conservation : contour ditching/dikes, check dams, irrigation, wells, etc...
  - fence constructions and maintenance
- Practice :
- fire prevention meetings with people
  - construction and maintenance of fire breaks
  - fight an early fire and practice fighting techniques
  - helping at the construction of a watch tower.
  - assist with watch tower duties
  - fence-building (demonstration area will eventually display various types of fence construction and fencing materials)
  - trips in the field (Dinderesso and abroad)
- Comments :
- this key course must be mainly practical work designed to give an on-the-ground familiarity with problems and solutions.

### Mensuration and inventory

- Theory :
- measurement of tree height, diameter, volume
  - basic cruise work (handling a compass, write measurements and notes)
- Practice :
- mainly field work with simple instruments ex: biltmore stick, compass, clinometer

### Basic surveying and mapping

- Theory :
- distance and angle measurements
  - closing a transect; boundary surveys
  - note-taking
  - levelling
  - sketching and mapping
- Practice :
- training with instruments
  - divide the class into groups which have to prepare small maps : ex. nursery, plantation, certain area in the forest of Dinderesso

- Comments : - each student must be individually checked in the field to make sure he can do it alone.

### Parks and Wildlife Management

- Theory :
- Classification and location of parks in Upper Volta
  - Common field activities in a national park : opening and maintaining roads and firebreaks; small bridges, huts construction...
  - wildlife description and ecology : animal habits and needs
  - basic management techniques
  - hunting
  - wildlife protection : Upper Volta legislation
- Practice :
- Long field trips in parks. The student gets his hands on different Park jobs
  - animal trailing and marks identification, done with bush people in Dinderesso and on trips.
  - hunting techniques (traps, etc..) with game park people
- Comments :
- Part of this training can only be made with small student groups : ex. wild animal trailing and observation
  - a "Demonstration area" can be chosen in the Dinderesso forest
  - Movies, slides, wall posters are necessary.

### Fisheries and fish culture

- Theory :
- fish anatomy and biology and freshwater ecology
  - description of important fish species of Upper Volta
  - main water resources of Upper Volta and location of fisheries
  - fishing tools and techniques
  - fish processing, treatment and preservation
  - fish ponds : - construction
    - management
- Practice :
- Fish dissection in laboratory
  - Fishing tools and techniques at home and in field trips
  - Fishing processing in field trips
  - Construction and management of a fish pond (tilapia...) near (in) Dinderesso
  - Prepare a fish collection for the laboratory

### Machine and Tool maintenance

- Theory :
- class - equipment management and control
  - parts ordering : stock keeping



Military training : First aid and hygiene

- Theory : - military basics  
- first aid and hygiene basics
- Practice : - physical education  
- arms training (safety)  
- first aid  
- hygiene
- Comments : - First aid training to be related with dangerous situations  
in field work

C LEVEL FORMATION OF "AGENTS TECHNIQUES DES EAUX ET FORETS"  
(FOREST TECHNICIANS)

General assumptions:

The students will be recruited either

a) students having a CEP (Primary School Certificate) plus 2 years of High School, plus two years of basic courses ("tronc commun") at Matourkou. See Matourkou curriculum on following page.

b) or after their BEPC (High School Certificate)

c) or from experienced and outstanding D level foresters who are suggested by the Eaux et Forêts Direction Générale to have a promotion and undertake C-level training.

Education time span: 2 years or 104 weeks.

1st year:

Selective training and immersion	4 weeks
Theory and practice at Dinderesso	28 weeks
Field trips	11 weeks
Legal Holidays and short vacations	5 weeks
Summer Holidays (1st part)	<u>4 weeks</u>
Total	52 weeks

2nd year:

Summer Holidays (2nd part)	4 weeks
Theory and practice at Dinderesso	35 weeks
Field trips	8 weeks
Legal Holidays and short vacations	<u>5 weeks</u>
Total	52 weeks

As in the case of D-level students, first year C-level students will take a written exam. After, they will have a 4-week period of Selective training and immersion. In our opinion a longer period of probation will be necessary to judge the students satisfactorily as to the probability of their future success after the 2 years training program.

The C-level students will have more theoretical education to give them the wider knowledge necessary for their future jobs. Still, they too will have plenty of practical field training.

During their first year, the students will take essentially the same basic courses and will do about the same field trips as the D level.

During the second year, they will have more specialised courses and their field trips will be related to these courses: Forests, Soil and Water Conservation: Range Management: Forest Economics, Harvesting and Utilisation: Park and Wildlife Management: Fisheries and Fish culture.

It is also suggested to give them 4 weeks of "specialisation". (see below, in General Comments.)

**CURRICULUM AT MATOURKOU****(tronc commun ATA)**

- 1st year :**
- Initiation in farming business
  - Farming techniques and animal traction
  - Horticulture of vegetable crops
  - Poultry and rabbits
  - Soil Science
  - Meteorology and climatology
  - Mathematics
  - Plant Biology
  - Animal Biology
  - Chemistry
  - Physics
  - French
  - Pomology

- 2nd year :**
- Plant and Animal Biology
  - Plant and Animal breeding
  - Soil improvement
  - Topography
  - Pomology
  - Farm Mechanization
  - French
  - Chemistry
  - Physics
  - Mathematics
  - Functional literacy
  - Rural Sociology

**Specialisation Cycle :**

- a) 12 months : theoretical formation and practical application
- b) 6 months : practicum or training.

**N.3. This specialisation cycle will not be in the C-level forestry students' curriculum.**

C LEVEL

1st YEAR

COURSES TITLES AND

LENGTH IN HOURS

COURSE TITLE	COURSE LENGTH IN HOURS					TOTAL	AVERAGE PER WEEK	
	THEORET. PRESENTATION	Practical Work Binder	Field Trips	Total	Theor.		practical	
Selective Training & Immers	-	70	70	140	140			
Plant Identif. & Uses	40	80	30	110	150	1	2.8	
Ecology & Biogeography	100	100	40	140	240	2.6	3.6	
Nursery & Plantation	40	80	40	120	160	1	3.1	
Silviculture	20	30	10	40	60	0.5	1	
Surveying, Mapping, Photointer	60	100	-	100	160	1.5	2.6	
Military training, First Aid & Hygiene	20	40	-	40	60	0.5	1	
Forest Legislation & Conservation Education	60	100	30	130	190	1.5	3.3	
<b>Total</b>	<b>340</b>	<b>600</b>	<b>220</b>	<b>820</b>	<b>1160</b>	<b>8.6</b>	<b>17.4</b>	
<b>PERCENTAGE</b>	<b>29%</b>	<b>52%</b>	<b>19%</b>	<b>71%</b>	<b>100%</b>	<b>TOTAL</b>	<b>26</b>	

C LEVEL  
2nd YEAR  
COURSES TITLES AND  
LENGTH IN HOURS

COURSE TITLE	COURSE LENGTH IN HOURS							
	THEORET. PRESENT.	PRACTICAL		WORK Total	TOTAL	AVERAGE PER WEEK		
		Dinder- esso	Field Trips			Theor.	practical	
Forest, Soil & Water Conser.	80	100	30	150	210	2.1	3.8	
Forest Mensuration & Inventory	30	60	20	80	110	0.8	2.1	
Forest & Range Management	40	80	40	120	160	1.0	3.1	
Administration & Accounting	40	40	10	50	90	1.0	1.3	
Forest Economics, Harves- ting & Utilisation	20	40	20	60	80	0.5	1.5	
Machine & Tool Mainten.	10	20	-	20	30	0.3	0.5	
Fisheries & Fishculture	50	30	80	130	160	1.3	3.3	
Parks & Wildlife Mangt.	50	30	60	110	140	1.3	2.8	
Specialisation & Report		70	70	140	140	(1 month Work)		
<b>TOTAL</b>	<b>320</b>	<b>470</b>	<b>330</b>	<b>800</b>	<b>1120</b>	<b>8.3</b>	<b>19.4</b>	
<b>PERCENTAGE</b>	<b>29%</b>	<b>42%</b>	<b>29%</b>	<b>71%</b>	<b>100%</b>	<b>TOTAL 26.7</b>		

General Comments:

The education at C-level gives more theoretical background (30% theory) than at the D-level. Most of the courses are the same as D-level, but they will have more hours of theory and classroom education and will obviously be more complete.

Field training has not been forgotten. In the first year, the students will go through a 4-week period of selective training and immersion. They will have altogether 19 weeks of field trips in the two years. We suggest furthermore that each student nearing graduation have 1 month of "Specialisation", e.g. a period during which he will have a special training and/or a special "small research task" to do in one of the major branches of the course: General Forestry (Nursery, Plantation, Forest, Soil and Water Conservation), Park and Wildlife Management, Fisheries and Fishculture.

This will help the student to learn to take the initiative, to develop his/her ingenuity; the experience will be summarized in a short report.

The students will have 2 months of holidays (March and April) at the end of the first year and the beginning of the second. We suggest the school help the students to find a job in forestry during this period. (Either for the U.V.F.S., Cooperation Projects (FAO, German...) or even at the Dinderesseo Forest or at the school).

## CURRICULUM FOR C LEVEL

## 1st YEAR

Selective Training: see general description under D-level course descriptions

Plants identification and use:

Theory: description of families, genus, species of common or important woody and herbaceous plants.

Practice: work in the field

- emphasis on plant characteristics, common names and main uses and also on scientific terms since C-level graduates will have to work more with reports and references using scientific terms;
- student must be well aware of plant associations, and recognize them in the field
- field-work with local people;
- each student prepares a plant collection associated with "Forest Management Research Work" e.g. identification of plants in a Research plot...
- long field trips.

Ecology and biogeography:

Theory:

- principles of ecology;
- man and ecosystem: desertification and overuse problems.
- study of main abiotic Factors affecting forest:
  - Climatology,
  - Hydrology,
  - Geology and soil science
- Silvics: behaviour and needs of local and imported tree species.
- Vegetation zones in West Africa;
- Forest types in Upper Volta
- Plant association and site indicators

Practice:

- outdoor work and trips to show the ecological reality; models;
- study plant association with field practical meaning: learn to draw conclusions on soil utilization from that;
- rock collection;
- soil studies: "on the spot" classification, soil composition and evolution; physical properties related to wind and water erosion problems; soil quality related to natural forest stands and plantations;
- Hydrology: water cycle, floods, drought, explained with slides and movies;
- long field trips: the students should recognize and know something about the different plant communities, and understand problems of degradation and overuse of the vegetation.

Comments: on C-level, accent must be put on a better understanding of the origins and processes of phenomena.

### Nursery and Plantation

Theory: - Nursery establishment and maintenance; site selection, seedbed layout, seed treatment, care of seedlings, lifting procedures, special germinating techniques, record-keeping, water supply and irrigation; plantation and reforestation techniques: site selection and classification, plantative layout, hole-digging and soil preparation, transport, care and planting of seedlings, weeding, thinning, tending. Management of work crews, basic operations planning, record keeping

#### Practice:

- work in both the nursery and plantations
- each student in charge of planting and taking care of an area at the nursery: including necessary record-keeping.
- work in Dinderesso and during the long field trips in different parts of the country;
- personnel handling: have a crew of workers under him and briefings from the experienced people.

### Silviculture

Theory: - basic silvicultural techniques and stand treatments

- Practice
- emphasize ways to keep the stands growing well, respecting the management plans descriptions and producing the desired outputs; mainly selective cutting and clear cutting, management of soil fertility, range management considerations
  - this course is also heavily related to forest protection: erosion, fire, wind, man, animals, disease
  - Dinderesso forest management unit: place for most work
  - Field trips will show some examples

### Surveying, Mapping and Photointerpretation

- Theory:
- distance and angle measurement;
  - boundary surveys
  - levelling;
  - closing a transect
  - note-taking;
  - sketching and mapping;
  - basic photointerpretation knowledge

**Practice:**

- fish dissection in lab;
- use of fishing tools, practice fishing techniques at Dinderesso and in field trips;
- participate at the construction and/or management of a fish pond near (in) Dinderesso;
- take part in fisheries management;
- prepare a fish collection with the students for the lab.

**Forest legislation and conservation education****Theory:**

- Upper Volta Forest laws  
Communication and extension work at the village level

**Practice:**

- meeting with Upper Volta F.S. Officers
- training at talking and working with "villageois"  
e.g. construction of a fire break near a village, tree plantation in a village
- meetings with the people at the beginning of the dry season to discuss a specific problem that occurred: bush fire in a plantation

**Comments:**

- Emphasize the need for diplomacy and sensitivity.

## CURRICULUM FOR C LEVEL

## 2nd YEAR

Forest, Soil and Water Conservation

## Theory:

- fire protection (control):  
prevention,  
detection,  
fighting
- soil problems:  
wind & water erosion,  
grazing of domestic animals  
cutting of trees
- water conservation techniques:  
dikes, ditches, dams, plantings, etc.

## Practice:

- fire prevention meeting with people (see conservation)
- construction and maintenance of fire breaks;
- fight early fires and practice fire-fighting techniques;
- helping with construction of a watch tower;
- work in irrigation, wells, anti-erosion constructions, wind-breakers, fencing at Dinderasso and in field trips.

## Comments:

- this key course must be mainly practical work and training. The C-level student must be able to identify and solve most of these problems.

Forest mensuration and inventory.

## Theory:

- description of mensuration and inventory instruments and techniques

## Practice:

- measurements of trees and stands;
- use of some mensuration equipment: - Biltmore stick  
- clinometer  
- tapes.
- making transects through the forest and work in inventory: plotting forest areas: description of trees & main grass composition; sampling techniques, density and diversity measurements for research or management purposes;
- note-taking

### Forest and Range Management Policy

#### Theory:

- student has to be aware of the process of deciding of forest and/or land use.
- fence construction and maintenance

#### Practice:

- walking forest and range, and after doing basic inventory work, deciding as a group what is the best way to use the land.

#### Comments:

- In this course, students and professors, local people, foresters of U.V.F.S., forest manager of Dinderesso, and others, can come together for a "mini-symposium" of forest/land use. Emphasize participation of local people.

### Forest economics, harvesting and utilization

#### Theory:

- facts and figures on wood industry and forest products
- basic principles of economic efficiency, allocation of scarce transportation (resources, supply and demand, marketing)
- basic logging principles: cutting, extraction
- wood processing: emphasis on poles, firewood, charcoal

#### Practice:

- work in the "exploitation" of the Dinderesso forest
- visit to the lumber, poles, firewood sales-place
- develop charcoal oven at Dinderesso
- field trips in the country

### Administration

#### Theory:

- job organization: objective goals, means, planning and programming work

- preparation of reports, letters;
- F.S. administrative "Red tape" and administrative terminology
- procedures; emphasis on this, since the C level "Agents techniques" will be an intermediary between planners and government administrators and workers.
- accounting basics
  - receipts,
  - budget handling,
  - book-keeping
- basic statistics and sampling;

**Practice:**

- training at school in doing field jobs and reports, diagrams, schedules...
- training at a forest service inspection or cantonnement.

Parks and Wildlife Management

**Theory:**

- management of a national park: basic planning, field work;
- classification and locations of parks in U.V. and neighboring countries;
- wildlife identification and ecology: animal habits & needs;
- basic wildlife management techniques;
- hunting;
- wildlife protection; U.V. legislation.

**Practice:**

- long field trips in parks. The students participate in different park jobs.
- animal identification in field, with local people at Dinderesso and on field trips.
- hunting techniques (traps, guns...) with game park people;
- C-level students have to do many of these jobs individually
- C-level students could work actively on developing a "Demonstration area" in relation with the Management Plan: e.g.:
  - fencing out an attractive site to see vegetation difference,
  - favoring a given species by selective cutting,
- Movies, slides, wall posters are necessary.

Machine and tool maintenance.

**Theory:**

- Equipment management & control:
  - ordering of parts
  - stock keeping

**Practice:**

- driving and maintenance of motor machines:
  - trucks cars
  - bulldozer
  - tractor
- emphasize on small engines:
  - mobylette
  - pumps
- handtools maintenance and repair:
  - sharpening
  - handle replacement

**Comments:**

- relate to field work methods and emphasize preventative maintenance

**Military Training, First Aid and Hygiene****Theory:**

- military basics
- first aid and hygiene basics.

**Practice:**

- physical education
- arms training (safety)
- first aid
- hygiene

**Comments:**

- First aid should be related to danterous field activities.

TEACHING ASSIGNMENTSD LEVEL

COURSES TITLE	PRIMARY INSTRUCTOR	BACK-UP
Selective Training and Immersion		S T A F F
General Botany	Ecology Assistant	Ecology instructor
Plant Identification and uses	Ecology Assistant	Ecology instructor
Basic Ecology and Biogeography	Ecology Instructor	Range Management Spec. Ecology Assistant
Nursery and Plantation	Surveying Assistant	Surveying Instructor Ecology Instructor
Silviculture	Ecology Instructor	Ecology Assistant Forest Manager
Forest, Soil and Water Conservation Techniques	Surveying Instructor	Surveying Assistant Fire Management Spec. Soil & Water Conserv. Spec.
Park and Wildlife Management	Parks Wildlife Assistant	Parks & Wildlife Spec.
Fisheries and Fish Culture	Fisheries Assistant	Fisheries Spec.
Mensuration & Inventory	Surveying Instructor	Surveying Assistant Ecology Assistant
Basic Surveying and Mapping	Surveying Instructor	Surveying Assistant
Basic Administration & Accounting	Sociology Instructor	Director
Forest Legislation and Conservation Education	Director	Sociology Instructor
Forest Economic, Harvesting, Utilization	Sociology Instructor Surveying Instructor	Surveying Assistant
Machine and tool maintenance	Surveying Assistant	Surveying Instructor
Military Training	Military (from Bobo)	Director
First Aid and Hygiene	Nurse (from Bobo)	

## C LEVEL

COURSE TITLE	PRIMARY INSTRUCTOR	BACK-UP
<u>1st Year</u>		
Selective Training and Immersion		S T A F F
Plant identification & uses	Ecology Assistant	Ecology Instructor
Ecology & Biogeography	Ecology Instructor	Ecology Assistant Range Management Spec.
Nursery and Plantation	Surveying Assistant	Surveying Instructor Ecology Instructor
Silviculture	Ecology Instructor	Ecology Assistant Forest Manager
Surveying, Mapping, Photo- Interpretation	Surveying Instructor	Surveying Assistant
Military Training, First Aid and Hygiene	Military (from Bobo) Nurse (from Bobo)	Director
Forest Legislation and Conservation Education	Sociology Instructor	Director
<u>2nd Year</u>		
Forest, Soil and Water Conservation	Fire Management Spec. Soil & Water Cons. Spec.	Surveying Instructor Surveying Assistant
Forest mensuration & inventory	Surveying Instructor	Surveying Assistant Ecology Assistant
Forest & Range Management	Range Management Specialist Surveying Instructor	Forest Manager Ecology Instructor Sociology Instructor
Administration and Accounting	Sociology Instructor	Director
Forest Economics, harvesting and utilization	Surveying Instructor Sociology Instructor	Surveying Assistant
Machine and Tool Maintenance	Surveying Assistant	Mechanic Surveying Instructor
Fisheries and Fish Culture	Fisheries Specialist	Fisheries Assistant

## C LEVEL

COURSE TITLE	PRIMARY INSTRUCTOR	BACK-UP
Park and Wildlife Management "Specialization Report"	Park Wildlife Specialist  S T A F F	Park and Wildlife Assistant

## FIELD TRIPS

### For D Level and C Level 1st Year

(Both classes will take the same trips. It will be up to the instructors to insure that 1st year C level students gain wider and deeper knowledge from the trips.)

The field trips are expected to last 10 weeks. They will all be within the country's borders. However, one extra week in the program has been added for unexpected delays.

#### 1 - Eastern Upper Volta (3 weeks)

Dinderesso

Bobo-Dioulasso

Ouagadougou

Gonse

- Management of natural stands
- Plantation
- Forest Exploitation
- Fire control
- Soil sampling and site evaluation
- Silvicultural research

Wayen  
Classified Forest

- Plant identification (sudan savanna)
- Soil sampling and site evaluation
- Conservation education efforts

Arly and Park W  
(Wildlife Reserve)

- Animal identification
- Animal tracking
- Plant identification (guinea savanna)
- Trail construction
- Construction and repair of small bridges and other road works
- Positioning of various road signs

Diapaga and Tapoa  
(Fisheries)

- Fish identification
- Fishing techniques
- Fish processing techniques
- Fish marketing

Fada N'Gourma

- Village plantation mensuration and inventory
- Work in conservation education

Bobo-Dioulasso

Dinderesso

2 - Northern Upper Volta (3 weeks)

Dinderesso

Bobo-Dioulasso

Dedougou

- Plantation mensuration and inventory
- Forest Service administrative organization
- Conservation education work

Tougan

- Ouahigouya**
- Village plantation, mensuration and inventory
  - Nursery work
  - Soil conservation: construction of contour dikes and small check dams
  - Reforestation project administration and reporting
- Djibo**
- Range management work
  - Plantation work
- Aribinda**
- Sahel animals: identification and tracking
  - Wildlife utilization experiments
  - Plant identification (sahel savanna)
- Dori**
- Plantation mensuration, inventory work
  - Sand dune fixation
  - Construction of wind breaks and live fencing
  - Species site trials
- Yalcgo**
- Village plantation work
  - Exploitation work
  - Conservation education work
- Kaya**
- Introduction to F. S. administrative work
- Loumbila  
(Fisheries)**
- Fish identification
  - Fishing techniques
  - Fish processing techniques
  - Fish marketing
- Ouagadougou**

Bobo-Dioulasso

Dinderesso

3 - Central Upper Volta (2 weeks)

Dinderesso

Bobo-Dioulasso

Boromo  
(Wildlife Park-  
Classified Forest)

- Wildlife identification and tracking
- Plant identification (well-developed sudano-guinea savanna)
- Building and repair of small bridges and other road work
- Positioning various road signs
- Mensuration and inventory

Ouagadougou

Nagbare

- Forest nursery establishment and management

Kombissiri

- Village Plantations work
- Conservation education work

Nobere

- PNUD- FAO Plantations; mensuration, inventory work

Po

- Wildlife Park Management organization
- Wildlife identification and tracking
- Plant identification (suoano-guinea savanna)

- Sapone
- Forest protection control: firebreaks construction, legislation impact and conservation education work
  - Plantation work
  - Soil, vegetation surveying and mapping

- Ouagadougou  
(C. V. R. S)
- General botany demonstration
  - Making of a scientific herbarium
  - Plant identification technique and references

Bobo-Dioulasso

Dinderesso

#### 4 - Western Upper Volta (2 weeks)

This region can be best covered if the field trips are subdivided into four separate, shorter trips.

1) Dinderesso (3 days)

Bobo-Dioulasso

- Mares aux hippopotames
- Fish identification
  - Fishing techniques
  - Fish processing techniques

Volta Noire Valley - Fisheries (as above)

Bobo-Dioulasso

Dinderesso

b) Dinderesso

(2 days)

Bobo-Dioulasso

Bama

- Administration of Kou valley project
- Soil and water conservation work: irrigation techniques

Bobo-Dioulasso

Dinderesso

c) Dinderesso

Bobo-Dioulasso

Banfora

- Soil and water conservation work; irrigation

Diefoula and Folonzo  
(Wildlife Reserve)

- Forest use control work
- Conservation education work
- Wildlife identification and tracking
- Plant identification (guinea savanna)
- Ecological effects of fire control

Bobo-Dioulasso

Dinderesso

For C Level 2nd Year

1 - Fish culture at Bouake /CTFT and Kossou/FAO (Ivory Coast) (2 weeks)

- Fish culture techniques
- Fish processing
- General Botany
  - Nursery and plantation
  - Silviculture

2 - Fisheries at Mopti (Mali) and environmental degradation around Ouahigouya

- Fish identification
- Fishing techniques
- Fish processing and marketing
- Representative fire, soil, water destruction and conservation problems in the Sahel, general resource overuse and desertification

3 - Park and Wildlife Management at Arly, Park W and Singou (2 weeks)

- Animal identification and tracking
- Trail opening and maintenance
- Building and repair of bridges, paths, roads
- Positioning of signs

Most of the time will be spent in the field working.

4 - General Forestry work at Maro Classified Forest

- Practical training in
  - Mensuration and inventory
  - Surveying and Mapping
  - Photointerpretation
  - Silviculture
  - Fire control: fire breaks construction

- Soil conservation
- Range management

#### D and C 1st Year Level Field Trips

##### General Comments:

The field trips will be carefully arranged and preparation made in advance to insure their success. The forest manager's assistant in charge of the coordination will be responsible for the advance work and contacts required prior to the arrival of the students.

At these levels, the trips will consist of as much field work as possible. In between project stops/site visits, the ecology professor is expected to cite examples to support the Ecology and Biogeography course.

#### C Level 2nd Year Field Trips

##### General Comments:

The training in these trips should put the emphasis on a better understanding of the general organization and purpose of the work being done. Unlike the first year trips where the students will be mostly asked to do this or that, the second year trips should be better prepared so that the students can give their "professional" advice and participate in the planning of work items, etc.

## ANNEX III

### THE COST OF DOING NOTHING

The discussion in Part IV, Technical Feasibility of the responsibilities and challenges which are now facing the Upper Volta Forest Service gives one a sense of what might be termed "the cost of doing nothing." It could be argued that the "cost" of not improving, expanding and reorienting the training program for low-level forestry agents in Upper Volta a decade or more ago can be measured in terms of declining soil fertility and crop yields, disappearing forest, fisheries and wildlife resources, and overgrazed, denuded pastures. True, the above parameters of environmental degradation have their origin in more than a simple lack of well-trained and energetic persons who view their chief responsibility as the management of renewable natural resources; above all, population pressures and the extremes of climatic variability in an environment such as the Sahel can compromise the success and effectiveness of even the most competent persons dedicated to natural resources management. But one cannot help but wonder to what extent the current rates of overuse and resource deterioration might have been checked by more substantial efforts to motivate and train forestry agents.

Table I lists some of the consequences which could be expected should the proposed project or one with similar objectives not be implemented.

#### TABLE I

##### SOME EXPECTED CONSEQUENCES OF A FAILURE TO INVEST IN THE TRAINING PROGRAM AT DINDERESSO

#### Forestry:

- Graduates lack basic skills in surveying, nursery and plantation management; continued emphasis on 3 - 4 exotic species for seedling production and reforestation.
- Development of forest resources remains competitive with and not complementary to food production efforts, by emphasizing use of deep, fertile soils for intensive, high-yielding, mechanized, essentially single-purpose plantations, which primarily benefit urban population--reduce firewood price for urban civil servants.

- Large percentage of development assistance budgets in forestry goes to expatriate personnel and heavy machinery to establish high yielding plantations of exotic species.

- Unlikely there will be substantial efforts to (a) plant on poorer soils and reclaim degraded farmland, (b) plant in drier areas, below 800 mm where intensive fuelwood production from fast-growing species is uneconomic, (c) conserve and manage forage and range resources, (d) assist agricultural production through agroforestry projects such as farm tree plantings (A. albida), tree farming (Nere, Karite), windbreaks, specialty plantings (gum arabic, round palm).

#### Fisheries:

- Continued localized overexploitation of stocks with (temporary) decline of productive potential.

- Limited efforts to develop the potential of fish ponds, as an alternative technology for protein production with less risk of contributing to desertification than cattle raising.

- Continued loss of large percentage of fish catch due to spoilage, insects, etc.; large amounts of wood used for smoking fish, in the absence of new technologies in fish preservation (more efficient smoking and emphasis on drying and salting).

#### Wildlife:

- Loss of opportunities for game ranching in the Sahel, as locally adapted wildlife populations are eliminated by poaching and loss of habitat; few alternatives to traditional livestock programs, with their problems related to overgrazing, water supply requirements, susceptibility to disease, etc.

- Low level of game meat production in Sudan zone as wildlife stocks remain undermanaged and locally overexploited; less protein in local diets.

- With diminishing genetic diversity among wildlife populations and sometimes irreversible habitat degradation, difficult or impossible to improve park system; loss of national heritage and lowered potential for tourism.

### Environmental Conservation:

- No field trips; graduates depart with no systematic exposure to environments beyond Dinderesso, such as the northern sahel, NW sudano-sahel, central sudan, eastern sudano-guinean, southern guinean zones.

- Inadequate practical training; little experience gained working with one's hands and developing familiarity and competence with basic skills, such as fencing, firebreaks, harvesting, surveying.

- No model extension program; continued lack of adequate dialogue to assess local needs and constraints, and to insure local participation in decisions regarding resource protection and utilization.

- No demonstration of multiple-use, sustained-yield management of forest and range lands; large fraction of forest reserves remain undermanaged, underproductive.

- Continued emphasis on resource protection and law enforcement (which contributes to the service being small, ineffective, and demoralized since few politicians see anything to be gained by supporting a forest 'police' service).

- Rural development lacking in 'forestry' elements (soil and water conservation, development of wood supplies with continued tendency to remain sectorial, with no one assuming responsibility for environmental conservation); inadequate technical assistance in forestry to agricultural extension workers (encadreurs); continued soil erosion and shortages of fertile farmland, over-cutting and shortages of fuelwood, heavy runoff and lowering of groundwater supplies, and overgrazing and destruction of rangeland.

ANNEX IVGOUV CONTRIBUTIONI. Teachers and Staff SalariesTeachers :

2 A's	180,000 x 12 x 5 =	10,800,000 CFA
2 B's	176,000 x 12 x 5 =	10,560,000 CFA
1 B	88,000 x 12 x 4 =	4,224,000 CFA
3 B's	264,000 x 12 x 2 =	6,336,000 CFA
Secretary	23,000 x 12 x 4 =	1,104,000 CFA
Student Coordinator(C)	38,000 x 12 x 4 =	1,824,000 CFA
Accountant	34,000 x 12 x 4 =	1,632,000 CFA
Drivers (8) x	22,000 x 12 x 4 =	8,448,000 CFA
Heavy Equip. Drivers(2)x	23,000 x 12 x 4 =	2,208,000 CFA
Cook	20,000 x 12 x 4 =	960,000 CFA
Cook's Aid	10,000 x 12 x 4 =	480,000 CFA
Mechanic	23,000 x 12 x 4 =	1,104,000 CFA
Mechanic Aid	12,500 x 12 x 4 =	600,000 CFA
Custodian	16,000 x 12 x 4 =	768,000 CFA
Forest Agents (2) x	25,000 x 12 x 5 =	3,000,000 CFA
Forester's Homologue (B)	88,000 x 12 x 4 =	<u>4,224,000 CFA</u>
	SUB-TOTAL	58,272,000 CFA

II. Student scholarships/salaries :

'79 D's :	$10 \times 12 \times 8291 + 10 \times 12 \times 4 \times 25,000 = 994,920 + 12,000,000 = 12,994,920$
'80 D's :	$30 \times 12 \times 8291 + 30 \times 12 \times 3 \times 25,000 + 2,984,760 + 27,000,000 = 29,984,760$
'80 C's :	$2 \times 10 \times 10 \times 29,000 + 10 \times 12 \times 2 \times 38,000 = 5,800,000 + 9,120,000 = 14,920,000$
'81 D's :	$30 \times 12 \times 8291 + 30 \times 12 \times 2 \times 25,000 = 2,984,760 + 18,000,000 = 20,984,760$
'81 C's :	$2 \times 10 \times 10 \times 29,000 + 10 \times 12 \times 38,000 = 5,800,000 + 4,560,000 = 10,360,000$
'82 D's :	$30 \times 12 \times 8291 + 30 \times 12 \times 25,000 = 2,984,760 + 9,000,000 = 11,984,760$
'82 C's :	$2 \times 10 \times 10 \times 29,000 = 5,800,000$
'83 D's :	$30 \times 12 \times 8291 = 2,984,760$
'83 C's :	$10 \times 10 \times 29,000 = \underline{2,900,000}$
	SUB-TOTAL      112,913,960 CFA

### III. Wood Value

#### A. Natural Stands (Non plantations) :

##### 1. Production (L. O. P.)

$$2 \text{ stere/ha/yr} \times 4,000 \text{ ha} \times 5\text{yrs} \times 600\text{CFA/stere} = 24,000,000 \text{ CFA}$$

##### 2. Inventory

$$20 \text{ years} \times 2 \text{ stere/ha/yr} \times 4,000 \text{ ha} \times 600 \text{ CFA/stere} = 96,000,000\text{CFA}$$

$$\text{SUB-TOTAL} = 120,000,000\text{CFA}$$

#### B. Plantations

##### 1. Production (L. O. P.)

$$10 \text{ stere/ha/yr.} \times 1000 \text{ ha} \times 5\text{yrs} \times 600 \text{ CFA/stere} = 30,000,000 \text{ CFA}$$

##### 2. Inventory

1977 : 240ha x 10stere/yr. x 1yr. x 600CFA	=	1,440,000
1976 : 304ha x 10stere/yr. x 2yrs. x 600CFA	=	3,648,000
1975 : 25ha x 10stere/yr. x 3yrs. x 600CFA	=	450,000
1963 : 30ha x 10stere/yr. x 15yrs. x 600CFA	=	2,700,000
1961 : 107ha x 10stere/yr. x 17yrs. x 600CFA	=	10,914,000
1960 : 52ha x 10stere/yr. x 18yrs. x 600CFA	=	5,616,000
1959 : 40ha x 10stere/yr. x 19yrs. x 600CFA	=	4,560,000
		<u>29,328,000 CFA</u>

##### 3. Cashew plantations (considered as firewood alone)

1972 : 500ha x 2stere/yr. x 6yrs x 600CFA	=	3,600,000
1970 : 100ha x 2stere/yr. x 8yrs x 600CFA	=	960,000
1969 : 100ha x 2stere/yr. x 9yrs. x 600CFA	=	<u>1,080,000</u>
		5,640,000

$$\text{SUB-TOTAL} = 64,968,000 \text{ CFA}$$

$$\text{TOTAL Wood Value} = 184,968,000 \text{ CFA}$$

IV. Land Value

$$10,000 \text{ CFA/hectare} \times 6,000 \text{ ha} = 60,000,000 \text{ CFA}$$

V. Buildings Value

$$\begin{aligned} & 3 \text{ bldgs} \times 75 \text{ m}^2/\text{bldg} \times \$350 \times \frac{1}{2} \\ & + 3 \text{ bldgs} \times 100 \text{ m}^2/\text{bldg} \times \$350 \times \frac{1}{2} \\ & + 1 \text{ bldg.} \times 240 \text{ m}^2/\text{bldg} \times \$350 \times \frac{1}{3} \\ & = \$120,000 \times 230 \text{ CFA/\$} = 27,600,000 \text{ CFA} \end{aligned}$$

RECAPITULATION (CFA)

I. Teachers and Staff Salaries	58,272,000
II. Student Scholarships/Salaries	112,913,960
III. Wood Value	184,968,000
IV. Land Value	60,000,000
V. Buildings Value	<u>27,600,000</u>
TOTAL CFA	443,753,960
	= \$ <u><u>1,929,000</u></u>

ANNEX V

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## ANNEX V-1

### PROJECT MANAGER

Position Title: Project Manager (Forestry Education and Development)

Introduction: The incumbent of this position will serve as the Project Manager for the Upper Volta Forestry Education and Development Project (686-0235). He/She will be the principal project advisor for a major project which encompasses the expansion and improvement of a training center for lower level forestry agents, as well as the development and execution of a management plan for a national forest. The projected total dollar value of the U. S. contribution to this project over a five-year period is \$5.46 million.

Duties and Responsibilities: The Project Manager will perform the following functions:

1. Assist in planning and formalizing agreements with the Government of Upper Volta (GOUV) and establishing relationships between the GOUV and USAID in order to facilitate project implementation.
2. Assist in establishing procedures to ensure the timely provision of USAID and GOUV inputs of commodities, technical assistance, training, construction and operational support. Monitor the utilization of those project commodities and be responsible for procedures necessary to good fiscal management of the project.
3. Provide technical and operational advice to enable the project to meet its objectives.
4. Administer/supervise U. S. contract personnel involved in the forestry school and management of a national forest.
5. Report to the Mission on program progress and problems, and make recommendations for modifications or changes in the project as necessary.
6. Participate in the evaluation of the project. Prepare Project Evaluation Summary and Contractor Performance Reports as appropriate. Evaluate audit report findings and take corrective action.

Controls over Work: The Project Manager will work under the direct supervision of the Director, Office of National Projects (D/ONP). While the incumbent has discretion in carrying out project responsibilities he/she will look to his/her supervisor for guidance in fulfilling his/her role within the framework of USAID Mission policies and regulations. The D/ONP will prepare the annual Performance Evaluation Report on the incumbent and conduct the periodic reviews called for in the overall evaluation system. Information reporting from the incumbent to the D/ONP will normally be by frequent oral conversations and periodic written reports as mutually agreed upon.

Other Significant Factors: The Project Manager will ideally be experienced in forestry vocational education as well as in project management. Moreover, it is desired that the project manager have relevant prior experience in Africa, preferably in francophone countries. The project manager should have a minimum of a masters degree in forestry, forestry education, or a field related to project management/implementation.

The Project Manager must have demonstrated planning, coordinating, negotiating, and problem solving skills as well as working knowledge of the AID programming process and documentation, contracting procedures, and financial management principles. He/she must also have strong oral and written communication ability.

The Project Manager must also possess personality traits necessary for effective interpersonal relationships, including empathy, understanding, tact, and sensitivity to the interplay among various sectors of a developing country and how such interactions influence the human resources development process.

S-3, R-3 French language skills are the minimum level required for this position.

## ANNEX 7-2

FOREST MANAGER AT DINDERESSOJob Description

The Forest Manager will be responsible for developing a detailed forest management plan which will include an accurate boundary survey, maps of topographic and physical features, vegetative maps and descriptions, evaluations of forest uses (past - present - future), a study of ecological and social impacts of the various plantations versus natural forest, an outline of production goals for the forest, guidelines for vegetation management practices and policies needed to meet both production and conservation goals with maximum sustained yield, a forest protection plan with prime emphasis on fire control, a program for experimental projects (in silviculture, range management, fire protection, etc.), plans for educational activities with forestry students from the Dinderesso school, a time table for management activities with yearly goals, a general monthly outline of activities determined by season, and policies and methods for maintaining forest management and production records.

The Forest Manager will also be responsible for effective implementation of the management plan in cooperation with the GOV Forestry Service. This will involve organizing manpower and materials at the proper time for seasonal work and special projects, encouraging local and official cooperation with forest management policies, organizations and regulations of forest exploitation, on-going supervision, and analysis of experimental projects and assistance with special projects and field work of the students from the Dinderesso Forestry School.

A dynamic, persevering approach will be necessary to implement and follow through on new management programs (such as natural forest management). Also a great deal of imagination and ingenuity will be required to recognize the many management, experimental, and educational opportunities available in the forest.

Qualifications:

- Two years experience in Sahel forestry
- 2+ level French skills or higher
- Minimum B. S. degree in forestry
- Good technical and administrative abilities in forestry.

## ANNEX V-3

ASSISTANT FOREST MANAGERJob Description

Apart from assisting the Forest Manager (see job description Annex L-2), the Assistant Forest Manager will have much to do with the practical training of students from the Dinderesso Forestry School.

As field training coordinator, he/she will be in charge of coordinating the students' training at the Dinderesso Forest Reserve. Thus it will be necessary for him/her to work closely with the instructors and students, as well as the Forest Manager.

He/she will also prepare the logistics for field trips, coordinating the contacts with the various organizations which will be asked to cooperate in receiving the students for field work. During the field trips the Assistant Forest Manager will travel in advance to make sure everything is ready: personal are present, materials and facilities are prepared, etc.

Qualifications

- Must be an energetic forester
- Minimum A. S. or B. S. degree
- Two years forestry experience in French-speaking West Africa
- Minimum 2+ level French ability

## ANNEX 7-4

FOREST SURVEYING INSTRUCTORJob Description

This instructor will be responsible for teaching the basic principles of surveying and map-making, including familiarizing the students with surveying instruments and techniques (compass, pacing, taping, levelling and, for C Level, plane table and alidade and transit).

The students after their course must be able to find the boundaries of a National Forest or Park, to lay out and map the principal features of a forest (roads, fire breaks, rivers and springs, land-forms), to lay out transects, and locate and map vegetation management units.

The instructor must also introduce the basics of inventory, mensuration, and photointerpretation techniques. He is expected to review basic geometry, trigonometry and mathematics to complete the above training.

Secondary subjects will be.

- To assist instructors responsible for establishing and running a forest nursery and plantations.
- To help technically in fire control, soil and water conservation works, assistance in design and lay-out.
- To teach the basics of harvesting and transportation of firewood, grass, poles, timber.
- To teach fence building techniques and construction of small buildings. To help teaching machine and tool maintenance.
- To help teaching the principles of forest management, operations planning, and basic decision-making.

Qualifications:

- Minimum of a B. S. in forestry with orientation towards engineering.
- Strong inclination towards practical field work.

- **Competence in demonstration and teaching skills**
- 2+ level in French
- Two years working experience in francophone Sahel
- Willingness to travel a minimum of three months a year

## ANNEX V-5

ECOLOGY SCIENCES INSTRUCTORJob Description

He/She will be responsible for teaching field botany and plant identification, ecology, and biogeography, and for bringing an ecosystem perspective into the school's instruction. Students will have a basic understanding of dry savanna ecosystems and study its components: vegetation, geology, soil science, hydrology, climatology.

He/She will also teach biogeography, with discussion of the different Western African vegetation formations and concentration on the different types of Savanna forests in Upper Volta.

He/She will also teach plant ecology and sylvics, to help students to know the needs of different species of natural and exotic trees, natural or artificial regeneration, seeding processes, etc.

Secondary subjects will be to assist other instructors in wildlife and fisheries ecology, soil and water conservation, fire control and management, range management and agroforestry.

Qualifications

- Minimum of a B. S. in Forestry/Plant Ecology with an orientation towards Tropical Savanna Ecology
- Strong inclination towards field work and applied research
- Working experience in francophone Sahel with 2+ fluency in French
- Competence in demonstration and simplification skills in teaching
- Willingness to travel at least four months a year

## ANNEX V-6

SOCIOLOGY AND FOREST ECONOMICS INSTRUCTORJob Description

He/She will be responsible for administration and accounting. The students must know how to budget and plan work, and the basics of bookkeeping.

He/She will also bring economics into the management of the forest, as it affects forest management decisions, and the different uses of a forest unit; also discuss marketing of forest products (firewood, charcoal, poles, etc.)

One of this instructor's main tasks will be to teach techniques of conservation education and forestry extension. The students will have to understand their role in meeting the needs of local population and in managing a forest or other natural resources to contribute to rural development.

The concepts of sustained-yield management for wood, products, water and forage should be presented as being fundamentally important.

Students should be familiar with making surveys and conducting meetings to determine local needs, constraints and potential areas of cooperation or conflict in resource use and management.

Qualifications

- Minimum of a B. S. in Human Ecology and Forestry with concentration in Forest Policy and Sociology.
- Minimum of two years working experience in francophone Sahel.
- Interest in understanding rural societies, background in environmental studies.
- Interest in Economics
- Very high capability in human relations
- 2+ level in French
- Willingness to learn at least one local language (Dioula)
- Must expect to travel one to two months/year

## ANNEX V-7

RANGE MANAGEMENT SPECIALISTJob Description

This instructor will be responsible for integrating the concept of multiple-use, sustained-yield natural resources management into all rural development activities affecting the physical environment.

He/she will teach the use of techniques to halt or reduce the process of environmental deterioration (forest, soil, water conservation techniques), and will assist students in appreciating the complexities of the issues of over-use and over-exploitation of the resources, and in realizing the consequences of these abuses in terms of decreased production and constraints to development.

This instructor will teach the basic procedures useful in planning, implementing, and evaluating resource conservation and development projects, particularly with respect to range ecosystems where pastoralism is the dominant land-use. He/she should show how to combine the interests of the local population with those of the forest service in land management (e.g. designating one part of a forest for grazing or cultivating, another for wood production, another for orchards, etc.).

He/she will be in charge of the development of most of the C Level course of Forest and Range Management and will work closely with other instructors covering ecology, silviculture, conservation education, fire control, and soil and water conservation.

Qualifications

- Minimum of a B. S. in Range Management
- West-African experience in land-use and in the implementation of Forest and Range Management Plans in the Sahel
- 2+ fluency in French and some fluency in a local language (Peul, Dioula, Djerma)
- Willingness to work six months/year for the project, of which three months will be spent in traveling.

## ANNEX V-8

SOIL AND WATER CONSERVATION SPECIALISTJob Description

This instructor will mainly cooperate with the Surveying instructor to teach fundamentals of soil and water conservation. He/she will also cooperate with the ecologist in soil science and forest hydrology.

He/she will familiarize D and C Level students with soil formation processes and techniques to control erosion, increase rainfall effectiveness and maintain soil fertility. Second year C Level students should receive training in more advanced techniques of watershed protection and management and understand run-off and rates of soil erosion. They should be able to design and construct contour dikes, retaining walls, irrigation canals, earthen dams.

He/she will also teach the maintenance of soil fertility in relation to biophysical and human factors (drought, floods, fire, overcropping, grazing, forest exploitation and plantations).

Qualifications

- B.S. in Soil Science and Forest Hydrology
- Relevant working experience of at least two years in francophone Sahel
- 2+ proficiency in French
- Must be favorably disposed to field work in Dinderesso and elsewhere
- Willingness to work as short term consultant (i.e. two months/year)

## ANNEX V-9

FIRE MANAGEMENT SPECIALISTJob Description

This instructor will teach:

- The role of fire in Savanna ecosystems
- The traditional or potential use of fire by farmers, herders and foresters
- The effects of fire on vegetation succession, forest and range productivity, and soil fertility
- Fire control techniques
  - Watch towers
  - Conservation education and fire prevention
  - Construction and maintenance of firebreaks
  - Reducing fuel to minimize fire threats
  - Controlled use (prescribed burning, early fires)
  - Planting fire-resistant species

He/she will collaborate with instructors in Forest, Soil and Water Conservation, Savanna Ecology, Silviculture, Conservation Education, Forest and Range Management.

Qualifications

- B. S. in Forestry with emphasis on fire control
- Minimum of one year working experience in francophone Sahel
- 2+ capability in French (must teach in French)
- Inclination towards field work and applied research
- Willingness to work as short term consultant (i. e. two months/year)

## ANNEX V-10

FISHERIES AND FISH CULTURE SPECIALISTJob Description

He/she will teach fisheries ecology, fish conservation and development of fisheries as a renewable resource, discuss the physical and ecological needs and managements for a rational fish culture, and teach fish processing and marketing, including fisheries "cooperatives", as well as providing support as needed for the work of the fisheries assistant.

Qualifications

- Minimum of a B. S. in Zoology, specialized in fisheries.
- Western Africa experience of at least two years with fresh water fisheries management.
- Substantial experience with fish ponds
- 2+ ability in French and fluency in a local language
- Willingness to work two months/year for the project
- Ability to organize field trips and work.

## ANNEX V-11

PARK AND WILDLIFE SPECIALISTJob Description

This instructor will provide support as needed to the wildlife assistant, give special attention to wildlife Management Planning (i. e. help the students to grasp the essentials of a park's ecosystem and understand the management's tasks they must do), advise and comment on parks administration, stress game meat production, noting the protein value of game for the local diets, and give information on wildlife ecology, emphasizing wildlife behavior and habitat requirements.

Qualifications

- Minimum of a B. S. in Wildlife Management and Ecology and Parks Management
- Two or more years experience in francophone Western Africa
- 2- ability in French and fluency in a local language
- Ability to organize practical training and work
- Knowledge of local fauna and flora
- Willingness to work four months/year for the project (e.g. as short term consultant)

## ANNEX V-12

GENERAL COMMENTS - TEACHING STAFF

A primary analysis of the suggested program for D and C Levels at Dinderesso shows that:

1. The surveying instructor will be responsible for 16 hours of theoretical and practical training. One can assume that he/she will need two preparation hours for each hour of instruction. This translates to  $3 \times 16 = 48$  hours per week. He/she will thus be quite busy, mainly during the first year where he/she will have to prepare both theory and practice at Dinderesso and on field trips.

2. The ecology instructor will have about 15 school hours, and the same comments apply as for the surveying instructor.

3. The sociology instructor is expected to have 9 school hours, thus 27 working hours for the first year.

Because of the smaller work load and his/her administrative preparation, we suggest that he/she becomes the USAID team leader and the school's deputy director.

These people can probably be best recruited from a pool of qualified former Peace Corps Volunteers.

The four assistants will work in accordance with the requirements of instructors and part-time specialists.

We can assume that the main bulk of the assistants' work will be field training and support for student projects, which should thus occupy them for more than 40 hours a week.

Assistants should be recruited from a pool of qualified Forest Service agents (preposes).

The part-time instructors will be hired for three years for the indicated number of months per year; they could come from the U. S. or from forestry projects in Upper Volta or other third world countries.

Range Management Specialist	6 months
Soil and Water Conservation Specialist	2 months

Fire Management Specialist	2 months
Fisheries and Fish Culture Specialist	2 months
Park and Wildlife Specialist	4 months

It is possible that counterparts for the Wildlife and Fisheries Specialists will be available in the near future. Counterparts for the Surveying and Ecology Instructors will probably only be available later in the life of the project.

It should be kept in mind that there are presently one forest engineer (A level) and two vocational forest technicians (B level) at Bobo-Dioulasso, and one D level crew chief (prepose), who are assigned to work at the Dinderesso Forestry School. They may want to continue working at the school, but since they may not be adequately well-trained, an opportunity for additional training should be given to them before the new project's start.

## ANNEX V-13

GOUV TEACHING STAFFTHE SCHOOL DIRECTORJob Description

The Director (a Voltaic) will be the head of the school. As the success of the school will rest primarily with this individual, he/she should insure that the school reaches its goals in a general atmosphere of commitment, competence, common spirit and goodwill. The Director's main tasks will be to supervise the academic, operational and financial aspects of the school, in order to meet the project objectives. He/she is expected to give professional advice to solve any operational or human problem within the school.

He/she must be the spokesperson of the school with respect to higher government authorities, and must defend the school's integrity and objectives in front of his supervisors.

The director must be dynamic, dedicated and must show by the way that he lives and works that he is willing to put other considerations above those of self. He/she should spend most of the time at the school; it is important to show that he/she is sharing the same living conditions as the others and that he/she has the school's success in mind. In a word, he/she must be able to put his/her boots on and go working into the field.

The Director must be a diplomat. While he/she has the last word on most decisions, he/she should show that advice from or dialogues with the deputy director and other staff members are important. He/she must be able to implement changes in the school and win acceptance of them by the staff.

The Director will be asked to teach or back-up the following courses of D Level and first year C Level: Administration and Accounting, Forest Legislation and Conservation Education, Military Training, First Aid and Hygiene.

Qualifications

- Must be a Voltaic forester with A or B Level education and training.
- Minimum four years field experience

- Experience and/or strong interest in administration and personnel management
- French fluency
- English capability, while not mandatory, would be helpful.

### ASSISTANT INSTRUCTORS

#### Forest Surveying, Mapping and Engineering Assistant

Job Description: He/she will principally assist the instructor in forest surveying, mapping and other engineering works: nursery and plantation design and layout, forest harvesting techniques, mensuration and inventory.

#### Qualifications:

- D or C Level training
- Minimum of three years practical experience in engineering work
- Must have initiative, be dynamic, and be manually skillful
- Must be able to work with both simple and more complex surveying and mensuration instruments
- Must have good understanding of French

#### Ecology Assistant

Job Description: This person will work closely with the Ecology instructor and must be a strong "field specialist" in plant identification and use, knowing the scientific as well as the French and vernacular names. He/she will be useful in all other disciplines using plant identification: Ecology and Biogeography, Inventory, Silviculture, Nursery and Plantation. He/she is expected to organize a herbarium with the ecologist.

#### Qualifications:

- D or C Level with a strong interest for field work
- Ability to communicate clearly and simply

- Fluency in French and in the local languages (Dioula, **Feul**, **More**)
- Readiness to travel three to four months/year

#### Fisheries and Fish Culture Assistant

Job Description: He/she will be responsible for the practical training in fisheries and fish culture. This training will include basic boating skills, use of nets, other tools, fish pond construction and maintenance, identification and taxonomy of Upper Volta fresh-water fish, fish processing techniques and fisheries organizations (cooperatives). He/she will be helped by the part-time specialist.

#### Qualifications:

- B, C or D Level training of at least three years
- Practical knowledge of fisheries organizations and techniques in **Upper Volta** and other countries of Western Africa
- Practical knowledge in fish ponds construction and maintenance
- Knowledge in fish identification
- Fluency in French
- Readiness to travel three months/year
- Ability to be responsible for watching construction and/or maintenance of fish pond(s) related to the school.

#### Park and Wildlife Management Assistant

Job Description: This person will be responsible for teaching identification, tracking and hunting of wildlife and game species; a practical approach to park and wildlife management problems (techniques of management, forest fire control, fire breaks, road and trail construction and maintenance; production of game for local population, and integration of wildlife protection in rural development issues. He/she will be assisted by a part-time specialist.

Qualifications:

- B, C or D level. three years minimum of experience
- Working experience in wildlife parks and in wildlife identification, tracking
- Knowledge of small engineering works: road and trail constructions, culverts, small bridges.
- Knowledge of Upper Volta fauna and flora
- Proficiency in French and a local language
- Readiness to travel three months/year

## ANNEX V-14

GOUV SUPPORT STAFFLibrary Attendant/Secretary

This person will be in charge of the library service and the secretarial work for the academic and accounting sections. He/she should have elementary training in library classification and filing, and knowledge of shorthand and typing.

Director and Staff Secretary

This person will primarily do secretarial work for the Director, but also will assist the professors and accountants as necessary. He/she must have initiative, experience and the ability to make decisions. Shorthand and typing skills are necessary.

Student Advisor ("Surveillant")

This individual will be in charge of helping students in all essentially non-academic problems such as boarding, cafeteria, recreation, medical supplies, transportation, etc. He/she must be dynamic, imaginative, and have a background in personnel management and administration.

Accountant

He/she will be in charge of administering finances, including salaries, purchasing, student scholarships, budgeting, etc. He/she will be in close working contact with the Director and the Deputy Director and will consult them regularly. A degree in accounting and good knowledge and experience in accounting are essential.

Mechanic

This person will be in charge of repair and maintenance of the school's vehicles and other equipment. He/she must have mechanical experience with gasoline and diesel engines, and hydraulic systems, and have good knowledge in electricity.

In addition, the school will need:

- Mechanic's helper
- Tools/Spare Parts Manager

- General Maintenance Person and Helper
- Cook and two Cook's Helpers
- Five drivers
- Two night watchmen
- 15 Fieldworkers and other laborers (nursery, etc.)

**In summary:**

- 5 School Director and Teaching Staff
- 14 Secretaries, Accountant, Mechanic, Maintenance, Cook,  
Watchmen, etc.
- 5 Drivers
- 15 Workers
  
- 39 School employees in addition to 3 expatriate instructors and 5  
short-term specialists.

ANNEX VIPEOPLE AND PLACES CONTACTED<sup>1</sup>GOUV (Ministry of Tourism and Environment):

Jean Barry, Director Forest Service  
 Sylvestre Ouedraogo, Acting Director, Forest Service  
 Jean Baptiste Kambou, Forest Engineer  
 Jacques Pakodi, Forest Agents Union Leader  
 Banlou Yaro, Director of Personnel, Forest Service  
 Jean Paul Sangli-Malenle, Director of Nagbangre Nursery  
 Casimir Ziba<sup>2</sup>, Head of Forest Service Bobo-Dioulasso Region

Francois Traore<sup>3</sup>, Forest Agent  
 Jean Baptiste Coulibaly<sup>3</sup>, Head of Bobo-Dioulasso District  
 Adama Traore<sup>3</sup>, Forest Agent  
 Julien Yonli, Forest Agent  
 Antoine Millogo<sup>4</sup>, Forest Agent  
 Doro Tomi, Director National Parks  
 Aime Ouedraogo, Acting Director, Fisheries Service  
 Mamadou Tapsoba, Fisheries Agent

Villagers of Dinderesso, Kokoroe, Nasso, Bana, Flasso<sup>5</sup>

Fred Weber, Club du Sahel  
 Jacques Stebler, CILSS  
 Koen DeSmet, CILSS  
 Piot, CTFT

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<sup>1</sup> Certain team members have visited (prior to project design) and are familiar with all of the proposed Upper Volta field trip sites. In addition, several Forest Agents, not listed here, responded to a questionnaire (see Annex H).

<sup>2</sup> Current Director of Dinderesso School

<sup>3</sup> Current Instructor at Dinderesso School

<sup>4</sup> Former Instructor at Dinderesso School

<sup>5</sup> See Annex K.

Miahle, CTFT

Spaak, AVV

Grannec, AVV

Peter Weinstabel, German Forestry Project

Dominique Louppe, FAO Forestry Project

Alan Fiske, Peace Corps/Upper Volta

Dinderesso Forest Reserve

Boromo Forest and Game Reserve

ANNEX VII

## BIBLIOGRAPHY

I. Review of existing reports and maps of the forest

## A. Forest boundaries

1. Maps by Dominique Louppe
2. Maps by P. Sarlin
3. Topographic map of Bobo-Dioulasso region showing the Dinderesso forest
4. Records of meets and bounds at the UVFS regional office in Bobo-Dioulasso

## B. Vegetative surveys and descriptions

1. FAO project report by Dominique Louppe - 1978
2. Maps of plantations by Dominique Louppe - 1976/1977
3. Map of Dinderesso Forest Reserve by Dominique Louppe - 1978
4. CTFT reports

## C. Topographic maps and descriptions of physical features

1. Maps by P. Sarlin
2. Topographic map of Bobo-Dioulasso region
3. FAO project report by D. Louppe

## D. Soil surveys and descriptions

1. Cartes Pedologiques - Dinderesso - By P. Sarlin - 1968
2. FAO project report by D. Louppe

## E. General background reports and maps

1. Climatic data
  - a. FAO project report by D. Louppe
  - b. Les atlas d'afrique - Haute-Volta
2. Bibliographie du Programme Propose pour l'Equipe "Ecologie et Environnement au Sahel" by Mme. Bucher Frimigacci (CILSS) - 1977

II. Other Sources

## CILSS Documents:

Note de Synthese sur la Strategie Forestiere - May 1977

CILSS Project Sheet UPV D 301  
Forestry Training Center-Dinderesso

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Evaluation des Besoins en Formation Forestiere dans le Sahel  
 et Propositions d'Action, July 1977

Les Implications au niveau des institutions forestieres  
 nationales (1976)

GOUV Ministry of Tourisme and Environment:

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Situation des Projets en Janvier 1977

Resume de la situation en Haute Volta (1976)

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Swift, Jeremy

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Terrible, R.P.

La Vegetation Ligneuse de la Haute Volta (1977)

Le Courrier

"Dossier: La desertification" No. 47, Jan-Fev. 1978

AMENDMENT N° 1

to the

PROJECT AGREEMENT

between

THE GOVERNMENT OF THE REPUBLIC OF UPPER VOLTA

and

THE GOVERNMENT OF THE UNITED STATES OF AMERICA

for

FORESTRY EDUCATION AND DEVELOPMENT

AMENDEMENT N° 1

A

L'ACCORD DE SUBVENTION

entre

LE GOUVERNEMENT DE LA REPUBLIQUE DE HAUTE-VOLTA

et

LE GOUVERNEMENT DES ETATS-UNIS D'AMERIQUE

pour

LA FORMATION ET LE DEVELOPPEMENT FORESTIERS

The Grant Agreement between the Government of Upper Volta (hereinafter "Grantee") and the United States of America, acting through the United States Agency for International Development Mission to Upper Volta (hereinafter "USAID"), dated July 31, 1979, is hereby amended as follows :

Article 3 : Financing

SECTION 3.1 : The Grant is amended to read :

To assist the Grantee to meet the costs of carrying out the project, USAID pursuant to the Foreign Assistance Act of 1961, as amended, agrees to grant the Grantee under the terms of this Agreement not to exceed two million five hundred thousand United States dollars (2,500,000) consisting of U.S. \$ 700,000 previously obligated and U.S. \$ 1,800,000 obligated by this amendment.

The Grant may be used to finance foreign exchange costs, as defined in Section 7.1 and local currency costs as defined in Section 7.2 of goods and services required for the project, except that, unless the Parties otherwise agree in writing, local currency costs financed under the Grant will not exceed the equivalent of one million three hundred and twenty seven thousand five hundred United States dollars (\$ 1,327,500).

Article 4 : Conditions Precedent to Disbursement

SECTION 4.5 : Terminal Dates for Conditions Precedent

Conditions Precedent are amended to read :

(a) If all of conditions specified in Section 4.1 have not been met within ninety (90) days from the date of this Amendment or such later date as USAID may agree to in writing, USAID, at its option, may terminate the Agreement by written notice to the Grantee.

L'Accord de Subvention entre le Gouvernement de la Haute-Volta (Bénéficiaire) et les Etats-Unis d'Amérique, par l'intermédiaire de l'Agence des Etats-Unis pour le Développement International en Haute-Volta (USAID), en date du 31 juillet 1979, est amendé comme suit :

Article 3 : Financement

SECTION 3.1 : La Subvention est amendée comme suit :

Pour aider le Bénéficiaire à faire face aux dépenses entraînées par l'exécution du projet, l'USAID, conformément à la loi de 1961 de l'assistance à l'étranger, comme amendée, accepte de lui accorder, aux termes de cet Accord une somme n'excédant pas deux millions cinq cent mille dollars des Etats-Unis (2,500,000) comprenant la somme de 700.000 dollars des Etats-Unis précédemment allouée et la somme de 1.800.000 dollars E.U. allouée par cet amendement.

La Subvention pourra être utilisée pour financer les dépenses en devises étrangères telles que définies à la Section 7.1, et les dépenses en monnaie locale, telles que définies à la Section 7.2, pour les biens et services nécessaires au projet, la condition étant, à moins que les Parties en conviennent autrement par écrit, que les dépenses en monnaie locale financées par la Subvention ne dépassent pas l'équivalent d'un million trois cent vingt-sept mille cinq cents dollars des Etats-Unis (\$ 1.327.500).

Article 4 : Conditions Préalables au Déboursement

SECTION 4.5 : Dates Limites pour les Conditions Préalables

Les Conditions Préalables sont amendées comme suit :

(a) Si toutes les conditions mentionnées à la section 4.1 n'ont pas été remplies dans les quatre-vingt-dix (90) jours à compter de la date de cet Amendement ou à une date ultérieure dont l'USAID peut convenir par écrit, l'USAID a la faculté de résilier l'Accord par avis écrit au Bénéficiaire.

.../...

(b) If the conditions specified in Section 4.2 (a) have not been met within sixty (60) days from the date of this Amendment, or such later date as USAID may agree to in writing, USAID, at its option, may terminate the Agreement by written notice to Grantee.

(c) If the conditions specified in Section 4.3 (a) have not been met within ninety (90) days from the date of this Amendment or such later date as USAID may agree to in writing, USAID, at its option, may terminate the Agreement by written notice to Grantee.

The amended Project Financial Plan is attached as Attachment 1.

The rest of the Financial Plan remains the same.

This Amendment shall be effective upon execution. Except as specifically modified and amended hereby, the Grant Agreement shall remain in full force and effect. All references in said Agreement to the words "Grant Agreement" or "This Agreement" shall be deemed to mean "The Grant Agreement as amended".

(b) Si les conditions spécifiées à la Section 4.2 (a) n'ont pas été remplies dans les soixante (60) jours à compter de la date de cet Amendement, ou à une date ultérieure dont l'USAID peut convenir par écrit, l'USAID a la faculté de résilier l'Accord par avis écrit au Bénéficiaire.

(c) Si les conditions spécifiées à la Section 4.3 (a) n'ont pas été remplies dans les quatre-vingt-dix (90) jours à compter de la date de cet Amendement, ou à une date ultérieure dont l'USAID peut convenir par écrit, l'USAID a la faculté de résilier l'Accord par avis écrit au Bénéficiaire.

Le Plan Financier du Projet amendé se trouve ci-joint en Annexe 1.

Le reste du plan financier reste le même.

Cet Amendement prendra effet à partir de la date d'exécution. Hormis ces modifications spéciales apportées par cet Amendement, l'Accord de Subvention restera inchangé et légalement valide. Toutes les références dans le dit Accord aux expressions "Accord de Subvention" ou "Cet Accord" devront être comprises comme "Accord de Subvention tel qu'amendé".

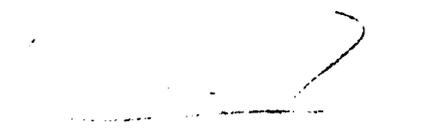
IN WITNESS WHEREOF the United States of America and the Government of the Republic of Upper Volta, each acting through its duly authorized representative, have caused this amendment to be signed.

EN FOI DE QUOI, le Gouvernement de la Haute-Volta et le Gouvernement des Etats-Unis d'Amérique, chacun agissant par l'intermédiaire de son représentant dûment mandaté, ont fait signer cet amendement.

FOR THE GOVERNMENT OF THE UNITED STATES OF AMERICA.

POUR LE GOUVERNEMENT DE LA REPUBLIQUE DE HAUTE-VOLTA.

By :   
Thomas D. Boyatt

Par :   
Georges Sanogoh

Title : Ambassador of the United States of America

Titre : Ministre du Plan et de la Coopération

Date : April 17, 1980

Date : 17 avril 1980

FUNDS AVAILABLE :

By :   
B. Loc Eckersley

Title : Mission Controller

FORESTRY EDUCATION AND DEVELOPMENT PROJECT FINANCIAL PLAN  
(PLAN FINANCIER DU PROJET FORMATION ET DEVELOPPEMENT FORESTIERS)

Source and Application of Funds - U.S. \$ Thousands  
(Source et Application des Fonds - E.U.\$ Mille)

Amount for an Incrementally Funded Project  
(Montant pour un Projet Financé par Tranches)

PROJECT INPUTS (REALISATIONS DU PROJET)	: First Two Years Obligations : :(Obligations des deux 1eres années)			: Future Years Anti- : cipated Funding :(Années futures envisagées)			: Life of Project :(Durée du Projet)		
	: USAID		: GRANTEE	: USAID		: GRANTEE	: USAID		: GRANTEE
	: FX	: LC	: LC	: FX	: LC	: LC	: FX	: LC	: LC
<u>Personnel</u>									
Long-term (Long terme)	: 442	: 78	: :	: 1,190	: 210	: :	: 1,632	: 288	: :
Short-term (Court terme)	: 60	: 10	: :	: 476	: 84	: :	: 536	: 94	: :
Evaluation	: 8	: 2	: :	: 42	: 8	: :	: 51	: 9	: :
<u>Commodities (Materials)</u>									
School (Ecole)	: 224	: 200	: :	: 254	: 127	: :	: 478	: 327	: :
Forest (Forêt)	: 428	: 38	: :	: 593	: 75	: :	: 1,021	: 113	: :
<u>Training (Formation)</u>									
School (Ecole)	: :	: 5	: :	: 34	: :	: :	: 39	: :	: :
Forest (Forêt)	: :	: 5	: :	: :	: 34	: :	: 5	: 34	: :
<u>Other Costs (Autres Frais)</u>									
School (Ecole)	: :	: 930	: 244	: :	: 186	: 657	: :	: 1,116	: 901
Forest (Forêt)	: :	: 70	: 1,026	: 15	: 130	: 187	: 30	: 185	: 1,213
Sub-Totals	: 1,162	: 1,338	: 1,270	: 2,604	: 854	: 844	: 3,792	: 2,116	: 2,114
GRAND-TOTALS	: 2,500	: 1,270	: 3,458	: 844	: 5,958	: 2,114			

FX - Foreign Exchange (Devises Etrangères)  
LC - Local Currency (Monnaie Locale)

GRAND TOTAL

8,072

Amendment no. 1

to the

G R A N T A G R E E M E N T

between

The Government of the Republic of Upper Volta

and

The Government of the United States of America

for

Rural Water Supply

Amendement no. 1

à 1'

A C C O R D D E S U B V E N T I O N

entre

Le Gouvernement de la République de Haute-Volta

et

Le Gouvernement des Etats-Unis d'Amérique

pour

l'Hydraulique Villageoise

Appropriation: 72-11X1012  
Allotment: 812-50-686-00-69-01  
Amount: \$2,500,000.00

The Grant Agreement between the Government of Upper Volta (hereinafter "Grantee"), and the United States of America, acting through the United States Agency for International Development Mission to Upper Volta (hereinafter "USAID") dated July 31, 1979, is hereby amended as follows:

Article 3: Financing

Section 3.1: The Grant is amended to read:

To assist the Grantee to meet the costs of carrying out the project expenses, USAID pursuant to the Foreign Assistance Act of 1961, as amended, agrees to grant the Grantee under the terms of this Agreement a sum not to exceed six million United States dollars (\$ 6,000,000), consisting of \$ 3,500,000 previously obligated and \$ 2,500,000 obligated by this amendment.

The Grant may be used to finance foreign exchange costs, as defined in Section 6.1 and local currency costs as defined in Section 6.2 of goods services required for the project, except that, unless the Parties otherwise agree in writing, local currency will not exceed the equivalent of two million eight hundred and eighteen thousand United States dollars (\$ 2,818,000). Estimated budget tables are attached to this amendment (see Annex 1).

Article 4: Conditions Precedent to Disbursement

Section 4.5: The Grant is amended to read as follows:

L'Accord de Subvention entre le Gouvernement de la Haute-Volta ("Bénéficiaire") et les Etats-Unis d'Amérique, par l'intermédiaire de l'Agence des Etats-Unis pour le Développement International en Haute-Volta ("USAID"), en date du 31 juillet 1979, est amendé comme suit:

Article 3: Financement

Section 3.1: La Subvention est amendée comme suit:

Pour aider le Bénéficiaire à faire face aux dépenses entraînées par l'exécution du projet, l'USAID, conformément à la Loi de 1961 de l'assistance à l'étranger, comme amendée, accepte de lui accorder aux termes de cet Accord une somme n'excédant pas six millions de dollars des Etats-Unis (\$ 6,000,000) comprenant la somme de \$ 3,500,000 allouée précédemment et la somme de \$ 2,500,000 accordée par cet amendement.

La Subvention pourra être utilisée pour financer les dépenses en devises étrangères telles que définies à la Section 6.1, et les dépenses en monnaie locale, telles que définies à la Section 6.2, pour les biens et services nécessaires au projet, la condition étant, à moins que les Parties en conviennent autrement par écrit, que les dépenses en monnaie locale financées par la Subvention ne dépassent pas l'équivalent de deux millions huit cent dix-huit mille dollars des Etats-Unis (\$ 2,818,000). Les budgets estimatifs sont joints à cet amendement. (Voir Annexe 1).

Article 4: Conditions Préalables aux Déboursements

Section 4.5:

If all the conditions specified in Section 4.1 have not been met within three (3) months from the date of this Agreement, and the conditions specified in Section 4.2 have not been met within ten (10) months from the date of this Agreement, or such later date as USAID may agree to in writing, USAID, at its option, may terminate the Agreement by written notice to the Grantee.

Section 5.5: Coordinating Committee

The Grant is amended to read as follows:

The cooperating country agrees to establish a coordinating committee in each of the four Regional Development Organizations (ORD's) of the project. These committees shall include representatives from the ORD's, HER, Direction of Public Health, USAID and one Prefet's representative. These committees will make the selection of villages to receive wells, and they will supervise the village health education program in their respective ORD's.

La Subvention est amendée comme suit:

Si toutes les conditions spécifiées à la Section 4.1 ne sont pas réunies dans les trois (3) mois à compter de la date de cet Accord et les conditions spécifiées à la Section 4.2 ne sont pas réunies dans les dix (10) mois à compter de la date de cet Accord, ou toute autre date dont l'USAID conviendrait par écrit, l'USAID, à sa convenance, peut mettre fin à la Convention, par avis écrit au Bénéficiaire.

Section 5.5: Comité de Coordination  
La Subvention est amendée comme suit:

Le pays participant accepte d'établir un comité de coordination dans chacun des 4 Organismes Régionaux de Développement (ORD) du projet. Ces comités comprendront des représentants des ORD, de l'HER, de la Direction des la Santé Publique, de l'USAID et un représentant du Préfet. Ces comités feront la sélection des villages d'implantation des puits et superviseront le programme d'éducation sanitaire dans leurs ORD respectif.

ANNEX 1:  
AMPLIFIED DESCRIPTION OF THE PRO-  
JECT

ARTICLE A:

Project Elements: Project Head-  
quarters

The Grant is amended to read as follows: The project headquarters will be constructed in Bobo-Dioulasso. The current administrative building of the Regional Service of HER will be destroyed and will be replaced by an administrative building provided by the project. The building will house all current regional HER staff, and project staff from HER, and the Direction of Public Health. A garage, warehouse, parking area and an enclosure fence will be built on a 4 hectare tract of land in Bobo-Dioulasso donated by the GOUV.

3.b. Well site selection:

The Grant is amended to read as follows: Selection of villages for well construction will be made by the Coordinating Committee of each of the 4 Regional Development Organizations (ORD's). Site selection within a village will be done by a project hydrogeologist in consultation with village officials. The hydrogeologist also will follow the execution of well drilling and well digging and establish a program of test pumping of wells to estimate outputs and determine the size of aquifers.

3.c. Mechanically drilled wells program:

This program will be performed by a "Drilled Well Brigade" consisting of a drilling team, a well development team, a masonry team, and four pump installation and maintenance teams.

ANNEXE 1:  
DESCRIPTION ELARGIE DU PROJET

ARTICLE A:

Eléments de Projet: Siège du projet

La Subvention est amendée comme suit: Le siège du projet sera construit à Bobo-Dioulasso. L'actuel bâtiment administratif du Service Régional de l'HER sera détruit et remplacé par un bâtiment administratif construit par le projet. Le bâtiment abritera tout le personnel actuel du Service Régional de l'HER et les membres du projet HER et le volet sanitaire du projet. Un garage, un magasin, un parking et une clôture seront construits sur un terrain de 4 hectares à Bobo-Dioulasso, terrain fourni par le Gouvernement voltaïque.

3.b. Choix des sites de puits:

La Subvention est amendée comme suit: Le choix des villages pour la construction des puits sera fait par le Comité de Coordination de chacun des 4 organismes Régionaux pour le Développement (ORD). La sélection des sites d'un village sera fait par un hydrogéologue du projet, en accord avec les responsables du village. L'hydrogéologue suivra également l'exécution du forage et la construction du puits et établira un programme d'essai de pompage du puits pour estimer les rendements et déterminer l'importance des couches aquifères.

3.c. Programme de forage des puits:

Ce programme sera réalisé par une "Brigade de Forage" comprenant une équipe de forage, une équipe de développement de puits, une équipe de maçonnerie et quatre équipes d'installation et d'entretien des pompes.

HER will provide a drill rig and support vehicles and the project will provide funds for the support of this equipment. The project will purchase a U.S. manufactured drill rig in FY 1980. Each team except the masonry team will be assisted by a Peace Corps Volunteer.

3.e. Well development and well disinfection:

The Grant is amended to read as follows:

One team consisting of 7 members will perform this task following drilling or digging of wells.

Well development will be accomplished in drilled wells to remove silt, fine sand and other such materials from a zone immediately around the well screen, thereby creating larger passages in the formation through which water can flow more freely towards the well. All wells will be disinfected to destroy disease-producing organisms introduced into the well during construction and the team will be responsible for testing the quality of the water.

3.f. Sanitary seals:

The Grant is amended to read as follows:

All wells will be capped with reinforced concrete to provide a sanitary seal. For hand-dug wells, this seal will be built by the well-digging team and will contain a lockable access port. A separate masonry team, consisting of 7 members, will be responsible for capping mechanically drilled wells.

3.g. Pump installation and maintenance:

The Grant is amended to read as follows:

L'HER fournira une foreuse et des véhicules de support et le projet fournira des fonds pour le support de cet équipement. Le projet commandera une foreuse de fabrication américaine pendant l'année fiscale 1980. Chaque équipe, sauf l'équipe de maçonnerie, sera aidée par un Volontaire du Corps de la Paix.

3.e. Développement et Désinfection des Puits:

La Subvention amendée se lit comme suit:

Une équipe composée de 7 personnes se chargera de ce travail une fois que les puits auront été creusés ou forés.

Une fois les puits creusés, il faut procéder à la mise en valeur, c'est-à-dire : éliminer la boue, le sable fin et d'autres matériaux dans la zone entourant la buse et les filtres de manière à faciliter l'écoulement de l'eau vers le puit. Tous les puits seront désinfectés afin de détruire tous les germes introduits pendant la construction. L'équipe sera chargée de tester la qualité de l'eau.

3.f. Obturation sanitaire:

La Subvention amendée se lit comme suit:

Tous les puits seront coiffés avec du béton armé pour garantir l'hygiène. Les puits creusés à la main seront scellés par l'équipe de puisatiers qui ménagera un orifice d'accès susceptible d'être fermé à clé. Une autre équipe composée de 7 maçons sera chargée d'obturer les puits forés mécaniquement.

3.g. Installation et entretien des pompes:

La Subvention amendée se lit comme suit:

An U.S. manufactured hand-operated Moyno pump will be installed in every well drilled, dug or deepened. Four teams of 3 members each will have the responsibility for installation and a quarterly maintenance visit to all pumps installed. Each team will be assisted by an American Peace Corps Volunteer. During the first year of the project only 2 teams will be formed.

Une Pompe Moyno de fabrication américaine, actionnée manuellement sera installée dans chacun des puits qu'ils aient été creusés manuellement, forés mécaniquement ou tout simplement approfondis. Quatre équipes de 3 personnes chacune seront chargés de l'installation et tous les 3 mois devront vérifier le fonctionnement de chacune des pompes. Chaque équipe sera aidée par un Volontaire du Corps de la Paix américain. Au cours de la 1ère année du projet, deux équipes seulement seront constituées.

4.a. Preventive health education program

The Grant is amended to read as follows:

This program will be the responsibility of the Ministry of Public Health, but will involve close collaboration with the Ministry of Rural Development through the National Supervisory Committee which will provide overall guidance concerning the preventive health education program.

The GOUV will constitute, at the level of each of the project's four ORD's, a Coordinating Committee including representatives of the ORD's, regional public health officers, HER and USAID to supervise the program. USAID will provide the services of 1 or 2 health specialists throughout the life of the project.

ARTICLE B:

Contributions:

Paragraph 4 of the Grant is amended to read as follows: Vehicles, equipment, materials and petroleum products for the well construction program and preventive

4.a. Programme d'éducation sanitaire préventive:

La Subvention amendée se lit comme suit:

Le Ministère de la Santé Publique aura la responsabilité de ce programme, mais le Ministère du Développement Rural y collaborera étroitement, par l'intermédiaire du Comité National de Contrôle qui fournira les indications générales pour la poursuite du programme d'éducation sanitaire préventive. Le Gouvernement voltaïque constituera un Comité Coordinateur au niveau de chacun des 4 ORD du projet, composé de représentants de l'ORD, des responsables régionaux médicaux, de l'HER et de l'USAID qui superviseront le programme.

L'USAID fournira 1 ou 2 spécialistes dans le domaine de la santé pendant toute la durée du projet.

ARTICLE B:

Contributions:

Le paragraphe 4 de la Subvention est amendé et se lit comme suit: Des véhicules, de l'équipement, des matériaux et des produits pétroliers pour le programme de

health education program except as listed in GOVV inputs. The project will provide an U.S. manufactured drill rig in FY 1980.

construction de puits et le programme d'éducation sanitaire préventive, sauf les contributions du Gouvernement voltaïque décrites. Le projet fournira une foreuse de fabrication américaine au cours de l'année fiscale 1980.

ARTICLE D:

ARTICLE D:

Implementation:

Exécution:

The Grant is amended by adding the following responsibility to HER: participate in the Coordinating Committee at ORD level.

La subvention est amendée par l'addition de la responsabilité suivante pour l'HER: participer au Comité Coordinateur au niveau de l'ORD.

ARTICLE E:

ARTICLE E:

Project financial plan:

Plan financier du projet:

The project financial plan is amended as follows:

Le plan financier du projet est amendé comme suit:

(see tables Article E, Attachments 1, 2 and 3).

(voir tableaux Article E, Annexes 1, 2 et 3).

Article E  
Attachment 1

RURAL WATER SUPPLY  
HYDRAULIQUE VILLAGEOISE

Source and Application of Funds - U.S. \$ Thousands  
(Source et Application des Fonds - E.U. \$ Mille)

Amount for an Incrementally Funded Project  
(Montant pour un Projet financé par Tranches)

PROJECT INPUTS (REALISATIONS DU PROJET)	Obligation Fiscal Year 1980		Obligations to date			Anticipated Life of Project Funding			
	Obligation Année 1980		Contributions jusqu'à aujourd'hui			Prévisions Durée du Projet			
	US AID FX	LC	GRANTEE LC	US AID FX	LC	GRANTEE LC	US AID FX	LC	GRANTEE LC
<u>Personnel</u>									
Long-term (long terme)	57	14	-	446	111	-	1,516	379	-
Short-term (court-terme)	-	-	-	75	9	-	311	35	-
<u>Commodities (Matériels)</u>									
Vehicles (véhicules)	99	120	-	970	120	-	1,432	234	-
Other equipment (autre équipement)	251	548	-	1,173	608	364	1,900	732	364
Materials and Tools (matériel et outils)	205	281	-	428	403	-	700	1,380	-
POL/Maintenance (EML/Entretien)	-	129	-	-	230	-	-	740	-
<u>Training (Formation)</u>									
U.S. participants (part. américains)	45	-	-	90	-	-	90	-	-
In-country (dans le pays)	-	-	-	-	24	-	-	107	-
<u>Other Costs (Autres Coûts)</u>									
Local Salaries (salaires locaux)	-	475	34	-	626	62	-	2,077	168
Construction	-	276	-	-	622	400	-	647	400
Sub-total	657	11,243	34	3,182	2,817	832	5,945	6,331	932
GRAND TOTAL		2,500	34		6,000	832		12,280	932

FX- Foreign Exchange (Devises étrangères)  
LC- Local Currency (Monnaie locale)

Article E  
Attachment 2

RURAL WATER SUPPLY (Wells Component)  
HYDRAULIQUE VILLAGEOISE (Composante Puits)

Project no. 686-0228 Source and Application of USAID Funds - U.S. \$ Thousands  
Project no. 686-0228 (Source et Application des Fonds USAID - E.U. \$ Mille)

Amount for Incrementally Funded Project by Year  
(Montant pour un Projet financé par Tranches par An)

PROJECT INPUTS (REPRESENTATIONS DU PROJET)	FY 79		FY 80		FY 81		FY 82		FY 83		Life of project (Durée du projet)	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
<u>Personnel</u>												
Long-term (long-terme)	254	63	-	-	150	38	312	78	208	52	924	231
Short-term (court-terme)	51	6	-	-	62	7	54	6	65	7	232	26
<u>Commodities (Matériels)</u>												
Vehicles (véhicules)	851	-	65	76	158	13	224	16	60	5	1,356	110
Other equipment (autre équipement)	908	60	232	548	529	64	168	60	30	-	1,867	732
Materials and tools (matériel et outils)	223	187	205	259	243	408	29	409	-	27	700	1,290
POL (EKL=Essence/huile/lubrifiants)	-	99	-	104	-	78	-	140	-	113	-	534
<u>Training (Formation)</u>												
U.S. participants (part. américains)	30	-	30	-	-	-	-	-	-	-	60	-
In-country (dans le pays)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Other Costs (autres coûts)</u>												
Local salaries (salaires locaux)	-	146	-	324	-	341	-	358	-	108	-	1,277
Construction	-	346	-	270	-	-	-	-	-	-	-	616
Sub-total	2,317	907	532	1,581	1,142	949	787	1,067	363	312	5,141	14,816
GRAND TOTAL	3,224		2,113		2,091		1,854		675		9,957	

FX - Foreign Exchange (Devises étrangères)  
LC - Local Currency (monnaie locale)

RURAL WATER SUPPLY (Health Component)  
HYDRAULIQUE VILLAGEOISE (Composante Santé)

Project no. 686-0228  
Project no. 686-0228

Source and Application of USAID Funds - U.S. \$/Thousands  
(Source et Application des Fonds USAID - E.U. \$ Mille)

Amount for Incrementally Funded Project by Year  
(Montant pour un Projet financé par Tranches par An)

PROJECT INPUTS (REALISATIONS DU PROJET)	FY 79		FY 80		FY 81		FY 82		FY 83		Life of project (Durée du projet)	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
<u>Personnel</u>												
Long-term (long-terme)	135	34	57	14	192	48	104	26	104	26	592	148
Short-term (court-terme)	24	3	-	-	12	1	-	-	43	5	79	9
<u>Commodities (Matériels)</u>												
Vehicles (véhicules)	20	-	34	44	-	35	20	37	-	8	74	124
Other equipment (autre équipement)	14	-	19	-	-	-	-	-	-	-	33	-
Materials and Tools (matériel et outils)	-	-	-	22	-	18	-	20	-	30	-	90
POL (EHL)	-	2	-	25	-	45	-	64	-	70	-	126
<u>Training (Formation)</u>												
U.S. Participants (Part. américains)	15	-	15	-	-	-	-	-	-	-	30	-
In-country (dans le pays)	-	24	-	-	-	32	-	31	-	20	-	107
<u>Other costs (autres coûts)</u>												
Local salaries (salaires locaux)	-	5	-	151	-	219	-	229	-	196	-	800
Construction	-	-	-	6	-	7	-	9	-	9	-	31
Sub-total	208	68	125	262	204	405	124	416	147	364	808	1515
GRAND TOTAL	276		387		609		540		511		2,323	

FX - Foreign Exchange (devises étrangères)  
LC - Local Currency (monnaie locale)

The rest of the financial plan remains the same.

Le reste du plan financier reste inchangé.

This Amendment shall be effective upon execution. Except as specifically modified and amended hereby, the Grant Agreement shall remain in full force and effect. All references in said Agreement to the words "Grant Agreement" or "this Agreement" shall be deemed to mean "The Grant Agreement as amended".

Cet Amendement prendra effet à partir de la date d'exécution. Hormis ces modifications spéciales apportées par cet Amendement, l'Accord de Subvention restera inchangé et légalement valide. Toutes références dans ledit Accord aux expressions "Accord de Subvention" ou "cet Accord" devront être comprises comme "Accord de Subvention tel qu'amendé".

IN WITNESS WHEREOF, the United States of America and the Government of the Republic of Upper Volta, each acting through its duly authorized representative, have caused this Amendment to be signed.

EN FOI DE QUOI, le Gouvernement de la République de Haute-Volta et le Gouvernement des Etats-Unis d'Amérique, chacun agissant par l'intermédiaire de son représentant dûment mandaté, ont fait signer cet Amendement.

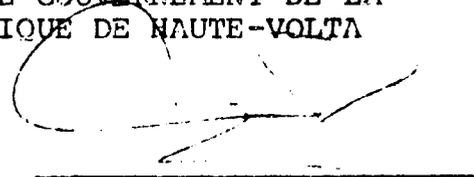
FOR THE GOVERNMENT OF THE UNITED STATES OF AMERICA

POUR LE GOUVERNEMENT DE LA REPUBLIQUE DE HAUTE-VOLTA

By:



Par:



Thomas D. Beyatt

Georges Sanogoh

Title: Ambassador of the United States of America

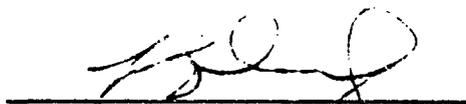
Titre: Ministre du Plan et de la Coopération

Date: April 1<sup>st</sup>, 1980

Date: 1<sup>er</sup> avril 1980

FUNDS AVAILABLE:

By:



B. Loc Eckersley

Title: Controller/USAID/Upper Volta