OFFICIAL PROJECT DOCUMENT

PDBAU587

49

PROJECT EVALUATION SUMMARY (PES) -- PART I

1. PROJECT TITLE: CAR RURAL DEVELOPMENT

2. PROJECT NUMBER: 676-0015

3. MISSION/AID/W OFFICE: USAID/CAMEROON

4. EVALUATION NUMBER (Enter the number assigned by the responsible unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY): ____

☒ REGULAR EVALUATION ☐ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES

A. First PAC-AG or Equivalent	B. First Obligation Expected	C. First Input Delivery
FY 82	FY 82	FY 86

6. ESTIMATED PROJECT FUNDING (000)

A. Total	$ 1526.2
B. U.S.	$ 1000

7. PERIOD COVERED BY EVALUATION

From (mo/yr) 6/82

To (mo/yr) 9/84

Date of Evaluation Review 1/3/85

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or recommendations, plus those items needing further action. (NOTE: Include decisions which authorize AID/W or implementing action to modify type or direction of, e.g., logframe, SOW, PIO/s which will place in evidence requests.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. AID bilateral involvement in fisheries in CAR be concluded at the PACD of this project. Peace Corps be encouraged to continue their efforts in establishing new commercial fish centers or integrated livestock operations, but to search for alternative sources of funding.	DOMINESSY	12/31/85
2. Both bee culture and rice culture show economic potential and AID should consider engaging a competent organization, such as a PVO, to make a concentrated effort in these areas in a possible phase II project. If pursued, the design should be completed ASAP and implementation should overlap with current project.	DOMINESSY/ SCOTT	8/85
3. If a phase II is pursued, funds remaining in the Rural Development Project should be de-obligated and re-obligated in the new project.	DOMINESSY, KOSHELEFF	8/85

BEST AVAILABLE DOCUMENT

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☐ Project Paper
- ☐ Financial Plan
- ☐ Logical Framework
- ☒ Project Agreement
- ☐ Implementation Plan e.g., CPI Network
- ☐ PIO/T
- ☐ PIO/C
- ☐ PIO/P
- ☐ Other (Specify) ____
- ☐ Other (Specify) ____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☒ Continue Project Without Change
- B. ☐ Change Project Design and/or ☐ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER BANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Larry Dominessy, Project Officer
Dr. Herbert Butler, Social/Cultural anthropologist
Ms. Christine Michele, Agronomist
Ms. Elizabeth Ann Bourke, Financial Analyst
Paul Olson, Peace Corps associate director
Mr. Gbado Basile, Technical Director, GOCAR

12. Mission/AID/W Office Director Approval

Signature: [signature]

Typed Name: Herbert N. Miller

Date: 3/7/85

AID 1330-15 (3-78)

MID TERM EVALUATION OF THE CAR RURAL DEVELOPMENT PROJECT

I. SUMMARY

The Rural Development Project is a well managed project which receives enthusiastic support of both the GOCAR and Peace Corps. The project has a great number of individuals involved in its three components, however, the effectiveness of this involvement is not uniform throughout each component. The project has made progress toward achieving its goal and purpose, however, it will not be able to achieve its objectives. The major reason for this is a too over-simplistic design which either did not identify critical constraints to each component, or if identified, did not provide the proper resources or strategy to address the problems.

The purpose statement generally is inaccurate asking for increased production when efficiency and financial viability would be more appropriate objectives. Particularly in the rice and bee components, it can be said that the major accomplishment of the project has been to identify constraints to real development in these areas. However, the current project has neither the resources nor enough time remaining to address them.

In general, the project evaluators concluded that USAID, and perhaps even Peace Corps, involvement in inland fisheries in CAR has come to maturity and was reaching a stage of diminishing returns. Both rice culture and bee culture show potential but present some challenging problems. The evaluators recommended that if activities were to continue in these areas that a project redesign be undertaken by a competent organization who also would be able to implement the revised project.

II. Introduction

The Rural Development Project consists of three components - rice, fish and bee culture. Although logistical support for all three components comes from the same administrative headquarters and all components involve Peace Corps Volunteers, each activity is distinctive. Therefore, beyond general remarks of project impressions and evaluation methodology, each component will be treated separately. Final recommendations for the project as a whole will be summarized in the final section of the report.

The general impression that one obtains of the project is one of a project that is well administered, well accepted by the Government and people of the Central African Republic, and one that is bringing about change at the grass roots level. The GOCAR has provided excellent leadership for the project, the Peace Corps has provided enthusiastic and capable volunteers, USAID has provided an outstanding technical assistance administrative specialist, and the American Embassy has provided its continuous interest as well as logistical support when requested. Though the project financially is small, it involves a great number of people and has activities scattered throughout half of the country. Project personnel have done a tremendous job in organizing project support, logistics and reporting systems. This has been particularly impressive since there is no resident AID personnel located in CAR. Project personnel have managed a sophisticated local currency account almost perfectly, procurement hasproceded on schedule, and project equipment has been well managed and well cared for.

There is, however, a very pervasive indication that the project design was simplistic and did not identify the underlying constraints in each sector. The project paper did identify serious and over-riding management and infrastructure constraints faced by the rice centers at Sakaye and Bozoum. However, the Project does not have the material and human resources to address these constraints, an absolute necessity if the Centers are to become economically viable. The project paper does not begin to identify the social and human constraints to beekeeping in the CAR and makes inappropriate recommendations for its promotion. In fish farming, the project paper is contrary to Peace Corps current philosophy of a small number of highly productive farmers versus a large number of marginal farmers. Although making progress in increasing production in all three project components, the real success of the project to date may be the foundation it could lay for future work in each sector.

III. EVALUATION METHODOLOGY

This evaluation is a regularly scheduled mid-term evaluation. It is of particular interest to project implementors because it provides a measure of project progress and verifies several hypotheses made in project design. In rice production, the hypotheses was that rice production would be re-established at rice centers that had been successfully operated in the past. However, the Centers had not been operated as independent economic units and with the departure of former overseers, the Taiwanese, serious management problems evolved. In fish production, the hypotheses was that well established programs being operated by Peace Corps and others indicated that the operation of an extension service and strategically placed fingerling production centers would be the most appropriate means of aiding CAR fish farmers. However, fingerling production centers have almost been abandoned by the project. In bee culture, the hypotheses was that technology involved in the production, purification and commercialization of bee products was simple and therefore the major thrust of the project would be the formation of village-level producer societies of cooperatives. In fact, the project is still struggling to identify an appropriate technology to extend to small producers. This is not to say that a tremendous amount of progress has not been made in all areas of project intervention, but to say that this progress often has been to identify what appears to be more basic constraints to extending each type of technology.

The evaluation plan combined the scope of work outlined in the Project Paper and those concerns raised by project personnel before the evaluation took place. The scope consisted of the following:

1. Determine the improvement in rice production, management procedures and agricultural cooperative organization on the rice centers at Bozoum and Sakaye with a view toward financial viability of the centers.

2. Examine the use and adaptation of new equipment and improved rice varieties at Bozoum and Sakaye.

3. Evaluate the effectiveness of the extension program in bee culture, progress in producing honey and beeswax, and the adaptability of modern hives and improved traditional hives.

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4. Evaluate the performance of the fish stations being improved under the project and the effectiveness of the fisheries extension program. Study the performance of fish farmers where extension efforts are not supported by fish stations as compared to those which are.

5. Examine the status of the provision of technical assistance and commodity inputs under the project.

6. Examine the continued validity of project objectives.

The evaluation was conducted using a series of consultants over a considerable time period. For the most part, these consultants were not engaged merely to evaluate the performance of the project, but were engaged to study a specific problem which had arisen in the course of project implementation and to formulate their advice of what the project might do to better its performance. These consultants and their areas of study that contributed to this report are as follows:

1. Dr. D. Janakiram, rice breeder, IITA, visited CAR from October 9 to 13, 1983 to examine cultivation practices being followed, make observations on improved rice varieties introduced by the project, advise center directors on disease and pest control, and recommend short-term training.

2. Ms. Christine Michele,. agronomist, visited CAR from January 19 to February 1, 1984, to analyze farm management techniques used at the Sakaye and Bozoum rice centers.

3. Dr. Herbert Butler, social/cultural anthropologist, visited CAR from June 15 to July 5, 1984, as part of the formal evaluation team for the project. He was responsible for making observations on social/cultural issues for all three components of the project.

4. Ms. Elizabeth Ann Bourke visited CAR from July 12 to August 10, 1984, to complete a financial analysis and corresponding recommendations for the rice centers at Bozoum and Sakaye.

The key individual from the GOCAR was Mr. Gbodo Basile, Technical Director for Rice and Bees in the project and Chief of Service for Studies and Projects of the Ministry of Agriculture. Larry Dominessy, USAID Program Coordinator for CAR, represented USAID and compiled the final draft of the evaluation report.

In all cases the method used to evaluate and analyse was personal interviews, personal observations, and review of relevant documentation and project progress reports.

IV. INPUTS

For the project as a whole, the logistical arrangements being used are briefly as follows: Contracting for the technical assistance administrator was done directly by USAID through a personal services contract. Short-term consultants are arranged by USAID/Cameroon. Large item procurement such as vehicles and rice equipment were done by the American Embassy in Bangui with

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project personnel doing necessary ground work. Small item procurement, maintenance, and project field support is being done through a project local currency account managed by the GOCAR project manager and TA administrator. Training is organized either by USAID/Cameroon or through use of the local currency account depending upon the type and location of training.

V. BEE CULTURE

A. External Factors: The Project Paper assumed that volunteer bee culture experts would be available and that Peace Corps would be able to field them on schedule. However, Peace Corps was only able to field two of the programmed three volunteers and for personal reasons one of these volunteers terminated his Peace Corps service very shortly after arriving in the field. The one volunteer who is working in the project is extremely competent and dedicated, but attainment of project objectives has suffered because of the lack of sufficient volunteers. The GOCAR also has had difficulty in assigning proper personnel. The most qualified beekeeping extension agent in the CAR was recently transferred to work in animal traction. Since there is no beekeeping training program in the country, a qualified replacement cannot be found. A recent graduate of one of CAR's agricultural colleges who worked with the French beekeeping project and wrote his thesis on beekeeping in the CAR is also now working in animal traction. One of the individuals assigned as counterpart to the Peace Corps volunteers is terribly afraid of bees. Another claims that his transfer to the bee project kept him from going to Egypt on a scholarship to study in his specialty - small animal raising. This, naturally, affected his attitude towards his new job.

Each time someone is needed by the CAR Bee Service, he must be completely trained. The Peace Corps counterparts receive the same training as the extension agents (which has caused some embarassement when the agents get better grades and do better field work than their future supervisors). If the CAR government is serious about its commitment to apiculture development, it must concentrate on setting up programs of bee training in its agricultural colleges. Efforts need to be directed towards developing appropriate curricula for these programs. Such training would provide a source of trained technicians to fill future vacancies within the Bee Service. If the present system of indiscriminate assignments and transfers is continued, the CAR's beekeeping development program will remain at ground zero.

On the positive side, it appears that at least one large merchandising company has begun to show greater interest in wax buying as a result of the project's efforts.

B. Inputs: As stated previously, the lack of Peace Corps Volunteers has had a serious impact on the project. The vacancies have existed for about one year although at the time of the evaluation two more volunteers were in training and were soon to be assigned to the field.

The project has been introducing both modern Kenya Top-Bar Hives (KTHB) as well as improved Semi-Traditional Hives. Neither of these appears to be appropriate technology for village beekeepers in CAR. Starting with the KTBH, the main reasons can be summed up under the catagories of cost, availability of materials, longevity, theft, and management.

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1. Cost: The Kenya topbar hive is expensive. The target population of the project (small-scale farmers) does not have the investment capital to buy these hives on their own. The idea of reinvesting profits is new and foreign to most villagers. The chances that any of the beekeepers receiving topbar hives will use the money earned from honey/wax sales to buy new hives and expand their operations are practically zero. Beekeepers are used to making their hives from free, locally available materials. There is no evidence to date that the Kenya Top-Bar Hive is more cost-effective for CAR beekeepers than the traditional hives in use. The protective clothing and smokers needed to start a Top-Bar Hive apiary add to the startup costs.
2. Availability of Materials: The materials needed for making, installing, and managing KTBH's are not locally available in beekeeping villages. No one has been able to produce a workable smoker in the CAR so these necessary management tools must be imported from France. Even in big cities like Bouar it is often impossible to find the grease needed to keep ants off hive wires and the materials suitable for making beesuits. Topbars must be cut to exact specifications. This is very difficult to do by hand so project topbars are made in a carpentry shop in Bangui.

3. Longevity: The lifespan of a KTBH in the CAR is not yet known. They are subject to damage by termites, ants, woodborers, rot, and fungus. Treating wood with preservatives is expensive and cannot be done in the villages. The quality of maintenance work done by participating beekeepers in KTBH apiaries has been very poor and has left hives exposed to damage by bushfires. There are problems with support poles falling over because of water damage, vandalism, poor installation, and damage caused by cows and pigs wandering through the apiary. Even with excellent harvests, it would take two years of production for a KTBH to pay for itself. How long the materials would hold up after that is unknown.

4. Theft and Vandalism: Because these hives must be placed a good distance from the villages to protect inhabitants, they are vulnerable to theft and vandalism. Vandalism causes the bees to abscond (i.e. to abondon the hive). Often after a colony of bees has left, there is evidence of vandalism (sticks in the flight holes, stolen topbars, damage from being hit with rocks, flight holes plugged with grease, etc.). All materials used in making the KTBH are useful to villagers. Even wire grease is stolen for use on bicycles and to make medicinal lotions. Beekeepers always report that their biggest problem is theft of hives. The KTBH's are much easier to steal than traditional hives which are placed high up in trees. One capture hive has already been stolen. Three different attempts to rob KTBH's have been reported and the bees subsequently absconded.

4. Management: "Beekeeping has great potential for development but is not easily or quickly learned" (International Agency for Apicultural Development). The KTBH is relatively untested in the Central African Republic. All bee service and project personnel (administrators, volunteers, extension agents, counterparts) are learning mostly from experience or by gleaning information about the KTBH as used in other tropical countries. Little is known about colony migrations. The absconding and defensive behaviors of the CAR bee seriously limits their management.

For as long as the human/bee relationship has existed in Central Africa, people have smoked and burned bees out of their homes (or killed them in

some other way) and taken all the combs and honey. The basic ideas that govern KTBH management - conservation of the colony, leaving enough honey for the bees - go against all traditional experience. The jump from beehunting and beehaving to beekeeping with a KTBH involves changing attitudes and behaviors that have been traditionally successful for centuries. Since bee service and project personnel are still having trouble understanding basic bee management using the KTBH, it is too soon to try to teach this technology to traditional beekeepers.

The Semi-Traditional Hive used in the CAR is another example of inappropriate technology. When constructed out of sticks or bamboo, these hives cannot be expected to last more than 2 years. Although it is theoretically possible to take off the old straw covering and put on a new one at the end of two years, this seems highly impractical in view of the disturbance such an operation would cause (most probably resulting in crushed combs, a balled queen, and the absconding of the colony). If the hives are made from treebark or tree trunks this would encourage killing a lot of trees. In view of the advancing Sahel and the fact that most African nations that traditionally use trees for hivemaking are seeking alternatives, it does not appear wise to encourage these types of hives. Again, there is no evidence that the benefits of this type of hive are worth the extra time and effort needed for its management.

C. Outputs

A tabulation of the approximate outputs of the project until June 30, 1984, are as follows:

Item	Project Goal	Status to Date
Extension agents trained	30	15
Consultant services provided	3 pm	0
Apiculture Center Director trained		Conference attendance programmed
Apiculture manual, posters and incentive buttons produced		Not started
Experimental KTBH hives distributed	1,833	335
Improved traditional hives in use	172,000	See notes below
Socio-economic study of beekeeping completed		In-process
Kilograms of wax marketed per year	129,000	12,650

Notes on each of the items above:

Extension agents trained: The lack of two of the three scheduled Peace Corps Volunteers has had a marked effect on all aspects of the project. Realizing that Peace Corps volunteers or other foreign technicians were only temporary assistance, the Bee Service decided to train counterparts for the volunteers who would be able to fill the volunteer's role upon their departure. In collaboration with the parallel French apiculture project (operating in the Kaga-Bandoro prefecture), a formal workshop was conducted January 9-28, 1984. A total of 11 extension agents were trained (6 for Ouham Prefecture and 5 for Nana Membere Prefecture) as well as 4 counterparts under the title of "Livestock Technicians". The lack of clear direction as to the proper technology may suggest the decision to increase

the number of extension agents significantly be held up, the point being that extension agents should be presenting a reasonably proven technology.

Consultant services provided: The Project Paper provides for consultant(s) with experience in bee culture projects in developing countries to be engaged to conduct management and technical training sessions in CAR for Apiculture Center staff. The lack of Peace Corps Volunteers, the lack of a clear direction for the bee component of the project, and lack of easy access to such specialized expertise have prevented the use of these consultancies. Future use should depend upon the continuing interest USAID shows in bee culture.

Apiculture Center Director Trained: The Project Paper provides for short-term training for the Director. A short-term course in apiculture technology was arranged in the States, but the course was cancelled for lack of sufficient participation. The Director is scheduled to attend the International Tropical Beekeeping Conference in November. The evaluation team believes that any future training should take place in an African country where apiculture is well developed rather than in the U.S. or Europe. There is a history of experimentation and adaptation in the African milieu which such a person should be aware of.

Apiculture manual, posters and incentive buttons produced: Although some funds have been expended for materials for the bee workshop, project personnel have found that the technology being introduced by the project to be of somewhat questionable value and hence the need to be careful in its promotion. It is doubtful if promotional materials will be of much value in CAR for the next one to two years until appropriate technology is produced.

Experimental KTBH hives: As stated in the previous section, the KTBH hive is not well adapted to the Central African Republic and its use should be restricted to schools and colleges as a teaching aid and for use to gather information on the biology and management of the CAR honeybee. Each extension agent should have his own KTBH apiary for his own education and to allow the Bee Service to see what potential the KTBH has in CAR. They also can be used to train Bee Service personnel. The number being made probably should not go much beyond what already has been produced.

The benefits of a KTBH - conservation of bee colonies, increasing honey and wax production, improving the quality of extracted honey - can be obtained in other ways. Swarm generating centers can be set up around the country. These are hives whose sole purpose is to produce swarms to increase the local bee population.

Improved traditional hives: As stated in the previous section, this is another example of inappropriate technology for CAR which, at this time, is even repudiated by some of their French inventors. Any effort to continue their production should cease.

Socio-economic study: Although there has been some study on the socio-economic aspects of bee farming, more work should be done regarding 1) the sexual division of labor and target groups; 2) degree of competition from other tasks during the honey/wax harvesting period - which is also the time for rainy season cultivation; 3) the feasibility of, or best approach to "pre-cooperative" organization which can reconcile the facts of social

structure with optimal market exploitation (in view of organizing clusters of women of a single village to render and sell beeswax, and 4) the selection process of assuring that the best candidate possible is selected to use trial KTBH hives which the project is distributing. A possible final socio-economic factor which needs to be examined is the indigenous markets and trade networks critical to the marketing of beeswax.

Kilograms of wax marketed per year: It is very difficult to measure what impact the project has had. The economic analysis in the Project Paper is based upon the adaptation of 175,000 new traditional hives, a concept which the project has abandoned. The project's main effort has been to improve marketing such that wax already produced in traditional hives is not discarded. It can be said with certainty that the beeswax sales of 650 kgs from Nana-Mambere Province was a result of the project since this area has no history of commercial beeswax sales. This is also the area where the only Peace Corps Volunteer is working. However, the 12,000 kgs reported from Ouham Province is in an area where wax has been produced and sold for many years, although the project's effort in organizing markets certainly had a positive effect.

D. Purpose: The project purpose is to increase small farmer production of beeswax and honey. EOPS are that improved traditional hives are producing 15 kgs of honey and .75 kgs of wax and that modern hives are producing 20 kgs of honey and 1.25 kgs of wax. At this time, neither improved traditional hives nor modern hives appear to be appropriate technology in CAR. Indeed, it appears as if much more work should be done within the existing traditional sector. Technologies should be allowed to evolve as apiculture habits change in CAR.

The impression one has of the apiculture component of the project is of an activity that was not sufficiently researched while the project was being designed. Although the problem was reasonably well defined, the strategy to address the problem is somewhat lacking in sophistication. The Project Paper identifies both production and marketing as the primary areas of activity. These were to be addressed by the formation of pre-cooperatives to market wax and honey and by the introduction of improved technology to increase wax and honey production. After two years of experience project personnel are beginning to realize that marketing should be the primary point of research and effort instead of production. As an example, in the Nana-Mambere Prefecture the largest holders of beeswax are the honeybeer makers (Douma Ladies) who receive their honey for beer making in the form of honey and nectar-containing combs which are crushed together. They obtain their supply through rural markets, neighboring villagers, or through their beekeeping or honey hunting spouses. The wax generally is thrown away after the beer is made. The Peace Corps volunteer decided to direct her major activities in wax producing toward these individuals. Interested women are being helped to form pre-cooperatives to share the work of extracting and selling their beeswax. Pre-cooperatives appear to be quite important. Wax rendering requires a considerable amount of work and only when quantities of over 20 kgs are done is it worth the expense and effort.

The problems are by no means uniform throughout the country or straight forward. There is the question of who owns the comb. In the Ouham area male beekeepers sell their honey to Douma Ladies but keep the comb. In the

Nana-Mambere Prefecture the Douma Ladies purchase honey and comb together. The relative attractiveness of the market may determine who trys to maintain control of the comb. Even this presents problems since if beekeepers were convinced to remove combs before selling honey to Douma Ladies, this would mean a changing of the traditional and economic organization of the Douma trade. Removing the combs reduces the volume of the product and beekeepers are afraid they would lose money if they sold only honey. Douma Ladies will not be easily convinced that a quarter of a pot of honey will produce the same amount of honeybeer as a full pot of honey and combs. They believe that the combs add flavor and body to the beer and are not at all interested in buying only honey. Most of their customers agree that the addition of comb debri makes a better beer. If a beekeeper took out the combs before selling the honey, it would mean much more work for him (or his wife) whereas honeybeer women have only to continue the douma-making process to obtain clean comb pieces ready for wax rendering.

Even marketing presents some peculiar problems. The project has placed much emphasis on organizing yearly wax markets in the beekeeping villages. Although this system seems to be working in other areas of the country where wax has been produced and sold for many years, there are reasons why this is not the best strategy for developing wax production in the new project regions of the Nana-Mambere and the Ouham Pende. A once-yearly wax market requires much organisation and makes the beekeepers totally dependent upon itinerate wax buyers. Definite dates can not be established far in advance and must often be changed due to rain, truck breakdowns or the whims of the buyers. If only one buyer comes to the wax market, the wax producers are forced to accept whatever price he sets for the wax. Even if there is more than one buyer, they can work together to fix the price of wax and thus keep the beekeepers from getting a fair deal. Such markets necessitate the stocking of wax throughout the honey harvest season. As already mentioned, it is hard to convince people who do not have confidence in the marketability of wax to make it and store it on a regular basis when they are not getting any financial rewards for their efforts. Wax makers also become discouraged listening to the ridicule of friends and neighbors who say they are being tricked and no one will come to buy their wax. As a result, much wax is never extracted. Since there is no financial incentive to make people render their wax as quickly as possible, empty combs are stored for extended periods of time and are subject to damage by waxmoths, rot, and rats. An alternative to yearly wax markets is the use of middleman wax buyers at weekly village markets to help consolidate the wax so it is of interest to the larger buyers. An obstacle to this in the CAR is a law which requires wax buyers to purchase a permit. The permit is expensive and small businessmen are not able to find large enough quantities of wax to justify the expense.

Another problem involves the concept of "pre-cooperative" as it relates to local social structure. On one level, it is evident that some groups of villages might be willing to get together, say, for a seminar or general meeting, while others apparently will not, due to jealousies or past inter village problems. Ccoperation, except for limited kinship groups in a limited way at that, does not seem to be the outstanding social feature in CAR that it is in many African societies. Even the kind of "pre-cooperative" effort which the Peace Corps volunteer suggests for women, pooling efforts and resources to render wax and sell it, may not be too successful except among limited groups of close kinspeople. All that seems

to surface suggests that efforts in the direction of broader cooperative efforts rather than a more direct appeal to individual self interest (at this time) may be disappointing and could well confuse the main issue and reduce the gains and motivation to continue.

In summary, it can be stated with reasonable certainty that this component of the project will have little chance of significantly affecting honey and wax production in CAR unless it improves its methodology. The project should adopt a phase-by-phase approach to the various aspects of its program (hive technology, socio-economic study of traditional apiculture, wax processing, marketing, and extension teaching) rather than trying to deal with them all at once. It is quite clear that any attempt to do this will require considerably longer than the 14 months remaining in the project.

E. Goal: The goal of the project is to increase incomes of the target rural population through agricultural production activities. The project undoubtedly has had some effect on the amount of beeswax sold although it probably has had an insignificant effect on the amount of honey and wax produced. As stated previously, the reason for this is the inadequate investigation into the constraints of apiculture during project design and the resulting poor selection of technology and interventions to be introduced. It now appears that honey and wax production can be increased merely by increasing the number of traditional hives, especially in those areas where beekeeping has not been practised before, and by better management of traditional hives. The benefits of Kenya Topbar Hives - conservation of bee colonies, increasing honey and wax production, improving the quality of extracted honey - can be obtained in other ways. Swarm generating centers can be set up around the country. These are hives whose sole purpose is to produce swarms to increase the local bee population. Honey and wax production can be increased by increasing the numbers of traditional hives, especially in those areas where beekeeping has not been practiced before, and by better management of traditional hives. Honey is the same whether it comes from a Kenya Top-Bar Hive, a traditional hive, or a tree trunk. The way to improve the quality of honey is to improve the methods of harvesting and extracting it.

F. Beneficiaries: The bee farming enterprise has the unique potential of serving both men and women. The bee farmer sells his honey to beer makers - women exclusively - so both benefit. The increased production should increase the amount of honey and honey beer, benefiting them even more. It appears that the higher the price of beeswax the more men will try to control its processing and sale since men generally control high profit goods. Children are also involved in beeswax rendering and though there is no evidence of them being rewarded for their efforts directly. It seems reasonable to assume that if wax rendering became too unprofitable, children could possibly do it for extra money.

If the KTBH hive or a substitute can be constructed locally it will generate work for local carpenters. If there is any degree of success in organizing villagers for marketing beeswax, the same structure may lend itself to other activities and thus lay the groundwork for greater social solidarity and cooperative action which would be a significant contribution to this society.

In a more general sense, in a country that badly needs the development of an entrepreneurial class to provide goods and services, this may be one of many steps toward that goal which would benefit the whole country.

The government benefits from the export of beeswax in the form of taxes and an improved trade balance.

G. Unplanned Effects: The somewhat ambiguous nature of the sexual division of labor as far as wax rendering and selling is concerned, plus the fact that wax was often discarded in the past (and was thus a "free" good) but now has market value as a "scarce" good, may be leading to some tension over the control and profit of beeswax in the domestic unit. The problems of seeking to organize clusters of villages has run into some problems due to old conflicts and jealousies. It is not clear how serious or widespread this might be.

The reported effort of chiefs to control some of the KTBH hives is an expected circumstance, but it could undermine efforts to create the best social climate around the experiment.

Another unplanned effect is the realization that Kenya topbar hives do have a value as teaching aids in schools and colleges to study social structures as well as provide honey and wax production.

H. Lessons Learned: Adequate feasibility and technical studies should be completed at the time of project design. Although this project is making a positive impact, its impact could be much more significant if a more carefully researched approach had been used in the project. There appears to be a good potential for apiculture in the CAR and it merits further development work.

VI. RICE CULTURE

A. External Factors: There are two external factors which have affected the rice culture portion of the project. First, a drought in the first half of 1983 essentially brought all rice production to a halt - irrigated as well as rain-fed rice. Believing that the country was beginning a protracted drought period, the GOCAR reacted by asking for outside food aid assistance. The Japanese government responded by offering three shipments of rice. The drought ended abruptly in mid 1983 and the second shipment of Japanese rice was flooding the market at the time the first harvest was being made at the Sakaye and Bozoum rice centers. With Japanese rice plentiful and at three-quarters the price of project-produced rice, the rice centers were unable to sell their rice. The problem was brought to the attention of USAID and the American Embassy by contract agronomist Christine Michele who was performing a study of farm management problems at the centers. The American Ambassador discussed the problem with both the GOCAR and the Japanese diplomatic representative which resulted in the cancellation of the third and final donation of rice, showing the seriousness with which the GOCAR treated the problem once it was revealed.

The Project Paper assumed that Peace Corps volunteers to be assigned to the rice centers would arrive on schedule. Although this was true, the volunteer assigned to Bozoum left abruptly about mid-way in his tour because of continual robberies at his residence. Peace Corps has been unable to replace this volunteer to date.

B. Inputs: Project personnel have done an outstanding job of procuring inputs as scheduled by the Project Paper. However, some problems have arisen.

Spare parts for the rice equipment purchased from Japan have been a critical problem. Project personnel were not accustomed to the machinery bought and could not foresee what their needs would be in spare parts. An example is rollers for the rice huller which need regular replacement. The sets delivered with the machines were rapidly used and resupply from Japan took several months resulting in long delays in processing rice. The new Japanese rice tillers are not as robust as the old and mostly worn out Taiwanese ones they replaced and the project has experienced considerable maintenance problems. As specified in the Project Paper, the Project purchased rice threshers and rice winnowers from CENEEMA, a Government of Cameroon center for the design and testing of agricultural machines. These machines were quickly discarded by the rice centers because of their inferior functioning as compared to much older Taiwanese machines and because of their fragility. The evaluators raised the question that if proper trained in their use, might the machines be better accepted. In any event, some action will need to take place because the well used Taiwanese machines are quickly coming to the end of their useful life.

The project provided for the purchase of an irrigation pump and engine to bring a 42 hectare block of rice paddies back into production. This block had been abandoned for some time and quickly grew over with brush and grass. Project design personnel identified the site of an irrigation pump installed by the Taiwanese. Although long since removed, various parts of the pump remained near the site. While yet to be installed, project personnel have purchased a pump of approximately the same size as the one previously installed. However, now it appears that there were two pumps installed rather than one, and perhaps even a third pump to assist in irrigating the second block of paddies which were considered gravity fed. At this stage, it is apparent that the project design team should have included engineering expertise that could have done a proper analysis of the irrigation system at Sakaye.

Short-term practical training at IITA in rice and manioc production for two GOCAR extension agents and invitational travel costs for their Peace Corps Volunteer counterparts were to be provided by the project. The Peace Corps volunteers completed their training in rice with Peace Corps funds before arriving in-country while the GOCAR extension agents have not yet participated in this type of training. Project personnel have had a difficult time organizing the training but hope to do it within the next 6 months.

The Project Paper provided for some work to be done in cassava and the project has imported some cassava plant materials and sent two individuals to IITA for an orientation visit on biological control of cassava mealy bug and spider mite.

Drawing from the conclusions of the report prepared by Elizabeth Ann Bourke on the potential economic status of the rice centers, it appears that a major change is needed in project strategy if the centers are to become financially viable. The needs include greater technical assistance, training, construction, commodities and project length. This will be discussed in detail later in this report.

C. Outputs:

1. Bozoum Rice Center

Rice cultivation and production

Since the inception of the project, activities at Bozoum have evolved as follows:

1982

Zones	Peasants	Plots[1]	Areas Sown	Tons Paddy	Tons Rice	Tons/ha Yield
Irrigated						
1st campaign	31	46	5,20ha	14,1	5,9	2,7
2nd campaign[2]	27	34	4,02ha	12,4	6,3	3,1
Rainfed	40	42	7,15ha	8,1	3,3	1,13
	98	122	16,37ha	34,6T	19,5T	2,1

1983

Irrigated						
1st campaign[3]	34	47	5,59ha	6,2	2,0[4]	1,1
2nd campaign	26	33	3,87ha	10,7	4,9	2,8
Rainfed	47	49	10,08ha	27,6	15,1	2,7
	107	129	19,54ha	44,5T	22,0	2,3

1. Plots in irrigated are usually 12,5 ares (10x10are = 1 hectare) or occasionally 25 ares ; rainfed plots are usually 25 ares.
2. Usually fewer farmers during 2nd campaign because of alternative work.
3. Badly affected by the drought.
4. Not all Paddy hulled by center.

1984 provisional

Irrigated	Peasants	Plots	Area Sown	Tons Paddy	Tons Rice	Tons Yield
1st Campaign[5]	45	51	5,92	9,1	4,9	1,5

5. Badly affected by drought and lack of water in reservoir.

These figures compare with those presented in the project data sheet as follows:

Yields T/Ha

	Planned		Actual	
	Irrigated	Rainfed	Irrigated	Rainfed
Starting Point	N/A	N/A	2,87	1,13
1st year 1983	3,5	1,5	1,78	2,7
2nd year 1984	4,0	1,75		
3rd year 1985	4,5	2,0		

(N.B.: Project equipment was actually available in 1983 for 2nd Campaign and rainfed only, not for 1st Campaign; 1984 will be the first year to benefit fully from project equipment).

Surfaces Ha

	Planned		Actual	
	Irrigated	Rainfed	Irrigated	Rainfed
Starting Point	N/A	N/A	9,22	7,15
1st Year 1983			9,46	10,08
2nd Year 1984				
3rd Year 1985	25	20		

(Irrigated total 20ha 1st campaign 5ha 2nd campaign).

At first sight it would appear that the first year of the project has been disappointing in so far as irrigated rice is concerned. Yields have been poor and the surface planted has hardly increased. In fairness, however, it should be pointed out that the results have been badly affected by drought with up to 50% of the plots abandonned due to lack of irrigation water. The importance of the reservoir in this context is continually emphasized by the management of the center.

On the other hand, the results for the rainfed rice appear fairly encouraging. Yields are considerably better than those planned and the surface cultivated has increased at a rate compatible with the achievement of the 20 hectares at the end of the third year. Caution should, however, be exercised over this point since further success will probably be greatly influenced by decisions relating to equipment utilization.

In passing one notes that the number of peasant farmers has increased and there appears to be no lack of demand for plots. Apparently over 100 presented their applications for distribution of rainfed plots this year and there was insufficient land available. In this respect an increasing number of peasant farmers appear to regard the center as a worthwhile means of increasing their income.

The effect on farmers' incomes

It is difficult to put a precise figure on the monetary benefit derived by the farmers from the center since there may be no alternative work to provide a shadow price for labor. However, taking into account the net output after the center has deducted all fees and relating that figure to the number of farmers some very general idea of the average benefit may be derived.

In so far as 1983 is concerned (which was badly affected by drought), the number of farmers increased from 122 to 129, the surface sown from 16.37ha to 19,54ha (with practically all this increase concentrated in rainfed), and production of paddy rose by 28,6% to 44,5 tons. Looking at the figures, however, it becomes clear that this improvement was the result of very much better yields in the rainfed plots while there was a decrease in the yield from irrigated rice. These general figures in fact conceal great variations in the yield for irrigated rice since the best farmers managed about 5 tons a hectare while others abandonned their plots due to lack of water.

In theory, using the 1984 fees for preparation and hulling, and assuming production levels at roughly the same level as in 1983, one may estimate the farmers' incomes as follows (bearing in mind that some will end up in debt and some will have made very much more than the average figure):

Irrigated: provisional
1984
1st campaign — 45 peasants, 5,92 Ha sown, 9,1 tons Paddy. 4.9 tons rices, yield 1,5 tons Ha.

Fees: 400kg. Paddy per hectare prepared = 2,368kg
8kg. Rice per 100kg rice hulled = 392kg.

Assume: average plot 13.15 ares

average production Paddy	202kg
average fee for preparation	52kg
balance	150kg
60% conversion for rice	90kg
average fee for hulling	9kg
balance	81kg per farmer

at a price of CFA 200 per kg. the farmer on average received CFA 16,200.

N.B. This figure does not include deductions for fertilizer and purchases of tools, sacks, etc.

Theoretically 24 x 50kg sacks of 20.10.10 fertilizer should have been used but the actual figure is probably nearer 1/2 this which implies a cost to the farmers of 12 x CFA 7,500 = CFA 90,000 or CFA 2,000 per farmer.

On a rough basis then, one may guesstimate that a mythical average farmer earned at least CFA 10,000 during the 1st campaign 1984 and to this should probably be added at least another CFA 5,000 to cover the paddy distributed at the plot.

Irrigated
1983
2nd Campaign — 26 peasants, 3,87 Ha sown, 10,7 tons Paddy, 4,9 tons rice, yield 2,8 tons Ha.

Fees: 400kg Paddy per hectare prepared = 1548kg
8kg Rice per 100kg rice bulled = 392kg.

Assume:	average plot 14,88 ares	
	average production Paddy	411kg
	average fee for preparation	60kg
	balance	351kg
	46% conversion to rice	161kg
	average fee for hulling	15kg
	balance	146kg

at a price of CFA 200 per kg the farmer on average received CFA 29.200.

N.B. This figure does not inlude deductions for fertilizer and purchases of tools, sacks, etc...

Theoretically 15 x 50kg sacks of 20.10.10. fertilizer should have been used but the actual figure is probably nearer 1/2 this which implies a cost to the farmers of 7.5 x CFA 7,500 = CFA 56,250 or CFA 2163 per farmer. On a rough basis then, one may guesstimate that a mythical average farmer earned at least CFA 24,000 during the second campaign 1983 and to this should probably be added at least another CFA 5,000 to cover the paddy rice distributed at the plot.

Rainfed
1983 47 peasants, 10,08 sown, 27,6 tons Paddy, 15,1 tons rice, yield 2,7 tons hectare.

Fees:	335kg Paddy per hectare prepared*:	3377
	8kg rice per 100kg rice hulled :	1208

*figure derived from old rainfed fee for tractor.

Assume:	average plot 21,45 ares	
	average production paddy	587kg
	average fee for preparation	72kg
	balance	515kg
	55% conversion to rice	283kg
	average fee for hulling	26kg
	balance	257kg

at a price of CFA 200 per kg, the farmer on average received CFA 51,400.

N.B. This figure does not include deductions for fertilizer and purchases of tools, sacks etc...
Theoretically 20 x 50kg sacks of 20.10.10. fertilizer should have been used but the actual figure is probably nearer 1/2 this which implies a cost to the farmers of 10 x CFA 7,500 = CFA 75,000 or CFA 1596 per farmer.

On a rough basis then, one may guesstimate that a mythical average farmer earned at least CFA 45,000 during the rainfed campaign 1983 and to this should probably be added at least another CFA 5,000 to cover the paddy rice distributed at the plot

2. Sakaye Rice Center

Rice cultivation and production

Since the inception of the project, activities at Sakaye have evolved as follows:

1982	Peasants	Av. Plot	Hectares Sown	Hectare Harvested	tons Paddy	tons Rice	Tons/ha[3] Yield
1st campaign	48	29 ares	14,3	N.A.	38.9[1]	20.4	2.7
2nd campaign	31	37 ares	11,5	N.A.	DROUGHT		
1983							
1st campaign		DROUGHT					
2nd campaign	61	37 ares	22,85	N.A.	DROUGHT		
3rd campaign	97	24 ares	23,15	10,65	40,3[2]	21,6	1.7 (3.8)
1984							
1st campaign	50	33 ares	23,15	16,40	37,4	N.A.	1,6 (2,3)

[1] Allowing for self-consumption only 34 tons were hulled.
[2] Amount net of distribution and self-consumption.
[3] Figures in brackets give yield per hectare harvested.

These figures compare with those presented in the project data sheet as follows:

	Yields T/Ha	
	Planned	Actual
Starting Point	N.A.	2.7
1st year 1983	3.5	1.7[1] (3.8)[2]
2nd year 1984	4.0	1.6[1] (2.3)[2]
3rd year 1985	4.5	

[1]NB: figures affected by drought and based on one campaign.
[2] Figures in brackets give yield per hectare harvested.

	Surfaces/Hectares	
	Planned	Actual
Starting Point	N.A.	25.8
1st year 1983		46.0
2nd year 1984		
3rd year 1985	216[1]	

[1]Based on an estimate of 3 campaigns per year and bringing Block A, estimated at 42 hectares, into cultivation i.e. 72 hectares available for rice cultivation.

The figures are undoubtedly disappointing, although the impact of the drought should be kept in mind. In fact production figures are probably considerably

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higher if the amount of rice distributed and kept for self-consumption is taken into account. In addition some farmers are clearly exceeding the planned production figures although others fall far below. One can, however, hope for some improvement arising from the demonstration effect. It is also to be expected that the current repairs to the irrigation system will improve yields. It would appear therefore that the production targets are probably attainable by the end of the project.

The surface targets, however, are another matter. Firstly, the project paper assumption that three full campaigns can take place in one year appears to be erroneous. The period required is closer to 15 months than 12 months. Secondly, it is by no means clear, given their other activities, that all the farmers are willing to undertake continuous rice cultivation. Thirdly, the actual physical amount of land cultivated appears to be over-estimated in the projections. Block A consists of 32 hectares and Block B of 33 hectares for a total of 65 hectares, not 72 hectares as the projections assumed. While it may be possible to take in a further 7 hectares from the surrounding land, this is not necessarily the case. In addition, the status of Block A is by no means certain. Even if the appropriate irrigation system were installed it is by no means self-evident that the type of cultivation that would result would meet the original terms of reference of the project. Currently utilization of Block A is not seen as greatly expanding the membership of the co-operative, but rather as permitting those members who wish to increase their holdings to do so, with any land left undistributed being cultivated by the center with the help of hired labor (reflecting in part the increasing trend towards institutionalisation and bureaucratisation of the co-operative management). It is hard to see these trends as being consomnant with a policy..." to design and successfully implement projects meeting the needs of the poor majority in the CAR"...

The effect on farmers' incomes

It is difficult to estimate the precise monetary benefit that the co-operative's members derive from the project's activities at the rice center of Sakaye. The absence of any very meaningful shadow price for labor makes such calculations problematic. However, by taking into account the net output after the center has deducted all fees and relating that figure to the number of farmers, some very general idea of the average benefit may be derived.

In so far as 1983 is concerned, even though it was badly affected by drought, the number of farmers increased from 79 to 158 over the two campaigns for which records were kept. It is in fact difficult to evaluate this increase since there was no third campaign in 1982 and no campaign in the early part of 1983. Approaching the figures from a different point of view, it would appear that comparing the 1st campaign 1982 with the 1st campaign 1984 there were only two additional farmers while the average size of the plots per farmer increased from 29 ares to 33 ares. In so far as production is concerned, there appears to be very little difference between that of the first campaign in 1982 and that of the first campaign in 1984, (38,9 tons in 1982 as opposed to 37,4 tons in 1984), although it is likely that something of

the order of at least 15 tons should be added to the 1984 figure to reflect the amounts distributed and kept for self-consumption. Obviously, some farmers will have had yields very much superior to the average of 2.3t/hectare while others will have simply abandonned their plots due to lack of water, illness, etc...

On an average basis, however, using the 1984 fees and applying them to the 3rd campaign 1983 and the 1st campaign 1984 and assuming that production levels will be at least as good as in those cases, one may come up with a rough estimate of farmers' average incomes as follows:

1984

1st campaign	50 peasant,	23.15 hectares prepared,
		16.40 hectares harvested,
	37.4 tons Paddy	22.4 tons rice, estimated,
		yield 2.3 ton/hectare.
Fees	400kg Paddy per hectare prepared	= 9260kg
	10kg Rice per 100kg rice hulled	= 2240kg.
Assume	average plot 33 ares	
	average production Paddy	748kg
	average fee for preparation	185kg
	balance	563kg
	60% conversion to rice	338kg
	average fee for hulling	34kg
	balance	304kg

at a price CFA 180 per kg the farmer on average received CFA 54.720 (CFA 60.800 if rice at CFA 200kg).

N.B this figure does not include deductions for fertilizer and purchases of tools, sacks etc.

Theoretically 116x50kg sacks of 20.10.10 fertilizer should have been used and 46x50kg sacks of urea, but actual consumption was 44 sacks of 20.10.10 and 2 sacks of urea which implies an average cost of CFA 6820 for 20.10.10 and CFA 290 for urea, or a cost of CFA 7110 per farmer.

On a rough basis then, one may guestimate that a mythical average farmer with a little over three plots earned at least CFA 47.610 (CFA 14,427 per plot) during the first campaign 1984, and to this figure should probably be added at least another CFA 20.000 to cover the paddy distributed at the plot for self-consumption.

1983

3rd campaign:	97 peasant, 23.15 hectares prepared, 10,65 hectares harvested, 40,3 tons Paddy, 21,6 tons rice, yield 3.8 tons/hectare.	
Fees:	400kg Paddy for hectare prepared	= 9260kg
	10kg rice for 100kg rice hulled	= 2160kg
Assume:	average plot 24 ares	
	average production Paddy	415kg
	average fee for preparation	95kg
	balance	320kg
	60% conversion to rice	192kg
	average fee for hulling	19kg
	balance	173kg

At a price of CFA 180kg, the farmer on average received CFA 31.140 (CFA 34.600 if rice at CFA 200kg).

N.B This figure does not include deductions for fertilizer and purchases of tools, sacks, etc.

Theoretically 116x50kg sacks of 20.10.10 fertilizer should have been used and 40x50kg sacks of urea, actual consumption figures are not trustworthy so the figures for the 1st campaign 1984 will be taken as a guide - a cost to the farmer of CFA 3,665.

On a rough basis then one may guesstimate that a mythical average farmer with approximately two and a half plots earned at least CFA 27.475 (CFA 11,448 per plot) during the third campaign 1984, and to this figure should probably be added at least another CFA 20,000 to cover the paddy distributed at the plot for self-consumption.

Obviously these average figures mask wide discrepancies. Some farmers will have had their land prepared and then will have had no production which was the case of 30% of farmers in the first campaign 1984 and 50% of farmers in the last campaign of 1983. They will only find themselves further in debt at the end of the campaign - debts which are usually carried forward to the next campaign. Other farmers, with high yields, will have paid proportionately less in fees for preparation and will dispose of larger incomes. In brief, the marginal, poor farmers on the less favorably situated plots will have done badly, while those who cultivate carefully well situated plots will have done very well out of rice cultivation. The objective should be to improve the irrigation system so that all plots may benefit from the same amount of water at the appropriate times and to re-inforce the amount of technical assistance and advice given to the less able cultivators.

The project is to provide a total of 48 person-weeks of short-term training in rice and manioc production for two extension agents and invitational travel costs for their Peace Corps Volunteer counterparts. The Peace Corps Volunteers did undergo training en route to their assignment in CAR at Peace Corps expense. Although the project attempted to organize training for the two extension agents, it was never able to schedule this with IITA but plans doing it in the future. Two Central Africans did travel to IITA for several days to study biological control procedures for cassava mealy Bug and spider mite. The project is to provide 20 person-weeks of consultancies from IITA. One consultancy was provided for one week and the resulting report is included as a reference for this evaluation report.

D. Purpose and Goal: The purpose of this component of the project is to increase small farmer production of rice and cassava. The goal is to increase the incomes of the target rural population through agricultural production activities. Since the purpose and goal are closely related, they will be dealt with together.

Most project efforts in this component have been placed on rice production with only a very minor effort on manioc. The Project Paper stated the Project would develop high yielding varieties of manioc tubers by Peace Corps

volunteers operating seedling nurseries and a testing program at Bozoum and Sakaye. Improved varieties were then to be made available to project farmers and would be ready for release to the GOCAR extension service and non-project farmers. Although some seedlings were brought from IITA (with no conclusive results) and some training did take place at IITA concerning an outbreak of cassava mealy bugs, no other effort has been tried or planned. The project evaluators believe this is the correct course of action. The type of development, testing and promotional program for cassava briefly described in the Project Paper would require a substantial effort far beyond the capabilities of the Central Africans and Peace Corps Volunteers involved in the project.

In the following two paragraphs, the Project Paper summarized the objectives of the rice component of the project:

"The present project proposes to build on the limited success of the previous experience by taking advantage of the existence of the two Rice Center cooperatives and insuring that farmers participate in running their own centers. One of the most important tasks of the French and Sango speaking Peace Corps volunteers and their CAR counterparts assigned to the Centers will be orientation of farmers to the necessity of planning/budgeting for the replacement of equipment and farm inputs."

"The project will provide to the Bozoum and Sakaye Rice Centers, improved rice seed, new farm machinery for the cultivation of the rice fields, rice processing equipment, such as rice hullers, rice sacks, farm tools, a quality of fertilizer, vehicles, and basic farm supplies for sale to Cooperative members. By serving as a source of agricultural inputs and equipment to the two rice cooperatives as well as providing management and the technical assistance, farmer production levels per hectare of land cultivated will increase. The quality of rice milled will also increase as a result of new milling equipment. The increased yields are predicated on the hypothesis that the introduction of improved rice seed (from the International Institute of Tropical Agriculture/Ibadan, Nigeria), application of the appropriate fertilizers to the fields, use of machinery available for sale and servicing in the CAR, and some modifications of water management and cultivation practices will make the critical difference in raising production levels."

However, the project design team made no effort to analyze the management structure, financial viability and economic potential of the rice centers. The assumption was that the Centers worked under Taiwanese management and with renewal of equipment and some technical assistance from Peace Corps, the Centers could be brought back to their previous state. However, it appears that the Centers were established as demonstration and training units by the Taiwanese and they never were far enough evolved to be studied as economically viable units. The Peace Corps provided a very business oriented and dedicated volunteer for the Sakaye Center. He became very alarmed with the extremely inefficient and economically unsound management practices of the Center. Through a very difficult crusade on his part he was able to bring this to the attention of Sakaye cooperative members, the GOCAR and USAID. The cooperative reacted by changing its entire Cooperative Administrative Council through re-election. The GOCAR reacted by replacing the government-appointed (and government employed) Center director. USAID reacted by providing a series of

two studies of the Centers, first a "Farm Management Study" by Christine Michele and secondly, "An Evaluation of the Current and Potential Economic Status of the Rice Centers of Bozoum and Sakaye" by Elizabeth Ann Bourke. Both of these reports were used in writing this evaluation.

In general it can be said that if the Centers are serious about establishing themselves as viable enterprises, they must begin a practice of planning ahead to pay for their fixed and variable costs. Yet, the idea of setting funds aside for things such as the replacement of machines is a concept foreign to their culture. A wealth of outright gifts by various donors with essentially no accountability required has not encouraged this discipline.

The following description summarizes the situation of each center and the options available to them:

Bozoum Rice Center: At the present time the center is not self-supporting. Firstly, the fee income generated is clearly insufficient to maintain the existing capital equipment without the help of the project. Secondly, the importance of the amounts involved in running and depreciating the transport vehicles is much too great for an operation of its size.

Consideration has been given to expansion of production at Bozoum. It should not be forgotten that the rice centre at Bozoum is a small project. As with practically all projects of such a size, material assistance is insufficient unless there is adequate management. In the final analysis, therefore, the key elements are human or people orientated.

It is in this light that the center's continued functionning must be viewed and its weaknesses identified. At the present time there is no difficulty about marketing Bozoum's rice as the center benefits from a seller's market. Even with increased production there should be no difficulty in disposing of the harvest unless there is a radical change in the government's import policy. The center's marketing function is thus assured at the present time without difficulty.

In fact, problems are far more likely to arise due to mechanical breakdowns either of the motor-tillers or of the huller/polisher. It cannot be stressed too often how vulnerable Bozoum is to mechanical failure and how isolated it is from assistance. Emphasis has been laid upon the keeping of an adequate stock of spare parts but in itself this will not be sufficient unless somebody reliable is trained and present to deal continuously with all maintenance and repair problems. It is highly desirable that someone should be selected and trained to a sufficient level to cope with the mechanical problems that the center may face. Such a requirement becomes all the more necessary if investements are made in additional equipment for rainfed cultivation.

At this stage it is not clear whether it will be worthwhile to increase the capacity of the center's reservoir although such a step is obviously desirable from the point of view of fee income generation. A survey should definitely be carried out to determine what is possible and/or worthwhile doing, preferably within the immediate future.

Although the amount of training provided by the center is one of the chief points in its favor, nonetheless, it is probably desirable that some additional training in irrigated cultivation should be given to the rice farmers and to this end the appropriate extension agent should probably pursue further studies. In fact, if the expansion plans go ahead then there is likely to be an increased number of new rice farmers who will need considerable training over the first few campaigns unless yields are to drop below target. Attention should obviously also be directed towards rainfed cultivation since this is the major area of expansion.

Currently Bozoum benefits from a clearly defined management structure, and in particular from the presence of the long-serving director. It is by no means certain that this state of affairs will continue if plans go ahead for the transformation of Bozoum into a co-operative. The peasant farmers have multiple interests of which rice cultivation is but one and it is probably unrealistic to expect them to devote increased time to co-operative affairs. In addition, it is difficult to foresee how the center's management, paternalistic and technocratic by tradition, will cope with the fragmentation of decision-making which would normally be entailed by the establishment of a co-operative. Assistance will thus be required to help the center over the transition stage and towards organisation of new patterns of authority. Perhaps the DACCCA, the Direction de l'Action Coopérative et du Crédit Agricole, could provide some guidance at this point.

The expansion of the center's activities and its formal organisation will also require a more sophisticated accounting system than that which is currently in place. At the present time the extension agents perform the tasks of store-keeper and cashier while the director keeps the accounts. It is probably advisable that an accounting system be installed by an expert. At this stage it is not clear whether the scale of operations will require a specialised cashier/book-keeper but the possibility should be examined and, if necessary, appropriate training given. The need for control systems as the center expands is self-evident.

In addition the growth of the center's credit functions will place an extra strain upon the administrative capacity of the center. Given the amounts involved it is probably desirable that the director assumes responsibility for this area of the center's activities. Delays in payment could have a serious impact on the center at certain times of the year due to the cyclical nature of production. At the present time the number of peasant farmers is small and decisions relating to credit are relatively easy. It will not be as simple to control the system when the numbers double.

For all the discussion of the necessity for expansion and the marginal character of the center's economic viability it should be underlined that the impression made by the Bozoum rice centre is of a well managed concern. It would be a pity if, in pursuing an expansionist policy, the importance of the management's quality was lost sight of.

<u>Strategic options for the Bozoum Rice Center:</u> The present scale of operations at Bozoum is insufficient to ensure the continuation of the center without project assistance. In order to expand production two courses of action are

possible. These are either to increase the area irrigated or to extend the rainfed cultivation (or both of these). Both these option will require the provision of further assistance by the project both in material ways and in training.

The expansion of the irrigated area implies the re-excavation, probable extension and ensuing maintenance of the reservoir. At this point in time, without expert advise, it is impossible to judge the cost of such works. While under the psychological impact of the project's assistance more of the peasant-farmers may be willing to cooperate on journées pionnières. Additional expenses will undoubtedly have to be incurred, particularly if earth moving equipment needs to be used.

The amount of land that could be brought back into production by this measure would vary between 10 and 20 hectares depending on the scale of the work undertaken. If an area of 15 hectares was taken as a starting point it could be envisaged that 15 hectares would be cultivated during the first campaign and 5 hectares during the second campaign for a total of 20 hectares per year. Conservatively, the yields on this irrigated land may be estimated at 4 tons/hectare (thus taking into account the poor yields to date, in part at least explained by drought and lack of irrigation).

The difficulty arises of trying to place some monetary value on the improved irrigation system and of working out some way of incorporating its maintenance into the fee structure. Allowing for the fact that some of the maintenance will be undertaken on a communal basis, the assumption may be made that an extra charge of 10kgs of paddy for the maintenance of the irrigation system will be incorporated into the preparation fee of 40kgs paddy for the preparation of 10 ares. The new fee would thus be 50kgs per 10 ares or 500kgs per hectare.

In so far as a time framework is concerned, even if an expert visits the center before the end of the year and reports favorably, work will not be able to commence before the dry season in early 1985 and it will be 1986 before the full benefit of the improved and expanded irrigated area will be felt. The implementation of this part of the expansion program would thus fall beyond the end of the project as it is currently defined.

The expansion of the area devoted to the cultivation of rainfed rice is in some senses simpler although it requires a number of critical decisions and considerable organisation. Estimates vary as to the amount of land that could be used for rainfed cultivation, ranging from 20 hectares to 50 hectares. Initially, it may be wise to consider expanding to 30 hectares leaving the further 20 hectares to a latter date so as not to over-stretch management capabilities.

The key factor for the expansion of rainfed cultivation is the fact that the area must be prepared in one month (usually May) to allow sowing to take place in June. The critical bottleneck here is the availability of machinery capable of preparing the area designated within the required time. The possibility of using draught animals, with a capacity of 25 ares a day, would

imply - allowing for sickness, etc., and the daily limits of their working capacity - at least 120 days work or 10 pairs of draught animals (c. cfa 1.200.000 at current prices) and it is by no means sure that they would be capable of breaking the bone dry land before the rains come*.

For this reason, although it may be desirable to retain the existing draught animals as a reserve, their limitations make it undesirable to rely exlusively upon them for the preparation of the rainfed area within the required time.

Two other possible solutions remain: the utilization of a small tractor (40 hp has been mentionned as being capable of coping with the hard ground) or the introduction of more robust motor-tillers than the existing Yanmar (which have problems breaking the soil before the rains come). It is estimated that a small tractor would cost in the neighborhood of CFA 8.000.000 and it should be capable of preparing 1 hectare of ground per day. Details of more robust motor-tillers (such as those used for mountain cultivation in Switzerland) are not currently available but it will be assumed for simplicity's sake that they would cost half as much as the tractor and be capable of preparing 50 ares per day: thus two motor-tillers would be required (which would confer greater flexibility and security on the operation) and the expenditures involved would be calculated at the same level as for the tractor which probably over-states considerably the real cost involved and provides some margin.

A by-product of either of these two solutions is that they would offer a means of transport between the centre and Bozoum (a cart may be attached to the motor-tiller). A disadvantage is obviously the maintenance factor and any decision to adopt either of these solutions would have to be underpinned with adequate stocks of spare parts and the provision of a well-trained mechanic capable of dealing with all but the most major breakdowns.

Sakaye Rice Center: At the present time if the center no longer had the expenses of the transport vehicles, particularly the Toyota Land Cruiser, it would be capable of being self-supporting. The costs of the transport vehicles' operation and their depreciation is too great for a center of its size. Nonetheless, it is obvious that at the present time there is not a great deal of margin available unless the irrigation system is improved and the center should beware of taking on too many additional commitments which involve it in extra expenses.

In essence, Sakaye is not a grand sophisticated project. It is a simple rice center that functions at a fairly basic level of cultivation. Grandiose schemes for its development do not seem appropriate and would only burden the

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* Footnote: It should be borne in mind that the draught animals used are of a considerably lighter build than those utilised in South East Asia, and are often subject to sickness.

center with a top-heavy capital structure. It would, however, be difficult to over estimate the importance of the personnel in such a simple structure. For this reason most of the conclusions regarding action to be taken (apart from the lightening of the capital structure) are people and management orientated.

There are four main areas for action. Firstly there is the marketing problem. It is suggested, since this function is vital for the co-operative's future, that responsibility for marketing should be clearly entrusted to the center's director who should be closely supervised in this task. It is by no means certain that the new director has any aptitude in this direction and it should be carefully considered as to whether he can with help (perhaps from DACCCA) evolve in this direction or whether his replacement should be envisaged.

Secondly, there is the mechanical problem. The absence of mechanical expertise at the center is of critical importance for its good functionning. It is also desirable that responsibility for the machinery should be entrusted to one particular person with a clearly defined job description. Adequate training should be provided for the person selected. The preference is for someone who is already working at the rice center and has some appreciation of the difficulties encountered in maintaining machinery in good working condition.

Thirdly there is the question of the maintenance of the irrigation system in good working order and the extension effort required to provide supportive technical assistance for the smaller farmers. It is obvious that much remainsto be done in both directions. At the present time much of the effort in this direction is provided by the Peace Corps volunteers, but with an eye to the longer term it would be advisable to place these efforts in a more institutionalised setting. Although the individual concerned would have to work closely with the person responsible for the machinery, responsibilities should be clearly defined. Some training must be offered, particularly on the operation of the irrigation system, but to make a successful impact the person concerned will need to be capable of animating the peasant farmers and bullying and coaxing them into using better techniques.

Fourthly there is the whole question of the development of the co-operative and its increasing institutionalisation as it takes on more functions. In this context the need for control mechanisms is self-evident. The attempt has been made to start the introduction of financial controls with the help of DACCCA, but this is only half the picture. The other half of the picture is the educating of the co-operative members into the exercise of their rights to control its Administrative Council and the management and the working out of a genuine management structure. Steps have been taken in this direction with the encouragement of one of the Peace Corps volunteers, but it is by no means an easy task and inevitably stirs up political controversy. Efforts should continue in both these directions and should be assisted, but it is difficult to identify precisely how these efforts would best be aided. It is hard to imagine courses tailored to meet these specifications. It is possible that DACCCA has some experience that could be helpful but it appears that its activities are usually based on larger units than Sakaye.

In theory then there is nothing to prevent Sakaye functionning as a successful rice center in the future once its capital structure has been lightened. It should not, however, be forgotten that unless the human, management problems are solved, its success will remain theoretical. Attention should therefore be concentrated on the problems identified and their solution.

Strategic options for the Sakaye Rice Center: At Sakaye the options for the future appear relatively simple. It is not recommended that Block A should be brought back into production under the aegis of the existing USAID project since it is by no means clear that this would correspond with the project's terms of reference. Should the co-operative decide to go ahead with this development in the future on its own initiative - perhaps using funds from the recently created Credit Agricole of the CAR - that would have to be its own decision. For the present, attention must be centerd on making Sakaye an effective unit on the basis of Block B alone.

The chief emphasis must be on the restoration of the irrigation system since this is the only way to create sufficient production to generate the necessary fee income to finance the center's activities. At the present time only 16.4 hectares out of a possible 33 hectares are actually harvested due to poor water control. Allowing a full year for all the work that needs to be carried out, including individual plot sluice gates, it will only be at the end of 1985 that the center will be starting to produce at around its full potential. Since it should be possible to recover some of the adjacent land, the future extent of Block B may be fixed, conservatively, at around 35 hectares*.

It does not appear to be realistic to expect three full campaigns each year. Taking an average of 5 months per campaign, 15 months would be required for three campaigns. Thus during a typical year an average farmer would have the possibility of cultivating two and two fifths campaigns. As has been underlined in the preceeding sections, the yields obtained by farmers vary considerably and could undoubtedly be improved. The project's target of 4.5 tons a hectare does not appear out of line provided that there is sufficient extension work and technical assistance. Initially though, average yields will probably be lower, at least in so far as they are reported.

For the co-operative members a further problem is posed by the question of the marketing of the rice. It seems clear that the members have an interest in combining forces to obtain better prices for their rice and to this end the center needs to establish a marketing framework with a clearly designated person who is responsible for sales and client contact (and in addition is properly supervised). The importance of this position means that it should probably be attibuted to the director. Given DACCCA's (Direction de l'Actions Cooperative du Credit et de la Commercialisation Agricole) experience in marketing coffee perhaps some assistance could be given on this point although the two markets are of course very different.

Reference has already been made to the problems experienced over the rice quality and the high percentage of broken rice. Obviously some form of assistance is required to determine what factors are chiefly responsible for this state of affairs, but it is to be questioned whether any fundamental modification in equipment is required.

The crucial importance of the equipment and its good functionning cannot be underestimated. A breakdown of the huller/polisher means no rice can be sold. A breakdown of the motor-tillers means that rice is not planted and a campaign may be lost. The absence of spare parts and the dearth of qualified mechanics renders the whole operation extremely vulnerable. In this respect the designation of someone responsible for the agricultural machinery and its maintenance and the training of such a person so that he is capable of repairing all but the most major breakdowns is absolutely essential. With hindsight it may be thought that some of the equipment supplied, particularly the motor-tillers, is perhaps rather fragile for the way in which it is used at the center. At replacement time it may be thought desirable to select more robust equipment.

Potentially Sakaye stands to benefit considerably from the possibility which its irrigated plots offer, i.e., staggering campaigns throughout the year so that machinery can be more effectively utilised. Although there is some resistance, occasioned partly by the competing claims of other crops, it should be possible by staggering transplanting times to easily cope with the potential 35 hectares with the existing machinery.

	Hectares	Labourage	Planage	Total
1st campaign	35	88	70	150 days
2nd campaign	35	88	70	150 days
3rd campaign 2/5tns	14	35	28	63 days
				363 days

At the present time 2 Yanmanr motor-tillers are used as well as the old Hino. With three machines they each work 121 days a year, or with two machines they each work 182 days a year. With proper maintenance and mechanical support these figures are not unrealistic.

In so far as the huller/polisher is concerned, a bottleneck may be created by the existence of only one machine. If one assumes that 84 hectares (35+35+14) are cultivated and that average production reaches 4.5 tons per hectare, then the center will have to be capable of dealing with 378 tons of paddy. The existing Yanmar huller/polisher deals with 1,3 tons a day which would mean that 291 days a year were required to cope with production. As a utilization rate this appears to be on the high side unless the center moves away from what is effectively a five day week without overtime and makes additional time available for maintenance. The replacement of the huller/polisher by a bigger machine or by two smaller machines should thus be seriously considered when these levels of production are reached.

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* footnote: Should some type of additional irrigation be required for Block B, which may well not be the case, it should be possible to come to some low cost solution using the "belier" type of pump with no moving parts.

It appears likely that these levels will be reached using the most promising of the new varieties of rice and with less, c. 60%, than the recommended fertilizer applications. It is to be expected that fertilizer use will remain sensitive to price, although technical assistance and extension work will encourage the smaller farmers to use greater amounts. The gradual "conversion" of the less progressive peasant farmers is a matter of great importance at Sakaye and there is a significant role for a well trained extension agent to play - stressing the neutrality of technical assistance in whatever difficulties may arise between the peasant farmers, the Administrative Council and the government secondees.

Ultimately there is the problem of co-ordinating and managing all these disparate elements which is by no means obvious as the center evolves and the wishes of its members alter. A major requirement will be a clear division of responsibilities and decision-making powers, as well as a sufficiently developed control system. It is by no means clear that the existing personnel will be sufficiently apt to follow the evolving requirements of the center.

E. Beneficiaries: The approximately 200 farmers at the rice centers and their families are the principle beneficiaries since the profit not only financially, but receive a supply of rice. Associated with this are laborers and relatives who work for the farmers and receive a quantity of rice for their labor. Rice from the centers is sold at population centers such as Bangui, Bouar and Berberati which receive a considerable infusion of rice in their markets and their urban populations are fed.

In the long term, the project is assisting in making the country more self sufficient in food production. Also the project is making a contribution in improving skills in organization, management, fiscal responsibility and rice technology; inputs which the present system of education in the Central African Republic does not adequately provide.

Concerning beneficiaries, a few remarks concerning social organization may be of interest. The Sakaye Rice center has been formally designated as a cooperative although its administrative structure and organization is too weak to effectively operate as one. Both centers have government appointed directors and extension agents financed from the national budget. The Bozoum Center is essentially managed and operated by its very capable director, Mr. Follot. In fact it might be said that, under the present circumstance, not much would be left of the operation had it not been for the strong and sagacious leadership of Mr. Follot. Mr. Follot has declared that before the expiration of the project he intends to encourage the farmers to form a pre-cooperative with an administrative counsel as a first step to moving toward becoming a full cooperative. However, the question which arises is if a competent director who has served in this capacity for many years may prove to be somewhat of a liability in the pursuit of a real cooperative. The farmers are drawn from many different ethnic groups and until this time have had no responsibilities in running the Center except to cultivate their appointed parcel of land. The thorny problem is that of finding or creating an informed group of farmers who can deal knowledgeably with the problems of organizing and running a cooperative. The Sakaye experience proves they can

learn rather quickly when given some facts regarding their rights and responsibilities. In this case, a Peace Corps volunteer was instrumental in cooperative replacing its administrative counsel and asking for the replacement of its government appointed director. However, the evaluators' inability to get a favorable response about the social structure of the group of farmers at the Bozoum Rice Center suggest that further organization may be a delicate endeavor. It seems appropriate to begin asking some searching questions and to seek some rather substantial responses at this time.

Lessons from Sakaye suggest not only a council should be organized, but that its rights and duties be made clear. This would imply also those rights and duties of the director and other functionaries. It would also be well to establish ties with DACCCA at some point and clarify the nature of these. And since the PCV must work very intimately within a somewhat complex organization, his position in it should be made as clear as possible to all.

F. Unplanned Effects: One unplanned effect, which was mentioned earlier in this section of the evaluation report, was the realization by the Government of poor internal decisions which stifle its own development program. Although the decision to accept a gift of Japanese rice was done under a serious threat of a continuing drought, the Government totally ignored the repercussions once the drought abruptly ended. When the project brought to the attention of government officials the inability of local rice producers to sell their rice because of a flooded market, it resulted in several Governmnent offices working together to remedy the problem.

Because of the shortage of spare parts and the refusal of the project to do repair work on an old tractor at Bozoum Rice Center, the center director made a commendable move toward the use of animal traction for field cultivation. This may prove to be an appropriate technology which could address some of the bottlenecks faced by the Center. However, there are problems connected with traction animals, prime of which is that systematic care and feeding of animals is not a part of Central African tradition. The current idea of supposing that one can adequately teach farmers to use and care for oxen in a short training session is overly optimistic.

The project unexpectedly has caused a bit of a revolution at the Sakaye Rice cooperative, mainly resulting from the actions initiated by the Peace Corps volunteer assigned there. The center director was replaced and the cooperative decided to change its administrative council. The internal friction caused by this had even led to a request that the Peace Corps volunteer leave, emanating from a very small but powerful group. There are hints that factions are now expressing themselves within the administrative council - a not surprizing development since they compete for and control more scarce resources now than before and have been made aware that even farmers can make things happen.

The growth of the above endeavor has brought the government (DACCCA) much more into the picture than before. This should be seen as a positive development. One aspect of this is the revamping of cooperative guidelines with a special section on rice cooperatives, according to the DACCCA director.

Finally, the project may be reinforcing a status quo at the Bozoum Rice Center. Given the Center's present organization, the only reasonable way to handle the inputs of the project is on its own terms - a kind of one-man operation with limited delegated authority and essentially no formal decision making in the hands of the farmers. This suggests that the project presently acts to reinforce a system that has not shown any clear indication of changing. In short, the more the assistance, the more it will be directed toward present ends, lending support to the status quo.

G. Lessons Learned: Clearly there was insufficient investigative studies done on either rice center during the design of the project. The project objective was poorly conceived. The project's objective should have been economic viability and not merely increased production levels. The effort that is needed at both centers goes far beyond the resources of the project. A proper feasibility study would have identified constraints in management, organization, cultural practices, and logistics whose resolution is crucial if the Centers are going survive.

VII. FISH CULTURE

A. External Factors: The orientation and interests of the Ministry of Water and Forest extension agents connected officially to the project has not lead to very fruitful partnerships with Peace Corps Volunteers (PCV'S). These agents generally have operated external to the objectives of the project. UNICEF-sponsored extension agents who worked with the project were originally picked from the local population and should have at least been good fish farmers, but often were not. This resulted in the PCV's simply having to train them somewhat as he/she did other farmers - or release them if they did not promote the program. These two factors led PCV's to work almost completely with the fish farmers directly. It appears that the primary asset of the UNICEF-sponsored personnel is that of model fish farmer and not as one who has knowledge much different from others.

B. Inputs: The project has experienced no irregularities with the provision of inputs and no changes are necessary.

C. Outputs: As is discussed in the Project Paper, Peace Corps and the U.N. have been involved in inland fisheries in CAR since 1947. Peace Corps involvement and experience in fisheries throughout the world has led them to switch from a policy of promoting many small "hobbyist" type fish farmers to operations where farmers devote a major effort to fish farming and look upon it as a major source of their income. The reason for this is that the amount of effort spent in extension efforts to hobbyist farmers is not proportional to the increase in fish production where as with commercially oriented farmers there is a very clear relationship. Commercial farmers are much fewer in number than hobbyist farmers because the number of sites available for this

type of practice is limited (i.e. there must be a location with free flowing water and appropriate topography to make dams to form ponds. Also, commercial fish farming is only appropriate near population concentrations where there is a market for the fish produced). What appears to occur is that when there are successful commercial farmers using good practices, their techniques are copied although not applied as carefully as with the commercial or "model" farmer. The result is less efficiency but done over a wide area. A minimal extension effort also encourages this. A large proportion of fish produced in this way is self-consumed. The transition of Peace Corps emphasis on commercial fish farmers took place in CAR during the present project.
The Project Paper provided as an output that 1800 existing and 900 new fish ponds would be producing an average yield of 20.5 kgs. per are. It called for the repair and management of six fingerling stations and fifteen fisheries extension offices. It provided for conduct of workshops to train regional and village extension agents and called for farmers to be producing their own fingerlings to restock their ponds by the end of the project. In reality what has occurred is that Peace Corps has abandoned its effort to repair and put into operation 15 fish station, but instead has encouraged (and in many cases succeeded) that these sites be put into private hands of groups of serious fish farmers to be used as commercial centers. These centers in turn produce fish for sale as well as fingerlings for sale or for their own use. Although some training of local extension personnel has taken place, the major emphasis has been directly with commercially oriented fish farmers.

The following is a tabulation of the status of the outputs of this component of the project. Fish farmers are divided into two groups. First are "serious farmers" or those farmers who view fish farming as a major source of income. Secondly are all other fish farmers.

In these tabulations, the following should be noted. The production "TOTALS" line are weighted averages:

$$\text{Weighted avg} = \left(\frac{\sum_{i=1}^{k} (\text{Production x avg. pond size x no of ponds})_i}{\sum_{i=1}^{k} (\text{avg pond size x no. of ponds})_i} \right), \text{"Total"}$$

"Total" average pond areas are also weighted averages. Potential incomes are the products of (Production x average pond area x price/kg). The "TOTAL" potential incomes are likewise merely the product of the averages of the same. Two posts, Bocaranga and Alindao, are not included since information was not available at the time of the evaluation:

Production 1982 (kg/are/year)	Production 1984 "Serious" farmers (kg/are/yr)	Production 1984 "other" farmers (kg/are/year	Average pond area "serious" farmers (ares)	Average pond area "other" farmers (ares)	Fish Price (CFA/kg)	Annual Potential Income for average "serious" Farmer (per pond)	Annual Potential Income for Average "serious" Farmer (per pond)
15	10,9	8	1,5	1,13	700	11.445 F CFA	6.328 F CFA
7	6,5	5,8	3,8	3,7	1.500	37.050	32.190
-	22	10	1,25	0,8	900	24.750	7.200
7	28	15	1,6	1,1	550	24.640	9.075
-	30	20	1,8	0,9	500	27.000	9.000
7	15,4	5,2	0,95	0,56	400	5.852	1.165
10	25	8	1,24	0,73	500	15.535	2.920
14	40	18	1,5	1,1	500	30.000	9.900
9,2	16,4	9,8	1,74	1,41	694	19.803	9.589

Number of "serious" farmers	Number of "other" farmers	New Ponds built since 1982	Ponds rebuilt since 1982	Existing Ponds	Total "commercial ponds	Total "other" ponds	Numbers of ponds in 1982
33	38	18	3	25	40	27	109
11	141	4	18	12	34	226	350
20	240	43	10	0	53	277	40
7	31	16	5	9	30	42	44
13	259	7	6	0	13	298	380
26	70	2	6	18	26	72	72
8	139	5	3	6	14	133	-
3	62	3	4	1	8	76	82
121	980	98	55	71	224	1,151	1,077

D. Purpose and Goal: The purpose of this component of the project is to increase small farmer production of fish. The goal is to increase incomes of the target rural population. Since they are closely related, they will be dealt with together.

There have been some fundamental changes of emphasis of the project's original goal, purpose, and outputs which have affected what one might call "progress." It appears that the impact of Peace Corps volunteers on Waters and Forest agents has been minimal. The extension personnel paid by UNICEF which the PCV's were to train have not always proved to be competent, motivated or effective. Thus, the PCV's have turned essentially to assisting fish farmers directly in pond building, management, and marketing. The idea is to assist a small number of well-motivated fish farmers until they have routinized correct procedures and have clearly seen the rewards. This creates a "model" situation which others may observe and emulate. This kind of emphasis has brought results in terms of production in some few instances from 30 to 40kg/are - almost double the target goal. The majority of producers harvest around 10kgs/are or less. The income is correspondingly very high to mediocre.

Conditions vary considerably. Some PCV's have been in place longer than others. The Berberati prefecture once had possibly 5000 ponds during the time of the French. Work has been concentrated on improving part of the 1000 remaining ones around Berberati rather than trying to build new ones. At Bocaranga, farmers had more ponds per owner than they could properly maintain so some have actually been abandonned to concentrate on those remaining. The 200 new ponds at Carnot were generally spontaneous responses to the presence of the PCV and were reported after they had been started, independent of the PCV's involvement. His work consists of giving guidance for appropriate changes during drainage periods.

It will be noted that, given the present orientation and emphasis, the increase in the number of new or reactivated ponds will not likely meet target goals. The trade-off, however, seems to be reasonable; the institutionalization of superior fish farming methods which itself could bring an increase in the number of ponds of higher quality and potential.

One aspect of the emphasis on particular fish farmers is that of teaching them to retain sufficient numbers of fingerlings. This plus the fact that neighbors are doing the same and generally have fingerlings to spare seems to obviate the need for fish substations. There was a general concensus that the substations be turned over to groups of farmers to use as fish producing operations as long as they cared for them properly. The one at Berberati is no longer functional at all. There seems to be little demonstrable need for the refurbished one at Bossembele which has as yet to produce fingerlings. The thought expressed was that the three large stations at Bangui, Bouar and Bambari could furnish fingerlings in event of some extraordinary emergency. However, these do not seem to be operational at all times, so the question of stations must be more carefully considered. A place like Bocaranga where many ponds go dry may be an exception to the general concensus since new supplies of fingerlings may be needed yearly.

The goal is to increase the income of farmers. Yet, several elements must be considered that affect the marketing of fish. Pursuits such as coffee growing or diamond hunting are much more lucrative. There are also other less striking modes of raising cash which influence motivation to concentrate on fish farming in an efficient manner. Also, the price incentive varies considerably from 500 FCFA/kg or less at Bossembele and Bozoum to 1000 FCFA/kg or more at Carnot and Berberati. (These are estimated figures of course since they are sold by volume and not by weight.) In some areas such as Bocarango beef competes with fish as do larger river fish, especially during the dry season when rivers run low. Finally, there yet seems to be a rather low threshold of "wants" in terms of non-subsistence consumer goods among many rural people, a level above which they do not wish to expend effort for such goods.

There appears to be a limiting plateau beyond which fish farming will not likely go in the foreseable future. Many of the sites suitable for a commercial fish farmers already are occupied as a result of the many years of effort in fisheries by the French, Peace Corps and FAO. Several volunteers felt that the effective role of Peace Corps in inland fisheries was nearly complete although extension efforts done by the GOCAR were still useful. The evaluation team agreed with this opinion that the fisheries effort as described in the Project Paper probably is at a point of diminishing returns. However, the evaluators did visit two non-project sites which have integrated livestock (poultry, pigs, ducks, etc) and fisheries operations which showed some interesting potential. This should be carefully examined if any future efforts are to be made in fisheries.

E. Beneficiaries: The general population has greatly benefited by the increase in protein supply. The fact that ponds are local phenomena means this supply is assured and readily available.

Fish farmers are of course the major beneficiaries. The profits are attractive in themselves, but also the timing can be manipulated so as to meet pressing needs.

In most cases wives assist in the harvesting of fish and then sell them in the market for their husbands. Domestic units vary but the woman seems to invariably share some of the profits. In some cases she will use a considerable amount of it for domestic needs.

Finally, the long term effects may be to contribute generally to entrepreneurial activity and to an increased participation in the market system -- factors which lead to the stimulation of the economy on a grander scale to the benefit of the region and nation.

F. Unplanned effects: FAO and the GOCAR Ministry of Water and Forests have been involved in fisheries activities for some time. It is of particular note the effect the USAID project has had on their strategy and actions.

At the beginning of the Rural Development Project in 1982, FAO's extension approach to fisheries could be summarized as follows:

1. Promotion of construction or renovation of government owned and managed fisheries substations.
2. Use of UNICEF sponsored animateurs as fisheries monitors who:
   -recorded the construction, stocking and harvesting of ponds.
   -promoted sale of station produced fingerlings at subsidized prices.
   -promoted increase in the number of fish farmers and ponds.

By mid-1983 a change in emphasis was noted after PCV's attached to the USAID project had been at post for about a year. Several important factors which evolved were:

1. Declaration of the Ministry of Water and Forest that "fonctionnement" funds would not be forthcoming from the GOCAR after the USAID project to support fish stations.
2. None of the substations were of sufficient scale or well enough managed to be financially self sufficient.
3. Logistical support for stations and fingerling deliveries after the project would be problemmatic.
4. A large number of farmers appeared to participate in fish culture activities because fingerlings were artificially cheap and because participation provided access to free tools, subsidized materials and free transportation useful for activities other than fish culture.

At this point there was sharp debate among the various participants of fish projects (Ministry of Water and Forest, FAO, UNICEF, USAID, Peace Corps). The result was increased emphasis on local self sufficiency by:

1. Emphasizing pond management and fish handling techniques to promote private production of fingerlings (one of the basic reasons for the use T. nilotica in African fish culture.)
2. Placing of government owned fish stations under private management.
3. Insisting upon the role of the animateur as a model fish farmer and local resource person.
4. Making resources available to animateurs and excellent fish farmers for upgrading their operations (increase pond number and size, construct water control devices, and begin associated animal husbandry projects.)
5. Increasing prices of government produced fingerlings to those of privately produced fingerlings.

These were largely initiatives proposed by USAID project personnel and PCV participants. All of these measures have been made part of the present official strategy of the FAO Global Fish Culture Project (CAF 007.)

The apparent success in teaching farmers to raise their own fingerlings seems to remove largely the need for substations including the rebuilt one at Bossembele.

Questions of orientation, motivation or level of competence on the part of African agents (animateurs) has reduced the function of the PCV training them to almost nil except those instances where one of them becomes a "model fish farmer". In such a case he is essentially no better informed than others, though he may assist the program and PCV. This indicates that the method of propagating fish farming is by the "spread effect" as good models incite others to emulate them, rather than through information disseminated by paid agents.

VIII. FINANCIAL SITUATION AS OF 9/30/84 (U.S. DOLLARS)

Items	Funds Programmed	Expenditures Plus Accurals	Est. Future Years Expendi-tures.	Unprogramm Funds
Technical Assistance				
Long term				
Project Administrator	163,900	106,800	61,200	(4,10
Short term				
Rice consultant	950	677	-0-	2
Farm Management Expert	4,000	3,676	275	
Financial Analyst	9,000	9,000	-0-	-
Anthropologist	10,900	10,228	-0-	6
Other	61,150	-0-	-0-	61,1
Commodities				
Vehicles motorcycles, bicycles:	179,600	111,870	-0-	67,7
Rice Equipment	40,500	40,600	-0-	(10
Training				
IITA - rice	27,600	-0-	20,000	7,6
Bee culture	21,000	-0-	6,000	15,0
*Other Costs (local currency account)				
Rice and Administration	124,000	52,775	50,000	21,2
Fish	115,400	49,525	42,500	23,3
Bees	132,800	59,675	35,000	38,1
Contingency (5%)	44,500	-0-	-0-	44,5
Inflation (10%)	64,700	-0-	-0-	64,7
TOTAL	1,000,000	444,826	214,975	340,1

* Includes: POL fertilizer, office supplies, farmer hand tools, maintenance, repairs, insurance, workshops, materials for hives and miscellaneous expenditures.

XI. SPECIAL COMMENTS

The evaluation team has the following recommendations to make concerning the project. First, USAID involvement in inland fisheries as is being promoted by the project should be concluded at the current project completion date. Peace Corps may wish to continue its involvement in establishing commercial fishing centers as it has been successful in so doing in the project. Peace Corps should examine other sources of funding for such an endeavor such as the USAID financed Small Project Assistance Program or funding available from other donor organizations. To be effective, it is important that the necessary logistical arrangements are made to ensure the volunteer is supported in the field. However, Peace Corps innovation in this field may have reached a plateau and Peace Corps may want to consider branching its efforts into other types of fisheries schemes such as integrated livestock operations.

Bee culture shows financial potential but the evaluation team was not at all certain as to what direction the activity should proceed. It was obvious that the Project Paper was not too useful in the conduct of this component. However, the one PCV involved did discover some interesting approaches to promoting interest in producing bee products in rural areas. A redesign and implementation of this component by a competent organization could lead to some impressive results.

The rice culture component of the project suffers from lack of understanding by those involved in the rice centers of the concept of financial viability. It appears that years of Government involvement and generous donors have led to almost indifference to the long-term outlook of personnel at the Centers. Although it appears that the Centers could become viable operations, it is quite apparent that there is a need for a major infusion of organization, management and infrastructure building before this long term goal can be met. Again, the evaluation team recommends that USAID consider engaging a competent organization to redesign and implement this component.