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EVALUATION

NORTH SHABA RURAL DEVELOPMENT

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C O V E R I N G R E P O R T

EVALUATION OF

THE NORTH SHABA RURAL DEVELOPMENT PROJECT

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TABLE OF CONTENTS

	Page No.
Preface	i
I. FINDINGS AND RECOMMENDATIONS	1
PNS as a whole	1
Individual subsystems	2
Infrastructure	2
Research and extension	2
Farmer groups	3
Marketing	3
Intermediate technology	3
Management	3
II. BACKGROUND	4
III. ACCOMPLISHMENTS IN THE PNS AREA	7
Production of maize	7
Marketing of maize	7
Farm households reached	10
Infrastructure built	10
IV. PNS PERFORMANCE	10
PNS as a whole	11
Management	12
Infrastructure	13
Research and extension	15
Farmer groups	18
Marketing	20
Intermediate technology	21

Recommendations to AID for Future Evaluations:

1. One contractor only.

2. Five evaluators maximum.

3. Adequate authority to team leader.

Add two weeks if recommendations are not followed.

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COVERING REPORT: EVALUATION OF PROJECT NORTH SHABA

Preface

The North Shaba Rural Development Project (USAID Project No. 660-0059), hereafter referred to as Project North Shaba (PNS), is the largest in USAID/Zaire's portfolio. Life-of-project authorizations from the U.S. Government are $13.4 million for FY 1977 through FY 1983 (9/30/83). Counterpart and Government of Zaire (GOZ) budgetary expenditures for the same period were estimated in the amended Project Paper at the equivalent of $9.6 million.

In accordance with the design in the original Project Paper, Dimpex Associates conducted a mid-course evaluation in June-July 1979. In addition, the implementing contractor, Development Alternatives, Inc. (DAI), has made two internal evaluations, the first in mid-1980 and the second in February-March 1982. The current evaluation of PNS is thus the fourth comprehensive one since the start of the project.

The Evaluation Team chosen by AID is one of the largest ever assembled for such a task. There were nine specialists from the U.S., selected from five different contractors:

Economist/Chief-of-Party	:	A. David Redding
Management	:	Everett L. Headrick
Transportation	:	Michael Spiegel
Agricultural Research	:	Henry C. Wiggin
Agricultural Extension	:	Sanath K. Reddy
Rural Development	:	Andrée Black-Michaud
Intermediate Technology	:	Joseph K. Campbell
Women in Development	:	Sylvia Watts
Rural Health	:	Betsy Stephens.

In addition, five persons resident in Zaire participated in part or all of the evaluation: Louise Fresco (UNDP/FAO), Citoyenne Mwimba Risasi (Condition Feminine), Citoyens Luamba me Duma and Pezo yi Bamba (Bureau d'Etudes, Départment de l'Agriculture), and Citoyen Mobula Meta Lidoga (Service Presidentiel d'Etudes).

Each team member is responsible for his own report. Those for the first eight persons listed above are in separate annexes to this covering report. The report on Health Systems Development (USAID Project 660-0057), which was evaluated at the same time as PNS because it is located in the PNS area, is reproduced separately. Some reports by other participants may be available at the agencies listed.

In retrospect, especially in view of the coordination difficulties stemming from the large size of the team and the number of contractors involved, the time allowed in Kinshasa was much too short. The tasks included: (1) writing draft reports, (2) consulting on substantive issues among team members, (3) editing, (4) analyzing individual reports so as to identify and assess more adequately causal factors for over-all PNS successes as well as failures, (5) assuring internal consistency among all team reports, and (6) discussing and coordinating fully the conclusions and recommendations of the final covering and individual reports.

The shortness of time was due in part to an insufficient total number of days allowed for evaluating a complex project in an isolated region, where transportation and transportation-delays eat up a large proportion of the available time. Another contributing factor was the allocation of team time, without consultation, to a specified number of days at the project site. In-depth discussion of the problems and possibilities might have led to a more efficient division of team time between field work and reporting. Finally, the choice of five different contractors for a single project served to transfer the editing responsibilities of the contractors to the team members, thus further reducing the time available to each for substantive writing and team consultations. Without both additional authority and time, the Chief of Party could not accept much of this responsibility.

The Evaluation Team was saved from serious embarassment on this account, only because the findings, conclusions, and recommendations of each team member turned out to be remarkably consistent with those of his colleagues. For the future, however, especially where so many professionals are working together on a short-term assignment for the first time, it would be wiser for AID and contractors alike not to rely on such happenstance.

The Team, except for members Campbell (who had departed the previous evening) and Reddy (who was still in Kongolo) met on the morning of May 8 to compare their findings and draw up team recommendations. They themselves were somewhat surprised by the unanimity which emerged.

Later that day the Team informed the USAID Mission Director and other officers of its conclusions and unanimous recommendations.

The Chief of Party, though he has obviously drawn heavily from his colleagues, is responsible for the covering report. However, no team member dissents from its conclusions and recommendations. Before their departures on May 23 and 26 respectively, team members Watts and Reddy saw and agreed with a draft of this final report. Before their departures on May 11, 12, 14, and 16 respectively, team members Spiegel, Headrick, Wiggin, and Black-Michaud saw and agreed with the final recommendations, the sections dealing with their respective subsystems, and a preliminary draft of the covering report. Mr. Campbell departed before team recommendations were drawn up; but on the basis of his final debriefing, team members believe he would agree with the substance if not the precise wording.

Thanks are due to many persons for their courtesies and cooperation: to Mr. Norman Sweet (USAID Mission Director), for his support and graciousness even during disagreements over substance; to Messrs. Richard Peters (USAID Agriculture Officer), Lee Braddock (USAID Design and Evaluation Officer) and Russell Anderson (AID/AFR/DR), for their briefings and support; to Mr. David Leong (AID/AFR/DR), for his invaluable coordinating, editing, and other assistance through all aspects of the work both in Washington and Zaire; to Ms. Louise Fresco (UNDP) for her many valuable suggestions on substance as well as her readiness to bear so expertly the onerous but essential burden of interpreting at our final PNS meetings; to Mr. David Soroko (the PNS Project Officer from USAID/ARD who accompanied the Team to the project area) and Ms. Anne Williams (Assistant Capital Projects Development Officer from USAID/DEO in Kinshasa), for their backstopping of the team; to Citoyen Kamwaka Kilunga Garba, Citoyenne Agnes Yaski, Mme. Milvia Marani, Mrs. Debby Rodriguez, and Mrs. Norma Duerbeck, who provided the typing services without which the report could not have been assembled; and to the many others, including particularly the PNS staff, whose names and affiliations are noted in the individual reports.

David Redding

A. David Redding
Chief of Party

Date: May 29, 1982

EVALUATION REPORT: PROJECT NORTH SHABA

I. FINDINGS AND RECOMMENDATIONS

1. The Evaluation Team has concluded, unanimously, that Project North Shaba (PNS) does not merit continuation, in the light of the technical and management performance of its subsystems. Accordingly, the Team recommends that USAID support of and participation in PNS cease. The Team further recommends that the phase-out be completed within six month from the date of submission of this report, or sooner if consistent with an orderly phase-out of project activities.

2. If, for policy reasons*, AID and the Government of Zaire (GOZ) find it appropriate to continue a foreign-assistance presence in North Shaba, the Evaluation Team believes, again unanimously, that the project should be redesigned in major respects and should be implemented by a different contractor. Options for elements of a new design for such a new project are contained in the individual reports on subsystems.

3. The Evaluation Team believes, again unanimously, that for the foreseeable future no project in North Shaba can be sustainable; that is, it cannot function satisfactorily without continued foreign technical and capital assistance. The Team wants to emphasize its belief that, if AID should decide to provide any assistance to a new North Shaba Project, AID should not set sustainability as a realizable goal in the foreseeable future.

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*Policy in this context could include over-all economic as well as political/strategic considerations. For example, the U.S. might conclude (1) that some form of economic assistance is desirable, (2) that a new project in North Shaba could and perhaps should salvage something from the PNS experience, and (3) that it might in any event be preferable to starting over in a new area of Zaire (even a less isolated one) or to giving program-type assistance.

(This footnote was added on May 22 by Watts, Reddy, and Redding, after the departure of other team members. They might or might not agree with it.)

4. The Team recommends sequencing of phase-out and disposition of subsystems as follows:

- Infrastructure. Start phase-out immediately and complete by October 1, 1982, including rehabilitation of unsafe bridges. Turn over responsibilities and equipment to Office des Routes (OR), unless other assured funding is found. If it is found, finance the subsystem as a new separate organization.

- Research and Extension (R&V)

-- Research. Terminate research immediately, and transfer specialized research equipment to other AID-supported research groups. Before terminating R&V subsystem, complete evaluation of storage methods and prepare report; also harvest, shell, clean, and prepare Kasai I seed for distribution, both that presently growing in the multiplication field at Ngaba and that used in the storage evaluation.

-- Extension. Continue extension services to the end of the phase-out period. Stop geographic expansion now. Take immediate steps to supply improved seeds in the PNS area. Improve extension methods and processes, with the aim of integrating an improved service into the DOA.* To the extent time permits, train extension agents in the technology of the most important crops and the methodology for its transfer. Provide each of them with concise written instructions, so as to make the extension message clear, simple, and consistent. Conduct short-term farmer training at those PNS centers where few farmers have accepted recommended practices.

*If this aim seems feasible and should require several additional months of AID financing to accomplish, the Team's extension specialist recommends USAID consider doing so.

- Farmer Groups (DGF). Start phase-out as soon as possible for all DGF activities, including those for women. Explore alternative means for repairing corn grinders and other equipment purchased from the IT subsystem of PNS; also alternative sources of supplies for farm groups (e.g., sacks for maize marketing and basic commodities for women's businesses). Make sure that the legal and financial reports of the two savings cooperatives are in order and on file. Discuss the contents of these reports in a public meeting with all members.

- Marketing (C&C). Phase out activities as quickly and smoothly as possible. Stop all purchases, and sell commodity stocks which were previously purchased for merchants and farmers (e.g., fuel and sacks) If feasible, sell such used items as trucks and tanks to merchants.

- Intermediate Technology (IT). Start preparing for PNS phase-out immediately. Sell part of the IT installation -- as quickly as feasible -- to a private enterprise which will provide equipment-repair services for Kongolo merchants and farmers. Transfer responsibility for disposition of any residual equipment to the infrastructure subsystem. Work particularly closely, during the phase-out period, with the extension service and farmer groups (on residual problems of equipment repair and tools) as well as with PMU (on accounting improvements) and infrastructure (on equipment and service matters).

- Management. Maintain the management subsystem (PMU, including SCAD), until completion of the phase-out. PMU should contract as soon as possible with a Zairian accounting firm to complete accounting activities,

including the development of information on expenditures by subsystems and discrete activities; and it should complete physical inventories and reconciliations against purchase documents. SCAD, the information unit, should complete current field work quickly and devote the remainder of its efforts, until project termination, to processing and reporting on data already collected. USAID should arrange for a final project audit as quickly as feasible.

II. BACKGROUND

1. The Evaluation Team is aware of the difficult problems facing PNS. Any integrated rural development project requires a clear purpose, systematic planning, establishment of priorities and budgets, programmed operations, and recognition of budgetary and institutional constraints. PNS is a particularly large and complex project, so that in addition it requires a high degree of coordination and integration of activities among its subsystems and with public and private Zairian institutions. PNS has the primary responsibility for meeting these requirements, even though AID must bear some responsibility because of an inadequate project design. PNS has not met this responsibility satisfactorily.*

2. The project area, located in the northern part of Shaba Province some 800 miles east of Kinshasa, is isolated in almost every sense of the

*An explanation, though not a satisfactory justification for this situation, is the absence of a Chief of Party for the expatriate contractor at the project site. The original Chief of Party left the site in October 1980; and his successor was "removed for cause," according to USAID, in October 1981. Thus, the Administrative and Financial Advisor has had to take on the Chief-of-Party responsibilities in addition to his own.

word. It is distant from even a medium-size urban center, and the transportation-communications network is most inadequate. Scheduled air service, either passenger or cargo, is no longer available to or from Kongolo (flights are theoretically still scheduled, but there have been only two in 1982 to date); rail service is both slow and infrequent (currently once a week to and from Lubumbashi and Kalemie respectively); roads are inadequate for either long-distance cargo or passenger traffic; and telephone service is non-existent. These factors contribute to the isolation felt by most expatriates and Zairians.

3. Recruitment of personnel for long-term PNS assignments is understandably difficult. Many Zairians feel it is "the end of the line for them" in terms of isolation, reduced chances of promotion, and reduced opportunities for additional earnings from evening or weekend work. However, even if, because of GOZ salary regulations, PNS could not provide sufficient monetary incentives for long-term assignments, it might have explored more actively the possibility of using some intermediate-term private Zairian contractors from Kinshasa, to perform such specific tasks as improving PNS accounting, budgeting, and information-research operations -- after which, less-experienced Zairians whom it could attract for longer terms could carry on the functions. PNS could also have sought more persistently to hire third-country nationals (e.g., from Britain or Francophone West Africa) who would be willing to endure the isolation. And it could have utilized more short-term expert expatriates as well, to map out tasks to be implemented by long-term expatriates and Zairian staff (including contractors).

4. The economic climate in Shaba, particularly the scarcity of almost all supplies needed for increased agricultural production as well as the uncertainties regarding prices to be paid farmers for their crops, makes yield-increases difficult and provides fewer incentives to farmers than are needed for sustained production increases. Moreover, liquidity problems constrain maize purchases by some merchants.

5. GOZ budgetary funding of local-currency costs of PNS has not been sufficient in any prior year, so that (in the words of the recent DAI evaluation) "without (PL-480 generated) counterpart funding, PNS would have ground to a halt a long time ago." The GOZ frequently points to PNS as its model project, and it has provided proportionately more funds to PNS than to other rural development projects. Nonetheless, owing to severe GOZ budgetary constraints (rather than any lessening of GOZ interest) PNS budget problems would be even worse in 1982 if not for counterpar funding. In response to the PNS request for Z18.3 million for 1982, the GOZ authorized Z4.8 million from its investment budget and Z891,000 from its ordinary budget. To date, the GOZ has allocated Z2,072,600 and Z891,000 respectively, the latter to be disbursed in monthly installments. (The shortfall of Z12.6 million will of necessity be met from counterpart funds.)

6. The GOZ macro-economic situation, moreover, is highly unfavorable to development of any kind: Foreign exchange is very scarce, so imports of tools, fertilizers and other agricultural inputs are either unreliable or nonexistent. Pricing and inter-regional trade restrictions continue. Insufficient resources are allocated to ameliorate transportation constraints. And administrative bottlenecks, often associated with corruption, continue to frustrate productive efforts in all sectors.

III. ACCOMPLISHMENTS IN THE PNS AREA

1. Maize Production in 1981 had already exceeded the target level for 1983 and has apparently increased still further in 1982. PNS is given credit for a substantial part of this accomplishment. Its rehabilitation of roads and bridges in particular and its infusion of resources have reportedly brought a new feeling of optimism and growth to the area.

Four qualifications to this accomplishment, however, require notin here (see economic chapter for discussion): (1) The extent of actual increases in maize production is open to serious question.* (2) The extent of PNS responsibility for whatever increases did take place can not be determined. (3) The overall benefits to farmers are not clear, since PNS did not systematically gather data on crops other than maize nor take account of environmental costs arising from its focus on maiz rather than on balanced farming systems, nor explore the benefits from possible increases in auxiliary services and production. (4) The cost to PNS of the increased production attributable to it has been substantial: a minimum of about $300 per ton of increased output between 1978 and 1981.

2. Marketing of maize increased by some 20,000 tons between 1978 and 1981, to a level of 32,000 tons, an achievement already greater than the 1983 target. However, again there are several serious qualifications to be noted (see economic chapter for discussion):

*As is noted in the economic report, the question of the extent of actual increases in the production and marketing of maize did not arise until after almost all the Evaluating Team had left Kinshasa. Thus, it did not influence in any way the Team's unanimous recommendation "that USAID support of and participation in PNS cease."

(1) The extent of actual increases in maize marketing may have been insignificant, if the 1976 figure provided by the DOA is accurate, so that the PNS accomplishment would simply have restored the situation which prevailed before the precipitous drop-off in 1977.*

(2) The extent of the PNS contribution to whatever increases in maize marketing did take place is not determinable.

(3) The costs to PNS of additional maize marketed, calculated on the basis of the unverifiable hypotheses discussed in the economic chapter, were substantial -- a minimum of about $550 per additional ton marketed in 1981 compared with 1978. This cost compares with (e.g.) the $250 per ton for imported maize at Lubumbashi.

Rehabilitation of roads and bridges is generally believed to be a primary factor in whatever marketing increase took place. In addition, PNS has supported three competing marketing elements: large merchants, small merchants, and farmer groups. It provided them in 1981 two trucks for rental; some 30,000 liters of fuel, or about 8% of the estimated 400,000-liter total for marketing operations in the PNS area; and 100,000 sacks, enough for about 30% of the 32,000 tons marketed in 1981, of which about 60% went to the largest private miller in the province. For the 1982 marketing season, PNS has obtained (through the Zaire Agricultural Marketing Support Loan, No. 660-0025), 25 additional trucks. These were intended for sale, but some may be rented instead, to both merchants and farmer groups.

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*This question also arose after departure of almost all Team members.

As is not surprising, the largest gainers from PNS support appear to be the large merchants (and also the private miller). Having the largest truck fleets, financial and commercial connections outside the PNS area, and access to bank credit, they have purchased most of the maize and secured the lion's share of PNS-supplied fuel and sacks. It appears, moreover, judged from conversations with merchants, with PNS, and with USAID, that only the larger merchants have both the substantial down-payment and bank credit required to obtain the USAID-imported trucks.

Smaller merchants have also profited from PNS marketing assistance. Whether many of them could survive as maize buyers if PNS ceased to operate is problematical, since obtaining fuel and credit under current circumstances in Zaire requires substantial influence and resources. The presence of purchasing counters (comptoirs) in Kongolo and Nyunzu will be helpful, however, since they can sell there any maize purchased from farmers -- at a profit and for cash.

Farmer groups have made a very slow start, marketing only 108 tons of maize via trucks rented from PNS in 1981 (or 0.3% of the PNS-area total). This proportion could rise to about 1% in 1982 if sufficient PNS trucks and fuel are available. If they are not available, these groups would find it difficult if not impossible to bring their maize to railhead purchasing counters, though they might be able to maintain a somewhat stronger bargaining position than formerly vis-a-vis merchants buying maize at the farmgate.

In short, it is not clear how much of the greater competition in maize buying would survive the demise of PNS. In any event, such competition would at best be among only a relatively few large buyers.

3. Farm households reached. PNS had by 1981 reached nearly 13,000 farm households (85% of its 1983 target), of which about 50% have adopted various elements of the improved package (primarily Kasai seeds). Moreover, the Team's recalculation of increased yields suggests that those farmers who have used Kasai I seeds have experienced increases more like 50% than the 10% to 25% noted in previous evaluations. Unfortunately, the distribution of new seeds has not kept pace with the growth in numbers of participating farmers, as is discussed under point IV-4 below.

4. Infrastructure. The 520 kms of all-weather roads currently in use, including newly built or rehabilitated bridges and culverts, were a major factor in these accomplishments. Although technically below standards even for developing countries, the roads could last from five to ten years on average without major rehabilitation, if there is routine and periodic mechanized maintenance. At current maintenance levels, however, they will require major work within a year or two. With the little or no maintenance likely once U.S. Government support of PNS ceases (see transportation report), some roads could well be unusable after one year or one rainy season.

IV. PNS PERFORMANCE

PNS has faced substantial problems in a setting not at all conducive to economic-social development. That it is functioning at all is an achievement. And it has achieved some successes beyond mere survival.

Nevertheless, the Team has concluded, unanimously as already noted, that PNS should be terminated within six months. Its conclusion is based on the following findings and analyses:

1. Economic and Other Over-All Questions. PNS has not gone beyond an inadequate project design, to think through its major purpose: Is it maize production and marketing, as one would judge from a review of accomplishments? Or is it, as stated in the amended Project Paper, to raise the incomes of participating farmers and develop a rural development process which is (not only self-sustaining but also) replicable in other parts of Zaire?

In large part because of this failure to think through the purpose of this project, PNS has not taken adequate account of other crops which might perhaps increase farmer income more than maize and which could be combined in an environmentally sound rotation system. Nor has PNS taken adequate account of the effects of relative prices on changes in production patterns. Nor, because it has apparently paid so little attention to the amended Project Paper, has it given sufficient attention to the fulfillment of a major condition precedent set forth there, namely that farmers be free to sell their products to any recognized buyer. Finally, because PNS management at all levels seems to have assumed -- and many have said -- that the U.S. Government had to continue to support the project or it would fall apart, PNS leadership has made virtually no efforts toward the goal of sustainability/replicability -- for either PNS as a whole or selected subsystems.

Focusing on major purposes as well as on the over-all situation would undoubtedly have resulted in more progress than the actual PNS focus on maize production/marketing and on narrow management problems (see below).

2. Management. As noted above, PNS management has not focused on major purposes. Neither has it focused on establishing priorities or on planning and programming systematically for whatever major purposes it was trying to achieve. Nor did it set up budgeting and accounting systems and procedures which would enable it to see what its priorities were in practice, as judged by actual allocations of funds. Thus, in the case of the training center at Ngaba, PNS is spending a very large proportion of its total budget (PNS itself does not know how much) on a center whose purposes and functions it has not yet determined.

Although the SCAD system is improving, PNS has not set up an adequate research-information system to provide baseline, farmer-income, farming-systems, and other information to enable appropriate measurements of project impacts and to facilitate improved decision-making by PNS as a whole as well as by its subsystems. Nor has it focused on major management-operations problems, such as the integration and coordination of its various subsystems or the recruitment and training of competent Zairian and expatriate staff.

The accounting system is ineffectual and cannot provide accurate data on past expenditures by subsystems and discrete activities, thus seriously limiting the ability of PNS (or this Evaluation Team) to gauge cost-effectiveness. Budgeting of discrete activities is non-existent, which

also severely impedes the ability of PMU and PNS as a whole to make rational management decisions or determine a priority ranking for project activities.

Written communications within PNS are generally lacking, and documentation of decisions and changes in policies and activities is limited. Many decisions have been verbal and thus subject to misinterpretation, non-implementation, and non-accountability by those involved.

Finally, neither PNS nor the USAID Mission has explored thoroughly (the Team is aware of the difficulties) the opportunities for formal and informal training of its staff. Consequently, few of the funds budgeted for this purpose have been spent. Greater use of short-term experts could also have provided some training to the PNS staff, who impressed the Team as being capable and dedicated but also relatively inexperienced.

PNS management is best characterized as "crisis management," going from one problem to another, including funding problems, without trying to anticipate and thus avoid them. Far too much management time has been spent on petty matters such as approval of vacation time or allocation of vehicles for staff transportation.

3. Infrastructure

The roads were opened without any apparent planned priorities, programming, budgeting and quantity estimates of material, equipment and labor. Most roads are technically below standards, even for developing countries.

No engineering design was used for the roads, bridges and culverts; and no engineering control was exercised in the construction of these facilities.

The subsystem used a good part of its resources for non-programmed work at Ngaba that has neither engineering documentation nor budgetary constraints. This work was done at the expense of other functions of the subsystem whose needs are more urgent (e.g., rehabilitation of unsafe bridges).

Some of the expatriate advisers at the start of the project were technically unqualified, lacking the necessary engineering education and experience. This has resulted in some wasteful operations which have added to the cost of the work.

With minor exceptions, there has been no formal training of the Zairian staff. This too has resulted in waste and inefficiency (e.g., a 20% equipment breakdown rate).

Management of the Infrastructure Subsystem is non-existent. There is no accounting, no budgeting of sub-projects, no programming of work, and, generally, no systematic direction of the subsystem. There is little communication (feedback) between infrastructure sub-units and subsystem management. Moreover, the subsystem management has allowed, and in some cases encouraged, other subsystems to interfere with its operations.

As part of the Project, OR was to maintain the National and Regional routes in the PNS area. They have never met this commitment, nor are they expected to in the foreseeable future. ESTAGRICO, the cotton parastatal responsible for the manual maintenance of the PNS roads, is also presently

unable to meet its commitment. The GOZ and the Ministry of Agriculture, although voicing support for the project, have not provided adequate financial and material support.

This subsystem is not sustainable now, nor will it be in the foreseeable future, since neither OR nor ESTAGRICO can be depended upon to take over additional responsibilities when they have failed to meet existing responsibilities.*

4. Research and Extension (R&V) Subsystem

Research has had a very limited impact on maize production. It has identified superior varieties of peanut, soybean, cowpea, and rice in yield trials and has made some progress in determining yield advantages of various cultural packages. However, the contractor has been unable to maintain an expatriate agronomist on the project. As a result, the research program has been fragmented, has lacked continuity, and is of a generally poor quality. Moreover, conclusions unjustified by the data have been drawn, and the research unit is at times confused as to what constitutes adaptive research and what constitutes demonstrations. (In fairness, the amended Project Paper is also vague concerning the difference between research and demonstration.)

Training has received very limited attention. Only the Zairian chief of the subsystem has received formal training related to research, a three-month program on maize production at the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria. No on-the-job training was furnished by the second expatriate advisor, who worked alone, in part

*Some members of the Team considered the possibility that USAID (or another donor)might continue financing during an interim period until (1) it could improve the capabilities of an organization to handle the maintenance burden and (2) the Zairian economy improved, so as to allow GOZ financing. They concluded, however, that the possibilities were too slim to justify such continuation.

because the Zairian subsystem chief was occupied with extension; and the extent of personalized instruction furnished by the first agronomist, if any, is not known.

The various farming systems in the PNS area had not been identified at the time of this evaluation, although both the original and amended Project Papers require identification of and research on them. Such studies should have been undertaken at the start of the project, by the information sub-unit (SCAD) and extension personnel working together. SCAD was not operational until about 1979, but it is still difficult to understand why the research advisors did not make studies of their own, so as to know the types of agricultural systems for which they were supposed to prepare improved technologies. Nothing in the files suggests this was done.

The "outputs" required in the amended Project Paper have either not been met or, in the case of identification of improved varieties other than maize, only partially met.

Research operations should therefore be terminated immediately, especially in view of the time required to obtain valid answers to research problems (at least four years).

Extension. The extension service has established an organization capable of reaching and communicating with farmers.

Through 60 village centers, it reaches about 12,800 farm households, or about 50% of the 25,600 households in the PNS area. Of the households

reached by extension agents, about 15% use the full package of improved seeds and recommended practices. An additional 35% use one or more of the recommended practices (probably mainly the improved seed). This rate of acceptance compares favorably with other developing countries.

PNS has inculcated an approach to extension -- based on principles of democracy, voluntarism, and education -- which is a sharp departure from the approach used by DOA and ESTAGRICO, the two other agencies in the area. For the first time, PNS-area farmers can receive at least some technical assistance and can hold a dialogue with a development agency.

The fact that farmers are willing to sit, talk, and complain or praise PNS is a considerable achievement, given the background and approach of traditional agencies in the area.

The extension service could have been much more effective, however, if it had focused more on the training of both supervisors and village-level agents. Extension supervisors know the technology but do not know how to give -- and have therefore not provided -- on-the-job training to village-level agents. Nor has the extension service provided more than perfunctory formal training (two weeks per year).

Accordingly, village-level agents, though dedicated, have only limited knowledge of major-crop technologies and extension methodologies. Moreover, because they have not been trained in analytical skills (including record-keeping), they do not understand the purposes and potential uses of analysis. Thus, they are not able to identify superior farm practices and provide feedback for adaptive research. Nor have they been able to develop valuable insights into local agricultural practices,

cropping systems, and the relative performance of the improved and the local varieties of maize using different sowing dates and cultural practices.

Associated with this lack of training -- a management responsibility -- is the failure to provide extension workers with concise, written instructions, so the extension message to the farmer can be clear, simple, and consistent.

The inability of the extension service to develop a multi-crop approach to farming has been another major deficiency. Moreover, it is a deficiency that persists throughout the PNS organization.

Still another deficiency which could inhibit the integration of the PNS extension service into DOA, as recommended by the Team, is the absence of any real effort by PNS to develop linkages with either the DOA or ESTAGRICO extension services.

Finally, the extension service and related PNS units (PMU and the research unit) have failed to develop and mobilize a system for assuring the availability and timely delivery of seeds and tools to farmers. In fact, seed production and procurement can fairly be said to have been the Achilles heel of the PNS extension effort. Without seed, extension has little to extend. PNS seems to have forgotten this key principle.

5. Farmer Groups (DGF)

Male. DGF activities have been slow to start and limited in their impact.

DGF has created 14 Farmer Councils whose membership is composed of representatives from different family groups. They perform no production or village functions but rather serve as transmitters of PNS information. They therefore have no basis for existence if PNS were not to continue.

DGF has also helped organize 38 farmer groups, to engage in economic activites. During the 1980-81 agricultural season, 55 men from seven of these groups rented PNS trucks and marketed 108 tons of maize at a railhead comptoir in Kongolo.

If PNS were to continue, it is conceivable that these marketing activities could expand significantly. But without PNS, there are no trucks to rent, no fuel for them, and therefore no possibility of continuing the activity.

DGF has cooperated with Peace Corps Volunteers in the construction of seven spring boxes, to improve village water supplies. Staff members have also backstopped two small savings cooperatives. Neither of these cooperatives can now contribute to the needs of small farmers, nor could they survive without the deposits of PNS staff.

In short, DGF activities have no raison d'etre without PNS and no possibility for being self-sustaining in the foreseeable future.

Female. The PNS staff has conscientiously tried to identify a valid program for women farmers in the PNS area. Program results to date are negligible, as is noted in the report on the women's component of PNS, due mainly to inadequate project planning and lack of implementation skills.

The program strategy selected for women -- to work communal fields utilizing new, time-consuming agricultural practices, so as to earn funds for purchase of basic commodities for resale at a profit -- was inappropriate. These special activities for rural women outside the context of the family would have added to the already overburdened schedule of women. It ran counter to the needs and desires of both women and their men, as is evident from the fact that in two years, four animatrices working full-time were able to attract only fifty women to the program.

The fault lies not so much with the Zairian personnel, who at the time of employment did not have sufficient project-management training, but rather with the contractor who should have made sure that the American staff hired as advisors had basic project-management skills. If the American advisors did not in fact have the requisite skills, the contractor's home office should have provided short-term training and regular backstopping to supplement the instruction.

6. Marketing (C&C). PNS marketing strategy has been, in concept, to provide logistical support to small merchants, so as to help break the monopoly of the big ones; to encourage collective negotiations between farm groups and maize buyers, so as to help farmers get more for their maize; and to influence provincial authorities to raise farmgate and railhead prices for maize.

Underlying this strategy is the belief that farmers will produce more, if maize prices rise sufficiently to provide appropriate incentives.

Concepts have not always been translated into practice, however. As noted in the preceding section, larger merchants have been able to profit more than the small ones from PNS support: and this is likely to be intensified, with the sale of USAID-supplied trucks for which only the larger merchants can qualify.

Similarly, collective bargaining between farmers and grain buyers is still more a wish than a reality. And PNS influence on farmgate and railhead prices does not seem strong, as is indicated in both the economic and marketing reports.

In over-all terms, the subsystem's achievements seem relatively slim. Competition in maize buying has increased, and the seven or eight strong merchants/grain buyers in the area are likely to survive. However, their survival will depend less on PNS interventions than on the state of the economy at both national and provincial levels, including in particular the availability of maize to buy and road-access to it.

7. Intermediate Technology (IT). The intermediate technology subsystem has fulfilled its goals, in terms of numbers of tools produced and blacksmiths trained. However, the training is not adequate, and the tools produced are of such poor-quality material and workmanship that they cannot do a satisfactory job even for a single season let alone stand up to hard use during several seasons. Accordingly, even at subsidized prices, farmers buy the tools only if they cannot afford the better-quality ones available from Lubumbashi and Kinshasa. Moreover, equipment produced by the IT subsystem -- for example, corn grinders -- is of neither appropriate

design or quality, so that it often breaks down after very short periods of use. A contributing factor is that the"expatriate advisor did not have the experience required to provide needed advice and training" (see IT report). The low quality of the steel used, from five old steel barges, is another contributing factor.

The largely-idle machine shop could have been used to manufacture spare parts for infrastructure equipment. This lack of cooperation reflects poor management, by PNS as a whole as well as by the IT and infrastructure subsystems.

The IT subsystem has performed satisfactory repair service for local merchants and others. The poor accounting system, however, makes it impossible to determine whether this aspect of the operation could be financially self-sustainable.

EVALUATION REPORT

ECONOMIC ASPECTS OF THE

THE NORTH SHABA RURAL DEVELOPMENT PROJECT

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TABLE OF CONTENTS

Page No.

1. INTRODUCTION
   1.1. The National Situation 1
      - Unwise economic policies 1
      - Recent trends 3
   1.2. The Situation in North Shaba 4
   1.3. The Agriculture Sector 5

2. EVALUATION FINDINGS
   2.1. Adequacy of Measurements 7
   2.2. PNS Purposes and Achievements 8
   2.3. Costs of Achievements 11
      - Costs 11
      - Benefits: Increased output and marketing . . . 13
      - Cost-Benefit calculations 18
   2.4. PNS Purposes Not Achievable by 1983, and Some Contributing Factors 19
      - Increase net income 19
      - Replicability/sustainability 20
      - Pricing policies 21
      - Purchase and sales policies 23

3. SUSTAINABILITY
   3.1. PNS or a Replacement Institution 25
      - Financing 25
      - Management 27
   3.2. Sustainability of PNS Functions 28
   3.3. Sustainability of Accomplishments 28

4. REPLICABILITY 29

5. CONCLUSIONS AND RECOMMENDATIONS
   5.1. Conclusions 30
   5.2. Recommendations 31

ANNEX I: Selected References and Contacts 32

EVALUATION REPORT

ECONOMIC ASPECTS OF PROJECT NORTH SHABA

1. INTRODUCTION

1.1. The National Situation

It would be hard to imagine a political-economic environment more inhospitable to economic development than Zaire affords at present.

The national economy has been going downhill for about a decade, largely as a result of unwise economic policies, including Zairianization and nationalization measures in 1974 and 1975, which were partially rescinded a year or two later, as well as large-scale unproductive investments; falling prices for Zaire's principal exports of copper and cobalt coupled with rising prices for its imports, particularly petroleum; and administrative bottlenecks (often associated with corruption, capital flight, and luxury living by the elite), which inhibit and distort investment and production.

The worsening terms of trade are outside Zairian control, but the unwise economic policies could be ameliorated if there were sufficient political will; and this in turn could increase productive investments and lessen unproductive skimming.

Unwise Economic Policies. The principal elements of these economic policies today consist of:

- Large budget deficits stemming from overspending by the Government of Zaire (GOZ), which have increased inflationary as well as balance-of-payment pressures and have led to general price rises of up to 100% annually in the late 1970's and foreign debts which now stand at $4 to $5 billion.

- Pricing policies which have held down prices to domestic producers. Designed mainly to ease the impact of rising prices on urban consumers, the policies have inhibited both agricultural and industrial production. They have thus depressed the supply of goods available to consumers and consequently have helped make further substantial price rises inevitable.

- Overvaluation of the Zairian Currency (zaires - Z), which inhibits exports and foreign-exchange earnings, encourages capital flight and less productive imports, and distorts investment and production. The overvalued zaire (the official value is now nearly three times that on the "parallel market") often precludes many exports, by making them unprofitable to domestic producers, or it diverts them into unofficial channels (i.e., smuggling). The lower cost of imports and of capital, to those who can gain access to foreign exchange through official channels, encourages its use for purposes which often contribute only minimally to economic-social development. Investment and production are distorted, because of the resultant scarcity of foreign exchange needed for imports of essential raw materials, intermediate goods, equipment for domestic producers in all economic sectors, and consumer goods needed as incentives to agricultural and other workers.

- Government investments which have been particularly low for agriculture and supporting services, including the road and rail network as well as agricultural equipment and spare parts. Even in its three-year plan for 1979-81, where agriculture was described as the "priority of priorities," the proportion of public investment planned for agriculture was set at only 11% of total public investment, while the ratio of actual to planned investment for 1979-80 turned out to be less than 20% compared with 40% for the average of other sectors. Moreover, as noted above, Government exchange-rate and pricing policies have discouraged private investment in productive capacity, since (e.g.) industrial operations can in any event utilize only a small fraction of existing capacity because of import shortages.

Recent efforts by the international community to help stabilize the Zairian economy -- evidenced by debt rescheduling, IMF Extended Fund Facility (EFF) arrangements for the June 1981 to June 1984 period valued at about $1 billion, and large aid infusions from the World Bank and bilateral donors -- led to significant improvements in GOZ policies and renewed hope for economic development.

Starting in late 1979, Zaire reduced its budget deficit, staying within IMF-set ceilings; slowed the rate of inflation from over 100% in 1979 to less than 50% in 1980 and 1981; reduced the arrears on foreign-debt payments from 75% of goods and services in 1979 to an estimated 25% in both 1980 and the following six months; and increased its production (real GDP) by an estimated 2.5% in 1980 and nearly 2% in 1981, compared with declines of over 3% annually in the mid and late 1970's.

Recent Trends. Since mid-1981, however, Zaire's economic situation has deteriorated in important respects.

- The value of Zaire's exports, affected by lower copper and cobalt prices as well as by transport problems, declined by an estimated 9% in 1981. (Zaire's overall terms of trade fell by 16% in 1981, following a 9% decline in 1980).

- Servicing of foreign debt, despite rescheduling to both government and private creditors, climbed from levels of 12% of export earnings (goods and nonfactor services) in the second half of the 1970s to an estimated 20% in 1980 and 30% in 1981. And foreign-debt-payment arrears appear to have increased substantially since mid-1981.

- Real imports, even including those coming in unofficially, remained low in 1981 despite nominal increases. Thus, production in such sectors as mining, manufacturing, and agriculture, which rely on imported materials and equipment, continued to be inhibited.

- Price distortions in the economy remained substantial, adversely affecting both agricultural and manufacturing investment and production.

- Budget revenues increased in 1981, partly as a result of higher import duties and excise taxes as well as the extension of duties to goods purchased with foreign exchange procured unofficially. Expenditure increases, however, more than exceeded those of revenues. Thus, starting in the second half of 1981, budget deficits exceeded the ceilings agreed upon with the IMF and have continued high into 1982.

1.2. The Situation in North Shaba

Shaba Province is of special importance to the GOZ for both political and economic reasons. Situated at the eastern border, some 800 miles from Kinshasa, it has been the site of secession attempts, invasions, and uprisings, the most recent being the two Shaba wars in 1977 and 1978.

The southern part of Shaba is the site of copper-cobalt mining, the major foreign-exchange earner for Zaire, and it is also a center of light industry and metal refining. It has had to rely on food imports for some time (an estimated 150,000 MT of maize in 1979), which has been a substantial drain on Zaire's increasingly scarce foreign-exchange resources.

The northern part of Shaba is apparently capable of producing sufficient maize and other crops to support these industrial and mining activities. However, although North Shaba now sends significant quantities of maize and palm oil to the south, maize shipments are well below the amounts needed.

That part of North Shaba where Project North Shaba (PNS) is located is isolated not only in the sense of being distant from even a medium-size urban center but also because of the transportation-communication network. Scheduled air service, either passenger or cargo, is no longer available to or from Kongolo (flights are theoretically still scheduled, but there have been only two in 1982 to date); rail service is both slow and infrequent (currently once a week to and from Lubumbashi and Kalemie respectively); roads are inadequate for either long-distance cargo or passenger traffic; and telephone service is non-existent.

The GOZ's political need to demonstrate its concern for Shaba Province, North Shaba's agricultural potential, and the U.S. desire both to respond to the GOZ concern and to help small farmers made this project seem a natural for both countries, despite their recognition of some of the problems they would face.

1.3. The Agriculture Sector in Zaire and North Shaba

Agricultural production in Zaire before independence contributed substantially to export earnings, accounting for an estimated nearly 40% of the total value of exports in 1959. By the 1970's, however, agricultural exports had fallen substantially in both absolute and percentage terms, accounting for an estimated 18% of the total value of recorded exports in the 1970-79 period.

During the same years, Zaire became a net importer rather than exporter of food. By 1970, for example, maize imports had reached an estimated 64,000 metric tons. And by 1978 they had climbed to more than 175,000 tons, of which about 85% came in to South Shaba. The estimates, though subject to a wide margin of error, correctly reflect the trend: Zaire, formerly an important exporter of food and other agricultural products, had become a food-deficit country.

North Shaba produces a number of crops important to its own economy. The output of maize in the PNS area in the 1980-81 season was estimated at some 65,000 metric tons, or more than 10% of the over 500,000 tons estimated for the country as a whole. (Again, all estimates are crude.)

Most observers agree that PNS-area maize output could be expanded to meet most if not all the large maize-import needs of South Shaba. The opportunities for sustained production increases in North Shaba are greatly reduced, however, by the macro-economic situation already described for Zaire as a whole. In particular, the supply of essential inputs to increase agricultural production is both scarce and unreliable -- inputs such as fertilizers, tools, equipment, and spare parts. The supply of fuel, trucks, spare parts, and sacks for marketing is similarly scarce and unreliable. Inadequate credit for merchants buying maize from farmers seems to be another major problem, especially for smaller merchants (some larger ones insist their cash reserves are ample). The road and rail network is not well-maintained. And rail service is slow, infrequent, and unreliable. Moreover, the unrealistic foreign-exchange rate makes imported maize cheap for the importer, while GOZ pricing policies also tend to depress prices paid to Zairian farmers nationwide.

In addition to those national economic policies which adversely affect agricultural production in North Shaba, maize policies in Shaba itself discourage or, at best, fail to provide adequate incentives to maize farmers in several ways:

- Shaba Province has violated at least the spirit of the commitment made by the Ministry of Agriculture, under the Amended Project Paper to allow PNS-area maize to be sold freely to all buyers. The transportation of maize to the neighboring province of Kasai Oriental, where the demand for and price of maize is much higher, is illegal. Moreover, maize buyers in Shaba Province cannot buy freely unless they are recognized as buyers by the Province.

- The Governor of Shaba sets producer prices for maize (and other crops) which are supposed to be minimum prices. In the past, however, maize buyers have often convinced farmers that these were maximum prices, using them as another lever to hold down prices paid. At the start of the current marketing season (April 1982) the questions of who can buy maize from farmers and how much they can pay had still not been fully resolved, even though the minimum price had been announced the previous month. Moreover, even apart from the above-noted difficulties, prices announced at market time are too late to influence planting, so they cannot serve as incentives to increased production as they otherwise might.

- Finally, the maximum prices set by the Province for milled flour also serve to depress the prices traders can pay farmers for their maize.

The PNS area also produces many crops of both local and regional importance other than maize. According to a PNS survey, reported in March 1982, manioc and peanuts are widely grown in Kongolo and Nyunzu, cotton in all three areas (including Mbulula), while rice is grown mainly in Kongolo and Mbulula. Palm oil was not covered by the survey, although it is a major crop in the Kongolo area. (Next to coffee, it is the largest agricultural

export of Zaire, but data on the share of North Shaba were not readily available.) A wide variety of vegetables is also grown in all zones.

These crops offer opportunities for export from the region, for improved diets locally, and for crop substitution if maize should prove less attractive to farmers in the future. Crop substitution, it might be noted, is a real possibility next year, since the prices of some other crops grown in North Shaba seem to be rising more rapidly than that of maize (see table in report on marketing). Such substitution would exacerbate the problems arising from the current maize shortage in South Shaba, perhaps leading to serious urban unrest in the south unless alleviated by additional maize imports, which the GOZ can ill afford.

2. EVALUATION FINDINGS

2.1. Adequacy of Measurements

The quality and accuracy of the physical data which are available seem to be both generally acceptable and improving. Though they are admittedly crude, and should therefore be interpreted as subject to wide margins of error, the data are probably as good as could be expected under the circumstances. It is not an easy task, for example, to estimate areas and yields under conditions where fields are non-rectangular, the spacing between plants varies widely, multiple cropping seems to be more the rule than the exception, and enumerators are relatively inexperienced.

Data available for analysis and management decisions, however, are inadequate in several important respects:

- Base-line data on such basic items as cropping patterns, hours worked on major crops during various periods, cultivation methods, tools and equipment used, areas worked, production, consumption, marketing and prices were not gathered at the start of the project.

- Historical data for the PNS area were not collated for any crop. Nor do PNS (or DAI) reports made available to the team analyze or discuss in depth the DOA data on the production and marketing of maize for earlier years (see Table 3).

- Neither time series nor comprehensive statistics on the current situation have been collected for PNS-area crops other than maize.

- Estimates of farm incomes are available for a few points in time, but they would be too flimsy to serve as the basis for comparisons for either total or average farm-household income, either gross or net, for either the PNS area as a whole or for the (significantly different) separate zones.

- Surveys have not been undertaken on farmers' attitudes, for example, in areas such as kinds of tools and equipment desired, reactions to PNS-produced tools and equipment, prices at which farmers would purchase seed, or the reasons for increases in areas planted to various crops -- such as higher prices to farmers, improved seeds, tools, labor availability, roads, marketing facilities, and availability of consumer goods. Nor, if there were discussions on these subjects between farmers and PNS extension agents or SCAD staff, was there any recording of them (systematic or otherwise).

- Data on actual dollar expenditures, either total or by sub-system, are not available at the project site for any prior year, nor are planned dollar expenditures available except for those set forth in the amended Project Paper (PP) in 1980. (Data on total dollar expenditures, not by sub-system, were found later at the USAID Mission.)

- Data on expenditures of local currency, both counterpart and GOZ budget funds, are available through calendar-year 1981. However, their accuracy is questionable, as is noted in other annexes. Budget estimates for 1982, though available, are not useful -- both because the actual totals are likely to be substantially different and because the breakdown by sub-systems is so uncertain.

2.2. PNS Purposes and "End-of-Project" Indicators Achieved

The over-all agricultural goal for Zaire, to which PNS is to contribute, is the achievement of national self-sufficiency in maize. The specific purpose of PNS, according to the amended Project Paper (PP) approved August 25, 1980, is dual:

- To increase the net income of small farmers in the Project area by 75% by the end of the project, as a result of raising corn production from 27,000 MT (1978) to 49,000 MT (1983);*

- To develop a rural development process in the form of a model that is replicable in other parts of Zaire.

By the scheduled project assistance completion date (PACD) of September 30, 1983, the end of project status (according to the same source) is to be as follows:

1. Annual maize marketed in the North Shaba project area is to increase from 11,000 tons in 1978 to 25,000 tons in 1983.

2. Maize marketed in the project area is to continue to increase at a rate of 10% per year (from 1983) through 1986.

3. Marketing of manioc, peanuts, rice and palm oil is to increase by (a total of) 20% between 1978 and 1983.

4. Net income of small farmers participating in the project for three years or more is to increase by (a total of) 75% - from an average in the two project zones of $385 in 1978-79 to $675 in 1983.

Whether PNS has developed a rural development process that is replicable in other parts of Zaire -- the second purpose of PNS -- is a question that is addressed in Chapter 4. Here only the first purpose noted above is discussed.

The short answer is that the data available are inadequate to assess the question on income, as was noted in the preceeding section. Moreover, even if more and better data were available, it would be difficult to answer the question as posed without addressing such very complex problems as the meaningful conversion of zaires to dollars under conditions where the exchange rates have been clearly out of line with relative purchasing powers. (The unofficial or free market value of the zaire is now about one-third its value under the official exchange rate.) Even if the zaires were not converted into dollars, as is done in the fourth "end-of-project" indicator in the log frame, the difficulties of estimating changes in

*The accuracy of the 27,000-ton figure is questionable. See Table 3 and text discussion.

real net income are formidable under conditions where the rate of inflation has approached or exceeded 100% in some years and has been at about the 50% level during the past two years.

In any event, PNS staff apparently did not foresee the need for this kind of data, on either a gross or net basis, despite the recommendations for additional attention in DAI's internal evaluation in 1980. Thus, the only recent data available from SCAD on anything approaching farmer incomes are in a report for the 1979-80 season, which indicates that total revenues in the PNS area as a whole for palm oil were about half as large as those from maize and that average revenues per farm family involved were nearly as large for palm oil as for maize. (Nearly 90% of the production was from the Kongolo-Mbulula area, but farmers in Nyunzu informed some team members that both palm products and rice could, and presumably would, be produced profitably in Nyunzu if their prices became more attractive relative to that of maize.)

Eyewitness accounts of those who know the area both now and as of 1977-78 suggest, nonetheless, that farmer incomes have improved. They note that the confidence and prosperity of the region have risen as a consequence of increased production as well as the large PNS payroll (currently about 800 persons) and the U.S. presence. The supplies of consumer goods in Kongolo and Nyunzu seem relatively ample, moreover, and villager complaints focused on rising prices, not availability of supplies.

The subordinate half of the first purpose and the first end-of-project indicator are points which are much easier to address.* Maize output in 1981 was already an estimated 66,000 metric tons, or 35% more than the 1983 target of 49,000 tons. Maize marketed in 1981, an estimated 32,000 metric tons, was already nearly 30% more than the first end-of-project indicator for 1983.

What is not clear from these production/marketing statistics is the extent of PNS responsibility for the progress. One non-PNS factor in

*Data on marketing of crops other than maize, as previously noted, are not available; and answers on maize marketing from 1983 to 1986 are obviously premature.

particular -- prices paid to farmers for their maize -- deserves mention here. Some farmers noted that rising prices paid them for maize, even though offset by the rate of inflation, were a positive incentive to them to increase the area planted to maize -- the source of most of the production increase. However, others pointed to the need to produce more just to keep up with rising prices of consumer goods (not to improve their living conditions). And some others (in Nyunzu) pointed to the availability of pygmy labor as an incentive to increase areas planted.

Repeated surveys of farmers' attitudes would clearly have been helpful in this respect, as would even systematic recording of PNS discussions with farmers. They could also be even more helpful in the future if producer prices for maize lag behind those for other crops, as may now be happening.

2.3. Costs of Achievements

Costs of achievements, another name for cost-benefits, can be approached in a number of ways.

A Measure of Costs. One could calculate dollar and local-currency expenditures for PNS for fiscal years 1977-81. These amounted to about $5.3 million plus Z19.9 million (see Table 1), or the equivalent of about $10 million, depending on the exchange rate used and without taking account of inflationary factors. One could even add to this an estimate of interest or opportunity costs.

In view of the difficulties and costs of starting PNS, as well as the expected problems in any development project, comparing this (more-or-less) maximum cost figure with accomplishments does not seem useful.

It may be more useful instead to calculate expenditures for fiscal years 1979-81, on the premise that start-up costs (in FYs 1977 and 1978) should be charged to general costs of national or regional development. These 1979-81 costs totaled about $3.9 million plus Z18.5 million. Or

*Data on marketing of crops other than maize, as previously noted, are not available; and answers on maize marketing from 1983 to 1986 are obviously mature.

TABLE 1

EXPENDITURES ON PROJECT NORTH SHABA

(in thousand)

Fiscal Year	$(US)	CP(U.S.)	CP(US-GOZ)	B.I.(GOZ)	B.O.(GOZ)	TOTAL ZAIRES
1977-78	1,350	--	353	1,000	--	1,353
1979	1,362	360	540	1,930	--	2,830
1980	1,412	1139	6,413	--	787	8,339
1981	1,168	--	2,000	4,700	630	7,330
1982*	1,500	n.a.	12,600	4,800	891	18,300
1979-81	3,942	1499	8,953	6,630	1,417	18,499
1977-81	5,292	1499	9,306	7,630	1,417	19,852
1977-82**	6,800	n.a.	21,900	12,400	2,300	36,600

*projected
**FY 1977 through FY 1982 (projected)

Data on U.S. dollar expenditures (in thousands) were furnished by the USAID Controller's office. These data were not available at the project site, according to PMU. For FY 1982, actual expenditures through 3/31/82 were $927,000 (plus Z14,000 in U.S.-controlled counterpart funds).

Data on U.S.-controlled counterpart fund expenditures (in thousand zaires) from PL-480 and other program-type assistance, were also provided by the USAID Controller's office.

Data on counterpart controlled by the U.S. and GOZ jointly as well as GOZ investment (B.I.) and ordinary (B.O.) expenditures (in thousand zaires) were provided by David Soroko, USAID/ARD -- except for FY 1982 (projected), which are from USAID/PRM.

The dollar expenditure figure shown in this table for 1977-81 is only about half the $10.5 million in projected dollar expenditures provided by PMU for the 1977-81 period, in lieu of actual expenditures, which were said to be unavailable. (The amended PP projects $10.1 million for this period.) Actual expenditures in zaires provided by PMU for the same period were Z16.9 million, compared with the Z19.6 million shown in this table.

could then reduce local-currency expenditures by (say) 25%, so as to exclude costs with only limited direct benefits to PNS as well as GOZ expenditures that might have been made in any event. The Ƶ13.9 million (75% of Ƶ18.5 million), if converted to dollar equivalents using an average free-market rate of 8 to 1, would amount to about $1.7 million -- or just half the $3.4 million obtained if a crude average of the official rates had been used.* Total dollar-equivalent expenditures for the 1979-81 period, as calculated for this special purpose only, were thus about $5.7 million.

When the Team was unable to obtain actual dollar expenditure figures from PNS for the 1979-81 period (PMU made available, instead, projected dollar expenditures), the Team estimated total actual expenditures for this period, in dollar equivalents, on the basis of cost information available at the site. As noted in Table 2, these totaled (in dollar equivalents) about $8 million.**

More sophisticated estimates might attempt to measure projected annual costs as of (say) 1982 or 1983, including both current expenditures and some annualized estimate of future capital costs. These, however, would require more information and time than are currently available; and they would also add the difficulty of estimating future accomplishments.

The smallest of the above three expenditure estimates -- $5.7 million in dollar equivalents -- is chosen for use here, so as to minimize the cost of the benefits which could be attributed to PNS.

A Measure of Benefits. The choice of a measure for PNS achievements is no easier and no more satisfactory. Two obvious measures,

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*The estimated rate, based on incomplete data from a World Bank source, is admittedly crude; but it is believed to be sufficiently accurate for current purposes. The free-market rate averaged about double the official rate, according to the same data.

**The difference between this and the smaller figure estimated in the preceding paragraph is accounted for by the presumed use of official exchange rates for the larger figure (which accounts for an estimated $1.7 million) and the inclusion of all local currency costs (which accounts for an additional 0.6 million of the difference).

Table 2

COST ESTIMATES FOR PNS ACTIVITIES 1979-81

(Dollar Equivalents, in thousands)

Rehabilitation of roads and bridges, estimated at $7,000 per km for the 520 km of roads completed	$3,640
Spare parts and reserve for equipment of the infrastructure subsystem, estimated at $450,000 annually	$1,350
Other costs of PNS, estimated at $1 million annually	$3,000
Estimated total costs, 1979-81	$7,990

The above estimates, by Team members, are based on cost information available at the project site. Although crude, they are consistent with the data on expenditures obtained later in Kinshasa from the USAID Controller (see Table 1).

increased output and marketing of maize from 1978 to 1981, are not satisfactory, for three reasons: (1) The extent of actual increases in maize production and marketing is open to serious question; (2) The extent of PNS responsibility for whatever increases did take place is not determinable; (3) The benefits other than maize production and marketing increases which may be attributable to PNS efforts (e.g., auxiliary services and production may also have increased) are also not determinable.

Regarding the actual extent of increases for maize, data on both production and marketing are shown in Table 3. The increase in production during the same 1978 to 1981 period chosen for calculating costs is 39,000 tons if based on the 27,000-ton-output figure for 1978 taken from the amended Project Paper. It is 25,000 tons if based on the DOA production figure for 1978. It is 32,000 tons if an average of 1977-79 production is assumed to be more representative of the base year. Or it could be as small as 15,000 tons for the three-year period, if one were to assume that all the 10,000 ton error postulated as possible by SCAD had served to increase the 1981 figure (i.e., 66,000 less 10,000 = 56,000 tons for 1981) and if the largest 1978 figure (of 41,000 tons) were chosen as the base. Use of opposite assumptions could, of course, lead to a very large increase, of 49,000 tons (76,000 less 27,000).

There is no objective basis for choosing one production increase over another, but the median of the first three estimates noted, rounded to 30,000 tons, seems at least as good as any other.*

Similarly, the marketing increases could be 21,000 tons (32,383 less 11,635 tons, rounded); or 22,000 tons if an average of 1977-79 marketing (9,964 tons) is used as the base; or only 3,000 tons if the 1976 marketing figure is chosen as the base.

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*This evaluator became aware of the statistical inconsistencies only after assembling data in Kinshasa, at which time it was too late to do more than ask the USAID Mission to obtain the statistics shown in Table 3.

TABLE 3

MAIZE PRODUCTION and MARKETING
Project North-Shaba Region

(Thousand Metric Tons)

Year	Production	Marketing
1970	13,637	4,526
1971	12,657	2,916
1972	21,385	16,473
1973	19,684	13,343
1974	24,715	19,251
1975	24,291	18,927
1976	34,056	29,218
1977	29,351	5,904
1978	40,921(27,000)	11,635
1979	31,530	12,353
1980	35,309	18,199
1981	65,965	32,383
1982	65,000	NA

1. Data cover the zones of Kongolo (including Mbulula) and Nyunzu.

2. Production data for 1970-78 were provided by USAID/ARD, from GOZ Department of Agriculture (DOA) sources. For 1978, an alternative figure of 27,000 tons, shown in parentheses, is given in the amended project paper; the recent DAI report notes that a 1978 figure is not available. The reliability and accuracy particularly of the earlier data are frequently questioned.

3. Production data for the years 1979-81 (crop-years 1978/79, 1979/80 and 1980/81) are from the PNS statistical unit (SCAD). The 1981 estimate, though given to the nearest 500 tons, is said by SCAD to be accurate within a range of plus or minus 10,000 tons.

4. The production estimate shown for 1982 is a simple average of the DOA figure (55,234) and the preliminary estimate provided by SCAD in late April (75,500).

5. Marketing data, from the same sources as the production data, are believed by all concerned to be more accurate. The PNS statistical unit believes the data for later years are more reliable than for earlier years. No estimate is available for 1982, since the marketing season begins essentially in April.

If the 29,000-ton marketing figure for 1976 is reasonably accurate,* it should be stressed, the PNS accomplishment would have consisted solely of restoring the situation by 1981 to what it had been five years earlier (before the Shaba wars) -- a much less difficult task than building from a "normally low" base. If the figure is substantially overstated, the PNS accomplishment would be correspondingly more impressive.

Again, given the Team's time limitations and the very limited PNS (or DAI) attention to this question, there is no objective basis for choice. As with the production increase, therefore, an arithmetic average (rather than the median) of the three increases in maize marketing noted above seems at least as good as any other -- an increase of about 15,000 tons.

Regarding the second major question, the extent of PNS responsibility for the increase, the information available does not allow objective answers. No one, not even the expatriate project contractor, claims that PNS is responsible for whatever increase has taken place. Moreover, if the 1976 marketing figure is accurate, and if the sudden drop in 1977 reflects mainly some transient event (e.g., the Shaba war), then a recovery in subsequent years could be due almost entirely to non-PNS factors, rather than to improved roads and other PNS services.

On the other hand, the team had concluded (before these questions arose) that PNS was responsible for much of the increased output and marketing, partly because (to quote the 1982 DAI report) the PNS addressed "critical bottlenecks" such as road rehabilitation and maintenance.

For purposes of cost-benefit calculations, we can do no better at this time than assume that PNS is responsible for (say) two-thirds of the increases already postulated for production (30,000 tons) and marketing (15,000) -- or 20,000 and 10,000 tons respectively.

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*One of the large buyers of maize in Nyunzu specifically referred to 1976 as having been a good year for maize availability, which lends some credence to the high marketing figure. Another buyer there mentioned an event in 1976 or 1977 which adversely affected maize marketing and led to spoilage in the fields. This remark is consistent with both the 1976 peak and the 1977 trough shown in Table 3. But at best, neither is more than suggestive of a possible 1976 peak. Unfortunately, my notes give no details, and the data themselves were not available at Kongolo to stimulate and facilitate further exploration.

Finally, regarding other benefits attributable to PNS, it does seem reasonable to assume that some benefits from the project may have spilled over into services as well as other production. Given the current data, however, this possible benefit cannot be quantified. In any event, the above figures seem to allow PNS a reasonable measure of credit for accomplishments in this area as well.

Summing up, for illustrative order-of-magnitude purposes only, increases in maize output and marketing are selected as measures of the benefits involved. They are hypothesized as having been 20,000 and 10,000 metric tons respectively.*

Cost-Benefits. Thus, the cost of additional maize produced in 1981, can be calculated at something like $300 per metric ton ($5.7 million divided by 20,000 tons). And the cost of additional maize marketed can be calculated at about $550 per ton ($5.7 million divided by 10,000).

This evaluator believes that the cost figure used is more than fair to PNS and the benefits attributable to PNS are probably overstated. Thus, the above estimates of costs are, in his opinion, minimum rather than most-likely costs per ton of additional maize produced and marketed.

These PNS costs can be compared with the estimated cost of imported maize at Lubumbashi in 1981 -- about $250 per ton, according to the recent DAI report. Or it can be compared with the estimated cost of North Shaba maize delivered at Lubumbashi -- about $1,300 per ton in 1981 after adjustment for impurities, or about $230 per ton at the official exchange rate, or something like $125 per ton at the unofficial exchange rate at that time.

If the measure of cost-benefits were expressed as costs per farm household using one or more of the recommended practices (probably mainly the improved Kasai I seed), the figure as of 1981 would be about $950 ($5.7 million divided by 6,000). If the calculation were made for the PNS-estimated 1,750 households using the full package of Kasai I seeds and recommended practices, the cost would be about $3,000 per household

*Note that while it would be conceptually desirable to add to the 1978-81 increases the increases (similarly calculated) for the one-year period 1978-79 and the two-year period 1978-80, these "increases" turned out to be negative, since it was not until 1981 that large increases took place. Thus, the addition of net benefits for these two periods would have depressed the benefits hypothesized as being attributable to PNS. (The "increases" for production were a negative 2,000 and a positive 1,000 tons respectively; for marketing they were a negative 5,000 and a positive 1,000 tons respectively.)

as of 1981. (These calculations should be interpreted with caution: The cost basis is not simply that of seed distribution or of the extension service per se but rather that of the total PNS system during 1979-81.)

2.4. PNS Purposes Not Achievable by 1983

The predominant impression gained from 3 1/2 weeks spent at the PNS site is that PNS management, for the project as a whole as well as for individual sub-systems, is not taking seriously the two major purposes of PNS as set forth in the amended PP.

Net Incomes of Small Farmers. The first purpose, raising the net income of small farmers by 75% between 1978 and 1983 -- presumably real income, not nominal income in which no account is taken of inflation -- has received so little attention that few, if any, at PNS seemed even to know it was a major purpose.

As already noted, virtually no data on either gross or net farmer incomes, nor on the production and marketing of other crops which might enable such estimates to be made, have been collected. This alone suggests that this major PNS purpose has not been taken seriously, a situation which is particularly strange in view of the widespread intercropping of maize with other agricultural products and the importance of other cash crops particularly in the Kongolo area.

Equally (perhaps even more) important, PNS has not questioned a basic assumption inherent in that purpose, namely that increased maize production is the best way to raise farmer incomes. Without data on relative price trends and productivity, one cannot test the validity of that assumption even for the past, let alone for the future.

This failure to take adequate account of other crops is not surprising, in view of the emphasis on maize production in both the original and amended PPs. But it may also be due to the view of current top PNS management and some USAID officers that farmers are unlikely to switch from maize to other crops even if there should be sharp changes in

relative prices.* And it may also be due to the apparent absence of concern by top PNS officials about the environmental costs of a focus on maize, including deforestation and land erosion: "If they didn't want to farm that way (i.e., slash and burn), they wouldn't do it."**

The recent DAI evaluation noted the problem of crop substitutability and the importance of price incentives, and the SCAD unit at PNS has recently responded by providing (as previously noted) some crude estimates on other agricultural production and prices. But a determined effort, backed by a strong TDY team, would be necessary for meaningful work on both points.

In any event, it is not possible to demonstrate that net incomes of small farmers have risen at all in real terms since 1978.

Replicability/Sustainability. The second purpose, replicability (and, at least by implication, sustainability) of any rural development process developed by the project, also seems to be receiving much less than adequate attention at the project site -- though DAI recognized in its recent evaluation that sustainability of PNS accomplishments is a (if not the) key issue.

At the project site, few if any of the top PNS staff seemed to be seriously considering how PNS could be made self-sustaining, who could take over some of the functions, and which parts of PNS might survive the withdrawal of foreign (i.e., U.S. Government) support in the absence of any special efforts by the GOZ or other institutions. They simply assumed -- and said -- that the USG had to continue to support PNS or it would fall apart.

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*The Governor of Shaba, incidentally, indicated in a conversation with the PNS Director in Lubumbashi in April 1982 (reported by USAID's monitor for PNS) an awareness of the influence of changes in relative prices. He said there that he had increased producer prices for peanuts (a month or so earlier), so as to discourage the PNS focus on maize. He has obviously not emphasized this point, however, since PNS management would otherwise have indicated more awareness of the problem in both word and deed.

**USAID, incidentally, was obviously concerned about possible land erosion, since it requested and financed an "Earth Resources Remote Sensing Team" from the GOZ Presidency, to survey the PNS area and other parts of the Tanganika Sub-Region.

It would thus not be surprising if PNS had made little progress toward sustainability even if the political-economic climate were favorable -- which, as discussed earlier, it is not.

The issues of sustainability and replicability are dealt with later in this report as well as in other reports. At this point, we will discuss (in turn) only two related aspects which are important not only to sustainability/replicability but also to farmer incomes. Those issues are pricing and purchase/sales policies in Shaba Province for agricultural products.

Pricing Policies. The Governor of Shaba sets prices which are sometimes interpreted as (1) the only authorized price, deviation from which may be punishable, (2) a floor price, which is meaningless since Shaba Province has no funds to purchase crops to prevent nominal price declines, or (3) a maximum price for purchases from farmers, an interpretation which has been used by buyers in the past to hold down farmgate prices.

The ambiguities seem to be deliberate, and one cannot be sure what is appearance and what is reality. The recent facts seem to be as follows:

(1) The Governor of Shaba announced in Kolwezi in March 1982, that farmgate prices for maize would be Z100 per 100 kg, and railhead prices would be Z150. These prices were interpreted as minimum prices by some USAID and PNS participants at the pricing conference where they were announced. Some merchants and farmers in the Nyunzu area, however, said the prices were "official," allowing no deviation, while others said they were maximum prices.

(2) Kibwe-Sakina, a large merchant buyer from Kongolo who had opened a comptoir (buying counter) in Kongolo in 1981, decided to extend his operations to Nyunzu this year, intending to pay farmers and small merchants the railhead price of Z150. The GOZ representative in Nyunzu, however, refused to allow the opening of this comptoir. The PNS Director

and the USAID Assistant Project Officer attended a meeting in Nyunzu on April 17 to help establish the principle of such counters. The GOZ representative then asked the Governor of Shaba to resolve the matter.

(3) The PNS Director and USAID Representative flew to Lubumbashi on April 23 to see the Governor, who had earlier refused to allow the comptoir to open. In return for several USAID concessions on a related matter of truck rentals, the Governor reportedly agreed (on April 29) to allow the counter to open, but he said he would close it down if USAID did not carry out the concessions made.

(4) The Governor did not deviate from the announced farm-gate price of Z100 per 100 kilos of maize. How rigorously this will be enforced as a ceiling price, however, remains unclear.

(5) Kibwe-Sakina began its buying operation in Kongolo on April 15, presumably paying the railhead price of Z150 per 100 kilos, but the Governor has refused to allow the Nyunzu comptoir to open until the USAID trucks arrive in the PNS area (probably about June 1).

(6) The Minister of Agriculture, Rural Development, and Environment told the Evaluation Team on May 7 that his ministry has decided to liberalize both price and purchase/sales policies but that the Governor of Shaba (and perhaps other Governors) oppose this policy because of their concern that prices to consumers may rise too high too fast, thus arousing urban unrest. The Minister indicated that this policy would be discussed soon by the GOZ Executive Council, but he did not make clear (the meeting was brief) whether any decision on price liberalization would be binding on Governors or (more likely) simply permissive.* GECAMINES, Zaire's copper-cobalt mining firm, was said to favor price liberalization, but it was not clear whether they would continue to subsidize flour prices for their workers or raise wage levels or do neither.

The point of this long recitation of facts and allegations is to demonstrate that pricing policies not only do not provide incentives to farmers to increase their planting and production of maize -- the principal operational goal of PNS -- but in fact they act as a deterrent in at least two respects:

*In a later meeting with the USAID Director (on May 27), the Minister said that a GOZ order will be issued making price liberalization a national policy, one that the Governor must follow.

(1) Farmers do not know at planting time what producer prices will be at harvest time the following year.

(2) Even after producer prices are announced, neither farmers nor merchants are clear as to the meaning of the prices.

Given the high rates of inflation in recent years, it would of course be difficult to predict with any assurance six months ahead of time what price levels would provide incentives. All the more reason, therefore, for province governors to let market forces take over, despite the hardships which would be borne by urban consumers during the transition period. These hardships -- not to be taken at all lightly -- could be ameliorated by the GOZ, however, in the interest of stimulating increases in agricultural production. In time, the increased production would help restrain further price increases for consumers.

The DAI report notes that producer prices for maize have not increased at the same pace as inflation generally. If nonetheless, according to the DAI report, nominal (not real) price rises have acted as production incentives, it is clear that the freeing of producer prices for agricultural products, would provide still stronger incentives for maize planting this fall. The reported curtailing of maize imports into Lubumbashi by some 25%, or about 30,000 tons below the 1981 level of about 115,000 tons, will put strong upward pressure on producer prices for maize, probably leading to substantial real price increases if not checked. Even some increase in real prices, however, would probably lead to substantial increases in maize planting in 1982 and production in 1983, despite labor-supply constraints (land constraints are currently less serious). Additional pygmy labor seems to be available in the Nyunzu area, and some increases at the expense of leisure seem still possible in all areas. In the long run, of course, labor-saving and yield-raising measures would be needed.

Purchase and Sales Policies Other Than Prices. Another Shaba policy serves to hold down prices paid to PNS-area maize producers, namely the restrictions on transportation of maize across province lines.

The amended PP stipulates that USAID support of PNS is contingent on a commitment by the Ministry of Agriculture "that farmers in the project area may sell their maize and other agricultural products to any and all recognized buyers, either as individuals or in groups without having to seek special licenses or permission."

Neither USAID or PNS seems to have a signed copy of such a commitment by the Ministry of Agriculture. However, at a meeting on May 7, the Minister stated that he was in favor of such trade, provided there is a reasonable balance between supply and demand. He added that not only is there no national law which prohibits either the sale or transportation of maize across province lines, but there is a national law which specifically allows it. Enforcement is another story, he added, in view of the powers of province governors. However, he said, the Governor of Shaba Province has agreed with two other governors to allow some maize to move across province borders.

The Governor of Shaba, with whom the Team has not spoken, could argue that he is not violating any GOZ commitment regarding sales across province lines -- to Kasai Oriental in particular. Legally, he is probably right. First, he could state simply that buyers from Kasai are <u>not</u> "recognized" by him. Second, he does not forbid the sale of maize to buyers from Kasai; he simply forbids the transportation. The maize, of course, still gets to Kasai Oriental, but (according to more than one person in the PNS area) only after payment is made for false documents, etc.

Removing these restrictions would, again, entail certain costs to urban consumers in Shaba Province in the short run. The price of maize is substantially higher in Kasai Oriental than in Shaba, so that maize prices in Shaba would undoubtedly rise. However, the greater stimulus to maize production plus the savings from the current costs of evading the legal restrictions might well lead to an equalizing or even downward pressures on maize prices within a year or two.

If the governors remove some restrictions this year and simultaneously announce an end to all such restrictions effective (say) a year or two from now, Shaba Province might reap the best combination of benefits.

3. SUSTAINABILITY*

3.1. PNS or a Replacement Institution

The Evaluation Team concluded, unanimously as noted in the covering report, that PNS could not survive a withdrawal of U.S. Government support. Supporting analysis is contained in the individual reports on PNS sub-systems.

Financing. PNS needs for both foreign exchange and zaires are substantial. The dollar expenditures shown in Table 1 are used for imported equipment, spare parts, and other supplies as well as for expatriate salaries. Even part of the foreign exchange needed could obviously not be assured, in view of the national economic situation already described. However, even if donor funding could be found for the foreign-exchange needs of PNS, past GOZ performance suggests that the need for zaires would have to be met in large part from counterpart funds.

GOZ budgetary funding of local-currency costs of PNS has not been sufficient in any prior year, so that (in the words of the recent DAI evaluation) "without (PL-480 Title I generated) counterpart funding, PNS would have ground to a halt a long time ago." The GOZ frequently points to PNS as its model project, and it has provided proportionately

*This and the following sections were written after the drafting of the covering report. They are briefer than originally intended, in view of the unanimity of findings and conclusions by team members.

more funds to PNS than to other rural development projects. Nonetheless, owing to severe GOZ budgetary constraints (rather than any lessening of GOZ interest), PNS budget problems would be even worse in 1982 if not for counterpart funding. In response to the PNS request for Z18.3 million for 1982, the GOZ authorized Z4.8 million from its investment budget and Z891,000 from its ordinary budget. To date, the GOZ has allocated Z2,072,600 and Z891,000 respectively, the latter to be disbursed in monthly installments. (The shortfall of Z12.6 million will of necessity be met from counterpart funds.)

Conceptually, special sources of financing are comparatively easy to locate. For example, the GOZ or Shaba Province could tax maize imports into Lubumbashi or fuel brought into the area, or it could assess a tax or user charge on all maize sold to purchasing counters or on all maize purchased by millers. In addition a consortium of private millers, brewers, parastatals such as Estagrico, and other businesses which currently profit from the PNS presence,could contribute to PNS financing.

In practice, however, such funding seems highly unlikely under current conditions in Zaire. Taxes or user-charges, according to all observers, would not reach PNS in amounts sufficient to finance PNS operations at even a minimum level.

One businessman suggested private collection of such taxes. However, he had no answers as to why the GOZ would be willing to give control over even special revenues to the private sector, nor could he suggest safeguards to ensure their use for PNS purposes. Moreover, he backed quickly away from indicating how much his firm could/would contribute, noting that many firms in Zaire (though not his own) are near bankruptcy. He also indicated the need for a private foreign firm to join in the financing consortium, so as to assure adequate foreign exchange for essential imports, though he could provide no reason for a foreign firm being willing to join such a consortium.

Management. Locating an institution in Zaire capable of taking over management of the project would be a second major problem.

Estagrico, the cotton parastatal, was initially considered a prime candidate, since it performs functions similar to those of PNS, and it operates in Shaba Province as well as elsewhere in Zaire. Estagrico, however, seems financially shaky, in part because of a flood of cheap-clothing imports and the resulting slump in demand for cotton by textile manufacturers in Zaire. Moreover, Estagrico's road-maintenance operations for PNS, as noted in the report on transportation, do not suggest an ability to handle another major operation.

Management by a consortium of private firms would be difficult under almost any circumstances in Zaire. Working out practical arrangements in the foreseeable future under current circumstances is simply not feasible -- for reasons either discussed or obvious from this and other evaluation reports.

Management in the near future by the Department of Agriculture (DOA) may never have been a realistic option. But it seems even less so now, since PNS management has not tried to build up DOA management capabilities in the PNS area. Rather, as a matter of deliberate policy, it seems to have separated itself from DOA to the maximum extent possible. For example, there are virtually no contacts between PNS and DOA extension agents despite their responsibilities for serving the same clientele. Whether or not this attempt to establish PNS independence was advisable five years ago is now irrelevent. It simply seems too late in the project life for PNS to think now of DOA as a management agent for PNS functions in the immediate future.

Management by a new regional development agency might have been a workable option if a start could have been made several years ago toward establishing it and integrating it with other GOZ organizations. The problems involved are formidable, and success would have been highly unlikely under circumstances prevailing in Zaire. At this point, however, this is also not a realistic option.

3.2. Sustainability of PNS Functions

Whether some PNS functions could survive after the withdrawal of U.S. Government support is a question discussed in the individual reports.

As noted in both the infrastructure and covering report, a deterioration of roads and bridges can be expected fairly quickly. Some residual benefits, however, could well remain in some areas for considerable time, the extent of which would depend on GOZ and farmer efforts.

The demise of manufacturing activities of the intermediate technology sub-system could prove to be a "blessing in disguise," since its presence may well have inhibited somewhat the establishment of a strong distribution system for better quality tools manufactured in (e.g.) Kinshasa or, in time, even in Kongolo. This might be even more true if farmgate and railhead prices for maize are allowed to rise further in real terms, so that farmers can afford more high-quality tools.

If roads and bridges can be maintained in something approaching a usable condition, and if the fuel situation does not deteriorate further, the larger merchants are likely to survive. Farmer groups, however, are unlikely to play a substantial role in marketing, as PNS had hoped.

Regarding research and extension, the sustainability of research is not in question, since PNS-sponsored research is virtually non-existent. The PNS extension service could be combined with that of the DOA in the PNS area, at least conceptually. Whether the extension service could survive and be strong in practice, however, is another matter.

3.3. Sustainability of Accomplishments

Whether and to what extent PNS accomplishments can be sustained is dependent, most importantly, on over-all economic performance in Zaire in the coming months and years. The prospects, as already noted, are not bright.

The path which the GOZ needs to follow is reasonably clear in broad outlines. At the national level, the most important actions are

devaluation; reduction of skimming and unproductive government spending in favor of expenditures to ameliorate transportation and other constraints; and free-market pricing for producers, so as to increase their incentives. Similarly, Shaba Province needs to ameliorate, and remove as quickly as feasible, its pricing and marketing restrictions.*

Under these circumstances, the survival of PNS or a replacement institution would be relatively unimportant. Critical functions would survive in one form or another, and major accomplishments would be almost certain to continue and to expand.

Under current circumstances, however, sustainability of PNS accomplishments is uncertain.

4. REPLICABILITY

PNS has not, as was noted earlier, fulfilled its second purpose: "to develop a rural development process in the form of a model that is replicable in other parts of Zaire."

That PNS has produced some benefits is not in question. That the process, with all the faults noted in the individual reports, should not be replicated is also not in question.

To be replicable, the process should:

- be developed in an economic-social environment that is reasonably conducive to rural development. PNS has not had that advantage. The process shows it.

- be managed by a top-notch team of both Zairians and expatriates. Only the second rung of Zairians seems to meet this qualification. The process shows it.

*The pricing restrictions, as is footnoted on p. 22, may soon be eliminated.

- develop an institution which is efficient, cost-effective, and appropriate to the situation, and which can either be integrated into other Zairian institutions or operate on its own, though with close links to other Zairian institutions. The process is at least as deficient in this respect as in others.

- be compatible with existing financial constraints. Clearly, the costs are not within the financial means of any conceivable combination of public or private entities in Zaire. Nor is it currently feasible for the beneficiaries to pay for the process.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

In brief, PNS has brought some benefits to North Shaba, though it is not possible to say how large the increases in production and marketing have been, nor the extent of the PNS contribution. The increased supplies of maize (and perhaps other crops) to South Shaba also help offset maize-import restrictions resulting from foreign-exchange shortages.

Regarding the two major purposes of PNS: Net income of participating farmers does not appear to have increased sufficiently so as to be 75% above the 1978 level by 1983. Nor, in the judgment of Evaluation Team members, has PNS developed a "rural development process in the form of a model that is(sustainable and) replicable in other parts of Zaire."

Finally, the costs of PNS accomplishments have been substantial. Though it is not possible to come up with a single defensible estimate of either costs or benefits, the estimates chosen for illustrative order-of-magnitude purposes are a cost of nearly $300 for each additional ton of maize produced, and over $550 for each additional ton marketed. This evaluator believes these figures give PNS the benefit of every doubt. In his opinion, the "true" figures of costs per ton of additional maize produced and marketed, if they could be determined, would probably be higher.

5.2. Recommendations

The Team's recommendations regarding PNS are stated in the covering report; and more detailed recommendations on PNS sub-systems are in the individual reports. They need not be repeated here.

This section will, therefore, simply summarize the economic recommendations from previous sections of this report:

- At the national level, the most important actions needed are devaluation; reduction of skimming and unproductive government spending, in favor of expenditures to ameliorate transportation and other constraints; and free-market pricing for producers, so as to increase their incentives.

- At the Shaba Province level, amelioration and (as quickly as feasible) removal of pricing and marketing restrictions are needed. In the transition period, it might of course be necessary to subsidize urban consumption. Given GOZ budgetary constraints, this would not be easy. But if all concerned regarded it as transitional, a special tax or user charge on (e.g.) maize imports or sales of domestic maize to millers might be feasible.

If the GOZ were to follow these recommendations, which are essentially the same as those of the international community, the progress of recent years in North Shaba would most likely continue and perhaps even accelerate. At the same time, the GOZ would create the necessary climate for modest, targeted technical assistance.

ANNEX I

Selected References and Contacts

A. Publications on the National Economy

1. World Bank, Zaire Sector Memorandum: Agriculture and Rural Development, May 26, 1981.

2. World Bank, Zaire Economic Memorandum: Recent Economic Developments and the Path to Recovery, May 20, 1981.

3. World Bank, Zaire Economic Memorandum: The Zairian Economy: Current Situation and Constraints, October 19, 1979.

4. IMF: Zaire - Recent Economic Developments, January 11, 1982.

B. Previous Evaluations

1. DAI, Five Years Later: Progress and Sustainability in Project North Shaba, March, 1982.

2. DAI, Internal Evaluation of North Shaba, Nomember, 1980.

3. Dimpex Associates, Evaluation of the North Shaba Integrated Rural Development Project, 1979.

C. AID Project Papers (PP)

1. Amended PP, August 25, 1980.

2. PP, August 31, 1976.

D. PNS, USAID and GOZ Documents

References to the most relevant documents are noted in the body of this report. DAI has a complete listing of all relevant reports, and many are noted in the above references.

E. CONTACTS

PNS staff at all levels, merchants and farmers in the Nyunzu, Mbulula, and Kongolo zones -- mostly with team members evaluating the DGF, C&C, IT, INFRA, and PMU sub-systems -- representatives of private and parastatal firms in Shaba Province, GOZ officials in Kinshasa, World Bank and IMF officials in Washington, and U.S. Government officials in Washington and Zaire.

EVALUATION REPORT
INFRASTRUCTURE SUBSYSTEM
NORTH SHABA RURAL
DEVELOPMENT PROJECT

By

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May 8, 1982

SUMMARY

The previous evaluations referring to this sub-system were noted. The individual units of the sub-system were noted. The individual units of the sub-system were evaluated and were generally found technically efficient in their work, but not very effective in teams of uses of Project resources, budgeting, and programmation of work.

The sub-system management unit was the exception. This unit does not function at all.

The sub-system is not sustainable now. Funding was studied and while it appears that, on paper, sone internal funding might work, it is really not feasible. Only external long term funding will sustain this sub-system in the forseeable future.

It is recommended that, unless the U.S. decides to remain in the area for political reasons, the sub-system stop operations by October 1982.

TABLE OF CONTENTS

	PAGE
TABLE OF CONTENTS	i
FOREWORD	1
CHAPTER ONE	
SCOPE OF WORK	4
CHAPTER TWO	
HISTORY AND BACKGROUND	5
CHAPTER THREE	
FINDINGS AND EVALUATIONS	
3.1. ROADS	6
3.2. BRIDGES AND CULVERTS	10
3.3. EXISTING ROAD AND BRIDGE MAINTENANCE	13
3.4. EXISTING EQUIPMENT MAINTENANCE	16
3.5. ROAD AND BRIDGE BUILDING AND REHABILITATION	19
3.6. FARMER AND VILLAGER ASSISTANCE	34
3.7. TRAINING	35
CHAPTER FOUR	
SUSTAINABILITY	
4.1. GENERAL	38
4.2. MODIFICATIONS PROPOSED FOR EXISTING SUB-SYSTEM	38
4.3. ACTIVITIES OF PROPOSED ORGANIZATION	40
4.4. CONTROL AND DUTIES OF SUB-SYSTEM 1982-1983	53
4.5. CONTROL OF SUB-SYSTEM AFTER 1983	54
4.6. ORGANIZATION OF SUB-SYSTEM AFTER 1983	57
4.7. FUNDING AFTER 1983	77
4.8. EXPANSION OF ROAD SYSTEM AFTER 1983.	79

CHAPTER FIVE PAGE

REPLICABILITY - ADAPTABILITY

5.1. GENERAL 81

5.2. PLANNING 81

5.3. IMPLEMENTATION-MOBILIZATION 82

5.4. ORGANIZATION 83

5.5. EQUIPMENT & LOGISTICS 84

5.6. METHODOLOGIES 84

5.7. FUNDING AND ACCOUNTING 85

5.8. SUSTAINABILITY 86

5.9. REPLICABILITY-ADAPTABILITY 86

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1. CONCLUSIONS 87

6.2. RECOMMENDATIONS 88

APPENDICES

A: LIST OF REFERENCES

B: LETTER FROM ESTAGRICO

FOREWORD

The task of evaluation is never an easy one and requires the cooperation of many individuals.

In making an evaluation, the scope of work is always foremost in the mind of the evaluator. He must always try to get as many facts, as many viewpoints, and as much data as possible.

The same people may be re-contacted several days running and asked the same question. Sometimes, contradictory statements may be given, and the evaluator must decide in the light of other evidence which version, what fact, or what result should be followed.

Each item must be analyzed. All aspects must be reviewed and analyzed.

A case in point is "evaluation of utilization of existing resources, including the efficiency and effectiveness of labor in road building, bridge building and rehabilitation."
Can an evaluation be complete if such factors as effects on resources of other subsystems, relation to other sub-systems, interference by other sub-systems etc, are ignored?

Relationships with other sub-systems, instances of unwarranted interference and non-replies to demands are touched in this report, since they affect the efficiency and effectiveness of an organization.

I believe that this report represents a fair and impartial evaluation of the infrastructure sub-system, including its effect on

other sub-systems as well as effects by other sub-systems on this one.

I wish to thank the following for their frankness in their discussions with me:

Citoyen Shukulu	; Chief of the Sub-system
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Kongolo/Kinshasa
May 8,1982

CHAPTER ONE

SCOPE OF WORK

In April of 1982, a multi-disciplinary team was sent to the North Shaba Rural Development Project in order to evaluate the project. As part of this evaluation, a Rural Roads Engineer was required to visit construction sites as well as make random road and bridge checks, to evaluate extent and quality of construction, rehabilitation and maintenance of the infrastructure sub-system of this project.

Specifically, the Engineer was charged with:

(a) the evaluation of the potential longevity of the road and bridge infrastructure
(b) the identification of the elements necessary for optimum life
(c) the evaluation of the current manual maintenance system
(d) the evaluation of the utilization of existing resources including the efficiency and effectiveness of labor in road building, bridge building and rehabilitation
(e) the evaluation of the efficiency and the effectiveness of the equipment maintenance system
(f) an estimate of the requirements for continued maintenance and expansion of infrastructure development after Project termination (sustainability) and determination of sources of finances, skills and institutions to perform required tasks.
(g) the determination of what extent farmer groups may assist in maintenance
(h) the evaluation of the appropriateness and effectiveness of training, both formal and informal, and assess future needs.

Additionally, after intra-team discussion, it was decided that the replicability/adaptability of the sub-system should also be evaluated.

CHAPTER TWO
HISTORY AND BACKGROUND

The objective set forth in the PP of the North Shaba Rural Development Project was to start a self-sustaining rural development process in eastern Zaire, primarily by increasing small farmer production of maize.

The PP foresaw the start of the project in late 1976 with external (AID) funding to cease in late 1982 and Government of Zaire funding to end in 1986.

The infrastructure sub-system had severe implementation delays among which were two major armed conflicts nearby, a major flood in mid-1979 and severe delays in the arrival of necessary equipment.

In mid 1979, an evaluation of the Project was performed by Dimpex, Inc. However, due to the above mentioned delays, there was little to evaluate and the report was mainly a recommendation for future efforts on the Project.

In August of 1980, an addition to the original PP was signed and authorized the extension of the LOP for an additional twelve months, to end in 1983.

In 1981, an evaluation of the Project was performed by the Project Consultant, DAI. Finally, in early 1982, the Project Infrastructure sub-system sub-contractor, Morrison-Maierle made an evaluation and some recommendations for this sub-system.

CHAPTER THREE

FINDINGS AND EVALUATIONS

3.1. ROADS

3.1.1. Description

The rehabilitated roads are constructed as single lane, unsurfaced dirt roads, ranging from approximately 10 feet (3 meters) in width to 14 feet (4.2 meters) in width. This has mostly been accomplished by motorized clearing and blading of the existing ground.

Side borrow was rarely used to raise the road grades, and in many areas, the road level is still well below that of the surrounding ground. This situation prevents the use of effective crossroad drainage. However, side ditches and outlet ditches, when maintained, keep the run-off away from the road.

To date (April 1982), about 520 kilometers out of 724 kilometers have been re-habilitated. Of these, 68 kilometers have been re-surfaced with laterite.

3.1.2. Potential Longevity of Roads.

Based upon a random inspection of the roads which have been completed, the following potential of the roads can be expected:

- With no maintenance, on dirt roads, the total road including

roadway, side ditches and outlet ditches will deteriorate and be generally unusable within one year, assuming the same level of traffic of the past two years. With heavier rainfall than before, complete deterioration may occur within one rainy season.

- If the traffic levels increase appreciably to meet the expected increase in production, then the roadway might remain clear to at least vehicle width by the action of the vehicles themselves. However, with no maintenance, the ditches would still become clogged, and the road would still have erosion. Road failure would then still most likely occur within one year, dut to oversaturation of the soil and the roadbed, and erosion of the road surface.

- On surfaced roads (laterite), the surfacing may last two years or more depending on several factors, such as traffic levels, severity of rainy season and original construction techniques. If the surfacing is lost, then the remaining dirt road would deteriorate within an additional year, giving a total life of a resurfaced road of three years, or more.

3.1.3. Necessary Elements for Optimum Road Life

Proper maintenance is an absolute necessity in order to prolong and optimize the usable life of any road.

Once a road is properly built, including adequate drainage, there are generally two types of maintenance functions to adequately retain the use of the road, i.e. routine maintenance and periodic maintenance.

Rehabilitation, although generally performed by reinforced maintenance crews, is not strictly a maintenance function, and is not treated as such in this report.

Routine maintenance is the regular, scheduled work performed throughout the year by a maintenance crew, including blading of road surfaces, shaping, cleaning culverts, clearing and reshaping ditches, cutting vegestation and patching potholes.

Periodic maintenance is also regular work performed by a maintenance crew, but not on a yearly basis. Rather, the work is done every 2 or 3 years, based on field inspections. These include resurfacing sections of roads and emergency repairs as a result of damage due to flooding, or high intensity rains.

The following maintenance operations are necessary to optimize the road life:

- Blading and shaping of the road to provide an even and smooth riding surface, and to repair erosion drainage. Due to the very nature of the operation, this is best done by motorized means. The frequency of this operation depends on the degree of rideability and usability of the road that is required. This, in turn, depends on traffic levels, weather, and road materials characteristics.

The local project roads should receive this operation once or twice a year, as long as the traffic is not excessive. The regional priority roads within the project should be thus worked three or four times per year.

It should be noted that none of the rehabilitated roads have received this type of maintenance. As a result, roads rehabilitated in 1979 and 1980 practically require almost total rehabilitation due to brush on the road, erosion, pot-holes, clogged ditches, etc.

- Repair of isolated areas (patching) such as potholes, surface erosion, failed shoulders and soft spots should be made as soon as observed. This can be a labor intensive operation as far as the placement and smoothing operation is concerned.

If no acceptable material is available nearby, then adequate material will have to be trucked in. Stock piles should be set up ahead of time along the roads. Then patching can be promptly made a necessary.

Again, no indication of this maintenance was observed on any of the rehabilitated roads.

- Resurfacing is a periodic operation, dependent on levels of traffic, severity of weather, and surfacing characteristics.

Based upon present traffic levels, and observed conditions, this should be done every two or three years.

However, to prevent excessive loss of surfacing material, blading and shaping must still be performed once or twice a year.

- Cleaning and repairing culverts are very necessary routine maintenance operations. This requires very little or no mechanization, and can be done with hand tools.

The frequency of this operation depends on the severity of the weather, but normally should be done at least once a year, <u>before</u> the start of the rainy season.

The existing culverts appear fairly clean, but only due to the force of the running water itself. There are weeds and brush that should be cleared away from inlets and outlets.

- Cleaning and re-shaping of ditches is another routine maintenance operation that can be performed with labor intensive methods using hand tools, or done by the grader when blading and shaping.

Since the ditches are partly filled with material that spills over from the roadway during the year, this operation should be coordinated with blading and reshaping the road in order to be able to re-use the spilled material on the roadway.

Cleaning and reshaping ditches should be completed before every rainy season. In addition, the ditches should be kept as clear as possible during the rainy season, even if the personnel have to work in the rain.

- Roadside maintenance, a routine maintenance operation, can also be performed with labor intensive methods using hand tools.

This operation includes grasscuting, brush and tree trimming, erosion control on right of way and litter pick up from the roadway.

Care must always be taken to minimize the grass cutting and brush trimming at the outside of the ditch line in order to minimize the possible erosion caused by run off.

This is the only operation which was noted on the rehabilitated roads, but on less than 40 percent of the roads.

3.2. BRIDGES AND CULVERTS

3.2.1. Description

As of April 1982, 30 bridges and culverts had been completed,

with 18 to 20 additional culverts planned.

One bridge is reinforced concrete. There are ten masonry arches. The abutments are rubble protected, but only in some cases.

The culverts are ARMCO pipe, ranging from a diameter of 80 cm to a diameter of 2 meters. These have masonry headwalls, constructed of rock and mortar, with some rubble rip rap at the outlet.

3.2.2. Potential Longevity of Bridges and Culverts.

Based upon visual inspection of the completed bridge and assuming no failure of foundations due to scouring, the concrete bridge should be usable for about twenty years.

However, the concrete was never tested, nor a slump test conducted. There was no mix control nor was there any cement testing. In addition, the concrete apparently was not properly cured.

Therefore, it is strongly recommended that close inspection for structural failures be performed yearly.

The masonry arches appear well enough constructed to have a usable life of 20 years if proper maintenance of the wing walls is performed. Care must be taken to prevent erosion in back of the wall as well as to prevent undermining.

Several arches have signs of possible underscouring and should be closely watched.

Metal culverts, with proper precautions, have been known to last the economic life of major roads (20 years). However, this presumes adequate and routine maintenance practices, such as cleaning and preventing scouring.

3.2.3. Necessary Elements for Optimum Bridge and Culvert Life.

Proper maintenance practices will optimize bridge and culvert lives. A major factor in proper maintenance is inspection and prompt identification of deterioration and/or damage. Such inspections should be yearly, especially at the end of the rainy season.

The repairs included in bridge maintenance operations include approach roadway repairs, deck surfacing repair, realignment and cleaning of the stream channel, abutment repair, foundation repair and painting of any steel surfaces.

Culvert maintenance includes cleaning out the culvert of silt and other materials, repairing any damage by underscouring at entrance or exit, and headwall repair, if necessary.

As mentioned in Section 3.2.2., special attention will have to be paid to the concrete bridge due to the lack of controls in its construction.

The arches have received no maintenance and there are indications of erosion along the wing walls and some under scouring.

The metal culverts have weeds and brush which are starting to clog some exits and entrances.

3.3. EXISTING ROAD AND BRIDGE MAINTENANCE

3.3.1. Existing Organizations

There are only three organizations within the project area which are presently capable of conducting maintenance operations:

- Office des Routes (OR)
- Project North Shaba Special Brigade (PNS)
- Estagrico

The Office des Routes is charged with the maintenance of National and Regional routes, but generally is not responsible for maintenance of local interest roads. However, there is a convention between DOA and OR that requires the maintenance of Regional and National roads in the PNS area by OR that expires Jan 1, 1983. However, to date, little maintenance of these roads has been done by OR. Additionally, the OR seems incapable of even maintaining the other regional routes near the Project area.

The Special Brigade has been concerned only with the rehabilitation of the project roads and the construction of bridges and buildings. As such, it has not been involved in the routine or periodic maintenance of the roads.

Estagrico is responsible for the maintenance of 434 kilometers of road west of the PNS area. In addition, as a result of a PNS-Estagrico Convention dated May 19, 1981, PNS rehabilitated roads have or will be turned over to Estagrico for routine manual maintenance by cantonnage operations. To date they are responsible for the 520 kilometers of rehabilitated PNS roads, with additional kilometrage due to be added as the Special Brigade completes the rehabilitation work.

Estagrico receives countepart funds for this work. In 1981, 2.2 million zaires were allocated, of which they have used only 400,000 zaires.

3.3.2. Organization and Resources

As aforementioned, Estagrico is the only organization presently conducting routine maintenance on PNS roads.

The maintenance program is supposed to employ a worker (Cantonnier) responsible for 2 kilometers of road. He is supervised by a Capita, who is responsible for 30 cantonniers, covering 60 kilometers of road. A Road Maintenance Supervisor controls the Capitas.

For the PNS roads presently being maintained by Estagrico, there should be at least 8 Capitas supervising over 250 Cantonniers.

The equipment on hand as of the date of this report is minimal. There is one land rover for the supervisor, 2 dump trucks, 1 bicycle per Capita and 1 wheelbarrow per Cantonnier on some roads.

The supervisor has no assistance and has an overly large area to supervise, ranging from south of Nyunzu to west of Kongolo.

3.3.3. Evaluation of Maintenance Program

The maintenance program began in July, 1981 on 294 kilometers of rehabilitated roads. In September, the Supervisor arrived and by the end of year Estagrico was responsible for the maintenance of about 460 kilometers of road. Cantonniers were hired to maintain these roads, including 30 who had originally worked directly for

the PNS Project.

In the Project area, the rainy season begins in October and ends in April with January and February normally dry. The cantonnier, during the rainy season, should do roadside maintenance, patching, and clearing and shaping of ditches.

Depending on the soil condition as well as the severity of the weather, roadside maintenance has to be performed three or four times a year. It has been estimated that a Cantonnier can do 100 meters per day, taking 20 working days to do 2 kilometers of roadside maintenance. As a result, the ditch clearance and patching operations are lagging and have not been done, except at a very few locations.

Heavy repairs are supposedly done by groups of Cantonniers working under the direction of a Capita.

Specifically, under this arrangement, the Cantonniers:

- Clean roadside ditches
- Clean outlet ditches
- Clean culverts
- Fill pot-holes
- Perform roadside maintenance
- Perform bridge maintenance

Generally speaking the maintenance work done by the Cantonniers when they are working is poor. The only work that was observed is cutting grass and some brush. This is partly explained, that since a good portion of these Cantonniers are farmers, planting and repairing their homes take precedence over road maintenance. As a result, there are sections of road that do not have any maintenance at all, due to a lack of available labor.

Additionally, the lack of adequate and competent supervising contributes to the poor maintenance apparent on some roads, and there is no regular inspection process of the roads to ensure proper maintenance practices.

Bridge maintenance appears almost non-existent. Some approach fills appear eroded, and approach roads appear somewhat separated from the bridge structure.

The culverts appear in somewhat better condition. Nevertheless, some are cluttered with debris, choked at the entrance with weeds and some indicate underscouring at the outlet.

As previously noted, the only activity which was observed during the inspection of the roads was the cutting of grass which is starting to envelop the roadways. There was absolutely no patching or filling in of pot holes, observed. Apparently, no culvert maintenance was being practiced.

In summary, it is apparent that the Estagrico maintenance operation as observed is not sufficient to sustain the rehabilitated roads.

3.4. EXISTING EQUIPMENT MAINTENANCE

3.4.1. Existing Facilities

The Estagrico maintenance facility covers approximately 2500 square meters, which includes vehicle storage within the compound.

The northernmost building is a maintenance shop with eight bays, four of which are grease bays. The bays are somewhat smaller than practicable and make the maintenance of large vehicles and road

equipment difficult to be completed under cover.

The storage room (warehouse) has few parts and is badly maintained. Parts such as fuel and air filters are covered with dirt and dust, which effectively ruins them as spare parts.

The easterly building includes a carpenter shop, a foundry, a welding shop and a machine shop. It is relatively well maintained and most of the equipment is in operating condition, except the carpentry shop which is pratically non-operable, due to lack of replacement parts.

The area has several covered areas which are full of unusable scrap, and in general presents a cluttered and inefficient appearance.

The PNS Special Brigade has maintenance space at Kongolo for at least 8 vehicles, including heavy equipment. There is only 1 grease bay. This maintenance is supported by a warehouse which is now orderly and well kept.

There is a machine shop, with lathes in good condition, capable of making some spare parts. There is a foundry, capable of small castings. The carpentry shop, presently used for furniture for the Ngaba Center, is sufficiently large to support the maintenance facility.

There is sufficient storage space for the entire equipment fleet of the Brigade.

There is also a PNS facility at Nyunzu. There is space to maintain three vehicles under cover.

There is warehouse and fuel storage facilities, and the compound is sufficiently large to store the maintenance fleet.

3.4.2. Evaluation of Existing Equipment Maintenance

The present Estagrico facility would not be capable of maintaining the equipment of the Special Brigade.

Additional buildings, enlargement of the working bays, enlargement of the parking area, better and more spare parts storage, a welding shop, and a larger parking compound are among the additional facilities which would be needed, if Estagrico was charged with maintenance of the Special Brigade equipment.

The four Estagrico mechanics are not capable of maintaining any heavy equipment and are capable of performing only normal vehicle maintenance, and that, under constant supervision.

Additionally, four mechanics and one supervisor are not enough to both maintain the road equipment and the cotton equipment.

The addition of buildings and maintenance equipment such as lathes, welders, etc, would severely overload the electric generating capacity which is now available at Estagrico. At present, they are running the generating plant at capacity most of the time. Although there are additional generators in the facility, these are inoperable due either to age or unavailable spare parts.

There is also some doubt that they will be able to fulfill the maintenance requirements in the future of the aforementioned PNS-Estagrico Convention.

The PNS equipment maintenance is now fairly efficient. Although the breakdown rate is almost 20 percent, the average deadlined rate of equipment has been only 5 percent during the last year.

This has been due in part to an efficient and knowledgeable expatriate equipment specialist being on the project. His "one-on-one" training has allowed some Zairois to further their basic skills, and these have become fairly proficient in equipment maintenance. There is adequate back-up equipment such as welders, lathes, a carpentry shop and a foundry to support the equipment maintenance, although the foundry and machine shop are presently under I.T. control.

The space available for the maintenance is quite adequate for 8 pieces of equipment at one time.

On the other hand, the lack of formal training to drivers and operators (as discussed in Chapter 3.7) has been a major factor in the large breakdown rate. Inattention to periodic maintenance, such as changes of oil, inattention to cleanliness of fuel, unfamiliarity with the equipment and inexperienced drivers also contribute largely to the large breakdown rate.

As noted, the low deadlined rate has been achieved due to the equipment specialist and fairly efficient Zairois mechanics.

To summarize, the equipment maintenance personnel is quite efficient although the normal maintenance practices by the operators and drivers of the equipment are poor.

3 5. ROAD AND BRIDGE BUILDING AND REHABILITATION

3.5.1. Organization.

The PNS Special Brigade is charged with the construction and rehabilitation of the roads and bridges in the Project area.

It is composed of two road-building units, a bridge building unit, a building construction unit, a culvert crew, a carpentry shop, a machine shop, an equipment maintenance unit and a management unit.

3.5.2. Resources of the Special Brigade

The Special Brigade has the following equipment available for the performance of its activities

1 roller
1 Front end loader
3 D6 Bulldozers
3 Graders
1 5-Ton Truck tractor
1 Water truck
2 Fuel trucks
1 Flat bed truck
8 Dump trucks
7 Pick ups.

There is an additional grader, afront end loader, four dumptrucks and two pickups on order. Additional assorted shop equipment, welders, generators spare parts and tools are also available.

The local Zairois staff of the Infrastructure subsystem accounts for over fifty percent of the total staff of the project, and the budget for the Infrastructure subsystem amounts to almost two thirds of the total budget of the project.

3.5.3. Efficiency and Effectiveness of the Special Brigade

Since there are so many separate units, each unit will be discussed separately.

Generally speaking, efficient technical work implies efficient use of resources for the particular sub-project while effective work does not necessarily imply efficiency.

Moreover, efficient work on a sub-project does not necessarily mean effective use of resources of the Project.

- Road Building Units

Although the Project nominally started in late 1977, the OR did not identify the Project routes until 1979.

Organization of the units is fair except for the inclusion of field mechanics. This represents a problem to have these men nominally in the equipment maintenance unit but working under the orders of the chief of the road building units.

The road building units should normally be headed by a qualified highway engineer. Although the present expatriate advisor has done a very good job, there are instances where previous engineering experience could have saved time, work and money in the rehabilitation of the roads.

Notwithstanding the fact that knowledge of multiple languages is advantageous, technical knowledge and experience takes precedence and is required to successfully implement road rehabilitation projects such as this in a desired time frame, within monetary restraints.

However, it is to be stressed that this is not a criticism of the existing Road Specialist. In the actual work, the crews are fairly efficient. The equipment operators, who were previously trained by OR, seem to know their jobs. Morevoer, the expatriate advisor has provided some formal training in the form of films. This has been limited, in part, due to the heavy work load, and as a result, most of the training is of the "show-me" variety.

The biggest deficiency of this unit is the lack of an established work program, defining priorities and establishing needed mechanized routine and periodic maintenance. Although a work program in the shape of a bar chart has been prepared, no time limitation or priority maintenance needs were established.

As noted in Chapter 3.1.3., optimum road life depends on proper maintenance practices. The road units have never been used for the maintenance of the roads which have been rehabilitated. As a result, some of the cleared roads need blading and shaping and some rehabilitation again.

The resurfaced roads have lost almost their entire surface and need recharging. The missing routine and periodic maintenance (shaping and blading) could have forestalled recharging for at least one year.

A second failing of the unit is the lack of an established budget. Even with an unsure monetary situation, budgeting is absolutely necessary for a construction project. Knowing monetary needs, even if only as a percentage of the total budget, can make efficient planning possible, especially on a project with cash flow problems. Standard accounting practices, also require the establisment of budgetary constraints.

Note must be taken that this is not necessarily the fault of the unit itself. Proper management by the management unit should have required and established a proper budgetary procedure. This is further discussed below, when the management unit of this sub-system is evaluated.

In summary, the road units are generally efficient in the rehabilitation work. This work does not remain very effective as the maintenance portion of the tasks normally performed by these units is not done. Also, having no budgetary indications or limitations is bad practice, especially with reference to the needs of the other units in the sub-system.

- Bridge Building Unit.

The bridge building unit at present is non-existent, having been absorbed completely by the building construction unit, due to the priority of work set up for Ngaba.

The completed bridges appear well built except as previously noted in Section 3.2.

No budget for this unit has been established nor is there a current estimate of materials that will be needed to complete the bridges, such as cement and steel.

Perhaps, the greatest failing of this unit is the lack of a work program with a priority list of work. Adequate bridges, are the lifeline of a road system, and a systematized program of bridge construction must always be established. A work program, including inspection of all bridge sites, estimating construction requirements in terms of costs, time needed for construction, materials needed and coordination with road rehabilitation should have been set up.

Additionally, a qualified civil, construction or structural engineer should have been on site at the start of the project. As has been previously said, there is absolutely no substitute for knowledge and experience. Knowledge of a language will not build a bridge.

Again, no criticism of the present bridge unit expatriate advisor is intended. Again, this is further discussed in the evaluation of the management unit of this subsystem.

There is presently no maintenance of the bridges by anyone including the bridge building unit, nor is there an inspection program.

The construction activity of this unit cannot presently be evaluated as there are no bridges presently being built.

- Building Construction Unit.

This unit is using over half the labor resources of the sub-system and all the cement and construction steel as well as the majority of the construction lumber, for its activities at Ngaba and Mbulula.

The amended project paper stated ".....11 to 16 permanent housing units at Mbulula/Ngaba plus construction/rehabilitation of six permanent structures at Ngaba for the research facility and 48 semi-permanent housing units".

Unfortunately, there is no documentation available to show how this evolved to new construction of fourteen permanent structures for a training facility including permanent dormitories for 48 people and a permanent structure for equipment maintenance, spare parts storage and associated equipment storage.

Discussions with Citoyen Mateso, the Director of the PNS, has, in

my opinion, failed to clarify this point. At the time of the writing of this report, there were not even current signed plans for the center.

This has become the largest single sub-project in the Project. There is a complete lack of adequate accounting techniques and work programmation on such a large undertaking.

The construction apparently has been directed on verbal orders. Good management practices require that such orders on major activities be confirmed in writing especially in order to prevent misunderstandings.

Budgetary estimates as well as material and labor estimates must be prepared in order to evaluate the effect of such undertakings on the Project as a whole and other sub-projects of the sub-system.

In the period, May 1981 to April 1982, this unit used the following resources:

Name	Main-months*	Avg. Cost**	Total Cost (Z)
Surveyeur des Travaux	40	410	16400
Superviseur des Stocks	8	507	4056
Magasinier	7	543	3801
Aide-Magasinier	8	327	2616
Chef d'Equipe	35	643	22505
Mecanicien/Auto	37	480	17760
Mecanicien/Beton	9	324	2916
Chauffeur	59	305	17995
Commis Pointeur	21	234	4914
Electricien	11	385	4235
Pompiste	31	428	13268
Aide Pompiste	3	163	489

Name	Main-months*	Avg. Cost**	Total Cost (Z)
Menuisier	101	401	40501
Aide Menuisier	8	224	1792
Charpentier	81	282	22842
Maçons	263	318	83634
Aide-Maçons	81	268	21789
Plombier	12	261	3132
Capita m/o	35	316	11060
Manoeuvre	1404	165	231660
Gardes	19	185	3515
Commis Dactylo	7	254	1778
		Total	536,658

*From Infrastructure records

*From PMU records

Since this is for 11 months, on year equals
12/11 x 536,658 = Z 585,445, say 585,000.

There is no estimate of exactly when they will finish this construction, or how much additional material and labor is needed.

On April 29, Citoyen Shukulu finally gave me an estimate of the total materials needed for the center, which was calculated from a set of unsigned plans, but for which the estimate of costs is unavailable.

According to minutes of coordination meetings held by PMU, work started up again on this sub-project in May of 1980. Based on a 50% effort in the period May 1980 to May 1981 of the last twelve month period, it can be estimated that since May 1980, over 750,000 Zaires in labor costs alone have been expended on this construction.

In addition, there are materials, equipment, and fuel utilized for this construction which might, at least partially, have been used for other more urgent purposes.

For example, on the route going in a North-South direction, north of Ngaba, commonly known as part of the "buckle route", there is a bridge whose abutments have collapsed. The bridge is in danger of completely failing should a heavily loaded truck go over it at a high speed.

Additionally, there is a major bridge south of Nyunzu which is not traversable by loaded trucks. When such a truck reaches the bridge, the load has to be carried by hand across the bridge to an empty truck on the other side.

The lack of construction of these bridges is directly attributable to Ngaba. The minutes of the Coordination meeting of April 18, 1981, state that no bridge construction is in progress because all the masons are assigned to Ngaba.

Even the need for this construction is open to question. At a distance of 35 kilometers from Kongolo is the Ecole Technique Agricole de Kaseya-Kongolo.

It has dormitories, assembly halls, laboratories, villas for professors and other buildings, all of which are in good condition. The prefet, when contacted, would welcome its use by PNS.

Additionally, there is a seed multiplication center, owned by DOA, about 6 kilometers from the Ecole Technique.

A reason given for not using this center was that it "was out of the PNS area". However, according to the agronomists, it is in the same Agro-climatic zone and its use could have saved the PNS much of its needed resources and money.

The startling fact in the construction of this center is that, apparently, there is no set program or curriculum presently planned for its use. More discussion on this will be found in the annexes of the various sub-systems concerned with the use of the center.

This unit appears efficient in the construction of the buildings. The Zairois staff appears knowledgeable in their functions, although they require constant supervision.

The construction of Ngaba represents a lack of proper programming of priority by the management unit. Again, it is stressed that no personal criticism of the expatriate advisor of the building construction unit is intended, although some written documentation would have been appreciated, in the form of labor and material estimates for the completion of the work. Further discussion is made in the evaluation of the management unit of the sub-system.

At Mbulula, the unit has refurbished houses which are not project-owned. Houses whose straw roofs were to be replaced by new straw roofs or repaired have new sheet metal roofs installed along with complete refurbishing of the interior.

There is no programmation of work or budgetary considerations, especially in reference to other sub-projects of the sub-system. There are no construction estimates for materials, labor or time required.

This unit, with reference to the entire sub-system, represents the biggest single drain on the resources of the sub-system as well as the biggest single drain on the entire Project.

- Culvert Crew

This unit, once a part of the road building unit, operates as

a separate unit. It is under the direction of the road expatriate advisor.

The crew is fairly knowledgeable, makes efficient use of its labor resources as well as efficient use of the materials on hand, in the construction of the culverts and appurtenances.

However, this unit, again, has no program with reference to coordination with other activities of the sub-system, nor are there construction and budgetary estimates. This is evident, for example, on a project road near Ngaba, where, if a culvert is not promptly executed, the next heavy rain will completely cut the road. The existing water and attendant erosion, already make it difficult even for four-wheel drive vehicles to cross the stream.

An additional deficiency in this unit is the lack of engineering techniques in the determination of culvert sizes and sizes of appurtenant structures.

Culvert sizes are presently gauged only by observation. No drainage calculations are made. Fortunately, it appears that this has resulted in oversizing the culverts, instead of undersizing, which would have been disastrous. Oversizing is only a slight waste of resources and is very often practiced on low maintenance roads such as the PNS roads.

However, there is one location where two large pipes were placed, and the water flow backwashed and cut across the road approach to the culverts. Two additional pipes, again without calculations, were added, and now, there is consideration to replace the entire system by a bridge. This expense and waste of resources could be avoided by the utilization of proper engineering techniques, and by the proper programmation of work.

This, of course assumes, that some technically proficient personnel is available for the work.

- Carpentry Shop

The carpentry shop has been involved in fabricating doors, windows and furniture for the Ngaba center as well as for the renovation of the houses at Mbulula and some necessary furniture at Kongolo and Nyunzu.

This unit is under the direction of the chief expatriate advisor of the Infrastructure sub-system. As with all units in this sub-system, there is no systematic programmation or budgetary exercises performed.

The carpenters appear knowledgeable and efficient in the work they are doing.

- Machine Shop

Until recently, the machine shop was under the complete management of the I.T. sub-system and was almost entirely monopolized by the sub-system.

As a result, very little use of the lathes, casting facilities and other machining facilities, which are generally important to proper equipment maintenance, could be made by the Infrastructure sub-system.

This was a waste of valuable and scarce project resources and proper coordination via programmation and direction might have possibly avoided such waste. This is also discussed in the I.T. annex.

- Equipment Maintenance Unit

The equipment maintenance unit is described in Section 3.4.

Additional note must be made, however, of the lack of adequate accounting practices and warehouse control which was existing throughout the life of the project up to the present.

Moreover, squabbling among the sub-system over control of material in the warehouse exacerbates relations between the sub-systems.

Good management practices dictate that warehousing be under the general control of management but under the direct control of the equipment advisor. This is especially important for inventory purposes and equipment allocations. The personnel in the warehouse must be cognizant of the various parts stored there as well as the uses of the parts and the manner in which they are used.

Requisitions must be proper. They should state clearly part name, purpose, number, and authority of the requisition. Accounting should be advised for proper charges to various sub-systems as the parts are used.

Receipt of ordered parts should be promptly processed and concerned sub-systems promptly notified. The warehouse should have "charge books" for each sub-system with programmed budgets to control the requisitions by each sub-system.

The equipment maintenance should have folders for every piece of equipment on the Project, including pick-ups, as is presently done, for most of the equipment.

Every repair, routine maintenance, periodic maintenance, special maintenance and fuel use should be noted in the folder. Labor charges,

material charges, and replacement parts, should also be noted.

Such charges should be debited as a charge to each piece of equipment as a cost of operating such equipment and such charge debited from each sub-system to which the piece of equipment belongs.

Most of these practices have now been implemented by the existing expatriate equipment specialist, although the management unit of the sub-system has not yet done so.

Since equipment maintenance is a service function, programmation is of the utmost importance to prevent breakdown of equipment due to lacking maintenance. Sufficient budgetary considerations must be given to allow complete maintenance services.

The Project management unit we well as sub-system management units must insure adherence to the maintenance program set up by the equipment maintenance unit.

As noted in Section 3.4, the Zairois staff of this unit appear to be well motivated and adequately knowledgeable.

- Management Unit

The management unit of this sub-system is under the direct control of the chief of the Infrastructure sub-system and the expatriate advisor.

It is responsible for the budgetary exercises of the sub-system, for the accounting of the expenses of the sub-system, for the budgeting of all sub-projects of the sub-system, for proper documentation of all undertakings, for proper coordination between sub-projects of the sub-system, and for proper coordination between this sub-system and other sub-systems as far as its activities coincide with other sub-systems.

Moreover, it must keep construction progress, construction estimates of materials, money and materiel, and all associated documentation required by good management and engineering techniques.

The existing correspondence and documentation file is practically non-existent. No approved budgetary exercises were found for any of the sub-projects in the sub-system.

No estimates for any of the sub-projects have been found nor future estimates for completion. Although the monthly reports describe some of the monthly activities, there is a definite lack of detailed future requirements for each sub-project. The accounting breakdown is also non-existent with respect to sub-project unit activities.

Some attempt was made to establish an organization chart. On June 7, 1981, an organization chart and bar charts of proposed work was sent to the Director and the PMU. The bar charts, however, were sketchy and no attempt was made to analyze the effect of each sub-project on one another nor to budget or estimate each sub-project.

No answer was received from the Director or PMU, although several verbal follow-ups were apparently made.

At the final session of the evaluation team, an answer was finally provided verbally. This is a span of over 10 months to get a response.

There have been instances of verbal directives by-passing the management unit of the Infrastructure sub-system. This is almost the ultimate sin in good management practice. For example, in the final session of April 30, the Director stated that he had not given directives, but only asked opinions. The sub-chief had understood this as a directive.

Good management practice in the form of written directives to the management unit would have prevented mis-understandings.

Although other sub-systems might, for purposes of "expediency", try to short-circuit a chain of command, it is imperative that the management unit of a sub-system control and prevent such attempts.

There is a lack of engineering documentation. There should be signed "As-built" plans of buildings and bridges. Detailed quantities expended for each unit of construction should be recorded as well as detailed labor charges.

This unit needs a qualified accountant to institute the proper accounting system for this sub-system. The personnel of the unit must be adequately large enough to handle the personnel problems.

Instances of lack of action due to default must be avoided at all costs. Action on personnel must be done within statutory limits and must be properly done.

Documentation on sub-system personnel must be kept as well as furnished to the Project personnel section.

In summary, this unit is not functioning properly in any respect.

3.6. FARMER AND VILLAGER ASSISTANCE

Farmer and villager assistance in maintenance of the roads is minimal. Some attempts have been made to enlist farmer aid in maintaining

roads abutting their fields, but there has been little or no success.

Since Estagrico, when they pay, hire villagers and farmers for cantonnage, there is little likelihood farmers and villagers would do maintenance for nothing, and, even as cantonniers, fields and houses take precedence over road maintenance.

Villagers do usually keep the ditches and some of the road bordering the villages free of weeds, but this is the extent of their maintenance effort.

There is also some assistance in one-time efforts such as installation of a culvert if it is of direct benefit to the village, but this is of limited value, due to the seasonal aspect of this assistance.

Additionally, there have been reports of villagers, hired as cantonniers, and given tools, of selling the tools in lieu of working.

Moreover, it seems likely that, if tools were given to the farmers and/or villagers, such tools would be apt to be used more in the fields than for the purpose for which they were given.

3.7 TRAINING

3.7.1. General

The training of Zairois personnel was foreseen as consisting of the following:

- On-the-job training
- Formal on-site classroom training
- Formal exterior (out-of-country) training.

Formal training was to be generally by TDY personnel, while on-the-job training was to be by the expatriate advisor.

Exterior training was to be in the United States or a suitable third country in organized courses.

3.7.2. On-the-Job Training

Generally, the expatriate advisors of this sub-system have instituted good on-the-job training, except in the management unit. Commonly called "one-on-one" or "show me" training, it specifically handles problems which occur but does not handle general or theoretical problems. Such techniques are especially efficient in equipment maintenance and such repetitive tasks as are found in carpentry and assemblage of culvert pipe.

Tasks on which multiple forces are used are not conducive to one-on-one training and formal classroom training is more apt to provide the needed results.

3.7.3. Formal On-Site Classroom Training

The only formal on-site training in this sub-system was performed by the road unit expatriate advisor.

This was done by way of video tapes and films on various road rehabilitation functions.

There were no other attempts at formal class training by anyone in this sub-system.

Tasks like assemblage, inventories, accounting, personnel direction and bookkeeping are much better subjects for formal classroom training than "one-on-one" or "show me" training. Unfortunately, this sub-system did not employ this type of training, except as noted above.

3.7.4. Formal Exterior Training

No documentation could be found that indicated that any attempt was made to find outside training nor that any attempt was made to define objectives of such training.

However, verbal discussion with the sub-system indicated that three Zairois members of the sub-system attended some training in Haiti and in Belgium.

Problems such as courses being only in English could have been solved by giving formal English classes on a continuing basis in the Project for all those interested.

These Zairois so trained could have been the nucleus considered for exterior training.

Moreover, there are organizations in the Francophone countries which have available curricula in road rehabilitation and maintenance, and attempts should have been made to utilize these.

CHAPTER FOUR

SUSTAINABILITY

4.1. GENERAL

It is obvious from the discussion in Chapter 3, that this sub-system, as presently constituted and as presently managed, is not sustainable now or will be after Project termination.

There are three periods of time in which to look at this sub-system:

- Before September 1982
- September 1982 - September 1983
- After EOP (1983)

The discussions that follow probe into the ramifications of each time period.

4.2. MODIFICATIONS PROPOSED FOR EXISTING SUB-SYSTEM

Regardless of what happens after September 1982, the sub-system must be modified and functionally running before September 1982.

An organizational structure and chain of command must be firmly established.

The following modifications to the existing structure is recommended:

- Chief of Infrastructure (Zairois), aided by an expatriate advisor

The Chief of the sub-system will be responsible overall for the administration of the sub-system.

He will be the direct supervisor of the sub-system management unit and oversee the chiefs of the different units within the sub-system.

- Sub-Chief (Road Unit) (Zairois), aided by an expatriate advisor

This sub-chief will be responsible for road rehabilitation and all road maintenance, but not for bridge and or culvert construction.

- Sub-Chief (Structural Unit) (Zairois), aided by an expatriate advisor

This sub-chief will be responsible for bridge building, culvert construction, building erection and miscellaneous construction.

- Sub-Chief (Equipment Maintenance) (Zairois), aided by an expatriate equipment specialist

This sub-chief will be responsible for all equipment maintenance, the machine shop, foundry, the carpenter shop and the administration and control of the warehouse.

4.3. ACTIVITIES OF THE PROPOSED ORGANIZATION

4.3.1. Chief of Sub-System

As aforementioned, he will be responsible for all final decisions of the sub-system. He shall control all exterior communications to and from the sub-system, and through the sub-system management unit, insure the proper action on the concerned communication.

He will directly supervise the sub-system management unit that will be composed of the following personnel:

- Personnel officer with assistant

Along with normal personnel duties, the Personnel officer will competently attend to all sub-system personnel problems. All necessary dossiers on all sub-system personnel shall be kept.

All hirings, firings, merit salary raises, etc., shall be done through this unit. This data shall be kept in individual folders for each person in the sub-system.

Cross reference with the Project Personnel officer shall be made on a regular basis to insure that the files in the sub-system as well as the files in the Project Personnel office are up to date.

The sub-system Personnel officer shall act promptly on all personnel problems. He will issue without undue delay all necessary paperwork dealing with any and all personnel.

Finally, he will insure that the sub-system file clerk has copies of all paperwork and actions for the sub-system files.

- Accountant with assistant

As part of his duties, the accountant will competently keep track of all financial transactions of the sub-system. He will keep track, and notify the concerned sub-system, of warehouse charges, maintenance of equipment charges and any special charges.

He shall notify Project accounting of such charges in order that Project accounting can keep proper records. He will insure that proper payroll records be kept, and that the personnel receive proper pay.

He shall retain time sheets of all personnel in the sub-system.

He will maintain records of sub-project expenditures including labor, materials, fuel, maintenance, etc. He will notify sub-chiefs with adequate advance warning if the expenses on a sub-project are passing budget limits.

He will aid the Chief of the sub-system in the preparation of the sub-system annual budget.

Such a budget will be broken down to the degree necessary to obtain information as to the costs and expenditures of any and all sub-system activities.

All sub-projects will be budgeted. If the total budget as requested by the sub-system is not granted, then the accountant, with the Chief and Sub-Chiefs will determine whether to delete some activities or phase down some sub-projects.

Proper documentation, in any case, shall be kept, including monthly cash reports.

Copies of all correspondence, final budgets, progress reports of expenses, and any or all actions shall be provided to the sub-system file.

- Training officer

In cooperation with the Sub-Chiefs, he shall arrange for formal classroom training for all suitable personnel.

He shall arrange for reading material, blackboards, chalk, etc., for all training sessions.

Where necessary, he shall arrange for formal out-of-country training for personnel. All arrangements shall be first approved by the Chief of the sub-system and forwarded to the Project Management Unit for approval by the Project Director.

All justificative material shall be annexed to the proposal to speed action by the Project Director.

Written confirmation or refusal should be requested to assure proper documentation.

He shall provide the sub-system files with all the correspondence, actions and proposals.

- File Clerk/Secretary

Along with secretarial duties, the file clerk shall keep adequate cross-referenced files of all memos, correspondence, orders, etc., pertaining to the sub-system.

A log should be kept to note date and time of receipt of all incoming correspondence. All outgoing intra-Project correspondence should also be logged with the time, date and signature of the person receiving such correspondence.

All monthly progress and cash reports should be filed and cross-referenced.

All files pertaining to the sub-system shall be complete and well-kept so that any necessary information can be easily divested.

4.3.2. Sub-Chief (Road Unit)

The sub-chief will be responsible for the road rehabilitation and mechanized maintenance required to sustain the roads, including culvert and bridge repairs, but not for the original construction of the structures.

He shall prepare a program for road rehabilitation, including labor, material and equipment estimates for each road to be rehabilitated.

He shall prepare a budget estimate for each road. Needs for fuel, equipment maintenance requirements and priority constructions shall be clearly identified.

Monthly progress reports should be made, indicating actual rate of progress versus programmed rate.

Actual uses of material, equipment maintenance facilities, labor and funds should also be compared on a monthly basis to programmed rates.

He shall coordinate the road rehabilitation activities with bridge and culvert construction to insure a smooth work flow.

A road maintenance program, with the activities indicated in Chapter 3, shall be prepared.

Budget estimates, equipment requirements, material requirements, labor needs shall be prepared.

The maintenance activities shall be planned as to interfere as little as possible with rehabilitation work. However, the maintenance work should take precedence in order to sustain and retain the effective use of the rehabilitated roads.

He shall have inspectors regularly inspect the rehabilitated roads to judge the maintenance requirements and to schedule periodic-type of maintenance in order to avoid bad degradations of the roads.

He shall notify the Chief of the sub-system if and when Estagrico cantonniers are not fulfilling the PNS-Estagrico Convention. However, he shall have the necessary maintenance performed in order to best protect the roads.

All processes, actions, notifications shall be fully documented. For expediency, some orders may be verbal, but should be followed with written confirmation.

Proper work records of all personnel, preferably in the form of time sheets, shall be kept. These shall be forwarded to the sub-system management unit for processing.

Accurate records of vacations, sick leave, absences without leave, infraction of rules, overtime, and any other personnel activities shall be kept and regularly and promptly given to the sub-system management unit.

He shall insure that equipment operators, truck driver and motorcycle users follow proper operating procedures as set forth by the equipment maintenance unit.

The road maintenance program and the road rehabilitation program shall be so set up that adequate time shall be allowed for proper preventive equipment maintenance.

The sub-chief shall notify the sub-system training officer of the unit training requirements and assist him in setting up formal training classes.

He shall, also, assist the training officer in the discovery of adequate exterior training. Selected personnel of the unit should be nominated with all justificative paper work, in order to minimize delays and work disruptions.

He shall refer all requests, orders, demands, communications, pertaining to the unit, coming from external sources, to the Chief of the sub-system for action.

He should receive written confirmation for all work that is undertaken that was not foreseen in the work program or the budget.

Proper accounting of any funds, materials, and labor shall be furnished to the sub-system accountant, by sub-project. All records kept shall be clear, consistent and non-ambiguous.

He shall maintain technical integrity in the road rehabilitation program, by using sound engineering techniques to provide low-cost efficient roads. Unsuitable material, inconsistent techniques and other unsound methodologies and or material should be avoided.

Unsuitable material shall be replaced as necessary, even if suitable borrow must be trucked in. Side borrow should be investigated at material sites as often as possible.

Grade lines should be smoothed and kept above surrounding ground as much as possible. Pavement crown slopes shall be consistent with the materials used.

Side drainage in the form of ditches shall be provided on all roads. Locations of cross-drainage requirements shall be promptly noted and turned over to the structural unit for determination of size and type of structure.

Records of all quantities of borrow, and any other materials shall be kept, especially use of fuel and oil for each road.

Upon the completion of a road, a total cost shall be determined from the records kept; including all costs chargeable to the road (labor, equipment maintenance, fuel, etc.). A cost per kilometer should then be derived, including amortized equipment costs.

This information shall be furnished to the Chief of the sub-system for further processing (to the PMU unit and SCAD).

3.4.3. Sub-Chief (Structural Unit)

The sub-chief will be responsible for drainage calculations

necessary for sizing drainage structures, for culvert and bridge construction, building erection and building maintenance.

In cooperation with the Road Unit, he shall prepare a program for culvert construction, and for bridge construction, including labor, general material requirements, and equipment estimates, for each road to be rehabilitated.

He shall prepare a budget estimated for all structures in the program for each road. Needs for fuel, equipment maintenance, cement, and priority constructions shall be clearly noted.

Monthly progress reports shall be made. Actual rates of construction versus programmed rates shall be charted.

Uses of cement, other materials, equipment maintenance facilities, labor and funds shall be recorded on a monthly basis by road and compared to programmed rates of usage.

He shall determine drainage structure sizes in accordance with accepted engineering techniques. All concrete construction shall be in accordance with accepted construction procedures. Careful control of such work shall be insured.

Conservative construction techniques shall be encouraged to minimize maintenance requirements. Grade lines of concrete structures shall be carefully set to match road profiles.

Culverts shall be carefully installed, paying attention to manufacturer recommendations and using well established procedures for such culvert installations. Adequate cover for such culverts shall be determined and promptly brought to the attention of the road unit.

Locations of culverts and bridges shall be carefully noted and recorded.

On completion of structures, total costs shall be determined, including but not limited to, fuel, cement, labor, materials, equipment, and miscellaneous activities associated with the work, such as forming. These costs will be promptly given to the road unit in order that the total road cost may be properly computed.

Records of all proceedings, calculations, and disbursements shall be clearly defined and kept.

Building rehabilitation and construction programs will be clearly defined. Priority studies should define the needs of the building construction as compared to the needs of bridge and culvert constructions.

The programmation should include labor, material and equipment estimates as well as budgetary estimates.

All processes, correspondence, actions, changes, shall be fully documented. For expediency, initial changes may be verbal, but should be followed by written confirmations.

Proper work records of all personnel preferably in the form of time sheets, shall be kept. These shall be promptly forwarded to the sub-system management unit for processing.

Accurate records of vacations, sick leave, absences without leave, infractions of rules and regulations and overtime shall be kept and regularly and promptly given to the sub-system management unit.

He shall adequately insure that equipment operators and drivers follow proper equipment operating procedures as set forth by the equipment maintenance unit.

All unit work programs shall allow adequate time for preventive maintenance to be performed on the equipment.

The sub-chief shall clearly identify and justify any possible quantity and/or budgetary overruns.

Selected personnel shall be nominated for formal training with all justifying documents to the sub-system training officer. Moreover, the training officer shall be made aware of all training needs of the unit.

All requests, orders, demands and commands which originate outside the sub-system, and which do not emanate from the Chief of the sub-system, shall be referred to the Chief of the sub-system who will then promptly act on such communication.

All work that is not in the work programs or that is extraneous to the budget shall be fully documented, especially as to cost, origin or work, purpose and time of completion. The effect of such work on programmed work and budgetary constraints shall be fully noted.

All data shall be promptly furnished upon request by the Chief of the sub-system only.

4.4.4. Sub-Chief (Equipment Maintenance)

The sub-chief shall be responsible for all equipment maintenance,

preventive maintenance, the use of the machine shop, the use of the foundry, the carpenter shop and the sub-system warehouse.

He shall prepare a program for routine maintenance of all equipment and notify all sub-system personnel through the sub-system chiefs of this program. Additionally, he shall institute a program of preventive maintenance and further publicize this program.

He shall prepare estimates for labor, material, fuel and oil for the maintenance services.

Equipment maintenance shall be performed promptly and efficiently to minimize work interruption of the units requiring the maintenance.

Files should be kept for each individual piece of equipment in the Project. All work performed on each vehicle shall be duly recorded in each respective file. Labor costs, replacement parts costs, oil and grease and miscellaneous costs shall be noted in the file.

Misuses of equipment noted during the maintenance effort should also be noted and the affected unit or sub-system notified.

A monthly report of all work shall be prepared. This report shall break down the costs by sub-system and shall be forwarded to all sub-systems as well as the management unit of the Infrastructure sub-system.

Any correspondence entered into by the sub-chief with any and all other unit heads shall be properly filed with copies forwarded to the sub-system chief.

The chiefs of sub-systems shall be notified if any equipment operators in their sub-system have failed to bring the equipment in for maintenance when due.

A corrective-action program should be defined for continued delinquencies by the same operators. This program should define penalties for infractions of the rules and regulations.

Spare part requirements estimates shall be made quarterly and forwarded to Project Management.

Truck, pick-up and motorcycle drivers should have trip logs, copies of which should be maintained in the respective equipment file.

The use of the machine shop shall be controlled by the Sub-Chief (Equipment Maintenance).

He shall set up work allocation programs and schedules to accomodate all sub-systems. A series of priority work should be set up to insure the least interruption of work in any sub-system.

All time, labor, equipment and material expended for any task shall be recorded. A monthly summary of work shall be prepared, showing tasks, total cost of tasks (including labor) and sub-systems for which tasks were performed. This summary should be forwarded to Project management, and all sub-systems, for processing.

All requests for tasks should be written. They should be clearly defined, with any time limitations that might be necessary.

All machine shop personnel shall be directly responsible to the Sub-Chief (Equipment Maintenance), and follow his orders or the orders of his representative.

The use of the foundry shall be programmed so as to minimize the use of fuel. Priority lists of tasks should be set up, with timing and urgencies noted.

Attempts should be made to combine different tasks, when possible.

Records of time, material and fuel used shall be kept and charged to different tasks.

A monthly report, of charges per task should be prepared and sent to the Project Management Unit, the Infrastructure Management Unit and all concerned sub-systems.

The carpenter shop shall be used to furnish support for all sub-systems. Therefore, it is incumbent on the Sub-Chief to prepare programmation of work.

All material and labor used for each task shall be recorded. Monthly summaries shall be prepared and forwarded to Project Management and all concerned sub-systems.

All supplies, equipment, material, spare parts, etc., shall be received by the warehouse. It shall promptly record such receipt, and if on special order by a sub-system, notify the sub-system of the receipt.

An inventory shall be conducted at least once a year, cataloguing parts by number, name, and if specifically for a sub-system, the name of the sub-system.

All demands to the warehouse shall be by requisition, that shall state very clearly, part, number, part name, purpose, and name and signature of authority to withdraw the part. Such withdrawal, shall be promptly entered into the inventory record.

The Sub-Chief shall prepare orders for new material, spare parts, etc., with enough lead time to prevent exhaustion of the supply on hand.

He shall forward such orders to the Project Management Unit for prompt processing.

He shall prepare monthly reports of activities of the warehouse, by sub-system, showing parts used and/or received. Copies of these reports shall be distributed to all concerned sub-systems.

The Sub-Chief shall be responsible for keeping personnel records of the sub-units under his direction pertaining to time worked, overtime, etc.

Copies of weekly summaries shall be sent to the sub-system management unit for processing.

All infractions of rules, regulations, any absences without leave, etc., shall be duly noted and reported to the sub-system personnel officer for action. Such reports shall be fully documented.

Finally, the Sub-Chief (Equipment Maintenance) shall insure that the sub-system management unit has copies of all pertinent correspondence, actions and requests for the sub-system files.

4.4. CONTROL AND DUTIES OF SUB-SYSTEM - 1982-1983

The second phase to be considered is the period 1982-1983.

The sub-system was slated to be turned over to OR in September 1982. However, it has been shown in Chapter 3 that:

- The OR is not capable of maintaining the National or the Regional roads within the Project area.

- The OR is not capable of maintaining its equipment nor get replacement parts
- The sub-system, by September 1982, will not have all its bridges completed. In view of past performance, it is highly unlikely that the OR is capable of or would want to build the necessary bridges.
- The road rehabilitation may not be finished by September 1982. The OR, incapable of road maintenance, would equally be incapable or road rehabilitation.

Therefore, it is strongly recommended, if the modifications proposed in Sections 4.2 and 4.3 are implemented, and if the PNS continues to EOP the Infrastructure sub-system remain within PNS.

The organization would have the capability, the organization and the experience to continue to build bridges, rehabilitate roads and to maintain the roads.

4.5. CONTROL OF SUB-SYSTEM AFTER 1983

The Infrastructure sub-system's major task after Project termination in 1983 will be the maintenance of the Project road system and other necessary activities in conjunction with its maintenance function.

There are three possibilities that can be considered, for the future of the sub-system after Project termination:

- Have OR take over the administration and activities of the sub-system
- Have Estagrico take over the administration and activities of the sub-system
- Maintain the sub-system as a separate organization.

4.5.1. OR Control of the Sub-System

The original project design foresaw the OR taking over the material, equipment, activities and functions of the sub-system, including the maintenance of the PNS roads.

The sub-system, if the modifications noted in Section 4.3 are followed, is capable of fulfilling the maintenance activities.

However, as noted in the previous section and based upon the performance of OR during the past five years as well as the difficulties in receiving adequate GOZ funding, it is very doubtful that OR could do the required maintenance on the PNS roads.

This is further evidenced by the utter lack of maintenance of some regional roads in the PNS area and the reduction in budgeted funds that OR has suffered.

Furthermore, the equipment maintenance of OR is of doubtful quality, with the equipment having very high deadlined rates.

4.5.2. Estagrico Control of the Sub-System

As discussed in Chapter 3, at present, Estagrico cannot maintain the sub-system equipment in their own facilities, nor is it likely, that, in fact of present and forecast economic conditions, they will be able to expand their facilities.

The monetary situation would make it also very doubtful if they could take over and maintain the present PNS facilities. Also, there would be a tendency to use the PNS maintenance facility for cotton equipment at the expense of road equipment.

It is to be noted, that of the roads they are presently obligated to maintain, less than 40 percent had any trace of maintenance. This is estimated on the basis of viewing at least 80 percent of the rehabilitated roads.

Moreover, the only operations the cantonniers were performing was the cutting of grass and weeds. Pot-holes and degradations were not being repaired. Except at one location, ditches were not being cleared.

There is not sufficient supervision, materials and tools for proper cantonnage operations. Improvement of this is doubtful, again given the economic, labor and logistical situation of Estagrico.

4.5.3. Maintain the Sub-System as a Separate Organization

The major drawback to this consideration is finding adequate funding. It appears out of the question to depend on GOZ funding, given its past record. Besides, if GOZ funding could be depended upon, OR might be better suited to control the sub-system.

The DOA does not have the funding capability, either, as evidenced by its difficulty in providing the Project funding.

Therefore, it is rather obvious that an alternative source of funding is required.

The most likely source of internal funding is a road tax, on merchants bringing produce to and from markets via the PNS roads or taking produce to shipping points via the PNS roads.

Control and collection of the tax could be either at railheads or at official buying counters. The tax could be based on tonnage being shipped.

The tax structure and procedure of collecting, as well as the legality within the Provincial and National tax system is left as beyond the extend of this report, and should be investigated by PNS staff, USAID and other officials, between now and September 1982, in order to provide adequate planning.

The amount of the tax is discussed later in Section 4.7.

A further possibility is the recent announcement by the GOZ of the availability of 53 million Zaires for maintenance of local interests roads (sic) to be let to local contractors capable of doing the maintenance work.

Further investigation by PNS staff and USAID to see whether the Infrastructure may touch this fund (as it has the only organization in North Shaba capable of full maintenance of local interest roads) should be done.

However, thought should be given if this is going to be a "one-time shot" or whether this will be a yearly continuing grant. Additionally, thought must also be given to past GOZ funding attempts, where good intentions have fallen victim to lack of available funds.

A third possibility is a loan from an international lending agency such as ADB or the World Bank. However, considering the present economic situation of Zaire vis-a-vis international lenders, this possibility is very remote, but should nevertheless be investigated.

The Infrastructure sub-system is well established, has adequate equipment and personnel and has adequate equipment maintenance facilities. As such, it might, on its own virtues, qualify for a loan, if some means of repaying the loan were indicated, such as a tax revenue.

A fourth possibility is a private venture consisting of a cartel of interested companies, such as the merchants in the PNS area itself. However, this is fraught with danger. Since the companies within the cartel would be competing companies, there is a possibility that there could be continual squabbling over priorities of maintenance, amount of funding by each company, lateness of contributions, etc., that could effectively freeze the maintenance effort.

Lastly, USAID could continue to finance only this sub-system after 1983 without requiring local participating funds. This would have to be on a grant basis, for if tax revenue was available, no loan would be necessary. Even if USAID finances PNS after 1983, this sub-system should be financed separately.

4.6. ORGANIZATION OF THE SUB-SYSTEM AFTER 1983

4.6.1. Organization

Regardless of the source of funding, the sub-system would be reorganized in order to be viable after Project termination.

The sub-system should be reorganized as follows:

Two divisions, each with a division chief; one based at Kongolo and one based at Nyunzu.

The division at Kongolo, where the system Director would be based, would include an administrative unit for the entire system, a road maintenance unit and the equipment maintenance and associated facilities existing at Kongolo.

The division at Nyunzu would have a road maintenance unit, a warehouse and some equipment maintenance facilities.

The equipment based at Kongolo would include a bulldozer, two graders, a front-end loader, six dump trucks, a roller, a water truck and a fuel truck.

Nyunzu would have a bulldozer, one grader, a front-end loader, four dump trucks, a water truck and a fuel truck.

The administrative unit should have the Director, a work superintendent, a personnel chief, two accountants, two clerks, two warehousement and a radio operator.

Each division would have mechanics, apprentice mechanics, equipment operators, drivers, cantonniers, capitas and other laborers as necessary.

The Kongolo division would be responsible for the roads from Kongolo to Mbulula and south to, but not including, the Makundi-Kitengetenge road.

The Nyunzu division would be responsible for the roads in the Nyunzu area, south to Makumbo and north to, and including, the Makundi-Katundu-Kitengetenge road. The Kabeya Mayi - Kalima road would also be the responsibility of this division.

For the purpose of this report, it is assumed that the roads supposedly maintained by OR at the present time would continue to be maintained by OR, e.g.; OR Route 631 (Kongolo-Mbulula).

4.6.2. Work Program

The divisions would be responsible for routine and periodic maintenance for roads, bridges and culverts. This would include the following tasks:

- Blading and Shaping of road with a motorized grader to provide a smooth and even surface.

- Roadside and outlet ditches would be reshaped and cleared, and if excess material is suitable, it would be used for roadway resurfacing.

- Resurfacing of long sections, to replace lost surface material, by motorized means.

- Patching isolated holes and degradations with suitable material.

- Cleaning and repairing culverts, including repair of headwalls, and cleaning of inlets and outlets.

- Clearing and shaping of road ditches with hand tools.

- Erosion control, as part of road-side maintenance, to prevent road-side erosion, by manual methods.

- Bridge repair, repair of bridge appurtenances, and clearing of stream channels as required.

- Vegetation control, cutting of grass, weeds and brush by manual methods.

A work program should be established by the Director in cooperation with the work superintendent and the division chiefs. In order to be able to establish such a work program, an up-to-date road inventory must be in existence or established.

This inventory, by division, should include route numbers, kilometrage, locations of drainage structures, locations of bridges, type of route (surfaced with laterite, dirt-reprofiled, trail, etc.) and various conditions of road surface, and appurtenances. It should be updated as maintenance and/or new construction is performed.

As has also been stressed in Chapter 3, the program should allow and insist on adequate equipment maintenance. Continual training should be provided to all maintenance personnel, all operators, all drivers and other concerned personnel to minimize equipment breakdown and to keep low dead-lined rates.

4.6.3. Resources Necessary for the Organization

Resources necessary for the maintenance activities, include funding, labor, material, and equipment.

The following calculations have been made, using these assumptions:

- Due to the severe financial and labor problems that Estagrico has and is forecast to have, they will be unable to perform the necessary cantonnage operations, and that these would be assumed by this organization, and

- Minimum-type maintenance, i.e., to maintain minimum levels of service, and

- The calculations are based on OR source data, PNS source data, field observations and "Road Maintenance Recommendations-PNS Rehabilitated Roads", published jointly by the Infrastructure Sub-System-Project North Shaba and Morrison-Maierle in February 1982.

For the purposes of the calculations of the necessary resources, the following task numbers and work units have been assigned:

Task No.	Description	Work Unit
1	Blading and Shaping of road with a grader and clearing roadside and outlet ditches	Km.
2	Resurfacing long section by motorized means with laterite	CM
3	Patching isolated holes and degradations with suitable material	CM
4	Cleaning and repairing culverts including repair of headwalls	No. of Culverts
5	Clearing and shaping of road ditches with hand tools	KM
6	Erosion control, as part of roadside maintenance, to prevent roadside erosion, by manual methods	Man-hours
7	Bridge repair and repair of bridge appurtenance	Man-hours

Task No.	Description	Work Unit
8	Vegetation control by manual methods	Km.

There are three types of roads in the PNS area which will be maintained by this organization:

- National and Regional routes (Class 2)
- Arterial roads (Class 3)
- Local roads (Class 4)

The divisions have the following kilometrages of the various classes of road:

Division	Class 2	Class 3	Class 4
Kongolo	65	79	390
Nyunzu	60	60	70
Total	125	139	460

All the kilometrages are estimated only and are subject to variations when all the roads are actually completed.

The following standards of work are proposed for minimum levels of service on the various classes of road.

Task No.	Criteria	Class 2	Class 3	Class 4
1	Times/yr	2	2	2
2	Frequency	2 yrs	3 yrs	-
3	Cm/Km/yr	5	4	3

Task No.	Criteria	Class 2	Class 3	Class 4
4	Times/yr	2	2	2
5	Times	3	3	3
6	Man hours/Km/yr	30	20	10
7	Man hours/Bridge/yr	60	60	60
8	Times/yr	4	4	4

Note must again be made that these are only general minimum standards used for the following calculations and that these may be varied after analysis of the maintenance experience of the sub-system in 1982-1983.

Task No.	Resources
1	1 Grader, 1 operator, 2 laborers
2	1 Grader, 1 Bulldozer, 1 Roller, 1 Front-End Loader, 4 Dump Trucks, 1 Water Truck, 1 Fuel Truck, 4 operators, 6 drivers, 4 labroers
3-8	362 Cantonniers, 24 capitas, hand tools, 2 Dump Trucks (only as needed), 2 drivers

The annual work program, then, can be computed as follows, by division:

Task No. 1

Kongolo Division

65 km x 2 times/yr	=	130 km
79 km x 2 times/yr	=	158 km
390 km x 2 times/yr	=	780 km
Subtotal		1,068 km

Nyunzu Division

60 km x 2 times/yr	=	120 km
60 km x 2 times/yr	=	120 km
70 km x 2 times/yr	=	140 km
Subtotal		380 km

TOTAL Km - Task No. 1: 1,448 km

Task No. 2

Resurfacing is assumed as 0.15 m of laterite compacted over 4.25 m width of road.

$$(0.15) \times (4.25) \times (1000) = 637.5 \text{ m/km}$$

Additionally, it is assumed that all Class 3 and Class 2 roads are or will be surfaced with laterite.

Kongolo Division

65 km x 637.5 x .50	=	20,719 CM
79 km x 637.5 x 1/3	=	16,788 CM
Subtotal		37,507, CM

Nyunzu Division

60 km x 637.5 x .50	=	19,125 CM
60 km x 637.5 x 1/3	=	12,750 CM
Subtotal		31,875 CM
TOTAL CM - Task No. 2:		69,382 CM

Task No. 3

Kongolo Division

65 km x 5 CM/km/yr	=	325 CM
79 km x 4 CM/km/yr	=	316 CM
390 km x 3 CM/km/yr	=	1,170 CM
Subtotal		1,811 CM

Nyunzu Division

60 km x 5 CM/km/yr	=	300 CM
60 km x 4 CM/km/yr	=	240 CM
70 km x 3 CM/km/yr	=	210 CM
Subtotal		750 CM
TOTAL CM - Task No. 3:		2,561 CM

Task No. 4

Kongolo Division

40* x 2 times/yr	=	80

Nyunzu Division

20* x 2 times/yr	=	40
TOTAL		120

*Assumed

Task No. 5

Kongolo Division

534 km x 2 sides x 3 times/yr	=	3,204 Km

Nyunzu Division

190 km x 2 sides x 3 times/yr	=	1,140 Km
TOTAL		4,344 Km

Task No. 6

Kongolo Division

65 km x 30 MH/km/yr	=	1,950 MH
79 km x 20 MH/km/yr	=	1,580 MH
390 km x 10 MH/km/yr	=	3,900 MH
Subtotal		7,430 MH

Nyunzu Division

60 km x 30 MH/km/yr	=	1,800 MH
60 km x 70 MH/km/yr	=	1,200 MH
70 km x 10 MH/km/yr	=	700 MH
Subtotal		3,700 MH
TOTAL MH - Task No. 6:		11,130 MH

Task No. 7

Kongolo Division

15 Bridges x 60 MH/Bridge/yr	=	900 MH

Nyunzu Division

5 Bridges x 60 MH/Bridge/yr	=	300 MH
TOTAL MH - Task No. 7:		1,200 MH

Note: Number of bridges are assumed.

Task No. 8

Kongolo Division

534 km x 4 times/yr	=	2,136 km

Nyunzu Division

190 km x 4 times/yr	=	760 km
TOTAL km - Task No. 8:		2,896 km

Based upon field observations, PNS data and general OR source data, the following productivity rates are feasible and will be used as the basis of yearly resources required:

Task	Productivity
1	8 km/day/crew
2	500 CM/day/crew
3	0.5 CM/day
4	10 man-days/Culvert (980 MH/Culvert)
5	200 M/day
6	N/A
7	N/A
8	100 M/day

Using the aforementioned calculations and productivity rates, the following annual maintenance resources requirements can be calculated:

Task No. 1

Kongolo Division

1,068 km/8 km/day/crew = 134 days

Nyunzu Division

380 km/8 km/day/crew = 48 days

Task No. 2

Kongolo Division

37,507 CM/500 CM/day/crew = 75 days

Nyunzu Division

31,875 CM/500 CM/day/crew = 64 days

Task No. 3

Kongolo Division

1,811 CM/0.5 CM/day = 3,622 days

Nyunzu Division

750 CM/0.5 CM/day = 1,500 days

Task No. 4

Kongolo Division

80 x 10 = 800 days

Nyunzu Division

40 x 10 = 400 days

Task No. 5

Kongolo Division

3,204 km/100 m/day = 32,040 days

Nyunzu Division

1,140 km/100 m/day = 11,400 days

Task No. 6

Kongolo Division

7,430 MH/6 MH/day = 1,238 days

Nyunzu Division

3,700 MH/6 MH/day = 617 days

Task No. 7

Kongolo Division

900 MH/5 MH/day = 180 days

Nyunzu Division

300 MH/5 MH/day = 60 days

Task No. 8

Kongolo Division

2,136 km/100 m/day = 21,360 days

Nyunzu Division

760 km/100 m/day = 7,600 days

Using these calculations, the available resources may be checked against the needed resources.

It must again be stressed that this is a minimum level exercise with several assumptions that will have to be verified during 1982-1983, ~~by~~ the results of the proposed maintenance program of the sub-system.

Task 1 and Task 2

Kongolo Division

Equipment Needed	Days
Grader	209
Bulldozer	75
Roller	75
Front-End Loader	75
Dump Trucks	450
Water Truck	75
Fuel Truck	75
Labor Needed	
Operator	209
Operator	75
Operator	75
Operator	75

Labor Needed (Cont.)	Days (Cont.)
Foreman	75
Drivers	810
Laborers	568

Working Days Available

Non-Working Days

Weekends = 52 x 2	=	104
Holidays (See Note 1)	=	16
Bad Weather (See Note 2)	=	80
TOTAL		200

Working Days Available - 365 - 200 = 165

Graders Needed (See Note 3)

209/165 x 1.25 = 1.58

Graders available: = 2

Bulldozer, Roller, Front-End Loader Needed (See Note 3)

75/265 x 1.25 = 1

One of each available

Dump Trucks Needed

450/165 x 1.25 = 3.4

Dump Trucks Available = 4

Nyunzu Division

Equipment Needed	Days
Grader	112
Bulldozer	64
Roller	64
Front-End Loader	64
Dump Trucks	384
Water Truck	64
Fuel Truck	64

Labor Needed	
Operator	112
3 Operators	64 each
Foreman	64
6 Drivers	64 each
Laborers	406

Working Days Available = 164

Graders Needed

112/165 x 1.25 = 1

Grader Available = 1

Other Heavy Equipment Needed

64/165 x 1.25 = 1

One of each available

Dump Trucks Needed

384/165 x 1.25 = 2.91

Dump Trucks Available = 4

Tasks 3 through 8

Kongolo Division

Man-Days Needed

3	=	3,622
4	=	800
5	=	32,040
6	=	1,238
7	=	180
8	=	21,360

Total = 59,240 days

Working Days Available

Non-Working Days

Weekends = 52 x 2 = 104
(See Note 4)

Holidays = 16

Bad Weather
(See Note 5) = 62

TOTAL 130

Working Days Available - 365 - 130 = 235

Number Cantonniers Needed

59,240/235 = 252

252 x 1.05 = 265 (See Note 6)

Number Cantonniers Provided

(minimum) 534/2 = 267

Nyunzu Division

Man-Days Needed

3	=	1,500
4	=	400
5	=	11,400
6	=	617
7	=	60
8	=	7,600
TOTAL	=	21,577 days

Working Days Available = 235

Number Cantonniers Needed

21,577/235 = 92

92 x 1/05 = 97 (See Note 6)

Number Cantonniers Provided

(minimum) 190/2 = 95

Note 1: From GOZ and PNS data

Note 2: Rainy season Nov-Dec and Feb-Apr.

Note 3: Allow 25% additional time for maintenance and breakdowns

Note 4: Cantonniers work 6 days a week

Note 5: Some equipment "bad weather days" are not considered manual work "bad weather days"

Note 6: Allow 5% additional for accidents, sick leave, etc.

A final reminder is made that this exercise is made on the basis of providing minimum level standards. However, a final, more definitive program could still be modeled after these calculations.

4.6.4. Costs

The costs of the program described in this chapter is the most difficult item to arrive to, as there is almost no documentation from this project that could be used for the necessary calculations.

Therefore, the costs are based mostly on the derived costs presented in the previously noted references and in the references noted in Appendix A.

Task 1

182 crew days; 1500 hours grader;

Salaries	: 12,300 Z
Fuel and Oil	: 97,200 Z
Spare Parts	:119,250 Z
	228,750 Z

Task 2

139 crew days; 850 hours heavy equipment; 9600 km/truck;

Salaries	:	60,000 Z
Fuel and Oil	:	336,600 Z
Spare Parts	:	298,300 Z
		695,200 Z

Tasks 3 through 8

Cantonniers	:	832,600 Z
Capitas	:	88,800 Z
General Admin	:	72,000 Z
Equipment	:	440,000 Z
Miscellaneous	:	275,000 Z
		1,708,400 Z

Overhead Costs (assumed as 30% of total)

790,000 Z

Administration (15% of total)

395,000 Z

TOTAL COSTS = 3,817,350 Z

Replacement Parts

OR allows approximately 1,080,000 Z annually for replacement of equipment. (190,000 $US at the official rate)

In addition, there is:

Cantonnier tools	:	$120,000
Pick-Up Trucks	:	$ 70,000
Bicycles	:	$ 20,000
Motorcycles	:	$ 10,000
Spare Parts	:	$ 44,000
Subtotal		$264,000
Total $ cost of replacement	:	$454,000

Some replacement parts are available in Kinshasa and Lubumbashi which could be purchased in Zaires. There are also merchants which could provide other spare parts for Zaires.

Alternatively, a stock of replacement parts might be financed before 1983, for use after 1983, to allow this fund to accumulate to the level necessary for it to function.

Please note that the costs quoted above are estimated using the current inflation rates. Also, all conversions are done at the official rate. Using the parallel rate would require less dollars, obviously.

4.7. FUNDING AFTER 1983

There are five possibilities of funding:

- Road tax
- GOZ 53 million Zaires
- International loan
- Private venture
- Continued USAID funding

PNS maize shipping records of 1981 indicated 31,000 tons were shipped. If a tax of 200 Zaires per ton was applied, 6,200,000 Zaires could be raised from maize shipments along. Assuming a twenty percent rise in shipments by 1983, the tax would give 7,440,000 Zaires for the maintenance organization.

This would allow approximately 1,000,000 Zaires for betterment and rehabilitation of further roads.

Of course, if GOZ provides the necessary funds or a portion thereof, then the tax could be lessened.

International loans, if possible, would still require the road tax, in order to pay back the loan.

Finally, private ventures, in the form of existing companies in the Project area are in doubtful economic condition at present. However, it does seem likely that they could affort to pay 20 makuta per kilo shipped to maintain the roads.

The problem with this, as previously noted, is in having a joint venture with many companies having competing interests. The maintenance effort could be frozen with dissension between the companies. Additionally, the larger companies could control the maintenance effort to benefit only the roads they use. Moreover, there is the possibility that the maintenance organization might have its equipment maintenance facilities used by the companies for the maintenance of their equipment to the detriment of the road equipment.

Despite the above drawbacks, this is a possibility that should still be investigated especially in light of the GOZ determination to use contractors to maintain local interest roads.

4.8. EXPANSION OF ROAD SYSTEM

Given an income of 7.5 million Zaires, and maintenance expenses of 6.3 million Zaires, it is also possible to program an expansion program for the road system.

With a surplus of 1.2 million Zaires, additional segments of road could be rehabilitated. However, these must be carefully analyzed vis-a-vis the forecast produce shipments to assure that the revenue of the following year would be sufficient to include the new segments within the maintenance program.

A new analysis of the maintenance program, similar to Section 4.4.3. should be performed to verify the adequacy of the available resources, including equipment, for the revised system.

Additionally, a rehabilitation program must be set up taking into account the maintenance program, and must not interfere with the proper maintenance of the road system.

It can be assumed that as new roads are opened, production will increase. With increased production will come increased exportations, and as a result, increased revenue for road maintenance and rehabilitation.

It is estimated, based on OR source data, PNS data and field observations, that the costs of opening a road will average approximately 10,000 Zaires per kilometer. This cost, of course, will vary depending where the road is, i.e., forest, savanna, hilly terrain, flat terrain, etc.

This cost does not include an expatriate advisor, original cost of equipment, replacement parts or foreign exchange which might be needed.

This estimate does not include an equipment replacement reserve nor an administration charge since that was included in the maintenance operation.

If 500,000 Z were spent a year for the rehabilitation of roads, it can reasonably be expected that 50 kilometers of road could be opened. Additionally, if we assume an average of 5 kilometers between villages, that would give 10 villages affected each year.

Assuming an average village of 40 families with 1.5 hectare each for cash crops, this would give 600 hectares of increased production.

Moreover, if it is assumed that each hectare produces 2 tons of maize, this would given an additional production of 1,200 tons and a tax revenue of 240,000 Zaires.

This increased revenue would pay for most of the increased cost of maintenance (5,300 Z/km) the following year (50 km x 5,300 = 265,000 Zaires), while the assumed increased production in the area as a whole would take care of inflation and the rest of the increased cost of maintenance.

The above scenario includes many assumptions, but it shows that, given the proper safeguards, such a scheme could work. It warrants further investigation by the PNS staff and USAID, using data from SCAD, SNCA and DOA, as well as from private companies.

CHAPTER FIVE

REPLICABILITY - ADAPTABILITY

5.1. GENERAL

Replicability, as used in this report, is defined as the ability of duplicating the sub-system at other similar locations.

Adaptability is the ability to take the sub-system and adapting it to other similar locations.

The discussion that follows will touch upon the various elements involved in the adaption of such a sub-system, namely:

- Planning
- Implementation (Mobilization)
- Organization
- Equipment and Logistics
- Methodologies
- Funding and Accounting
- Sustainability
- Replicability - Adaptability.

5.2. PLANNING

Obviously, in planning a project, the other elements noted above must be touched on.

The location, existing road system, actual existing maintenance, actual existing facilities, desired annual progress in road rehabilitation, training facilities and available funding (including the steadiness of the local participation) must be studied in the light of the adaptation of the sub-system to another area.

It is highly unlikely that, even with proper planning, any system can be exactly duplicated from area to area. It is, however, much more likely that it could be adapted to fit particular regions or areas.

For large projects, a CPM diagram should be prepared to identify the critical tasks, as well as to identify the reasonable length of project. Cash flows and needs should be analyzed in view of the noted CPM and problem times foreseen as much as practicable.

Personnel planning the implementation of such a sub-system should be thoroughly familiar with the area to which it is wished to adapt the system. Familiarization can be done by literature, discussions of previous field visits made by associated staff and most importantly, personal visits to the area. The obvious lack of in-depth planning and programmation of this sub-system should not be duplicated elsewhere.

5.3. IMPLEMENTATION (MOBILIZATION)

The mobilization pattern used in this sub-system must not be duplicated.

Mobilization must be done in stages, especially for a sub-system such as infrastructure.

The assurances of proper housing, available food, electricity, and potable water must be made before sending a team to implement the project.

Proper mobilization of this sub-system would send the equipment specialist and the construction engineer first. They would assure living quarters and equipment facilities. Once these were assured, and the necessary equipment was on site, then the road unit, drainage unit, structural unit and administrative unit could all be mobilized without any undue delays. Of course, this mobilization would have to be coordinated, within a Project, with other sub-systems.

It is not clear, due to the lack of available information on the relative effect of each sub-system on the Project results, which sub-system should be mobilized first. However, it is clear that all the sub-systems should not be mobilized at the same time. It is also obvious that the personnel necessary to assure the living quarters, the equipment facilities, the logistics, the power facilities and potable water, etc., must be first on site.

5.4. ORGANIZATION

The organization of the sub-system, as modified in Chapters 3 and 4, can be duplicated in any region that the sub-system is established.

The duties of the sub-chiefs would vary depending on the availability of equipment, personnel, tools, etc. For example, if there was no foundry, the sub-chief - equipment maintenance might also have to build or erect a foundry, if necessary. But basically, the duties would remain the same.

The chain of command should remain the same as well as modified administration of the sub-system.

The personnel should be direct-hired by the sub-system personnel officer.

5.5. EQUIPMENT AND LOGISTICS

The equipment available for the performance of the various tasks of the sub-system is quite adequate. The amount of heavy equipment and types will vary, based on the different conditions found in different areas. For example, heavily wooded areas might require heavier bulldozers and/or more bulldozers.

The logistics have to be ameliorated for adaptation to another area. Quicker delivery of replacement parts, fuel, oil and tools would have to be developed. A CPM, of course, can go a long way in giving adequate lead time on the order of parts, but delivery must always be assured, regardless of lead time.

Also, it would ease logistic problems if all the vehicles were diesel-powered, instead of some gasoline-powered and some diesel-powered.

Additionally, if the area was savanna, with no forests to speak of, a carpentry shop might not have lumber to work with and could be deleted.

The needs for any project, based on area, terrain, time constraints, soil conditions, climatic conditions, etc., must be analyzed before adapting the equipment and logistics in any area.

5.6. METHODOLOGIES

Basic methodologies, e.g., clearing a road with a bulldozer, are easily duplicated. However, given bad soil conditions, where clay abounds, for example, will vary the current methodology of surfacing only a few project roads.

Additional methodologies should be included such as soil testing, materials testing, cement testing, concrete construction standard methodologies, drainage standards and pavement structural standards.

Pre-project testing can go a long way in determining project needs and methodology.

Road cross-sections, ditches, culverts and masonry construction may have to vary according to different conditions. The existing standards could be adapted but not necessarily duplicated as is.

Work programs, and maintenance programs will vary with climatic conditions. Again, existing programs could be adapted but not duplicated as is.

In summary, the developed methodologies used by the sub-system in implementation can be adapted to other areas but cannot be duplicated as is.

5.7. FUNDING AND ACCOUNTING

The last thing that should be duplicated is the method of funding, budgeting and accounting that has been used in this project sub-system.

The funding, budgeting and accounting should be as modified in Chapters 3 and 4. The methods so described can be duplicated, without adaptation, for any project sub-system.

However, any proper accounting system, using accepted accounting and reporting procedures could be used effectively with this sub-system, if it was conscientiously followed.

5.8. SUSTAINABILITY

With the modifications and recommendations described in Chapter 4 and in the above sections of this Chapter, the sustainability of the sub-system could be assured, given the necessary funding.

Again, an analysis as made in Chapter 4 would be required for a sub-system of a new project, to check its sustainability, and means of funding analyzed.

However, given available funding, this sub-system would be sustainable.

5.9. REPLICABILITY - ADAPTABILITY

In general, the sub-system cannot be replicated as is, but can be fairly easily adapted to other areas.

This is based on the assumption that there is proper planning, proper mobilization, organization, good equipment, well-planned logistics, adaptive methodologies, funding, proper accounting techniques, and aside from funding, is sustainable.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1. CONCLUSIONS

Based on the discussion and analyses in Chapters 3 and 4, the following conclusions can be reached:

1. While the rehabilitated roads are generally technically sound, those were note done in a programmed order of priorities. These rehabilitated roads do not have satisfactory maintenance, with some needing almost complete rehabilitation.

2. The bridges and drainage structures appear satisfactory but were built with little or no engineering design and no programming. Misuse of resources on other subprojects has resulted in some high-priority bridges not being built.

3. Existing equipment maintenance is satisfactory at this time, but only due to the extreme effort of the existing advisor.

4. OR and Estagrico are incapable of properly fulfilling their commitments to the PNS.

5. Local villager and farmer assistance in road maintenance cannot be depended upon.

6. There is no viable management of this subsystem. There is no coordination of sub-projects, no budgeting and practically no accounting system.

7. The sub-system is not sustainable now, nor can it be in the foreseeable future.

8. The insufficiencies in this subsystem can be partly attributed to poor planning, poor management, poor stateside support for sub-system staffa and relatively inexperienced expatriate advisors.

9. DOA and GOZ cannot de expected to fulfill their commitments now or in the foreseeable future.

6.2. RECOMMENDATIONS

After due consideration of the findings in Chapter 3 and consideration of the feasibility of the exercices conducted in Chapters 4 and 5, the following recommendations are made.

1. In view of the fact that sustainability can not be reached in the foreseeable future, and the lack of financial contributions from DOA and GOZ, stop AID funding for this subsystem as of October 1982 (Six months phase-out period).

2. Minimize the work at Ngaba and construct bridges and culverts on the remaining roads on a high priority basis, to be completed by October 1982.

3. Rectify the sub-system management and accounting, in the phase out period, as recommended in Chapters 3 and 4.

4. The PNS staff and USAID study and try to arrive at funding for this sub-system as expounded in Chapter 4.

5. If local funding is assured, modify sub-system, as recommended in Chapter 4, into a road maintenance organization, <u>with no exterior funding or expatriate advisors</u>.

6. Failing a successful attempt to find local (Zairois) funding, return to sub-system to OR.

IF, due to policy reasons, it is decided that US presence ir required in North Shaba, then the following recommendations are made:

1. Modify and reorganize the sub-system following th exercice in Chapters 3 and 4, so that the sub-system could operate as an independent organization.

2. Assign an outside independent accountant at once to perform an audit and to set up a viable accounting system.

3. Insist on a viable and feasible work program, based on the sample in Chapter 4.

4. Phase-out the expatriate advisors, with the Bridge advisor leaving upon completion of bridges and other advisors by October 1983.

5. Sub-system staff and USAID pursue a course to arrive at suitable funding or partial funding of the sub-system, possibly one of the alternative noted in Chapter 4.

6. Funding by USAID would continue but for this sub-sytem as a separate entity, and not as an integral part of a newly designed project.

IT IS MY OPINION THAT THIS SUB-SYSTEM CANNOT BE MADE SUSTAINABLE, REGARDLESS OF THE TIME SPENT, UNLESS AN ASSURED SOURCE OF FUNDING IS FOUND. BASED ON THE COUNTRY'S BLEAK ECONOMIC SITUATION AND THE FAILURE OF GOZ AND DOA TO LIVE UP TO PAST COMMITMENTS, IT APPEARS THAT ONLY EXTERNAL FUNDING CAN SUSTAIN THIS SUB-SYSTEM.

IF, FOR POLICY REASONS, USAID WISHES THE ROAD SYSTEM TO SURVIVE THEN THE QUESTION OF SUSTAINABILITY SHOULD BE DROPPED, AND USAID BE PREPARED FOR AN INDEFINITE LONG TERM PRESENCE IN THE AREA.

Appendix A

List of Reports Consulted

North Shaba Maize Production Project; Dimpex Assoc.

Infrastructure Report; Feb. 1979; Morrison, John.

Bridge Building Unit; Sept-Oct 1980; Kabler, Paul

End of Tour Report; Brooks Atkinson

End of Tour Report; Merritt Sargent

Evaluation and Recommendations to Infrastructure Subsystem; Infrastructure Subsystem and Morrison-Maierle.

Five Years Later: Progress and Sustainability in Project North Shaba; DAI

SOCIETE AGRICOLE ET COMMERCIALE DU CONGO BELGE - ANCIENNE S.A.R.L.

ESTAGRICO

Siège social : Kolwezi (Département Spécial)
Siège d'exploitation :
KONGOLO - UVIRA
B.P. UVIRA No 54
B.P. KONGOLO No 95
B.C.Z. KAL. No 327
Ident. Nat. : K 1815 0
B.C.Z. Kin. No 100733.76
B.K. KAL. No 0101[illegible]
B.C.Z. Bukavu No 353030.02
B.D.P. Uvira No 60386

Correspondant à Kolwezi :
ESTAGRICO C/o FILTISAF
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Zone C - Tél. : 32021 - 32071
Extension 7792 à 7793
B.P. Kinshasa : 8331

N/Réf. N° 0370/ ESTAGRICO/[illegible]

Kongolo, le 29 Avril 1962.-

A Monsieur L. GPLIN
S/c P.N.S. - OKTOBO.-

BEST AVAILABLE DOCUMENT

Monsieur,

CONCERNE : VOTRE VISITE DU LOIS DE LIRE A ESTAGRICO.-

Tout d'abord laissez-moi vous remercier pour la façon objective avec laquelle vous avez compris notre position de consommage manuel et les conseils judicieux que vous nous avez prodigués -
Nous ferons tout pour les mettre en pratique -

J'ai suivi, avec tout l'intérêt et toute la réserve que requiert pareille demande, votre exposé concernant vos appréhensions de devoir éventuellement transmettre à l'ai quelque temps les activités de réhabilitation routière à un opérateur inapte à assurer une continuité du travail dans l'optique prévue ou inconvenient de la valeur de la chose cédée -

Vous m'avez dit qu'à première vue, notre société pourrait représenter cette certaine garantie que vous recherchez.
Vous avez [illegible] vos installations à Kongolo ([illegible] atelier, aires de travail) -
[illegible]

[illegible]
[illegible] permettait de me faire un [illegible]
d'activités,

vous élever [illegible] vous [illegible]
d'estimation d'utilisation des [illegible], [illegible]
toute, une étude [illegible] rédhibilité -

A l'analyse, [illegible]
manquais totalement [illegible] pour [illegible]
rigoureuse et valable à votre [illegible] -

Ne désirant pas [illegible] en avant, ni dans un sens ni dans l'autre, une action requérant beaucoup de circonspection, je vous propose de [illegible] les [illegible], de les étudier et de leur soumettre à notre bureau de I.M.M. Engineering qui se chargera de la réponse -

J'espère que ce projet [illegible] bien être [illegible] -

Je vous prie de croire, [illegible], à l'expression de mes sentiments très distingués.-

BEST AVAILABLE DOCUMENT

EVALUATION OF PROJECT NORTH SHABA, RESEARCH PORTION OF R&V SUBSYSTEM

by

Dr. Henry C. Wiggin
Agricultural Research Specialist
Ronco Consulting Corporation.

May 1982

SUMMARY - RESEARCH PORTION OF R&V SUBSYSTEM

The findings of two evaluations, Dimpex and DAI, and a five-year report by DAI were reviewed and the salient points were brought out. The failure of the research portion of the subsystem to complete the EOP outputs, the lack of adequate experimental design, the lack of continuity in the research effort, and the use of statistically non-significant data to draw unwarranted conclusions was noted and discussed.

In view of the minimal contribution made by research to the project goals, the inability of the Contractor to consistently field an agronomist during the life of the Project, and the fact that research is currently at a standstill, the research portion of the subsection is considered to be ineffective, it should not be replicated, and it is recommended that research be terminated immediately. The remainder of the R&V subsection, extension, should be terminated by October-November 1982. Other options are described in light of possible policy decisions which might be made.

CHAPTER 1 - INTRODUCTION

PNS PURPOSE AND END OF PROJECT STATUS INDICATORS

The stated purpose of the North Shaba Rural Development Project (PNS) was to increase the income of small farmers by 15% by increasing maize production from 27,000 MT to 49,000 MT by September 1983, and to create a rural development process in the form of a model which could be replicated in other parts of Zaire.1/ To contribute to this purpose, the objectives of the Research and Extension (R&V) subsystem were to:

1) Design, test, and introduce maize husbandry methods, and to a lesser extent, other crops technologies tailored to the farming systems in the various localities;
2) Develop an institutional base in North Shaba capable of carrying out adaptive research and disseminating improved technologies to farmers; and
3) Create a system that allows on-going communications among extension agents, farmers, and researchers.

These objectives were the same for both the original Project Paper (PP) and the amended PP. Because of early problems in locating a qualified U.S. agronomist, a Zairian staff untrained and inexperienced in adaptive research, and the inability of the original Communications subsystem to provide baseline data on existing farming systems in the Project area, a new timeline was devised in the amended PP, such that R&V subsystem outputs would be more in line with the original PP expectations.

1/ It will be noted that the EOPS (PP Amendment, Annex 2, page 1) states that maize marketed annualy in North Shaba would rise from 11,000 tons in 1978 to 25,000 tons in 1982. The key word here is "marketed", as opposed to production, as stated in the Purpose.

With respect to the research portion of the subsystem, the following outputs were proposed in the amended PP:

1) Of the crop technologies(husbandry practices) practiced in the project area, the best were to have been identified by June 1981.
2) New technologies suitable for the project area and not dependent upon imported unputs were to be identified by June 1982.
3) New technologies suitable for the project area and dependent on imported inputs (mechanized equipment hybrid seed, fertilizer, insecticides, etc.) were to be identified by September 1982.
4) All technologies were to be considered suitable only after successful experimentation on farmers' own fields (applied research).
5) Research operations would be fully under GOZ control and supervision for continued operation at end of Project (GOZ capability was to be developed by Project and tested by expatriate research director before termination).

PREVIOUS EVALUATIONS

Dimpex

The Dimpex evaluation suggested a number of changes in the composition and execution of research. It was suggested that the PP proposal of surveying and subsequent adoption of the most effective local production methods would offer minimal increases in maize production. The eventual use of fertilizer was considered inevitable, so present research including fertilizer as a variable was encouraged, as was expansion to include more sites, rotations and soil-testing.

A case was made for the introduction of animal traction, and several citations to ox power in Zaire were made to support the thesis of the utility of oxen in the Project area.

It was suggested that fertilizer would be required in order to meet the project's production golas. At the time of the evaluation, it was estimated that fertilizer could not be imported prior to 1980.

The report assumed that the production of manioc, peanuts and rice could easily be increased 20% by 1982, but only if fertilizer were used. The lack of baseline information at the start of the Project made it difficult to measure changes, but it was thought that an increase in farmers' net income of 100% by 1982 would be reasonable, if the pricing policies for maize were changed.

In an outline of project output (EOPS 1982), the following estimates were made:

1) New technologies suitable for Project area (both dependent on imported agricultural inputs, and independents of these) would be 90% of full achievement.
2) All technologies accepted as suitable only after successful experimentation on farmers' own field, estimated at 50% of full achievement.
3) Research operation (developed by Project and tested by expatriate research director) fully under GOZ control and in sustained operation by end of Project, estimated at 50% of full achievement by 1982.

It was recommended that other maize varieties, in addition to Kasaï I, should be examined and increased as it could be demonstrated that agronomic characteristics were equivalent or

superior to Kasaï I. Thus, other varieties could be substituted for Kasï I in the event of a disease build-up or other problems.

The evaluation suggested that some thought be given to the appropriateness of incorporating genes for high lysine into adapted varieties for home consumption. The introduction of earlier and later maize varieties could be used to extend the maize harvesting period for on-farm consumption, and sweet corn could be introduced. Project personnel and counterparts should remain alert for CIMMYT developments in maize production and related activities in Zaire (PNM).

DAI

An internal evaluation was performed in November, 1980, by the implementing contractor, DAI, acknowledging that the original baseline survey was not performed because it was thought to be polically sentitive. At the time of the evaluation, there was no information available on production practices or land, labor and/or capital requirements.

The evaluation noted three levels of research; that on trial station land (Ngaba, Kongolo, Nyunzu and Kilubi); the so-called diamond trials carried out on demonstration fields at Farm Centers (it was noted that these trials were not complete, half of the possible combinations being missing); and at the third level, a package of recommended practices and improved seed was promoted to farmers. This package had not been tested on the trial stations prior to use on the demonstration fields.

The research program consisted primarily of attempts to prove the PNM/CIMMYT package at the expense of testing any other production tehniques or doing any concerted work on other crops.

The evaluation drew attention to the large variety of farming systems and noted that as yet, the production environments were not well known. Further, once the systems and production environments were categorized, it should have been possible to address these variables in research experiments designed to elucidate similarities, differences and improvements. It was recommended that the three-level organization be continued.

The research program was needed to generate recommendations responsive to farmers' needs. Farmers were apparently evaluating elements of the PNS maize package, and only using those which corresponded to the conditions in which they worked. The point was that information generated within the Project was published with no indication of methodology, problems, analysis or interpretation.

It was recommended that for the 80-81 cropping year, research site selection should reflect production typology, scope should be broadened, diamond trials expanded to at least six treatments and monitoring of on-farm applications should be more systematic. These results should be used to direct research activities in future years.

DAI REPORT

The DAI report of 1982, although not an evaluation, noted the lack of good technical assistance and the failure to implement a farming systems approach to improve productivity. It also noted that little adaptive work was done with the PNM maize package and stated that this "blueprint" approach had resulted in low adoption rates, only 30% of farm households in Farm Centers adopting the whole package, while 60% adopted only the improved seed. The concentration on maize production at the expense of work to gain information on rice, peanuts, manioc and cotton was mentioned.

This report made several recommendations with regard to research:

1) R&V work should be reoriented to emphasize adaptive research on maize and other crops grown in the Project area.
2) A technical advisor should be recruited as soon as possible. If emphasis is put on Recommendation I, two advisors might be considered, one for research and one for extension.
3) The opening of Farm Centers in the west bank area of Kongolo and the north-east section of Nyunzu. (Note: This recommendation is related more to Extension than to Research, but would have implications for research because farming systems in those areas would need to be investigated and trials and demonstrations could be mounted at the Farm Centers).
4) Suitable DOA personnel in the Project zone should be incorporated into PNS, and the remainder should be removed from the area.
5) The possibility of a closer collaboration between PNS and ESTAGRICO should be explored, perhaps leading to the gradual incorporation of one into the other.

SUBSYSTEM COSTS

Sufficient information is not available to separate the funding for the research portion of this subsystem and the extension portion. Thus, the information presented in Table 1, extracted from data furnished by PMU, concerns the total subsection.

Table 1

Expenditures of the R&V Subsystem

Year	U.S.Dollars	Counterpart Funds Zaires	GOZ Zaires
1977 1/	331,000	---	---
1978	250,000	---	---
1979	199,000	65,000	125,000
1980	232,000	266,000	34,980
1981	429,200	33,792	400,440
1982 2/	266,900	---	1,450,000

--- 1/ First two years had no listing for funds in Zaires. Other years through 1981 are amounts actually spent.
--- 2/ Scheduled expenditure as of April, 1982.

Proposed expenditures in U.S. dollars from FY 81 through FY 83 as set forth in the amended PP are shown in Table 2.

Table 2

Proposed Funding, Project Paper

Item	1981	1982	1983	TOTAL
Contract Services	168,000	131,000	131,000	430,000
Commodities	210,400	115,900	49,100	375,400
Participants	50,000	20,000	-0-	70.000

The amounts for 1981 and 1982 in the dollar colum of Table 1 are broken down in Table 2 under columns 1981 and 1982.

CHAPTER 2 - FINDINGS

RESEARCH RELATED

The research component of the R&V Subsystem has few accomplishments, due principally to lack of continuity in the research program and the inability of the contractor, DAI, to field satisfactory research advisors in a timely manner. This fact is noted in DAI's report of 1982. Improved varieties of peanut, soybean, cowpea and rice have been identified in yield trials, but these trials have not been extensive enough nor repeated enough to narrow statistical confidence limits. Variety trials to date do not adequately separate varieties at the 5% confidence level, and usually, there is no significance at the 1% level.

Diamond trials with Kasai I maize as the improved variety have been carried out for a number of years at a number of locations (Farm Centers). As expected, the compenent, local variety, local practices, no fertilizer, is statistically inferior to the best package, improved seed, recommended practices, use of fertilizer, in cases where statistical significance can be shown. Additionally, the incomplete diamond trial format has been repeated for a number of years, and farmers are invited to choose the best, even though a component of the best package, fertilizer, is not available. Further, the diamond trials are only half of a 2x2x2 trial, which if carried out using locations as one source of variation, would permit the separation of the effects of the various components, but not a specific location x component interaction, and a superiority of one "package" over another for particular areas (Farm Centers) could not be demonstrated. A better method would be the use of three or four replications at each location, so locations could be analyzed separately.

the averages from 15 Farm Center demonstrations in 1979-1980 and 12 demonstrations in 1980-1981. As stated above, the extracted information must be taken with caution, since there is no statistical justification for this.

Based on two years' data, the best planting time was said to be 15 September - 15 October. It was also recommended that planting take place after two or three good rains in the Kongolo zone. However, there was no analysis of the data, which were composed of dates, fertilizer vs. no fertilizer, and resulting yields. Nevertheless, the recommendation of waiting for several good rains is probably better than trying to fix a calendar date.

Six storage methods are currently being compared at Ngaba. These methods consist of :

1) the so-called "IITA method", an elevated bamboo crib containing husked ears,
2) adobe base (simulating a house or kitchen) with crib-like superstructure; smoldering fire below day,
3) adobe base, inside platform, no fire,
4) same as (3), but with a fire every other week,
5) construction similar to (2), but with a fire at irregular intervals, to simulate occasional cooking, and
6) mud-and-wattle walls, superstructure similar to (2), intermittent fire.

Number 6 was used the previous year, and the mud is coming off the walls, thus giving better ventilation below the maize. In storage methods 2 through 6, the ears have not had the husks removed. The stated purposes of the tests are to:

1) Compare methods and keep the best.
2) Identify the critical times when insect attacks are most virulent.
3) Study the evolution of damage and losses during the time the maize is stored.

An experiment on crop rotations using several combinations of maize, manioc, peanut and soybean was carried out for three years, starting in 1978. Unfortunately for information extraction, the third year's data were discarded by the newly arrived American research specialist before they could be incorporated in a report. This experiment was to have been carried out for four years; results are of little value.

From information presented in Résumé des Activités des Recherches et de Vulgarisation du P.N.S., Premier Rapport Trimestriel, Année 1981, it was possible to extract effects due to practices, seed an fertilizer. Because of the way the data were presented, no statistical proof was possible, but in Season A, 1979-1980, the use of Kasaï I seed without improved practices and fertilizer appeared to make a 48% improvement over use of local seed under the same conditions. If improved practices and fertilizer were used with the variable being improved vs. local variety, Kasaï I seed alone was noted to make a 49% increase over local seed. The whole package (Kasaï I, improved practices and fertilizer), apparently resulted in an improvement of 193% over the local seed, local practices, no fertilizer package.

In Season A, 1980-1981, again without statistical proof, it appeared that the use of improved practices alone resulted in a 30% increase in yield over local practices, Kasaï I appeared to give a 45% yield advantage over local seed, and the improved package, Kasaï I plus improved practices, apparently resulted in an 86% improvement over local seed and practices.

In both years, it seems apparent that recommended seed and husbandry practices resulted in improvements in production, although the magnitude cannot be known with any certainty, as there is no statistical proof. In either year, there was only one diamond trial at each Farm Center, and the diagrams of these trials were based on

Although these tests are called experiments, they are little more than observation trials. This should not be taken to mean that they have no value; they should give a good indication of the effectiveness of the various types of storage. The disadvantages are that adequate repeated sampling (to determine incidence and rate of infestation by insects) is difficult without changing the make-up of the storage, and there is no replication (which, in any event, would be expensive and space-consuming). It also seems that some of the methods do not differ greatly, and thus will be difficult to separate.

In connection with storage, the statement has been made that there is no problem of st rage in the Nyunzu area, because the farmers leave their maize in the field until sold. However, an examination of the roughly 46 tons of maize seed currently stored at Nunzu indicated weevil damage, a few rotten kernels, and a number of broken kernels. The maize smelled musty. Apparently, this seed was sieved, but was never put through a seed cleaner.

In a fertilizer trial with five levels each of N and P_2O_5, only the nitrogen levels were significant at the 5% level, whereas P_2O_5 and the N x P interaction were not significant. In spite of this, the responses were plotted out on a graph, and it was recommended that large farmers use 120 units of N to 46 units of P_2O_5, while small farmers would easily make a profit with 66 N and 46 P_2O_5. This recommendation was not justified by the information. To compound the error, a series of cost-effectiveness calculations were then made, based on data that were not significant.

Three years' data indicate that G17 is the best peanut variety available at this time. Varieties A1055 and A65 are also recommended as good varieties, although the 1980-1981 trial shows no significant difference between these two varieties and the local check.

In the 1980-1981 Season A, a complete 2x2x2 experimental series was planted at nine locations. The eight treatments were local vs.

improved seed, local vs. improved practices, and fertilizer vs. no fertilizer. The report does not give the experimental design, so it is presumed that locations were used in lieu of replications. In any event, the report states that there was no significant difference between treatments. In spite of this, perhaps in an attempt to salvage whatever was possible from the work, two diamonds were diagrammed, one with, and the other without fertilizer, purporting to illustrate the advantage of the improved package in each case. It was interesting to note that Ngaba showed the lowest treatment and overall yield, albeit non-significant. Gamble notes (page 7 of his preliminary report) that the plowed area at Ngaba is marginal for maize. With the high levels of alumina present in the soil and the high water table much of the year, it would seem possible that symptoms of aluminum toxicity in maize would appear, resulting in stunting and/or early death of the affected plants in some cases.

Some interesting preliminary results were obtained from a crop association trial using maize (Kasaï I) in association with various crops. This was the first year of the trial and no conclusions had yet been drawn since the companion crops had not been harvested at the time of the report (January-March 1982).

However, if the companion crops are ranked in descending order according to the yield of the maize with which they were planted, the arrangement would be beans, cotton, peanuts, soybeans, rice and manioc.

OTHER FINDINGS

The question was asked in the last DAI report as to why farmers were adopting seed and prices that appeared to offer a relatively small advantage in yield, namely 10% to roughly 25%. Using SCAD 1981-1982 information, the following table was prepared to illustrate calculated yield potential due to improved seed as well as

improved practices.

Table 3

Yield Advantage of Improved Package Components

Over Local Seed and Practices, In Percent

Location	Improved Package	Kasaï I Only
Forest	68% ± 20%	57% ± 18%
Savannah	78% ± 38%	68% ± 35%

According to these figures, there is a clearcut superiority of either the entire improved package or of the variety, Kasaï I, alone, over the use of local seed and local husbandry practices, either in forest or in savannah areas. These calculations would be valid within the limits of the validity of the raw data to the extent that the SCAD samples reflect the true state of the population being sampled.

Multiplication of seed of improved and recommended varieties is a natural extension of the research function in areas lacking personnel trained in techniques of isolation, knowledgeable as to varietal characteristics, and skilled in maintaining varietal purity. The decision to multiply and release a variety should be made after adequate testing to determine the superior varieties, followed by field trials in differing ecological area, and finally by observation plots on farmers' fields.

Once the seed has been multiplied, (consideration should be given to performing this multiplication in several locations so as to reduce the need to transport large quantities of seed long distances) seed distribution becomes a function of the extension

branch of the subsystem. Extension, in consultation with SCAD, should make the decision as to the seed requirements for the next year, as well as the decisions concernin g distribution, although consultation will be required with SCAD, PMU and Infrastructure. However, the final decision should be vested in the R&V subsystem.

The problem of deforestation was brought up in a conversation with a DOA Agronome de Zone in Nyunzu, who stated that farmers in the area were disturbed by the fact that they had to move farther away from their villages in order to be able to clear land for maize. When this land is exhausted, it does not return to its original fertility. Some corroboration was provided by the aerial view near Nyunzu. A number of ponds covered with algae, and with dead trees standing in them, and nearby areas that appear to have had the grass removed by severe erosion, provide evidence of changes occuring in the ecology. Farmers complain that because of the distances that they have to go to their fields from the villages, they are forced to bivouac at the fields during the cropping season and their children are not being educated, which is done in the villages. They complain that PNS has not provided them with any rotations or solutions to permit a less frequent move to new land.

On the other hand, a Project official has claimed that the apparent ponds are always forming in the savannah, and are not a result of shifting cultivation. It was also stated that the farmers moved because they had always done so, and if they didn't prefer this, they didn't have to do it.

The ERTS summary addresses the problem of deforestation, which had apparently been raised earlier, and states that much "forest" cutting is apparently recutting of previously cropped land that has been in bush fallow for a number of years. However, the summary also mentions the difficulties caused by dry season photography

and rainy season ground truth and the lack of multi-season/multi-year imagery, and states that partly due to the above factors, resolution of Landsat imagery was not particularly good. The resolution is probably not good enough to delineate eroded areas and stagnant ponds. In Volume II of the ERTS report, it is stated that there is deforestation in the Nyunzu area, in some cases approaching 90%, with a large area being 48% deforested. This conclusion is based on Landsat imagery done in 1957 and 1978. The report further concludes that the fertile area around Nyunzu between the Lukuya River and the railroad line where 40% deforestation has occured be carefully monitored to avert the consequences of such deforestation.

CHAPTER 3 - OUTPUTS

From the standpoint of expected outputs existing at the end of the project, September 1983, the research portion has not fared well. The first output given in the amnended PP concerns the identification by June 1981, of the best crop technologies currently in use in the Project area. At the time of this writing (May, 1982), there has been no evidence whatever of progress toward this goal.

Second, new technologies which are not dependent on imported agricultural imports are supposed to be identified by June, 1982. This has been done only to a certain extent, if the identification of improved crop varieties can be considered as a technology. Other than this and the use of the modified PNM package excluding fertilizer, there have been no new technologies.

Third, the identification of suitable new technologies involving the use of imported inputs, to be done by June, 1982, is essentially incomplete. The use of fertilizer (N and P_2O_5) has been the subject of some experimentation, but results have been inconclusive The use of fertilizer as presented to farmers as part of the PNS maize package has not been investigated as a separate entity. The use of mechanized equipment, as suggested as being a possible component of new technology, has not been investigated, and probably should not, considering the problems of maintenance, operation and fuel, except in collaboration with the I.T. subsystem. An exception to this would be the use of mechanization in the growing, harvesting and preparation of seed. Insecticides are essentially unavailable and should not be considered except for storage of seed stocks at experiment stations, and the use of hybrid seed

should not be considered in the foreseeable future, because of the cost of development, cost of production of inbreds and crosses, and lack of fertilizer.

Fourth, the acceptance of all technologies only after successful experimentation on farmers' fields has only been carried out in a partial manner. In the case of the PNS maize package, the package has been tested along with three other "packages" as a diamond trial on cooperating farmers' fields, and has been used in demonstration fields. Unfortunately, farmers have not been overly eager to adopt the entire package, although they have been more amenable to the use of the improved variety, Kasaï I.

Concerning the contribution that research has made to meeting the goals of the Project, information is available from surveys made by SCAD. Information taken from the SCAD report for the period 1980-1981 is summarized in Table 4. The percentages were calculated directly from production estimates.

Table 4

Percent Increase in Maize Production

Due to Various Factors, 1980

Zone	R&V Package	Factors		
		Left Bank Annex	Area Increase	Weather
Kongolo	4.70	62.00	26.33	6.95
Nyunzu	10.75	----	57.92	31.32
Average	7.73	31.00	42.13	19.14

From the standpoint of a part of the Project purpose requiring that maize production be raised from 27,000 metric tons in 1978 to 49,000 metric tons in 1983, it appears that there has been success, but this probably cannot be laid at the door of research. According to information presented earlier, the combination of improved seed and practices has resulted (1982 SCAD data) in an estimated increase in production of 21,149 metric tons over unimproved seed and practices.

CHAPTER 4 - SUSTAINABILITY

There has been no training that would permit the present Zairian staff to design,carry out and analyse a comprehensive research program. There has not been sufficient continuity in previous research efforts to produce viable information that can be built upon for future research work. Whatever impact the first agronomist made has been mostly dissipated through personnel movements; the second agronomist preferred to work alone. DOA personnel who examined the project with the evaluation team believe that GOZ will be unable to support either the research or extension portions of the subsystem. The research portion does not exist, for all practical purposes; there is nothing to sustain.

CHAPTER 5 - REPLICABILITY/ADAPTABILITY

Unfortunately, the research program to date has been so disjointed that its influence upon extension and crop production is minimal. Given this, the existing non-program has not furnished enough evidence of its value or potential value to warrant adapting it to other projects.

The preparation of work plans is an admirable exercise, and serves not only to direct the attention of the technician to planning a year's research trials but also as a tool to be used by the scientist and/or managment for measuring progress. The submission of work plans is called for in the PP, but a purported work plan in the files turned out to be a rather vague chart or agricultural calendar delineating times for performance of land preparation, planting, weeding, harvesting, and report writing. Had this requirement been followed, it probably would have provided an activity worthy of duplication elsewhere.

CHAPTER 6 - CONCLUSIONS AND RECOMMENDATIONS

It is this writer's conclusion that research should be terminated. This should come as no surprise, since research is presently dormant and has contributed little to the Project goals in the past. Research is intimately linked with extension, since research without some means of passing on findings to those who would benefit (farmers) is work done in a vacuum, and extension without something to extend is sterile. The following recommendations must, of necessity, encompass the extension portion of the R&V subsystem, in addition to research, and to some extent, the entire Project. They are given in descending order of preference.

- Recommendation A.

1) Terminate the research portion immediately and make arrangements to release valuable, and unused, equipment to other research efforts currently supported by USAID, such as PRONAM, PNL, INERA, and possibly PNM, if it is reactivated. This equipment would include, but not be limited to, the Udy protein tester and associated equipment and chemicals, tetrazolium seed tester, soil test equipment and seed and soil moisture testers.
2) The Kasaï I maize currently growing at Ngaba should be harvested when ready, shelled, cleaned, germination tests run, and preparations made for distribution in September - October by extension personnel.

3) Kasaï I maize currently being used in storage evaluation tests should continue to be sampled, and whatever conclusions arrived at should be written up and filed with DOA, AID and PMU. When these tests are completed, this material should be processed for seed, and if germination is satisfactory (75% or better), it can be put with the seed from (2), above, and distributed to farmers.

4) Seed maize currently stored at Nyunzu (46 tons) probably will not be suitable for seed by September. However, should it be desired to attempt to use it for seed, the small seed cleaner at Ngaba should be taken to Nyunzu, and the broken and damaged kernels removed. By using a strong air flow and adjustement so that a fair proportion (say 10% - 15%) of apparently sound kernels are blown off, it may be possible to remove much of the kernels damaged by weevils. Germination tests should be carried out after cleaning samples of seed, and if germination remains low, all should be burned. Under no circumstances should it be permitted to get into consumers' hands because of having been treated with insecticides.

5) Maize currently stored in the girls' dormitory at Ngaba smelled musty. Although no germination tests were carried out, it seems likely that by September, it will not be suitable for seed. This has apparently not been treated with insecticide, and, if not used as seed, could be sold as grain.

6) When extension personnel have completed the work of seed distribution, October - November, this remainder of the subsystem should be terminated. There would seem to be no valid reason to wait until the present Project termination date of September, 1983.

- Recommendation B.

In the event that, due to policy reasons, it should be decided to continue the Project until September, 1983, the following recommendations would apply:

1) Neither a long-term agronomist nor a TDY person to prepare designs for experiments should be posted. In the case of a long-term assignment, there would not be enough time to make a meaningful contribution, since rotation and inter-cropping research require at least four years. Short-term assistance would be equally without value, because there are not sufficient Zairian personnel to adequately carry out the work, once it is planned.
2) Existing research organizations, such as PNM and PNL, should be encouraged to prepare some trials in various ecological zones at the Project area. PRONAM is not included in this group, because of the time required for manioc growth, unless arrangements are made to check results after PNS is phased out, or short-term entomological trials are planned. In any event, care should be taken to ensure that the necessay personnel are available in PNS or can be supplied by the cooperating organization to permit adequate maintenance of the research.
3) Multiplication of Kasaï I seed should not be carried out in the 1982-1983 cropping seasons, because the Project would phase out before this seed could be distributed.

4) Distribution of scientific equipment, as proposed in Recommendation A, Part 1, should proceed during the June 1982 - September 1983 period. There would not be as much urgency, due to the longer period of time available, so the actual requirements and stability of the proposed recipients could be assessed more accurately.

- Recommendation C.

If a policy decision should be made that some form of assistance is indicated in North Shaba, in spite of the obvious difficulties entailed in trying to mount a successful project in such a remote area, then PNS should be replaced with a totally new one.

1) Terminate research and extension, as set forth in Recommendation A.
2) Shift emphasis and funds, if necessary, to Infrastructure, to build bridges and open and maintain roads.
3) While Infrastructure is maintaining a presence in the area, prepare a totally new Project, being very clear as to whether it is a production project or integrated rural development, negotiate a new contract with a new contractor, and have new personnel on the site by September 1983, at which time Infrastructure will phase out/be incorporated in the new Project.
4) Recognition must be made of the fact that a Project in this area will not be sustainable in the foreseeable future without exterior technical and capital assistance, and that the funding organization has to be prepared for a long-term assistance program.

EVALUATION REPORT

NORTH SHABA RURAL DEVELOPMENT PROJECT

(Extension Component of Research and Extension Sub-System)

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Sanath K. Reddy

EVALUATION REPORT

Agricultural Extension, Project North Shaba

Table of Contents

I. Introduction: 1

Project Background and History
Project Goals and Purpose
Research and Extension Sub-system: Objectives
End of Proje-t Outputs
Evaluation Methodology

II. Previous Evaluations 10

DIMPEX Evaluation
DAI-USAID Internal Evaluation (1981)
DAI Internal Evaluation (1982)

III. Organization of PNS Extension Service 15

Structure
Staffing
Adequacy of Support
Extent of Coverage
Extension Methodology
Linkage between PNS and Other Extension Agencies
Role of Farmer Groups

IV. Technical Package 25

Recommended Practices
Level of Adoption of Recommended Practices
Reasons for Non-Acceptance
Seed-distribution: Key Element of Package

V. Training of Extension Personnel 29

Current Status of Training
Potential Uses of N'Gaba Training Center
Staffing of N'Gaba Center

VI. Findings and Recommendations 35

Accomplishments and Failures
Observations on Overall Impact
Recommendations: Option 1
Option 2 - with suggestions for redesign

SUMMARY OF MAIN RECOMMENDATIONS

Appendices
A. Data Tables
B. Summary of Lee Hardt's Study
C. List of Documents Consulted
D. List of Persons Contacted and Places Visited

I. INTRODUCTION

Project Background and History:

Project North Shaba (PNS), an integrated rural development Project started its operations in April 1977. It is jointly funded by USAID - $13.4 million (technical assistance and commodities) and Government of Zaire (GOZ) contributing comparable amount in local currency over the seven year life of Project, ending September 1983.

Project headquarters are located at Kongolo in the Tanganika Subdivision of Shaba Province. This particular region of Zaire is isolated both in the physical and psychological sense. Air and bus services do not exist in the area. Biweekly train service operates in the area which would take several days to connect with nearby regional population centers. Project communications with Kinshasa and other relevant organizations are by means of radio and a singe-engined aircraft which flies project personnel in and out of the Project headquarters. Roads in the project area have considerably improved since project began its operations. Inadequate and minimal health facilities exist in the region. Recreation facilities are virtually non-existent.

While the project officially began in July 1977, it did not begin to perate until late in the planting season of 1978, and activities began to have impact only from the planting season of 1979. The long lead time required was due to

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1 Information provided by DAI Team.

the problem of finding qualified expatriates technicians to work in North Shaba (even qualified Zairian Personnel), USAID's selection process of expatriate technicians, logistical problems of moving project personnel and material into North Shaba, etc. Thus, the Project's problems began with its inception and were never truly overcome at least in the case of expatriate technicians. These problems were compounded by the Katangese rebellion of 1978 (April-June) which did not help the recruitment of long-term techncial advisors.

Agricultural Background:

Geographical area, covered by PNS, has been traditionally viewed as the "breadbasket" of Shaba Province. Maize exports from the region, traditionally, supported the urban populations of the mining twons in South Shaba. Sudden drop in corn production, in the mid-1970s to as low as 6,000 MT's and corresponding need to import corn into South Shaba, resulted in the initiation of Project to promote increased production of maize in North Shaba and its movementto urban markets.

Even today, as in the past, farmers of the North Shaba area practice slash and burn type of farming. Traditionally, farmers clear the forest and tropical vegetation with axes and machetes, and burn the undergrowth. Clearing and burning operations begin in the period May through July and with the onset of rains in September various crops are planted. All agricultural operations are carried out manually, using a hand-hoe. Labor is provided by the farmer's family with small amounts of hired labor. Hired labor is used (Pygmy labor) most often in the forest region than in the savannas. Two major agroclimates are noticeable in the area: forest and savanna regions. Savannas

are not true savannas but secondary forests. The so-called savannas have been cleared and have been under cultivation for long period. In the forest region , soils are relatively rich compared to the soils in savannas. That is the main reason for the higher productivity of forest soils. Average rainfall in the area is about 900-1200 mm per year. Rainy season starts about early in September and last about four months. Occasional rains fall during January-April. Rainfall is fairly steady and evenly distributed.

Major crops in the area are maize, manioc, peanuts, rice, beans, and cotton. Corn is grown both as a sole crop and as a mixture with rice and peanuts. Manioc is mainly grown as a sole crop and so is cotton. Occasionally, a few plants of corn can be noticed in cotton fields as well as sweet potato on the field borders. According to reports, even where corn is grown with rice and peanuts, corn population dominates the field. Thus, peanut and rice mixtures seem to be secondary and only small surpluses are marketed. Cotton is harvested and sold and is not converted into any products at the village or family level. Collection of palm nuts, processing and extraction of oil, both for family consumption and sale, are important aspects of farming. Palm oil, therefore, contributes significantly to the agricultural-product mix at the family level and hence on the allocation of f amily labor resources. Palm oil is the basic medium of cooking.

There are two agricultural seasons. Main agricultural season begins in September. Corn and other food crops are planted in September. Second season begins in December-January. Cotton is the main crop during second season. Planting of cotton begins from mid-December to mid-January and continues until February. A small amount of corn is sown in the second season.

Within the project area, there are significant differences in food consumption patterns. In the sectors of (Kongolo and M'Bulula), maize is the principal food crop, followed by manioc. Hence, part of the harvest is stored for consumption and the surplus is sold. In the Nyunzu sector, manioc is the main food crop and very minimal quantities of maize is consumed. Maize in this sector, is the principal commercial crop. This explains, perhaps, the lack of traditional storage system in the Nyunzu area.

There is a high degree of post-maturity losses of corn (as against post-harvest) in PNS area, particularly in the forest areas. Matured corn is left to stand in the fields till the marketing season approaches (May-June). Summer winds and weakened stems lead to crop lodging, which in turn leads to rotting of corn and attack by termites. According to estimates, 20-25% of mature corn is lost in this way. Our own impressions of the fields and harvested corn on the cobs confirmed the high degree of losses. This is yet another potential area of intervention for PNS to study.

At the beginning of the Project, institutional aspects of agricultural development were weak and ineffective. There was no applied research in the area. Extension agents of the Department of Agriculture (DOA) were not promoting agricultural development. They were seen more as tax collectors rather than development agents. Farmers were thus totally isolated from the development processes. Cotton extension agency (ESTAGRICO) had just started its activities. Agricultural technical school in the area (Ecole Technique Agricole de Kasaya) reopened in late 1975 after many years of closure. Therefore, it is no exaggeration to say that the lines of communication with farmers were initiated by a development agency, for the first time, since Project North Shaba began in 1977-78.

Project Goal and Purpose :

Project Goal : "is to achieve self-sufficiency in maize production within the shortest possible time-frame" (PP page 64)

Project Purpose: "is to identify an effective rural development process for improving small farmer production and income which is replicable in other parts of Zaire. The process by which this will be accomplished builds on the current practices of farmers with innovations being introduced only after they have tested and grown on farmers' own lands". (PP page 64).

Objectives of Research Extension Subsystem:

To achieve the Project goal and purpose, a sub-system of research and extension was conceived with "operations directed towards the development and delivery of improved maize and other crop technologies".

The main objectives of this sub-system were :

1) develop, test and introduce maize and other crop technologies tailored to the farming systems in the various localities;

2) recruit and train extension workers to provide timely and appropriate technical advice as appropriate technologies are developed; and

3) create a system that allows ongoing communication among extension workers and their trainers, the farmers of the project area and researchers.

The following outputs were expected from the extension component of the Research and Extension sub-system.

1) Development of an effective extension system that can be replicated in other parts of Zaire. Several principles to guide the development of such a system have been identified jointly with DOA; briefly stated, the principles were (PP page 18-79)

a) farmer involvement in decision-making, i.e., the development, testing and delivery of improved technology

b) development of effective relationships between farmers and extension workers replacing the traditional police functions of the extension workers with communication and educational functions.

c) linking extension operations with research to ensure feedback to the research staff of farmers' experiences with innovations and thus aid in the development of meaningful innovations.

d) accountability of extension personnel to the local population being served by the Project

e) developing a system of para-professional "extension workers" to help the diffusion of improved practices while reducing the burden on government to support extension operations.

2) Development of an effective extension organization beginning with selection of villages; organizing village centers; organizing councils of farmers consisting of representatives from major farming groups in the area; recruitment of extension agents (agricultural assistants); training of extension agents; and assigning the extension agents to village centers.

3) Other outputs expected of the extension system were: training of farmers at Mbulula research center; instituting special programs for training women in agriculture; coordinating extension activity with the agricultural programs of primary and secondary schools; assisting Pygmy farmers; and farmers' training.

Expected Outputs of Extension Organization

The following outputs were expected according to the log frame in original PP. (Research and extension sub-system:)

a. 75 Agricultural assistants, 20 mid level extension staff, 4 senior level extension staff trained and operational by 9/1982 (same in Revised PP).

b. 225 Farmer's council leaders receive para-professional training by 9/82 (Revised PP.75 by 9/82).

c. 25% of small farmer participants adopt-extended "best currently usede" crop technologies by 5/79; 50% by 5/80 (Revised PP 2500 small farmers adopt new seeds by 12/29. 1200 each by 9/83).

d. 25% of small farmer participants adopt extended new (non-imported ag. " inputs) technolgies by 8/81, 50% by 5/82 (Revised PP: 3000 by 12/81 6000 each by 12/83).

e. 75% of small farmer participants show changes in agricultural techniques by the end of Project. (Revised PP 15000 by 1986).

Further, DGF subsystem outputs, relevant to agricultural extension are indicated below.

a. Farmers councils and sub-councils initiated : 10 by 9/77, 25 by 9/78, 55 by 9/80, 75 by 9/81.

"As an example of confusion in the PP, this writer wonders as to what is the difference between "extended best currently used technologies" and "extended new technologies". Further outputs in(d) are in addition to those referred in(c) or above the 1977 or 1978 base?

Evaluation Methodology :

Observations, facts and impressions presented in this report are based on the following :

1. Review of Project related documents with USAID/ Kinshasa, DAI and PNS.
2. Data provided by the Project Personnel
3. Discussions with PNS Staff
4. Interviews with field agents (R&V:DGF)
5. Interviews with farmers
6. Interviews with other agencies in the area : DOA, ESTAGRICO, Ecole Technique Agricole de Kaseya.

Limitations: In any evaluation of this type, the evaluator by necessity has to dependent on the longitudinal data generated by the project towards its goal achievements; periodic reports submitted to the funding agencies (GOZ & USAID case) and supplement the data by observations in the field and discussions with the project clientele, project personnel and relevant agencies in the area. However, lack of longitudinal and baseline data was a severe handicap. Limited data that is somewhat reliable is available only for the year 1980 and 1981".1) According to senior PNS Staff pre 1980 data should be used with the "bag of salt", and not the proverbial "pinch of salt". These are the limitations faced by this evaluator (and of course others) in nailing down quantitative measures of achievement as they relate to yields, production and area under cultivation. It is suggested that readers should take cognisance of these limitations. Even the data presented by PNS and the implemeting contractor are often at variance.

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1) "SCAD, the unit responsible for data collection and monitoring has been in operation only since the las two years.

In a Project like PNS, various systems are to be viewed as mutually supporting and enteracting. Therefore, in discussing extension component of the research and extension sub-system, occasional references are made to research and certain other sub-systems which have a direct influence on the working of extension organization.

II. PREVIOUS EVALUATIONS

Observations and recommendations of the three earlier evaluations are summarized below:

Dimpex Evaluation (June-July 1979):

Mid-course evaluation conducted by Dimpex Associates noted the following observations :

1. Intensification of training of PNS extension agents using facilities and Personnel at M'Bulula
2. Farmers training at Ngaba station: evaluation seriously questioned the idea of training farmers at Ngaba during the cropping season.

DAI, Internal Evaluation (Nov. 1980)

DAI, internal evaluation of November 1980 noted the following with respect to the status of agricultural research and extension at PNS :

1. The topics of agricultural research in PNS have been variety trials (maize, groundnuts); planting date (maize); mixed cropping (maize, beans, rice); rotations (maize, cotton, manioc, groundnut, sesame); land preparation (maize), fertilizer levels (maize); and diseases (maize).

2. PNS research organized at three levels. "First level of research is being executed currently on four trial stations - Ngaba, Kongolo, Nyunzu and Kilbui". (P38). Majority of the activity occurred on the sation at Ngaba.
   Second level is the diamond maize trials in 16 farm centers (78-79) and in 18 farm centers (1979-80).
   Third level is the promotion of recommended practices on the basis of "demonstration fields". Use of improved seed had resulted in a 20-25% increase in yield over local varieties.

3. Regarding technical package : a) PNS research consists primarily of testing the PNM/CIMMYT maize production package at the expense of tesging any other production techniques; much of the redearch at PNS has been peicemeal and unsystematic; b) current package includes imroved seed, early planting (Sept. 15), row planting, and increased density (75 cm x 50 cm x 2 plants). Further, this evaluation refers to the "nature of plential risks to farmers in adopting this package is known, no effort has been made to assess the trade-offs between increased benefits and increased risks".

4. Very little attempt has been made to understand existing farming systems and there is no systematic effort to adapt the PNM package to conditions in North Shaba.

5. Technical assistance: "the team has been seriously deficient in certain technical skills and has suffered from a general inability to transfer knowledge to to local personnel"...Overall, the quality of technical assistance provided has not been adequate to accomplish Project objectives".

It is to be noted that DAI's observations quoted above are misleading and confusing. Firstly research is not executed at four stations, only minimal research effort made, is at the Ngaba station.

Secondly, the observations about "known potential risks to farmers in adopting the recommended practices": We would like to ask what known potential risks exist and of what magnitude? No doubt to some extent such statements and less than adequate technical assistance provided to PNS, has been partly responsible for the confusion, vacillation and ambiguity observed to exist in the PNS extension service [1].

With due caution, it is to be noted that PNS is a fairly viable and productive package. I should truly be called as a set of viable interventions rather than a technical package in the conventional sense of the term. The practices recommended

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1. Quote from DAI, 1980, internal evaluation. "The research program should organize its on-station trials, field trials (i.e., "demonstration" fields), and on-farm trials (champs d'encadrement) to be representative of these specific production environments". The authors of the above report seem to be confused about demonstrations and on-farm trials.

are by and large risk free and do not involve cash expense on the farmer's part except for seed. Thus, the package is a low risk package; since the superior yield of the seed has been proven in demonstrations.

DAI's Internal Evaluation - March 1982 :

This report's purpose was to assess progress towards stated objectives of the Project and to determine whether successful elements of the Project might be sustainable over the long term, beyond the period of external donor assistance". Major observations and recommendations of this report are summarized below :

1. Problems of staffing: 3 different directors of R&V[a]. in less than five years (Zairois), and two expatriate advisors in less than three years. Therefore, no sustained research program with continuity and direction. Thus, research effort was mismanaged all ill-conducted due to problems of staff and logistics.

2. Attemps to produce improved seed at farm level resulted in a fiasco by the inability of PNS to supervise seed production fields and lack of money to buy what was produced.

3. Data collection from 900 farmers to study and analyze farming systems.

4. Extension activities :
   Promotion of Kasaï-I Package;

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a R&V Research and extension.

5. Training of extension agents in July of each year in all major crops of the area

Progress to date :

1. R&V is working with 85% of the target population as of 1981-82 crop season.
2. 52% of the farmers within the PNS area (farm centers) adopted improved seed.
3. 28.9% of the farmers within the PNS area (3,705 out of 12,832 farm households) have adopted some o all of the improved practices
4. 60 farm centers established (80% of 1983 target)
5. Farmers produced 66,000 tons in 1980-81 - 134.7% more than the 1983 target.
6. Corn exports from Project area increased from 5,904 tons in 1977 to 32,383 in 1981 - an increase of 432.6% or an increase from 57 kg (1977) to 308 kg (1981) per household. "This increase has resulted from a combination of better prices, improved infrastructure, PNS package and increased acreage brought under cultivation". (Prices of corn increased from 10 Zaires per metric ton in 1977 to 60 Zaires per ton in 1981.

Problems Encountered :

1. diversifying extension activities;
2. re-orienting extension approach from single crop approach to multi-crop approach;
3. providing technical assistance in agronomy and extension;
4. increasing the number of farm centers;
5. closer collaboration with Estagrico.

Summary:

A common thread in all the three evaluations is the recognition of the following weaknesses in the Project :

1. Lack of a well tested package (it does not seem to be a serious drawback to this evaluator. See section on Technical Package),
2. (a) Need for understanding farming systems in the area.
   (b) Research and extension approach based on farming systems.
3. Need for improving the quality of extension work through training.
4. Poor quality and quantity of research support totally inadequate to meet the project goals and objectives.

III. ORGANIZATION OF PNS EXTENSION SERVICE

Structure

PNS Area is divided into three sectors: Kongolo, M'Bulula and Nyunzu. Each sector is divided into zones (composed of 3-4 agricultural centers) and Agricultural Centers (composed of 3 to 5 villages). PNS Extension Service thus is a four tier structure. At the top is the Chief of the Research and Extension Sub-System. Below him each sector is headed by Charge' de Vulgarisation who is assisted by an Assistant at zonal level (Assistant de Vulgarisation) who in turn supervises several agricultural centers (Centres Agricoles). Each agricultural center is covered by an extension agent called as Vulgarisateur. See Appendix A, table 1

There are at present 60 agricultural centers in PNS area: Kongolo sector (22 centers); M'Bulula Sector (25); and Nyunzu sector (13).

Staffing

Zairian agricultural service consists of four levels of trained manpower; designated as AO, A1, A2 and A3, in the descending order of hierarchy, based on number of years of training. Each level is briefly described below.

AO: Ingénieur Agronome
A total of 11 years after Ecole Première
(Humanité agricole (2), Etude Agricole (4), Etude Superieur (5)

A1: Ingénieur Agronome Téchnicien
A total of 9 years after Ecole Première
(Humanité Agricole (2), Etude Agricole (4), Etude Superieur (3))
AO and A1 are Senior level positions. AO personnel are assigned to research institutions while A1 level personnel are assigned to field and administrative positions.

A2: Agronome
(A total of 6 years after Ecole Première, Humanité Agricole (2), Etude Agricole (4)).
Mainly middle level extension workers

A3: Agronome
(A total of 4 years after Ecole Première)
Lower level extension workers, also called as moniteurs.

PNS extension service is staffed by Ingenieur Agronome(A0) as the chief of research and extension subsystem and Engenieur Agronome Technicien (A1) at the sector level and Agronome A2 at the zonal level and Agronome (A3) at the agricultural center level. Agronome (A3) at the agricultural center level is the extension agent who is directly in touch with the farmers. Intermediary position at the zonal level, (Assistant de Vulgarisation) is sometimes staffed by an experienced Agronome A3.

Village level agents (Agronome 3) tend to be very young and fresh out of the training center. PNS selectes the agents at the end of training after administering a test. Selected agents are given a short training course of 3-4 weeks before being assigned to a village center.

Level of Support

Logistics: Chief of the Research and Extension Sub-System is responsible for the extension activities. He is located at M'Bulula, at the agricultural research and training center and is provided with a vehicle. Sector chiefs (charge' de vulgarisation) are located at sector headquarters and are provided with Honda motorcycles. Zonal chiefs reside at one of the centers within their zones, are provided with motorcycles and supervise 4-5 agricultural centers. Village level extension agents (vulgarisateurs) live at the agricultural center, are provided with bicycles and cover villages(5-6) within the center. Logistical support as currently provided seems adequate.

Technical Support: Village level extension agents receive technical support (supervision and advice) from the two levels immediately above them i.e. Assistant Vulgarisateur and Charge' de Vulgarisation. From observations in the field and discussions with various extension workers, it is to be said that PNS extension workers are severely handicapped by lack of basic technical literature and basic field equipment which every extension workers should have (eg. measuring tape, cords and field balances).

Lack of technical support becomes very serious when it is seen in conjunction with the less than adequate quality of pre-service training received at the training center. A visit to one of the training centers in the area and discussion with knowledgeable people in the area confirmed our fears regarding the quality of training offered. Training center itself was devoid of anything remotely resembling a library and instructors were out of touch with the current state of art either in extension methodology or the production techniques of major crops in the PNS area. PNS should take immediate steps to provide PNS extension

staff at all levels with field oriented technical literature manuals and field equipment.

Extent of Coverage

As of April 1982, extension service of PNS reaches 12 833 agricultural households out of a total of 25 561 approximately 50% of the households of the area. (See Appendix A, Table 2).

Linkage Between PNS And Other Agencies In The Area

Within the North Shaba - PNS area there are two other extension agencies, dealing with farmers. Dept. of Agriculture (DOA) and ESTAGRICO, the parastatal cotton development agency.

DOA has a three tier extension system operating almost parallel to the PNS extension agency. DOA's extension service in North Shaba is divided into two zones: Kongolo and Nyunzu. Each zone is headed by Agronome de Zone (A1 level) and is divided into subunits called collectivities, which are headed by Agronome de Collectivite' (A2 level). Each Collectivite' consists of several villages. There are several extension agents in each Collectivite', called as Moniteurs (A3 level). Each moniteur is responsible for a group of villages, generally 5-6. The morale of DOA's extension service is very low. The middle and lower level are poorly paid, and are not provided with any means of transportation. Only Agronome de zone, is provided with a vehicle and meagre allowance for gasoline (POL), which we were told was enough for just 3 months and often funds are not available at required times to buy the POL. Further, DOA's moniteurs are paid pitiably low salaries and we have been told that they have not received salaries for the last three months. During our visits to village it was confirmed that DOA agents do not visit the villages to promote agricultural development. These occasional visits are confirmed to tax collection and enforcement. It should be noted that ever since the colonial times, DOA agents have been used as law enforcers and tax collection agents. Therefore their philosophical and attitudinal orientations are far from those required of extension agents in the true sense of the term. It is also said that the quality of DOA agents is far below that of PNS agents, who have at least received additional training. PNS at present does not have any linkage with DOA's extension service, even though both are expected at least in theory, to be dealing with the same clientele. The reasons noted above are among the obvious ones for the cool and distant relationship between the two agencies. Yet our discussion with both PNS and the two zonal agronomists of

DOA, indicated that there are possibilities of coordination between the two agencies which should be seriously explored. The possibilities are discussed elsewhere in this section.

The second agency in the area ESTAGRICO (Societe' Cottoniere et Agricole de l'Est du Zaire) is a parastatal organization between cotton industry and Gvt. of Zaire designed to promote cultivation of cotton. ESTAGRICO has a four tier extension service in the North Shaba area. At the lowest level in contact with the farmers is a Moniteur/Propagandist (level A3 and lower) covering about 200 farmers. At the third level are Auxiliaires (A2 and experienced A3's) supervising 5-8 moniteurs. At the second level are Agri-postes (A2 and A1 level) supervising 2-4 Auxiliaires, depending on the size of the area. At the top is an Ingenieur Agronome (expatriate) assisted by an adjoint (A1).

Morale of ESTAGRICO agents seems to be far above the DOA agents, mainly because of better logistics and higher salaries. Several Moniteurs and Auxiliaires are provided with bicycles (rest are being provided). Agripostes are provided with motorcycles. There are at present 250 moniteurs/propagandists, 35 auxiliaires and 9 agripostes and two Ingenieurs in the organization. At present there is no linkage between PNS and ESTAGRICO. In the past a few ESTAGRICO agents participated in the PNS training program.

Possibilities of Linkage

As indicated earlier there are differences in the three agencies as to salaries, and resources provided to the extension personnel. The possibilities are more favourable for linkage (ccordinateurs) between PNS and DAO agents with ultimate integration of the two agencies. As large amount of PNS extension staff payroll comes out of GOZ funds linkage with and integration would seem to be economic and efficient. Certain proposals (written) in this regard have been made by PNS Director to the Govt. of Zaire, but have not been followed up. PNS has made limited and f eble efforts to develop linkages with DOA. Such efforts were limited to inviting DOA agent's participation in the training program in 1980. While DOA was apparently willing to participate, requested transport and per-diem allowance for its staff to attend the training program. As PNS was either unable or unwilling to pay the costs, DOA agents refused to participate in the program. No further efforts were reported in seeking and establishing collaboration and linkage between the two agencies.

The following suggestions are made to develop linkages with the DOA's

extension organization in the area.

1. Request participation of all DOA moniteurs in the PNS area, in the training program. This is essential to improve the quality of DOA moniteurs. Project, being relatively better placed in terms of resources, should extend transport and daily allowance to enable DOA agents to attend the training. These allowances would be minimal and within the project means.
2. Project should consider providing bicycles to DOA moniteurs (one time cost, with no commitment to repair costs) in the PNS area.
3. DOA should transfer the technical control and direction of moniteurs to PNS. (Similar proposal was made earlier in 1979) USAID/Ministry of Ag, GOZ, should use their leverage with DOA to bring about this linkage.
4. A mechanism of coordination between PNS extension supervisors and DOA supervisors (Agronome de zone, Agronome de collectivités) should be established.

While these steps alone do not lead to ultimate integration they would provide ideas and experience which could be employed in integrating the agencies. Such an integration, in the PNS area, has wide possibilities of replication in other parts of the country. Had steps towards establishment of linkages between agencies been taken by PNS, it would have provided some replicability of the project processes, applicable to other parts of Zaire.

Linkages between PNS and ESTAGRICO:

Resource and training-wise PNS and ESTAGRICO agents are somewhat similarly placed. The following limited steps are suggested in developing collaboration between the two agencies.

1. PNS should invite the ESTAGRICO supervisors to serve as instructors/ resource persons in the training program.
2. ESTAGRICO conducts periodical village level training for cotton extension agents. PNS extension agents should be required to participate in these one-day sessions. These steps would be essential if PNS has to implement a multicrop approach compared to single crop approach as is done at present.

Extension Methodology in PNS Area

Extension methodology followed in the PNS area consists of two basic

methods. Firstly, direct contact with the farmers using discussion and persuasion. Secondly, convincing farmers thru demonstrations on the farmers fields. There is a potential for using group meetings just prior to sowing and before harvesting and marketing. Group meetings have two basic advantages. They should be used for educating other farmers through sharing of experiences of farmers who had good harvest and for obtaining feed back about the recommended practices. This has not been practiced in PNS so far and should be encouraged.

(A) A major observation relates to the demonstrations conducted in PNS area. No demonstrations were conducted during the cropping season, 1981. In earlier years too few demonstrations have been conducted on farmers fields. Two demontrations per agricultural center, at the minimum, seem to be optimal, considering the low adoption of large number of recommended practices.

Second observation relates to the design of demonstrations (dispositif). Serious questions of logic could be raised as to the design of demonstrations. Two designs were followed:

1. Four plot design (called as diamond plot design)

   Improved Variety + Recommended Practices (IV + RP)

   Improved Variety + Traditional Practices)IV + TP)

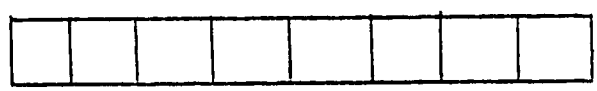
   Local Variety + Recommended Practices (LV + RP)

   Local Variety + Traditional Practices (LV + TP)

IV RP	IV TP	IV RP	IV TP

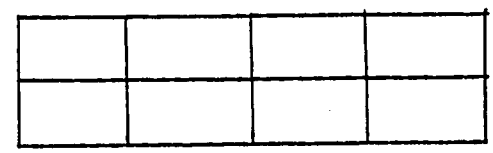
2. Eight plot design (Champs de sites)

Same treatments as above but each treatment is repeated with and without fertilizer, thus making it a 8 plot demonstration. Thus the demonstration would have 8 plots arranged in straight line or arranged in two rows of 4 plots each. This was reported to be discontinued during the 1981 season.



IV + RP + F
IV + RP - F
IV + TP + F

IV + RP - F
LV + RP + F
LV + RP = F



LV + TP + F
LV + RP - F

The following questions could be raised about the two designs. About the first design:

- why traditional practices are recommended with improved variety?
- Why recommend improved practices with local variety?
- Are we not giving confusing messages to the farmers?

Extension message must be clear, specific and un-ambiguous. We are recommending improved seed and a set of practices to go with it. Let that alone be demonstrated against farmers seed and his practices. The main idea behind a demonstration is to provide local proof about the superiority of recommended practices.

About the 8-plot design the following questions are raised:

- what is the PNS policy regarding fertilizer use?
- is fertilizer a component of technical package at present? Obviously not. Then why demonstrate.
- Is it not confusing to the farmer to lay out such a demonstration on his field?
- Has PNS developed a policy of fertilizer procurement, credit and distribution system?
- Is PNS ready to provide farmers with fertilizers if they are convinced and ask for it? Obviously PNS is not yet ready. Then PNS would be creating a dangerous credibility gap between promise and performance.

Similar questions were posed to the field agents and their response was that they did not agree with the design but were advised to follow the TDY experts advice. In fact there exists confusion in the extension service as to whether these are demonstrations or research trials. It is recommended that both the 4 plot and 8 plot demonstrations be discontinued and simple two-plot demonstrations be conducted on farmers fields using improved seed + recommended practices and local seed + traditional practices, so that the intended message is clear and specific and farmers can easily judge the differences.

IV	LV
RP	LP

Further there is no evidence of demonstrations in PNS ever having been used as either educational or training tool. No written records exist on any of the demonstrations conducted. There is no record developed for agents

to record the observations on demonstrations. It should be noted that demonstrations are powerful tools not only for convincing farmers but also for training of extensions agents and in providing feed back to the researchers. Well planned and executed demonstrations could serve as tools of operational research. This is a serious short coming of the planning and supervision of PNS extension program.

(B) A serious lacuna in the extension service is the lack of written material/instructions about the package being promoted. It was observed that not a single extension worker contacted had printed/typed instructions about the package. First step in promoting a set of packages is to provide written instructions to extension agents, however, simple the practice is. This helps not only understanding but consistency in advocacy of the practices. Good written instructions also provide in-depth information about the reasons for the recommendations. About certain practices (plant population and date of sowing) there was somewhat different understanding among certain extension agents. This could have been prevented if there was a set of instructions for every one to follow. This is an alarming failure on the part of senior staff of PNS. Such instructions could have been provided (typed, duplicated or photocopied with simple illustrations) at a very negligeble cost to the project, compared to the glossy brochure produced by the project at a huge cost of over $7000; which has no educational value as far as the farmers or extension agents are concerned.

Role of Farmer's Groups

This section addresses the role of the sub-system DGF (Development des Groupements de Fermiers).

Two tasks of this sub-system are to help establish farmers councils (Conseils de Cultivateurs) and create farmers associations or farmers groups (Groupement de Fermiers).

In the first instance farmers councils are mainly representative bodies of farmers who live within the geographical area formed by the agricultural center. Its main function is to serve as a link between extension agency and the farming community at large. No economic functions are attributed to this group. The problems of introducing economic activities into this group are discussed in a separate report and thus would not be elaborated here (see Andrée Black-Michaud's report for details). In the second case farmers associations are formed with economic objectives. For example pooling and selling of corn, renting of a truck to take the pooled grain to the market to obtain better price, bulk purchase of

soap and salt, etc. Mostly farmers associations are small groups of farmers, related either by patrilineal or matrilineal connections or groups of extended families occasionally one or few members deriving some economic advantage. These groups are active mostly during the marketing period of corn.

To date DGF has helped form 14 farmer's councils (out of a possible number of 60 or one for each agricultural center) and 27 farmers associations (men) and 11 farmers associations (women). Major activity of farmers associations has been for joint marketing of grain and very limited activity in the area of purchase and resale of soap and salt.

The experience of PNS in this area to date suggests that unless there is an element of economic activity associated with these associations, membership would not find it interesting to stick together. Such economic activity, as has been belatedly recognized by DGF/PNS lies in marketing of agricultural produce and occasional purchase of day to day necessities and resale at the village level. It is commendable that this has been realized by DGF during last year.

In view of the fact that DGF works primarily with farmers helping them to organize for better marketing (or provide a joint front for better marketing practices such as weighing of produce etc.) and has limited resources in terms of field agents (10 animateurs) it is suggested that DGF be merged with R&V sub-system as a unit within the subsystem charged with organizing farmers associations. The other aspect of marketing (dealing with merchants) is mainly the function of sous-system de commercialisation. Since this sub-system is by and large active only during the period of corn marketing, it is suggested that this sub-system be eliminated and its personnel transferred to PMU as a separate unit like SCAD. In any event, PMU has a greater say in the matter of dealing with merchants, big and small. Merging commercialization sub-system with PMU would enhance coordination of various issues involved in dealing with merchants and would also add to the efficient xse of resources.

An advantage of merging DGF with the research and extension sub-system would be to help the extension service in developing group processes and approaches. For example, in future, if it is decided to produce seed at village level, a compact area would be needed for seed production. Farmers councils and farmers association/groups could be useful in providing such a compact area and undertaking seed production activity on adjacent fields. DGF, as a part of extension could play a useful role in this. Further, it could expand its activities using extension agents without need to recruit additional personnel.

Approach: Single vs. Multiple Crops

To date the focus of extension service has been on the principal crop enterprise of the area, i.e., maize. However, there are other important food crops in the area such as kasava, peanuts, and beans. In Nyunzu sector kasava is the principal food crop and maize is the commercial crop. Cotton is yet another important commercial crop. Extension workers at the village level are generally unaware of either the peanut variety (introduced several years ago) and the cotton variety currently promoted by ESTAGRICO. Project Paper talks of farming systems and PNS claims credit for the increase in the quantities of peanuts and palm oil marketed from the area; while the PNS extension service is totally oblivious of other crops in the area. Farming in the PNS area is not a single crop enterprise. Farmers grow and have equally strong interest in other crops. Therefore, while emphasizing corn production, PNS extension service should have started promoting other crop technologies. Again, it seems to this evaluator tha there was a lack of clarity of Project's objectives at the middle and lower levels of PNS extension service and failure of guidance from above.

If PNS is to be continued, PNS should start testing available crop technologies in kasava and peanuts, and start training its extension agents in multi-crop approach.

IV. TECHNICAL PACKAGE

Kasai-1 mazie production package recommended by PNS consists of the following practices.

1. Improved seed - (Kasai 1)
2. Early sowing: (about Sept 15)
3. Line planting (75 cm x 50 cm; 3 plants per hill)
4. Thinning to two plants per hill
5. Two to three weedings before flowering
6. Optimum plant population, 53,000 plants/hectare as against 25-30,000 under local practice
7. Optimum time of harvest

Seed is the key element of the package. Kasai-1 was developed by Projet National du Mais (PNM - CIMMYT) and proved reasonably well adopted to the PNS area compared to other varieties tested in the area. It seems susceptible to yellow streak virus from the observations of the standing crop (2nd crop) both at the N'Gaba station and in the farmers fields. However, there is no serious concern expressed by farmers. The virus attack seems to be more in the second season than in the first season, which is the main season. Kasai-1 yields obtained in the demonstrations and its wide acceptance by farmers is an indication of the suitability of the variety to the PNS area,until a still superior variety could be found. The rest of the recommended practices are basically cultural practices with zero cash investment on the part of farmers except for additional time required for planting and weeding. Thus the recommended practices, do not constitute a risk on the part of farmers in the way use of fertilizers and perticides would.

Package as currently recommended is a viable package, however, certain elements of the package would need further testing specially the elements relating to spacing and date of sowing. A question has often been raised in project related reports and documents about the suitability of Kasai-1 package (eg:"package is not suitable because it does not take into account traditional farming system;" "nature of potential risks to farmers in adopting this package" etc.). It is to be noted that introduction of new seed is not the same as replacing an existing crop or introducing a new crop which might affect the farming systems practiced in a locality. Maize is a traditional crop in the area and thus a part of the traditional cropping system. The only demand introduction of new seed might place on the farmer is that of extra time required for line sowing and weeding. Further, given the current set of recommended practices, it is difficult to see what the

potential risks are to farmers in adopting this package (except when poor quality seeds are supplied). Discussions with farmers and extension workers indicated that the resistence of farmers to line sowing is not so much due to the competing nature of demands on farmer's time by various crops.[1] But to a large extent this is due to behavioral changes required of the farmers. The argument about the demands on women's time does not seem to fully explain the resistence to line sowing and weeding given the relatively small area of cultivation, about 1.4 ha. in M'Bulula area and 2.5 ha. in Nyunzu area. In other African cultures, notably in west Africa, where weeding is a traditional practice (and often acts as a constraint on expanding cultivated area), demands on women's time are much more extensive (such as grinding millets, fetching water from long distances and collecting firewood from far-off places). Therefore, resistence to line sowing seems to be a question of behavioral changes among the farmers. Further, tradition of mai-mai consumption (palm liquor) does not seem to help the situation.

Adoption of Recommended Practices

1. Seed: It is our impression that Kasai-1 seed is widely accepted. It is no exageration to say that acceptance rate exceeds 50%. According to PNS report of 1980-81 55% of the area cultivated under maize is sown to Kasi-1. M'Bulula sector has a high acceptance rate.

2. Cultural Practices: There are varying levels of acceptance of cultural practices Row planting is practiced on about 12% of the maize area (1980-81 report). Similarly, according to various estimates not more than 15% of the farmers practice weeding two times.[2]

According to a 1981 report,[2] of the households reached by the extension service,15% of the households use full package of improved seeds and other practices. Additional 35% use one or more of the recommended practices (probably mainly the improved seed). (See Appendix A, table: 3). DAI report indicates somewhat higher rates of adoption for 1981 season (Appendix A: Table: 4). But the data for the two years is not comparable, since the two reports use different units (households vs. farmers). Certain farmers we have visited with seem to be using different spacing (75 x 60 cm) and number of seeds per hill (3 to 5).

It is clear from the information gathered in the field and project reports that the Kasai-1 package is not fully adopted by majority of farmers, for one reason or the other. Even though Kasai-1 seed has found wide acceptance, other practices are being accepted much slowly. This phenomena is not peculiar to North Shaba

1 Two other crops in the PNS area during the first season are peanuts cultivated in very small area and manioc which is a long duration crop of 10-12 months.

2 These figures seem to be acceptable and reasonable compared with the findings of a research study conducted in a non-PNS village: see Appendix: 1 for details. (Terry Hardt's study).

farmers alone[3]. Experience world wide shows that no package, however proven has been adopted completely and it undergoes modification at farm level depending on farmers resources and behavional readiness. Therefore it is utopia to expect total acceptance and adherence to a package. However, a key factor in the very low adoption rates of recommended cultural practices seem to be the inability of PNS extension service to demonstrate and communicate the advantages of recommended practices. Farmers in general tend not to perceive the impact of good cultural practices on yield levels and tend to attribute increased yield to seed only. In other words, cultural practices have low communicability. Hence PNS extension service should make vigorous efforts at breaking the perception - communication barrier in order to promote the adoption of cultural practices.

The reasons for lower acceptance of cultural practices need to be explored further. A key factor that needs to be explored is to what extent resistence to weeding (first crop of corn) is due to the competing labor demand for other crops and subsistance tasks, specially gathering of palm nuts and oil extractions. An alert and well supervised extension service (and of course SCAD) could have provided some answers to these questions.

Therefore, in summary, the following conclusions can be drawn regarding the nature of package.

1. The practices recommended are a set of viable and minimum risk interventions.
2. Yield increasing potential (upwards of 25%) has been demonstrated. (Appendix A, Tables 6 and 8)
3. Low level or rate of acceptance of certain elements of the package seem to be both due to behaviour changes needed and due to competing demands on family labor by other subsistance tasks.[4]
4. Greater efforts to educate the farmers about the advantage of certain practices (optimum plant population, crop-weed competition) as against just informing them (to sow in lines and weed thrice) are likely to result in higher acceptance rates.
5. The package proposed is within the resource structure of farmers.

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[3] Given the fact that package has been extended, only during the last four cropping seasons, poorly trained extension agents, the acceptance rates are similar to those observed in the developing countries. Note that, it took 14 years for hybrid corn varieties to be adopted by Iowa farmers.

Seed Distribution

Seed is the main element of Kasai-1 package. Yet PNS has not developed a program of seed production and distribution in the area. Efficiency of extension service had been adversely affected by lack of concern at PNS in this regard.

In 1980 seed production was organized on selected farmers fields. Yet when the farmers were ready to sell the seeds, PNS was unable to purchase the seed and thus farmers either consumed or marketed the seed as grain. In 1981, PNS purchased seed from private producers and transported to project area (about 54 tons). The cost of seed including transportation was so high (5 Z/kg) that farmers were unwilling to pay such a high price. The cost of seed and delay in the arrival of seed, resulted in the sale of just about 4 tons. Till today about 50 tons of seed lies unsold in the PNS warehouses. The result: there has been hardly any infusion of new seed into the area during the last two seasons. The seed in the farmers hands at present is about 3 years old supplied in 1978 and 1979 seasons.

PNS could have organized seed production at N'Gaba station and thus produced seed and made available to the farmers at a much lower cost (we were told that during 1981 season some seed was produced which could be distributed in the 1982 season).

If the project is to continue and make impact on the overall maize production in the area, organization of seed production and distribution should receive top priority. Without this PNS technical package has no meaning.

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4 Lee Hardt study (1981) indicates that in half or more than half the cases men and women together performed 1st (56%) and 2nd weeding (50%) operations. Hence the idea of competing labor demand for agricultural vs homemaking-subsistance activities does not explain fully the resistence to weeding practices.

V. TRAINING OF EXTENSION PERSONNEL

Current Status of Training:

PNS recruits from the group of trainees graduating from agricultural schools called as "Ecole Technique Agricole". One such school from which majority of PNS extension agents were recruited is located at Kaseya, about 35 km from PNS HQ at Kongolo. Trainees enter the training school after primary school (6 years) and receive training during a four year period. Training consists of general education and technical agriculture. Most trainees come from within the PNS area and belong to rural households. PNS administers a test to select the best among the graduating class. Those who pass the test join PNS as village level extension agents. Once selected the agents are given one month training (mostly in agricultural theory) and assigned to the agricultural centers (Centre Agricole). On the job training is provided (in theory) by their immediate supervisors. In addition to on the job training, extension agents are expected to receive training every year(recyclage or refresh training) to improve their skills and agricultural knowledge.

A look at the quality of training offered at the agricultural schools would be informative. The impressions about the quality of training offered at the agricultural school are based on one visit to the training center and discussions held with the director of the Ecole Technique Agricole (Prefet). The school has more than adequate physical facilities, buildings and a farm. The quality of training offered is very poor. The instructors are not acquainted with the current state of art relating to the technologies of the major crops in the area. Also they have not received any further training since their graduation. The school is devoid of any teaching resources such as books, equipment etc. Students are hardly given any training in extension methodology, skills of communication; and dealing with farmers. Curriculum stresses basic education and elementary agriculture. Minimum amount of time is spent in practical training. Thus it is no exageration to say that at graduation the trainees or agents recruites by PNS totally lack basic competencies required of extension agents such as technical, extension-communication and analytical competencies. Thus the critical importance of training at PNS once the agents are recruited.

Training to date at PNS:

In addition to giving one month training to extension agents before assigning them to agricultural centers, PNS todate has conducted two training

sessions lasting about three weeks during each of the years 1980 and 1981. No written record exists of the content of training nor the impact of training process on the knowledge and skills of extension agents. However, inquiries revealed two foci of training. They were: information about crop technolgies (maize, peanuts) and training in extension methodologies. It was not possible to evaluate the quality or comprehensiveness of training in the absence of any written evidence. Absence of physical facilities and personnel to date (as of May '82 training facilities are nearing completion) makes it difficult to accept the claims made in regard to training. In the opinion of this evaluator, even in the absence of formal training facilities at N'Gaba station PNS could have conducted specific problem oriented training for its agents. The agents in each sector could have been assembled in one of the villages, using the village school as a place of training, and one or two day problem oriented, intensive training program could have been conducted by charge' de vulgarisation, Director of PNS and one or two experts invited from PNM or other relevant organizations (PRONAM, ESTAGRICO, etc.). Thus 3 training sessions (first one before planting, second before mid point in the cropping season and third before the harvest could have raised the quality of extension work in the PNS area. (A similar training is conducted by ESTAGRICO for its field agents). Resources of PNS past and present would have been more than enough to conduct this type of training. In all fairness, it is to be pointed out that, head of the Research and Extension sub-system and the three charge' de vulgarisation have been found to be very competent and knowlegeable persons. Their knowledge of technical agriculture and extensions methodology was impressive. However, they needed higher direction and guidance. Clearly head of the R&E sub-system was overburdened with overseeing the whole R&E efforts and he had little time left to guide and supervise sector and zonal level personnel. It is no exageration to say that only with single A3 level research assistant he was struggling to bear the burden of research effort at N'Gaba. Further, several of TDY experts, their conflicting and inconsistent advice often based on partial understanding of local agricultural conditions, did not make easy the job of R&E subsystem chief. There was no person in PNS, either expatriate or local, to provide inputs into the type of training needed for PNS agents. I cannot help marking that it is yet again the failure of higher levels of the PNS to assess the staffing needs at R&E subsystem so that R&E system fulfills its responsibilities.

Another output expected of the extension component of R&V subsystem was the training of 75 para professionals. This was not done till to date. Again, PNS extension organization could have identified certain farmers (farmers known as good farmers;members of farmers councils) in each of the sectors and conducted training sessions in a centrally located village. Three half a day sessions spread out during the cropping period at appropriate terms, would have improved the quality of extension work, provided feed back to the extension agents and improved the rapport of the extension agents with farming community. Such training would have hardly required any resources and would have been right at the door step of the farmers and their families.

N'Gaba, research and extension center has been operational, for the last two years, (at least in a limited way). The station should have served as a point from which new ideas diffuse and radiate into the neighboring farming communities. This means that in addition to various trials and experiments conducted on the station, reasonably large fields of at least 1 hectare should have been laid out using recommended practices, to serve as demonstrations. Field days should have been organized by inviting farmers from neighboring villages to visit the center to observe the various crops. Transportation could have been arranged to enable the farmers to come to the center to observe various crops grown at the center. If nothing else such a step could have greatly contributed to the breaking down of barriers between PNS and the farmers improved the dialogue between PNS and farmers and increased the level of rapport between extension agent, researchers and farmers. Experience in other countries has time and again proved the beneficial effects of such an approach. Unfortunately this was not done at N'Gaba and a valuable opportunity was missed (apparently waiting for the construction of the buildings).

Potential Uses of N'Gaba Center

N'Gaba research and training center, nearing completion, is ambitious and somewhat above the requirements(present and immediate future) of a project like PNS. The center has following accommodations:

1. Lodging for at least 32 to 64 trainees (2 to 3 trainees/room)
2. Three class rooms
3. 1 Conference room
4. 4 residential units for trainees
5. Offices for the research and adm personnel
6. Laboratory
7. Large store
8. Workshop and garage

Inspite of the huge sums spent on the construction of training center (over half million dollars), organization and layout of the center betrays lack of planning and foresight. At the time of our visit no responsible persons at PNS, either local or expatriate has indicated specific plans for the operation and use of the center constructed at such a huge cost. Ideas about uses of the training center are mostly in the minds of people and nowhere exists a definite or tentative written plan of training. One often hears of farmers training at the center. According to this plan farmers and their wives are to be brought to the center for 2-3 month training during the cropping season. This notion is totally impracticable, since no farmer could be induced to leave his crops and family (at least one wife and children) behind. Further such a program is fraught with logistic and other difficulties. Therefore, this idea of training farmers at N'Gaba should be abandoned. It has not proved successful anywhere in the developing world and there is no reason to believe that it would anything but be an exercise in futility.

Potential uses of N'Gaba training center are enumerated below:

1. Training of PNS extension staff:

Every year between July 1 and Aug 15, before the Agricultural season begins training courses should be held for all the extension staff (4-5 weeks).

This period of training should include among others the following:

Technical subject matter

Extension methodology

Review of past years program and lessons learned.

Experts and knowledgeable persons available in the PNS area from other agencies and a few from relevant research organizations should be invited to participate in training sessions.

2. Training of SCAD Personnel:

The center could plan one week sessions for SCAD personnel, to train them in interview techniques, data collection and observation techniques and data analysis. A few extension agents at a time could be associated with this training and over a period of time all extension agents should be recycled thru this training.

3. Annual Research Seminar:

PNS, R&E, Subsystem could organize a research workshop every year to review the research results obtained during the year and to plan the research for the following year. This could be a 3-4 day conference, involving both researchers and extension workers. Selected researchers could be invited from INERA and other

research organizations to serve as resource persons and provide inputs. Participation of extension workers would provide a meaningful approach to research problems existing in the area.

4. Rural development conference:

For lack of better title the phrase rural development conference is used. Any other suitable term could be employed. In this type of conference the basic idea is to bring together rural development practitioners (such as PNS leaders and staff) and key clientele of PNS activities. (Key farmers or farmers representatives; small and large merchants; school teachers and local businessman). The two groups (PNS staff and clientele groups) could discuss mutual problems (eg: issues in marketing between merchants and farmers, how can merchants meet farmers needs of consumer goods; how best marketing process be improved, etc.) Similarly, farmers can raise questions about the services rendered by extension service. In such a conference DGF and Extension service should play an important role. Such a conference would also provide valuable feed back to an organization like PNS about the problems, probable solutions and programs.

5. Participation of other agencies:

National research agencies dealing with area crops (PNM, PRONAM, INERA) should be requested to use the N'Gaba facilities to conduct trials or to test the adoption of their recommendations to the North Shaba area. A prerequisite is a qualified Zairian staff at N'Gaba, through whom above organizations could conduct trials (as opposed to having their own staffs).

ESTAGRICO should be invited to lay out cotton demonstrations/trials on the farm, so that farmers could observe cotton technology.

Staffing at N'Gaba Station

N'Gaba Research and Extension center does not have any staff (except head of research and extension subsystem and a single A3 level technician to assist him in research) at present. Again it has been the failure of project leadership not to think through and plan for the operation of the center. How could one person supervise a large extension service and conduct research? Irrespective of the presence of expatriate advisors, USAID, by virtue of having invested a huge amount in the construction of the center, should ensure that at least two qualified agronomists (A0 level) and 4 assistants (3 additional) are assigned to the station to conduct adoptive research trials under the direction of national agencies mentioned above.

Similarly a A1 level technician, with experience in extension should be assigned to take charge of the training program at N'Gaba center. A0 level researchers and A1, technicians identified above should work under the chief of Research and Extension subsystem for effective coordination of research and extension effort either in PNS or similar project.

VI. FINDINGS AND RECOMMENDATIONS

Accomplishments and Failures:

1. Extension Organization:

Extension component has made considerable progress in establishing an extension organization capable of reaching and communicating with farmers. Through 60 village centers it is reaching 50% of the households in PNS area. For the first time, PNS farmers are able to dialogue with a development agency and receive at least some technical assistance. PNS has been able to inculcate a pilosophy of development based on the principles of democracy, voluntarism and education. This is a sharp departure from the authoritarian approach commonly attributed to the two other agencies in the area (DOA and ESTAGRICO). The fact that farmers are willing to sit, talk, complain and praise (when it is due) is a considerable achievement given the background and approach of the traditional agencies in the area. In terms of coverage (reaching slightly over 50% of farm households in the area) and the number of farm centers established (60), progress has been satisfactory. The morale of extension agents is generally high.

While PNS extension service has achieved a certain degree of success there are serious deficiencies in its approach (methodology), very poor supervision of field agents compounded by lack of skills among the field agents (technological, communication and analytical competencies). Attention to these problems could have made the extension service much more effective. Extension agents primarily depend on persuasion and to a very limited extent on demonstrations to convince the farmers about the profitability of recommended practices. Very few demonstrations have been laid out on

farmers fields (12 in 1979, 15 in 1980 and none in 1981). In a tradition-bound society (such as PNS farming community) group approaches could be very useful. PNS extension service has never tried group approaches. Generally, there has been a very poor supervision of field agents, thus, very little on-the-job training of agents has taken place. There are no records maintained by a field agent. Reporting by the agents is rather unknown. There is a total absence of feedback from the field, either on problems or progress or suggested solutions. No written instructions are available with the field agents about the recommended practices. Lack of written instructions is among the main reasons for lack of understanding or even differential inter-preparation of the Package by certain field agents.

2. Adoption of Kasai-I Package:

Impact of extension on the acceptance of recommended practices, and thus on corn production is not insignificant. At present, about 50% of the farmers are using improved seed and about a third (15%) of whom are using full package and the rest (35%) are using one or more of the recommended practices (See Table 3 and 4). From the impressions gained from the visits to fields and discussions with farmers, it seems that about 20-25% of those using seed are also using one or more of the recommended practices. Given the fact that the roject did not really get off the ground until late in the planting 1978 season (four cropping seasons at best), rate of adoption of recommended practices has been satisfactory. (Note that it took Iowa farmers 14 years to adopt hybrid corn.)

Table 5: Extent of Area Cultivated in PNS[1]

Sector	1978-79	1979-80	1980-81	1981-82
Kongolo	838	2,100	5,230	5,431
M'Bulula	1,540	2,341	3,497	4,365
Nyunzu	2,295	3,329	6,143	6.943
TOTAL	4,673	7,770	14,970	16,739

Reasons for the high acceptance of maize seed are obvious. According to the yield data available, Kasai-I yields surpass that of local variety. Farmers were in agreement about higher yields of Kasai-I. PNS has made no attempt to study or analyse the reasons for the low acceptance of the cultural practices. Low adoption seems to be due to one or more of the following reasons. Firstly, it is behavioral. That is, line sowing and weeding (2-3 times) involve learning of new behavior and work habits. Traditionally, farmers do not weed. Planting is done at random. Secondly, farmers in the developing countries tend to attribute increased yields to the seed only. Influence of other cultural practices on the yield is not communicated or observed easily. Hence, the importance of developing a good demonstration program. PNS extension staff tended to inform the farmers rather than explain and educate the farmers in the reasons for line sowing (optimum plant population, etc.), and weeding (eliminating or reducing plant competition (To do this, extension agents need technical skills and communication skills in dealing with the farmers.). Third reason for low adoption of cultural practices seems to be the possibility of competing demands on farm families labor [a] required for other crops and subsistence activities of homemaking, corn pounding, collection of palm nuts and palm oil processing. Extension workers did not have proper training to observe these factors. Neither SCAD nor the research component (farming systems) provided enough support to extension on this aspect.

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a: The prevailing notion of weeding as the main responsibility of women is not borne out by research in the PNS area (see Lee Hardt and Blakley studies). Further, the notion of lack of time due to subsistence activities does not fully explain low adoption of cultural practices. In other African cultures (West Africa), where women's tasks are equally laborious, weeding is a traditional practice.

Partial acceptance of Kasai-I Package is not something peculiar to this area. In general, most packages undergo modifications at farm level depending on the farmer's resources and his ability to take risk. Kasai-I package is a viable, and a minimum risk package and certainly within the resources of farmers. What has been lacking is effective extension approach to promote the package. An important problem in sustaining the Kasai-I Package has been the inability of PNS to develop a program of seed production and distribution. The seed available with the farmers is 2 to 3 years old and thus might have lost, considerably the genetic purity.

3. Extension Training:

Very little extension training has been conducted to date. Two to three week training session have been conducted during July of 1980 and 1981. No written records of training exist. Hence, it is difficult to comment on the quality or content of training offered. Due to poor supervision, very little on-the-job training has occurred. Annual orientation training and on-the-job training by supervisors was very essential in view of the inadequate pre-service training (both in quality and content) received by PNS field agents.

Farmer training was not conducted to date. PNS officials indicated that once construction of N'Gaba station is completed, farmers' training will commence. Farmers would be brought to N'Gaba station for 2-3 months during the season for training. This seems impracticable. Farmers' training should only be conducted in the villages with occasional field days conducted at N'Gaba center.

4. There has been no perceivable linkage between PNS extension service and the other extension agencies in the area (DOA and ESTAGRICO). Very limited efforts have been made to develop linkages between the agencies. The possibilities of coordination and linkages with DOA and ultimate integration were not pursued. Incidentally, this would have served as a model and example for replicating in other regions of the country. In fact, the possibility of linkage and integration was one of the key elements of replicability in the Project.

5. There has been no research support to the PNS extension program, because of the problems if initiating and sustaining applied research program at N'Gaba station. Therefore, the strength of relationship between trial stations and farm centers cannot be evaluated. The only applied research activity that took place during the four years was the one dealing with the so-called diamond trials and Kasai-I Package trials with fertilizers. These trials were conducted on farmers' fields by researchers in cooperation with extension agents.

6. Technical Assistance:

Problems of providing technical assistance in research had also affected the overall performance of extension. Short-term technical assistance provided in extension did not address the main issues involved in strengthening the performance of extension (extension methodology, training and supervision).

Recommendations

In view of the overall performance of the PNS project to date two alternate recommendations are presented.

First option:

Keeping in view the progress made by PNS extension service, it is recommended that PNS extension component should continue until the end of the phase out period. PNS extension service should use this period as a consolidating period and not expand its activities geographically. During this period USAID should examine with Govt. of Zaire, various means of integrating PNS extension personnel into DOA. During this period PNS should concentrate on improving the existing organization by improving the methods and processes. If this aim seems feasible (integration and strengthening) and should require several additional months of AID financing to accomplish, USAID should consider doing so. Suggestions for improvement are indicated below:

i) Organize training for extension agents in July. Topics should include (1) Maize and other important crops - Cassava (manioc), Peanuts, Cotton; (2) Extension Methodology: how to approach the farmer; how to conduct demonstrations and group discussions.

ii) Each extension agent should conduct at least two demonstrations in his area.

iii) 4-plot demonstration design should be dropped in favor of simple two-plot design using improved seed with recommended practices vs. local seed with traditional practices.

iv) Initiate farmers' training in centers with low adoption rates. Three half-day sessions should be conducted at selected villages to which farmers from neighboring villages should be invited. (1st session: early September before planting, 2nd session: 6 weeks after planting, 3rd session: after flowering). This training could be conducted by charge' de vulgarisation (3), assistant, and the field agent.

v) Prepare written instructions on recommended practices (fiche technique) which should be given to each extension agent. Prepare written instructions in Swahili to be distributed among literate farmers. This could be achieved at a very low cost.

vi) Prepare a demonstration booklet (record book). Extension workers should maintain a record of each demonstration conducted with entries relating to planting date, size of field, recommended practices followed, observations on incidence of pests and diseases, germination

plant count, dates of weedings, date of first flowering, date of harvest and yield.

vii) PNS should take immediate steps to supply Kasai-1 seeds during the coming season (August-September 1982).

- Shell, clean and pack into 25 kg bags (recommended rate) Kasai -1 seed on cob at present remaining unshelled at N'Gaba.
- Sample the seed and obtain germination tests on the previous year's seed remaining in storage at N'Gaba. (Samples should be drawn after cleaning). If test results are at least 75% or more, only then release seed for distribution.

Second option:

If the project is extended or decision made to continue USAID's presence in North Shaba beyond September 1983, then project should be completely redesigned, with realistically defined purposes and goals, and reduced in terms of sub-systems to bring about greater cost effectiveness.

The redesign should take the following suggestions into consideration:

i) define clearly and realistically project goals and purposes;

ii) identify which sub-systems should be continued, which should be merged and which should be eliminated;

iii) indicate clearly the role of each sub-system and linkages between sub-systems.

From the present experience and study, the following would seem justified.

a) Continue PMU with better managerial and decision-making capacity, with SCAD revitalized to gather better quality data, useable and timely reports. Merge credit and commercialization (C&C) with PMU[1] (designate as a unit under PMU like SCAD). C&C primarily deals with a handful of merchants and its credit program is worthless. Merging C&C with PMU, would bring much needed economies in the PNS (separate vehicle, staff, etc.). In any case, dealing with merchants needs much more input and decision-making from PMU.

b) Continue the infrastructure sub-system

c) Eliminate intermediate technology. Its support to increased corn

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[1] This mode of merging (Credit-Commercialization with PMU and DGF with R&E) is suggested to avoid the inherent conflict that would result from the same people (or unit) dealing with farmers and merchants in maize marketing, if DGF and Commercialization are merged in a redesign project, as suggested elsewhere in the evaluation.

production has been negligible. Merge the equipment with the infrastructure sub-system. Simultaneously private enterprise should be encouraged to supply substantively better quality tools.

d) Continue research and extension sub-system and provide with two technical advisors: agronomy and extension.

e) Eliminate DGF sub-system and merge it with research and extension sub-system as a unit within the system. DGF primarily deals with farmers (and women). Its limited achievement to date has been in organizing farmer's groups to market their corn. DGF is ill-equipped to provide any content for farmers councils and interpret feedback from these councils. This they can only do in conjunction with extension. Therefore, they would be better placed as a part of extension. Further, DGF should not expand beyond its current size and area until it really develops a process and method of organizing farmer's groups to plan and execute basic economic activities. Thus, the merged DGF should concentrate basically on two things: 1) Continue to organize farmers groups for economic activities; and 2) Continue to organize and work with farmers councils for broader project purposes (developing group approaches needed by extension workers).

Recommendations for extension component in a redesigned project

Organization:

1. Continue research and extension activities in the same sub-system for better coordination of research and extension.
2. Current structure of organization - 4 levels - is adequate - if quality of supervision, and training are improved.

Staffing:

3. Provide expatriate technical assistance in the form of a long term advisor to assist in developing training programs, extension methodology and effective supervisory practices.
4. Provide a Zairian technician of A1 or A0 level (with experience in extension) to work at N'Gaba station to design and implement training programs.

Training:

5. Zairian supervisors at sector and zone levels should be trained in supervision of extension agents.
6. Interservice training program of at least 3-4 weeks should be organized every year for extension agents. Content should include crop technologies and extension methodology,methods of observations etc. Detailed written training plans should be developed on the basis of need assessment.
7. Farmers training should be conducted at the village level shortly before the planting season,during the crop growth period and before harvest. Three half-a-day sessions would seem sufficient. A village should be chosen as a center and farmers from the neighboring villages must be invited to participate in these sessions (include women if customs and conditions permit).
8. Animatrices should be given short training in crop technologies or recommended practices to make their work with women effective.

Extension Methodology

9. Every village agent should be provided with written instructions about the practices being promoted.
10. Multi-crop approach should be used instead of single crop approach.
11. Every extension worker should be required to conduct at least two to three demonstrations on farmers fields.
12. A system of record keeping should be developed for each extension agent. A separate record should be maintained for each village.
13. An overall annual plan of extension activities should be drawn up before the planting season identifying specific activities requirements of supplies etc.
14. Quarterly meetings should be held separately for each sector for review of program and problems. Feed back from extension agents must be solicited actively on problems and needed solutions.
15. Coordination between agencies in the area should be developed to mutually reinforce the activities.
16. Provide the field agents with (a) technical literature on production techniques of relevant crops (such as booklets produced by I.I.T.A. on maize and cow-pea. (b) Basic equipment to measure demonstration plots and weighing produce from demonstration plots.

Overall Impact of PNS (Observations and Comments)

From the visit to project site and from the data supplied by PNS the following observations could be made.

1. There has been an increased production, resulting in a marketable surplus in the area (maize exports from the area). (Could be attributed both to PNS and external factors).
2. A development process has been initiated in the form of an organization to reach even isolated villages with technology.
3. There seems to be more affluence and economic activity in the area. It could be both due to the PNS payroll and due to the increased income generated by increased maize production.
4. Opening of roads and access to markets has contributed to increased production of maize (and perhaps other products) and increased flow of consumer goods into the villages.
5. An indicator of increased income and aspirations (and thus of development)-- reported by farmers, merchants and PNS staff -- has been the demand by farmers for high cost consumer goods such as bicycles, sewing machines, radios and galvanized iron sheets for roofing.

However, we cannot help asking the following questions. At what monetary cost has this been achieved? Is the process replicable and sustainable in the long run. The answer to the first question is that the huge cost is not commensurate with the limited overall success. Secondly it does not seem to be replicable, if cost is any consideration, and the project has been unable to develop appropriate rural development processes. Sustainability of the project (meaning, maintenance of roads by GOZ private initiative, extension service to be financed by farmers and merchants, etc.); seems to be impossible. In the absence of continued foreign assistance, the GOZ is unable to finance rural development projects. However, certain elements of the project, (infrastructure and research and extension) seem sustainable with much lower levels of foreign assistance and current levels of contributions from the GOZ.

PROJECT NORTH SHABA EVALUATION

SUMMARY OF MAIN RECOMMENDATIONS

EXTENSION COMPONENT

First Option :

PNS Extension component should continue until the end of the phase out period. During this period USAID should examine various means of integrating PNS extension service with DOA. This period should be used as a strengthening and consolidating period and not to expand its activities geographically. If this aim seems faisible (integrating and strenthening) and should require several additional months of AID financing to accomplish, USADI should consider doing so. PNS should concentrate on improving the existing organization by improving its methods and processes. Details are suggested below.

ii) Organize training for extension agents in July. Topics should include (1) maize and other important crops - kasava, peanuts, cotton; (2) extension methodology: how to approach the farmer; how to conduct demonstrations and group discussions.

iii) Each extension agent should conduct at least two demonstrations in his area.

iv) 4-plot demonstration design should be dropped in favor of simple two)plot design using improved seed with recommended practices vs. local seed with traditional practices.

v) Initiate farmers' training in centers with low adoption rates. Three half-day sessions should

be conducted at selected villages to which farmers from neighboring village should be invited. (1st session: early September before planting, 2nd session: 6 weeks after planting, 3rd session: after flowering). This training could be conducted by chargé de vulganisation, assistant, and the field agent.

vi) Prepare written instructions on recommended practices (fische technique)which should be given to each extension agent. Prepare written instructions in Swahili to be distributed among literate farmers. This could be achieved at a very low cost.

vii) Prepare a demonstration booklet (record book). Extension workers should maintain a record of each demonstration conducted with entries relating to planting date, size of field, recommended practices followed, observations on incidence of pests and diseases, germination, plant count, date of weedings, date of first flowering, date of harvest and yield.

viii) PNS should take immediate steps to supply Kasaï-I seeds during the coming season (August-September 1982).

: Shell, clean and pack into 25 kg bags (recommended rate) Kasaï-I seed on cob at present remaining unshelled at Ngaba.

: Sample the seed and obtain germination tests on the previous year's seed remaining in storage at Ngaba. (Samples should be drawn after cleaning). If test results are at least 75% or more, only then release seed for distribution.

Second Option:

If the Project is extended or decision made to continue USAID's presence in North Shaba beyond September 1983, then Project should be completely redesigned, with realistically defined purposes and goals, and reduced in terms of sub-systems

to bring about greater cost effectiveness.

The dedesign should take the following suggestions into consideration :

i) define clearly and realistically Project goals and purposes;
ii) identify which sub-systems should be continued, which should be merged and which should be eliminated
iii) define sharply the role of each sub-system and linkages between sub-systems.

From the present experience and study, the following would seem justified :

a) Continue PMU with better managerial and decision-making capacity, with SCAD revitalized to gather better quality data and prepare useable and timely reports. Merge credit and commercialisation (C&C) with PMU[1] (designate as a unit under PMU like SCAD). C&C primarily deals with a handful of merchamerchants and its credit program is non-existent. Merging C&C with PMU, would bring much needed economies in the PNS (separate vehicle, staff, etc.). In any case, dealing with merchants needs much more input and decision-making from PMU.
b) Continue the infrastructure sub-system.
c) Eliminate intermediate technology. Its support to increased corn production has been negligible.

1. This mode of merging (Credit-Commercialisation with PMU and DGF with R&V) is suggested to avoid the inherent conflict that would result from the same people (or unit) dealing with farmers and merchants in maize marketing.

Merge the equipment with infrastructure sub-system or repair shop. Elimination would also boost the private enterprise supplying substantively better tools.

d) Continue R&V sub-system and provide with two technical advisors: agronomy and extension.

e) Eliminate DGF sub-system and merge it with R&V sub-system as a unit within R&V; DGF primarily deals with farmers (and women). Its limited achievement to date has been in organizing farmer's groups to market their corn. DGF is ill-equipped to provide any content for farmer's councils and interpret feedback from these councils. This they can only do in conjunction with extension. Therefore, they would be better placed as a part of extension. Further, DGF should not expand beyond its current size and area until it really develops a process and method of organizing farmer's groups to plan and execute basic economic activities. Thus, the merged DGF should concentrate basically on two things: 1) continue to organize farmer's groups for economic activities; and 2) continue to organize and work with farmers councils for borader project purposes (developing group approaches needed by extension workers).

APPENDIX: A

DATA TABLES

PNS EXTENSION SERVICE

Table 1: Organization of PNS Extension Service (April 1982)

No. of Sectors	:	3	(Kongolo,	M'Bulula, Nyunzu)
No. of Zones	:	10	4	5 3
No. of Village Centers:		60	22	25 13
(80% of 1983 target)				
No. of Villages/Center:		3-5		
No. of Farmers/Agent	:	Approx. 200		

Table 2: Extent of Coverage[1] (No. of Households[2])

Sector	1978-79	1979-80	1980-81	1981-82
Kongolo	1,124	2,806	4,582	5,554
M'Bulula	1,749	2,938	4,017	4,205
Nyunzu	922	1,613	2,484	3,074
TOTAL	3,795	7,357	11,083	12,833

1: Source: Project North Shaba: Annual Report
2: Total number of ag. households in PNS area - 25,561, and a total population of 166,054. (Source: Bref Appercu Sur les Activités du PNS, March 31, 1982.)

Table 3: No. of Households Using Recommended Practices (1980-81)

No. Using Full Package	:	1753 or 16%
No. Using One or More Practices:		4,280 or 38.5%
No. Using Traditional Practices:		5,050 or 45.5%

Source: PNS Annual Report, 1980-81.

Table 4: Number of Farmers Using Recommended Practices[1]

	1980-81	1981-82	Remarks
No. Using Seed	6,033	9,589	80% of 1983 Target
No. Using One or More Improved Practices	1,753	3,705	62% of 1983 Target

1: Source: Five Years Later Progress and Sustainability in Project North Shaba , DAI, March, 1982, P. V-8. (Note that these are number of farmers. It is possible that each household could have more than one farmer.)

Table 5: Extent of Area Cultivated in PNS[1]

Sector	1978-79	1979-80	1980-81	1981-82
Kongolo	838	2,100	5,230	5,431
M'Bulula	1,540	2,341	3,497	4,365
Nyunzu	2,295	3,329	6,143	6.943
TOTAL	4,673	7,770	14,970	16,739

1: Source: Project North Shaba: Annual Report 1981-82.

Table 6: Demonstration Results: Kasai-I Package (kgs/hectare)[x]

	1979-80 (15 Locations)	1980-81 (12 Locations)
Improved Seed & Recommended Practices	4,203	3,503
Improved Seed & Traditional Practices	2,123	2,641
Local Seed & Recommended Practices	2,727	2,351
Local Seed & Traditional Practices	1,434	1,881

x: No Fertilizers. Source: SCAD, 1980 data, Maximum yield 1980-81, 4,176 at Lengwe.

Table 7: Corn Exports From Project Area 1977-81

	1977	1978	1979	1980	1981
Price/M. Ton	Z10	Z22	Z35	Z45	Z60
Kongolo	1,099	1,516.5	1,908	3,656	5,853
Nyunzu	4,805	10,118.5	10,445	14,542.5	26,530
TOTAL	5,904	11,635	12,353	18,122	32,383

Source: Five Years Later Progress and Sustainability in Project North Shaba, DAI, March, 1982. (Note that PNS really started its activities in 1979 and hence 1978 should be considered as the base year to judge the impact on production. See Page V-12 of DAI Report.)

Table 8: Average Yields of Improved and Local Varieties of Maize in PNS Area (kg/hectare)

Sector	Improved Variety		Local Variety	
	Forest	Savanna	Forest	Savanna
Kongolo	1.691	1.234	1.398	1.147
M'Bulula	1.786	1.420	1.00	.950
Nyunzu	2.498	768	1.685	.795

Source: Project Nord-Shaba, Rapport Annuel 1979-80.

APPENDIX: B

A research study (Terry Lee Hardt, 1979) conducted in a non-PNS area observed the following:

1) 22 out of 100 farmers had knowledge of the variety Kasai-I (22%).
2) 13 out of 22 had received information from PNS employees and 9 from friends and relatives.
3) Of those who had knowledge of the variety, 18 heard of it in 1978, 9 in 1979, 4 in 1980 first season, and 1 in 1980 second season.
4) 19 out of 22 indicated that at least one person in their household was using the variety (86.36%).
5) 15 out of the 19 households indicated that the household head had first planted the seeds.
6) Following findings were indicated about the extent of coverage:
   - 3 out of 19 planted new variety in all their fields (15.78%)
   - 4 of the 19 planted new variety in half or more of the area (21.05%)
   - 12 of the 19 planted a small amount of new variety (63.15%).
7) Impact on number and size of fields planted:
   - 5 out of 19 planted more fields than before
   - 8 out of 19 planted larger fields than before
   - 12 out of the 19 planting some of the new variety, planted more maize
   - 6 of the 19 reported selling more maize than before.

APPENDIX: C

LIST OF DOCUMENTS CONSULTED

1. Project Paper: North Shaba Project, 1976.

2. Revised Project Paper: North Shaba Project (August 1980)

3. Dimpex Report: Evaluation of the North Shaba Integrated Rural Development Project: 1979.

4. DAI: Internal Evaluation of Project North Shaba, November 1980.

5. DAI Report: Five Years Later: Progress and Sustainability in Project North Shaba, March 1980.

6. Blakely Report: Case Studies of Selected North Shaba Project "Farmers' Centers. (March 1979)

7. Terry Lee Hardt: "Decision-Making Roles in the Rural Household and the Adoption and Diffusion of an Improved Maize Variety in Northern Shaba Province". Ph.D. dissertation, Iowa State University, Ames, Iowa, 1981, p. 63,64,66,67 (p. 47 (Du 2. Ag. labor)

8. Guide du Visiteur au Project North Shaba, s/s de R&V., 1981.

9. Resumé des Activites des Recherches et de Vulgarisation du P.N.S., Premier Rapport, trimestriel, 1981.

10. Annual Report, Project North Shaba, 1980-81.

11. Annual Report, Project North Shaba, 1979-80.

12. Project North Shaba 1980-81, End of Tour Report (Merrit-Sargent, COP, 12/31/81).

13. Rapport d/une Mission d/Agronome et de Vulgarisation Agricole, Effecture au PNS, Zaire, du 27 juillet au 27 Aout '1980, (Donal Humphal & F. Regier).

14. Bref Apercu sur les Activites du PNS: 31 Mars, 1982.

15. Grain Storage in Project North Shaba: Loss Assessment, Analysis, and Recommendations (Roger W. Vinisa, Appropriate Technology/Grain Storage Consultant, DAI, no date)

16. Manioc Potential for Project North Shaba. S. J. Pandey, Project National Manioc, INERA/M'VUAZI, Gare MWEKE, BAS ZAIRE, 12 April 1982.

17. Evaluation de L'Occurrence et L'Impact des Maladies Phythopathologiques Dans la Zone du Projet Shaba Nord (B. E. Lockhart, TDY Consultant, DAI, July 1980)

18. Evaluation de L'Occurrence et de L'Impact des Maladies Phytopathologiques Dans la Zone du Projet Nord Shaba, II (B. E. Lockhart, TDY Consultant, DAI, December 1980)

APPENDIX: D

List of Persons Contacted & Places Visited

A. PNS Personnel:

1. Cit. Matiso, Director, PNS
2. Cit. Mbuyi Lusambo, Chef de Section, Kongolo
3. Cit. Kasungu, Chef de Section, M'Bulula
4. Cit. Esul Ngandu, Chef de Section, Nyunzu
5. Cit. Nyagashendi Gakwavu, SCAD
6. Cit. Kaziyama, Chef, SS, DGF
7. Cit. Baziki, Animateur, Sector M'Bulula
8. Cit. Muama Wa Milumbu, Agronome-Vulganisateur (Pendé)
9. Cit. Nasibu, Assistent de Vulganization, Nyunzu
10. Cit. Gazimba, Rapporteur Principal, SCAD, Nyunzu
11. Cit. Useini, Chef Sous-System, Recherch et Vulganization
12. Cit. Kafunda, Chef Sector, (DOA), Agronomede Zone
13. Cit. Kaniyama Kassé, Project Seed Multiplication
14. Cit. Cherúmé, Director, CENECOF

B. Other Agencies:

1. M. Decock Francais, Agronome, ESTAGRICO
2. Cit. Kafunda, Chef, Agronome de Zone (DOA), Nyunzu
3. Chef, Agronome de Zone (DOA), Kongolo
4. Cit. Lubangi, Prefet, Ecole de Kaseya
5. Father Antonio: Kivu Sola, Missionary Farm
6. Kibwe Sakina: Grain Merchant

C. Expatriate Personnel (PNS/USAID):

1. David Gas: DAI
2. Ken Kohan: DAI, Former Chief of Party
3. John Gold: PNS/DAI/SCAD
4. Bill Balrymph: PNS/DAI/DGF
5. Ed Slam: PNS/DAI/Pilot
6. David Sonco: USAID/Project Officer

D. Villages Visited:

1. Kaseya
2. Kongolo
3. M'Bulula
4. Kiyonga
5. N'Graba
6. N/Dala
7. Sanga
8. Nyunzu
9. Pendé
10. Makwikui
11. Kibuli

NORTH SHABA PROJECT

EVALUATION OF FARMERS' GROUPS DEVELOPMENT (DGF) AND OF MARKETING AND CREDIT (C. + C.) SUB-SYSTEMS

Andrée Black-Michaud

Ronco Consulting Corp.

15 May 1982

SUMMARY OF THE MAIN RECOMMENDATIONS

First Option: Cessation of the North Shaba Project within six months

- DGF and C.+C. should phase out their activities immediately.
- DGF must make sure that the legal and financial reports of the two savings cooperatives are in order and on file.
- The content of these reports should be made public in a meeting with all the members who should also discuss the future of the cooperatives.
- PNS should devote major effort to the training of its Zairian employees and to the integration of all its cadres into national employment structures.
- SCAD should stop gathering new data and focus on the analysis and the writing up of the material so far collected.

Second Option: End of PNS in September 1983

- DGF and C.+C. should phase out their activities as smoothly as possible.
- DGF should teach marketing and investment principles to the largest possible number of farmers. All peripheral actions (the construction of spring boxes, the support to savings cooperatives, etc.) should be dropped.
- C.+C. may consider selling some of its commodities (used trucks, tanks, etc.) to local merchants or, otherwise, hand them over to the Dept. of Agriculture.
- SCAD should continue to collect data only inasmuch as they relate to problems of utmost importance. Most of its time should, however, be devoted to the processing and writing up of the existing material.

Third Option: Extension of PNS' Mandate after September 1983

- Farmers' Councils should be kept, provided a group approach is needed by the Extension sub-system. DGF expertise in the matters connected with the creation, gathering and use of the Councils should henceforth be employed for the training of their colleagues.
- DGF and C.+C. should merge and work under one leadership with one coherent set of objectives and priorities.

- The new sub-system should phase out its help to big merchants and polarize its effort on concrete, measurable actions leading up to the alleviation of the work load on the farm and to the increase of small farmers' revenues through marketing.

- A multidisciplinary team should come at once to North Shaba to help SCAD sketch out a picture of the farming situation in the area. The backstopping team should also contribute to the redesign of SCAD methodology which should be more problem oriented.

- A comprehensive training program should urgently be elaborated for all PNS staff-members.

- A promotion and reward system should be implemented for all PNS employees.

- Immediate attention should be paid to the integration of all PNS services and cadres into national structures.

TABLE OF CONTENTS

Title	Page No.
1. DGF	1-7
1.1. Preamble	1
1.2. Background Informa	1-5
- Initial Design: Built-In Difficulties	(1-2)
- First Warning: The Blakelys' Report	(2-5)
1.3. DGF Today	5-7
1.4. Sustainability Prospects	7
2. C.+C.	8-16
2.1. Preamble	8
2.2. Background Information	9
2.3. Achievements to Date	9-15
- Higher Floor Price at the Farmgate?	(10)
- Collective Negotiations Between Producers and Buyers?	(10-11)
- Better Maize Price Through Competition	(11-13)
- Whose Merchants is PNS Really Helping?	(13-15)
2.4. Sustainability Prospects	15-16
3. CAUTION	16
4. ANALYSIS OF THE MAIN DIFFICULTIES	17-27
4.1. The Farmers' Councils	17-18
4.2. False Assumptions	18-22
4.3. Lack of Managerial Skills	22-23
4.4. Lack of Incentives	23
4.5. Inadequate Training Program	24-25
4.6. Absence of Clear and Consistent Priorities	25-27
5. POTENTIAL ALTERNATIVES	27-29
ANNEXES I to VII	30-39
REFERENCES	40

1. FARMERS' GROUPS DEVELOPMENT -- DEVELOPPMENT DES GROUPEMENTS DE FERMIERS (DGF)

1.1. PREAMBLE

"Some time back, we reached a level of discouragement which was such that we asked PNS to abolish our own sub-system." We said, "other sub-systems might be willing to have us. If not,...well...we will presumably have to be sacked." (Excerpt of an interview held on 23/04/82 with a small group of animators from the DGF sub-system.)

1.2. BACKGROUND INFORMATION ABOUT DGF

Initial Design: Built-In Difficulties

The first PNS design was based on the assumption that to be self-sustainable, rural development had to be achieved with the active participation of small farmers (DAI 1980: 1). In practice, it meant that each of the extension units of the Project, the Farmers' Centers or centres agricoles, would become the focus of an effective organization and cooperative effort.

In the Project design, 75 Farmers' Councils were planned. As soon as one was established, the idea was that a farmers' group would also be created to carry out simple functions, such as the sale of I.T. tools, the collection of data concerning small farmers' practices and the demonstration of improved husbandry (PP 1976: 3).

As the organization and financial capabilities of the Project expanded, it was envisaged that the farmers' group would turn to more substantial activities

in the field of marketing, for example (idem).

Since little was known of the existing socio-economic and political conditions prevailing in the area, the Project Paper did not specify the exact composition these farmers' groups should have. It was nevertheless stipulated that the development of such groups should be encouraged "within the context of popularly defined needs and opportunities based on existing patterns of cooperation" (idem).

By putting so much responsibility on the shoulders of an unknown quantity and by assuming that groups of an ill-defined nature could efficiently act as intermediaries between the farmers and PNS, while at the same time engaging in economic activities, the Project Paper was already sketching out many of the difficulties that the future DGF sub-system was to meet and try to overcome later.

First Warning: The Blakelys' Report

As Farmers' Centers were delimited, DGF started to build up farmers' groups called Farmers' Councils or conseils de cultivateurs. Such groups were, and still are, made up of members of major patrilines, matrilines or other family groupings delegated by the different villages of a Farmers' Center.

Right from the outset, the creation of the Farmers' Councils led to several problems.

First, the fact that a single village may shelter more than one patriline or matriline combined with the fact that the members of these kinship groups are often spread out in different villages means that fair representation

excludes the possibility of working with a restricted nucleus of people. In corollary, summoning all the members of a Council can be a burdensome task.

Besides, the formal character of the Council implies that, unless some special effort is made, women are bound to be excluded from it.

Thirdly, it brings together individuals who, otherwise, would not necessarily interact with one another. Mistruct amongst members often prevails, ruling out the possibility of initiating common economic activities.

The focusing of DGF on the Farmers' Councils, at the beginning, also prevented the sub-system from paying sufficient attention to other types of groupings whose members - very close relatives and sometimes neighbors - live at close quarters and occasionally cooperate together in "real life".

As early as 1979, the shortcomings arising from the initial orientation of the Project were clearly foreseen by the Blakelys: ..."Village, or area-wide Farmers' Councils are one kind of Farmers' Group which can play certain roles and serve to benefit farmers in certain ways. The effort to strengthen groupings of farmers should not, however, be limited to the level of the Farmers' Councils..."

"Smaller groups will continue to be an important contact point and focus for many Project activities. Great effort should be made to identify and get to know these smaller groups so that things as I.T. introduction can <u>add to</u> the joint action capabilities of local groupings rather than being the sole focus of activity for a fragile grouping of doubtful longevity" (1979: 15).

Despite the Blakelys' warnings, and although the following year some of the inherent weaknesses of the approach were becoming more and more blatent, the revised Project Paper which followed Dimpex/USAID evaluations, called for patience rather than questioning the capability of the Councils to achieve the tasks that were originally assigned to them.

Indeed, one reads in the summary of the DGF sub-system activities: "Farmers Group Development, in the sense of achieving some economic viability among groups, will take longer than anticipated. Within the given timeframe, a reduced number of farmer groups or farm centers will reach the pre-cooperative stage. Based on the beginnings that have been made, one can envision a solid foundation being laid upon which additional groups can build to achieve economic viability and social benefits beyond the Project life" (RPP 1980: 5).

The report then specifies that: "Resources must be concentrated on the production and marketing activities for which the Project was designed... The potential of success appears to be greatest in the domain of marketing... There is a possibility that groups in several localities may rent grain trucks from the Project to market grain directly at the Kongolo or Nyunzu railhead" (idem).

That only 11 of the Farmers' Centers had a Council by June 1980 and that the Councils had so far hardly ever accomplished anything besides the dispatch of information, apparently did not undermine the confidence of the authors concerning the ability of the DGF personnel to reorient the Councils towards production and commercialization activities.

The report did not show any worry either about the use of trucks - a means of transport small farmers could never rent unless PNS was directly helping them - to lay the foundation of a more active and sustainable involvement of the producers themselves in the marketing of their maize.

1.3. DGF TODAY

The most significant change that occurred since the publication of the revised Project Paper has to do with the acknowledgement that the Farmers' Councils cannot, at present, carry out economic activities of a communal nature.

In the field of collective production, marketing and investment DGF is now, rather, working mainly with smaller groups, the Farmers' Groups or groupements de fermiers, who closely correspond to the smaller units the Blakelys had pointed out as potential groupings, to which PNS should pay more attention

This shift of emphasis indicates that the personnel of DGF are able to analyse past experience and draw useful lessons from them, a flexible approach to work which is, in the context of a project like PNS, a major and rare asset.

In terms of overall tangible achievements, however, DGF realisations have been, as of the end of December 1981, very modest. Up to that time, DGF had:

- created 14 Farmers' Councils;
- helped 38 Farmers' Groups to get organized and engage in economic activities;

- provided assistance to two savings cooperatives, and
- cooperated with Peace Corps Volunteers in the construction of seven spring boxes.

If one looks beyond this simple enumeration and examines the content of DGF main activities, the limited impact of the global effort is even more evident.

At the moment, the Farmers' Councils mainly transmit information on behalf of SCAD, I.T. and the Extension sub-systems. In theory, they should also provide some feedback to the Project, although, in practice, very few of the farmers' comments ever reach PNS. Besides, when they occasionally do, they are rarely taken into consideration.

The lines of action of the new offspring of DGF, the Farmers' Groups (27 made up of men and 11 of women), vary according to sex. The male groups mainly engage in the collective marketing of maize, while their feminine counterparts are busy growing crops in communal fields.

During the 1980-81 agricultural season, 55 men belonging to seven Farmers' Groups rented PNS trucks and marketed 108 tons of maize in Kongolo. They thus made Z18,500 more than they would have if they had waited for merchants to buy their production at the farmgate (cf. Panorama 1982: 11-12).

An even smaller number of women actively take part in the operations sponsored by DGF (see Sylvia Watts' evaluation for a detailed analysis of women's activities). (Also see Annex I and II of this report for a concise picture of the situation.)

To worsen this already dim state of affairs, very few of the groups function except on an ephemeral basis, and virtually none of them has accepted to reinvest its profit into further income-generating activities that would benefit the whole group.

Even if one takes into account the fact that last year three groups of farmers initiated collective bargaining to obtain fairer weighing procedures from the merchants, and even if some women have managed to purchase salt and soap in bulk to be resold in their villages, it is difficult not to be struck by the slimness of the achievements.

DGF also spends some time and energy backstopping the two incipient savings cooperatives of Kongolo and Mbulula, although neither of them is at present in a position to effectively attend the needs of small farmers.

Indeed, the membership of both cooperatives (slightly over 400) is almost entirely made up of PNS personnel, and the few loans (ranging from Z300 to Z1,000) that the Kongolo Cooperative has recently granted have all been for social or commercial motives. In any event, with savings that amount to less than Z50,000, it is hard to conceive how these cooperatives could offer sufficient credit facilities for the development of agriculture in the area.

1.4. SUSTAINABILITY PROSPECTS

In a nutshell, despite the willingness and the concern of DGF personnel, the activities of this sub-system have so far been very scattered and their impact extremely limited. The prospects for any of the actions to be sustainable, were PNS to pull out in 1983, or were PNS going to continue as it is now in terms of design, approach, and personnel, are virtually nil.

2. CREDIT AND MARKETING -- CREDIT ET COMMERCIALISATION (C.+C.)

2.1. PREAMBLE

"PNS has done a lot in the area by opening new roads. It would have been even better, though, if it had focused its effort on the secondary roads of the Nyunzu sector, instead of working first around Kongolo. For example, there are very good maize farmers near Kaobe and north of Butanto, but the roads to reach them are terribly bad."

"Yes, you are right, the most worn-out of my 22 trucks do go there, anyway."

"(Not the trucks I just bought from PNS? Their ground clearance is not good enough!)".

"It is, however, very difficult and I have to face constant breakdowns"

(Excerpts of an interview held on 20/04/82 with the largest maize merchant in the PNS area).

.....

"PNS is mainly helping the big merchants. It is true that I was able to rent a truck from the Project last year. But after PNS departure, who is going to rent me a truck and how am I going to get my sacks?"

"I cannot, at present, buy one of the vehicles sold by the Project. It is out of the question, because the bank refuses to lend me the money."

"If the conditions for obtaining a loan were relaxed, I might just be able to make it."

"Then, what I would really like to do is try to monopolize the palm oil market!" (Excerpts of an interview held on 22/04/82 with one of the small merchants of Kongolo.)

2.2. BACKGROUND INFORMATION

The primary task assigned to the Marketing/Credit sub-system in the initial Project Paper was to "promote a strong, competitive market system by increasing the number of viable grain merchants" (RPP 1980: 17).

Difficulties linked with the dismantling of ONACER incited the authors of the RPP to recommend a reduction of the sub-system involvement to:
"1) assisting area merchants in the procurement of fuel and sacks,
2) aiding in carrying out the 025 loan, 3)...[renting] trucks and [offering] other possible assistance to smaller merchants and farmer groups,
4) studying the needs for farmer production credit, and 5) monitoring the sale, movement and shipment of agricultural products from the Project area and formulating desired changes in policy marketing system" (idem).

2.3. ACHIEVEMENTS TO DATE

At present, the basic philosophy backing C.+C.'s actions is that the maize production of small farmers should increase gradually, provided there is a sufficient price incentive. Logistical support to small merchants, who could help in breaking the monopoly of big ones, pressures at the Provincial level for the farmgate price of maize to become more attractive and the encouragement of collective negotiations between producers and buyers have all been part of the strategy used by the sub-system to stimulate farmers to produce more.

Everybody agrees that in the PNS area, business is much more flourishing now than it was five years ago. During the same period, the volume of maize commercialized has reportedly risen steadily.

Paradoxically, the Marketing and Credit sub-system's activities are said "to have remained limited in scope during the Project's life" (Sargent 1981: 21).

Higher Floor Price at the Farmgate?

As the following table indicates, the impact of PNS in the setting up of a higher official price for maize at the farmgate is very questionable.

Official Prices for Agricultural Products (per kilo)

Product	1977	1978	1979	1980	1981	1982
Maize	Z.10	.22	.35	.45	.60	1.00
Rice	Z.12	.15	.50	1.00	1.00	1.50
Groundnuts	Z.09	.075	.50	.80	1.50	3.00
Shelled Groundnuts	Z.16	.155	.80	1.00	2.00	5.00
Manioc	Z.10	.10	.35	.45	.60	1.00
Beans	Z.15	---	.75	1.00	1.50	5.00
Cotton (1st)	Z.60	.60	.90	.90	1.15	1.80
Cotton (2nd)	Z.40	.40	.60	.60	.90	1.60

Source: C.+C., April '82 (on request)

Indeed, even if between 1977 and 1982 the price of maize has been multiplied by ten, the price of all the other agricultural products (except for cotton) has increased at least as much or even more in relative terms.

Collective Negotiations Between Producers and Buyers?

DGF's attempts to induce collective negotiations between producers and buyers has already been mentioned. In 1980-81, three Farmers' Groups managed to

convince the largest merchant of Kongolo to use regulated scales at the farmgate and to replace unscrupulous agents. (It is common practice in the area for the buyers to extort extra maize from the farmers).

Instead of sending his truck unloaded to the farms, the same merchant has, in principle, agreed this year to bring empty drums and corrugated sheets of metal to some Farmers' Groups, on the condition that the farmers give him in advance a list of the items they want to buy. Other merchants already sell salt, soap and other small commodities while buying agricultural products.

However, such response to the small farmers' needs on the part of the merchants remains very limited in scale and still is very much monitored by PNS personnel, rather than by the farmers themselves.

Collective bargaining for obtaining better prices at the farmgate is, at present, little short of a wish.

Better Maize Price Through Competition

Both farmgate and railhead price of all major agricultural products (except for palm oil) are set every year by the Governor of Shaba Province, just before the opening of the new agricultural season. In theory, thus, increased competition does not lead to higher prices, although competition may enable the producer to sell his crop to the merchant who cheats him less. This in itself may represent a "gain" or, rather, a "non-loss" of 10-15%.

In practice, prices do fluctuate considerably in the course of a year (see Annex III a + b, and Annex IV). The problem is that the logistics of marketing are such that small farmers are only exceptionally in a position to benefit from these fluctuations.

Typically, the merchants sift the countryside as soon as the roads are practicable for vehicles, and leave empty sacks with farmers. Even if no formal contract is signed linking a producer to a given merchant, the acceptance of one merchant's sacks is, in fact, the equivalent of a promise to later sell him the maize.

The simultaneous ownership of a large fleet of trucks and of a good supply of both sacks and fuel, combined with enough cash to purchase maize as quickly as it can be transported, are capital factors for the success of a merchant. They are also determinant in the evacuation of maize during the period of the year where the price is lowest.

The following comment made by DGF technical advisor well describes the situation: "Farmers are pushed into making an early decision as to whether they should sell to an unwanted, but guaranteed merchant, or take their chances that some other merchant will eventually come by to purchase their corn at a higher price. Most farmers facing high costs associated with the increasing risk, select the first option."

The only alternative which is at present open to small farmers is that they may now sell their maize at the "buying counters" of Kongolo, Nyunzu and Lumanisha. The price offered at the counter is very attractive in comparison with that at the farmgate (this year, Z1.50 per kilo as against Z1.00).

The big fly in the ointment, however, is that without a vehicle, one cannot take advantage of the system.

During 1981, PNS tried to alleviate this problem by renting trucks on a priority basis to Farmers' Groups and to small traders who did not own trucks. Of the 2,000 tons of maize sold at the counter last year, however, hardly more than 100 tons were taken into town by the farmers themselves.

Late confirmation of the availability of a vehicle and delays in announcing the cost of rental only partly explain why small farmers did not bring much of their maize to the counter, instead of selling it at the farmgate to the local merchants. In fact, the rental of trucks to farmers is also deliberately tempered by C.+C. and PMU who see this opportunity as a threat to the emergence of small merchants.

Which Merchants is PNS Really Helping?

The rental of trucks constitutes only one step amongst many others to promote a strong competitive market system by increasing the number of small merchants likely to break the monopoly of the big ones.

The sale of empty sacks and fuel at official prices represents another important measure that C.+C. views as a way to stimulate competition. According to the PNS ex-chief of party, this activity has been C.+C.'s major market intervention (Sargent: 22).

In 1981, the Project has sold 100,000 sacks and roughly 30,000 liters of fuel. This quantity represents less than 10% of what the merchants use each year. Curiously enough, though, 60,000 of the sacks went to Tarica Fréres, a miller from Lubumbashi who buys most of the North Shaba maize, and 10,000 were purchased by the biggest merchant of Kongolo (see Rapport Annuel 1980-81: 44). As for fuel, the same year, most of it went to big and very big merchants (see Annex V).

These statistics warrant comment.

In the first place, C.+C.'s activities are often swerved from their basic philosophy because those who need and can afford PNS services are those who are already well-off and because PMU can hardly refuse to assist the big merchants who themselves back up the Project - when it is short of funds, for example.

The sale of the trucks bought with part of the 025 loan will even more seriously undermine C.+C.'s strategy.

To date, the only merchant who has been able to buy two of these vehicles is the most powerful maize buyer of the whole area. He recently purchased two trucks, at 250,000 Zaires each, in cash. His firm has 11 stores and will be in a position to mobilize 22 trucks this marketing season.

Presumably, three other merchants could buy vehicles for cash, if they wished. One is a major political figure in the region and another one is the largest merchant in Kongolo. He belongs to an extended family of traders who operate stores in different towns of Shaba Province.

In other words, unless the conditions for the acquisition of trucks are modified, only a limited number of already prosperous and well-organized merchants will be financially capable of buying them.

If USAID/Kinshasa should decide to support the national banks with counterpart funds, another group of six or seven merchants may be granted credit to purchase some of the vehicles (see Annex VI for a list of potential buyers).

However lenient USAID decides to be, though, none of the small merchants and none of the farmers will qualify for a loan. Although small farmers and small merchants should receive top priority according to PNS present rhetoric and although C.+C. is indeed offering sporadic help to small traders and to a limited number of farmers, none of them can acquire trucks, the most formidable and indispensable weapon in the commercialization game.

In other words, even if the number of grain merchants has doubled during the last five years, only a few of the latecomers on the marketing scene are likely to survive without PNS assistance.

In contrast, it appears that during PNS mandate, the strength of the four big merchants has been considerably consolidated, while an equal number of middle-sized traders have also been emerging (see Annex VI).

This tendency is not necessarily a bad thing. Given the deterioration of the economic situation in Zaire, the backing up of already strong firms may constitute the best guarantee for the continuation of a dynamic commercial sector after PNS departure. In view of the circumstances, there might be some virtues in making compromises, although this covenant clashes with some of the official policies of PNS.

2.4. SUSTAINABILITY PROSPECTS

The point is, however, that, in overall terms, C.+C.'s achievements have been so far very limited.

The farmgate price of maize appears little influenced - if at all - by PNS' interventions. Collective bargaining between producers and buyers is still

a wish more than a reality. And the promotion of a strong, competitive market system is happening partly with the Project's (unavowed) cooperation but, above all, in spite of it: by definition, merchants are businessmen whose job is to capitalize rapidly and turn any situation to their financial advantage.

The seven or eight strong merchants of the area are therefore very likely to survive whether or not C.+C. helps them. Their survival will, henceforth, be more dependent on a healthy economic situation at the national level, and on the maintenance of a good road system as well as on the increase of crop production in North Shaba.

3. CAUTION

At this juncture, it is important to note that criticism concerning DGF and C.+C. sub-systems is by no means a reflection of the incompetency or the irresponsibility of their personnel.

Rather, these sub-systems have been plagued by major difficulties preventing their adequate working. Focus will now turn to these problems and, whenever possible, suggestions will be made to their potential solution in the eventuality of a PNS prolongation after September 1983.

SHOULD PNS STOP IN SEPTEMBER 1983 OR BEFORE, THE SUB-SYSTEMS SHOULD CONCENTRATE ON THE SMOOTH PHASING OUT OF THEIR ACTIVITIES AND NOT UNDERTAKE ANY MAJOR CHANGE.

4. ANALYSIS OF THE MAIN DIFFICULTIES

4.1. THE FARMERS' COUNCILS

As mentioned earlier, DGF was plagued from the outset by having to channel all its effort through the Farmers' Councils, a body of people well suited to the dissemination of information but poorly adapted to the carrying out of collective economic activities.

Farmers' Councils should be kept, provided a group approach is needed by those - like the extension agents, for example - who have to transmit information. DGF expertise in matters connected with the creation, gathering and use of the Councils should henceforth be employed for the training of their colleagues.

In this respect, it should be stressed that whoever will be dealing with the Farmers' Councils, some improvements will have to take place to maintain the groups' viability and to sustain members' interest. First, the information to be disseminated will have to be more pertinent than before and tools to be sold (if any) will have to be of better quality.

PNS has suffered a loss of credibility by offering second-rate implements and by pushing a technical package that could only exceptionally be accepted.

Put differently, it is now imperative for the Project to stop considering that the rejection of advice or new tools by farmers is mainly due to their ignorance or stubbornness.

Since farmers generally have good reasons to be sceptical, field agents would greatly improve their effectiveness if they were willing to listen and understand why certain innovations are accepted while others are universally unpopular.

Instead of constantly repeating that maize has to be sown in rows, for example, extensionists would have gained a lot if they had understood that, although rows of maize may look nice, they are time consuming to make and they do not necessarily lead to better results, especially in a context where agriculture is not mechanized and where weeding is partly taken care of by rice when it is intercultivated with the main crop.

4.2. FALSE ASSUMPTIONS

DGF actions have also been seriously imparied by a number of false assumptions that have guided some basic options for one type of activity against others. One DGF program for women provides a good illustration.

The women's program in question has always been justified on the grounds that women do 65% of the work in the fields and that most of PNS resources have gone to men to be used in "men's fields" (see DAI 1982: I-9).

The 65% figures comes straight from the original Project Paper and, although it certainly corresponds only to a very rough estimation, it has never been questioned. Recent fieldwork in the context of this evaluation alluded that, quite to the contrary, men probably devote more time to crop production than women. Women are, on the whole, very busy, but for other reasons. These reasons shall be addressed later.

SCAD was consulted to find out evidence in favor or against these findings. Although the data collection unit has been in operation for several years, no data whatsoever were available to support either of the two opposite points of view.

On request, SCAD finally compiled figures they had on maize production and to everybody's surprise, the results indicated that, indeed, men do spend more time than women in maize fields, not vice versa (see Annex VII).

An early verification of the Project Paper assumption would have entitled DGF to focus its effort towards some of the other factors which overload women with work. The sub-system could have, for instance, addressed and implemented a program aimed at reducing the lengthy task of food processing.

A very similar and erroneous basic assumption is the belief that in North Shaba men cultivate by themselves in "men's fields", while women practice agriculture separately in "women's fields" (see DAI 1982: I-9). This assumption has percolated for years, from one report to another. Since all the extension agents of the Project E.+R. sub-system are men who find it easier to work with the masculine half of the farming population, PNS has been keen to have a feminine section in DGF in order to teach improved agricultural practices to women as well. The concern of PNS is supported by the fact that, on the whole, women seem reluctant to adopt the Kasai I package.

In lengthy field discussions with farmers of both sexes, it became obvious that the meaning of men's fields versus women's fields is seriously misunderstood by the Project. Apparently, women's fields designate fields where

crops are mostly grown for home consumption. In the case of a polygamous marriage, each wife will have her own separate field and may well carry out most agricultural tasks required by herself, although this is by no means a strict rule. In the case of a monogamous household, the husband is likely to accompany his spouse and lend a hand as needed.

Conversely, the men's fields refer to fields whose production is not meant for family consumption. Typically, cash crops or crops reserved for occasional visitors are sown there.

The point to be made is that, although such fields are labelled "men's fields", both men and women cultivate them jointly. This means that, while working with their husbands in the "men's fields", women have a chance to use the Kasai I package. If they fail to adopt the package in the "women's fields" - i.e., the home consumption fields - it is not ignorance but some other reasons.

First, the traditional variety of maize is preferred to Kasai I for its taste is considered better and it is easier to grind. It should be emphasized here that maize grinding is already an extremely time consuming activity.

As mentioned before, women are also over-burdened by a multitude of tasks - rearing children, fetching water, processing food, etc. - besides producing crops as such. Sowing in rows, or any husbandry practice which takes extra time is bound to be unwelcome.

If there had been a minimal understanding of the way agriculture is carried out in North Shaba, the futility of teaching women how to "improve" their

agricultural practices by asking them to devote additional time in supplementary fields, the PNS "communal fields", would soon have been obvious (see Annex II for a summary of the results achieved in such fields).

To return to the initial thesis, part of DGF strayings are due to not having received from SCAD some of the pertinent background information essential for the elaboration of a meaningful plan and work program.

Clearly, SCAD is at present incapable of timely processing and analysing most of its data, DGF as well as Extension and Research are seriously suffering from both a lack of periodic benchmarks to assess their progress and from a shortage of feedback to monitor their future action.

SCAD shortcomings will have to be overcome at the shortest possible notice if PNS is to continue after September 1983. It is no longer excusable for a project which has been in actual operation for four years not to have solid information on farming systems, labor force requirements for crops other than maize, the assessment of major constraints preventing the development of small-scale agriculture, the identification of the farmers' best problem-solving devices, etc.

Several steps will have to be undertaken for SCAD to become fully effective. Firstly, a small team made up of an agronomist with considerable interest in extension problems, a rural sociologist/anthropologist with a good understanding of tropical agriculture and an agricultural economist who has previous experience with small farmers in Africa should come out at once to North Shaba to sketch out a picture of the farming situation in the area.

The same team should also help SCAD personnel to redesign their present methodology. The collection of data should be more problem-oriented (What are the main bottlenecks? Why are certain parts of Kasai I package accepted by a few people and not by others?, for example), and it should also be conceived in a way such that the material is processed, analysed, and written up quickly. As non-utilized data tend to give a false sense of security, its accumulation is worse than no data at all

The members of this multidisciplinary team should also briefly work with some of the professionals of the other sub-systems (including PMU) to make sure that they fully understand how they can best use SCAD services. A monitoring and evaluation unit within an agricultural project is of recent introduction in Zaire and some of the key people in PNS admit that they still are puzzled about its exact role.

It would be ideal if at least one member of a SCAD backstopping team could come back to the field from time to time to supervise the work and provide sustained support. Everything possible should also be done to recruit extra Zairian staff to reinforce the sub-system.

4.3. LACK OF MANAGERIAL SKILLS

Besides the difficulties just analysed, several factors account for the limited impact of DGF activities. These factors also apply to C.+C. sub-system.

One has to do with the minimal attention paid to planning, management and evaluation within the sub-systems (see Sylvia Watts' report for a detailed analysis of these problems).

It is true that one cannot expect a specialist in rural development, agricultural economics or any related discipline, to necessarily be a specialist in project management as well. It should be incumbent on PNS, however, to provide some basic training in administration to all the heads of the sub-systems and to all the technical advisers. To argue that lack of managerial skills is a national disease in Zaire for which there is no cure is just not admissible since one raison de'etre of a project like PNS is precisely to transfer skills.

4.4. LACK OF INCENTIVES

Another cause which explains why DGF and C.+C. have thus far achieved so little relates to what could be called "lack of incentives". This, however, is not specific to DGF and C.+C.; it hampers all PNS sub-systems.

There is no reward system whatsoever in the Project. As a consequence, all employees stand on the same footing regardless of how well or poorly they perform. That seniority was not taken into consideration to determine one's salary was another grievance. When the PMU was questioned on this matter, no clear answer was given.

A promotion and reward program would certainly contribute to boosting the low morale of PNS Zairian personnel. The Project should also give top priority to the integration of its cadres into the national employment structure. Should the Project terminate in the near future, these people will suffer because they lack job security and have no recognized experience as civil servants.

4.5. INADEQUATE TRAINING PROGRAM

Training opportunities are an incentive of great importance, yet of severe neglect by the Project.

The elaboration of an adequate training program should be of utmost priority to motivate those who are working for the Project and to attract future candidates if PNS continues after 1983. Although a substantial sum of money was planned for the training of Zairians abroad, only one has been to the United States for advanced studies and only a handful have been outside the country for seminars, workshops or short-term courses.

It was explained that for financial reasons the training of Africans should, whenever possible, be done in Third countries and even better, in Zaire. There is little to argue against, provided pertinent training exists and is made available.

At present, nobody, either from DAI or from USAID/Kinshasa, has an exhaustive and up-to-date list of African Universities, Institutes, or Schools likely to provide courses that could be useful to PNS personnel. Planning any serious program is therefore out of the question.

As an alternative, USAID/Kinshasa has asked the U.S. Department of Agriculture to provide the instruction for some courses to be given in Zaire in the near future. It should be emphasized that this initiative will only partially remedy the problem. Its effectiveness will also be very closely linked to the language ability of the teachers, who should be either native French speakers or people who are perfectly bilingual.

Any compromise on that issue will further exacerbate the feeling of irritation and frustration that is growing among PNS Zairian staff-members, who too often have to guess - rather than understand - what some of the Americans of the Project are talking about.

In-service training only occurs on a limited basis at the moment, for some of the expatriate posts are not filled and also because some of the professionals provided by the contractor are so inexperienced that they themselves need backstopping.

In this respect, it was very difficult for all evaluation team members not to feel that the great potential of the Zairian personnel was not sufficiently enhanced. It would have been troublesome enough to find that the blind were leading the blind. But to discover that, at times, the blind were leading the one-eyed person was more than embarrassing.

To close this section on training, it should be mentioned that organized visits to other agricultural projects in Zaire and the establishment of a small collection of the basic literature on rural development in the context of small-scale farming would benefit all those in the field.

4.6. ABSENCE OF CLEAR AND CONSISTENT PRIORITIES

The last and possibly most important problem that both DGF and C.+C. have to face is the absence of clear and common priorities. This in turn has hampered the development of a program of well-defined, concrete and coherent activities.

As far as DGF is concerned, this situation is partly attributable to the open-ended and muddy character of the objectives that were set for the sub-system some time back.

The main change recommended for DGF in the revised Project Paper well illustrates the point. It reads: "A sharper definition of objectives for the sub-system, which will involve closer integration with other sub-systems' efforts in agricultural production, technology generation, and dissemination and marketing will require... [that] emphasis on the economic viability of farmer groups...be reinforced. The sub-system will also attempt to be responsive to social service demands from farmer groups" (1980: 14-15).

In other words, the activities of the sub-system should be refocused on... almost everything!

Another basic reason why DGF experiences difficulties in achieving significant results in related to the fact that in the field of marketing, which has been defined as one of its main spheres of operation, its anticipated activities sometimes clash with those of the commercialization and credit sub-system.

C.+C.'s difficulties in conciliating its basic tenets with PMU's requests and USAID's prerequisites for loans have been broached earlier on.

Conflicts of interest between DGF and C.+C. could be avoided if both sub-systems could merge and work under one leadership with one coherent set of objectives and priorities. A lot militates in favor of the consolidation

of these two sub-systems which are singularly weak, both in terms of personnel (less than 20 employees, in all) and of overall achievements.

The new system should be rebaptized (the sub-system of "Rural Economic Development" was a name suggested) in a way such, that no one gets the impression that he has been cannibalized by the other.

At this point, it should be mentioned again that no such measure should be taken unless PNS mandate is extended beyond September 1983.

5. POTENTIAL ALTERNATIVES

Should a revamped PNS emerge from the ashes of the old one, the new sub-system should phase out its help to big merchants and polarize its effort on concrete, measurable actions leading up to the alleviation of the work load on the farm and to the increase of small farmers' revenues through marketing. Any matter connected with crop production, as such, should remain the province of the Extension unit.

At this time, only provisional suggestions likely to prompt those who might redesign PNS II can be made.

One of these activities would consist of promoting the sale of small hand mills to reduce the lengthy task of maize grinding in the Kongolo and the northernmost part of Mbulula sectors. This enterprise should be undertaken with the active collaboration of the "Condition féminine" Department (see Sylvia Watts' report for a thorough discussion of this proposition).

The private sector might also be interested in taking over such a project or parts of it.

The purchase of bicycles by small farmers' groups might also be worth exploring. Up to last year, there was not much point for farmers to market their maize in town, instead of selling it at the farmgate, since the price everywhere was the same.

The big discrepancy which prevails at present between the farmgate price and the price offered for maize at the counter (50% more) might encourage farmers to come more often to town to market part of their production.

Some may thing that the use of bicycles, and not that of trucks, constitutes a step backwards. At the risk of laboring a point already made, it is necessary to repeat at this juncture that the rental of trucks by farmers is a measure which, although it has the appearance of progress and modernism, is in fact no more than a stop-gap which has no chance of sustainability whatsoever after PNS' departure.

An extremely quick series of interviews with men whose job consists of commuting between Kongolo and different villages indicates that, at least in theory, such an undertaking would be technically feasible.

Indeed, the persons interviewed said that it was possible to transport sacks weighing up to 50 kgs or drums containing about 40 liters of liquid over distances exceeding 70 kms on a three to four times a week basis. All these men had had their bicycles for at least eight years and were convinced they could last much longer, provided adequate repairs were regularly done.

Financially, the prospects are good also, since each trip to a maize counter would generate, this year for example, an extra income of Z25, a sum of money that many people take several days to earn in the PNS area. Since the same means of transport could also serve to carry other products (rice, groundnuts, oil, etc.), the initial cost could be rapidly paid off. The use of a bicycle could become even more profitable if some Farmers' Groups could appoint one of their group members to run a shuttle-service and so commercialize most of their production for a small commission.

This activity should also be carried out with the active collaboration of a Zairian agency, probably the Rural Development section of the Department of Agriculture.

As for the case of maize grinders, the private sector might be interested in the promotion of such a project, which should go along with the sale of sacks and drums.

If so, the role of PNS II could be more oriented towards the teaching of marketing, accounting and investment principles and towards maintenance training.

If a sufficient number of farmers are in a position to decide for themselves when, and to whom, they want to sell their crop, collective bargaining may become a reality.

ANNEX I :

Farmer Group Marketing Activities in 1980-1981.

Village	No. of Members	Total Weight(kg)	Wt/Member (kg)	Net Income (.90 Z/kg)	Normal Income (.60 Z/kg)	Income Increase (Z)	% Increase
Malomo-Agri	12	40,604	3,384	2,618	2,031	587	28.9
Majikazo	6	30,732	5,122	3,962	3,073	889	28.9
Ndenga	4	3,605	901	697	541	156	28.8
Tujaribu	10	2,500	250	193	150	43	28.7
Nyanga	4	5,259	1,314	1,016	788	228	28.9
Senga	15	14,412	961	743	576	167	29.0
Apandaki	4	11,813	2,953	2,284	1,772	512	28.9
Average	8	(15,561)	2,126.5	1,645	1,276	369	28.9

Source: DAI 1982: V-5

ANNEX II :

Results of Women's Group Activities in 1980 - 1981.

		Season A		Season B	
Village	Members	Activity	Result	Activity	Result
Kateba I	5	Soybeans	Not Harvested	---------	---------
Kateba II	12	Soybeans	Some kept, rest sold for Z 52	Peanuts	Harvested later, half sack unsold
Kateba III	4	Soybeans	Not harvested	Soybeans	Harvest sold for Z 12
Mbulula	5	Vegetables	Shared among members	Soybeans and Peanuts	Shared among members
Kilumba	5	Soybeans and Peanuts	Not harvested	Soybeans and Peanuts	Eaten by antelopes
Muranganangа	8	Peanuts	55 kgs(20 bags) sold for Z 50	Peanuts and Cotton	Field untended poor harvest

Source: DAI 1982: VI-8

ANNEX III a:

KONGOLO SECTOR

PRODUCERS' PRICES 1980 (in Zaires)

LOCATION	PRODUCTS	UNIT OF MEASURE	JAN	FEB	MARCH	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
KONGOLO	Maize Gr.	100 kgs	50	50	45	40	45	45	50	50	65	75	75	92,50
	Maize Fl.	100 kgs	100	100	100	100	100	100	100	-	-	-	-	116,50
	Groundnts	100 kgs	143	143	128,50	243	243	243	243	243	228,50	228,50	228,50	286
	Shelled groundnts	100 kgs	250	250	225	250	150	150	-	-	-	-	-	-
	Rice	100 kgs	120	120	120	120	120	120	120	120	145	160	180	230
	Palm oil	200 ltrs	350	450	450	450	450	500	600	600	550	540	650	650
SOLA	Maize Gr.	100 kgs	45	45	42,50	45	45	45	45	50	60	65	65	75
	Maize Fl.	100 kgs	100	100	100	100	100	100	100	-	-	-	-	-
	Groundnts	100 kgs	120	120	95	100	-	-	-	-	220	240	-	-
	Shelled groundnts	100 kgs	100	100	86	86	145	145	145	145	160	200	200	245
	Rice	100 kgs	80	80	100	100	100	100	120	100	120	120	140	150
	Palm oil	200 ltrs	210	180	360	360	300	410	450	410	360	420	450	450
MBULULA	Maize Gr.	100 kgs	40	40	40	45	45	45	45	45	50	50	65	75
	Maize Fl.	100 kgs	-	-	-	-	-	-	-	-	-	-	-	-
	Groundnts	100 kgs	-	-	-	-	-	-	-	-	-	-	-	-
	Shelled groundnts	100 kgs	-	-	86	86	-	-	-	-	-	-	-	-
	Rice	100 kgs	76	76	100	100	100	100	100	90	120	120	160	200
	Palm oil	200 ltrs	195	150	400	400	300	350	450	410	420	450	450	450

Source: C.+ C., April 1982 (on request)

ANNEX III b:

NYUNZU SECTOR

PRODUCERS' PRICES 1980 (in Zaires)

LOCATION	PRODUCT	UNIT OF MEASURE	JAN	FEB	MARCH	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
NYUNZU	Maize Gr.	100 kgs	-	-	-	40	45	45	45	80	90	120	110	120
	Palm oil	200 ltrs	-	-	-	750	750	750	750	750	750	900	900	900
	Groundnts	100 kgs	-	-	-	125	103	120	120	150	180	-	-	-
	Shelled groundnts	100 kgs	-	-	-	250	-	230	250	300	300	350	350	350
	Rice	100 kgs	-	-	-	100	80	200	200	200	240	300	320	320
LENGWE	Maize Gr.	100 kgs	-	-	-	40	40	45	45	45	45	48	-	-
	Groundnts	100 kgs	-	-	-	90	100	120	120	150	150	-	-	-
	Shelled groundnts	100 kgs	-	-	-	125	-	250	250	250	250	250	250	250
	Rice	100 kgs	-	-	-	100	80	100	100	145	145	120	120	200
	Palm oil	200 ltrs	-	-	-	300	300	425	450	300	300	375	450	450
LUIZI	Maize Gr.	100 kgs	-	-	-	40	45	45	45	45	45	45	-	-
	Groundnts	100 kgs	-	-	-	120	106	120	120	150	150	-	-	-
	Shelled groundnts	100 kgs	-	-	-	-	-	250	250	250	250	250	250	250
	Rice	100 kgs	-	-	-	200	120	200	200	200	250	-	-	200
	Palm oil	200 ltrs	-	-	-	750	750	700	900	900	900	750	900	900

Source: C.+ C., April 82 (on request)

ANNEX IV:

CONSUMERS' PRICES 1980 (in Zaires)

LOCATION	PRODUCT	UNIT OF MEASURE	JAN	FEB	MARCH	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
LUBUMBASHI	Maize Gr.	100 kgs	100	150	130	130	90	90	90	95	120	145	220	220
	Maize Fl.	100 kgs	150	180	170	160	200	200	200	165	180	180	220	220
	Groundnts	100 kgs	-	-	-	-	345	345	428,50	428,50	-	-	-	-
	Shelled groundnts	100 kgs	300	250	265	300	300	350	450	400	380	425	650	750
	Rice	100 kgs	145	180	220	260	240	225	280	320	320	320	265	335
	Palm oil	200 ltrs	875	725	1200	1500	900	1100	1000	750	900	950	1000	1050
KAMINA	Maize Gr.	100 kgs	120	110	100	95	80	85	85	90	130	150	200	250
	Maize Fl.	100 kgs	150	130	140	135	165	165	200	200	200	225	-	-
	Groundnts	100 kgs	400	265	250	230	-	-	-	-	-	-	-	-
	Shelled groundnts	100 kgs	250	200	225	250	250	280	350	325	350	375	400	425
	Rice	100 kgs	145	145	150	200	200	240	240	220	225	260	280	340
	Palm oil	200 ltrs	800	550	675	900	850	900	900	875	850	900	950	950
KALEMIE	Maize Gr.	100 kgs	80	100	100	110	75	85	90	85	95	110	150	175
	Maize Fl.	100 kgs	130	120	140	135	165	165	200	185	200	200	180	180
	Groundnts	100 kgs	400	285	230	-	-	-	-	-	-	-	-	-
	Shelled groundnts	100 kgs	280	250	225	250	200	250	350	325	300	300	400	425
	Rice	100 kgs	160	145	150	175	145	160	240	190	200	260	360	380
	Palm oil	200 ltrs	800	625	675	1250	750	900	850	850	800	850	950	900

Source: C.+ C., April 1982 (on request)

ANNEX V:

P.N.S. ASSISTANCE TO TRADERS

TYPE OF TRADER	TRUCK RENTAL			SALE OF FUEL			SALE OF SACKS		
	79	80	81	79	80	81	79	80	81
TARICA	-	-	-	-	-	-	-	-	60,000
BIG MERCHANTS	4	1	1	14,200	7,800	13000	-	-	13,746
MIDDLE-SIZED MERCHANTS	3	4	9	16,240	12,000	11000	19	-	-
SMALL MERCHANTS	16	29	24	51,460*	10,400	6260	-	-	841
FARMER TRADERS	54	9	76	-	-	200	2925		216

Source: C.+C., April'82 (on request)

*This figure seems exaggeratedly high according to one of the ex-chiefs of P.N.S. Party

ANNEX VI:

TRUCKS AVAILABLE IN P.N.S. AREA DURING MARKETING SEASON

TRADERS	SECTOR	1979	1980	1981	1982	REMARKS
	Nyunzu				Expected during marketing season	
S.B.S.	"	11	10	10	22	Already bought 2 trucks from PNS
NYEMBO AMISI	"	6	4	3	4	Could get credit
ALI SALIM	"	0	3	7	12	Could buy cash
KOSTOGLOU	"	11	0	0	0	
KYUNGU NGOY	"	0	1	1	2	Could get credit
LUHUNGA NGOY	"	1	1	1	1	
KITAMBALA KAGELA	"	1	1	1	1	
KANKOLE MAKONGOLO	"	1	1	1	1	
KAHITE SENGA	"	0	0	0	1	
COMMERCIALE SHAB.	"	0	6	6	9	Could get credit
NYEMBO MWARABU	"	0	1	1	1	
SALEH SAID M.	"	0	0	1	1	
GENERALE DE TANGANYIKA	"	0	0	1	1	Could get credit
KIPEKEPEKE	"	0	0	0	4	Could get credit
	Kongolo					
KIBWE SAKINA	"	5	3	6	12	Could buy cash
P.N.S.	"	3	4	5	6	
UMBA LENGE	"	0	2	4	5	Could buy cash
MALI YA BUTOTO	"	1	0	1	1	Could get credit
LUALABA	"	0	4	2	2	

TRADERS	SECTOR	1979	1980	1981	1982	REMARKS
	KONGOLO					
MULAMBA MUYOLOLO	"	0	0	2	2	
REHANI JUMAINI	"	0	1	1	1	
OMARI TAMBWE	"	0	1	0	2	
TWENDE MBELE	"	0	0	1	1	
MISSION CATHOLIQUE	"	0	0	1	1	
MUMBUNGA	"	0	0	0	1	
MBAYO IDI	"	1	1	0	0	
KULOLEKO	"	0	0	1	0	
KABEBE	"	1	0	0	0	
TASABU	"	2	0	0	0	
TWITE KATEMBWE	"	0	1	0	0	
HODOLF TAMBWE	"	1	0	0	0	
YUMA SHAOZI	"	1	0	0	0	
TOTAL		46	44	57	90	

Source: C.+ C., April'82 (on request)

ANNEX VII:

LABOUR INPUT FOR MAIZE PRODUCTION

1980-1981

1. KONGOLO SECTOR	MAN-DAY OF WORK PER HECTARE		
OPERATION	MAN	WOMAN	CHILD
1) Preparation	17,46	11,36	0,48
2) Planting	3,88	3,62	0,45
3) Weeding	14,42	12,23	0,45
4) Harvesting	3,36	5,66	0,34
5) Post-Harvest	3,66	4,36	0,33
Total	42,78	37,23	2,06
%	50,7	44,1	2,4
2. MBULULA SECTOR			
1) Preparation	20,58	10,80	0,96
2) Planting	4,81	4,44	0,66
3) Weeding	24,08	21,65	2,04
4) Harvesting	9,01	12,42	0,87
5) Post-Harvest	3,82	5,39	0,57
Total	62,30	54,70	5,10
%	50,2	44,1	4,1
3. NYUNZU SECTOR			
1) Preparation	15,46	8,21	0,36
2) Planting	7,55	7,41	0,36
3) Weeding	7,64	6,42	0,36
4) Harvesting	10,67	8,15	0,40
5) Post-Harvest	11,88	8,70	0,40
Total	53,20	38,89	1,88
%	48,7	35,6	1,7
Great Total	158,28	130,82	9,04
%	49,8	41,2	2,8

Source : SCAD, April '82 (on request)

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PNS 1982 — Projet Nord Shaba: Rapport annuel 1980-1981, Kongolo, Zaire, 59 pp.

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SARGENT, Merrit 1981 — Project North Shaba 1980-1981: End of Tour Report, Dec. 31, 55 pp.

WATTS, Sylvia 1982 (forthcoming) — Evaluation of "WID" in North Shaba Project.

EVALUATION REPORT OF THE INTERMEDIATE TECHNOLOGY PROGRAM OF THE NORTH SHABA RURAL DEVELOPMENT PROGRAM (660-0059)

by

Joseph K. Campbell, P.E., Ronco, Inc.

May, 1982

The statement of work for the Evaluation team describes my responsibility as follows:

"The Intermediate Technology Specialist shall, through observations of current Project tool-production activities and visits to a number of farms throughout North Shaba evaluate the appropriateness of tool production. He shall evaluate the technology in terms of increasing the productivity of farm labor, the timeliness of operations, time savings and the efficiency of farm operations generally. He shall also identify likely future needs for intermediate technology beyond basic hand tools and assess the adequacy of current efforts to meet these needs.

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And he shall recommend changes which could not only make this syb-system more effective but also increase the chances of project process sustainability beyond the termination date of AID's participation. Specifically, he shall :

a. Evaluate past and current production levels, inputs, training and final use of tools to determine the success of this sub-system in meeting project objectives.

b. Evaluate the future financial and physical viability of this sub-system activity. Has GOZ/ Project subsidization as practiced been necessary/justifiable in the past? Will imports be necessary in the future or could intermediate technology efforts use mainly local resources? Could local manufactures be competitive with tools brought in from Kinshasa or abroad?

c. Determine if there are any entities, public or private, capable of taking over this sub-system after project termination.

d. Explore the advisability of further promoting private repair/fabrication shops in village or larger communities, using the blacksmiths trained under the project.

e. Determine the effectiveness and appropriateness of

current project training, both formal and informal, as well as the levels and types of training required to carry on current or expanded levels of manufacturing and distribution plus research and development. Is continued blacksmith training advisable? Are current locations of traing appripriate for the future?

f. Evaluate future intermediate technology needs and assess the sub-system's capability to meet these needs.

g. Explore the desirability and possibility of integrating intermediate technology activities with agricultural research activities.

h. Identify and define the range of physical and natural resource constraints that would affect an expanded technology development effort.

i. Suggest categories (and examples within these categories) of tools and equipment that seem most appripriate and affordable for farmers within the project area.

j. Review the distribution system for hand tools and other intermediate equipment. Are tools and equipment available as well as affordable to small farmers? Outline recommended options for improved distribution.

After an evaluation team discussion it was decided that the report should also include a discussion of the replicability and sustainability of the Intermediate Technology Subsystem.

Field observation and visits were made prior to the writing of this report. Three days were spent in Kinshasa, one day at the Cassava Research Station (INERA) at M'Vuazi, 20 days in or near Kongolo, a day at the Ngaba Research station near Mbulula, a day in the Kivu Sola area and two days in the Nyunzu area.

The reports most applicable to the Intermediate Technology Subsystem are listed as Appendix A. Names of persons in Zaire with whom I discussed farming, tools and the North Shaba Project are listed as Appendix B.

CHAPTER I - INTRODUCTION

The "Project North Shaba" began as the North Shaba Maize Production Project (No. 660-11-199-059) had as its purpose "to identify an effective rural development process for improving small farmer production and income which is replicable in other parts of Zaire". (Ref. 16). The primary sub-goals of the Intermediate Technology Subsystem were to:

1. Purchase and sell to farmers:

   500 corn shellers (maize shellers)
   500 hand mills (burr mills)
   200 peanut decorticators (hullers)
   200 rice hullers
   100 oil palm presses
   10,000 machetes, coupe-coupes, ect

2. Establish an Intermediate Technology Center at Kongolo to manufacture appropriate equipment for sale to farmers and to train village blacksmith to repair imported and Intermediate Technology Center produced equipment.

3. Develop improved maize storage facilities.

It was postulated that by making appropriate agricultural tools and village level processing equipment available to small farmers - a more efficient use of labor would result, thus making a

significant contribution to the attainment of the project goals.

The orginal Project Paper was signed in Sember 1976 and was scheduled to terminate on September 1982.

The grain storage activity proposed in the project paper was never undertaken, but this was due to the termination of the National Office of Cereals (ONACER) program and was not a deficiency on the part of the Intermediate Technology substem. The responsibility for grain storage work was transferred from Intermediate Technology to the Research and Extension Subsystem.

In August 1980 the original Project Paper was changed to the "North Shaba Rural Development" project (No. 660-059) which had as its purpose (Ref.17) "to increase the net income of small of small farmers in the project area by 100% by the end of the project as a result of raising corn production from 27,000 MT (1978) to 49,000 MT; and to develop a rural development process in the form of a model that is replicable in other parts of Zaire". The project assistance completion date was extended to September 30, 1983.

Under the amneded Project Paper to the primary sub-goals of the Intermediate Technology Sub-system were to :

1. produce tools and machines in the refurbished SNCZ shop in Kongolo
2. train local blachsmiths
3. Test and fabricate appropriate machines for village use.

The Intermediate Technology dollar budget for the final three years of the project (1980 - September 30, 1983) also provided for :

1. funding through 1981 for an expatriate engineer
2. two man-months of technical assistance
3. training of Intermediate Technology Sub-system personnel outside of Zaire
4. $47,000 for new equipment.

The most important evaluations of and recommendations for the Intermediate Technology system are provided in the following reports:

1. Evaluation of the North Shaba Integrated Rural Development Project Zaire by Dimpex Associates (no date)
2. Small Agricultural Tool Production in Zaire by William Fiebig, May 6, 1981
3. Report on Production of Small Agricultural Tools in the PNS Project by Manfred Mueller, August 1981
4. End of Tour Report by Merritt Sargent, December 1981
5. End of Tour Report by Brook Aitchison, January 1982
6. Five Years Later: Progress and Sustainability in Project North Shaba by Development Alternatives, Inc., March 1982.

The reports by Fiebig and bv Mueller are the most useful for evaluation of the IT subsystem.

Although the six reports are useful, none was prepared by an engineer from outside of the project -- a striking void. Because of training and experience, an engineer would have more likely observed strengths and weakness of the I.T. Subsystem not observed by persons trained in other disciplines.

The Mueller report (Ref. 3) is very useful in that it contains cost-of production-data and makes the point that the tool quality/cost trade-off can only go so far before a farmer will refuse to purchase a low quality tool even if he can purchase it at a low price.

The Fiebig report (Ref. 2) provides some detail about the physical operation of the Intermediate Technology subsystem as well as a description of other intermediate technology activities in Zaire.

Mr. Brooks Aitchison was the only advisor to the Intermediate Technology subsystem, so his End of Tour Report (Ref. 1) is useful in providing a sense of the philosophy of the I.T. subsystem. The organization chart of the I.T. subsystem is shown as appendix C.

There have been in North Shaba some physical and natural resources constraints that have retarded an expansion of technology in regards to agricultural tools and machines. In my opinion

the major constraints to the use of more agricultural technology in the form of tools and machines by farmers are:

1. Lack of money
2. Lack of animal mechanical and electrical power
3. Availability of land
4. Poor transportation.

Some data (Ref. 3) indicate that the average farmers' household requires seven hand tools and the average life of a tool is five years. If the average cost of a tool is 15Z, the farm household must spend 21Z (7 tools ÷5 years x 15Z = 21Z) annually just to replace basic tools. Since the total cash available to the household is somewhere between 325 and 1,000 Z, there is little discretionary income available for additional agricultural machines and tools. In view of this condition, a tool or machine must,,because of its uniqueness, be available if task is to be done - machete would be in this category; or the technology must be so far superior in performance to the traditional method that it is economically desirable - for example, the manually operated maize grinder

The farmer in North Shaba lacks animal or mechanical power. Since it is primarily power by which a person's effort is amplified, it means that the farmer in North Shaba for the present and for the probably life of Project North Shaba will be constrained to manual power. A well-fed man has a work output equivalent to about one-tenth horsepower over eight hours.

Animal power in the form of cattle or horses does not appear feasible because of the tsetse fly. If the tsetse fly were to be eliminated, the introduction of draft animals into a society which has not utilized draft animals would be a long term development process. Mechanical power in the form of internal combustion engines is also unfeasible at present because of lack of income to support the machines and the poor availability of fuel in the countryside.

For the present, it appears that human powered equipment is the most feasible, although the choice of useful technology is very limited because of the small power output of a person.

In North Shaba there is sufficient land for slash and burn agriculture although it is true that farmers must travel further and further from their villages to find "forest" land to slash and burn and plant to maize. Since the farmer can farm with low power input by using slash and burn methods, there is not pressure on him to intensify agricultural production on the land by the use of higher outside energy sources such as fertilizer; more efficient cultivation methods such as planting in rows and using push type cultivators; or utilizing the internal combustion engine to pump water for supplementary irrigation to grind maize, etc.

Poor transportation increases the cost of moving farm produce to market and thus reduces the farmers market and income. The lack of transportation retards the flow of information and limits the availability of spare parts. The lack of transportation in North

Shaba has limited the effectiveness of the Extension service, has made it difficult for farmers to attend meetings, and has caused serious problems in repairing mills distributed by the I.T. subsystem and delivering steel to blacksmiths.

CHAPTER 2. FINDINGS

Measurements.

The basic objectives of the Intermediate Technology subsystem currently are to (1) produce hand tools such as hoes and machetes, (2) produce processing equipment for village use such as peanut decorticators and small burr mills, (3) train blacksmiths to produce hand tools, and (4) operate a repair center.

Since tools and machines produced and people trained are physical entities, a measure of accomplishment can be obtained merely by counting the various items. These data have been gathered by the Intermediate Technology Subsystem and have been reported in various project reports.

The reason that tools and machines should be fabricated and blacksmiths trained is to provide farmers with useful and economically viable tools. Before tools or machines are designed, it is essential that the customer's (the farmer in North Shaba) wants, needs and preceptions of tools as well as his ability to purchase tools is known. After the initial gathering of this information, there must be a feed-back loop between the customer and the I.T. Subsystem in regards to tool performance.

It appears to me that in the interests of efficiency, this information should be obtained and disseminated by the Information

Subsystem (SCAD). However, SCAD was not staffed to serve as a feed-back loop for the I.T. Subsystem, so at the end of 1980, the I.T. Subsystem established a "Research and Development Service" (Ref. 1). However, from discussion with farmers, checkin of tools at the depots at Kongolo, Mbulula Nyunzu, and discussions with the Chief of the Intermediate Technology subsection, it is obvious that the feed-back of farmer, PNS extension personel, SCAD and the I.T. subsystem is not yet effective.

Accomplishments of the Intermediate Technology Subsystem

1. In Kongolo an Intermediate Technology Center and Workshop was established in the former railroad and shipyard shops (Chemin de Fer des Grands Lacs railroad and river transportation) belonging to the National Railroad Company (SNCZ). By September 1977, the I.T. Subsystem consisted of the subsystem Chief Cit. Sedzabo and a head blacksmith leading a five-person team with four shop machines in use and a small tool production of 200 units per month (Ref. 1).

2. From the initiation of the project in 1977, through March 1982, approximately 33,000 tools such as hoes, machetes, coupe-coupes, etc. and 225 machine prototypes and processing machines (such as peanut decorticators and palm oil presses) were produced by the I.T. subsection.

I.T. TOOL PRODUCTION

Year	Hoe	Machette	Coupe-Coupe	Shovel	Blacksmiths Misc. Tools	Axe
1978	4,231	1,273	1,763	0	0	856
1979	3,532	263	1,702	30	533	278
1980	2,752	1,301	1,694	8	2,337	237
1981	3,173	924	2,246	403	1,363	0
1st. Qtr. 1982	460	89	568	0	0	0
TOTAL	14,148	3,850	7,973	441	4,235	1,371

Source : Ref. 14

I.T. MACHINE PRODUCTION

Year	Palm Oil Press	Peanut Decorticator	Misc. Machines
1978	21	0	0
1979	50	43	0
1980	11	23	42
1981	14	21	0
1st Qtr. 1982	0	0	0
TOTAL	96	87	42

Source : Ref. 14

3. Besides the hand-tools, at least one prototype was constructed after research about the following machines (Ref. 1) :

Grain winnower
Wire loop pedal threshers
Diaphragm irrigation pump
Lift pump for water well
Soap making techniques
Protective box for (water) spring
Maize shellers (3 designs)
Blacksmith's forge
Palm oil press

I.T. REPAIR INCOME

Year	Income from Repair work (Z)	Receipts from repairs & tool sales as reported by PNS Accounting Office (April 1982)
1978	795.75	-
1979	7,592.50	19,472
1980	9,417.00	7,309
1981	26,692.00	89,516.60
1st. Qtr. 1982	12,660.00	10,253.
	67,157.25	1,26.550,60

Source : Ref. 14

4. From 1978 through the first quarter of 1982 the Intermediate Technology Subsection in the Kongolo shop performed Z.67,160 of repair work for farmers and merchants.

5. Beginning in March 1979, eighty-six men from villages in the project area received two weeks of blacksmith training at the I.T. Shop. As part of the training the made their own blacksmithing tools.

6. In the last quarter of 1977, the expatriate advisor for the Intermediate Technology subsystem, Mr. Aitchison, received a month's training in blacksmithing and related work in England. From October 1980 through January 1981, the Chief of subsystem, Cit. Sedzabo Seko, received training in Intermediate Technology in France.

Cost of Accomplishments of the Intermediate Technology Subsystem

It is difficult to obtain exact financial data for the Intermediate Technology Subsystem (ITSS) from the Project Management Unit (PMU), but examination of the cost of the ITSS and the cost of the North Shaba Project reveals that the Intermediate Technology Subsystem has received about 5 1/4% of the project's funds. See the following table.

Intermediate Technology Subsystem Expenditures

Calendar Year	$ U.S.	Countepart Funds (Z)	G.O.Z. (Z)
1977	251,000.	0	0
1978	70,000	0	0
1979	45,000	0	41,600.
1980	26,000	40,270	62,540.
1981	351,000	13,824	157,650.
TOTAL	743,000	54,094	261,790.
Total PNS Budget 77-82	$14,126,000	Z8,557,050	Z8,360,865.
I.T. as % of PNS	5.26%	0.63%	3.12%
1982 I.T. BUDGET	$54,600	0	Z240,000.
1982 PNS BUDGET #	5,222,400	706,000	12,375,00
I.T. as % of PNS	1.04%	0%	1.94%

Source: Data from R. Ackerman of PMU on 17 April, 1982

CHAPTER 3 - ANALYSIS OF FINDINGS

At a point where three-quarters of the project life has been expended what is the health of the Intermediate Technology Subsystem? Has it met the goals set for it during the evolution of Project North Shaba?

Among the various subsystem of PNS, the Intermediate Technology Subsystem is unique in that there has been only one chief of the subsystem, Cit. Sedzabo Seko, and one expatriate advisor, Mr. Brooks Aitchison. Cit. Sedzabo joined PNS in January 1977, and arrived in Kongolo at the of 27 as chief of the Intermediate Technology Subsection in August 1977.

Cit. Sedzabo is an Agricultural Engineer (B.S. d'Engenieur du Genie Rural, National University of Zaire, July 1976) and had five months of experience as an irrigation engineer before joining Project North Shaba.

Mr. Aitchison at the age of 23 arrived in Kongolo in September 1977, as a Peace Corps advisor to Cit. Sedzabo and the Intermediate Technology Subsection. Mr. Aitchison has a B.S. degree in mechanical engineering.

In his End-of-Tour report of January 1982 (Ref. 1), Mr. Aitchison evaluates the I.T. Subsystem by writing:

"I believe that we have generally achieved ITSS' three basic goals, but much work still needs to be done. We have a strong production and repair center that is organized and functioning very well, but is not yet self-financing. We have an RID service which ties into this Center. It is functioning and productive, but at a very slow rate. Much could be done to expand this service. We also have a training service which is viable, productive and successful, but which could be expanded into other technical fields as well.

"What have been ITSS' quantitative outputs to date? We have produced and sold over 25,000 handtools in the project area. We have produced and sold over 170 Intermediate Technology machines. We have performed over 40,000 Z. worth of outside jobwork for clients. We have taught 86 village blacksmiths how to forge agricultural hand tools and make blacksmithing tools. We have sold over 5 tons of metal stock to these blacksmith for use in forging agricultural hand tools. We have trained 40 Intermediate Technology Technicians and Administrators in the day to day operation of an I.T. Center."

One of the first tasks for the I.T. Subsystem was to renovate the unused machine shop, forge shop, and foundry which PNS had acquired from the National Railroad Company (SNCZ). The equipment includes three drill presses, four large engine lathes, three small engine lathes, a shaper, a planer, a power hacksaw, a forge with under the floor air draft sytem, a pneumatic drop hammer, a cupola, supply of coke, and crucible among other machine shop and carpenter shop equipment. However, the I.T. subsystem does not have on hand in Kongolo an inventory of the equipment and facilities purchased from SNCZ. Has some equipment removed from the shops? For example, were the powered metal shears and the two-meter wide set of powered rolls, now in an adjacent SNCZ shed, included in the sale? PNS is fortunate to have the elements for a good production and training facility as found in the SNCZ shops it acquired in Kongolo. Renovation of the I.T. shop facilities is about 85% completed.

Five old steel barges on a "marine railway" adjacent to the shop are the source of steel for the manufacture of agricultural and tools and village level processing equipment by the I.T. Subsystem. This source of steel is both an advantage and a curse. An advantage is that the steel is in Kongolo. A curse is that the steel is unsuitable for a tool such as a machete which must be able to retain a sharp edge and be easily bent under ordinary usage.

The I.T. Subsystem got off to a fast start in producing agricultural tools such as hoes, machettes and coupe-coupes.

"There is no good English translation of coupe-coupe although the word Scythe is sometimes used. The coupe-coupe used in Zaire is approximately 75 cm. long and resembles a lightweight machette sharpened on both edges about one-fifth of the length back from the blade tip. Since the coupe-coupe is used primarily for cutting grass, the sharpened portion is often soft bent at an angle to the major plane of the tool". In September 1977, the Subsystem was producing 200 tools per month.

What suggestions did previous evaluations make in regards to the I.T. subsystem? Has the I.T. Subsystem implemented the recommendations?

The Dimpex Evaluation of mid 1979 (Ref. 5) said little about the I.T. Subsystem, but noted that "the program is progessing generally as projected by the PP". The report contained four general recommendations."

1. The Subsytem should obtain help in gathering information concerning the demands for and the problems encountered in the use of I.T. manufactured tools.
2. The manufacturing cost and the selling price of tools should be adjusted so that the I.T. subsystem becomes a profitable venture in 1982.
3. Thought should be given to the disposal of the I.T. subsystem at the end of the project.
4. Some on-the-job training be provided for selected technicians.

The Fiebig report, "Small Agricultural Tool Production in Zaire", of May 1981 (Ref. 2) did not make any recommendations.

The Mueller report of August 1981 (Ref. 3) recommended that I.T. purchase one railcar load of used rails immediately. Railroad rails are of sufficient carbon content so thatthey can be used to make good quality machetes axes, and hoes.

The I.T. subsystem attempted to establish a feed back system to provide information about the demands for and problems with I.T. tools by inaugurating the "ITSS Research and Development Service" at the end of 1980. However, since this service consists of one person, Cit. Katuta Wailunga, it cannot be very effective as a feedback mechanism.

As to the recommendation that the manufacturing cost and the selling price of the tools he brought into line so that the Intermediate Technology Subsystem becomes self supporting; an attempt has been made to do so by increasing the prices of tools and doing more outside repair work.

Between August 1981 and November 1981 the prices of tools and machines were increased substantially. For example the price of hoes was increased from 6Z to 10Z, machetes from 7Z to 10Z, and coupe-coupes from 7Z to 12Z. An increase of output of tools would also reduce unit cost and thus increase profitability, but until quality of the tools is improved, there will be farmer resistance to purchasing PNS tools.

It is estimated (Ref. 3) that there are 125,000 basic hand tools in use in the PNS area, but that 75,000 more hand tools are needed. When one assumes that the average hand tool last five years, than there is a replacement market of approximately 25,000 hand tools per year. Since the I.T. shop has produced tools at the rate of 8500 per year (based on 4,248 tools being produced in first six months of 1981), depending on the tool mix, it would appear that sales should be assured.

Unfortunately the quality of the tools and the distribution network only three sales offices in PNS area work against increasing sales. As long as cost of production and distribution is higher than the selling price, tool production will not be financially viable.

Price list of I.T. as of Nov, 1981 and Current as of April, 1982

Hoe	10 Z ($1.79)	watering can	40 Z ($7.16)
Axe	10 Z ($1.79)	rake	15 Z($2.68)
Coupe-coupe	12 Z(2.15)	Maize shelling aid	10 Z($1.79)
Machette	10 Z ($1.79)	Palm oil extractor	500 Z($89.45)
Shovel	10 Z ($2.68)	Peanut decortication	300 Z($53.67)
Trowel	10 Z ($1.79)	Used steel plate	15/kg($1.22/lb)
Chisel	15 Z ($2.68)		
Hammer	30 Z ($5.37)		

"based on exchange rate of 5.59 Z per 1,00 U.S.$

The recommendation in the Mueller report that the Intermediate Technology sybsystem purchase a railcar of used railroad rails from SNCZ in Lubumbashi at a low price of about 300Z per ton, but now SNCZ doen't want to sell the rails. The pneumatic hammer in the Intermediate Technology forge shop would have made it possible to make tools from the steel rails.

Has the production levels of the basic agricultural hand tools and the end-use of the tools met the project objectives?

In September 1977, tool production was at the rate of 200 tools per month. In considering only the basic agricultural tools - the hoes, machetes, and coupe-coupes -- the average production rate was as follows (Ref. 14):

Year	Total	Monthly average
1977	-0-	200
1978	7,267	606
1979	5,497	458
1980	5,747	479
1981	6,343	528
1st quarter 1982	1,117	272

Source : Ref. 14

It can be seen from the monthly average of hoe, machete and coupe-coupe production that the highest rate of production was in 1978. Production then decreased due to the fact that the steel plate could not be removed from the barges at a sufficiently rapid rate. Removal of the rivets was the problem, but this bottleneck was solved by obtaining pneumatic chisels. Production then increased. The workemen were working on a bonus system. For each tool produced above a daily quota, a production bonus was paid. Unfortunately, lack of a suitable inspection standard resulted in an increased production of poor quality tools.

During the first quarter of 1982 the rate of production decreased due to lack of sales and a supply of tools in stock at the tool sales office in Kongolo, Mbulula, and Nyunzu. At the same time the Chief of the subsection tighned up on quality by rejecting the very poorest tools made by the workmen.

So it appears that the I.T. Subsystem has fairly well met the goal of the project in regards to the number of basic tools produced, but has done a poor job in regards to tool quality and tool selection. For example, the hoe preferred for weeding has a shape different from one used for tillage, but I.T. offers only one model.

Training has been conducted at three levels in the Intermediate Technology Subsystem:

1. Training of the Subsection Chief and his advisor
2. Training of I.T. workforce
3. Training of blacksmiths.

During the first half of 1977 the I.T. Subsystem Chief, received approximately a month's training in Intermediate Technology at the Centre de Development Communitaire (CEDECO) at Kimpese, Bas-Zaire. During the last quarter of 1977, the I.T. Subsystem advisor went to England for one month's training in blacksmithing and related activity. Three years later beginning in October 1980, the I.T. Subsystem Chief, spent 3 months at GRET (Groupe de Recherche et D'Echange Technologique in Marseilles, France to study intermediate technology). The training in France had much in the philosophy of Intermediate Technology but little in technical details.

Upon reviewing the first five years of the Intermediate Technology Sybsystem, it appears to me that the expatriate advisor did not have the experience required to provide needed advice and training to the chief of the I.T. Subsystem. For example, the machine tools acquired with the SNCZ shop facilities could be very valuable in manufacturing needed appropriate technology such as burr mills for grinding maize and cassava, oil palm presses, peanut decorticators, etc.

Moreover, the advisor did not obtain four elementary items necessary for utilizing a lathe and found in any operating machine shop:

1. a set of micrometers
2. a reference book for the machinist
3. cutting oil
4. a bench grinder reserved for tool bits.

Micrometers and associated calipers and depth gages are required if one is to receive the unique advantages of machine tools. As of April 1982, the finest measuring device in the I.T. Subsystem is one venier caliper.

Reference books such as the "Machinist's Handbook" or "Mark's Mechanical Engineering Handbook" in English as well as similar handbooks in French are required where machine tools are being used or metals are being forged. Such references provide information on cutting speeds, tempering temperatures, clearances for various fits, etc. In particular, where people are to be trained and the chief of the subsection is to become more efficient, such a reference book should be obtained at the initiation of the project. As of April 1982, no such references are available to the I.T. Subsystem.

Cutting oil, sometimes called machining fluid, is required when doing some types of metal cutting. The I.T. Section attempted to get by, using diesel fuel as cutting oil until 1981, when a new advisor in the Infrastructure Subsection ordered some cutting oil .

Grinders are essential for fine grinding such as sharpening drills and bits, and rough grinding such as removing flash from castings. To keep the grinding fine work, and another wheel for

fine grinding. Grinding wheels should be kept square and true by means of a simple tool called a "grinding wheel dresser". As of today there is no grinding whell dresser nor a bench grinder reserved for the fine work of sharmening drills or tool bits, in the I.T. Subsystem shop.

The training of the I.T. shop workforce has been an important element in the operation of the I.T. Subsystem. In September 1977 the I.T. Subsystem Chief Sedzabo and six other persons. Today it consists of 39, including :

1	Subsection Chief	2	Electric & Gas Welders
1	Subsection Asst. Chief	3	Mechanists
1	Research & Development Man	3	Carpenters
6	Blacksmiths	7	Maintenance
6	Foundrymen	4	Office Perso...
3	Metal Cutters on Barges		
2	Metal Cutters on Shears.		

There is no formal training program for the workers in the I.T. subsystem; however, when electrical and acetylene welding equipmment was obtained, a retired SNCZ welder was hired to teach two I.T. employees to be welders and when the foundry was renovated, a former SNCZ foundryman was hired to teach the others. The three machinists are young men who were trained in Kalemie.

A program to train village blacksmiths has always been a part of the I.T. program. The original project paper had a goal of eighty trained blacksmiths by September 1982 (Ref. 16). With the training of the last group in November, 1981, eighty-six blacksmiths have been trained (Ref. 1). So statistically, this segment of the I.T. subsection has met the Project Paper's goal.

The blacksmithing training consists of a two week course in Kongolo. The blacksmiths lodge at the home of I.T. workers. Each blacksmith receives 10 Z per day (as of Nov. 1981) to pay for food, soap, etc.

The blacksmiths are taught metal selection, tempering, tool making and management. Each participant makes a set of tools for his own use. At the end of the training period a "graduation" party is held for the trainees and their hosts.

An area of blacksmithing which does not receive attention in the training program is the forge. At the I.T. shop an electric blower provides a steady supply of air through underground pipes to the forges. Most village blacksmiths in North Shaba use a crude in-ground type of forge with poor air draft. A study of air draft systems used on forges in Indonesia and Ghana for example.

The blacksmith should also receive some training in the disassembly of the burr mill, peanut decorticator, and oil palm press, since the village blacksmith is a logical village focus for machine adjustment.

Unfortunately after the blacksmiths return to their villages with supply of steel there is not an effective distribution system to insure that blacksmiths can obtain additional steel to continue to make tools. This problem must be solved if blacksmith training is to produce results.

The Kongolo I.T. Center is the most satisfactory site for training blacksmiths,since equipment and materials as well as I.T. blacksmiths are in Kongolo. Furthermore, at Kongolo there is an opportunity to teach blacksmiths about maize mills, peanut decorticators and other I.T. machines. The I.T. shop at Kongolo should be the one blacksmith training center for the PNS area.

Integration of agricultural research and intermediate techlology research

Agricultural Research is conducted under the Research and Extension Subsystem (R&V). It is my opinion that there should not be a formal integration of the Intermediate Technology Subsystem with the research function of R&V for it has had serious difficulties in carrying out the research function. An integration of Agricultural Research and Intermediate Technology would probably be a detriment to each.

Examination of Agricultural equipment and discussions with people at the Ngaba Research Station reveal that land preparation and the growing of maize for seed multiplication was accomplished by tractor mechanization. The Ford 5600 and Fiat 880 farm tractors, Massey-Ferguson 3-bottom discplow, Ford 309 corn planter, and the I.H. 133 field cultivator which I saw at Ngaba on April 14, enables the research station to grow maize in a mechanized fashion. This is appropriate for seed multiplication and those experimental trials which do not require a farming or cultivation system as used by the farmer in North Shaba. However, when the research plots are such that the plots are to reflect conditions in farmers' fields, hoes, machetes, coupe-coupes, maize shellers, etc. manufactured by the Intermediate Technology Subsystem should be used in the research trials.

There is a definite need for increased cooperation between the Extension function of the R&V and the I.T. subsystem. At present there is little cooperation between I.T. and the Extension part of R&V. The approximately 65 Extension Persons have not been trained in the use of the tools and machines produced or imported by I.T.

The extension persons should receive training in the use of I.T. machines so that they could better serve both the farmer and

the project by being knowledgeable about the machines produced by I.T. and serve as a feed-back loop information and suggestions about improving farmers tools and village level machines produced by the I.T. subsystem.

Appropriate Tools and Equipment for the Project Area

The cash income of the average farm family in the North Shaba Project area is uncertain, but is probably somewhere in the range of 325Z" to 1,000Z"" per farm household. Of course these area gross estimates.

Since hoes, machetes, and coupe-coues are basic farming tools, there will continue to be a demand for good quality tools at a reasonable price. Processing machinery which serve more than one household in a village is also appropriate.

The Intermediate Technology Subsystem has the machine tools and foundry which could be used to manufacture the simple processing machines for which there is a need and a demand in the villages Peanut decorticators, burr mills to grind maize, rice hullers, and perhaps water pumps, are appropriate and affordable at the village level. Unfortunately, the machines thus far developed by I.T. still require design improvements to reduce cost and to improve performance and maintenance charactetistics.

"Le Revenue per Menage dans l'Aire du P.N.S. 1980 from S.C.A.D. in which the cash income of 325Z was a total of: 167 from maize; 143 palm oil; 5 cotton, and 10 peanuts.

"" See page 50 of Project North-Shaba Report.Annual 1980/81 (Ref. 18). If the product of the production and prices is divided by the 29,000 farm families, a cash income of approximately 1,000Z per farm household is obtained.

When developing or adapting a machine to produce in the I.T. shop for use by the farmer or in the village, some design work must be done. For a trained engineer such as the I.T. Subsystem Chief or the former I.T. advisor, design should be most readily accomplished by using a drawing board and describing the machine and its parts as mechanical drawings. However, the I.T. facilities do not enclude a drawing board and there are no drawings of machines which have been developed by the I.T. subsystem. By first designing a machine on paper, it is easier to make changes and secure a design which will have a minimum of shop operations and usually less scrap.

However, sometimes it is easier and faster to copy an imported machine and test the local version before making drawings. If the version performs satisfactorily, than drawings and/or templates are made to be used in manufacturing the units. The I.T. Subsection does have templates for manufacturing the peanut decorticator.

In my opinion the following tools and machines are not only needed by the farmers and could be purchased by the farmers, but the I.T. shop could manufacture them if proper materials were employed, designs were adopted to available materials and shop tools, and the machines and facilities of the I.T. shop were utilized more fully. For more comments about design features of some of the I.T. designed machines see Appendix D.

Recommended Simple Tools

1. Digging hoe
2. Cultivating hoe
3. Machete
4. Coupe-Coupe

Recommended Village Level Machines

1. Manually powered burr Mill (for grinding maize)
2. Peanut Decorticator
3. Oil palm press
4. Oil palm nut cracker
5. Water pump
6. Pedal thresher for rice
7. Manually operated rice huller.

What is the future financial viability of the Intermediate Technology Subsystem?

The original Project Paper (Ref. 16), the amended Project Paper of August 1980 (Ref. 17) and the Dimpex Evaluation (Ref. 5) mentioned the fact that the I.T. Subsystem is to be financially self sufficient by October 1982 and that the subsystem at the end of the project be sold or given to a private group, organization, or individual as profit-making venture. The chief of the sub-section and his advisor have made efforts to make the subsystem self-supporting. Suggestions for the disposal of the subsystem have been of a general nature and not specific proposal.

The Intermediate Technology Subsystem with its payroll of thirty-nine persons currently performs four primary functions:

1. Manufacturing hand tools
2. Training blacksmiths
3. Constructing some village level processing machines
4. Repairing equipment for merchants, other PNS subsystems, and some farmers.

Intermediate Technology Subsystem's physical plant is certainly the basis for quality production of tools and machines.

In 1976 Project North Shaba purchased buildings, a number of machine tools (old but usable) and five old river boats for $375,000. The boats were purchased for their steel plate. At the time it was assumed that $1.00/kg was being paid for the usable steel in the boats (Ref. 3).

Subsidization of the I.T. Subsystem in Project North Shaba to renovate the shops, hire an advisor and train blacksmiths has been justified. The persons in the project area who receive blacksmith training did not have the financial means to pay for the two weeks of training which they received.

Development of village level machines requires an investment of money in design time and the building and testing of prototypes with financial self sustainability expected at a future date. Unfortunately, as of May 1982 the Intermediate Technology Subsystem does not have any machines ready for production which can be produced and sold at a breakeven point or for a profit. This portion of the program will require a continued expenditure of money with the expectation that suitable units can be manufactured and sold by I.T. within the next six or nine months, assuming that the subsystem receives some design help.

Repairing equipment for merchants, other PNS Subsystems and some farmers should not be done at a loss and should not require subsidization, but at present there is a lack of accounting data and facts in both I.T. and P.M.U. as to the degree of profit or loss in each of the four primary functions of the Intermediate Technology.

A detailed study of the cost of producing tools in the Intermediate Technolgy shop is contained in the Mueller Report (Ref. 3). Basing the costs on the first six months of production in 1981, Mueller estimated that the three most common tools had the following costs:

	Machete	Coupe-Coupe	Hoe
Gen: production cost	5.01	5.01	10.02
Depreciation	3.01	3.01	6.02
Cost of steel at 5.50Z/kg	3.58	4.95	4.13
TOTAL I.T. Cost	17.18	18.55	20.13
I.T. Selling Price (Nov. 1981)	10.00	12.00	10.00
UMAZ (Kinshasa)	12.82	--	17.36
Chanimetal (Kinshasa)	15.01	14.61	18.25

Sources: Price List of 1 Nov. 1981 Mueller Report (Ref. 3)

The Mueller study states that the cost of handles is excessive and should be reduced. Handles cost $ 2 in the villages. The UMAZ and Chanimetal tools would be two or three $ dollars highe in cost in Kongolo because of transportation charges; thus, when these conditions are taken into account it is possible that the cost of an I.T. produced tool in Kongolo will be no higher than a tool imported from Kinshasa. Unfortunately, even if the cost of the wooden handle is reduced by $3.50 and the deprection is ignored, the current selling price will not cover manufacturing costs. The price of the tools must increase if the I.T. tools are to reflect all the costs which should be assigned to them. However, then the I.T. tools would be priced at about the same price as the tools imported into North Shaba. Sales of the I.T. tools would drop because the I.T. tools are generally of lower quality.

In the foreseeable future, there will probably need to be a hidden subsidy in that the steel for the tools was purchased in 1976 and there is no current payments being made into a sinking fund for future steel purchases or into a sinking fund to reflect depreciation of plant machinery.

CHAPTER 4 - SUSTAINABILITY OF THE I.T. SUBSYSTEM

What can be done to provide the Intermediate Technology Subsystem with a better chance of sustainability and make it a more desirable entity to sell to a private, governmental, or philanthropic organization? In this section two lines of action will be discussed. One for the situation where the project ends as scheduled on September 30, 1983, and the other for the situation where the project would be extended.

Village Level Processing Equipment

Since there is a farmer demand for village level processing equipment such as maize mills (burr mills) and since the I.T. Subsystem has the facilities to produce such equipment, an opportunity exists for the I.T. Subsystem to fulfill farmer's need. Unfortunately, I.T. has not yet constructed a complete maize mill. To manufacture maize mills or other machines which function properly and can be sold at a reasonable cost, I.T. must make more efficient use of its plant resources and labor force. Using the maize mill as an example the following changes must be affected.

First, the design of the mill must be selected. Twenty small Hunt manual powered burr mills and twenty large Hunt manual powered burr mills are currently in use in the PNS area. One of these designs should be selected to be copied. If the large unit is too difficult to be powered by the people using it, then perhaps the smaller unit should be selected as the unit to manufacture. For more discussion about burr mill design see Appendix D. The HUNT burr mill is made in England and is common in Africa. Copies of it are being manufactured in some local foundries in Africa, so there is no need to purchase various mills and conduct a testing program.

Outside of the grinding plates, position of hopper, and feed screw, the mill should be redesigned to use the materials which the I.T. shop has in abundance. For example, the stand supporting the mill should be a weldment made from the steel angles being removed from the barges.

Who will do the redesign? A weakness of the I.T. subsection is that of machine design. An expert in the design of machines for local manufacturing and simple maintenance should be hired to spend two months in Kongolo working with the I.T. Chief, Assistant Chief and Research and Development Man redesigning the mill for I.T. manufacture and teaching the above three persons the elements of practical machine design where the facilities of the plant, capabilities of the workmen, desires of the farmers, and the financial constraints are reflected in the final design.

The cupola uses scrap cast iron as its raw material, thus the steel plates from the old river boats are not used in the foundry. The foundry is a key resource in building village level processing machines and in creating an entity which will have value at the time it is sold by PNS. As early as possible a practical expert foundryman should be hired as a consultant for one or two months to make recommendations and to teach the I.T. foundrymen to make better castings. Unless this occurs, the foundry will continue to produce high cost castings. As the foundry improves, it will not only be an essential part of the manufacturing work of the I.T. subsystem, but will be valuable for repair services.

The I.T. machine shop has tools which are not being fully utilized. Of course part of this lack of utilization is that more lathes and other machines then necessary for the PNS project were in the shop purchased from SNCZ. These machines can be utilized in manufacturing village level equipment. But who will help the Chief of the I.T. subsystem teach the machinists better practices and obtain at least normal productivity from the equipment?

The current mechanical advisor in the Infrastructure subystem, Mr. Robert Engisch, is very knowledgeable about machine tools and the operation of a machine shop.

It may be well to have a portion of this advisor's effort seconded to I.T. for the machine tools until September 1983. The arrangement should be beneficial to both Infrastructure and I.T. Infrastructure has need of lathes, shapers and milling machines to make repair parts for their road building equipment while I.T. requires training in the proper use of the machine tools There is always the possibility of a conflict between personalities in I.T. and Infrastructure but in this particular arrangement both subsystems have much to gain by working together.

The quality and quantity of maize mill parts should improve if the above steps are taken.

Hand Tools

It is generally known that I.T. hand tools are of low quality. Because of the steel used for the tools, the tools cannot be expected to keep a cutting edge. However, there is a demand as long as the higher quality tools imported from Kinshasa or from foreign countries are much higher priced. Good tools because of their higher cost are not always available in North Shaba where merchants often perfer to put their money into consumable items which cost less per unit and have a much higher turn over rate than do agricultural tools. Therefore, tool production should continue at the low level it was running during the first quarter of 1982. One or two men would make tools every day, the other blacksmiths would only make tools when they are not engaged in other manufacturing or repair work. In an effort to upgrade

quality, perhaps each blacksmith should stamp his mark as well as a PNS mark onto each tool he makes.

Because of the cost of shipping the tools from Kinshasa to North Shaba, it should be mossible for the poorer quality tools to compete. The demand for tools would be met by tools imported from Kinshasa or Lubumbashi, I.T. produced tools and blacksmith produced tools.

Repair Work

In various visits to the I.T. shop, it appeared to me that repair work was consuming a lot of I.T. manpower, but is this effort contributing to the overall PNS project? Is it generating sufficient income to recover costs or is it providing a subsidized service to Kongolo area and merchants?

The I.T. shop charges 30Z per hour ($5.73/hr at official rate) for repair work no matter how many workman are involved on the job. If electric welding is required, there is an additional charge of 2Z per stick of welding rod ($3.36 official rate). In 1981, the gross income from repair work was at an average rate of 2,224Z per month. During the first quarter of 1982, the average monthly gross income is 4,220Z per month.

Assuming that income from repair work is 4,220Z per month and that only labor at 30Z per hour was used (not the actual condition since many of the repairs require are welding), it would mean 140 hours of work. Assuming that only one man did repair work and he works 7 1/2 hours per day, the repair current level of repair work would keep him busy 19 days/month out of the normal 22 working days in a month.

In order to make fair charges for repair work and to reduce conditions that may encourage dishonesty in the future in the reporting of repair income, the method of calculating charges should be based upon number of man hours consumed, supplies such as welding rod, consumed, and a percentage surcharge added to the cost of labor and supplies, for it is logical that a job demands more man-hours of effort should be charged more than one requiring fewer man- hours of efforts

The PMU and the Chief of the I.T. Subsection should also review together the present system of payment of repair work and the physical disposition of customer payments to insure that the opportunity for misappropriation of customes payments is minimal.

I believe that the repair service for farmers and businessmen should continue but that the method of computing charges should be reviewed and changes instituted so that charges reflect the cost in wages, supplies, depreciation, and capital so that the I.T system is not subsiding the repair service.

A program should be set up to train village blacksmiths in maintenance and simple repair of maize mills. This training should take place under the extension function of the R&V Subsystem with funds from that subsystem, but with the teaching conducted by I.T. Subsystem personnel. If simple machines such as maize mills are to release women for other work, it is essential that there be a person in the village who has some knowledge about the operation and repair of such a device.

Those with Extension responsibilities in the R&V Subsystem do meet on a regular basis. At some of these meetings, the I.T. Subsystem Chief and some other I.T. personnel should be invited to discuss specific subjects such as maize mills, machine distribution, repair charges, etc.

- Assuming that Project North Shaba is extended beyond September 1983 -

If Project North Shaba is extended beyond September 1983, the same actions should be taken as in the situation where the project is not to be extended.

In October 1983, if I.T. is self supporting, it should continue as suggested above. If it is not self supporting, the machine shop should be transferred to the Infrastructure Subsystem and the foundry and forge shop, closed down or sold.

If the I.T. Subsystem is not profitable by October 1983, and if the current economic slump in mining and thus metal working companies in Zaire continue it will probably be difficult to find a buyer for the I.T. Subsystem. Since the I.T. Subsystem currently serves as a repair center for merchants and farmers in the Kongolo area, some equipment might be sold to a private businessman who would continue as a repair center for the Kongolo area.

CHAPTER 5 - REPLICABILITY/ADAPTABILITY

If Project North Shaba were to be replicated in another area of Zaire, would it be possible to replicate the present Intermediate Technology Subsystem as part of the replicated Project? The answer is "no, it is not very likely".

The PNS I.T. Subsystem facilities such as the machine shop, foundry and raw materials (mild steel, coke, scrap iron) which were available in Kongolo are unlikely to be available in most areas of Zaire requiring an agricultural development project. Furthermore we can learn from experience, in fact if Project North Shaba were to be established in North Shaba tomorrow, the Intermediate Technology Subsystem should not be an exact copy of the present Project North Shaba.

- Adaptating of the I.T. Subsystem to other rural development projects in Zaire is feasible. Of the primary responsabilities of the I.T. Subsystem of Project North Shaba - tool production, blacksmith training, manufacture of village level machines, and, repair services, the activities would be in the following order of priority with 1 of first priority :

1. training of blacksmiths
2. repair services
3. assembly of village level machines
4. manufacture of agricultural tools.

The first two activities are essential, the third is desirable, and the fourth not required in most situations.

The training of blacksmiths is important since it is the local blacksmith who will be available to repair hand tools or to make new

tools. The training of the blacksmith should also include learning about the operation, maintenance, and repair of village level machines such as maize mills

It is essential that refresher training be conducted annually for the blacksmiths so that they may continue to inprove their skills. This has not been done in Project North Shaba.

The North Shaba Project is also revealing the importance of establishing a raw material supply network for the blacksmiths. In some areas of Zaire local sources of scrap metal will be able to supply the blacksmiths, but in other areas such as North Shaba a distribution system utilizing Project Personnel, grain merchants or other already linked by an information or a trading network will be required to supply steel to the blacksmiths.

A repair service by an Intermediate Technology Subsystem Center in essential to repair those machines which cannot be repaired by the local blacksmiths. The same facilities will also be used for training blacksmiths.

Mass production of agricultural tools such as machetes, coupe-coupes and hoes should in most cases not be undertaken in most situation since present production facilities of such tools are underutilized. Present factories in Kinshasa and Lubumbashi are also in areas where the quality of steel required is more readily available than in most agricultural regions of Zaire.

The manufacture of village level machines should probably be part manufacturing and part assembly with certain specialized parts imported from manufacturing centers in Zaire or overseas and final assembly and some manufacturing done at the I.T. Center.

It is essential that as part of any rural development plan which includes an Intermediate Technology Center for the distrib-

ution and/or manufacturing of agricultural tools or machines that a market survey be first made in the project area to determine what the farmers state they need, what they will pay for those devices, and the amount of cash income they probably will have available to buy the tools or machines. Without such knowledge about the "customer" the project will be severely handicapped.

CHAPTER 6 - RECOMMENDATIONS

The following recommendations apply to the Intermediate Technology Subsystem which according to the Amended Project Paper (Ref. 17) is to be self supporting by September 1982 and sold to an organization or person by the termination of Project North Shaba.

1. Within in the next several months a technical expert in practical operation of a gray iron foundry, particularly in the areas of cupola operation, sand conditioning, mold technique and pouring techniques should be hired to work with the I.T. Subsystem Chief and the foundry group for a month in teaching them better gray iron casting techniques. The expert should be French speaking. Such a person is probably available in the Lubumbashi or Kinshasa areas.

2. Beginning immediately and continuing until September 1983, a portion of Infrastructure Subsystem's Mechanical Advisor's time should be seconded from Infrastructure to the machine shop area of the I.T. Subsystem for the purpose of improving machine shop operation and machine tool maintenance.

3. An engineer with practical experience in the design for manufacture and use of village level processing machines he hired for two months to work with the Chief, Assistant Chief and Research and Development man to aid and to teach that in the process and design technique required in redesigning a machine to be produced in the I.T. facilities and sold to farmers in North Shaba in particular and Zaire generally. This expert should be in Kongolo within the next few months but his visit should not coincide with that of the foundry expert. He will need to bring his own drawing instruments.

4. Emphasis should be placed on making repair parts and eventually complete maize grinders.

5. Small Agricultural tools production should continue but at the current reduced rate of about 300 per month.

6. The repair service schedule of charges should be revised to more accurately reflect actual costs and the system of calculating charges and payment of those charges be revised to obtain a better accounting procedure with financial safegards.

7. PMU should be more responsive in providing the I.T. Subsystem with information such as monthly sales of types of tools and budget information since this information is needed to manage the subsecti

8. The subsection Chief should be given the authority for approving vacation for the employees in his subsection since he is the on responsible for the subsection. At presentthe Director of the project must approve an individual's dates of vacation.

9. The PMU should actively seek a buyer of the I.T. facilities after making an inventory of plant equipment and comparing it with the inventory of the items purchased from SNCZ.

10. The distribution of tools produced by I.T. or purchased elsewhere should be through the extension arm of the project. It may be necessary for PMU to forciably persuade the two subsections to work as a team.

11. Reference book such as the Machinist's Handbook as well as some micrometers be obtained for the I.T. machine shop.

A P P E N D I C E S

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B. - Persons consulted in Zaire

C. - Organization Chart of Intermediate Technology Subsystem

D. - Comments about some Processing Machines being developed by the I.T. Subsystem.

APPENDIX A

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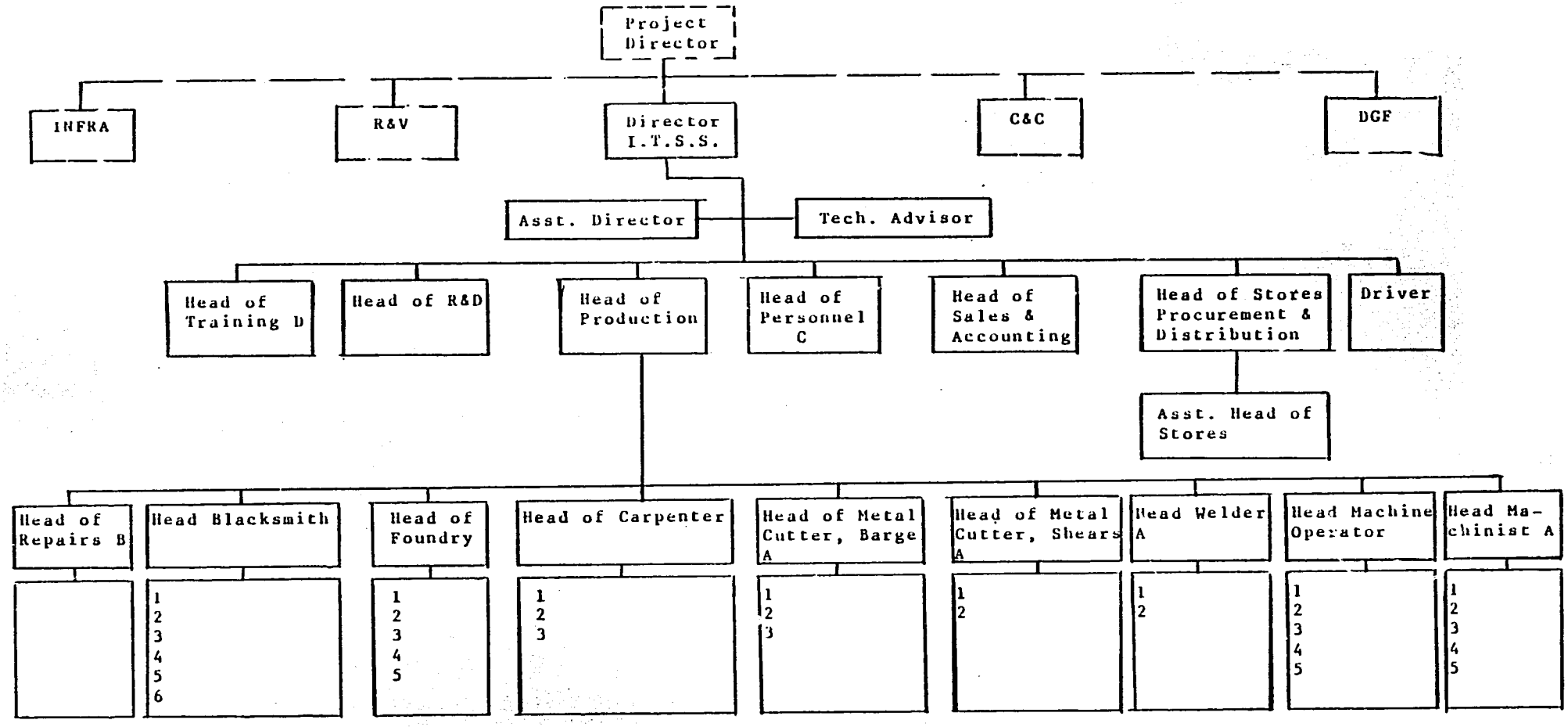
APPENDIX - C ORGANIZATION CHART OF INTERMEDIATE TECHNOLOGY SUB-SYSTEM.



A- Filled by Head of Production
B- Filled by Head of R&D
C- Filled by Head of Stores & Head of Accounting
D- Filled by Assistant Director

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APPENDIX D

Comments about some Processing Machines being developed by the Intermediate Technology Subsystem

Manually operated Burr Mill

This type of mill is used throughout Africa to grind maize or dried cassava into flour and peanuts into paste. In 1978 I.T. received 20 small and 20 large manually operated Hunt (English) burr mills. Thse mills were sold to farmers or farmer groups.

These mills sold for 550 Z and have received acceptance by the purchasers. There have been some problems. For example some of the set screws securing the drive wheel to the shaft loosened because there were no locknuts. Inadequate lubrication has also been a problem in some cases, but this is to be expected in a non-mechanized group of society. These problems emphasize the need for training purchasers of the mills in proper adjustment and lubrication.

The working part of this type of mill consist of two identical cast iron grinding plates. Replicas of the plates have been made in the I.T. foundry. Although the body of the Hunt mill is a gray iron casting, the body could be designed to be made out of the 5 mm mild steel plates from the barges. It would be necessary to import into Kongolo steel shafting for the one shaft in the mill. Until the I.T. foundry improves its casting technique, it will be better to design the mill with a fabricated sheet steel body.

In an I.T. produced mill attention should also be given to using pins instead of set screws and lock nuts where possible; heavier bushings; and the use of oil impregnated wooden thrust spacers to adjust for wear in the bronze thrust washers.

Peanut Decorticator

The current I.T. decorticator hulls peanuts, but it could be made simpler and the number of parts reduced by redesign. For example, instead of using pieces of pipe for the pivot bearings, the pivot point could be a hole cut into the angle iron frame section.

For the working face of the machine, a cast iron plate such as used on the imported peanut decorticator at the Kivu Sola Mission could be made in the I.T. foundry and used on the I.T. machine. Such a working plate would probably accommodate a greater variation in size of peanuts than the present I.T. design.

Furthermore, with such a working face, there is the possibility that by providing a second set of pivot points, and several retarding bars in the bottom of the decorticator, the unit could possibly be used to shell maize. It would be worth invertigating.

Oil Palm Press

The I.T. oil palm press is not really a press, but is an oil palm extractor which extracts oil from the pericorp of the palm fruit (in North Shaba, oil is not generally extracted from the kernel).

The traditional method of extracting palm oil is to first cook the palm fruit in boiling water and while still hot dump the fruit into a modified 55 gallon oil drum standing on end. The top of the drum is open while the bottom of the drum is perforated to allow the oil to drain into a collecting spout. An essential part of the device is a vertical wooden shaft set along the longitudinal axis of the oil drum, resting on a wooden thrust bearing at the bottom of the drum and at the top set in a hole in a cross bar attached to two vertical posts set about six feet each side of the oil extractor drum. About six cross sticks protude through that part of the vertical shaft within the oil drum. Two other cross sticks, each about six feet in length, protude from the verticle shaft at a height of four to four and a half feet above the ground.

Oil extraction occurs when two or four persons push against the two upper cross sticks as they walk around the drum, agitating the cooked fruit within the drum, releasing the oil from the pericap of the fruit.

A complaint of the traditional device is that people become dizzy.

To overcome the problem of diziness the I.T. Subsystem had designed and constructed from steel sheet an oil extractor which uses the same principle as used in the traditional extractor. In the I.T. oil extractor the rotating shaft to which the agitator arms are attached is a horizontal shaft which is powered by a crank on each end. Two people - each one turning a crank - power the extractor. However, people claim that the unit requires too much power and is tiring. In my opinion the unit probably does not require more power than the conventional oil extractor; however, in the conventional unit workers push the cross bars at chest level thus using both arm muscles and the strong leg muscles to power the agitator. In the I.T. unit a person uses only the muscles of one arm to power the agitator; the arm becomes tired and the workman states that the I.T. extractor "takes more power".

I.T. has an experimental model which is claimed to be an improved on the present design. The agitating shaft is vertical. It is still powered by two hand cranks. Each crank is cantilivered of the frame. At the end of each crank shaft is a cast iron bevel gear which meshes with a cast iron belvel pinion fastened to the vertical agitating shaft. In examining one of the units I found that much force on a crank can deflect the crankshaft sufficiently so that the bevel gear and pinion do not mesh.

Some additional question must be asked. Will the additional cost of the gears and additional bearing result in an oil extractor which is superior to the traditional design? If perchance the latest I.T. model is a much better oil extractor than the conventional unit can the farmer or village afford it? How does I.T. propose to eliminate the problem of gear deflection for if it occurs in the shop, it protends failures and broken gear teeth in the field?

Wire Loop Pedal Thresher

A wire loop pedal thresher is used for threshing rice and is a very common machine in S.E. Asia where the thresher is carried to the rice field so that the sheaves of rice do not need to be carried very far to the thresher. A foot treadle operates the threshing cylinder, thus the farmers hands are free to hold a sheave of rice while the machine threshes out the grain.

The I.T. Shop has constructed two prototypes. One unit 104 cm wide x 75 cm high x 112 cm deep appears to be too heavy and too large for easy transport. It is constructed primarily of wood.

A smaller unit has a cylinder of 45 cm diameter--as measured to the tips of the wire loops - and 46 cm length. This unit is approximately the size of those made in S.E. Asia. Unfortunately, the steel frame for the unit is so heavy that it too would be difficult to transport on a bicycle or to be carried some distance by two men. The small I.T. wire loop thresher uses a foot pedal and an eccentric mechanism to drive the threshing cylindre. It would probably be easier to use if a wooden treadle the length of the thresher were used instead of the metal foot pedal. Such a system is used on the small Asian pedal threshers. The International Rice Research Insitute (IRRI) in the Philippines has plans for such a thresher.

Another rice threshing device is a wheelbarrow thresher made from one common 200 liter oil drum. The International Institute of Tropical Agriculture (CIAT) in Cali, Columbia has a design (by Engineer Lloyd Johnson) for converting an oil drum into a wheelbarrow thresher. In this device the sheaf of rice is flaided across a grating on top of the "wheelbarrow". The rice falls into the box section of the device. As threshing occurs the device is wheeled from one area of the field to another. The wheelbarrow thresher can than be used to transport the grain to the farmer's house.

Of course before production of any of these units are mass produced, it is necessary to determine the selling price of the machine and the demand for the machine at the necessary price.

EVALUATION REPORT OF THE WOMEN'S COMPONENT OF THE NORTH SHABA RURAL DEVELOPMENT PROGRAM

May, 1982

Sylvia Watts
Transition Technology, Inc.
Washington, D.C.

TABLE OF CONTENTS

I. Introduction ..... p. 1

II. Evolution of Women's Component ..... p. 1

A. Description of 1980 Program ..... p. 2

1. Program Results..... p. 2

2. Analysis of Results ..... p. 5

3. Recommendations..... p. 10

III. Programming for the Future

A. Proposed Project for Implementation as of September 1983 ..... p. 13

B. Preliminary Draft Design ..... p. 16

C. Background Information on Women in Zaire ..... p. 22

1. Legal Status ..... p. 22

2. Rural Women's Roles ..... p. 24

D. Program Considerations and Constraints p. 25

E. Influence of Rural Families' Needs in Programming Choices ..... p. 26

APPENDICES

A. Comments on PNS Promoted Women's Activities Regarding Soybeans and Spring Boxes

B. Indirect Benefits to Women in Project Area

C. Charts on Women's Roles

(Typing by USAID/Kinshasa)

INTRODUCTION

Since the initiation of Project North Shaba (PNS) in 1977, PNS staff has conscientiously tried to identify a valid program for women farmers in the Kongolo, Mbulula, and Nyunzu areas of Shaba Province. If program results to date are negligible, it is perhaps due more to staff's lack of adequate project planning and implementation skills than to lack of willingness and effort. The following brief look at the evolution of the program and an analysis of program results will illustrate this conclusion.

EVOLUTION OF WOMENS PROGRAM

To determine the opportunities for assisting women in the project area, the Farmer Group Development Sub-System (FGDS)[1], which has the responsibility for managing the women's program, conducted a survey of the women in the target area in order to ascertain their perceived needs. At the same time, the surveyers presented FGDS' suggestions for a project there. The results of the survey created a programming dilemma as the needs expressed were not compatible with the focus of PNS suggestions -- agricultural production and marketing. In fact, women farmers rejected outright FGDS' offer for training assistance in modern agricultural practices and instead proposed that FGDS construct adult learning centers and small medical units.

In partial response to the stated wishes of the women farmers, FGDS initiated a traditional adult literacy program which was carried out without adequate facilities. They justified the program and, therefore, the diversion from their stated objectives, by defining it as an integrated rural development project which could be promoted under the PNS aegis. The classical literacy program was later replaced by a more practical, functional literacy program at the same time as the introduction of the use of communal fields. Profits earned from the sale of produce from these fields was to provide villagers a means to finance the construction of adult learning centers. Center construction never materialized, however, as the restricted size of the communal fields precluded adequate harvests and, therefore sufficient funds. Women participating in this program eventually lost interest, and it was consequently terminated.

In 1980, a new FGDS Zairian Director was named, along with a new American advisor. Together they outlined a different strategy for assisting women in the

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(1) See Andrée Black-Michaud's report for a complete description of this Sub-System's activities.

project area. Women's needs as such, pertaining to farming, processing, marketing and trade were partially addressed, although inadequately. Their plan emphasized the initiation of income generating activities to finance local communi development projects. Within the framework of this newly identified broad goal, three interdependent objectives were planned.

- "To encourage women's groups to initiate communal fields of soy beans, peanuts and cotton and market the produce together;
- With proceeds from the sale of produce from the communal fields, buy salt, soap and smoked fish in Kongolo, Mbulula and Sola for resale in their respective villages at prices lower than those quoted by small itinerant peddlers; and
- With profits from the sale of salt, soap and smoked fish, buy "appropriate technology" equipment, or finance special group projects". (2)

DESCRIPTION OF 1980 PROGRAM:

At the invitation of FGDS personnel and with permission from their husbands, groups of three to fifteen women in nine villages initiated income-generating group activities on donated land aimed at ultimately acquiring intermediate technology processing equipment, primarily manual corn grinders. About fifty women farmers of the 17,000 in the area participated in this program from 1980 to the present.

Four women community development agents (animatrices) carried out this program, backed up in theory by the Zairian Director of FDGS and his American advisor. From March to September 1981, there was also a woman expatriate technician assigned to work exclusively with women's activities.

To implement this program the animatrices traveled by motorbike to each of the nine villages at least once a week. The villages are located within a radius of about forty kilometers from the home bases of Mbulula and Kongolo.

PROGRAM RESULTS AS OF 1980

The three objectives of the women's component of PNS stated earlier translate into a three-step process with ensuing problems and discouraging results as illustrated in Table I:

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(2) Translation from "Panorama des Activities du Sous-Systeme de Developpement des Groupements de Fermiers, Pour les Annees 1980-1982."

TABLE I

	MEANS (Step 1) →	MEANS (Step 2) →	END (Step 3)
OBJECTIVES:	Communal Fields	(expressed need) Basic Commodities Business	(expressed need) Corn Grinder Rental Business and Special Projects
PROCESS:	Harvest → Profit →	Purchase → Sales → Profit →	Purchase → Rental → Profit
PROBLEMS:	- Wild animals ravaged fields - Poor seeds gave low yields - Group members neglected care of fields due to other labor demands - Insect infestation	- Items sometimes unobtainable (stock depleted) - Means to travel from village to town where items available was impractical or irregular - Demonitarization of Zaire currency wiped out first profits - Some group members moved, taking with them share of profits - Profits insufficient due increase in item prices	- Breakdowns within first year of purchase - Inefficient repair system usually left machine inactive for several months at a time - PNS Corn Grinder stock depleted by 1981; women unable to purchase to date
RESULTS:	- Minimal or no harvest - Harvest insufficient to move to Step 2	- profits negligible - business often on hold	- PNS animatrices discouraged - Inefficient business - Credibility of PNS threatened - Members of group lost face - No other village women asked to participate in PNS activities

This three-step process was designed to begin with a basic income-generat activity (communal farming) which would create profits which would be invested in another income-generating activity -- basic commodity purchase/sales. Finally, profits from the second activity were to be invested in manual corn grinders, whereby the women could either turn the machines themselves for profit, or rent the machine to others for profit.

Of the nine groups participating in the above process, only one has realized profits from the first step and is currently conducting purchasing/ selling activities. Two groups bypassed the initial step and moved directly to purchasing/selling activities. Capital was raised by requiring group members to contribute a portion of their personal savings. Of the three groups which either began or reached this second step, only one is still in business.

One group bypassed the first two steps and went directly to the purchase of a corn grinder, again financed by group members' personal savings. Another group which had gained enough profit from the purchasing/selling activity was in the position to purchase a corn grinder; however at that time, there were no longer PNS corn grinders for sale. That was over one year ago, and there are still no corn grinders available.

Therefore, since 1980, no women farmers group has methodically moved through the three-step process. Only one group continues to conduct purchasing/ selling activities, despite supply problems, and only one group is involved in a corn grinder rental operation. Exacerbating this latter group's problems are increasing mechanical breakdowns and an inefficient repair system.

Regarding the first activity, communal farming, eight of the nine groups continue this exercise which in reality involves two objectives, one primary and one secondary. The primary objective, earning profits to reinvest in a basic commodities sales business, was not achieved. The secondary objective, training the women to use improved agricultural practices in the communal fields, apparently had some success. These practices included sowing in rows, spacing seed pockets from 50-75 cms. apart, sowing no more than two seeds per pocket, weeding at least two times per season, harvesting when crops are sufficiently dry, and, finally storing crops in clean granaries. The women were expected to transfer these techniques to their family fields. That transfer was in fact, the ultimate intent of the training. As this transfer was the real purpose of the agricultural practices training, the animatrices should have been able to state specifically how many women had done so. However, they could not. One stated that she was

not sure, and the other guessed at a transfer rate of about sixty percent. Verifying the application is indeed difficult as fields can only be reached on foot, and they are located at some distance from the site of the communal fields.

An additional problem in the transfer of methods is that some of these new practices are not necessarily compatible with local farming systems. Resources therefore may have been misused, and farmer's time wasted. (See Andrée Black-Michaud's report for complete details).

In conclusion the women's component of PNS only partially achieved intended results. Additionally, there appear to be two obvious unintended negative results. First, the four PNS animatrices' morale is low as evidenced by increasing job absenteeism and one request for transfer to an administrative position in the Project Management Unit Sub-System. Second, the lack of spontaneous participation in the revenue generating program by additional groups of women in the nine villages where the animatrices work illustrates a credibility problem for the women's project as a whole.

ANALYSIS OF RESULTS

With respect to the total number of women who participated in the program as well as what they were able to achieve, results to date have been negligible. In examining the problems at all phases of the execution of the women's program, one element appears to be of more import than others as cause for the lack of possible results: basic project management. At all phases of the project cycle-design, implementation, evaluation - the techniques used did not adequately guide staff and keep them informed as to needed changes.

Viewed from the perspective of standard project management, planning for the women's component was elementary in that objectives lacked clarity and focus, and were not measurable in terms of quantity, quality and time (see Table II); and in that a basic feasibility study was not done to determine the optimal means to achieve objectives. Finally, the planning was inadequate in that no detailed work plans were developed for the program.

Had a simple feasibility study been conducted, the choice of initiating communal fields as the most appropriate means to raise capital to buy intermediate technology food processing equipment would probably have been eliminated. Had basic design been completed, bottlenecks arising in the supply system for basic commodities and corn grinder businesses could have been avoided.

PROGRAM OBJECTIVES LISTED IN THE OFFICIAL FGDS DOCUMENT*	PROGRAM OBJECTIVES AS STATED BY THE ANIMATRICES
1980-81 1. Organize women's farmer groups whose purpose is to promote agricultural activities capable of generating necessary revenue to finance local community development projects: a) Encourage women's groups to initiate communal fields of soy beans, peanuts, cotton and market the produce together; b) With proceeds from the communal fields, buy salt, sugar and smoked fish in Kongolo, Mbulula and Sola for resale in their respective villages at prices lower than those quoted by small itinerant peddler; and c) With profits from the sale of salt, soap and smoked fish, buy appropriate technology equipment or finance special group projects. 1981-82 2. Train women's groups who farm their own fields and women's groups who farm communal fields and men and women's groups who farm together. 3. Identify the marketing channel for produce grown by the women, because for the time being, the animatrices of FDGS are the ones who help the women's groups sell their harvest. FDGS would like these groups to become independent. 4. Help to encourage the Research & Extension Sub-System's extension agents train women who farm. The animatrices of FDGS will be the intermediaries between the women farmers and the extension agents to transmit information and to help establish good relations between the women and the male extension agents.	1. Integrate women in agricultural development so that they can participate in production. 2. Provide women a source of revenue. 3. Manage her revenue. 4. Seek to become a bit more independent. 5. Have a sense of community awareness which can facilitate resolving a certain number of problems: basic commodities, corn grinder, adult learning centers, children's health, access to water. 6. Orient women to participate in actions of local interest: opening secondary roads, improving water sources, village cleanliness. 7. Teach new agricultural practices as a means to increase production. 8. Lighten the daily work load. 9. Involve women in development activities (to avoid their being left out).

* "Panorama des Activities du Sous-Systeme de Developpement des Groupements de Fermiers, pour les Annees 1980-1982".

The problem of insufficient planning was further complicated by the lack of adequate monitoring and reporting procedures. As there was no standard reporting format, information in monthly reports on activity status varied in terms of frequency and level of detail. The effects of variables in cost, performance, quantity and schedule of work on progress toward achievement of objectives were not discussed. The content of the reports emphasized description of activities they contained no analysis of problems. Problems to be resolved were simply passed up through the managerial hierarchy (from animatrice to section chief to Sub-System Director to PNS Director) where, according to the animatrices, timely decisions were rarely made. As an example, the Kongolo animatrices in their May 1981 report, requested senior management to redefine the objectives of the women's program, because "... work is still not precise and results are vague". One year later, although more objectives have been added, the basic program for women remains unchanged, and the monthly reports continue to cite the same problems.

The continued reporting of these reoccuring difficulties should have stimulated an analysis of the problems and a reassessment of the basic program objectives and underlying assumptions. Instead of this approach, which would certainly have lead to a major redesign of the program, the FGDS Director has recently asked the PNS Director to hire additional animatrices to expand the on-going program.

That the women's program has continued, relatively unchanged, since 1980 is indicative not only of management neglect, but also of management inability to recognize the need for maximized use of limited resources.

In addition, the women's program has suffered from the lack of an effective intervention strategy, as was reported in Development Alternatives, Inc.'s (DAI) recent evaluation. To date, PNS has deferred resolution of this problem on the basis that the development of a cohesive strategy for assisting women in the Project area is the task of the female expatriate advisor. Except for a six-month period in 1981, DAI has been unable to recruit such an advisor. If, indeed, PNS management did not feel qualified to design a coherent strategy for women farmers and was unable to recruit a permanent female advisor for the program (a need which can be questioned), a management decision would have been in order to suspend the program until all the necessary conditions had been met. Instead, the four Zairoises animatrices were allowed to implement this inadequately planned and supervised program, whose failure was almost inevitable.

An additional complicating factor and a partial explanation for this

unfortunate situation is the unsatisfactory working relationship existing between the Zairois Chief of FGDS and his expatriate advisor. Much of what the advisor recommends is rejected; and as the Zairois has final decision-making authority, the advisor has no possibility of implementing his recommendations. This problem has been repeatedly reported to the Director of PNS in monthly reports for well over a year, but he chooses not to address it.

An additional point regarding the deficient monitoring and reporting system concerns the flow of information among the different PNS Sub-Systems. There are instances in which the capacity of one Sub-System to achieve objectives is dependent on another Sub-System's ability to provide an effective service. For example, the corn grinder rental business faced problems due to the inefficient repair system operated by the Intermediate Technology Sub-System. Close cooperation and coordination would obviate this situation. Such has not, however, been the case. Despite periodic reporting by the animatrices about the unsatisfactory repair system, the service did not improve. Although the animatrices knew that the grinder rental businesses were loosing money due to breakdowns and that, as a result, their credibility was suffering, they also felt helpless to initiate change.

FGDS not only inadequately planned and monitored the women's project, but also neglected evaluation of it. In view of animatrice's complaints as early as 1981 concerning the effectiveness of the women's income generating program, two factors may explain why FGDS did not conduct an internal evaluation to be used as a basis for redefining the program. First, as has been mentioned earlier, FGDS staff judged itself not qualified and too busy to resolve the problems of the women's program, and adopted to wait for the arrival of an American specialist in women's affairs. Second, educational background of the FGDS Zairian personnel predisposed them to not except immediate results. These individuals were all trained in a school where a strong emphasis on community development prevailed. They recognized that the women's program was not progressing quickly or well, but they also questioned whether sufficient training time had been allowed to warrent better results.

Granted, community development takes time. PNS however does not operate in a chronological vacuum not does it have unlimited resources; it is a project with a definite budget, specific purpose, beginning and end. In this context optimal use of resources is required. FGDS staff in general do not seem to have grasped this essential concept.

A final point related to management is that of personnel morale. A number of PNS administrative policies add to overall job dissatisfaction. Individually,

these items seem insignificant: in aggragate they are important and affect personnel productivity. The following is a list of factors leading to employee discontent:

a) Some Sub-Systems are considered more important than others and are therefore given higher salaries and priority use of equipment. For example, personnel in Research & Extension are paid more than those in FGDS and have first access to motorbikes.

b) Seniority is not respected by PNS. Some individuals have been hired by PNS at higher salaries than those with the same educational level and seniority. Reaction: "Why work very hard?"

c) PNS applies a salary system which differs from the Government of Zaire (GOZ). PNS pays according to position, not educational level. (The GOZ bases its salary policy on a combination of educational level, seniority, and work performance).

d) PNS statutes contain a clause regarding benefits for seniority which is not applied.

e) At the time of hiring, PNS promised personnel that they would have access to training which has not materialized. (One person in FGDS is in the U.S. for training, the remaining employees have received no training since 1980).

f) There is almost no access to magazines or literature which would permit personnel to upgrade their skills. PNS has a library; almost all publications however are in English and most all PNS personnel are proficient in French, not English.

g) Given the cost of medications, the new medical policy is not adequate It was suggested that PNS review ESTAGRICO's health policy as one which is more responsive to personnel needs.

h) PNS provides no organized social program. Access to a building where recreational activities could take place would be some compensation for those who have accepted work in the isolated environment of the Project area.

i) PNS offers no job security. Personnel are not registered with the GOZ "Fonction Publique" and therefore, have no representation if they are fired.

j) Up until recently, PNS personnel were not registered with the GOZ social security program (the GOZ fined PNS for this neglect).

k) No money is available to purchase raincoats and boots for FGDS personnel who ride motorbikes and travel considerable distances during the rainy season to villages where they work. Other Sub-Systems provide this equipment for

their personnel. (This equipment is available for purchase in the Kongolo market).

A PNS management review of these employee perceptions could improve employee morale. Some of these problems may be easily resolved; some may be misperceptions or insoluble, but all of them represent facets of personnel dissatisfaction and, therefore, merit consideration by management.

The women's income generating program has in short, been poorly managed. Fault lies not so much with the Zairois personnel, who at the time of employment did not have sufficient project management training, but rather with the contractor who should have made sure that the American staff hired as advisors had minimum basic project management skills. If the American advisors did not in fact, have the requisite management skills, the contractor's home office should have provided short term training and regular backstopping to supplement the instruction.

Of more significance, however, then the mismanagement of the program, is the inappropriate program strategy selected for women. The decision to program special activities for rural women outside the context of the family and to propose the initiation of communal fields utilizing new, time-consuming agricultural practices added to the women's already overly charged schedule. The fact that in two years, four animatrices working full time were able to interest only fifty women in the income generating program would seem to be more a reflection of the inadequacy of the program than the lack of sufficient time to convince the women of its importance.

RECOMMENDATIONS

The current women's component of PNS is not suitable for replication and should be phased out. A new program should be designed. In view of the fact, however, that PNS is scheduled to terminate in September, 1983, there is insufficient time to adequately design, organize, and implement a new, more appropriate program. Therefore, as a course of activity in the remaining fifteen months, the following actions are suggested:

1. A phase out strategy for the women's program should be developed immediately. Some activities, such as the communal fields, could cease in August after all the harvest is finally sold. Others, such as the basic commodities and corn grinder businesses, cannot be abruptly discontinued because of the role the animatrices play in thse activities.

The animatrices should aim to work themselves out of the role they play in providing middle-men services in the commodities businesses. Alternative

repair service options for the corn grinder operations should be established. Currently, PNS's Intermediate Technology Center (ITC), although deficient, is the only facility in the area capable of handling major repairs. If ITC were to close, grinder owners confronted with a major breakdown would have no alternative but to junk their equipment. Any success the program has had would be discarded along with the grinders.

2. By July 1982, a new job description, including periodic follow-up activities required to phase out the old program and new assignments within FGDS or other PNS Sub-Systems should be written for the animatrices. The animatrices must be fully employed at meaningful work, and the problem of their increasing job absenteeism remedied. Finally, regardless of the responsibilities defined in their new work, they should be required to develop clear, measurable objectives and work plans for all tasks.

3. On-the-job training in adult educational techniques and basic project management should be provided for the animatrices.

4. The unsatisfactory working relationship between the FGDS Director and his expatriate advisor should be immediately addressed.

5. Given the recommendation to phase out the current women's program, the special American female advisor which PNS has been trying to recruit for some time, will no longer be needed.

PROGRAMMING FOR THE FUTURE

PROPOSED PROJECT FOR IMPLEMENTATION AS OF SEPTEMBER 1983

Should PNS be extended beyond 1983, the commercialization of manual corn grinders in the Kongolo and Mbulula areas is proposed as the optimal project for addressing women's priority needs. The corn grinder project is an important opportunity to address women's labor problems. Access to grinders would considerably reduce the amount of time spent in pounding, a physically debilitating chore endured throughout their working lives. The project is also valuable in that it does not risk interfering with local custom regarding male and female roles. Furthermore, it is not a "special" project only for women and therefore susceptible to male opposition. It is, instead, of value to the entire family, and indirectly benefits all members. It is also a project which will afford women some free time, not aggravate their already busy schedules.

Women spend an estimated twenty two hours per week processing corn kernels into flour. It takes about thirteen hours to prepare the corn and another nine hours to pound the softened corn fragments into flour. Access to a corn grinder would reduce weekly time from twenty-two hours to four. Eighteen hours per week per woman could thus be freed for other activities. Each women should also physically benefit from this program, because of the elimination of at least nine hours of pounding activity per week. These nine hours per week over a thirty-two year period add up to a savings of 14,976 hours during her working life. 14,976 hours represent 375 work weeks or about nine years.

In addition to the project's improving the quality of life for the participants, there is a high potential for rapid results and wide impact in a relatively short time.

In fact, the benefits of the project will reach the whole population of the target area within five years. The risk factor is probably lower than that for most projects as it basically involves an aggressively promoted commercialization business with known components i.e. sales, supply, etc. Nevertheless, the degree of success will depend on the ingenuity of those who design an efficient supply, distribution, and maintenance system. Finally, the deciding element will be the dedication of those individuals mobilized to implement the project and their determination to make it succeed.

Following is a preliminary draft design for the corn grinder proposal. It represents approximately sixteen hours of team work in Kongolo in collaboration with one of the animatrice and her husband, who is also a community development agent for PNS. The draft is intended only as a point of departure for a feasibility study.

The proposed project spans five years during which time a minimum of 470 corn grinders are sold to service 17,000 families, a ratio of one grinder for every 36 families. It is assumed that each grinder operates from dawn to dusk and is turned by a male who either owns the grinder or is hired to turn it. If women, who are less trong, turn the grinder, each grinder can serve only eighteen families; and, therefore, the project would have to sell 960 grinders to service the entire area population.

The grinders could be bought either by a group of families or by individuals. If the grinder is rented, the owner could earn between 4000-8700 Zaires per year, depending on the number of hours the machine operates per day and the sex of the operator.

The success of the project depends on the identification of more appropriate grinders than the one which PNS has sold

in the past and the development of an effective maintenance and repair system. The feasibility study should assess the possibility of selling mechanical grinders which operate on a reliable fuel source and have an accompanying distribution mechanism. (UNICEF/Kinshasa should be contacted for information pertaining to their mechanical corn grinder program operating in Kasaï).

Farmers could either pay cash or buy grinders on credit. Given past experience with credit plans, it is probably preferable to require cash, at least initially. If sufficiently motivated, farmers can raise necessary capital as was demonstrated by the five women in the village of Katiba who raised sufficient funds from their personal resources to purchase a PNS manual corn grinder. Because grinder sales will not be subsidized as was the case with the models imported from England and sold by PNS in 1979-80, the feasibility study will have to determine the maximum amount farmers would be willing to pay for reliable models and maintenance service.

The corn grinder commercialization project could be organized an implemented exclusively by PNS, or it could be done in collaboration with the Office of Women's Affairs ("La Condition Féminine"), the Department of Rural Development, and businessmen in the Kinshasa and Kongolo areas. With respect to this latter group, an interesting opportunity worth exploring concerns a group of wealthy, experienced businesswomen in Kinshasa who have volunteered their services to "La Condition Féminine". These women could be used as advisors in designing and setting up the supply and distribution systems. Their expertise could also be valuable in designing the publicity program and business training course specified in the following design. As most of these women are illiterate, their advice on how to counsel farmers and small merchants in order to maximize their operations could be invaluable.

COMMERCIALIZATION OF CORN GRINDERS

Preliminary Draft Design

FOR USE AS A POINT OF DEPARTURE FOR FEASIBILITY STUDY

	INDICATORS WHICH CLARIFY AND MEASURE
PURPOSE Corn grinders lighten work load of women farmers and provide a potential source of revenue for some families	1. By 1987,.....% of farmers in the Kongolo and Mbulula sectors own corn grinders 2. By 1987, 100% of families in the project area have access to a corn grinder 3. Among those who own corn grinders ... use them as a source of revenue and clear between 4212 Z/8736 Z per year 4. Women economize at least 18 hours per week through access to a corn grinder.
OUTPUTS 1. Best manual corn grinders are identified and tested.	1.a Criteria for selection: - spare parts can be made by local blacksmiths - life of machine is at least 5 years - first breakdown occurs after 10 months from purchase date with maximum utilization - models should be adapted to rural African conditions - models are selected in light of shipping distance, supplier capacity for delivery and cost 1.b At least 3 models are identified and tested for a 6 month period in the following 18 sites:

SITE	MODEL A	MODEL B	MODEL C
1. 2. Etc.			

1.c Sites selected for testing the corn grinder meet the following criteria:
- corn is the main staple
- priority is given to villages who have already purchased PNS corn grinders

1.d All 3 models are tested at the same time in the same village

1.e Corn grinders should be tested by current owners of PNS corn grinders for a one month period.

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2. Publicity program developed and functioning

2.a By ..... the publicity program is developed.

2.b Orders correspond to the sales projection chart.

2.c The publicity program is scheduled according to the following calendar.

Village	Date	Discussion subject

2.e Each village registered in the publicity program is visited at least 3 times at which time the following topics are discussed:
- corn grinder performance
- order terms
- purchase terms
- place of purchase

	- model specifications - maintenance requirements - purpose of project - corn grinder as a rental business - training: technical, management
3. Corn grinder supply system is established and functioning	3.a. Stock in place always corresponds to sales forecast. 3.b. Spare parts in stock reflect projected needs in maintenance calendar. 3.c. Supply system organized by .....
4. Sales and distribution system set up and operating	4.a. The lapse of time between orders and delivery does not exceed 2 weeks. 4.b. ..... number of agents are programmed to contact on a monthly basis ..... number of households. 4.c. After the second visit, ...% of households contacted order corn grinders according to the following calendar:

Village	No. of households	Anticipated orders
1. 2. etc.		

4.d. ..... number of corn grinders sold per village according to the following calendar:

Village	No. of households	No. of corn grinders sold
1. 2. etc.		

4.e Where applicable profits from corn grinder rental business permit loan repayment in maximum timeframe of 3 months

4.f Annual sales and distribution forecast is as follows for minimum placement of a total of 470 grinders

1983	1984	1985	1986	1987
10	50	150	200	60

5. Maintenance and repair system is set up and operating.

5.a All corn grinders are operational at least .....days per year.

5.b A serviceman inspects each grinder according to the following calendar:

Villages	minor check-up	Revision
1. 2. etc.		

5.c Corn grinder owners have access to a major repairs service located within a radius of 10 km.

5.d The local blacksmith in villages where corn grinders are sold can handle the following minor repairs:

5.e Repair and maintenance costs established by local blacksmiths reflect raw material cost and number of hours required to complete the job.

5.f Each corn grinder owner maintains a priority spare parts inventory.

6. A basic management training program is developed and operating for corn grinder business operators.

6.a Training expectations are as follows:

Management concepts	No. of people who apply concepts	No. of people who attend training
1. Advantages of hiring men to turn grinder		
2. Maximizing no. of hours machine used		
3. Maintenance		
4. Streamlining loan repayment		
5. Basic accounting		
6. Owner's public image		
7. Publicity		

6.b Training will consist of 2 types:

- on site visits by itinerant agents once a month
- periodically with groups at a given site and for topics requested by grinder owners or agents

6.c By ..... the training program is organized

6.b ..... number of agents are trained by .....

6.e Agents are selected by the following criteria:

- fluent in local language
- native of area
- completed 4 years primary school

	- 3 years work experience - sensitive to rural area individuals behavior and needs
7. Monitoring and control system set up and operating	7.a Reports are received by project director according to the implementation plans. 7.b Responses to issues raised in reports are given in a timeframe according to their nature and urgency. 7.c The monitoring and control system is developed by..... 7.d Villagers and project agent complaints and suggestions reach persons designated in the reporting system.

BACKGROUND INFORMATION ON WOMEN IN ZAIRE

Women's legal position, roles, constraints, and concerns influence the strategies adopted to address their needs. In addition, there is a difference between the kinds of problems rural and urban women encounter. Accordingly, urban area programs might include lobbying for legislation to improve women's legal status, day care centers, skill training and legal counseling. Projects for rural women on the other hand, would most likely focus on ways to lighten their burdensome workload. Unerstanding these differences is the key to designing meaninful programs for either group.

Legal Status

Married women, according to the Workers Code of Zaire, enjoy the same status as children under legal age. Married women are considered minors. As "parent", the husband has legal authority over both children and wives. Under these circumstances, wives must obtain written permission from their husbands to seek employment, apply for a visa or passport, open a bank account, or incorporate a business. The law also states that employers, if requested, must pay directly to husbands all wages earned by their wives. Men can also request employers to fire their wives. The latter apparently happens quite frequently at times of marital discord.

Regarding protection of legal rights, in instances where mothers are abandoned or divorced, the law stipulates that husbands are to provide alimony. In practice none does particularly in the large towns. Women who seek recourse from

the judicial system find their appeals summarily dismissed. Abandoned or divorced city women are therefore particularly vulnerable because jobs are scarce. Their only alternative is to turn to a friend or nearby relative whose income is most likely already stretched to the limit. Women in rural areas do not face these same kinds of problems because the social dynamics are different.

In the village setting, extended families and friends exert considerable pressure on individuals to conform to established rules and practices. By contrast, in the cities, individuals whose parents live in distant villages are relatively free from social constraints. For instance, in rural areas, it would be very difficult for a husband to abandon a wife for a younger, more attractive one. Divorce in the village occurs only rarely. That wives and children are abandoned more frequently in the cities is a function of urban men's decreased purchasing power. In the past, when Zaire's economy was stronger, men were able to support first wives and children even though they took advantage of their right to have as many as four wives plus numerous mistresses. Today they are forced to choose among them.

Furthermore, a proposal recently submitted to the Courts for passage into law signals a potential worsening of women's position in society. Under the pretext of decreasing the number of young city girls who enter into prostitution, this proposal reduces the sexual/marriageable age of young women from sixteen to fourteen. In reality, this measure is apparently an attempt to reduce the number of legal suits brought against men who impregnate girls under the age of sixteen. Under existing laws parents can now prosecute guilty parties.

Rural Women's Roles

As throughout most of Africa, rural women in Zaire are farmers, merchants, processors, artisans, mothers, and wives. Their days are long; their work is arduous. Throughout the day they transport heavy loads on their heads, performing the same function as horses, donkeys and vehicles in other parts of the world. They marry early in their teens, and opportunities for formal training and education are limited. They age very quickly as a result of hard work, deficient diet, disease and continued pregnancy. Despite these circumstances, village women are generally good-natured, honest and courageous. They usually do not travel except for occasional short trips to surrounding villages, and, because of this isolation, alternative life styles are not well known to them.

Men and women have very specific work roles. Some work may be shared; most is not. It is important to understand that a village woman generally finds herself on her own with responsibilities as farmer, mother, processor, etc. She bears this burden alone because society does not permit men and boys to share in certain tasks, and because young girls marry and leave the family coumpound at the very time when they could fully assist their mothers. A village woman can expect to spend 32 years at physically hard labor, assuming she rears a family of 6 children born two years apart and the last child is male who leaves the family to marry at age 20. After these 32 years, or at about age 46, her workload is reduced because her married children begin to provide a certain amount of assistance.

Information about women's work in the Kongolo and Mbulula areas of Shaba province is contained in the charts in the Appendix. The information was obtained in a very short time

from a limited number of people. The list is illustrative only, and is by no means exhaustive or complete. In examining this information to identify areas for assisting women, three categories are immediately apparent. First is the need for tools and equipment to either increase efficiency or to reduce physical energy required to complete the task. Next is the lack of alternate transportation methods to haul produce from fields to village and village to site of sale plus water for food processing purposes from source to village. Finally, there is a need for containers such as sacks and barrels that cannot be made locally. An activity for the future could involve instruction in basic accounting and business principles, but only when the magnitude of operations increases.

Programming Considerations/Constraints

There are four major considerations which influence the selection of projects for women in the rural areas. The first is the fact that rural women are not independent and have not thought about whether they could or should be. It is an irrelevant point for them; they are an integral part of the family. In theory and in practice they are accountable to their husbands. Accordingly, women cannot participate in projects without their husband's consent, and permission will not usually be granted unless the project has merit and will benefit the family.

Second, women's schedules are overly charged, not with optional tasks, but rather with activities related to basic survival. Additionally, some periods in the year require more labor than others, i.e. harvest time. Third is the factor of compatibility with local traditions. For example, certain families in the Kongolo area said

that they had not entirely replaced their local variety of corn with the new, improved variety introduced by PNS. To do so would have represented a rupture in ties with their ancestors. Another case in point involved the initiation of a women's communal field in the Mbulula region. Due to clan rules about use of land, those farmer women who had volunteered for the project but who did not come from the clan which had donated the land could not participate . This group had to find a separate piece of land.

The last consideration involves the participant's perception of benefit to be gained as balanced with the amount of risk involved and additional labor required for each project. Farmers are astute individuals. Their ability to reason and to judge the utility of new ideas which require changes in their living patterns is often underestimated.

Influence of Rural Family Needs on Program Choices

Recognizing the importance of men's opinion concerning programming activities for women, the evaluation team first interviewed a number of village chiefs and notables in the Kongolo and Mbulula area; then women in the area were asked the same questions. Men and women cited the need for corn grinders, village wells, access to basic commodities such as sugar and salt, a medical care unit, an adult learning center, and tractors. These requests represent goods and services to which many farmers apparently had access prior to Zaire's Independence. The grinders and wells were consistently the first two items mentioned by both women and men.

The villager's six requests may be broken down into two categories-- those which can be met by means of a village oriented program and those which demand extensive, long-term external technical assistance. Because rural women will be most directly affected by access to corn grinders, sufficient water supply, and basic commodities, those needs and their importance must be addressed first.

Among all interviewed, corn grinders, preferably a mechanical model, were the priority item. The men said that their wives expended too much energy pounding corn into flour; that it was hard work which became more difficult as their wives aged. They said further that their families sometimes did not eat lunch until as late as five o'clock in the afternoon because the wives had to return from their work in the fields before they could pound corn into flour for the "noon" meal. Because the family does not eat breakfast, the men felt that this was a long time to wait.

Unless a village is situated near a lake or river, provision of a water supply usually poses a continuous and often seemingly unsolvable problem. Normally, water for cooking and drinking is fetched twice daily by women and children who walk to streams or springs located at least one kilometer, usually, further, from the village. It is, therefore, used sparingly. Clothes are washed and baths are taken at the stream or spring site. Easier access to water in sufficient quantities will not only considerably lighten women's workload, but it will also improve the health of families. There are apparently a signficant number of village wells in the Kongolo and Mbulula area whose pumps no longer work. Because the wells have been disfunctional for a long time, their repair would require

not only pump replacement but also restoration of the interior walls.

Due to the general deterioration of the road system in Zaire and problem the country faces in obtaining manufactured goods from abroad and raw materials for its factories, rural areas in Zaire are increasingly cut off from basic supplies. The following list of elementary items now unavailable to the farmer on a regular basis illustrates the extent of his isolation. The list is an estimation of those items required monthly by a rural population of 1700.

1. 10 dozen cans of milk
2. 250 kilos of sugar
3. 100 packages of tea
4. 100 packages of coffee
5. 10 boxes of bath soap
6. 10 boxes each containing 60 bars of laundry soap
7. salt
8. 100 cans of sardines or corned beef
9. 2 barrels of kerosene
10. 4 boxes of batteries
11. 2 cartons of matches
12. School supplies (slates, pens etc.) (particularly at the beginning of the school year).

As the supply of these items is irregular, they are of course, expensive. When available, however, farmer access becomes the principal problem, cost aside. Villagers have two options for purchase of basic commodities. They can either wait for the passage of an itinerant peddlar who travels from village to village on bicycle and demands,

according to farmers, exhorbitant prices or they can travel to the nearest major trading center that stocks commodities. As farmers have no bicycles, and public transportation does not exist, they must go on foot. The distances involved and the demands of their work usually preclude the latter option. The farmer, who in 1982, does not have access to salt for his meals, an occasional cup of tea, or a match to light his home-made cigarette is, with reason, resentful. In general his standard of living has plummeted, and he feels that he is being punished. As a result, today he is bitter, skeptical and mistrustful. It is because of this setting that projects face obstacles from the outset. If a commodities program can be tied to the corn grinder project and benefit from its supply and distribution system, the program as a whole will benefit from increased farmer cooperation.

APPENDICES

APPENDIX A

SOYBEANS AND SPRINGBOXES: APPROPRIATENESS TO PROJECT

Comments are in order regarding the introduction of soy beans in the Project area and the participation of the animatrices in the spring box program carried out by PNS in collaboration with Peace Corps volunteers (PCV). The objective of the spring box program was to provide villages with potable water. From 1979 to the present, spring boxes for ten natural springs serving nine different villages were constructed. A total of about forty days was devoted to this effort by the four animatrices. The PCVs provided technical assistance in the construction of the spring boxes, and the animatrices mobilized the women to collect construction materials: sand, rocks, and gravel.

While providing potable water to villages is in itself a valid activity, it is not a priority village activity for women in the Project area. From a Public Health point of view, initial measures recommended to improve the health status of villages place more emphasis on easy access to sufficient quantities of water than on limited access to limited quantities of potable water. Constructing village wells is therefore more important than providing boxes for water sources which are located long distances (at least a kilometer) from villages. Spring boxes provide potable water, but do not influence the amount of water that women can realistically carry back to the village.

Persuading farmers participating in the income generating program to grow soy beans in their communal fields was an application of an objective related to the improvement of the nutritional status of the villagers. The appropriateness of their introduction is questionable, as the soybeans could not be marketed through traditional channels and required a promotional program which the animatrices were ill prepared to provide.

Several factors should influence the promotion and introdiction of crops for their nutritional value: production requirements; market potential, including price per kilo; and the nature of the nutritional deficiency in the area. While it is true that the market price for soy beans is high, it is also true

that the market is restricted. Further it is not established that there is a serious nutritional problem in the Kongolo area.

To date the soy bean crops have been marketed for the women farmers by the animatrices because the farmers cannot sell them in their respective villages. The absence of a village market for the crop reflects the need for an aggressive program in the villages which will educate the villagers and inform them of the value of soy beans. The only people, however, for whom the animatrices organized educational activities were the women who grew the soy beans and their objective, unfortunately, was not to eat the crop, but to sell the beans in order to obtain the necessary capital to initiate basic commodities businesses.

Practical demonstrations of the nutritional value and the preparation of soy beans were organized for the women growing them. These demonstrations were not always valid. In order to provide maximum nutritional value, certain varieties of soy beans must be soaked for at least eleven hours prior to cooking. In one session demonstrating how to prepare roasted soy beans to be eaten like peanuts, the animatrice told the women to soak the beans for twenty minutes prior to frying them. The soy bean variety grown and the recipe book from which the animatrices take their recipes need to be correlated to make sure that correct information about soy bean preparation is communicated.

Prior to the aforementioned cooking demonstration, the animatrice gave a five minute presentation on the nutritional value of soy beans. The key to her exposee was her assertion that soy beans contain vitamin B complex and 38% protein as opposed to meat which is only 17% protein. She further stated that eating soybeans would help prevent Kwashiorkor. This presentation highlighted the inadequacy of her training in adult education and her insufficient understanding of the topic. These misleading presentations built around abstract technical words further underscore the fact that FGDS supervisory personnel, either out of lack of knowledge or neglect, did not adequately monitor the animatrice's work in order to correct their deficiencies and to upgrade their skills.

APPENDIX B

INDIRECT BENEFITS TO WOMEN IN PROJECT AREA

About 10,000 women farmers were indirectly influenced by other PNS Sub-System's programs. Women work in the fields with their husbands; extension agents from the Research and Extension Sub-System (RES) worked with approximately 10,000 male farmers in the area; it can be assumed, therefore, that women benefited from RES training. The assumption that men transfer information to their wives, which is often challenged in "Women in Development" literature, cannot be questioned in this case. The proof of this exchange is, ironically, the evidence PNS personnel reported that many women worked against the efforts of the RES extension agents by influencing their husbands not to apply a number of the farming techniques recommended. The women claimed that some of the recommendations were too time consuming and that some threatened linkages with their ancestors. While the extent of female influence cannot be determined, it appears to be fact that only one technique (improved seed) of at least five introduced by the extension agents has been widely accepted by the male farmers in the project area.

APPENDIX C

ROLE-FARMER

CROP	DIVISION OF LABOR	TOOLS USED
1. Corn	Husband : clearing	
	Husband and wife : - slash and burn - carrying off fallen wood and brush - tilling - seeding - harvesting	 hoe string machete axe coupe-coupe
	Wife: transport of harvest to home	
2. Cotton	(same as for corn)	"
3. Peanuts	(same as for corn)	"
4. Rice	(same as for corn)	"
5. Cassava	Wife does most of labor	"
6. Vegetables	(same as for cassava)	"

ROLE : PROCESSING

CROP	PRODUCT	METHOD	FREQUENCY OR PERIOD	EQUIPMENT OR TOOLS USED	TIME REQUIRED	DESTINATION
1. Corn	flour	pound	once a week	- morter or pestle - grinder	22 hours 4 hours	home consumption
2. Corn	kernels	- beating jute sack filled with cobs for large quantity - hand tool for 2 sacks - by hand for dishpanful	daily during harvest period			Family needs and for for sale to merchants
3. Palm nut	oil	extract	during harvest once a week	locally made press	1 day	commercialization
4. Peanuts	shelled peanuts	hand shell	Dec-Jan and May-June	hand	3 days for one jute sack	commercialization
5. Rice		hull	Apr-June	morter and pestle		family needs, commercialization
6. Corn & Cassava waste	alcohol	distilling	weekly	clay pots	1-3 days	commercialization
7. Oil and caustic acid	soap	mix	1-2 times monthly	barrel, utensil pipes	24 hours	commercialization
8. Cassava	flour	pound	daily	morter & pestle	1 hour	home consumption

ROLE: MERCHANT

PRODUCT	Period marketed	CLIENT	PLACE OF SALE	MEANS OF TRANSPORT	UNIT PRICE	QUANTITY SOLD	CONTAINER USED	DECISION MAKER RE-GARDING MARKETING	RECEPIENT OF PROFITS
1.Dry Corn	May-Sept	merchant	village	merchant transports in truck	100Z/100kgs	3/4 of harvest	jute sack	husband	husband 3/4 wife ¼
2.Cassava	All year	anybody	fields, village, market	bicycle foot	1 Z for 3 tubers	¼ of harvest	basket	wife	husband ¼ wife 3/4
3.Rice	June-July	anybody	village, market	merchant's vehicle, foot, bicycle	1½ Z per glassful	3/4 of harvest	jute sack	wife	husband ¼ wife 3/4
4.Peanuts	Apr-May	anybody	village, market	foot	1 Z per glassful	3/4 of harvest	jute sack	husband	husband 3/4 wife ¼ 4
5.Tomatoes & other vegetables	Apr-May	anybody	village, market	foot	½ Z	3/4 of harvest	basket	husband	husband 3/4 wife ¼ 4
6.Sweet potatoes	Apr-June	anybody	village, market	foot	1 Z for 3-5 tubers	3/4 of harvest	basket	wife	husband 3/4 wife ¼ 4
7.Termites	All year	special people	village, market	foot	1/10 Z per spoon	3/4	basket	wife	husband 0 wife 100%
8.Snails	Nov-Dec	special people	village, market	foot	4 Z	3/4	tin contain-er or sack	husband	husband ¼ wife 3/4
9.Oranges	May-June	anybody	village market	foot	1/10 Z for one	3/4	sacks	husband	husband 3/4 wife ¼ 4
10.Bananes	April-May	anybody	village, market	foot	1½ z for one	3/4	--	husband	husband 3/4 wife ¼ 4
11.Palm oil	periodic	merchant	village		1 btl= 2½ Z	1-5 barrels	barrel	husband	
12.Cotton	June-Oct	merchant	village	merchant's truck	1 kg = 8/10 Z	50-150 kilos	basket	husband	

ROLE: ARTISAN

TYPE	PERIOD MADE	TOOLS USED	QUANTITY REQUIRED	RAW MATERIAL USED	CLIENT	UNIT PRICE	TIME REQUIRED TO MAKE
1. Pottery	dry season		10 per week	clay	villagers	10-45 Z depending on quality	
2. Winnowing tray	April-May	"tete" "nduga" "bambu"	4 per week	"tete"	villagers	8 Z	
3. Baskets	all year	"boukindi" "mondo" "carbone"	2-3 per week	bonkindu	anybody	10-20 Z	
4. Mats	Apr-Sept	"machette" like ecorce sauvage	3 per week	nduga	anybody	15 Z	1 week
5. Hats	all year	"bukindu" "mondo" "carbone"	6 per week	bukendu	special people	5 Z	
6. Cord	January May-Sept	knife "machette"	6 per week	lunkole, luvuba, boissons acquatique	fisherman farmers	25 Z	1 day for 150 meters

EVALUATION OF THE PROJECT NORTH SHABA PROJECT MANAGEMENT.

EVERETT HEADRICK

MAY 1982

TABLE OF CONTENTS

	PAGE
SUMMARY	
PNS PURPOSE AND END OF PROJECT INDICATORS	1
PREVIOUS EVALUATION	2
PROJECT MANAGEMENT UNIT ACCOMPLISHMENTS AND PROBLEMS	2
PMU COSTS	3
EVALUATION METHODOLOGY	4
ANALYSIS OF ACCOMPLISHMENTS AND FAILURES IN REGARD TO THE REVISED PP AND PRIOR EVALUATION	4
OVERVIEW OF PMU DEVELOPMENT	9
PMU ACCOMPLISHMENTS	10
PMU PROBLEMS	12
EFFECT ON PNS ACTIVITIES	20
MANAGEMENT STRUCTURE	20
SUSTAINABILITY OF ACCOMPLISHMENTS	21
RECOMMENDATIONS	21

SUMMARY

Management within PMU exists at a very basic level. Shortages of staff and the ever-present cash-flow problem the management mode is crisis management.

The most serious problems are:

- lack of management planning, resulting in poor decision making,
- an ineffectual accounting system which cannot provide accurate data on past expenditures,
- lack of an effective budgeting system including cash flow management,
- lack of documentation for decisions and communications between PMU and the various subsystem; and
- the inability for the information collection division of the PMU (SCAD) to collect baseline and farmer income data which impedes appropriate measurement of project impact.

The evaluation team has recommend termination of the project within 6 months.

However, if the project were to continue, improvement of the PMU would be priority activity.

PNS PURPOSE AND END OF PROJECT INDICATORS

The North Shaba Rural Development Project (Project number 660-059) was designed to contribute to the national agricultural subgoal of self-sufficiency in maize production. The project purpose, as stated in the amended Project Paper was:

> "To increase the net income of small farmers in the project area by 75% by the end of the project as a result of raising corn production from 27,000 MT (1978) to 49,000 MT (1983); and to develop a rural development process in the form of a model that is replicable in other parts of Zaire."

The project was originally designed with six subsystems being managed by an overall Project Management Unit (PMU). The subsystems are Research and Extension, Infrastructure, Intermediate Technology, Marketing and Credit, Farmer Group Development, and Information. In the Project Paper Amendment of August 1980, the arrangement was slightly changed, with the Information subsystem being brought directly within the PMU.

The PMU was composed as a tripartite decision-making unit, consisting of the host country Project Director, the expatriate Chief of Party, and the expatriate Assistant Director for Administration and Finance (ADAF). In its pure form, the PMU was to provide a balance between expatriate and host country counterparts in the decision-making process, provide consistency in management, and serve as a learning tool for project management. An effective PMU would provide leadership, and administrative and support services for the project.

By the end of project, the following outputs directly related to the PMU were expected:*

a) Information system developed and functioning:
Information system provides information in a timely manner adequate to meet decision-making needs for decision makers at following levels: farmer; pre-cooperative; extension worker; research; intermediate technology village enterprise merchant; project management; local and national project management; local and national GOZ organizations; Department of Agriculture; Office of the President; external market and suppliers and USAID.

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* Source: Project Paper Logframe

b) Integrated Department of Agriculture (DOA) program developed for post-project operations in Nyunzu and Kongolo zones:

- sufficient numbers of Zairians trained to undertake DOA operations in project zones;
- DOA program developed for post-project operations integrates agricultural support activities (research extension, road maintenance, marketing, and information collection and dissemination).

c) Model organizational structure developed for DOA to carry out rural development processes within other zones.

PREVIOUS EVALUATIONS

This evaluation represents the fourth comprehensive evaluation for Project North Shaba (PNS). The first evaluation was conducted by Dimpex Associates Inc., in mid-1979. It was this evaluation which forced many changes, evidenced by the Project Paper Amendment of August 1980. There have been two internal evaluations conducted by the implementing contractor, Development Alternatives, Inc. These internal evaluations were conducted during mid 1980 and early 1982. Comments regarding end of project requirements, earlier recommendations, and current problems will be addressed in Chapter 3; "Analysis of Accomplishments and Failures."

PROJECT MANAGEMENT UNIT ACCOMPLISHMENTS AND PROBLEMS

The PMU has in part accomplished objectives set forth by the PMU design. It has provided some leadership to the project, serves as an information contact for public and private agencies, and provides centralized procurement, warehousing, personnel, and accounting services. These in total have partially served to increase project efficiencies by alleviating each subsystems need to carry out these services.

However, in many areas, including those which have had some successes, problems exist which critically impede project implementation and severaly reduce management effectiveness of the PMU. The most serious problems are:

- lack of management planning, resulting in poor decision-making;

- an ineffectual accounting system which cannot provide accurate data on past expenditures
- lack of an effective budgeting system, including cash flow management;
- lack of documentation for decisions and communications between the PMU and the various subsystems; and
- the inability for the information collection division of the PMU (SCAD) to collect baseline and farmer income data which impedes appropriate measurement of project impact.

These and other problems will be discussed further in Chapter 3, "Analysis of Accomplishments and Failures."

PMU COSTS

Throughout the life of the project, the PMU and SCAD are projected to cost $2,037,900 and $744,000, respectively, financed through project grant and loan funds. Local currency was also provided, originating from Counterpart funds, and the Zaire Government Budget Ordinaire (B.O.) and Budget Investissement (B.I.). PMU utilized approximately 19% of the total dollar budget and approximately 20% of the Zaire budgeted funds. SCAD utilized better than 7% of the budgeted dollar funds, and less than one percent of counterpart and budgeted Zaire funds. Dollar and local currency expenditures in PMU and SCAD were:

PMU COSTS

Year	Grant Funds ($) (1)	Counterpart Funds (Z) (2)	Zaire Government (z) (2)
1977	478,000	57,000	-0-
1978	199,000		-0-
1979	201,000	305,000	107,300
1980	179,000	237,397	213,590
1981	677,700	19,968	1,409,135
1982 (budgeted)	573,200	-0-	2,460,000
TOTALS	2,307,900	609,365	4,190,025

1. Budgeted, PMU did not have a record of expenditures
2. Actual Zaire expenditures, according to PMU records, 1982 budgeted.

Source: Information obtained in interview with ADAF Officer, 4/82.

SCAD COSTS

Year	Grant Funds ($) (1)	Counterpart Funds (Z) (2)	Zaire Government (Z) (2)
1977	155,000	-0-	-0-
1978	95,000		-0-
1979	55,000	-0-	32,300
1980	88,000	37,500	37,670
1981	193,200	13,824	82,080
1982 (budgeted)	158,000	-0-	200,000
TOTALS	744,200	51,324	352,050

1. Budgeted, PMU did not have a record of $ expenditures
2. Actual Zaire expenditures according to PMU records, 1982 budgeted.

Source: Information obtained in interview with ADAF Officer, 4/82.

EVALUATION METHODOLOGY

Evaluation findings are based upon numerous meetings with PMU staff members, a large majority of the subsystem chiefs and their expatriate counterparts, farmers, and other resource people in the project area. There was also an exhaustice review of project files, project documents, correspondence and accounting information.

ANALYSIS OF ACCOMPLISHMENTS AND FAILURES

In analyzing accomplishments and failures, it is necessary to first compare accomplishments to expected outputs as defined in the Project Paper logframe. From this, one can gain a sense as to whether basic objectives were being met. In perhaphs a more critical respect, it is then necessary to evaluate the performance of the PMU in light of the above accomplishments, and as a management unit directing this project.

OUTPUT # 1

"Information system developed and functioning. Information system provides information in a timely manner adequate to meet decision-making needs for decision makers at following levels: farmer, pre-cooperative, extension worker,

researcher, intermediate technology village enterprise merchant, project management, local and national GOZ organizations, Department of Agriculture, Office of the President, external market and supplies and USAID".

The Service de Collecte et Analyse des Donnés (SCAD) is in operation, albeit with reduced staff, and is providing pertinent data to various subsystems, the PMU, and USAID. SCAD operations have been hampered by supply shortages, as well as by an inexperienced yet eager Zairian staff.

OUTPUT # 2

"Integrated Department of Agriculture program developed for postproject operations in Nyunzu and Kongolo zones".

- Sufficient number of Zairians trained to undertake DOA operation in project zones.
- DOA program developed for post-project operations integrated agricultural support activities (research, extension, road maintenance, marketing, information system)".

No evidence could be found of plans, or preparations for a plan for post-project operations in Nyunzu and Kongolo zones. Talks have been held in regard to the possible placement of various subsystems by/between USAID, DOA, DAI, and some preliminary discussions with ESTAGRICO, but concrete action has yet to be taken. Given the problems associated with obtaining adequate GOZ financing for this project, development of such a plan with the requisite GOZ funding would be extremely difficult at this time. A general feeling among several Zairians questioned is that this project will be unable to maintain its present size or scope without additional outside funding or severe reduction of the project scope and size.

There has been insufficient activity in the area of providing training to the Zairians to undertake DOA activities in the project zones. The staff is generally young and inexperienced; however, it is willing to learn and could be more effective, given training. Increased levels of training, both formal and on-the-job, could serve to more fully utilize available manpower.

Ten staff members have received a total of 25 months of short-term training in research and extension, crop storage, farmer group action and credit, intensive hand labor road maintenance, appropriate technology statistics, and

communication. The Director departs in May for a two-month training course in management. One staff member is now in a Masters Program in Sociology. On-the-job management training for sub-system chiefs is at a very low level.

OUTPUT # 3

"Model organizational structure developed for DOA to carry out rural development process within other zones".

Given problems of project implementation and project sustainability experienced in this project thus far, a model organizational structure has not yet been developed. This is not to say nothing has been learned with respect to a model organizational structure, but it is obvious a modification of design is required in order to create a sustainable structure to carry out successful rural development projects.

In order to evaluate the performance of the PMU, it is beneficial to trace briefly a history of the PMU, using evaluations, subsequent recommendations, and remedial measures taken. One must remember throughout this analysis the fact that the PMU is a concept contrary to traditional Zairian organization, and that difficulties encountered are formidable barriers to overcome.

The first comprehensive evaluation of Project North Shaba (PNS) was conducted in mid 1979 by Dimpex Associates, Inc. The PMU was closely examined, criticized, and recommendations were made. These recommendations were formalized in the Project Paper Amendment in August 1980.

Development Alternatives, Inc, completed two internal evaluations, one mid in 1980 and the last one during March 1982. Since the Dimpex evaluation contained many of the most appropriate management recommendations, the focus of this section will be to review performance primarily against the Dimpex report.

Six primary recommendations regarding the PMU in the Dimpex evaluation are reviewed below. The recommendations were valid, and if they had been implemented, management of the project would have improved significantly. They are:

RECOMMENDATION # 1

"Project management, together with GOZ officials, should start

planning for the smooth transition of project activities and their integration into GOZ agencies (or evolution to PVOs or private sector companies), at the end of the project. A document on this subject should be presented by 1981 for thorough discussion and modifications and be ready for implementation in 1982".

This recommendation was the likely force behind the project output change which was formalized in the amended PP. At the tine the recommendation was made, it was envisioned that several of the subsystems could be absorbed into related GOZ agencies. For example, it was thought that the Farmer Groups Development subsystem could be placed within Rural Development; Research and Extension could move into the Department of Agriculture; Infrastructure could move into the Office des Routes; and, Intermediate Technology would be sold to a private entrepreneur. Subsequent problems have arisen, placing in jeopardy realization of these plans. The predominant cause is the incongruous policies and goals of the subsystems and the GOZ. Personnel policies and requirements of establsihed GOZ organizations may not allow absorption of project personnel and subsystem into GOZ organizations.

RECOMMENDATION # 2

"The PMU should consider expansion of its membership to allow revolving participation of the subsystem chiefs. The decision-making process and flow of authority/responsibility should be streamlined and clarified to allow a higher level of participation by Zairians. Relations with local authorities and large merchants should be clearly delineated. The financial system should be revised to provide more detailed plus reliable accounting information. Installation of a cost accounting system would provide needed information by cost centers and be useful for project management during project life, facilitating analysis of cost effectiveness of each subsystem. This sytem would also be useful for purposes of providing financial guidelines for replications".

The decision-making process within the PMU was vaguely defined and resulted in confusion among the subsystem chiefs as to how to proceed with their work. Relations among the subsystems and between them and PMU were characterized more by competition for scarce resources than by collaboration and integration. Also, PMU relations with local authorities and commercants were necessary to the project's survival. Yet it was thought that these would run counter to the project

objectives of servicing the interests of small farmer organizations. The Dimpex team also had great difficulty in determining the financial status of the project.

In order to alleviate these problems and bring more Zairians into the decision-making process, the PMU has instituted a series of bi-monthly meetings with subsystem chiefs, and expatriate staff. This can only be described as a limited success, as scheduling difficulties, time conflicts, etc., have changed the meetings frequency to roughly once a month. In addition, meetings are frequently devoted to personnel and salary issues which might more efficiently be handled by the subsystems on an individual basis. These bi-monthly meetings will be discussed in greater detail later in this chapter.

The accounting system has not been modified to provide the desired detailed and reliable accounting information. Not only is it difficult to obtain accounting information on individual subsystem activities (e.g. cost per kilometer of road rehabilitated, cost of resources currently expended and planned for the Ngaba training facility), but on a grander scale, it is difficult to obtain data on amounts being expended per subsystem. This aspect alone has severely limited the amount of information this evaluation could obtain and review for its analyses.

RECOMMENDATION # 3

"The project finance officer should keep separate files on implementation costs by specific subsystems. Financial reports should include the analysis of increases in costs due to inflation in Zaire as well as in the U.S. plus costs of delays in deliveries and their effects or cost overruns. Efforts should be made to align present accounting practices (which closely follow the American System) with those of other GOZ agencies".

Accounting practices are aligned with the GOZ system. However, the finanacial department does not now have the capability to provide implementation costs by specific subsystems, nor is it able to provide an analysis of increases in costs due to inflation in Zaire as well as in the U.S.

RECOMMENDATION # 4

"The PMU should establish personnel policy guidelines matching manpower requirements, both for expatriates and Zairians".

Personnel policy guidelines for local staff have been prepared and are contained in a project personnel manual. PMU and the subsystems have examined some of the manpower requirements. Difficulties in staff recruitment and financial constraints have limited the project's ability to meet overall manpower requirements.

RECOMMENDATION # 5

"Training programs for Zairian project personnel should be established as soon as possible, either in the project area, Bukavu, Upper Volta, etc."

Some short-term training has been provided to ten staff members. One staff member is in long-term training, however, additional staff training is required.

RECOMMENDATION # 6

"The Communications and Information subsystem requires the services of additional Zairian personnel including a statistitian. All the present staff of the sub-system requires intensive training in data collection and analysis to be provided by short-term technical assistance".

Recruitment through the DOA has not been successful in obtaining a chief for the section. Other alternatives such as promotion of someone now working within SCAD should be considered. One statistician is now in a three-month training course. Data collection and analysis have significantly improved since the Dimpex evaluation; however, intensive training is still required.

OVERVIEW OF PMU DEVELOPMENT

The PMU is a three-person entity designed to exercise joint leadership over the project and share decision-making responsibility. It is composed of the Zairian director, the expatriate advisor/chief of party, and the expatriate deputy for administration and finance.

PNS' organizational structure is designed with the intent to decentralize decision-making. This is not like the centralized Zairian organizational model, and the tendency at all levels of Zairian staffing is to look toward a centralized

decision-maker.

The PMU has experienced difficulties in its development and its past problems appear to be difficult to overcome. Contributing factors were inconsistencies in PMU staff and staff shortages which led to poor decisions. Exacerbating the situation is the sheer difficulty of operating in a physically remote location.

In the five years the PMU has been operational, it has had two full-time host country directors and one part-time host country director, two expatriate Assistant Deputies for Administration and Finance Officers, and two expatriate Chief of Party Officers. The project has not had a Chief of Party for the past seven months, although a temporary Chief of Party arrived in Kongolo during the period the evaluation team was on site. With such a turnover rate, it is easy to see why the PMU cannot generate consistency in management.

Staff recruitment has been an extremely difficult problem for both Zairian and expatriate personnel. The project site is remote and isolated, with Zairois viewing the project area as a career and cultural backwater. The contractor, DAI, apparently, experienced difficulty in recruiting qualified expatriate staff and recruited some staff who were not qualified in terms of training and experience. This has resulted in lack of adequate progress in some project subsystem and resentment of the situation by Zairian subsystem chiefs who have worked with the expatriate personnel.

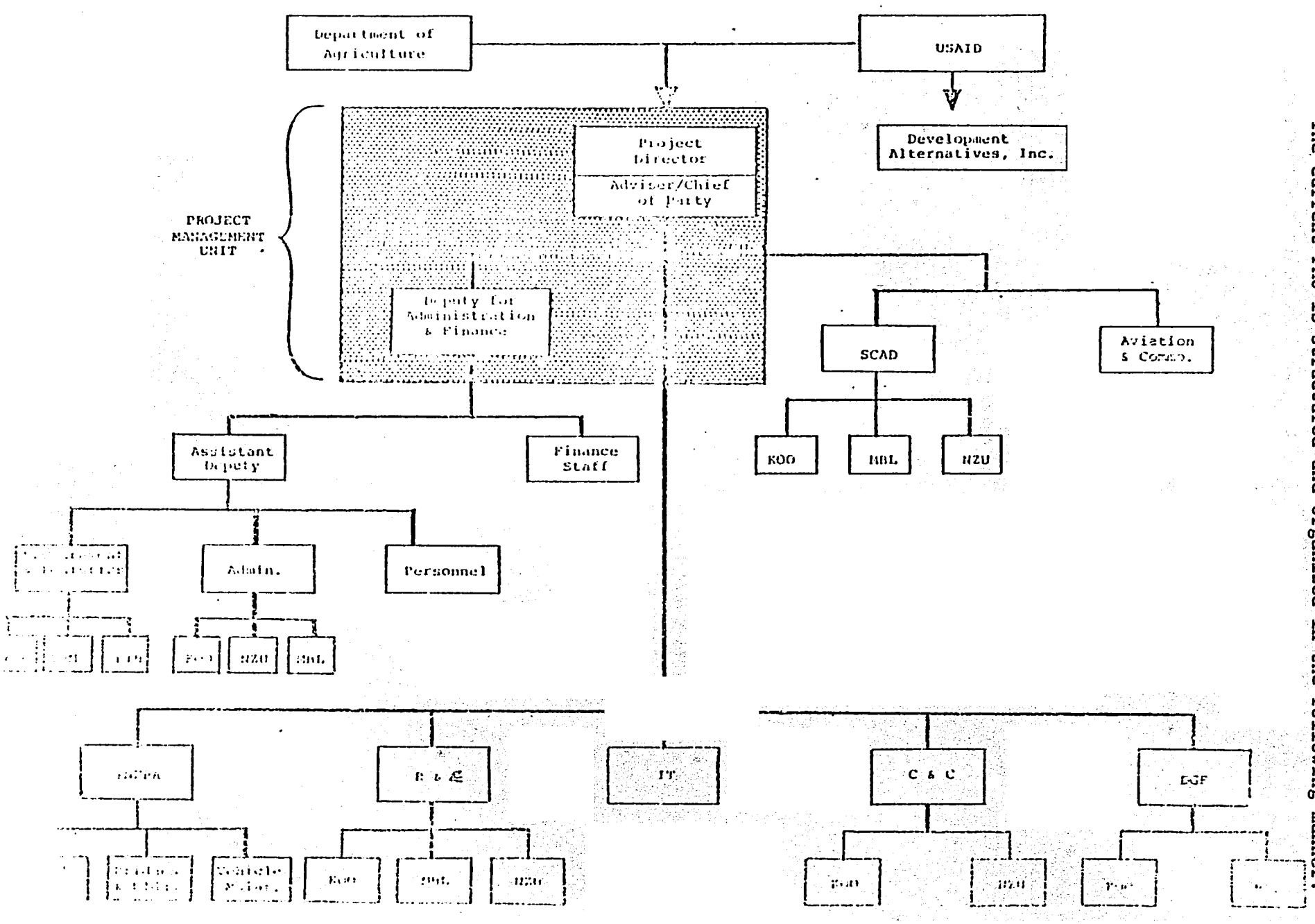
Kongolo, during the dry season is three days by road or rail from Lubumbashi, the Provincial capital. Air Zaire flights are scheduled; however now, they are supposed to be provided on a demand basis. It is reported that only two Air Zaire flights have arrived in Kongolo during 1982.

PMU ACCOMPLISHMENTS

The PMU is the official representative of PNS as regards local, regional and national authorities, outside organizations, and other national or international institutions. PMU has represented PNS in these contacts with varying degrees of success in promoting project activities. PMU has assisted in getting the project implementation underway and recruiting an excellent, but inexperienced Zairian staff. The evaluation team was generally impressed by the quality, interest, and capabilities of the Zairian staff. This has been accomplished despite the problems associated with being at the end of all supply lines - commodities. financial,

communication and personnel.

The current PMU is structured and organized in the following manner:



The organization when properly staffed and functioning would provide needed services and direction to the total project. However, factors such as lack of adequate financial management, staffing, abuses of resources, lack of management skills, cash-flow problems, and ineffective decision making impinge upon the Unit's ability to provide the direction required for the most effective management of the total project. As a result, the project director is in reality managing the project in the more traditional Zairian manner. All decisions on hiring and firing of personnel, approval of all vacations, and budgetary control rest with the Director. All preparation of payroll sheets, accounting services, and responsibility for resource control remain with the Project Management Unit.

Reportedly these actions have been given to the sub-system in past years and the resulting abuses have forced the Project Management Unit to step in and reassert control, thus resulting in centralized decision-makeing. However, this situation reflects a lack of PMU management capability and failure to have installed proper checks and balances in the financial system.

PMU PROBLEMS

Management can best be described as "crisis management", in that so many problems have developed in implementation of the project that little time has been left for rational planning to avoid crises. This situation has been compounded by serious local-funding cash-flow problems which have frequently resulted in the stopping of all or many of the project activities, delayed ordering of needed supplies, resulted in termination of employment of labor crews, and delayed salary payments. In the past, the project has been forced to borrow money from local businessmen, borrow counterpart funds against planned funding by the Department of Agriculture - then use the DOA funds to repay the Counterpart Fund. Given the financial situation,

the PMU, rather than expend funds for services & goods in order of their priority, will immediately pay existing bills and process as many of the pending purchase requests as possible, attempt to hold some money in reserve to pay salaries, then start the requests for adequate funding again. Also when a check from the GOZ or the Counterpart Fund has been deposited, problems resulting from transfer of funds from one bank to another require an inordinate amount of time on the part of the PMU staff to assure transfer of funds to the proper account. Normally, thirty days elapse from time of initial deposit until funds are available to the project.

Priority construction of Ngaba and the associate funding requirements have placed an additional stress upon the total cash flow situation. Currently pending are purchase requests worth 2.2 million Zaires for Ngaba. Labor requirements for the May 81 - April 1982 period are costing approximately 585,000 Zaires as estimated by the Infrastructure Subsystem Evaluation for both Ngaba and Mbulula development. The impact of Ngaba and its effect on project resources is compounded by the fact that budgets for the construction activity have never been prepared. It has been impossible to obtain an estimate of the total construction cost of Ngaba.

The most critical area of PMU is the finance staff and financial management. Again, many of the problems are brought on by the difficulty in obtaining competent Zairian staff who will serve in a remote area. The acting head of the finance staff is on TDY to Kongolo from DOA, Kinshasa. He will be on the project only three months. One of his primary duties is to recruit and train new staff locally. Four high school graduates have been hired and presently are receiving on-the-job training. Only two members of the original staff have been retained, the rest having been discharged.

Aggravating the over-all financial situation is the lack of an accounting system which can provide costs for discrete activities or budgets for specific

actitivities within the subsystem on which to base decisions and determine prorities. The evaluation team attempted to determine the cost of Ngaba construction, costs per kilometer of road renovated, cost of the commercialization program and many other project components. This information was not available through the financial office. The DOA conducted an evaluation of the project in December 1981; they requested information on Ngaba costs, the information was not available. Four months later the information was still not available to this evaluation team.

Budgets for discrete project activities are not prepared at any level in the project. Budgets are prepared for the global activities of each subsystem generally based on an annual work plan. Discrete activities are not clearly identified in the global budgets. This situation is reflected by the Director's statement in a general meeting on April 18, "a budget (for Ngaba) would be an illusion, since the cost of construction items are constantly increasing."

Ngaba, among many other examples, demonstrates the lack of financial and budgetery management in the project. Reportedly, senior GOZ officials of Shaba Province think Ngaba Training Center is an excellent idea and have encouraged the project to rapidly complete construction. The project has acceded to this request which they view as political pressure and also a demonstration of high-level interest in the project. Several problems become apparent when this activity is reviewed:

1. Firm plans as to the future use of the Ngaba Center, student load, types and frequency of training to be provided, size of faculty, etc. are nonexistent.

2. Estimates of cost, budgeting analysis or total cost projections of the center have not been made, nor have steps been initiated to obtain this information.

3. Impact on the total project has not been estimated when roughly one-thir of the current project resources are being devoted to a major construction activity.

4. PNS has not prepared an analysis as to annual cost of operation and maintenance of the center following construction, including transport and support of students and faculty in location, which is remote from the Kongolo railway and airport.

5. There is no record that project management had explored an alternate possibility of using the Ecole Technique Agricole, de Keseya, Kongolo which appears to have adequate buildings and an area for research. Reportedly, this training school is located outside the project boundaries, although near enough that project boundaries could have been reshaped to include the center. It has the same agro-climatic zone-as-the Ngaba area plus better soil.

Cash-flow problems as discussed earlier in this section further complicate financial management. The DAF Officer states that "we have not yet had any two consecutive quarters without a cash-flow problem." During this evaluation the project experienced another cash-flow crisis. Funding existed to pay April salaries and no other expenses. Planning was underway to terminate Ngaba construction; at this point 3,000,000 Zaires was made available to the project from the Counterpart Fund. In 1981, an unexpected expense of 706,000 Zaires which amounted to ten percent of the 1981 local currency budget was incurred in clearing 230 Nissan trucks through customs and delivery to Kinshasa. PNS staff member contend that the USAID Mission requested PNS to provide assistance and was to reimburse the project for costs incurred in this activity. Reimbursement has not been made by USAID, creating financial difficulties for the project. This is an example of poor management. The PMU should have prepared a memorandum of agreement for the USAID/Kinshasa mission to sign which authorized PNS to clear the trucks through customs and delivery to Kinshasa and commited USAID/Kinshasa

to payment of expenses associated with this activity. This documentation, if completed would have protected the project finances.

Management effectiveness is also reduced by slow decision-making and poor communications. In part this has evolved from the fact that at any one time one or two of the PMU members are absent from the office. During the past year, the Director, Chief of Party - DAI, and the Deputy for Administration and Finance have each averaged four months away from the Office. During the past seven months the project has lacked a Chief of Party for the contract team, limiting the PMU ability to provide adequate project managment. One result has been slow and often inadequate decision-making with many decisions being verbal. Most subsystem chiefs feel that this situation has adversely affected their operations, especially when this means a change or modification in project orientation or policy. Letters regarding personnel matters are seldom answered and frequently require several additional letters to elicit a reponse. Hiring of chauffeurs is one issue that has led to the generation of many letters. For example, action was initiated in August 1981 to hire fifteen chauffeurs. The DAF Officer stated that he had passed the request to the Personnel Office with the notation that drivers would not be hired until the Infrastructure subystem had established an adequate Driver Testing Program, he did not notify Infrastructure, in writing of the decision. Both subsystems wrote several letters to the Personnel Office without obtaining a response. During April 1982, Infrastructure subsystem was verbally told to hire drivers.

Another example of slow decision-making is reflected in the Seed Distribution Program. In 1981 the Research and Extension subsystem ordered 25 tons of maize seed. PMU doubled the order, on the assumption that demand would be greater than 25 tons, then failed to work with the subsystem in development of a Seed Distribution Program. The seeds arrived in Kongolo and remained at the railway station for two weeks before they were moved to Ngaba and Nyunzu. Only four tons of seeds were sold from the amount purchased, because of failure to determine the effective

demand for seeds, appropriate pricing of the seeds, and the method of distribution. This year, discussions regarding a Seed Distribution Program commenced in April 1982. Distribution of seeds should commence in August 1982. A decision regarding seed distribution should have been made several months ago, and the proposed system thoroughly reviewed and understood by all personnel. This is especially important because the Chief of the Research and Extension subsystem will be departing on vacation during May 1982.

Bi-monthly meetings were established to provide a greater opportunity for subsystem chiefs and the expatriate advisors to have an increased role in the decision-making process. Reportedly, the meetings are seldom held twice a month and are all too frequently devoted to routine personnel matters, complaints about salary, etc. Another general complaint is that follow-up of decisions and assignment of responsibility with dates for completion of assignments are frequently not pursued by project management.

PROCUREMENT AND LOGISTICS

The procurement and logistics section handles subsystem procurement requests and manages the warehouse and fuel depot. There is a single logistics representative in Lubumbashi and a major logistics, communication and freight forwarding operation in Kinshasa.

Originally PMU managed the centralized warehouse for the project in Kongolo. As the project gained momentum, responsibility for the warehouse was turned over to the Infrastructure subsystem, because the subsystem was responsible for the majority of the items procured and the Infrastructure Office was next door to the warehouse.

Lack of adequate control in the Kongolo warehouse, and the need for

improved inventory control, including establishment of reorder points, and an improvement in notifying subsystems of the arrival of their purchase requests resulted in PMU reasserting control of the warehouse. Several of the former Procurement and Logistics staff were fired and new personnel employed. Consequently, the staff is new and untrained. The expatriate mechanic has assumed the responsibility of training the staff, organizing an inventory, and providing the English names of stored parts. Currently, the staff is having difficulty in determining which part or item has been requested, because of inexperience and language difficulties.

Centralizing control of the warehouse and attempting to control losses have resulted in delays in the issuance of material from the warehouse. Also, shortages of office supplies have occurred. One impact of the shortage of office supplies and the difficulty in obtaining bicycle parts from the warehouse has been the decision to reduce SCAD's 1982 program of information gathering and analysis by one-half. More than one-half of SCAD's bicycle are in need of repair.

PERSONNEL

The personnel staff, in Kongolo, maintains the payroll, personnel records, and nominally deals with the labor union. However, because of abuses of the personnel system and difficulty in dealing with the labor union, all decisions are centralized with the Director regarding annual leave, hiring and firing of personnel, and promotions. This system, while correcting some abuse, is a grossly inefficient use of the Project Director's time. The personnel office is often condemned for not being responsive to subsystem correspondence; however, many of the responses are dependent upon the Director's action or decision.

ADMINISTRATION

The administrative staff is based in Kongolo, with administrativ

sector chiefs and small staffs located in Mbulula and Nyunzu. The administrative sector chief in Nyunzu is the senior officer with the Research and Extension subsystem. Approximately ten percent of his time is reportedly spent on administrative issues. The senior administrative officer for Mbulula is the expatriate adviser to Farmer Group Development. He estimated that 50 percent of his time is devoted to administrative issues and attemping to control theft of commodities and fuel. The rationale for assignment of an expatriate administrator is that he is the only person who can control misuse on theft of project resources.

Recruitment for the Counterpart to the Deputy for Administration and Finance is urgently required. Several candidates have been considered over time, but PMU has not been successful in recruiting a candidate. This position is critical to the effective operation of the PMU.

Recruitment of a Chief Accountant, a properly trained accounting staff, the chief of SCAD, and one assistant to the chief, are critical positions to be filled.

Formal training of PMU and SCAD staff has not been satisfactory. The Director departs for a two-month management training program early in May 1982. Two people are currently in short training programs in statistics and communication. Organized and structured on-the-job training has had limited success, because of the demands for time which have been imposed on PMU and SCAD in project administration and demands for information. The Director has indicated desires to have more information than he has been able to obtain on short-term training opportunities, particularly in French-speaking African countries.

EFFECT ON PNS ACTIVITIES

Implementation of subsystem programs have been delayed as a result of slow decision-making, inadequate financial management, and a general lack of management skills at all levels of project management, including the subsystems. Costs of project activities are not available, thereby seriously limiting judgement, based on costs, as to replicability of specific project activities. The unit to date has utilized approximately 20 percent of project funding which seems out of proportion to the benefits derived from its activities.

MANAGEMENT STRUCTURE

Organizationally PMU, if properly functioning, would provide an excellent management tool for the total project. An alternative method of management could be transfer of responsibility for accounting financial management and personnel to the subsystems with PMU retaining several responsibility for obtaining GOZ financial support and representing the total project to USAID, GOZ, and other entities.

This would require each subsystem to recruit and manage their own administrative and service staffs. Given the size and scope of Infrastructures operation this is a needed step. However, the other subsystems are much smaller in size of staff and level of funding requirements and therefore should depend on PMU to provide the administrative and financial services. The Infrastructure administrative section would work closely with PMU to provide their accounting information and assure project cohesiveness. However, given the generally low level of management competence within the project, this writer believes the existing PMU structure should be maintained, with emphasis placed on improved management.

SUSTAINABILITY OF ACCOMPLISHMENTS

The Project Management Unit, if operating as envisioned, appears to be an excellent mechanism to provide leadership to the project; assure timely implementation activities to overall project development; and provide central administrative services to the project components.

However, the PMU as presently staffed and functioning does not provide the desired level of management capability to the Project North Shaba.

SCAD has provided some input for decision-making, but personnel in the unit require additional training in data collection and analysis, and also additional staff is required to process data in a timely manner. As the project winds down, SCAD's services will be necessary to evaluate project accomplishments. SCAD's placement in the PMU appears appropriate and establishes it at a management working level which provides a sound basis for working with subystems as appropriate. SCAD should be managed by the PMU staff responsible for collecting and analyzing data to be used for management purposes. It can and should service the requests of subordinate units, but it reports to project management and gathers data with project management's authority.

RECOMMENDATIONS

Based upon the failure of the Project to implement recommendations of prior evaluations and to undertake significant improvements in project management and operation since the last PP revision and the lack of project sustainability, this writer recommends termination of the project within six months from submission of the evaluation. During the six month period the AID may wish to design another project to build upon some of the existing activities within the project area.

If this recommendation is accepted then action must be initiated as indicated below:

1. Negotiation with the DOA regarding USAID termination of assistance to Project North Shaba
2. USAID negotiation of a contract with a zairian accounting firm to undertake the following actions:
   a) Update accounts and continue accounting services to the end of the project
   b) Verify past accounting and assign costs and income to the appropriate subsystems
   c) As possible refine accounting system to determine costs and income of discrete activities such as the commercialization program, rennovation of the roads, operation of the Intermediate Technology Subsystem, etc,
   d) Prepare budget and reserve funding to pay full employee benefits of employers directly financed by the project.
3. USAID undertake a physical inventory of commodities on site and reconaile the inventory with shipping lists and other procurement documentation.
4. USAID should arrange for a final project audit.
5. Continued USAID support of PMU until the end of the project
6. DAI to plan scheduled departure of contract staff and provide TDY assistance as may be required to phase out DAI participation and contract termination.
7. SCAD should complete current field work, then devote the remainder of the time available to report preparatoom.

However if the AID decides the project should continue or be extended the following recommendations are proposed:

FINANCIAL MANAGEMENT

A) The most urgent action is reestablishment of financial controls. Immediate action is required to obtain competent staff. The project has been requesting the DOA, to provide staff, without success, since October 1981. AID and DAI should review with the DOA the availability of experienced personnel who can be assigned to the PMU. If DOA personnel are not available, contract negotiations should commence with local firms to provide the accounting services, to review staffing requirements, to provide adequate checks and balances within the system for maintenance of financial and accounting integrity, to account for income from sale of services and commodities, and to work with a financial management person to design accounting systems which will provide unit or discrete activity costs as an aid in determining sustainability/replicability costs.

B) AID should negotiate with DAI a contract modification for the remaining life of project to provide an experienced financial management person to develop a critical path financing plan for all project activities. The critical path financing plan would be based upon the minimum amount of financing required to meet critical project objectives, then would be expanded, by a priority system, to meet less urgent requirements as additional financing becomes available. Critical path financing would result in better use of project resources; assist in over coming the present cash flow situation and assist the project in withstanding pressures for project changes or assumption of activities.

The third major activity would be to work with the financial staff in developing an accounting system to extract, from existing financial documentation, discrete activity costs, i.e., cost per kilometer of road renovation, cost of Ngaba, cost of houses rebuilt or renovated, costs and benefits of the commercialization program, etc.

BUDGETING

PMU and DAI must place greater emphasis on budgeting. Budgets were prepared by subsystem personnel for the first time in 1981. This step needs to be expanded to include training of subsystem personnel in development of their annual work plans identifying activities by priority, then preparation budgets covering major activities to be undertaken on a prioritized basis. Budgeting will establish a partial basis for improved internal monitoring and evaluation.

The concept of budgeting, while foreign to the Zairian system, would provide a form of management training to project cadre and provide them with a basis for more completely analyzing and understanding the objectives of their activities. A two-month TDY consultant would be invaluable in training project staff and PMU to develop and utilize budgets as a management tool.

PLANNING

The bi-monthly meetings are important and should be continued. Meetings should be planned in advance, follow a written agenda, and be more fully utilized as an issues forum. Individuals not directly concerned with specific issues could be excused following the general meeting. Issues addressed could include, for example: commercialization plans and needs for an upcoming season; seed distribution; effectiveness of the extension system, etc.

Minutes should be kept of the meetings, efforts made to follow-up on decisions and establish dates for completion of assigned actions. The status of each assignment should be reviewed at each subsquent coordination meeting until the task is complete.

Reshaping the bi-monthly meetings to address issues would also provide an opportunity to anticipate needed changes in the program and allow adequate time for rationale planning to undertake changes or modifications as needed. Development of a calendar of activities for each subsystem would assist in focusing on issues or problems and provide a time-frame for initiating studies of issues or problems.

DECISION-MAKING

Decision-making is weak and requires sharper focus. Additional staff may provide assistance. The last DAI evaluation provided the following recommendation, "A capable Zairian with experience and an appropriate technical background in rural development project management should be recruited as deputy for operations as soon as feasible. This person would assume much of the role now played by the expatriate chief of party and become the third official PMU member at the termination of expatriate assistance." The deputy would be responsible for resolution of problems and be the focus of necessary decisions during the Director's absence from the project site.

The other position to be staffed is the Zairian counterpart to the deputy for administration and finance. PMU and USAID should press the DOA for immediate action in staffing the position with a qualified person.

Good management requires the PMU and subsystems to formalize decision-making in a written form. This would assure more complete understanding and agreement as to the intent of a decision. The PMU must also develop a policy of promptly responding to correspondence from subsystem personnel.

Clearly defined areas of responsibility are necessary in the PMU. Definition of the roles can be reinforced through continuation of the several brief meetings weekly among the PMU staff. As personnel are absent, other members of the PMU will have to assume responsibilities of the absent members.

The Director should delegate personnel decisions back to the personnel office and the subsystems and make those personnel accountable for management according to established regulations. However, given the strength of the labor union and problems generated in working with the union, it may not be possible to delegate responsibility for personnel management away from the Director's Office.

PROCUREMENT AND LOGISTICS

PMU should continue control of the warehouse but management of the warehouse should be returned to Infrastructure subsystem. However, PMU should insist on the following: cyclical inventories of warehouse stocks with at least a complete semi-annual inventory; reconciliation of all fuel stocks on a daily basis; establish a system to monitor both distance travelled and fuel consumption by each vehicle; and notification provided to a subsystem when commodities ordered by that subsystem arrive in the warehouse.

PMU/Infrastructure should provide an in-country short-term training program for the new head of procurement and logistics unit in warehouse management

MONITORING AND EVALUATION

A formal process of monitoring and evaluation is required as well as continuing the informal system of discussions with project personnel and visits to project activities. Formal review and discussions of work

accomplished as compared to planned work, project expenditures in relation to project budgets, definition of problems which may impede progress, and issues are areas to be included in semi-annual evaluation sessions. Subystem activities can be asessed and changes agreed upon as necessary.

SCAD

PMU working with the DOA and other GOZ agencies should determine the availability of a qualified person to be assigned as chief of the subsystem. If a candidate is not available, promotion from within SCAD should be considered There must be someone trained to take over who understands the rudiments of data compilation and analysis and do data extrapolations and validity tests.

Assignment of a TDY information specialist by DAI is necessary to provide training to the staff in data collection and analysis; assist in determining the type of data to collect in design of future studies; and organization of work and studies to collect information in a efficient manner.

TRAINING

The Project Director does not have information on short-term training programs in French-speaking Africa. USAID should promptly obtain information on training programs from French-speaking areas as well as other appropriate training information which may be utilized in development of the programs. Based on this information, USAID should assist the project in scheduling training to utilize remaining training funds as rapidly as possible.

The Project Director, with assistance from AID could utilize the Director's management training program to conduct management seminars for the subsystem chiefs. This will have the effect of reinforcing the

Director's training, but also means the initiation of management skills in the project. Management training should also be provided to subsystem chiefs as training opportunities become available.

ADMINISTRATIVE SUB-UNITS

Accounting checks and balances need to be instituted to manage accounting practices of the bookkeeper at Mbulula and Nyunzu. Both bookeepers are responsible for receiving funds from sale of intermediate technology equipment, the commercialization program, etc., as well as disbursement of small amounts of cash.

The expatriate administrative sector chief at Mbulula should be replaced by an administrative representative of PMU, who holds enough rank and seniority, to effectively deal with subystem chiefs located in the Mbulula area.

AVIATION AND COMMUNICATIONS

The last DAI evaluation for this section is appropriate, "the aviation and communications capability must be maintained throughout the expatriate support phase of PNS. It is essential for both efficiency and safety. To keep it going requires a pilot who is also a certified airframe and power plant mechanic. There are no local maintenance facilities. The same is true for communications: the project must have a technician capable of maintaining the radios. USAID/Kinshasa must immediately consider the question of extending the pilot-mechanic position irrespective of what is decided on extending the rest of the project. It would be highly desirable for PNS to have its own air support in the post-expatriate phase. Certainly it should try to keep the radio communications capability intact."