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Groundwater Demonstration Plot
Pukdale, Kabupaten Kupang, Timor
Nusa Tenggara Timur

Monitoring Report No. 5
Final Report

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Executive Summary

This is the final report regarding monitoring activities at the groundwater demonstration plot in Pukdale, Kabupaten Kupang, Nusa Tenggara Timur. The demplot was established in 1985 by P2AT, the groundwater division of the Department of Public Works. It comprises 7 hectares and is located in the Oesao plain, one of Timor island's principal agricultural regions. 23 households own land in the demplot and all of them participated in and benefited from the new groundwater irrigation system during its first year of existence.

During this first year, P2AT assumed all operational and maintenance costs of demplot operation. The agency assigned a staff member to oversee all aspects of demplot development. He worked full-time throughout the year to help the farmers create a viable water users association, to develop a water allocation and distribution system, and to provide agricultural advice and assistance. At his instigation, the water users association established a fund to cover the cost of pump repairs and other contingencies once P2AT has transferred financial responsibility for the demplot to the farmers. Association members are required to pay a nominal fee to this fund at the end of each cropping season. This amounts to approximately 4-6% (under US\$10/hectare) of the estimated operating cost of the system (US\$140-235/hectare). No mechanism has been developed yet to recover actual operation and maintenance costs, however.

The development of the demplot was closely monitored from April, 1985 through July, 1986. In addition, two surveys of all demplot beneficiaries were conducted. The first was a baseline socio-economic survey administered to demplot households prior to their realizing any benefit from participation in the project. The second follow-up survey was conducted at the end of the third cropping season and was intended to measure the impact of demplot participation with respect to changes in cropping patterns, intensity, and productivity and to changes in levels and sources of household income. The results of the monitoring activities and of the two demplot surveys are presented in the consultant's four previous reports.

Irrigation has been available to the project beneficiaries since June, 1985. For the first time in their experience, farmers were able to produce irrigated palawija (secondary) crops during the dry season. They produced two crops of corn between June and November, 1985 as well as one crop of rain-fed rice between December, 1985 and July, 1986. The demplot irrigation system was the sole source of water for the corn and it provided

supplementary irrigation for rice during the last months of the growing cycle when the yearly rains had ceased to fall. Corn was produced for consumption and for sale. 43% of the first harvest and 21% of the second were sold as green corn; the remainder was consumed or dried and stored for consumption as a staple. Average sales per hectare amounted to approximately US\$ 700 and \$300 respectively for the two seasons. Total yields were the equivalent of approximately 2.5 tons (dried) per hectare.

The productivity of rice was greater on demplot land than on farmers' land elsewhere. Yields from demplot parcels averaged 2.6 tons of milled rice compared to 1.2 tons on other land. The higher yield was due to the fact that farmers were able to plant rice on their demplot parcels 1-2 months earlier than on their other land.

Costs of participation in the demplot project were unrealistically low during the first year since P2AT assumed all operational and maintenance costs. Estimates of the cost of irrigated corn production (including agricultural inputs as well as irrigation) range between approximately US\$175 and \$270 per hectare. The cost of rain-fed rice production varies from US\$180 to \$635 per hectare depending upon the method of land preparation (cattle trampling or tractor); source of labor (household, sharecropper, or hired wage laborers from Kupang); and use of agricultural inputs. The estimated minimum cost of supplementary irrigation for rice is approximately US\$20 per hectare for each flooding.

Financial benefits derived from demplot participation varied widely after one year. The percentage of total household income contributed by demplot corn sales ranged between .4% and 65.6%, while the mean contribution was 19.7%. (None of the farmers had begun selling rice from their third demplot harvest at the time of the re-survey.)

Average per capita household income in 1985-6 was US\$195, which represented an increase of \$20 over the previous year. Mean income was \$148 (\$30 higher than that of the previous year). Average expenditures of \$160 were the same for both years; while the mean level during the second year increased \$17 to \$146. The demplot surveys showed that income and expenditures are somewhat artificial, however, and therefore are not the most accurate measures of changes in the standard of living in most households. Rather, it is important to determine how money from increased crop production is utilized and to determine the extent to which it enables households to expand and protect their productive resources. In 1985-6, the majority of demplot participants used their earnings from corn sales to subsidize rice production (to pay for tractor rental) or to purchase rice. This eliminated the need to sell off livestock or borrow money for these purposes.

The successful expansion of groundwater development in NTT will depend not only upon the design and implementation of viable

irrigation systems, but also upon improvements in the capacity of the implementing agency to undertake this project. The success of the Pukdale demplot has been due largely to the relentless efforts of one individual, the P2AT staff member assigned to oversee of demplot development and maintenance. Forms of institutional support from P2A1 which will be required in order to replicate this experiment are not generally available. This is due to a shortage of experienced and properly qualified staff as well as to weaknesses in administrative management. In addition, attempts to develop inter-sectoral cooperation and involvement (particularly from the Agriculture Department) have been minimal.

Two major areas for improvement within P2AT have been identified:

1) Planning and program direction - to develop a comprehensive plan and a specific set of guidelines for groundwater development in the province. This would enable the staff to devise long- and short-term plans for effective and appropriate utilization of resources and personnel; and it would facilitate regular evaluation of office performance and the monitoring of progress toward programmatic objectives.

2) Review and evaluation of current staff - to determine areas in which further training of existing staff members and/or the introduction of new personnel will be needed to fulfil its long- and short-term plans for groundwater development. P2AT should also develop specific and comprehensive job descriptions for all staff positions to facilitate staff reorganization, if deemed appropriate; and to enable the administration to conduct regular evaluations of the progress and performance of each staff member.

Recommendations for ensuring the future success of the Pukdale demplot include:

1) P2AT's continued financial and advisory support - which this should be scaled down gradually in order to provide the farmers with increasingly more experience in managing the system themselves. P2AT's consistent involvement in the project in its second year is necessary in order to ensure participants' ongoing confidence in and adaptation of the irrigation system as an integral part of their agricultural activities.

2) Coordination between P2AT and the water users association to develop an equitable and efficient payment system. This should be tested before P2AT has withdrawn its financial and active advisory support.

3) Coordination of agricultural support to provide necessary advice regarding cultivation and irrigation of alternative crops and assistance in obtaining agricultural inputs if necessary. If the P2AT staff were expanded to include more members with

agricultural experience, this support could be supplied from within the implementing agency. Under current conditions, however, such assistance must be sought from the local offices of the Department of Agriculture.

The expansion of groundwater development is predicated on the selection of appropriate sites that meet criteria of social soundness and agricultural viability, as well as the geohydrological factors that have guided P2AT's site selection in the past. Customary use and ownership of land in prospective locations should be investigated in order to eliminate properties of absentee landlords and large landowners who depend on hired outside labor for agriculture and/or use their land exclusively for livestock grazing. This can be accomplished through the examination of existing village census records as well as through on-site observation and discussions with local farmers and hamlet leaders by P2AT staff.

Additional recommendations for the development of future sites include:

- 1) Farmer-dug wells - Demplot beneficiaries and other villagers themselves suggest that small groups of farmers dig their own wells of 6-9 meters in depth. P2AT's role in construction would consist primarily of assistance in determining sites in which groundwater is likely to exist and in acquiring and installing material and equipment such as concrete for the well lining, surface-mounted centrifugal pumps, and pipes.

- 2) Establish simple water distributions systems that do not rely on complex or sensitive equipment and for which spare parts are readily available.

- 3) Establish systems that can be managed by small groups of individuals (10 or less) due to the general lack of strong leadership and a lack of experience with intra-group coordination.

- 4) Involvement of beneficiaries in all stages of project development.

- 5) Marketing assessment - to determine the level of local need and demand for potential demplot crops and to ascertain the capacity of local markets to absorb increased production.

The provincial branch of P2AT in NTT cannot act alone improving its existing operations, in effecting institutional change, in experimentation with new technologies, and in expanding its capacity to monitor and maintain additional demonstration plots. Specific support from the central office of P2AT for staff expansion and training will be necessary and policy decisions regarding the long-term decentralization of authority may be required.

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1. Overview of Monitoring Activities and Demplot Development

Consultant's Role

in 1985, USAID and the Government of Indonesia (GOI) instituted the Small-Scale Irrigation Management Project (SSIMP) in three provinces: Nusa Tenggara Barat (NTB), Nusa Tenggara Timur (NTT), and Sulawesi Selatan. The aim of the project is to provide small scale irrigation systems for agricultural intensification and crop diversification in relatively dry areas of these islands.

In the province of NTT, the primary focus of this project is the development of groundwater potential. This is among the first attempts to exploit groundwater for irrigation in the province. The division of the Ministry of Public Works that is responsible for groundwater development, P2AT, began the first phase of this project in early 1985 (before SSIMP was approved) with the establishment of a seven hectare demonstration plot in west Timor. The demplot is located in the village of Pukdale which lies in the Oesao plain about 30 kilometers east of the provincial capital, Kupang.

USAID and the GOI expected the demplot in Pukdale to provide them with an opportunity to study social and organizational aspects of establishing and maintaining a groundwater distribution system and to determine the socio-economic impact of the system on the local population. For this reason, the consultant, an anthropologist based in Kupang, was hired by USAID to follow the course of the demplot for its first year and to report at regular intervals to USAID and the GOI on its development.

The consultant was assigned two principal tasks:

1) Conduct baseline and follow-up surveys of beneficiaries:

This involved conducting a baseline socio-economic survey of all beneficiary households prior to their realizing any benefit

from the new irrigation system. Data collected at this time was intended to serve as a benchmark against which changes in cropping patterns, intensity and productivity and changes in sources and levels of income could be measured. It established levels of income and expenditure, property holdings, and basic demographic information for each beneficiary household.

In addition, demographic information and data regarding land and livestock holdings from existing village census records were collected and compared with data from the consultant's survey. The purpose was two-fold:

a) Village data was used to establish the relative socio-economic status of demplot beneficiaries vis-a-vis the other households in the village. This was especially relevant given the concern of SSIMP with assuring equity and social soundness of site selection. Since the Pukdale demplot was established by P2AT prior to the initiation of SSIMP, this concern was not addressed specifically in the selection of Pukdale as a project site. The results of the consultant's research, however, can be used as a comparative basis from which to evaluate potential future project sites and may identify certain specific criteria that should be included in site profiles.

b) Information elicited in the consultant's survey was used to evaluate the reliability of existing village census records. Since comprehensive surveys of the sort undertaken in Pukdale probably will not be conducted in the future, it is important to determine the extent to which pre-existing village census information can be relied upon to facilitate site selection. Thus, data on each household in the demplot were juxtaposed to comparable information from the village demographic and property censuses. Differences between these two sets of data were analyzed, since the reasons for discrepancies are likely to be applicable to data from other proposed project areas in Timor. Data from the village census also were compared with information from the kecamatan wherever possible to determine the reliability

and extent of information available at higher levels of government.

A second survey was conducted in June and July, 1986 after the demplot households had completed three full cropping cycles using the new irrigation system. It was used: a) to determine the impact of demplot participation on the beneficiaries and b) to discuss farmers' concerns about ongoing demplot operations in order to learn how the current system can be made more effective and plans for future sites might be improved. The results of the surveys are presented in the consultant's Monitoring Reports Nos. 2 and 4 respectively.

2) Process documentation of demplot development over the course of its first year

Process documentation refers to a method of chronicling activities of a sub- or pilot project. Process documentation researchers describe activities observed, identify the participants involved and describe their interactions, and discuss the problems and issues that emerged in the course of the implementation of the subproject. The goals, focus, and methodology of process documentation differ significantly from other forms of evaluation research. Process documentation research is qualitative, unlike other evaluation research that employs surveys to collect quantitative data. Process documentation is not intended to pass judgement on either the performance of the agency personnel or on the sub-projects that they implement. Rather, the principal aim of process documentation research is to determine and describe lessons learned from the subproject that could be incorporated in the planning, implementation, and coordination of future subprojects.

In its application to the Pukdale demplot, process documentation research followed the introduction of the new irrigation system and the creation of a water users' association by the implementing agency, P2AT. Attention was focused on the users and intended beneficiaries of the new technology as well as on the

staff of the implementing agency, all of whom were involved in the development of the demplot project. This research lent important insights into the capability of the implementing agency to launch and implement new projects. Thus, it enabled the consultant to identify areas in which the agency should be strengthened in order to improve its effectiveness. With respect to the beneficiaries, this methodology enabled the consultant to analyze the impact on the farmers over time and to identify actual and potential problems in the organization of water management, their capacity to maintain and operate the system on their own, their response to new agricultural patterns, and their willingness to risk involvement in a new project. The findings of this research are reported in the consultant's Monitoring Report No. 3.

Outline of Demplot Development

A 50-meter tubewell was drilled at the Pukdale site in mid-January, 1985. The following month a temporary surface-mounted pump was installed. Members of the 23 households that own land in the demplot worked cooperatively to dig water distribution ditches and to construct a fence around the seven hectare area.

By June, 1985 the temporary pumping system became fully operational. Later, a permanent irrigation system was installed at the site by a local contracting firm under the supervision of P2AT. This included a concrete division box, 600 meters of concrete-lined irrigation canals, a new 18 h.p. diesel Kubota centrifugal pump, and a building to house the pump and fuel supplies. The permanent system was completed in February, 1986.

Between June, 1985 and July, 1986, the farmers successfully produced two crops of irrigated corn as well as one crop of rain-fed paddy rice with supplementary irrigation provided by the demplot system. During this first year of demplot existence, P2AT has covered all operations and maintenance costs. The agency intends to continue this funding for at least another year.

At the instigation of the P2AT staff member assigned to oversee demplot development, the farmers organized a water users association (P3A) to coordinate irrigation management. Together with the P2AT staff member, the leaders of this organization developed a water distribution scheme as well as a schedule for planting and fertilization. The group also agreed to assess a nominal fee on all demplot landowners in order to establish a contingency fund to be used when P2AT has withdrawn its financial support for the demplot. This amounts to Rp.100 per .01 hectare of land planted (Rp.10,000/hectare) and is payable at the end of each harvest season.

The farmers' support for the demplot project is notable not only because it marks their first experience with dry season irrigation and water management, but also because of their perseverance despite an uncertain beginning. The temporary irrigation system that served the demplot during the first two cropping seasons was plagued with minor mechanical problems with the used equipment that was installed initially. At least five different pumps were utilized during the first five months of demplot operations. There were delays in obtaining spare parts due to administrative sluggishness at P2AT in processing requests and/or to the unavailability of needed parts in P2AT's storage or in stores in Kupang. In addition, P2AT staff members sent to repair faulty equipment often lacked the technical expertise to accomplish this task.

A further impediment to project development was that agricultural support from the local extension workers of the Department of Agriculture was minimal, despite their initial commitment to provide the farmers with ongoing advice and assistance in acquiring agricultural inputs. Thus, nearly all advice on planting methods and on fertilizer and insecticide use was provided by the P2AT staff member who was responsible for overseeing demplot operations, although this was beyond his field of expertise. This was not a formal or systematic process but it was an effective short-term expedient to launch the project successfully in its first year.

The seven hectare area that comprises the Pukdale demonstration plot was traditionally used to produce one crop of paddy rice during the annual rainy season. It was left fallow during the dry months to serve as a grazing area for livestock (primarily cattle and goats). This land, however, was not generally regarded as a primary source of subsistence or income. Indeed, as the initial survey of the 23 landowning households revealed, the land they own in the demplot is not their only sawah property and does not comprise a major portion of their holdings in the majority of cases.

II. Findings of the Research and Monitoring Activities

Activities and Role of the Implementing Agency

Office management

During the first year of the demplot's existence, the office of the implementing agency, P2AT, was in an interim phase. Many of the problems of demplot coordination that emerged during the first year of the project stemmed from a lack of administrative definition in the P2AT office. For example, the position of Project Leader was filled until April, 1986 by the head of the provincial Water Resources Division, although the de facto head of the P2AT office was the man who filled the P2AT staff position of Technical Assistant. In late March a new project leader was appointed by the Directorate of Irrigation II, and he officially assumed the position from the head of WRD in late May, 1986.

In the case of some other staff positions, one individual held two posts while other slots were empty. These staffing problems were compounded by the fact that there were no readily available and complete job descriptions for each of the P2AT positions. Similarly there was no complete list of the current staff that would facilitate the appropriate assignment of individuals with the requisite skills and experience for particular jobs. Since the new Project Leader has just assumed his post it is premature to speculate on staff reorganizations or other administrative changes at P2AT.

In addition to weakness in the interim administrative structure of P2AT, there have been logistical impediments to efficient administrative management and project development. P2AT moved from a complex it shared with WRD to its own quarters in a relatively inaccessible part of Kupang in July, 1985.

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Public transportation to this area is limited and erratic. Staff members who do not have their own vehicles often must wait up to an hour or more for a public mini-bus and, therefore, arrive up to one to two hours late in the morning. P2AT has few vehicles and they often are in a state of disrepair, which delays or prevents travel to field sites as well as to other Public Works offices in Kupang. Over the past year travel to field sites outside of Kupang was often delayed due to the combination of administrative and logistical obstacles. For example, travel must be authorized by the Project Leader in an official form letter (surat jalan). This states the dates and duration of the trip and is used to calculate (and justify) a standard allowance for food and lodging (uang jalan) and fuel purchases. For P2AT staff, the letter had to be approved first by the Technical Assistant at P2AT and then by the head of WRD as acting Project Leader. This process often took days given the problems of traveling between the P2AT and WRD offices and the frequent absence of one or the other of the two necessary signatories. Once authorization was received there was often a further delay in collecting fuel and travel money from the staff of the treasurer's office.

Depending upon the urgency of a project and the initiative of individual staff members, the inefficient functioning of this system may or may not have been an obstacle to project activities. In the case of the irrigation staff member who worked in Pukdale, he could not have undertaken his job effectively had he waited to complete this full administrative process. He did not receive uang jalan for the majority of his trips to the demplot. In addition, frequently he used his own funds to purchase fuel for the P2AT vehicle he used though he was not always compensated later.

Launch of the demplot project

a) Site selection: The site of the Pukdale demplot was chosen prior to USAID's involvement in any irrigation activities in NTT. According to the P2AT staff, formal criteria used for site selection are dictated by their central government office. These include:

- 1) geological and geohydrological potential for groundwater;
- 2) semi-arid conditions (i.e., rainfall and other water sources are insufficient);
- 3) demonstrable need for irrigation (i.e., area is cultivated but has insufficient water supply); and
- 4) response of farmers to idea of introducing groundwater irrigation is favorable.

The former de facto Project Leader (Technical Assistant on the administrative chart) and members of the irrigation staff are aware that the prospect for an irrigation system's sustainability by the beneficiaries is, in part, a function of appropriate site selection. Nonetheless, current site selection procedures at P2AT are not derived from an integrated approach whereby technical constraints are considered in conjunction with socio-economic issues, agricultural constraints, and the prospects for long-term economic feasibility. The site selection criteria cited by P2AT and listed above do not constitute a specific set of guidelines that can be adopted in order to evaluate and compare potential project sites. At this point, the P2AT staff is not coordinated to work in divisional or inter-divisional teams to collect or evaluate data appropriate to this task.

In the case of the Pukdale demplot, the P2AT staff cited the above criteria as post facto justification for its location. They explained that the primary reasons for boring a well in that particular spot were: 1) there was an expanse of flat land in an area in which they expected to strike an aquifer; and 2) the head of the village there was enthusiastic about the prospect of a well. Subsequent drilling elsewhere in Timor by P2AT has been

undertaken for the same basic reasons. These are defensible justifications for digging wells and constructing irrigation systems. As the exclusive factors involved in site selection, however, they betoken a lack of understanding of the variables involved in long-term project development and success.

b) System construction: The water distribution system designed by P2AT was disproportionately expensive given the small command area of seven hectares and limited number of beneficiaries (23 households) it was established to serve. The system followed a model from Java, with one major alteration: the substitution of a surface-mounted centrifugal pump for a submersible pump which would have been more costly and difficult to repair. The differences between the Javanese and Timorese settings in terms of such factors as evapo-transpiration and percolation losses, land contours, potential uses of the system, economic feasibility, and so on were not evaluated in detail, however. Furthermore, alternative distribution systems were not given serious consideration. This is understandable to the extent that the Pukdale demplot is the first groundwater irrigation system to have been designed by P2AT in NTT. In general, the staff has had little or no experience with and exposure to alternative systems. In addition, they are limited by a lack of appropriate equipment and facilities.

P2AT acknowledges that other systems might be feasible. They recognize, however, that their experience and expertise have not prepared them to experiment with alternative systems. They are concerned as well that the central government office would not support their experimentation.

While it is inappropriate to evaluate P2AT's performance on the basis of what they might have done, it is reasonable to examine the procedures they did follow in installing the system that is now in place in Pukdale. This system was designed without a careful analysis of the long-term costs, maintenance requirements, reliability, availability of spare parts and replacement materials, and so forth. Furthermore, the capacity

and availability of P2AT staff members to maintain and repair the system were not evaluated prior to installation. Thus, during the first year of the demplot's existence there has been no routine technical monitoring. One person from the irrigation staff was charged with all monitoring, community organizing, agricultural extension, system maintenance and construction supervision responsibilities for the demplot. This became a full-time job, involving his spending six to seven days and two to three nights each week in the demplot between the months of May, 1985 and February, 1986.

Fuel, spare parts, and other supplies have been provided by P2AT throughout the launch phase of the project. Nonetheless, there have been intermittent delays in the delivery of these supplies due to administrative inefficiency. In most cases, this was due to the absence from Kupang of the individuals who must approve the release of supplies or money (the head of WRD and P2AT Technical Assistant, as acting and de facto Project Leaders respectively); or due to the slow speed at which P2AT's logistics and accounting divisions process requests. Temporary solutions to this problem usually involved the P2AT irrigation staff member purchasing fuel or spare parts with his own funds.

c) P3A formation: A water users' association was established through the coordination of the village head and P2AT irrigation staff member assigned to the demplot. All male heads of household whose land was included in the demplot were called to an organizational meeting by the village head. There was never a discussion about including women in this or in subsequent meetings. At some subsequent meetings wives or daughters of male demplot owners went in and out to listen and/or to serve refreshments; but they never spoke in these meetings, nor were they expected or called upon to participate. It should be noted that women worked in the demplot fields and contributed at least 30% of the total labor. They usually collected cash from the buyers of their demplot corn and put this money into their household

expense fund. (As is customary, the women are responsible for the money from household agricultural activities. Whether it is women or men who receive money from agricultural sales, women keep all or most of this money to use at their discretion to cover household expenses.)

At the initial meeting of the P3A, the P2AT staff member explained the plans to install a permanent irrigation system. He told them they would be expected to form a P3A, to work together to maintain temporary irrigation ditches, and to coordinate planting schedules and water distribution. Since this P2AT staff member had had no previous experience with groundwater irrigation or with establishing a demplot, he did not have a fixed model from which to work. This proved to be an advantage in the sense that he worked closely with the farmers to establish the water users' association and to organize the water distribution system.

Throughout the demplot's first year there have been disputes over amounts and timing of water allocation, intermittent dissatisfaction with P3A sub-group heads, etc. These have been resolved by the P2AT staff member who acts effectively as a trusted neutral party. He also encourages the head of the P3A to hold regular meetings and helps him organize the agenda for these events.

d) Agricultural assistance and intersectoral cooperation:

Neither the farmers nor the P2AT staff member had had previous experience with irrigated dry season crops. The P2AT staff member attempted to enlist the assistance of the local agricultural extension workers based near the demplot, however this was not forthcoming. Thus, nearly all advice on planting methods and on fertilizer and insecticide use was provided by the P2AT staff member who consulted books and, when possible, knowledgeable individuals.

Intersectoral cooperation is, in general, difficult to develop. In the case of P2AT and the provincial and kabupaten level offices of the Ministry of Agriculture, there are few

occasions or programmatic reasons for their staffs to meet. The initiative for engendering such cooperation as is required at the demplot should come from P2AT, beginning with contact between the Project Leader and his structural equivalent in the agriculture department and followed up with regular contact between appropriate staff members from each office. The experience of the demplot demonstrated, in this case at least, that informal attempts by field staff to develop useful inter-sectoral cooperation were inadequate.

Status and Activities of Project Beneficiaries

Relevance of data collection

The survey instrument used to collect socio-economic and agricultural information about the demplot participants was intended to serve two purposes. First, it was designed to elicit baseline data against which information from a follow-up survey could be compared in order to determine the impact of the demplot on the participants. The findings of these surveys have been discussed in detail elsewhere (see consultant's Monitoring Reports No. 2 and No. 4).

The second goal of the survey instrument is of particular relevance here. That is, rather than serve as a prototype for research at other project sites, the baseline survey was expected to provide a means of determining and evaluating the depth and extent of information about beneficiary households that should be collected in the future. The strategy of the survey was to ask detailed and, often, redundant questions from a variety of perspectives in order to elicit complete information.

This proved to be an effective and indispensable method, since the respondents' answers to individual questions generally did not encompass the scope of information required by the survey. Thus, respondent's first answers to seemingly straightforward questions about the number of cattle and amount of land owned, about the amount of their annual rice harvest, levels of weekly household expenditures and so on were almost invariably incomplete. The reasons for the difficulty in eliciting complete information regarding livestock and land holdings, agricultural production, and household budgets are revealing of certain issues that have direct relevance to project development; and for this reason, they are discussed below.

Livestock ownership

In the case of livestock, owners do not always include animals less than one year old in their herd count since they expect some of the young to die. In the case of large herds, owners conduct an annual round-up in order to brand the newly born animals and count their total herd. This occurs at the end of the dry season when significant numbers of livestock are sick or have died due to starvation and thirst; and owners do not know until the round-up how the size of their herds have changed over the preceding year. Farmers also under-report the total number of cattle they own out of fear of being assessed a sizable head tax. In one case, the owner of a herd of 50 cattle reported having only three head. He was referring to cattle that are tethered for fattening (sapi paron) in the yard adjacent to his house.

Land holdings and land use

In the case of land holdings, some people cited only their sawah in Pukdale, some gave the total amount of sawah owned in Pukdale and in surrounding villages, some included plots of garden and orchard land situated in a separate location from their homes, while others mentioned only the land on which their house and home gardens are located. We had to ask individually about every possible category of land the respondents might own or to which they might have access (e.g., family-owned or sharecropped land). Villagers do not think of their landholdings as one, albeit non-contiguous, block. Furthermore, land not used or not potentially usable for rice or palawija production often is disregarded. From another perspective, we could not assume that all sawah land owned is regularly farmed. This varies from year to year depending on the farmers' assessment of rainfall and availability of labor at the start of the wet season. For example, during the 1984-5 rainy season which farmers accurately predicted would be insufficient, 10 (44%) of the demplot farmers did not plant rice at all; only 6 (26%) planted all of their

sawah, while the remaining 7 (30%) planted less than 50% of their land. During the 1985-6 season, demplot farmers planted 40 to 100% of their total land; although they all planted 100% of their demplot land since they knew pumped water would be available to supplement rainfall if necessary.

The decision to plant also depends upon the availability of rental tractors or rencah cattle to prepare their land. It is becoming increasingly more difficult to find cattle owners who are willing to provide their herds for land preparation. Owners risk cattle dying from the strain of trampling hard soil since the animals usually are weak and sick at the end of the dry season when land must be prepared for rice planting. Furthermore, since the customary payment for cattle rental is a share of one-third of the harvest, cattle owners share the risk of a poor harvest with the landowner. Tractor rental is paid in cash at the time of rental. (Harvest shares are not accepted as an alternative except in special cases such as that of close kinship between the tractor owner and the farmer.) Thus, owners of large herds - such as 6 (26%) of the demplot families - prefer to sell off part of their herds to purchase tractors. 6 (26%) of the demplot farmers reported using rencah cattle to prepare their land for the 1985-6 season; however 3 of these individuals used their own cattle. In one case, the farmer also owns a tractor but it was broken and could not be repaired in time to prepare his land.

Farmers' use of tractors depends upon their having ready cash as well as on the availability of rental tractors in good repair. 17 (74%) of the demplot farmers reported using tractors in the 1985-6 season, of whom 8 (35% of the total) paid for the rental with money from their demplot corn harvests. One of the farmers arranged to rent a relative's tractor and to pay with a one-third share of his harvest. This non-cash arrangement was possible, in part, because the tractor was broken and not available for use until after most farmers already had prepared their sawah. In general, given the shortage of tractors in the Oesao region, it

is not surprising that farmers are willing to pay rental fees of Rp.100,000 to 125,000 per hectare if they can obtain these funds.

Maintaining tractors in good repair is a serious problem throughout the Oesao plain area. Spare parts usually are not available in Kupang and take months to receive when ordered from Java. The cost of replacement parts often is prohibitively high, so some owners abandon hope of using their tractors or arrange to sell them cheaply. All demplot tractor owners reported that their tractors have stood idle for as much as six consecutive years while they waited to accumulate enough money to repair them or simply waited for spare parts to be sent from Java. One demplot owner who owns three tractors spent Rp.1,000,000 repairing one of them this year and traded another for ten head of cattle.

Rice production

Eliciting information about rice harvests is a complex process. Farmers do not know readily the total gross yield of their land. Rather, their first response is to cite the net amount of unhulled rice (gabah) they bring home after all harvest shares and laborers have been paid. One must determine first how much rice has been provided as compensation to laborers. There are variable arrangements for tasks such as planting and weeding, and often laborers are paid with a combination of money at the time the work is performed and unhulled rice or paddy rice at the end of the harvest. Harvesters generally are paid five kilograms of paddy a day or one "blek" (large biscuit tin that holds 10 to 12 kilograms of unhulled rice) every three days. In addition, farmers generally do not cite the total amount that has been paid to harvesters. Rather, they state the number of workers and number of days these individuals worked. In about 40% of the demplot cases, farmers obtained fertilizer and/or insecticide in exchange for harvest shares; however it did not occur to them to add this information to their calculation of harvest yield until we asked whether they used fertilizer and how it was obtained.

After this information had been clarified we determined the number and volume of harvest shares paid (e.g., if applicable, one-third to the rencah cattle owner, one-third to the sharecropper or laborers, and one- or two-thirds to the landowner). At each stage of the calculation it was critical to determine whether the rice was in paddy, unhulled, or milled form given the difference in weight of nearly 50 to 70% between the different forms. Such calculations had to be made separately for each of the farmer's plots since labor and land preparation arrangements may be different from one place to another. This was complicated by the fact that some farmers could cite only the total amount of labor provided by harvesters at all of their plots and/or stated the combined net harvest share they received from all plots rather than describe each plot individually. Because some farmers could not separate the labor costs for their demplot sawah from those at other plots, it was not possible to compare their 1986 demplot rice yield with that from their other land when we conducted the household re-survey.

Thus, in order to elicit information on rice harvests we could make no assumptions or generalizations as we collected the data. Rather, we had to ask a series of careful questions at each stage of the harvest calculation to clarify the scope of information the respondents provided at each step.

Household budgets

Household budget data is directly linked to information about vegetable, fruit, and rice production. Households usually could not tell us accurately how much money they spend per day or week on food, fuel, soap, and other supplies since they often barter for rather than purchase these items; and since the amount of goods obtained is contingent upon the availability of bananas, green vegetables, chilis, and so on to sell or use for barter each week. Thus, we had to determine and combine information about: 1) which items are obtained, 2) at what intervals, and 3)

how they are acquired with data on 1) the period of availability and 2) the amount of garden and orchard crops and rice produced.

In general, by enumerating acquisitions, we could determine an approximate weekly and annual amount spent by each household. This was compared with information about the frequency with which vegetable and fruit crops are available and about the amount of produce taken to market to sell or barter during each month of the year. Since some yields are seasonal, sales of rice and/or vegetable crops can satisfy daily household needs for three to five months of the year. If no cash is available during other months, households limit their consumption to the amount of goods obtainable with bananas, coconuts and/or eggs they produce each week. (Calculating egg production presented yet another complication given the dramatic fluctuation in the chicken population throughout the year. Newcastle disease usually kills all or most of the chickens in the village each year at the end of the dry season.)

Just as there is a dependent relationship between household consumption and agricultural production, livestock sales are tied to large annual or irregular expenditures. Sales of livestock generally occur in order to satisfy specific needs such as obligatory contributions to family ritual celebrations and to the local church, taxes, school fees and related expenses, and medical bills. Thus, we elicited information both on the types and amounts of major purchases or expenditures, but also on the sources of cash used. This was cross-checked with information about changes in herd size and how money from livestock sales (reported at another point in the interview) was spent.

Similarly, the process of developing household inventories provided an opportunity to elicit sources of income that respondents neglected to mention. Thus, lists of furniture, luxury goods, farm equipment, and so on were generated not only to determine the approximate value of each household's property, but also to learn the sources of cash used to purchase the listed items.

For example, in four cases, we learned that adult children provided household furnishings and regular support for their parents, although this assistance had not been mentioned as a source of income. In at least five cases, respondents who had under-reported the size of their livestock herds had to revise the information originally offered after we learned that the household made occasional large purchases or contributions to their extended family with money from livestock sales. There had been no indication in the size or type of their houses, furnishings, dress, or other visible indicators of wealth. It was only by probing in a variety of ways that we obtained relatively accurate information.

Specific findings of the research

The examples above demonstrate the complexity involved in obtaining reliable information on wealth, productivity, and other general socio-economic issues. Given the experience of collecting this data it is now possible to identify certain key sets of information that should be collected in potential or future project sites to determine: 1) the relative socio-economic status of potential beneficiaries, 2) to identify indicators of improved socio-economic status as a result of project participation, and 3) to assess their capacity to take the risk of participating in a new irrigation project and predict the level of participation that can be expected.

1. Indicators of wealth and relative socio-economic status of participants

Agricultural self-sufficiency:

Self-sufficiency and financial stability in Pukdale come from owning a combination of sawah, garden/orchard land, and livestock. A primary indicator of farmers' potential subsistence and income levels is the amount of sawah they own or to which they have access. Farmers regard their holdings as adequate for subsistence if they own enough sawah to supply their family's

consumption needs for one year and if they have enough livestock, vegetable gardens and/or orchards to produce enough cash to purchase other foods and household necessities. They regard themselves as above subsistence level if they can produce a marketable surplus of rice and/or are able to save some of the proceeds from the sale of other agricultural products.

The following discussion provides a rough indication of the amount of land required to meet a household's needs. All demplot households serve rice as a staple for at least one or two meals a day if possible. They mix this with corn or eat corn alone if they have insufficient supplies of rice or lack the money to purchase it, however. In calculating their households' rice requirements, families generally include an estimate of the amount served to guests and the amount used for contributions or gifts to people they visit outside the village (or to outsiders who come to their homes), to the church, and to extended family members for weddings and other events. While gifts of rice to outsiders may be regarded in objective terms as expendable, villagers in Pukdale do not view them as such. They generally opt to fulfil their perceived social and ritual obligations at the expense of their own family's consumption. Thus, their calculations of rice requirements should be regarded as accurate.

Using the villagers' calculation, their rice requirement is .4 to .55 kilograms (milled rice) per person per day or roughly .5 kg. These values emerged with such consistency that they could not be ignored. They were obtained through calculations of absolute consumption rates elicited in the survey and also conformed with respondents' estimates of yearly rice requirements.

A household of six members, for example, estimates that its yearly rice requirement will be roughly 1095 kg. As determined in the demplot surveys, Pukdale farmers' yields range between 600 and 2400 kg. (milled rice) per hectare depending upon agricultural inputs, extent of crop loss due to infestation, rainfall, and labor availability. Using the lowest yield estimate, a

household of six that provides 100% of the labor for rice production would need a minimum of 1.8 hectares of sawah to satisfy its yearly rice requirement. Using the highest estimate the requirement is .5 hectares. In fact, all households reported that they use outside laborers for some or all of the tasks involved in rice production and that they pay the laborers (and, in some cases, cattle or tractor owners) in harvest shares ranging from roughly 15 to 67%. Factoring in labor cost (in harvest shares) and depending upon the yield, the hypothetical sawah requirement for a household of six ranges between .5 and 3 hectares or between .008 and .17 hectares per capita. If the cost of tractor rental is added (Rp. 100,000 to 125,000), an additional 286 to 357 kg. of rice (@ Rp.350/kg.) must be produced. This would require between 12 and 60% more sawah depending upon the yield.

A quick calculation of the level of rice production among prospective or future project beneficiaries would involve comparing:

- 1) number of household members multiplied by .5 kg (and, if possible, cross-checked against the amount of rice they perceive as their yearly household requirement);
- 2) net amount of rice brought home after the harvest;
- 3) cost (if any) of tractor rental, labor, and/or inputs multiplied by current rice price.

If the net amount (#2) minus the capital costs (#3) exceeds the household requirement (#1) the household can be viewed as self-sufficient in rice. If the amount is insufficient, it should be determined how the household makes up the deficit in staple food and whether or not the family must forego other purchases to do so. If there is a surplus it should be determined whether the profits are essential to household solvency.

Livestock ownership:

Households that are self-sufficient through rice, vegetable, and fruit production generally regard livestock as a savings from

which they can draw. Herds of ten or more cattle generally provide enough security that households can sell off one or two animals in the event of emergencies or pressing household needs. Owners of 25 or more cattle may use their animals productively for renciah and/or to be sold for purchase of a tractor. Owners of herds of this size can be viewed as wealthy if they also own and exploit adequate sawah or other agricultural land to satisfy their household's needs (or have an additional source of income to meet these needs). It should be noted, however, that yearly losses due to illness, starvation, and theft may be considerable. Demplot owners reported losses between 10 and 50% in 1985-6. Thus, owners of under 10 head of cattle and one or more hectares of sawah and additional garden or orchard land may be more secure than those whose sole productive resource is livestock.

Tractor ownership and use:

Ownership of tractors indicates wealth of long standing since owners would have sold 10 or more head of cattle to buy this equipment. Depending on cattle size, prices range from Rp.100,000 to over 400,000 while tractor prices start at Rp.3,000,000 for the smallest models. Tractor ownership also suggests the potential for increased wealth if tractors are used for rental purposes. It is important to note, however, whether the equipment is in good repair and whether the owners can afford to purchase spare parts as necessary. Given the expense of spare parts on the one hand and the potential profits from tractor rental on the other, the capacity to maintain tractors in working order is a more accurate indicator of wealth than tractor ownership alone.

The capacity to pay (up-front) for tractor rental suggests that farmers have access to enough capital to risk rice production. On the other hand, tractor use should not be regarded as a sign of wealth. Rice production is a central feature not only of the economy but also of the culture of villagers in the Oesao plain. For this reason, they may deplete their livestock

resources, reduce household consumption, or forego use of fertilizer and insecticide in order to pay for tractor rental (if rencah cattle are not available).

House type:

The quality of housing and furnishings is not, in itself, a reliable indicator of wealth. For example, purchase of a radio, tape recorder, or television may reflect a household's desire to enhance its prestige at the expense of improvements in the diet or reflect a decision to forego purchasing new clothes, making household repairs, and so on. The range of house types among demplot families does not correspond to the amount of productive resources owned. For example, three young demplot families (head of household is 39 years or below) built permanent or semi-permanent homes (all or partial masonry walls, cement floors, and zinc roof) with money obtained from sales of inherited livestock, thereby depleting some of their productive resources. Their parents and other older demplot members (50 years and above) invested in cattle or purchased sawah rather than spend their money unproductively when they were young and only gradually upgraded their homes to semi-permanent level.

The following table (no. 2) provides a list of the productive and income generating property owned by each of the demplot households.

It is presented here to illustrate the range of variation in the extent of demplot members' properties, and to provide background information on the ranking of demplot households according to their ownership of productive resources that is presented in Table 3.

Table 2

Productive Resources and Income Generating Property

HH#	Demplot (ha)	Other Sawah (ha)	Gardens (ha)	#Cattle	# Prod. trees	# of Tractors	Pump
1	.60	19.40	3.40	300	350	3	1
2	.38	5.62	2.00	15	1000	3 (share)	
3	.76	.50	.29	3	60		
4	.13	3.00	1.00	6	50	1 (share)	
5	.25	1.00	.25	15	25		
6	.17	.58	.60	50	22		
7	.20	.80	.25	8			
8	1.25	2.75	1.00	25	75		
9	.20	7.80	1.00	100	240	1	
10	.15	1.85	.65	2	30		
11	.20	1.30	.50	2	45		
12	.13	3.87	.50	10	55		
13	1.50	3.50	.52	5	110		
14	.06	1.94	.10		2		
15	.10	4.90	2.70	6	30		
16	.15	2.35	1.00	450	90	1 (share)	
17	.18	1.32	.68	10	30		
18	.15	1.85	.35	38	5		
19	.25	4.50	1.00	6	4		
20	.14	4.46	2.10	120	420	1	
21	.20	2.42	.50	10	75		
22	.14	2.96	.75		25		
23	.10	8.02	2.25		80		
Avg:	.33	3.77	1.00	59	129		
Mean:	.18	2.75	.68	10	50		

Table 3 summarizes the information in Table 2. In order to assess the wealth of demplot owners relative to one another, the mean holding in each category is used as a standard. Households are ranked according to the number of categories in which their holdings equal or exceed the mean.

Table 3 also includes the age of each head of household, household size, and the total estimated value of each household's material property (home, furnishings, agricultural equipment and so on). It might be assumed that there is a correlation between one or more of these variables and ownership of productive resources. As the table shows (and as is discussed further below) this is not the case.

Table 3

Ranking of Households by Holdings of Productive Resources

Highest - above standard in 4 or 5 categories (demplot, sawah, and garden/orchard, cattle, and productive trees)

Middle - above standard in 2 or 3 categories

Lowest - above standard in 0 or 1 category

HH#	HH size	Tractor (#)	Age of hh head	Value of material property (in million rupiah)
Highest (26% of demplot households):				
1	7	3	63	29.00
2	9	3	59	6.10
8	10		61	6.50
9	4	1	68	7.35
16*	5	1	77	3.25
20	5		74	16.00
Middle (49% of total households):				
3	7		37	2.93
4	5		80	2.63
5	3		36	2.92
12	5		69	1.15
13	4		58	1.90
15	10		58	1.75
17	8		60	1.15
19	9		44	.20
21	6		55	.53
22	8		57	.73
23	5		50	1.10
Lowest (26% of total households):				
6	3		62	1.35
7	9		50	1.48
10	4		81	.60
11	5		56	2.10
14	2		77	.58
18	6		76	2.40

*Is above mean in only 3 categories but ownership of 450 head of cattle makes this household one of the wealthiest in the village.

It is notable that the most active participants in the demplot project were members of the top two groups. Members of the lowest group were the last to pay their post-harvest fees to the P3A and members of this group (only) complained that they would not be able to afford payments for irrigation water in the future.

The highest group in the table is distinct from the other two. It includes all the major cattle owners in the demplot. (They are also the owners of the largest herds in the village.) The value of their homes and other property is considerably higher than that of members of the lower groups; and tractor ownership is concentrated in this top group as well. This suggests that tractor ownership tends to accompany other forms of wealth rather than to supplant them. That is, farmers do not risk disposing of property unless they have sufficient reserves of cattle or other productive resources. All of the individuals in the top group are prominent senior members of the community, including the former village head and the father of the current one. All of these men are regarded as "tua adat" (traditional elders) who are involved in local dispute settlement, organizing ritual events, determining brideprice and so on. Thus, they have considerable influence in community affairs. It is not surprising, then, that most of these men have been instrumental in promoting the demplot.

The variables age and size of household were included in the table for reference, but they are not useful indicators of wealth. The mean age of demplot owners is 60 and only three individuals are under the age of 50. While these households are ranked in the middle group, older demplot members are distributed throughout all three groups such that further generalizations about age and wealth are irrelevant. This is complicated by the fact that all of the participants over age 50 (87%) depend to some extent on the labor and/or financial assistance of their children and/or grandchildren; and some have formally or informally distributed their livestock and land to their children.

All except one of these older farmers have at one or more grandchildren and/or children living in their homes. This is a flexible and, often temporary arrangement, however, depending upon the age of grandchildren and the extent to which they are available to help their grandparents.

2. Productivity over the course of three cropping seasons

Corn production and disposal:

Table 4 presents production data from the first two (dry season) cropping seasons. Productivity was lower than the maximum possible yield (40,000 ears/hectare) which was based on the assumption that farmers would plant at intervals of 1 x .5 meters, placing two seeds in every hole. Actual yields of the two cropping seasons were 92% (36,918 ears) and 83% (33,352) of the estimated maximum yield respectively. The lower yield of the second season was due to the fact that one landowner planted his second crop over one month after the other farmers and much of his yield was lost when the first rains of the wet season fell in November before his corn was ready to harvest. (He owns 1.25 hectares located at the point farthest away from the pump. He generously waited until farmers elsewhere in the demplot had received adequate irrigation to prepare and plant their land during the first cropping season before requesting water for his own parcel. Thus, he began his dry season cropping considerably later than all other demplot farmers.)

As Table 4 shows, farmers sold less than half of their yields each season (43% and 21%). This was not due to a marketing problem, but rather to household consumption. Green corn is a favorite snack food; and all demplot families consumed some of their harvest in this form (13% the first season and 16% the second). In addition, farmers saved 43% of the corn from their first harvest and 63% from the second harvest (unhusked and dried on the cob) to be consumed as a supplement or substitute for rice in the event of the failure or insufficiency of their 1985-6 rice crop.

Table 4

First and Second Season Demplot-Corn Harvest Yields

	<u>1st crop</u>	<u>2nd crop</u>
<u>Production:</u>		
Amount of land planted	6 ha	5.34 ha
Total harvested (ears)	221,510	171,170
Average production/hectare (ears)	36,918	33,352
<u>Market value of yield:</u>		
Market value (green @Rp50/ear)	Rp 11,075,500	Rp 8,558,500
" " " per hectare	Rp 1,845,916	Rp 1,602,715
Market value (dried @15 ears/kg Rp150/kg)	Rp 2,215,099	Rp 1,711,699
Market value dried corn/hectare	Rp 369,183	Rp 320,542
<u>Actual sales:</u>		
Actual total sold (green @ Rp50/ear)	95,440	35,810
Percentage sold	43%	21%
Total amount of sales	Rp 4,722,000	Rp 1,800,000
Average amount of sales/hectare	Rp 787,000	Rp 337,172
<u>Consumption:</u>		
Total consumed (ears)	27,760	27,400
Percentage consumed (as green corn)	13%	16%
Total dried for storage (ears)	98,310	107,960
Percentage dried for storage	44%	63%
Total weight of stored corn @ 15 ears/kg	± 6.5 t	± 7 t
Market value of stored corn @ Rp150/kg	Rp 975,000	Rp 1,050,000

The re-survey of demplot households revealed that the contribution of green corn to total agricultural income ranged between 2.4 and 100%; and the mean contribution was 56%.

Table 5 shows the percent of total household income contributed by demplot corn. The mean contribution was 19.7% with a rather dramatic range of 0 to 65.6% among all households.

Not surprisingly, it was the head of the P3A (#3) whose corn harvests contributed the highest percentage to total household income. This man devoted himself full time to demplot activities during the dry season and followed the agricultural advice of the P2AT staff member regarding spacing, fertilizing, and so on. The farmer who derived no income from demplot corn is the oldest landowner in the group (#10). He gave full use of his demplot land to various relatives and did not receive any direct benefit from the yield.

Table 5
 Contribution of Demplot Corn Sales to
 Total Household Income

<u>HH#</u>	<u>%</u>
1	11.8
2	11.9
3	65.6
4	33.0
5	29.9
6	3.3
7	12.2
8	28.6
9	16.6
10	--
11	41.0
12	41.9
134
14	30.6
15	8.6
16	2.8
17	27.7
18	19.7
19	18.5
20	10.5
21	23.0
22	9.2
23	31.5

Rice:

Estimates of production levels of rain-fed paddy rice based on information from the initial household survey indicate that farmers expect a gross yield of 600 to 2400 kg. of milled rice per hectare. The survey showed that the 1984-5 rice crop was considerably lower for the households who planted rice that year. (See consultant's Monitoring Report No. 2.) This was due to inadequate rainfall at the beginning of the wet season in November (approximately 50mm.) after which little rain fell until the latter half of December (316 mm.). Since farmers generally make decisions about planting seedbeds in November, many of them were discouraged at the start of the season from planting all or some of their sawah. 39% of the households did not plant rice at all; and of those who planted, 26% planted 20-80% less land than they had in previous years. According to their reports, only six of the demplot households (26%) reached self-sufficiency levels in 1984-5.

By contrast, 100% of the demplot households planted rice in 1985-6. Rainfall in November and December was spread more consistently throughout this period (approximately 154 and 170 mm. over the two months) and farmers felt more confident that the season's rains would support a rice crop. Farmers were particularly confident about planting at the demplot since they were guaranteed supplementary water in the event of rainfall shortages.

Table 6 shows rainfall levels during the rainy seasons (November through April) of 1984-5 and 1985-6 as well as the average levels from the years 1980-5 from the Babao collection station (located approximately four kilometers from the demplot). Of the sources of rainfall information for the Oesao region that were available, this is the most consistently and accurately reported. (See discussion in the consultant's Monitoring Report No. 2.).

Table 6
Wet Season Rainfall Levels Measured at Babao

	<u>Avg. 1980-5</u>		<u>1984-5</u>		<u>1985-6</u>	
	days	mm	days	mm	days	mm
November	8	138	7	43	6	154
December	12	239	20	316	11	170
January	13	342	8	241	23	663
February	16	364	14	314	14	305
March	10	197	6	101	10	155
April	6	84	8	72	6	65
Total	65	1364	63	1087	70	1512

In general, all farmers said that the rice yields on their demplot parcels were greater than those at their other sawah locations. The primary reason for this was that farmers planted their demplot sawah first. They planted seedbeds in the demplot in November and transplanted one month later. Elsewhere, most of the farmers did not begin planting seedbeds until late December and their crops suffered from a lack of rain during the latter half of the crop cycle (after March). Farmers who had planted their demplot crop late were able to supplement their water supply using the demplot irrigation system; however there was no such back-up for land elsewhere.

It was not possible to obtain separate information regarding crop yields at farmers' demplot and other sites in all cases. While most farmers could state the size of the yield at each of their sites, this information was of little use without the additional data regarding labor costs given the significant level of harvest shares provided to outside workers. As previously mentioned, the majority of farmers could not provide an accurate

accounting of the differential labor costs from one site to another because they employed the same laborers and paid them in aggregate amounts for work at more than one location. All farmers stated that their yields were higher on the demplot sawah than at other sites, although we could determine the accuracy of this assertion for only seven households (30%) who had separate accounts of labor and input costs.

Table 7 provides comparative rice production information for the seven households from whom we obtained separate accounts for each of their sawah. The yields from their demplot land are compared: 1) to the combined yield from their other sites for the same season and 2) to the combined yield for all sites during the previous (1984-5) season. In all of these cases, the farmers either did not plant or did not realize a harvest in their demplot parcels during that season. The differences between yield levels are significant in every case, ranging from 23% to over 400% greater at the demplot in 1985-6.

Table 7

RICE PRODUCTION IN DEMPLOT PARCELS, 1985-1986

HH#	Demplot Land Planted (Ha)	Gross Yield (Kg)	Est. Gross Yield/Ha (Kg)	1985-6 Yield/Ha on other Land (Kg)	1984-5 Yield/Ha (Kg)
4	.16	300	1,875	1,332	-----
5	.27	600	2,222	1,800	720
6	.17	576	3,388	1,334	533
7	.20	480	2,400	900	405
8	1.46	5,342	3,659	2,347	-----
16	.13	522	4,015	1,053	190
20	.14	180	1,286	251	200

Average estimated gross yield/ha on demplot land 1985-6: 2,692 kg

Average estimated gross yield on other land 1985-6: 1,288 kg

Average estimated gross yield on all land 1984-5: 410 kg

3. Assessing the socio-economic impact of demplot participation

Disposal of the yield: In order to determine the impact of demplot participation, it is important to establish the ways in which the produce was disposed. If some or part of the yield is consumed, the extent to which crop production satisfies household consumption needs should be calculated. In the case of corn which is consumed in place of or mixed with rice, for example, the extent to which it replaces or reduces rice purchases should be determined.

If the yield is sold, it is important not only to calculate profits, but also to determine how the money earned was used, e.g., reinvested in tractor rental or agricultural labor; used to purchase supplementary rice for household consumption; spent on non-essential luxury goods. If the money is used for the purchase of non-essentials, it is relevant to determine whether the household is agriculturally self-sufficient or has other sources of income (such as livestock sales) and therefore regards demplot profits as disposable income.

Farmers generally can account for the disposal of particular sums of money such as demplot profits. The use of this money must then be compared with other agricultural production information to determine whether these profits are: 1) increasing already existing wealth or disposable income; 2) helping to raise the household toward or enabling it to reach self-sufficiency (especially by subsidizing rice production); 3) being used to raise nutritional or other living standards; or 4) being used for non-essential purposes despite primary consumption and other needs. Households in the first category do not fit the criterion of equity among project beneficiaries. On the other hand, they can sustain the risk of ongoing demplot participation and may be more willing than less secure households to take an active role in project development.

Households in category 4 above may be the least likely to take an active ongoing role in demplot development. Only one of the Pukdale demplot households fell into this category. (They

purchased a tape player.) In fact, they did not participate regularly in water management, P3A meetings, or other demplot activities. This is due to the fact that the head of household is an elderly infirm man. His unmarried son and the son's children share the household. The son is a cattle trader who spends little time in the household or demplot areas. He planted the household's .13 hectare demplot parcel, but did not weed it; and he was seldom available to assist with water distribution during the scheduled flooding times for his family's land. This did not jeopardize the family's profits from the corn harvest because 1) the leaders of the P3A and P2AT staff member assumed responsibility for distributing water to untended plots and 2) harvesting was done by the buyers.

In fact, participation in the demplot did not affect significantly the social or financial status of demplot households. Average per capita household income was Rp. 220,000, an increase of about Rp.30,000 in 1985-6 over the previous year's rate. Expenditures in 1985-6 remained at approximately the same average level (Rp.180,000) as those of the previous year. None of the households expected at the outset of their participation in the demplot that they would make money from this enterprise, so they did not make special plans for the expenditure of increased income; and there was no change in the ranking of demplot households shown in Table 3.

In the majority of cases, demplot earnings took the place of money they normally expect to earn from selling rice. 35% of the households claimed that they used their earnings pay for tractor rental for the 1985-6 rice cropping season; and 26% of the households said their demplot earnings saved them from having to sell off livestock or borrow money from relatives to purchase rice. All households could state specifically how their demplot earnings were used. Their responses are presented in Table 8.

Table 8
Use of Demplot Earnings

	<u>Number of hh</u>	<u>%</u>
Tractor rental for sawah preparation	8	35
Food purchases	6	26
Contributions to extended family	3	13
Small home improvements	2	9
Purchase of gold jewelry	2	9
Clothing purchases	1	4
Purchase of tape recorder	<u>1</u>	<u>4</u>
Total	23	100%

4. Capacity and willingness to participate in a new project

Acceptance of government projects: In general, farmers in Oesao are sceptical of government programs. In the past, promised agricultural extension services and inputs, piped drinking water systems, and so on have not been provided or have been ignored by the implementing agencies soon after they were undertaken. Thus, farmers tend to ignore new projects until they are ordered to participate in them by village and regional officials.

This was true in the early stages of demplot development, given the series of problems with the initial temporary pumping system installed by P2AT. Once the system began to operate fairly dependably and the farmers enjoyed their first successful harvest, their interest in the demplot's future increased. By the end of the first harvest (roughly four months after the water users association was formed), 70% of the members of the P3A had begun attending meetings. By the beginning of the second season, they also began cooperating more effectively in coordinating water management by following the schedule established by the leaders of the P3A and P2AT staff member for rotational floodings of demplot parcels. Evidence of this cooperation was farmers'

presence in the demplot on their scheduled irrigation days, fertilizing their crops in accordance with the watering schedule, and ceasing to demand water whenever they feared that their land was becoming too dry. Furthermore, by the end of the first harvest the farmers had agreed to pay a nominal subscription fee to the P3A and by the end of the second harvest all except one farmer had paid their share.

Despite the initial success of the demplot, there is still considerable scepticism about the demplot's future. During the consultant's follow-up survey interviews with each demplot household, every respondent asked about the future of the demplot once the P2AT staff member assigned to oversee it and the consultant herself were no longer making regular frequent visits. 48% (11) of the demplot households expressed specific concerns about P2AT's ongoing commitment to operate and maintain the system for at least another year.

These doubts primarily stem from the concern that the demplot will be neglected once P2AT begins to develop sites elsewhere. Only one member of the P2AT staff has been active consistently in Pukdale. Farmers assume that he will be compelled to provide the same constant assistance at other sites and no longer will have the time for Pukdale. The farmers expect and rely upon this P2AT staff member to provide guidance in irrigation management, agricultural advice, and assistance in obtaining agricultural inputs. They also depend on him to serve as a neutral third party to help resolve intra-group conflicts and disputes.

Financial commitment: Clearly, it cannot be assumed that farmers automatically will accept a new irrigation project, however much they need water, unless they believe there is some guarantee of success. Households generally are cash-poor, preferring to sell produce or livestock only when they perceive a need for money. Thus, they are not likely to risk capital

investment in agricultural inputs (and, eventually fuel costs) voluntarily.

On the other hand, when interviewed at the end of the third successful demplot harvest season, 83% (19) of the demplot farmers said that they would pay for fuel and other costs of operating the demplot pumping system once P2AT is no longer responsible for its support. Most of them also said that they were not sure where they would find the money required, but that they would find a way to pay their share since they want to take full advantage of the irrigation system. The remaining 17% (4) said that they did not know whether they could afford to continue participating in the demplot if P2AT no longer underwrites it and they requested that P2AT continue doing so indefinitely.

The majority of demplot farmers are willing to pay a relatively high price for rice production. This suggests that they will make capital investments in agriculture if they perceive the necessity to do so. Table 9 provides an estimate of minimum costs of rice production per hectare; and Table 10 summarizes the alternative agricultural methods and forms of payment that are involved.

Table 9

Minimum and Maximum Costs of Rice Production per Hectare

	<u>minimum</u>	<u>maximum</u>
1. Land preparation	Rp. 70,000	Rp. 280,000
2. Cultivation	40,000	280,000
3. Harvesting	52,500	87,500
4. Inputs	<u>39,750</u>	<u>68,000</u>
Total	Rp. 202,250	Rp. 715,500

Table 10

Methods and Costs per Hectare of Rice Production

	<u>payment in kind</u>	<u>actual cost</u> <u>or (market value)</u>
1. <u>Land preparation</u>		
Cattle puddling (payment = 1/3 harvest) or	200 - 800 kg.	(Rp 70,000 - 280,000)
Tractor rental		Rp 100,000 - 125,000
2. <u>Cultivation/tending</u>		
Sharecropped (payment = 1/3 harvest) or	200 - 800 kg.	(Rp 70,000 - 280,000)
Hired labor - payment in kind:		
- plant	150 - 200 kg.	(Rp 52,500 - 87,500)
- weed/tend or	150 - 200 kg.	(Rp 52,500 - 87,500)
payment in cash:		
- plant		Rp 20,000 - 30,000
- weed/tend		20,000 - 30,000
3. <u>Harvesting</u>		
Hired labor (60 - 100 person-hours/ha @ 2.5 kg milled rice/ person-hour)	150 - 200 kg.	(Rp 52,500 - 87,500)
4. <u>Inputs</u>		
- fertilizer (300 kg/ha @ Rp 100/kg)		Rp 30,000
- insecticide (1-2 ltr @ Rp 1000 - 4000)		Rp 1,000 - 8,000
- seed (25 - 30 kg @ Rp 350-1000/kg)		Rp 8,750 - 30,000

The cost of irrigating paddy rice was not calculated since the demplot irrigation system was not used and is not intended to be used as a primary water source during the dry season. The demplot system was used only briefly (approximately 123 hours in all) to supplement rain water for the parcels of two farmers who planted their sawah late in the season. Given this minimal experience using the demplot for supplementary irrigation, it was not possible to calculate future costs of such usage.

Comparing the minimum and maximum costs of irrigated green corn and irrigated paddy rice production, it is clear that the former is considerably cheaper.

- Minimum and maximum costs of production:
 - Rp.196,120 - Rp.302,000 - irrigated corn
 - Rp.202,250 - Rp.715,500 - paddy rice

On the other hand, there is potentially more flexibility in the method of payment for rice production. With the exception of purchasing inputs, all costs of rice production can be paid in kind. This is particularly desirable for farmers who have limited sources of cash and who do not have a surplus of cattle to sell in order to finance rice production. Up to this time, there has been no discussion by the P3A or P2AT staff of establishing a system of deferred payments or payments in kind for demplot water use. This is an issue that should be considered before P2AT relinquishes its financial responsibilities for the demplot.

Profit potential of corn and rice: Considering the estimated market value of green corn (Rp.50/ear @ 40,000 ears/ha.) the maximum gross is Rp.2,000,000. If the corn is dried and sold, the maximum gross is Rp.400,050 (based on a calculation of 2.667 tons/ha @15 ears/kg times the market price of Rp.150/kg.) Using these as maximum and minimum figures, the estimated net profits for irrigated corn can be compared to those for rice. The estimated range of rice yields/ hectare of 600-

2400 is used here since this conformed to the information provided by all demplot farmers regarding their experience in the past, including those whose yields exceeded the maximum expected amount this year. Given the estimated market value of Rp.350/kg., the range of gross income from rice production is Rp.210,000 to Rp.840,000.)

Table 11

Profit/loss Potential for Corn and Paddy Rice

	<u>Irrigated corn</u>		<u>Paddy rice</u>	
	1 minimum	2 maximum	3 minimum	4 maximum
a Gross yield	Rp 400,050	2,000,000	210,000	840,000
b Prod. costs	196,120	302,000	202,250	715,500
	(1a -2b)	(2a - 1b)	(3a - 4b)	(4a -3b)
c Net	98,050	1,803,880	-505,500	637,750

While the deficit of Rp.505,500 listed as the minimum net for rice production is extreme, it does indicate that there are theoretically greater risks involved in rice production than in corn; just as there are higher profits possible in green corn production. It is important to note, however, that there was an unlimited market for green corn at the time of the demplot harvests because no other area in the Oesao-Kupang was producing this crop.

Commitment of land: The demplot irrigation system enabled farmers in Pukdale to undertake the production of dry season crops for the first time. The land the demplot comprises normally lies fallow during the dry months, being used only as a grazing area for small numbers of livestock. Thus, there was no serious displacement of other activities with the introduction of dry season cropping there. All livestock owners had other land on which to keep their animals and no one complained about a loss of grazing area. On the other hand, there was an occasional

problem with livestock from households outside the demplot entering at night when the gate that closes off the road leading into the demplot area was left untended. (The responsibility for tending the gate fell to the head of the P3A and his family because he could not organize a system to rotate the responsibility within the P3A membership.)

The establishment of the demplot expanded the utility and enhanced the value of their land there rather than altered its function. The only questionable aspect of land use involves the .01 hectare of land used for the fenced yard in which the pump house is located. The owner was not compensated for this land and was not consulted initially about its being used. The land was freely given to P2AT by the village head at the time the well was drilled after the acting head of P2AT told him that his agency had no funds to compensate land owners. They agreed that the land would become property of the water users association after P2AT ceased to support demplot operations. The landowner complains about this arrangement because he was not informed of the decision to use his land until after P2AT had been promised the well site. On the other hand, after the P3A was formed, the members decided that the owner of the land where the pump house is located does not have to pay the association's subscription fee at the end of each harvest. They believe that, over time, this will amount to fair compensation; although they did not base this decision on any calculations of land or potential yield values.

The issue of land use for pumping facilities, irrigation canals, and so on has not been discussed thoroughly. Clearly landowners are likely to give up small parcels of land freely before value-enhancing improvements are made. Nonetheless, after an irrigation system has been installed landowners may regret their decision to donate land. This is potentially disruptive to the unity and coordination of water users groups, even if the landowner has signed over a deed to this property to the P3A giving the group full rights and ownership. Thus, P2AT should

seriously evaluate its land acquisition policy to avoid potential intra-group conflict or dissension stemming from an owner's perceptions of inequity with regard to group access to his land. (See recommendations in Part III below.)

Commitment of time: All landowners said at the organizational meeting of the P3A that they were interested in participating in demplot activities. Nevertheless, farmers generally are not idle during the dry months of the year; and throughout the first two cropping seasons there were conflicting demands on their time.

Male farmers from 87% (20) of the demplot households were occupied throughout some or all of the dry season in other parts of the village tending cattle and garden/orchard land. Women were occupied with home gardens (using water from their household wells), although they were also available to plant, fertilize, oversee children's labor, and collect money from the buyers who came regularly to the demplot to harvest and purchase the corn. At least 50% of the landowners relied upon relatives (especially adult offspring, sons-in-law, sisters, and brothers) from outside their households to perform all or part of the demplot farming tasks. Arrangements for disposal of the harvest were idiosyncratic, ranging from none to all of the yields going to the individuals who performed the tasks. In 3 cases, adult offspring provided their labor without compensation, using this as an opportunity to contribute to the support of their aged parents.

Owners of large cattle herds were absent from the demplot during at least two months of the dry season because they were tending their herds elsewhere. Labor in their demplot parcels was provided by other relatives, though those individuals were not considered members of the demplot water users association (P3A) and had no formal responsibilities to it.

Households in Pukdale are typical of those throughout the Oesao plain in which the head and, often, teen-aged sons are absent throughout the dry season. For this reason, households

with grown children (or other relatives) who can provide agricultural labor are more likely to participate actively in dry season projects than those in which household labor is supplied only by the head of household and his wife. In future site selection, then, it will be important to determine not only who owns land in a prospective area but also who will be available to work there.

The existing Pukdale P3A is constituted only of demplot landowners. Their sons often attend the meetings in place of their fathers; however it is the landowner himself who is responsible for payment of the demplot subscription fee each cropping season and for providing labor for necessary cooperative maintenance tasks (e.g., repairing fences and clearing out irrigation canals). Women were never included in the consideration for membership either by the P2AT staff or by village officials, although they control household finances and, often, are responsible for overseeing and collecting money from outside buyers who come to the village to purchase corn, rice, coconuts, and other crops.

It was consistently difficult for the leaders of the P3A to assemble the entire membership for meetings. At least 50% of the members were not in the demplot at the times designated for meetings even though they had been personally invited by one of the group leaders. Thus, meetings were delayed for hours while members already present tried to summon the others. At least one-third of the meetings had to be rescheduled (usually for late evening or Sunday after church when it was more likely that farmers would be in the vicinity of the demplot).

By the second cropping season, the head of the P3A abandoned attempts to hold regular full group meetings. Instead, he held meetings only with the secretary of the P3A and leaders of each sub-group (5 individuals) since it was easier to work with and to assemble the smaller group. It was then the responsibility of these leaders to convey relevant information to the members of their individual sub-groups.

As long as the demplot farmers continue to depend on P2AT for full financial support and rely on the constant attention of the P2AT staff member, the majority of members do not find compelling reasons to participate actively in meetings and water management. This past year they have been able to maintain their gardens and livestock elsewhere without having to make serious regular commitments of time and labor to demplot activities.

5. Cooperation between farmers

Routinized cooperation outside of adat (traditional, ceremonial)-related activities is not as common among farmers in NTT as it is in Java and other areas in which gotong royong (mutual assistance) may be standard practice. This fact is not always understood by P2AT (and other institutions) in NTT that are dominated by individuals from Java and other parts of western Indonesia. Thus, they may be frustrated in their expectation that farmers will work together to accomplish particular tasks. Cooperative efforts in the development of the Pukdale demplot were achieved when the village head or the head of the P3A firmly instructed that specific tasks be undertaken.

The most reliable and efficient opportunities for coordinating farmer activity in the demplot have been fortuitous and are incidental to normal demplot operations. These are scheduled visits from important outside officials and dignitaries for which there always is considerable preparation, since local custom dictates that guests be received with generous displays of hospitality. This involves not only preparing food and arranging cultural performances, but also serves as an opportunity for farmers to improve the appearance of the demplot. Cleaning of irrigation ditches, fence repair, weeding, and so on can be accomplished on short notice if farmers are informed that an important guest will be inspecting the demplot.

In the early stages of pump operations there were serious problems of inequity of water distribution. These were due largely to the timing of pump break-downs rather than to con-

scious attempts by the P3A leaders and the P2AT staff member to deprive certain individuals of water (as some farmers believed). At least 30% of the farmers have been irresponsible about following group regulations about timing of planting, fertilization, and insecticide use. Similarly they do not keep irrigation ditches around their land in good repair to facilitate water flow. Each of these problems has been discussed at most of the P3A meetings and pointed out to recalcitrant farmers informally by the P3A leaders and the P2AT staff member. It was not until the pumping system became more reliable after several months of operation and the farmers had had their first successful irrigated crop that the majority of farmers began to demonstrate that they understood and respected the justification for the P3A's regulations and activities.

Despite improvements in the farmers' attitude toward the P3A, there remains a significant level of distrust and envy of their fellow members and leaders. Discussions during the consultant's re-survey revealed that 87% (20) of the demplot farmers continue to be seriously concerned about the equity of water distribution and of the weakness or lack of responsibility of the P3A leadership in assuring fair water management. The primary issue motivating this concern is that flooding various portions of the demplot takes a variable amount of time depending upon: 1) the distance between individual parcels and the pump which is an unavoidable condition and 2) upon the maintenance of the canals and ditches through which the water has to pass, which depends upon the cooperation of all group members.

As long as they do not have to absorb the cost of fuel, farmers are not concerned about the differential pumping time requirements. They realize, however, that flooding areas of the demplot that are most distant from the pump takes two to five times longer than those closer to it. Thus, hourly costs to individual owners would vary dramatically.

No one in the demplot or at P2AT has discussed payment schemes seriously yet. Nonetheless, during our re-survey

interviews, many respondents mentioned their fears that the burden of demplot operation will not be borne equitably. Two of their suggestions reflect this basic concern:

a) Conduct a reliable, official survey of the demplot in order to determine exactly the size of each parcel. This will ensure that all farmers are paying their proper share of the post-harvest subscription fees. This would also assure equity if a payment scheme were adopted in which farmers pay a portion of total operating costs based on the size of their land rather than the length of time it takes water to reach and flood it.

b) Increase the debit of water currently produced by the demplot pump to reduce operating time. This and any other measures to economize on operations and maintenance costs to reduce the overall (and proportional individual) financial burden increase the likelihood that all members of the group would pay their share.

III. Conclusions

Recommendations for Sustaining the Existing Demplot and for Developing New Sites

The success of the demplot to date has occurred in a village where cropping is normally possible only during the rainy season and where farmers find it difficult to coordinate for any task other than prestige enhancing rituals. Furthermore, this has been achieved despite considerable initial scepticism on the part of all demplot farmers about the possibility for success, given the first efforts of P2AT to launch the demplot at the beginning of 1985.

An analysis of the reasons for the current success, ~~of~~ one individual, the P2AT irrigation staff member, ~~are~~^{is} largely responsible. There has been minimal cooperation from local offices of the Ministry of Agriculture and little effort on the part of the P2AT office in Kupang to facilitate such necessary inter-sectoral activity. Furthermore, the other forms of institutional support from P2AT which would be required to replicate this experiment are not generally available due to a shortage of experienced and properly qualified staff as well as to inadequate administrative management.

In order to ensure the success of expand^{ed} groundwater development in NTT, a number of practical and programmatic measures should be undertaken by P2AT in cooperation with USAID. The following discussion presents suggestions regarding the specific development of new groundwater sites in Timor and also provides recommendations for strengthening the capacity of the implementing agency to undertake this expansion.

Selecting and monitoring sites

To date, technical criteria appear to have been the principal issues considered when selecting locations for drilling. Specifically, P2AT's choice of a drilling site at Pukdale was determined by the existence of an aquifer in a relatively vast flat agricultural area to which the village head gave P2AT access. Certainly these are primary considerations for choosing the general location for a project site. The choice of the specific location of the well within the broad potential area, however, was not based on a careful examination of other variables relating to the future sustainability of an irrigation system. There was no mechanism for systematically comparing and evaluating various potential drilling locations in order to determine, for example, which would benefit the largest number of people and would be sustainable by those people in the future.

Thus, socio-economic criteria and issues of equity have not been regarded by P2AT as viable considerations in choosing drilling sites. High priority has not been given to the relevance of undertaking cost-benefit analyses or to the necessity of considering experimentation with alternative technologies in order to determine the most economical and suitable for local conditions. Plans for providing adequate support to a demplot, be it logistical (i.e., provision of fuel, oil, spare parts, or mechanics), agricultural (i.e., provision of extension advice and inputs), or institutional (i.e., assistance with development of the P3A) have not been developed yet.

Site selection should involve the collection of data from formal sources (such as geohydrological surveys, village records, and interviews with local officials) as well as from informal conversations with people at prospective sites. Eliciting information informally is a useful way of cross-checking that provided by local officials who may have a vested interest in establishing irrigation systems in particular areas.

There may be a number of prospective sites designated in one village. Initial discussions should be used as an opportunity to

narrow down the choices in each village to avoid unnecessary work in the selection process. For example, it should be possible to eliminate inappropriate prospective sites such as those owned by absentee landlords or those in which there are agricultural or other projects that might limit farmers' involvement in developing an irrigation system.

The following suggestions should be regarded as progressive steps in the determination of appropriate project sites:

1) Identify sites that meet geohydrological and other critical technical criteria:

This activity would include making an inventory of existing well points in the Oesao region to determine areas in which groundwater capability already is assured. A distinction should be made between site selection for the initial experimental phases of groundwater development if various technologies and water management procedures are going to be tested.

At the initial stage, the site selection process should also eliminate areas that are not accessible enough to enable P2AT staff to visit them regularly to provide regular maintenance and assistance and to perform monitoring tasks. This would tend to favor areas that are readily accessible to major transportation routes and markets. At the same time this probably would eliminate remote areas in which the needs for development assistance to improve the standard of living are greater. During a later phase of the project - after effective technologies and monitoring procedures have been established - P2AT could expand groundwater development to areas in which socio-economic needs are greater.

2) Determine general patterns of land use:
Information can be acquired and cross-checked from several accessible sources:

a) observing activity (or lack of it) at prospective sites;

- b) discussions with the heads of the village, hamlet or sub-hamlet in which the land is located; and
- c) discussions with villagers whose homes are located near the site or who happen to be at the site at the time of the visit.

If prospective areas have not been used for agriculture in the past, it will be important to determine the reason for this. For example, throughout the Oesao plain there are areas in which the soil does not support rice or other crop production. Instead, the land is left fallow year-round and used, if at all, for livestock grazing. (According to local farmers the ground water and the soil in these areas is "salty." A technical analysis would have to be conducted to determine the nature of technical problems with the soil and/or water supply.) In other grazing areas with agricultural potential, cattle owners may not be willing to surrender their pasture land.

3) Determine property ownership, the identity of actual users of the land, and a rough estimate of the productive resources available to prospective beneficiaries;

This involves determining the total number of landowners at a prospective site; their place of residence and its proximity to the site; the approximate size, number and location of their land holdings; the nature of arrangements regarding labor at or use of plots that are not farmed by the owners themselves; and the number of livestock (especially swamp buffalo and cattle) and productive trees owned by prospective beneficiary households.

Presumably, sites would not meet project selection criteria if land were owned in large parcels thereby limiting the number of beneficiaries; if landowners live far from the site such that they would not be regularly available to assist with water management and would not be able to take an active role in site development; and if landowners had in the past or intended in the future to hire outside agricultural laborers (who would not be members of a water users association) to work at the site.

The relevance of determining the relative wealth of prospective beneficiaries depends, in part, on the potential risks involved in project participation. Clearly, it is not the intention of SSIMP to benefit the wealthiest farmers in a prospective region. Nevertheless, households that have relatively large cattle and/or land holdings, for example, may not fit equity criteria but they may be more willing to risk participation in an experimental project. On the other hand, if irrigation systems planned for future project sites involve constant attention, households with fewer interests might be more likely to devote the time necessary to achieve project success. Thus, site selection should include an assessment of the demands on farmers' time and the approximate capital investment necessary for project participation.

The most useful and readily available demographic data and information on property holdings can be obtained from village records and from brief interviews with village officials. Records kept at the kecamatan level regarding Pukdale were seriously incomplete and, as far as we could determine, there was no reliable central source of information about regional land and livestock ownership or agricultural yields. (We did not have access to IPEDA tax records which might have provided this information.) At the village level, however, we were able to obtain information about the amount, distribution, and types of village land (listed in a monthly village land registry - Daftar Pemilikan Tanah, Ternak, dan Tanaman) and about individual holdings of villagers (in the annual household property census records - Daftar Penduduk). Theoretically this data is collected by every village to satisfy regional census requirements. Examination of this information in villages where prospective sites are located would provide a preliminary indication of the size of holdings within the village. A separate document, the village household survey, provides the name, age, sex, educational level and occupation of every village resident. This would provide an indication of the potential number of benefici-

aries within a household and the labor force available to work at the prospective site.

If these sets of data were in order, it is likely that the village secretary (or other official) could identify the information regarding each prospective beneficiary household in the course of one interview. If written census and property records are not available, it is still possible that relevant information on size of households, rough estimates of the size and location of land holdings, and approximate assessments of livestock ownership could be obtained informally in discussion with the head of the local hamlet or sub-hamlet in which the site is located.

Written records would not provide an indication of the amount of land owned outside of a given village by its residents or of the amount and location of land within the village that is owned by outsiders. This information is crucial to establishing accurately the identity, household location, and rough socio-economic status of prospective beneficiaries. It should be possible to establish the identity of landowners at a prospective site by talking with the village and kampung or sub-kampung heads and cross-checking it with information obtained in informal conversations with one or more local residents or individuals working at the site.

As the consultant's research demonstrated, the size of livestock and orchard holdings was under-reported in the village records; just as the information on land (especially sawah) ownership was distorted since holdings outside the village were not included. Nonetheless, since this information is consistently lower for the entire village population, the census data enables the investigator to determine relative status differences between individual households.

Data on household property holdings should be available on request from the village secretary since all villages are required to collect such data annually. If it is not readily available, a P2AT staff member could request that the information

be collected by the heads of the hamlets in which prospective project sites are located. (The consultant was able to obtain data in Pukdale within two weeks after requesting that gaps in data provided in census records from two hamlets be filled.)

4. Determine whether there are existing farmer groups and/or "contact" farmers that might provide support for a new project:

Throughout the Oesao plain sawah farmers are affiliated with loosely formed water management groups (often referred to as subak) whose leaders oversee the distribution of water from local weirs and rivers. It would be instructive to interview the village or kampung representative(s) of these groups in prospective sites if there are questions about past methods of or problems with water management.

Theoretically, local agricultural extension agents (PPLs) divide the households in their bailiwick into small farmer groups in order to meet with and advise them regularly. The local groups involving demplot farmers were inactive due to the lack of attention paid them by the local PPL. Groups in other parts of the village and elsewhere are more active, however. Given the lack of personnel with agricultural experience and expertise on the P2AT staff, it would be benefit the project to take advantage of such extension services as already exist. Although the cooperation of the Ministry of Agriculture is expected under the terms of SSIMP there are no financial or institutional incentives to promote such involvement at the local level.

At the district level, the Department of Agriculture identifies so-called kontak tani ("contact farmers") who are viewed by local extension agents to be especially capable and productive. If a site in which a contact farmer was active satisfied basic selection criteria, it might be useful to choose that area in order to test the effectiveness of enlisting his special participation in the project.

Monitoring site development

Monitoring the socio-economic and organizational aspects of site development can be used in two ways:

1) as a means to assess the response of beneficiaries to the project and determine the socio-economic impact of their participation in it; and

2) as a mechanism to ensure that adequate guidance in water management and, if possible, agricultural assistance are provided.

With respect to the first point, data collection should be as simple and economical as possible. Existing sources should be utilized if available and the collection of harvest data by villagers themselves should be encouraged.

Initial baseline information can be established through the strategies listed as points 3 and 4 in the discussion of site selection above. In each village in which a project site is located, the researcher should obtain existing village census information on each beneficiary household and review it with the village secretary or kampung head to make adjustments to improve its accuracy. While these officials may not have exact knowledge of households' property, they usually can determine whether the information available is reasonably correct. This information will familiarize the researcher with each household prior to conducting interviews with them and provide a cross-check of information provided during the interviews. Village officials also may be able to provide additional information on the status in the community of (some of) the participant households which may assist the demplot overseer in understanding the dynamics of the water user group.

Baseline and follow-up information could be established in a short interview with each beneficiary at the beginning and end of the agricultural year. Successful collection of information of this nature is contingent upon the researcher's familiarity with agricultural practices and sensitivity to the socio-cultural characteristics of the population in the project area. The P2AT

staff member who accompanied the consultant when she interviewed demplot families and oversaw demplot development has had no formal training in social research techniques. Nonetheless, he is capable of conducting household interviews and could train other members of the P2AT staff or outside assistants such as local university students to do so.

The following minimum information can be established in a brief initial interview. The consultant's re-survey instrument could be adapted easily for this purpose. (The justification for including each set of data is explained in Part II of the present report and discussed in more detail in the consultant's previous reports.)

- 1) size, location and use of land holdings
- 2) amount of livestock owned and for what purpose
- 3) whether tractor, rice mill, pump, vehicle, or other equipment are owned; whether in working condition; and how used
- 4) approximate previous rainy season yields of rice (being certain to distinguish between the gross yield and the household's net after all harvest labor, sharecropping, and other costs have been met); whether sufficient, in sufficient, or surplus amount was produced; approximate yields of rice specifically on the land in the irrigation project area
- 5) other agricultural production (list of crops, whether sold/bartered, and for what purpose)
- 6) other sources of income and how earnings used
- 7) whether earnings are adequate to meet household consumption and other needs; if not, what other sources of support if any are available

In order to accumulate accurate information on crop yields throughout the year, the P3A should be encouraged to collect information on gross yield, monetary cost of labor and inputs, consumption and sales rates, and gross income from each member.

Simple forms could be prepared and supplied to the P3A to facilitate this data collection. In 1985-6, the head of the Pukdale P3A collected this data efficiently under the guidance of the P2AT staff member assigned to the demplot. It not only was used by the consultant to measure the economic impact of demplot participation and by P2AT to assess beneficiary response to the project, but also by the members of the P3A to prove to themselves that their participation in the demplot was profitable.

Because farmers tend to forget exact harvest information, it is preferable to collect this data at the end of each cropping period. Then at the end of the agricultural year, a more general follow-up interview could be conducted to determine:

- 1) whether there were any changes in property holdings as a result of project participation (e.g., purchase of cattle or agricultural equipment with profits from dry season harvests)
- 2) whether and to what extent the level of rice production, if any, at the project site, increased or decreased from the previous year's yield
- 3) how money earned from project participation was used
- 4) who worked on their land at the project site and how were they compensated, if at all
- 5) whether the participants planned to continue their involvement in the project; whether there were any serious problems, concerns, or suggestions about the future of the irrigation system

The second feature of site monitoring is more directly related to the development of the project. Given the experience of the Pukdale demplot, it would be advisable for P2AT to appoint an Irrigation Division staff member to oversee the development of each site. At the beginning, this individual's role would be similar to that played by Hari Suwito in the Pukdale demplot. That is, he should assist the participants in the formation of a water users association; in developing a coordinated planting,

fertilization, irrigation and harvest schedule; making logical and practical cropping choices; in determining appropriate planting methods; and so on. If agricultural extension services in the area are ineffectual or non-existent, ideally the P2AT staff member could be assigned an advisor from the Department of Agriculture either at the provincial or district level to whom he could turn for agricultural advice. Alternatively (or in addition) it would be effective to provide the overseer with enough agricultural information to enable him to offer basic ongoing assistance to the farmers.

The overseer should have as his primary goal the participants' achievement of self-sufficiency in all aspects of irrigation system management and use. This task involves three steps:

- 1) evaluating whether the system itself is manageable given farmers' actual and potential level of technical and organizational sophistication and degree of interest in sustaining it;
- 2) determining ways of improving the system to increase its cost-effectiveness and manageability by the farmers; and
- 3) assisting the farmers to take over full financial control of and responsibility for the irrigation system as soon as possible.

Ensuring beneficiary participation

Current demplot:

1. Provide ongoing support from P2AT

P2AT should continue to fulfil its obligation to provide fuel and other supplies on schedule and to maintain the system in good repair. This is especially important in the second year of the demplot's existence to ensure the participants' ongoing confidence in and acceptance of the irrigation system. At the same time, P2AT should plan a phased withdrawal from active involvement in order to provide the farmers with increasingly more

experience in managing all aspects of demplot operations and maintenance.

2. Develop a payment system

To date P2AT has made no serious attempt to determine how the P3A will organize demplot finances once the agency is no longer involved there. During our re-survey, nearly 40% of the respondents suggested that the post-harvest subscription fee be raised in order to accustom all P3A members to paying a higher price for the use of the irrigation system.

The P2AT staff should begin soon to discuss the issue of payment at full meetings of the P3A to enable all members to have a role in the determination of a payment system. Given the farmers' concern with the cost of operations and maintenance coupled with their usual cash-poor status, the possibility of introducing an optional deferred payment scheme should be considered. This could be based loosely on the traditional bagi hasil (harvest share) system whereby farmers would pay for their seasonal water use by turning a percentage of their harvest over to the P3A for the group to sell.

3. Provide advice and assistance

Farmers are interested in increasing the cropping options available to them. The majority are interested in planting peanuts, mung beans however they are have little experience with multiple cropping and are not aware of the irrigation requirements for dry season crops.

Future project sites:

1. Farmer-dug wells

The most interesting and striking outcome of our discussion of demplot development with each participant during the course of the re-survey was the nearly unanimous interest in farmer-dug wells. Respondents consistently asked whether P2At would agree to provide pumps either freely or on credit if they dug their own

shallow (approximately 6-9 meter) wells for irrigation purposes.

There is one such well that was dug within the past six months located several hundred meters from the edge of the demplot. The landowner had been given a diesel pump from the district government as a reward for consistently high yields in his rice fields. Thus, the only costs of construction were in purchasing concrete for the lining of the well, several lengths of galvanized pipe to carry water to irrigation ditches, and zinc and other materials to construct a makeshift shelter for the pump. Including the price of the pump, this system would have cost no more than Rp.1,500,000 - 2,000,000 to construct. It serves a minimum of 4 hectares at this time, but its full capacity has not been tested yet.

2. Establish simple new systems that do not rely on complicated or sensitive equipment:

The earliest months of demplot operations were characterized by frequent, small problems that incapacitated the pump for hours and days at a time. Most of the difficulties were simple (i.e., broken fan belts, pulleys out of alignment, and a leaky valve). Repairs were not difficult once the sources of the problems were discovered, although mechanics from P2AT were not always able to identify the difficulties easily. To compound these problems, it was not possible to obtain some spare parts immediately since they are not kept in large stock in Kupang.

Based on this experience, it is clear that farmers who have no mechanical training or previous exposure to pumps and other equipment cannot be expected to maintain a system with which P2AT staff members themselves have difficulty. Furthermore, farmers may not want to spend the time or money trying to acquire spare parts - however small the cost - if they feel that the system is prone to break down frequently.

It is reasonable to assume that farmers at new sites can learn to operate centrifugal pumps like the one in use at the demplot now (and, indeed, a few farmers elsewhere in Oesao are

using such pumps now). Nevertheless, they must be provided with adequate training and guidance in order to undertake successful operation and maintenance of this equipment on their own.

The availability of spare parts should be regarded as a crucial criterion in the choice of equipment to be installed at new sites. As farmers become dependent on irrigation, they will be unable to postpone agricultural activities while they wait for spare parts to be ordered and shipped from Java or elsewhere. Information regarding tractor ownership suggests that the primary problem with maintenance of this equipment is not the lack of money to pay for spare parts but the long period of time it takes for the parts to be delivered.

3. Establish systems that can be managed by small groups of individuals:

Unlike people in Java and other parts of Indonesia, the Rotinese farmers in Oesao do not have an established tradition of gotong royong (mutual self-help) whereby people cooperate on communal projects. In our re-survey of demplot farmers the majority of respondents commented that leadership of the P3A is not strong enough to manage water distribution for a group as large as theirs and for this reason there was often a lack of coordination of maintenance and water management activities. Farmers themselves recommend establishing smaller water user groups at future sites (possibly no larger than 10 farmers per group).

The participation of an outsider whom the farmers know and trust (i.e., the P2AT staff member) at P3A meetings and in organizing water distribution was often an effective means of ensuring group coordination and of reaching decisions that required the approval of all members. This suggests that organizers from outside the village might be instrumental in assisting farmer groups in establishing water management procedures and coordinating necessary communal activities.

4. Involvement of beneficiaries in all stages of project development if possible:

Beneficiary participation in new projects is likely to be higher if these individuals perceive from the outset that they are responsible for project success. If they feel that the project is to be developed and managed by the Government, they are likely to remain uninvolved. This attitude stems from past experience with Government projects that failed due to the lack of ongoing assistance or follow-up after initial efforts had been made. If farmers were involved in the planning and installation of new systems, for example, they would be more likely to accept and support the project, particularly if they felt that they had had some role in its design or development. This is not to say that farmers themselves should design irrigation systems, rather it suggests that farmers be encouraged to comment critically on project plans and that their ideas and criticisms be seriously evaluated by the implementing agency's staff.

5. Coordinate inter-sectoral assistance as necessary:

This is particularly important with respect to agricultural extension. New project beneficiaries, like the Pukdale farmers, will need advice on appropriate crop choices, multi-cropping, irrigation requirements, and so on as well as assistance in obtaining necessary inputs. Support for such extension services must come from provincial and/or Kabupaten authorities as well as from field staff. To ensure the cooperation of the Department of Agriculture or other agencies, P2AT staff members should develop and maintain a line of communication with their counterparts at those agencies.

6. Marketing assessment:

As new sites are developed, the choice of crops to be planted at each site should be coordinated each season to avoid flooding local markets with the same crops. An assessment of the capacity of local markets to absorb particular crops also should

be conducted to determine the feasibility of crop diversification.

Strengthening the Implementing Agency

There are a number of weaknesses within the P2AT office in NTT which could be ameliorated if they were addressed systematically. Two principle ways in which P2AT in NTT could be improved are:

- 1) to clarify its short- and long-term plans for the development of groundwater resources in the region such that these provide clear, coherent goals and guidelines for the entire staff, and

- 2) to strengthen the overall management of the office such that all members of the staff gain a better sense of their job responsibilities and of the interrelationships between the tasks of their respective offices.

The experience of the implementation of the groundwater development pilot project at Pukdale thus far suggests that inadequate or inappropriate management, rather than scarce resources, is the primary constraint to successful project implementation. The difficulties encountered do not appear to arise out of too few resources, but rather out of a need to make more efficient and effective use of the human, material and financial resources which are already present.

The implication of this analysis is that the provision of additional resources (new equipment, training or technical assistance) cannot effectively improve P2AT's capacity to develop successful groundwater systems unless it is accompanied or preceded by policy decisions affecting management practices. Policy decisions at a senior level will be required to restructure institutional incentives and procedures so that improved

performance is encouraged within the P2AT, if not within the Ministry's broader irrigation program.

There are several specific areas where the evidence presented in the consultant's reports suggests that policy decisions or innovations can improve management practices and through this affect institutional performance and capabilities, perhaps without the need for many additional resources. The first major area concerns the program and project planning process. As noted earlier, there is no specific statement of program objectives. A decision to require the articulation of program objectives and a strategy to achieve those objectives would impose a coherence and direction on P2AT activities which presently do not exist. It would provide the basis for the more efficient and effective use of existing resources.

Based on this strategy, both office and individual work plans could be required. (While these have been developed by P2AT staff members in the past, these plans have not been used consistently and effectively.) Ideally, work plans would establish specific objectives for a given year and would identify benchmarks for tracking both office and individual performance. Project resources and staff time could then be coordinated more effectively and it would be possible to assess office achievements on a continuous basis.

In addition, an annual review would be undertaken of the office and individual work plans to ensure that they are consistent and continue to remain appropriate for P2AT in Kupang. This review should involve all staff members in order that people become oriented towards fulfilling a strategic goal as opposed to finishing a task only.

If the articulation of a programmatic strategy and the formulation of work plans were required, this would have important consequences for the development of project plans. It would be possible to assess a project plan in the context of the strategy. Project staff and supervisors could look beyond the one year time horizon established by the annual budget cycle and pay closer

attention to the long-term effectiveness of P2AT activities. In this connection, project plans could be required to include assessments of socio-economic conditions which affect project implementation and the achievement of programmatic objectives. Equally important, it would be clearer to P2AT staff why such information is required and why it should be important to them as they go about the task of implementing a given project.

The second major area for policy decisions concerns the creation of an effective monitoring system. At present P2AT, like almost every other government department, is required only to report quarterly on two aspects of project implementation: physical achievement and financial disbursements. In the absence of an articulated strategy or office and individual work plans with clear benchmarks, it is difficult to know what else could be monitored systematically. The establishment of a monitoring system, then, only makes sense if it is coupled with policies requiring programmatic strategies, work plans, and improved project planning documents.

The significance of a monitoring system arising out of strategies, work plans, and project plans is that it enables P2AT leadership to collect information systematically on progress toward achieving broader objectives. Equally importantly, it allows P2AT to focus attention on the long-term results of their work and to assess the sustainability of benefits.

Finally, the third major area for policy decisions affecting P2AT management concerns decentralization of authority. The effectiveness of P2AT activities will always be hampered if staff have no authority to deviate from nationally determined models and to develop programs responsive to local needs and requirements. Policy decisions affecting decentralization of authority, however, are only possible if they are coupled with the policy innovations affecting program and project planning and monitoring systems which were discussed above. This is because any decisions to encourage decentralization of authority must be coupled with an effective means for enforcing accountability. This is

one of the major uses of an effective monitoring system, which in turn rests upon the articulation of a programmatic strategy and the formulations of work plans.

Without this support from the national level, it is unlikely that additional equipment, training, or technical assistance (as are usually provided by AID projects) will result in marked improvement in the performance of P2AT and the effectiveness of their programs. With these kinds of policy decisions and support from the national level, it will then be possible to determine what kind of training or technical assistance will be required to implement the new policies. For example, training and technical assistance could be targeted specifically to support the development of program strategies, the formulation of office work plans, and the establishment of an effective monitoring system, once it has been determined that these should be introduced into the present system.

It is clear, then, that the suggestions for strengthening P2AT at the provincial level must be reinforced by policy decisions from higher levels of the Ministry hierarchy. P2AT staff at the provincial level do not have the authority to initiate these changes and to incorporate them into the ongoing management procedures of the Ministry. This suggests that the first step in trying to bring about the policy changes proposed here is to review them at the national level showing how they are based on an analysis of empirical data generated by close monitoring of the work of P2AT and do not arise simply out of unique circumstances or contingent conditions.

Laporan Kegiatan Demplot Pukdale
Dari Bulan Oktober Sampai Perte-
ngahan Bulan Desember 1985.-

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H A R I S U W I T O
Staf pertanian P2AT.

LAPORAN DEMPLOT.

Pendahuluan.

Pengalaman Demplot.

Berdasarkan pengamatan kami, tanaman jagung diberikan air dengan interval 15 hari pada masa pertumbuhan dan diperpendek menjadi 12 hari pada masa pembentukan buah yaitu pada tanaman sedang mengeluarkan bunga akan lebih baik dalam memberikan hasil dari pada memberikan air lebih banyak atau kurang dari itu.

Pada irigasi sumur pompa, hal ini memberikan keuntungan yang tidak sedikit karena bila petani belum berpengalaman dalam irigasi tanaman polowijo yang diusahakan dalam areal persawahan pada musim kemarau, (kita ketahui bahwa kebanyakan petani di P.Timor bertanam polowijo di ladang pada musim hujan) tentunya takut bila tanamannya tidak diberikan air sebanyak-banyaknya dan kegagalan selalu menghantui mereka.

Keuntungan tersebut diatas adalah bila petani sudah mengetahui kapan air diberikan juga dengan interval 15 hari mereka percaya bahwa tanamannya tidak akan mati, maka mesin pompa tidak harus bekerja berat pagi sampai malam dihidupkan yang tentunya akan banyak menghabiskan bahan bakar, pelumas ataupun operator sendiri harus kerja overtime dengan tidak ada tambahan imbalan jasa tetapi tetap dengan Rp. 20.000,-/bulan. Disamping itu dengan diketahuinya interval yang mendekati tepat dalam pemberian air, akan dapat memperluas areal per tanaman dengan melibatkan lebih banyak petani dalam suatu areal dengan sistim irigasi sumur pompa.

CARA BERTANI.

Dalam penanaman pertama dengan polowijo yang diusahakan oleh petani dilokasi demplot, biarpun sudah diberikan penyuluhan tentang bagaimana bertanam jagung yang baik tetapi hasilnya masih banyak pula petani yang belum mengikutinya, karena berdasarkan pengalaman mereka diladang tidak perlu mempergunakan sistim panca usaha.

Sebenarnya sistem panca usaha sangat penting sekali digunakan untuk usaha tanaman polowijo.

Dengan pengolahan tanah yang baik, tanaman jagung akan hidup subur karena tanaman ini menghendaki tanah yang lembur untuk perkembangan akarnya atau dengan mengemburkan tanah maka air didalam tanah akan lebih bertahan sampai beberapa waktu dan kelembabannya dapat dipertahankan nula.

Varietas unggul : Dengan varietas yang baik produksipun akan meningkat pula karena kita ketahui bahwa varietas lokal tidak respon terhadap pemupukan, jadi biarpun tanaman tersebut dipupuk sesuai dengan anjuran tidak akan membarikan hasil seperti yang diharapkan.

Jarak tanam : Dengan adanya jarak tanam yang baik lebih mudah dalam penyilangan, pembagian makanan ataupun pembagian sinar matahari lebih merata, juga dengan adanya penyilangan tanaman pengganggu dapat dihindari dengan sendirinya makanan dalam tanah dapat diisap oleh akar tanaman yang diusahakan saja.

Pemupukan : Dengan adanya pemupukan tanaman akan hidup baik karena akar bisa lebih panjang dan banyak tentu akan lebih banyak mengisap makanan, batang akan besar dan kokoh, daun akan hijau lebar dan panjang yang tentunya dapat berasimilasi dengan baik dan pembentukan buahpun akan baik pula.

Dapat diketahui bahwa suatu tanaman tidak hanya membutuhkan air saja dalam pertumbuhannya tetapi harus ada unsur mikro atau makro yang harus tersedia dan bila tanaman kekurangan salah satu unsur yang dibutuhkan (difisiensi) tanaman akan kurang memberikan hasil.

Faktor-faktor lain dalam panca usaha tidak boleh ditinggalkan dalam usaha pertanian untuk tercapainya produksi yang diharapkan.

CARA PEMASARAN.

Seperti yang sudah dilaporkan maka pemasaran hasil (jagung) dalam bentuk masih muda dilakukan dua cara yaitu : pembeli datang sendiri kelokasi dan petani ada yang menjual hasilnya ke pasar.

Dari data yang kami kumpulkan pada penanaman ke I, dari seluruh lokasi demplot yang ditanami hanya 1/3 saja yang terjual, untuk dapat jelasnya dapat dilihat pada lajur dibawah ini :

NÖ.	Nama petani	Luas area are.	luas ditanam are.	Juml. bulir	Dijual Rp.	Dimakan	sering.
1.	C.D. Suidale	20	15	5100	50.000	1500	2600
2.	Martinus N.	1,5	1,5	550	2.000	300	210
3.	A.W. Fangidae	30	30	11000	1200.000	2000	5000
4.	P. Fangidae	20	20	7500	1200.000	1000	2500
5.	N. Fangidae	15	15	5660	1150.000	660	2000
6.	B. Fangidae	16	16	6000	1225.000	400	1100
7.	Y. Fangidae	14	14	15400	50.000	900	3500
8.	L. Fangidae	17	15	5600	1150.000	500	2100
9.	A. Ingunau	13	13	5000	1200.000	200	800
10.	Y. Ingunau	60	60	121000	1565.000	2700	7000
11.	Dikson F.	3	3	1100	35.000	100	300
12.	Mateus F.	17	17	4000	1100.000	400	1600
13.	Soleman Ing.	20	20	7800	1150.000	800	4000
14.	Filmon F.T	76	76	130000	1750.000	6000	9000
15.	M. Jali	20	20	7600	1150.000	1000	3600
16.	K. Kiuk	6	3	1000	15.000	400	300
17.	M. Mesak	8	8	3000	1100.000	200	800
18.	Ayub F.	14	14	5000	50.000	400	3600
19.	T. Fangidae	15	15	5500	1100.000	500	3000
20.	Samuel F.T	125	125	148000	1800.000	4000	28000
21.	Y.Y Kiuk	14	10	3700	50.000	900	1800
22.	Y.T.H Kiuk	12	12	4400	1150.000	400	1000
23.	Laazar F.	23	23	9000	1200.000	1000	4000
24.	Eklopas F. I	9	9	3500	50.000	600	1900
25.	Eklopas F. II	13	13	5000	1100.000	500	2500
26.	Z.H Ingunau	17	17	6400	1100.000	1000	3400
27.	Y.G. Kiuk	10	10	3700	30.000	400	2700

Dari luas areal ± 6 Ha. menghasilkan bulir sebanyak 221.510 bulir dan ternyata hanya mendapatkan uang sebanyak Rp. 4.722.000,- sisanya dimakan sendiri maupun banyak yang kering,.

Memang jagung yang tidak terjualpun bisa untuk dimakan sendiri tetapi alangkah baiknya bila dijual dalam bentuk muda dan akan mendatangkan uang yang lebih banyak dibanding bila sudah kering.

Untuk menjadikan petani lebih produktif masalah penyuluhan harus selalu diadakan baik oleh dinas yang bersangkutan dalam hal pertanian atau dinas-dinas lain yang bisa membantu.

Penyuluhan ini tidak hanya dalam hal cara bertani saja melainkan juga masalah pemasaran tidak boleh diabaikan, karena apa gunanya bila petani bisa memperoleh hasil yang baik dan lebih dari cukup untuk dimakan sendiri tetapi kelebihan hasil banyak tersimpan dan sukar untuk dibuang kepasarannya akibatnya bila tidak baik dalam penyimpanan hasil tersebut lama-kelamaan akan rusak.

BAHAN BAKAR.

Dalam penanaman pertama, dari mulai penanaman sampai menghasilkan menghabiskan bahan bakar sebanyak 3000 liter solar atau

3000 x Rp. 242,- = Rp.726.000,-

Pelumas sebanyak 40 liter = 40 x Rp. 1000,- = Rp. 40.000,-

Pemupukan.

Pemupukan pada penanaman pertama, petani masih agak sulit untuk diajak memupuk tanamannya. Pada areal seluas \pm 6 Ha. yang rencanakan akan menghabiskan pupuk sebanyak 1560 kg. dengan catatan per hektar menghabiskan 200 kg urea dan 60 kg. TSP ternyata petani hanya menghabiskan pupuk sebanyak \pm 900 kg. terdiri dari 750 kg. Urea dan 150 kg. TSP. Pemupukan ini sebetulnya ada paksaan dari kami yaitu bila arealnya tidak dipupuk maka tidak dilayani bila petani minta air untuk tanamannya.

Pemberantasan hama.

Penyemprotan hama dengan memakai obat insektisida simithion digunakan pada areal seluas 1 ha, yaitu hanya pada areal yang terkena serangan saja dan konsentrasi yang dipakai adalah 2cc/liter. Obat yang habis terpakai = 2 liter a' Rp. 3000,- tiap liter.

Penyiangan.

Penyiangan dilakukan oleh petani sendiri dan keluarganya, sehingga tidak perlu mengeluarkan biaya untuk aktivitas ini.

Pengolahan tanah.

Seperti juga dalam penyiangan, karena dikerjakan oleh petani dan keluarganya sendiri sehingga tidak mengeluarkan biaya pula.

Beberapa masalah yang dihadapi pada penanaman pertama.

Pada waktu penanaman pertama, karena mesin pompa yang digunakan kurang siap pakai artinya mesin atau pompanya sendiri sering rusak2 yaitu pada bulan Juni, Juli dan Agustus sehingga banyak menimbulkan masalah dalam pembagian air ke petak2 pertanaman, namun adanya dedikasi yang baik dari ketua P3A dan operatornya maka hambatan itu bisa dikurangi yaitu dengan jalan menghidupkan mesin siang dan malam untuk kelangsungan hidup demplot tersebut, disamping itu petanipun masih kurang kesadarannya dalam hal bergotong royong seperti membersihkan saluran air yang akibatnya dapat menghambat jalannya air itu sendiri masuk ke petak2 pertanaman atau di dalam petak-petak tanaman itupun masih kurang kebersihannya.

Masalah ini sebenarnya tidak terjadi bila ada kerja sama antar staf P2AT bagian irigasi atau petugas penyuluh pertanian yang ada bisa

memberikan bimbingan dan penyuluhan tentang cara2 bertanam yang baik, penggunaan air secara efektif dan efisien juga dapat menyadarkan petani bahwa air yang ada ini adalah milik bersama jadi harus dikelola bersama pula. Namun penyuluhan2 seperti itu tidak pernah diadakan oleh petugas PPL yang ada.

Kalau dilihat keberhasilannya memang penanaman tahap I dengan fasilitas seperti itu memang berhasil, tetapi bila dikelola lebih baik lagi niscaya hasilnya akan lebih baik dan akan menambah kepercayaan petani bahwa air tanah yang sudah ada itu dapat menghidupi mereka.

Masih kurang berhasilnya petani dalam pemasaran jagung muda ini, karena kurangnya pengalaman seperti : dalam perkiraan mereka tanaman tersebut belum siap dipanen tetapi setelah dicoba maka sudah banyak yang tua akibatnya hasil tersebut kurang laku dipasarkan dan terpaksa dijual kering untuk disimpan atau dijual dalam bentuk pipilan yang tentunya pendapatan merekapun tidak sebaik bila dijual dalam bentuk muda (Rp.50,-/buah).

KOMENAR UMUM MENGENAI KEMAJUAN DEMPLOT.

- Banyak petani yang tadinya tidak mendukung adanya demplot sekarang menjadi mau mengikutinya setelah mereka melihat sendiri keuntungan keuntungan yang diperoleh kawan-kawannya.

Pendapatan dari menjual jagung inipun mereka bandingkan dengan apabila petani mengusahakan padi sawah maka perbedaan ini akan jauh lebih besar hasil polowijo dibanding usaha padi sawah, maka pada periode tanam berikutnya banyak petani yang mengusulkan untuk bertanam jagung kembali.

- Areal demplot yang tadinya merupakan areal kering tidak dapat ditanami, dengan adanya irigasi air tanah ini sekarang nampak menghidupkan dan mendatangkan uang yang tidak sedikit jumlahnya, maka petani diluar demplot banyak yang iri mengapa daerah mereka tidak diberi fasilitas seperti itu karena mereka juga mengalami kegagalan dalam usaha tani karena kekurangan air pada waktu musim hujan.

PENANAMAN KE II.

Laporan yang kami buat sekarang ini sebetulnya terdiri dari dua hal yaitu pada halaman 1 sampai dengan 6 adalah berkisar pada masalah2 yang ada pada penanaman pertama dan halaman 7 dan seterusnya mengenai kegiatan pada penanaman ke II.

Kegiatan penanaman ke II.

Pada penanaman ke2 sudah dimulai pada tanggal 23 September 85 seperti yang sudah kami laporkan pada laporan monitoring untuk USAID bulan September yaitu setelah melalui hasil rapat anggota P3A yang diadakan tanggal 19 September yang lalu.

Tanaman yang dipilih yaitu masih juga jagung karena harga pasornya masih baik sampai saat ini dan penanaman ini dilakukan secara bertahap dimana areal yang tanahnya sudah diolah/dikerjakan siap untuk ditanami setelah dilaporkan pada ketua regunya masing2 dan ketua regu tersebut bisa lapor pada ketua P3A maka penanaman bibit dapat dilakukan dan diberikan air.

Karena areal yang dimiliki petani demplot rata2 15 are, diambil ke - bijaksanaan bahwa areal akan diberikan air setelah mencapai luas 30 are, jadi dalam tiap tahap dapat melibatkan petani sebanyak 2-3 orang. Cara ini berguna untuk pemberian air agar supaya tiap harinya tidak melebihi kekuatan air yaitu 30 are, juga pada waktu pemasaran hasil karena ada interval waktu penanaman maka memudahkan dalam hal pemasarannya (tidak bersamaan waktunya untuk dipanen).

Dapat kami laporkan disini bahwa mesin pompa setiap hari dapat mengairi areal seluas 30 are pada tempat2 yang dekat dengan sumur dan 20 - 25 are pada tempat2 yang jauh dengan sumur.

Mesin pompa operasi dari jam 7⁰⁰ pagi sampai jam 19 malam atau 10 jam kerja setiap hari.
(dengan 2 jam istirahat)

Dari luas areal demplot 6,20 hektar, 20 are tidak ditanami karena pengolahan tanah yang tidak dapat selesai.

Alasan dipilih kembali tanaman jagung untuk usaha tani tahun ke 2. disamping harga dipasaran yang masih cukup baik saat ini juga pengolahan tanah tidak harus sebaik bila menanam tanaman lain seperti kacang tanah, kacang hijau dll. harus dibuatkan bedengan2 tetapi bila bertanam

jarum cukup mengerjakan tanahnya pada tempat2 yang akan ditanami yaitu dengan jalan membuat alur2 dengan jarak alur satu dengan alur lainnya satu meter.

Tanaman ke 2 mulai diusahakan pada bulan September dan bulan Oktober maka kegiatan bertani bila tidak cepat dilaksanakan terlalu banyak air pada bulan akhir Desember dan bulan Januari dan tentunya tanaman malahan akan mati karena terlalu banyak air dari hujan yang jatuh. Untuk memenuhi kebutuhan air dan penghematan bahan bakar, kami perkirakan bahwa pemberian air dari irigasi air tanah hanya pada bulan Oktober, Nopember dengan sedikit bantuan dari air hujan, begitu sebaliknya bila memungkinkan pada bulan Desember akan banyak memakai air hujan dan sedikit air tanah karena pada bulan Desember ini kami perkirakan akan lebih banyak jatuh hujan.

Perkiraan ini memang agak benar pada bulan Oktober/November tetapi bulan Desember ini kelihatan malahan kurang turun hujan, maka kalau memang tidak turun hujan pada pertengahan Desember terpaksa mesin pompa harus dioperasikan guna memenuhi kebutuhan air untuk tanaman yang pada bulan Desember ini sudah banyak tanaman mengeluarkan bunga. Tanaman jagung pada fase berbunga banyak membutuhkan air, bila kekurangan air pada fase ini menyebabkan kemerosotan hasil biarpun sudah dipupuk-sesuai dengan dosis yang dianjurkan.

Cara bertanam.

Pada penanaman tahap II cara bertani banyak lebih baik dari pada waktu penanaman pertama, ini karena petani banyak menimba pengalaman pada waktu penanaman pertama.

Pembuatan alur2 untuk tempat tumbuhnya tanaman sudah seperti yang kami anjurkan yaitu dengan jalan menggemburkan tanah, ini mempunyai keuntungan ialah dengan jalan menggemburkan tanah tersebut maka kelembaban tanah dapat lebih lama dipertahankan.

Karena kelembaban dapat dipertahankan lebih lama maka dapat pula menghemat dalam penggunaan bahan bakar/pelumas dan interval waktu pemberian air selama 15 hari dapat dilakukan dengan baik, disamping petugas sendiri tidak perlu harus selalu ada dilokasi untuk memecahkan masalah yang selalu timbul.

Pemupukan.

Setelah melihat keuntungan pada penanaman pertama, tidak ada masalah lagi dalam aktivitas pemupukan yaitu pemupukan dilakukan dua kali biarpun belum memakai dosis yang tepat seperti yang dianjurkan namun begitu hasil pertumbuhannya lebih baik seperti yang terlihat di lokasi demplot.

Pemupukan pertama diberikan pada waktu sebelum pemberian air ke dua yaitu 5 hari setelah tanam dan pemupukan ke2 diberikan sebelum menerima air yang ke 4 yaitu pada umur 35 hari setelah tanam. Pupuk yang habis digunakan akan kami laporkan pada laporan berikutnya yaitu setelah menghitung keuntungan dari hasil panen ke2 ini selesai.

Penyiangan.

Seperti menyiang ini, sama dengan memupuk, mengolah tanah menanam, memungut hasil, memasarkan hasil semuanya dikerjakan oleh petani sendiri beserta keluarganya.

Pekerjaan ini dilakukan pada pagi hari dan sore hari.

Pemasaran hasil.

Pada laporan ini kami buat, ada areal yang sudah dipanen dan dijual yaitu areal seluas 60 are dan 14 are.

Panen ini ditanam pada tanggal 23 September dan 27 September yang di punyai oleh dua orang petani Yusuf Ingunau dan Eklopak Fagidae. Areal pertama kepunyaan Yusuf Ingunau seluas 60 are, sementara ini sudah mendapatkan uang sebanyak Rp. 80.000,- Petani ke 2 belum dapat kami laporkan karena belum kami ambil datanya.

Cara pemasaran : Pembeli datang ke lokasi dan memetik sendiri, setelah itu baru dihitung oleh petani bersama pembeli berapa yang dipetik dan dibayar.

Uang hasil penjualan biasanya dipegang oleh petani seperti sudah terbukti sekarang ini.

Hama dan Penyakit.

Pada penanaman ke 2 ini tidak ada serangan hama dan penyakit namun ada areal seluas 1 ha. kepunyaan Samuel F. yang disem-

not dengan obat insektisida sumithion dengan konsentrasi 1,5 cc tiap satu liternya.

Penyemprotan ini dilakukan pada pagi hari dari jam 6⁰⁰ pagi sampai jam 8⁰⁰ pagi yaitu pada waktu masih banyak embun yang tujuannya agar obat bersama embun tersebut masuk di ketiak2 daun akhirnya ulat penggerak batang dapat terbasmi.

Tujuan dari dari penyemprotan ini untuk pencegahan agar ulat penggerak batang atau penggerak daun tidak menyerang tanaman.

Beberapa faktor yang menguntungkan petani demplot.

- Pada waktu panen jagung sekarang ini, belum ada daerah lain yang panen maka diharapkan hasil panen ini akan lebih banyak terjual.
- Banyak tamu-tamu penting yang datang ke lokasi demplot dengan sendirinya mereka akan merasa malu bila tanamannya tidak baik, aki 6 bat dari rasa malu ini mereka harus bertanam se-baik2nya dengan sendirinya tanpa disadari hasilpun akan meningkat pula.
- Bila kita lihat curah hujan sekarang ini mungkin petani diluar demplot banyak mengalami kegagalan dalam usaha taninya karena kekurangan air, namun petani demplot biarpun dengan luas areal yang sempit sepanjang tahun dapat mengolah lahannya karena adanya fasilitas irigasi air tanah.

Kemungkinan masalah yang dihadapi bila demplot sudah dikelola sendiri oleh organisasi P3A.

Dari catatan yang kami punyai, akan kami coba untuk menghitung berapa berapa biaya untuk membayar air irigasi dalam satu hektar juga beberapa masalah yang perlu dipikirkan mulai dari sekarang ini.

Sudah kami ketahdi bahwa dalam satu hari, mesin pompa bekerja selama 10 jam dapat mengairi areal seluas 30 are pada tempat2 yang dekat dengan sumur dan 25 are pada tempat2 yang jauh dengan sumur.

Bila 30 are diperlukan waktu selama satu hari, maka dalam satu hektar = $\frac{100}{30} \times 1 \text{ hari} = 3 \text{ hari } 3 \text{ jam atau } 33 \text{ jam.}$

Berapa waktu yang dibutuhkan untuk mengairi areal seluas 6 ha. = $3 \text{ hari } 3 \text{ jam} \times 6 = 18 \text{ hari } 18 \text{ jam atau } 20 \text{ hari kerja.}$

Maka dengan demikian jarak waktu pemberian air dari satu hektar pertama dengan satu hektar yang ke enam membutuhkan waktu yang cukup lama yaitu 20 hari ker ja atau interval waktu 15 hari kami anggap paling baik sampai saat ini, tidak dapat dilakukan. Kami coba buat pula coretan tentang berapa rupiah petani harus membayar bila sudah dikelola oleh organisasi P3A sendiri.

Kira2 pembayaran untuk tiap jam =

Bahan bakar minyak 1,5 liter/jam x Rp.242 =	Rp. 383,-
Pelumas (olie, gres)	± = Rp. 50,-
Operator dibayar per jam	± = Rp. 100,-
Jaga tirta	± = Rp. 100,-
Tabungan untuk kas P3A	= Rp. 50,-

Banyaknya pembayaran dalam satu jam = Rp. 683,-

Dalam satu musim tanam rata2 polowija diberikan 8 kali oncoran = maka petani harus membayar dalam satu hektar per satu musim tanam = 33 jam x 8 x Rp.683,-/jam = Rp. 180.312,-

Berikut ini akan kami coba untuk menghitung keuntungan petani terapa rupiah yang diterimanya dalam satu hektar, bila diusahakan tanaman jagung, kacang tanah, kacang hijau.

Jagung.

Jenis pengeluaran,

Bibit yang diperlukan = 25 kg/ha x Rp. 200,-	= Rp. 5000,-
Pupuk 260 kg/ha x Rp. 100/kg	= Rp. 26000,-
Rembayaran untuk keperluan pembelian air	= Rp.180312,-
Obat insektisida 2 liter/ha x Rp. 3000/liter	= Rp. 6000,-
Pengolahan tanah, penyiangan dll	= Rp. --

Biaya untuk sarana produksi = Rp. 217.312,-

Jagung yang didapat dengan jarak tanam 0,5 x 1 meter per hektar = $\frac{10.000}{0,5} \times 2$ pohon/lubang = 40.000 pohon.

Uang yang didapat bila dijual dalam bentuk pipilan kering =

$\frac{40.000}{8} \times \text{Rp. } 150,-/\text{kg} = 750.000,-$ Hasil bersih yang akan diperoleh = Rp. 750.000,- - Rp. 217.312,- = Rp. 532.688,-

Bila jagung tersebut dapat terjual semua dalam bentuk masih muda = (40.000 x Rp. 50) - Rp. 217.312,- = Rp. 1.782.688,-.

Kacang tanah.

Jenis pengeluaran dalam satu hektar.

Bibit 150 kg/ha x Rp. 800/kg	= Rp. 120.000,-
Pupuk 125 kg/ha x Rp. 100/kg	= Rp. 12.500,-
Pembayaran air 8 kali oncoran	= Rp. 180.312,-
Obat insektisida 2 liter/ha x Rp. 3000/liter	= Rp. 6.000,-
Pengolahan tanah, penyiangan dll.	= Rp. --

Biaya untuk sarana produksi = Rp. 318.812,-

Bila dalam satu hektar mendapatkan 900 kg. biji kacang tanah kering =
 900 x Rp. 800,- = Rp. 720.000,- dan hasil yang diperoleh =
 Rp. 720.000 - Rp. 318.812 = Rp. 401.188,-

Kacang hijau.

Jenis pengeluaran dalam satu hektar.

Bibit 25 kg x Rp. 600/kg	= Rp. 15.000,-
Pupuk 150 kg x Rp. 100/kg	= Rp. 15.000,-
Pengolahan tanah, penyiangan	= Rp. --
Pembayaran air 6 kali oncoran	= Rp. 135.234,-
Obat insektisida 2 liter x Rp. 3000/liter	= Rp. 6.000,-

Biaya untuk sarana produksi = Rp. 171.234,-

Bila dalam satu hektar mendapatkan 1 ton biji kering =
 1000 x Rp. 600,- = Rp. 600.000,- dan hasil yang diperoleh =
 Rp. 600.000 - Rp. 171.234 = Rp. 428.766,-

Usaha tani padi sawah belum bisa kami hitung berapa rupiah
 untung rugi dalam satu musim tanam karena belum pernah mencobanya.

Demikian sedikit gambaran tentang jumlah biaya yang disediakan
 untuk sarana produksi air maupun sarana produksi lainnya .

Maka bila dilihat Rp. 683,- petani harus membayar dalam tiap jam
 dan hanya dapat mengoncori 3 are lahan atau Rp. 180.312 per hektar
 dengan membutuhkan waktu 33 jam kerja, terlalu besar sarana produk
 si ini bila dibanding dengan sarana produksi lainnya yang kemung-
 kinan petani tidak kuat untuk membayar.

Demikian pula kekhawatiran ini terdapat pula dalam interval waktu
 pemberian air bahwa pergiliran waktu pemberian air ^{20 HARI} memang terlalu
 lama .

Berdasarkan pengamatan kami, bahwa interval waktu pengoncoran 20 hari, tanah sudah kering dan tanaman sudah mendekati titik layu permanen yaitu daun sudah mulai menggulung.

Kekhawatiran ini mungkin hanya berlangsung selagi saluran permanen belum selesai dibuat, umpama air sudah lewat saluran permanen dan dalam satu jam dapat memoncori lahan seluas 5 are, maka luas areal 1 ha. dapat diairi selama 2 hari kerja. Jika demikian halnya maka interval waktu pengoncoran sudah dapat dicapai, biaya sarana produksi yang dikeluarkan untuk air dalam satu Ha. = 20 jam x 8 kali oncoran x Rp. 683,- = Rp. 109.280,-

Kesimpulan.

- Bahwa untuk menjadikan petani lebih produktif diperlukan penyuluhan tentang bagaimana cara bertani yang baik dan pandai memilih pola tanam apa yang lebih banyak menguntungkan bagi mereka.
- Bahwa sumur yang sekarang kita pakai untuk demplot sebenarnya tidak mencukupi untuk areal seluas 7 hektar.
- Banyak petani diluar demplot minta supaya daerahnya juga diberi fasilitas sumur bor untuk usaha pertanian dan air minum yang pada musim kemarau banyak sumur yang kering.

S a r a n.

Dalam lapotan ini kami memberanikan diri untuk memberi saran bahwa sumur yang ada ini bisa diubah menjadi sumur produksi dengan diameter 12 inc. dengan sendirinya akan menyediakan debit yang lebih besar juga petani dalam membeli air untuk usaha tani tersebut bila dicoba untuk menghitung tidak terlalu tinggi karena pemikiran kami bahwa sumur nantinya akan dikelola oleh kelompok tani namun bila air tersebut terlalu tinggi harganya atau kurang mencukupi jika mengoncori luas areal 7 ha. biarpun diberi penyuluhan semaksimal mungkin tetapi susah berjalan bila sudah diserahkan pada organisasi kelompok Persatuan Petani Pemakai Air (P3A).

MEMO

To : Nancy H. Tumavick
Chief, Water Resources Division

Date: June 30, 1955

From : Suzanne E. Biskel *SB*
P2AT - Kupang, NTT

Subject : Weekly Log
June 23-30, 1955

1. Pump operation

In general the pump has been running well. This week, however, a bolt on the pump pulley broke (from wear). The pump operator immediately turned off the machinery and awaited our arrival (though he thought he could repair the problem himself). He and my counterpart took the pump to nearby Oesao to have the bolt re-soldered. Pak Hari preferred to take care of the problem locally rather than risk waiting several days for a P2AT mechanic to fix it.

The operator runs the pump for about 10 hours a day, 6 days a week. Since most farmers are idle on Sunday, the operator uses this day to let the pump "rest." The pump produces roughly 7-9 lps. At this early stage in the development of the demplot, the water requirement is great. It is necessary to saturate the land now because it is rock-hard and cracked due to the extraordinary shortage of rain this year. Later, as the earth begins to retain water and remain moist, pumping requirements will decrease.

The approximate monthly cost of operating the demplot pumping system at this time is:

a. solar:	Rp. 116,160	(2 liters/hour - 120 l./wk. @ Rp. 242/liter)
b. oil:	22,500	(1 5-liter can approx. every 10 days @ Rp. 7,500)
c. pump operator:	20,000	(monthly salary - though he has not been paid yet)
d. fan belts:	<u>24,000</u>	(1 set per week at most - @ Rp. 5,000/set)

Total Rp. 182,660,- per month

The actual cost of running the pumping system should be considerably less once there are permanent irrigation canals (to reduce water loss) and once a single unit pump (that does not require fan belts) is installed.

2. Farmer Participation

Approximately 80% of the demplot is now planted. The remaining parcels are being prepared for planting now. At least 50% of the planted parcels have been fertilized. The head of the PSA tries to keep a daily schedule of water distribution. For the time being, farmers are asked to request water several days in advance of the time they want it. The head of the PSA schedules distribution providing farmers can demonstrate that their land is ready for water.

One man complained to us angrily that the head of the P3A and the pump operator were monopolizing the water for themselves and their extended family. This is a potential problem because the P3A head and the pump operator are brothers, their father is the largest single demplot landowner, and a number of their close relatives own demplot land. Nevertheless, in this case, the farmer who complained was at fault. He had not dug proper irrigation channels to carry water from the main channel to his land so most of the water diverted to his land would have been lost. In addition, he wanted to have water for only 1 or 2 are of the 14 are he owns since only this portion had been prepared. The problem was resolved when we asked the head of the P3A to explain to the disgruntled man in our presence his reasons for denying water at that time. My counterpart then helped the farmer fix his irrigation channels and made certain that the head of the P3A scheduled the farmer for the first slot available.

3. Farmer interviews

I conducted interviews with 7 farmers this week. (Total number of interviews with demplot owners to date is 11, leaving 13 outstanding.) In most cases, I have conducted the interviews by myself with each farmer and his wife and/or one or two older children. My counterpart usually accompanies me to the respondent's home but stays for a few minutes only. He often spends his time advising people who are working in the demplot about agricultural matters. Comparing interviews with and without Pak Hari present, I find the latter more flexible and, consequently, more informative. Pak Hari tends to re-phrase my questions and to summarize respondents' answers as I am writing them down. This often breaks the momentum of the interview and may distort the data.

The head of the P3A accompanied me on two interviews. In principle I try to avoid having outsiders present. In these cases, however, this was not a problem. Both respondents were elderly relatives of the head of the P3A who speak very little Indonesian. The head of the P3A served as interpreter from and into Rotinese as necessary. Given my familiarity with life in Pukdale at this point, I usually can discern when information people offer is incomplete or inaccurate (or, in these cases, when the head of the P3A altered the respondents' answers). I rephrase questions and approach problematic issues from different perspectives throughout the interview in order to obtain the necessary data.

It is clear from the interviews and informal discussions in Pukdale that the P2AT pump is especially welcome this year. Many farmers did not bother to plant rice at all this year because of the lack of rain. Those who did plant put in 50% or less than usual. Many harvests were lost altogether, and almost every household is or will be compelled to purchase rice for home consumption. In some cases, farmers who harvested rice this year are selling it in order to buy greater quantities of cheaper rice for household consumption. Rice purchased from the government warehouse in Kupang (Dulog) is about Rp. 275/kg. while they can sell their rice harvest for a minimum of Rp. 400/kg.

Almost every day someone from another part of Pukdale confronts us about digging wells to irrigate their property. They often ask why one area is treated so favorably. My counterpart usually tells them to be patient but is careful never to promise anything.

cc: D. Putman, ARD/WRD
A. Newman, ARD/WRD

MONTHLY REPORT - #2

June, 1985

Suzanne E. Siskel, P2AT - Kupang, NTT 

Summary of principal activities and progress to date:

- 1) Minor repairs to the pumping system have made it run more smoothly and steadily, producing between 5-6 liters per second and running for 10 to 15 hours a day.
- 2) Farmer participation has increased steadily. Rehabilitation of the demplot begun in May - fencing, cleaning out irrigation canals, and clearing the land - was completed by cooperative labor. 80% of the demplot is now planted (mainly in corn).
- 3) Instruction and advice on planting methods, fertilizer, irrigation, etc. was provided on a limited scale by the local agricultural extension workers (PPM and PPL) and on a daily basis by my counterpart.
- 4) Comprehensive interviews regarding socio-economic issues have been conducted with half of the demonstration plot landholders.

1. Procedural matters

During the first week of the month my counterpart, Hari Soewito, reported to the provincial SosPol authorities that I am working as a consultant with P2AT. The SosPol office provided a letter of permission for me to hold this position for the term of my contract (through April, 1986).

My counterpart and I go to Pukdale almost every day. Both of us are concerned with monitoring the pumping system and farmers' activities. Pak Hari also discusses agricultural problems and methods with farmers who are working in the demplot, while I interview other farmers in their homes. We have developed good rapport with the farmers and the village administration. Because we are in Pukdale so much, we learn of problems rather quickly (and can anticipate potential ones before they become very serious). Whenever possible, my counterpart tries to resolve problems on the spot.

For technical matters and material, however, this is not always possible due to bureaucratic delays. There are at least 3 reasons for difficulties:

- 1) P2AT is understaffed and the personnel are often busy with a number of projects other than the Pukdale demplot.
- 2) The bureaucratic procedure for obtaining fuel, spare parts, documents, etc. involves approval from a number of people. The absence of one individual can interrupt the process for some time. (One example of bureaucratic delay is the salary of the pump operator. He has worked a minimum of 10 hours a day for nearly 2 months but has not received any salary yet. The necessary documents were submitted after the operator had worked for about 2 weeks, but they are still being processed.)
- 3) There is no back-up pumping system at the demplot. People depend entirely upon the P2AT pump for irrigation water. If it is broken, farmers' crops are jeopardized.

2. Status of the pumping system

Two improvements were made this month that increased considerably the pump's effectiveness. Metal pipe was installed to carry water from the pump to the highest sections of the demplot. The pipes made it possible to channel water to at least 1 hectare of the demplot that had not received any water prior to that time.



Also, the narrow fan belts that had been used to connect the pulleys of the motor and pump were replaced with thicker, wider belts. The ones in use now are still too small, but are more appropriate than the originals. These fan belts enable the pump to produce about 10 liters per second at full power (about twice the amount produced with the smaller fan belts). To spare the motor, however, the pump operator has not been pushing it to full capacity. Rather, the pump runs at about 5-6 liters per second.

The water requirement for the demplot is considerable because the land is rock-hard and cracked due to the lack of rain this year and because there is much water loss due to evaporation and percolation in the irrigation channels. The current cost of running the pump at this time, then, is probably somewhat higher than it will be after permanent irrigation channels are installed (to reduce water loss) and once there is a single unit pump (and the problem of pulleys and fan belts is eliminated).

At this time, the approximate cost of operating the demplot pumping system is:

a. solar:	Rp. 116.160	(2 ltr./hr. -- 120 l./wk. @Rp. 242/l.)
b. oil:	22.500	(1 4-ltr. can approx. every 10 days @ Rp. 7.500)
c. pump operator:	20.000	(monthly salary)
d. fan belts:	22.500	(3 sets per month at most - @ Rp. 7.500)

Total
Rp. 181.160,- per month

3. Farmer participation

All the farmers who own land in the demplot have done some work on their land. About 80% of the land has been planted already and nearly half has been fertilized as well. The farmers' efforts are especially impressive for at least three reasons:

1) During these dry season months farmers are busy with other tasks such as tending their cattle (kept as far as several kilometers from their homes) and almost weekly cooperative community labor projects in which adult men are required to participate.

2) Farmers were very skeptical initially about the chances of the pumping system actually working well enough to provide adequate irrigation for their crops (due to the early difficulties with the pump).

3) The farmers have to front their own money to buy seeds to plant, fertilizer, and insecticide. For some people this is a hardship because they had no rice crop (a major source of income and subsistence for almost all demplot farmers) due to the lack of rain this year.

Many of the demplot farmers and their children participated in cooperative efforts to finish the rehabilitation of the demplot begun the previous month. There remained some irrigation channels to be cleaned out, several hundred meters of fence to close the fields to livestock, and the installation of metal pipes to carry water from the pump to the highest portions of the demplot. All of these tasks were accomplished by the end of the month. One incentive to complete this work was the filming of the demplot (among other P.U. projects in NTT) by TVRI on June 15. People in Pukdale were pleased by this recognition of their work on the demplot but disappointed that no one was interviewed for television and that they never learned when or if the footage of Pukdale was broadcast.

4. Agricultural extension activities

There were meetings of the PJA held on June 8 and 13 with the agricultural extension worker assigned to Pukdale (PUL) and the regional coordinator (PPH), both of whom are based at the Naibonat agricultural extension center (BPP - Balai Penyuluhan Pertanian of Dinas Pertanian). Only about half of the farmers attended the first meeting since most people were busy in other

parts of the village tending their cattle and gardens. The head of the P3A rescheduled the meeting for 5 days later and the kepala desa angrily ordered all P3A members to attend. The PPM discussed the relative merits of various possible crops for the demplot (i.e., watermelon, corn, and various other vegetables). He stressed the importance of trying crops that would bring the most profit with the least amount of risk. Competition from vegetable growers in neighboring areas and the difficulties and expense of marketing watermelon make these crops less attractive than corn.

The PPM suggested that the farmers plant corn at fixed intervals of 1/2 m. x 3/4 m. that follow the contour of the land rather than use the local "matahari" system. That system involves planting corn at intervals of 1 m. x 1/2 m. in lines running directly east to west. This system is thought to maximize the amount of sunlight that strikes the plants. According to the PPM and to Pak Hari, however, that method is unnecessary in an area of intense sunlight such as this. The PPM and PPI walked through some of the farmers' fields to demonstrate the method, but they have not followed up this orientation meeting with subsequent visits to the demplot. On the other hand, Pak Hari has been providing almost daily agricultural advice and assistance to the demplot farmers.

The PPI had offered to find a source of corn seed and fertilizer from which the demplot farmers could purchase necessary supplies. He never fulfilled this offer, however. Most of the farmers have been able to find a local source for corn seed. Fertilizer presents a bigger problem because the cooperative (KUD) in Naibonat where Pukdale farmers purchased supplies in the past has been closed for some time. Now farmers must go to Oesao or Kupang to buy fertilizer and insecticide from retail stores and pay for transport back to the village.

5. Data collection

As of 30 June I have conducted comprehensive interviews with 11 of the 24 demplot farmers. The interviews usually last a minimum of 2 hours and in most cases have involved the farmer himself, his wife and/or one or more of his teenaged or adult children. Most of the time I conduct these interviews by myself while my counterpart talks with other farmers as they work in their fields. The head of the local P3A has accompanied me on interviews with 2 elderly respondents whose ability to speak bahasa Indonesia is limited. At certain points in the discussion, the head of the P3A served as translator from and into Rotinese.

It is clear from the interviews and informal discussions in Pukdale that the P2AT pump is especially welcome this year because of the lack of rain. Those who did plant put in 50-75% less than usual. Many harvests were lost altogether, and almost every household is (or will be) compelled to purchase rice for home consumption. In some cases, farmers who harvested rice this year are selling it in order to buy greater quantities of cheaper rice for consumption. Rice purchased from the government warehouse in Kupang (Dulog) is about Rp. 275/kg., while farmers can sell their rice harvest for Rp. 400/kg. or more.

6. Plans for July

The primary focus of my attention during the coming month will be the completion of interviews with all demplot farmers. In addition, I will continue to monitor the progress of the demplot crops, P3A activities, general socio-economic issues relating to the demplot, etc.

Pak Hari will continue overseeing pump operations and agricultural activities. He is especially concerned with increasing the amount of water supplied to the demplot. He also will work with the administration of the P3A and with the pump operator to regulate the flow of water to each demplot parcel in a the most equitable and efficient manner possible.

All the demplot farmers should have planted and fertilized once by the end of July. Those 3 or 4 farmers who planted in early June should be ready to harvest their corn in early to mid-August.

cc: Hs. H. Tunavick, Chief, WRD-USAID ✓
 Mr. A. Newman ARD/WRD - USAID
 Dr. D. Putman ARD/WRD - USAID

Ir. Hartono, Kepala Pengairan, DPU-NTT
 Ir. Basuki L., Pemimpin P2AT-NTT
 Sdr. Hari S. P2AT-NTT

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MEMO

To : Ms. Nancy M. Tumavick
Chief, Water Resources Division

Date : July 8, 1985

From : Suzanne E. Siskel
P2AT - Kupang, NTT

Subject : Weekly Log
June 30 - July 6, 1985

1. Pump operation

Due to the previous week's problem of a bolt on the pump pulley breaking off, the fan belts that drive the pulley were damaged and tore apart on Saturday night (29 June) after we had left Pukdale. (We had suspected this would happen, but hoped not so quickly. P2AT did not have any extra fan belts in stock and the local retail supplier had none available on Saturday morning when we checked there on our way to Pukdale.) We did not learn of the problem with the broken fan belts until Monday morning when we arrived in Pukdale and it was not until that night that Pak Hari could locate new fan belts and install them. Thus, there were 48 hours during which the pump was stopped unexpectedly. There were a number of very angry farmers who had been scheduled to receive water during that time.

The morning after the fan belts had been replaced the pump was stopped again. The operator had tried to prime it with 30 or more buckets of water to no avail. The problem was a leak in the valve at the submerged end of the pipe. To avoid waiting for hours or days for P2AT mechanics to fix the valve, Pak Hari asked farmers who were at the demplot to help pull up the pipe so that he could fix it on the spot. They had no tools to take the lengths of pipe apart as they drew it up, so all 16 or so meters of the pipe had to be pulled up in one piece. This was a dangerous feat given the weight of the pipe and the strong wind that caused the pipe to sway precariously over the pump shed to which it had been lashed for support. The valve was repaired make-shift fashion with a new rubber washer made out of an old inner-tube and glued onto the inner section of the (badly rusting) valve. Since this repair was completed, the pump has run almost non-stop all week.

2. Farmer participation

At any given time there are at least 5-10 people (young and old men and women) working in the demplot planting, weeding, or fertilizing their corn, as well as 1 or 2 men still breaking up their land in preparation for planting. Pak Hari told the head of the P3A that water should be provided first only to those parcels of land that have been planted in order to insure that the corn does not die. Fortunately, much of the unplanted land belongs to the father of the pump operator and head of the P3A so he understands the water shortage problem. There had been a meeting of the P3A scheduled for Tuesday (July 2) but it failed to take place due to the funeral of a Pukdale man that almost all the farmers attended. At this meeting Pak Hari had hoped to explain the water shortage problem and clarify the system of water distribution. Instead, he ended up staying at the demplot all night for 2 nights in order to regulate water distribution and to explain it to the farmers one by one.

Last month when people began to plant corn, Pak Hari was anxious to get the demplot started. He instructed the pump operator to provide water for people who requested it and could demonstrate that their land was ready for it. While this facilitated rapid planting in some parts of the demplot, it did not foster the development of an efficient and equitable distribution system. Though the P2AT meeting was not rescheduled, Pak Hari has managed to talk to most of the farmers about water distribution and has help the head of the P3A and pump operator to organize distribution by P3A sub-group.

This week for the first time since the water users' association was organized, there have been serious problems between the P3A leadership and other demplot farmers. While the issues involved were legitimate, the problems were exacerbated by the emotional and physical state of the head of the P3A and the pump operator. Both men have been spending virtually all their time - day and night - in the demplot keeping the pump going and channeling water to the scheduled recipients. This involves shoveling dirt to break down and then rebuild barriers from one irrigation channel to another. In addition, they usually help other farmers plant, weed, break up soil, etc. Problems arose when the head of the P3A asked one of the farmers to finish about 18 meters of fencing that had not been completed on his land and was the last unfenced section of the demplot. This man, already disgruntled about not having water from the pump when he wanted it, became enraged at the head of the P3A and acted as if he were going to strike him. Instead, the head of the P3A struck the farmer. Apparently the two men then resolved the problem between themselves (and the head of the P3A ended up putting in the fence himself). Nonetheless, the farmer's family viewed the incident as an affront to them as well as to their relative. Pak Hari has spoken to the most vociferous members of this family and, gradually, their anger has subsided. We suspect that this fracas is part of an ongoing series of feuds and rivalries. (Virtually all the people involved in the demplot are related to one another by blood and/or intermarriage, and the background to disputes like the one described here is very complex.)

3. Meetings at P2AT

On Monday (1 July) Ir. Basuki and I discussed the problem of water supply at the demplot. The output from the pump is enough only if the pump runs at full capacity for most of the day and night. Not only does this tax the motor and use much fuel, it also puts a great strain on the pump operator. (Theoretically the supply of diesel fuel should not be a problem - Ir. Basuki approves whatever amount is necessary. The problem is that it is dispensed by the P2AT staff in small amounts - from 20 to 80 liters - which is only enough for a few days given fuel consumption of about 2 liters/hour.) Ir. Basuki plans to drill at least 1 and up to 7 more wells within demplot boundaries. P2AT plans to solicit tenders within a week for a package that includes drilling, construction of permanent irrigation channels and pump shed, and purchase of additional pumps.

Ir. Basuki, Pak Hari, and I met briefly with Kepala Pengairan, Ir. Hartono, to report on progress to date at the demplot. He seemed most interested in the farmers' attitude about the demplot and about the extent of their participation in the project. He also asked me to provide him with bi-monthly reports about farmer activities. (In fact he receives a copy of the monthly report I send to your office. Beginning with the June report I am providing a detailed summary in Indonesian for him, Ir. Basuki, and Pak Hari.)

On Saturday (July 6) Totok Rudjito, Pemimpin Subproyek Irigasi, discussed the placement of additional bores in the demplot. We agreed that there is no need for more than 2 additional wells on this site, and that further drilling should be done in other parts of the village where agricultural potential and need are equally great. We also discussed the possibility of borrowing the WIO well until the new P2AT wells are finished. My advice, as always when this question comes up, was to discuss it first with WIO and Dinas Kesehatan. Apparently, Abadi Putra, Pimpinan Subproyek Peralatan Mekanik/Pemboran, telephoned Mr. Gupta of WIO about this matter. Mr. Gupta agreed in principle that P2AT could use the WIO well temporarily provided they first had the permission of Dinas Kesehatan (the owner). I do not know when (or whether) P2AT actually will seek this permission.

4. Farmer interviews

To date I have completed 14 interviews. I was able to conduct only 3 this week because almost everyone was involved in their fellow villager's funeral, in cooperative labor activities (fixing a road and building the village meeting hall) and in tending cattle that are kept far from the farmers' homes.

cc: D. Putman, ARD/WRD
A. Newman, ARD/WRD

MEMO

To : Ms. Nancy M. Tumavick
Chief, Water Resources Division

Date : July 14, 1985

From : Suzanne E. Siskel
P2AT - Kupang, NTT

Subject : Weekly Log
July 7-13, 1985

1. Pump operation

There have been no mechanical problems this week. There continues to be a shortage of water, however. The pump has been running between 15 and 23 hours a day and producing about 6 liters/second. There remains about $\frac{1}{2}$ hectare that has received no water at all. (Because the land is so dry it must be flooded once. This softens the earth and makes it easier to prepare the land for planting.) Given the distance from the pump to this unplanted $\frac{1}{2}$ hectare, it will take at least 2 hours for the water to reach the area and then another 3 hours or more to flood it. The owner of most of this land, father of the head of the P3A and pump operator, is sympathetic to the situation. He volunteered to forgo planting this time, but Pak Hari insists that this is not necessary. As soon as all newly planted and newly fertilized corn has received adequate water the unplanted $\frac{1}{2}$ hectare will be flooded. Each planted section of the demplot is scheduled to receive water every 15 days after the first irrigation.

To ease the water shortage temporarily, Ir. Basuki arranged this week to put a pump on the WIO well. Since there were no pumps available in P2AT's storage, an electric (generator-powered) submersible pump was borrowed from a local construction firm. It is being installed today.

2. Farmer participation

Another farmer has joined the demplot. He has about 10 are. This brings the total number of landowners to 25, but there are many more than just those men involved in the demplot. Most of these men are assisted by their wife, children, and siblings. There are 19 demplot owners between the ages of 55 and 80. All of these men are active (tending their cattle, gardens, and planted fields); but many of the oldest ones rely on their sons to do most of the work on the demplot land. Since many of the sons have their own separate homes, this adds at least 10 households that will partake directly of the demplot corn harvest.

3. Farmer interviews

I have completed 20 interviews. I hope to be able to arrange to do the remaining 5 within the next 2 weeks. The remaining farmers in the survey (with the exception of the kepala desa) spend little time in the vicinity of the demplot. These men live most of the time in reed and thatch houses in the areas where they keep their cattle and have gardens (several kilometers from their family homes). The usual pattern is to return to their family home on Saturday evening, go to church Sunday morning, and return to their cattle and gardens on Sunday afternoon.

During the interviews, most of the farmers ask me about getting more wells to serve their land in Pukdale and Oesau. Some of them also complain about inequities they perceive in the distribution of water at the demplot. This week, however, there was a new problem. A farmer who owns the land on which the P2AT well was drilled is upset about the amount of land being

used for the project. His primary grievances are:

1) The kepala desa and head of the P3A are forcing him to give up more land for the pump shed than the amount to which he originally agreed. As it is, nearly half of his 12 are property is used for the temporary pump shed, irrigation channel, and the strip of land used to bring vehicles up to the shed. Now that there are plans to build a permanent shed, more land is required. The head of the P3A told him he must agree to provide it.

2) The irrigation channel leading from the pump bisects his property, though he had requested that this channel be dug along the boundary of his and the adjacent property.

Several other demplot farmers told me that this man is not reliable. Irregardless of that, his complaint raises the important issue of how land is (or should be) acquired for projects such as this demplot and what is the status of this land after a well is dug. According to Pak Basuki, before the demplot was established he told the kepala desa that he would not set up a demplot in Pukdale unless the village could provided the land for the pumping facilities. P2AT would not buy the land or pay any indemnification. The kepala desa said there was no problem - the land was free - so Pak Basuki assumed that there would be no future difficulties in using the land. (It is not clear whether or not the current land question will become a major problem. It seems unlikely that the farmer involved will garner much support since he is not a member of the principal extended families that own demplot land and since he spends virtually all of his time in his garden, several kilometers from the demplot area.)

cc: D. Putman, ARD/WRD
A. Newman, ARD/WRD

MEMO

To : Nancy M. Tumavick
Chief, Water Resources Division

Date : July 26, 1985

From : Suzanne E. Siskel
P2AT - Kupang, NTT

Subject : Weekly Log
July 14-20, 1985

1. Pump operation

On Sunday (July 14) a generator-powered submersible pump was installed in the WHO well. This is a used one, borrowed from Waskita Karya until P2AT drills another 1 or 2 wells on demplot land and provides new pumps. The newly installed pump produces only about 5 liters/second and uses about 3½ liters of diesel fuel per hour. (Compare with the other pump's output of about 6 liters/second and fuel requirement of 2 liters/hour.) While Ir. Basuki and other P2AT staff acknowledge the inefficiency of the entire system, they say that cost effectiveness is a secondary concern at this stage in the demplot's development. The most important issue is the farmers' interest in planting food crops and making full use of the new irrigation system.

P2AT released 2 200-liter drums of diesel fuel for the demplot this week. Pak Hari delivered 1 of them to the home of the pump operator in Pukdale; the other he will store in Kupang until needed. If there is too much fuel stored in the village, Pak Hari suspects that people might try to "horrow" some of it.

As long as the pump operator has been responsible for fuel there has been no apparent exploitation of the fuel supply. Pak Hari's record of the amount of fuel delivered to the demplot corresponds to the operator's verbal reports about daily usage and to our own observations. The written record of fuel usage is less reliable, however. This is more likely due to the pump operator's inefficient bookkeeping than to dishonesty. He often forgets to fill in the precise starting and ending times of daily pump operation, so he has to go back and fill in rough estimates of operating time several days later. This is as much P2AT's fault as his. He was provided with a blank notebook in which he was told to keep a record of pump operations. Having never done this sort of bookkeeping before he does not know how to do so properly; and, perhaps, does not understand its importance. Pak Hari recognizes this problem and says he will help the operator devise a more reliable reporting system.

2. Farmer participation

Now that there is more water being supplied to the demplot, farmers who had complained about being short-changed seem less apt to do so. Rather than complaining about the pump operator or the leadership of the P2A, they seem to be more tolerant of the fact that the pumping system is still temporary. Pak Hari tells them repeatedly that water distribution will be more equitable and regular as soon as the permanent installations are made.

This has been a relatively quiet week in terms of farming activity because almost all the demplot households have been involved in the wedding of the son of one of the demplot landowners. The bridewealth required was 16 head of cattle and over Rp.200,000. This was accumulated by soliciting contributions from brothers and other close relatives of the groom's father, most of them demplot landowners. (The local government has set a limit for

bridewealth of Rp.350,000 or 9 head of cattle, but this is not always honored.) The families spent most of the week constructing temporary shelters for the wedding receptions at the bride's and groom's homes; arranging food; receiving guests from other parts of Timor, Rote, and Java; and so on. Farmers who were involved in these activities told us that after the wedding festivities were over they would return to fertilizing their corn, weeding, etc.

3. Farmer interviews

I conducted 1 more interview this week, bringing the total to 21 out of 25. Another interview had been scheduled but the respondent cancelled our appointment when his son became ill and had to be hospitalized. I hope to conduct that interview (and as many of the outstanding ones as possible) next week.

cc: D. Putman, ARD/WRD
A. Newman, ARD/WRD

MEMO

To : Nancy M. Tumavick
Chief, Water Resources Division

Date : July 28, 1985

From : Suzanne E. Siskel
P2AT - Kupang, NTT

Subject : Weekly Log
July 21-27, 1985

1. Pump operation

The pumps on the P2AT and WHO wells ran steadily from 8 to 24 hours each day. The only operational problem was that air got into the fuel line of the generator at the WHO well and the motor would not start. The pump operator was able to diagnose and fix the problem before we arrived at the demplot.

The pump on the WHO well has a more symbolic than concrete function at this point, given its low output and high fuel consumption (output - 5 liters/second; fuel required - $3\frac{1}{2}$ liters/hour). This being the case, Pak Hari wants to install a more cost-efficient machine there. Apparently the only one available at P2AT is a broken centrifugal pump (output capacity - 12 liters/second). It requires about Rp.50.000 worth of repair. If Pak Hari can arrange to fix and install this pump, he then will have the pump and motor removed from the P2AT well temporarily in order to fix or replace their respective pulleys so that they are uniform in size. This should reduce the problem of stress on the fan belts. (As it is, one or more of the fan belts break each week and must be replaced. The price of a fan belt is Rp. 2.500 to 3.500 depending upon which store has them in stock.) It is not clear how long it will take for these improvements to be completed.

P2AT recently solicited tenders for the construction work that is planned at the demplot. According to Ir. Basuki, within a month or two a local private construction firm will begin to install permanent irrigation channels and pump shed as well as supply new pumps for the demplot. At the same time P2AT and Waskita Karya will drill one or more wells within the demplot and drill others elsewhere in the Pukdale area (8 in all). Since it is not clear how long it will be before this work begins, Pak Hari is hoping that the work on the temporary pumping system described in the preceding paragraph can be accomplished quickly to increase the current pumping capacity.

2. P2AT

P2AT has moved to its new headquarters in the newly developing Kelapa Lima section of Kupang (very near the large hotel that is under construction). Electricity was just installed, but telephone service will not be available for months. A mess, driveway, and other parts of the complex have not been completed yet.

P2AT had been occupying part of the P3SA complex. This week the P3SA staff members who had been sent by CIDA to study in Canada began returning to Kupang. The first Canadian consultants are expected to arrive here in August.

Ir. Basuki has written to Ir. Koesdaryono in Jakarta to suggest he visit NTT in September when most of the demplot farmers will be harvesting their corn. (I was told several months ago that the P.U. Minister would be coming out here in August, but it appears that this is not the case.) As far as I know Ir. Koesdaryono has not informed P2AT about the dates of his visit.

3. Farmer interviews:

I have completed all but one interview with demplot landowners. The last one must be postponed. This farmer's son is dying as a result of having been poisoned. Interestingly, other people told us that this took place in Kupang and is a case of "black magic"

One of the two interviews I conducted this past week involved two men who had been listed individually as demplot landowners. In fact, they are father and son. The son does not own any land or livestock of his own. Though an adult, he lives with his parents and is unmarried. He and his father were surprised that the P3A roster listed them separately since the son is regarded as a dependent of his father. I interviewed them together and will count them as one rather than two demplot landowners. This is consistent with several other similar cases. This makes the total number of landowners 24.

With regard to land tenure in Pukdale, there are 2 major categories of land that farmers mention:

1) tanah warisan or pusaka (also referred to as tanah milik sendiri): land owned outright by the farmer that was inherited (usually from his father). Many of the demplot farmers have 1 to 4 hectares of inherited (sawah) land in the village of Oesao. Note that Pukdale and Oesao were part of a single desa administration until the mid-60's when Pukdale became a separate administrative unit. (You may recall from your visit to Pukdale that there is considerable flat land on either side of the road as you approach the entrance to the village. Some of the land on the south side of the road - on the right as you go toward Pukdale - is owned by demplot farmers and other Pukdale residents. Apparently P2AT has dug a few unsuccessful exploratory wells in this area.)

2) tanah usaha sendiri: meaning, in general, any land worked by the farmer. In fact, people use this to refer to land they have acquired on their own either through purchase from another individual or through a grant from the government. I have encountered only a few examples of land purchases and the arrangements were idiosyncratic (i.e., exchange of 3 or 4 head of cattle for a hectare; Rp50 paid in the early 60's for a hectare). More common is land provided by the government. In some parts of Pukdale, including the demplot, open (unfarmed) village land was divided into plots ranging from 1/10 to 1/2 hectare and granted to farmers so that they could turn it into sawah. (The majority of farmers in our survey have about 1/2 ha. in the demplot that was granted to them in the late 60's by the former kepala desa who wanted to develop the rice production potential in the area.)

Elsewhere in Pukdale, plots of 1/2 hectare or more have been granted temporarily to farmers who agree to clear (and cultivate) them. After 1 or 2 seasons, the farmers can move on to work other uncleared village land. Some of the demplot farmers told me that until 2 or 3 years ago they grew rice on village land through this arrangement, but rainfall and surface water have been too scarce since then to do so.

Many farmers also have small gardens in wooded areas near a small river that runs through the village. Whether people have outright ownership or longterm usufruct is not a major issue. Their having planted banana, kapok, coconut and other trees and their cultivating vegetables on this land gives them de facto right to it as long as they maintain their gardens. Some people also keep livestock (mainly cattle and goats) in these areas.

According to village records, the total area of Pukdale is 5600 hectares (7 x 8 km.). This figure includes rivers and roads that run through Pukdale and occupy about 600 hectares. The remaining land within the village is broken down roughly as follows:

Privately owned -

tanah perkampungan	212
tanah pertanian	202
kebun campuran	65

Village owned-

alang2/padang rumput	4,414
tanah bangunan	100
tanah penggunaan lain2	8

Total 5,001 hectares

There is no official data regarding the total amount of land cultivated (mainly in rice) each year. According to village administrators and farmers, though, no more than half of the private land (tanah per-tanian) and a negligible amount (under 100 ha.) of village land (padang rumput) has been planted for the past few years due to the water shortage. At least half of the rice planted died due to insufficient irrigation and, to a lesser extent, to infestation with plant hoppers (wereng) and other pests.

cc: D. Putman ARD/WRD
A. Newman ARD/WRD

MONTHLY REPORT - #3

July, 1985

Suzanne E. Siskel, P2AT - Kupang, NTT

Summary of principal activities and progress to date

1) P2AT has added a second pump at the demplot - a submersible pump borrowed from Waskita Karya - and installed it in the WHO well. This is a temporary expedient until P2AT drills additional wells to supplement the demplot water supply. The combined output of the two pumps is 11 liters per second and diesel fuel use is 5 1/2 liters per hour.

2) A new farmer who has 1/10 hectare on the northwestern fringe of the demplot has joined the P3A. He and all the other demplot farmers have finished planting their corn.

3) To date, baseline data regarding socio-economic and agricultural matters has been collected in comprehensive interviews with 23 of the 24 demplot farmers.

4) P2AT has moved its offices from the P3SA complex on Jl. Lalamentik to the newly developing Kelapa Lima area on the southern edge of Kupang. The new headquarters are not fully completed and there is no telephone service to this area yet. The move coincided with the return to Kupang of the P3SA personnel who had been sent by CIDA to study for a year in Canada.

Status of the pumping system

Pump operation at the P2AT well was interrupted for about 48 hours during the first week of the month because 1) fan belts broke and there were no replacements readily available at P2AT or in stores in Kupang; and 2) there was a leak in the valve at the submerged end of the pipe. Hari Suwito fixed the valve make-shift fashion with the assistance of demplot farmers. The pump has run smoothly ever since.

The primary problem with the pumping system is that its output is insufficient to supply the entire demplot satisfactorily. The pump has been operating between 15 and 23 hours a day and producing about 6 liters per second. There was, until the last week of the month, about 1/2 ha. that had received no water at all. (Because the land is so dry it must be flooded once. This softens the earth and makes it easier to prepare the land for planting.) Given the poor condition of the irrigation canals and the distance (about 300 m.) from the pump to this unplanted 1/2 ha., it takes over 2 hours for the water to reach the area and then at least another 3 hours to flood it. The owner of this land, who is the father of

the head of the P3A and the pump operator, is sympathetic to the situation and had volunteered to forgo planting. Pak Hari, however, insisted that this was unnecessary. After all the newly planted and newly fertilized corn in the rest of the demplot received adequate water, the unplanted section was flooded so that the landowner could begin preparing and planting it.

In order to ease the water shortage temporarily, P2AT is borrowing the WHO drinking water well that is located at the southern edge of the demplot. Because there were no spare pumps readily available at P2AT, a submersible pump was borrowed from Waskita Karya. It was installed at the end of the month. This pump is considerably less efficient than the centrifugal pump used at the P2AT well. It produces 5 liters per second and its generator uses 3 1/2 liters of diesel fuel per hour. (The other pump produces 6 ltr/second and consumes fuel at a rate of 2 ltr/hour.) Pak Hari hopes that a broken centrifugal pump in storage at P2AT can be repaired soon and installed at the WHO well instead.

Farmer participation

Usually there are at least 5 to 10 people (landowners themselves, their siblings, wives, and children) working in the demplot during the day. There are 19 demplot owners between the ages of 55 and 80. All of these men are active (tending their cattle, gardens, and planted fields); but the oldest ones rely on their sons to do most of the work on the demplot land. Since many of the sons have their own homes and families. This adds at least 10 households that will partake directly of the demplot corn harvest, bringing the total to 34.

Nearly all of the demplot farmers have complained to Pak Hari and me about their land not receiving enough water. In fact, this is more of a problem for the head of the P3A, the pump operator, and Pak Hari who spend 8 to 23 hours a day at the demplot to see that water is distributed as equitably as possible to all the farmers. In part, the farmers' complaint about the water supply stems from their reluctance to believe that corn does not need much water. (This is their first experience with irrigated palawija.) Pak Hari has scheduled water distribution to each plot at 15 day intervals with an additional supply made available within 1 or 2 days of the application of fertilizer. This should be sufficient.

The other reason for farmers' complaints was eliminated when P2AT installed a pump on the WHO well, even though the additional amount of water supplied to the demplot is small. Farmers had been resentful that this well was being used exclusively by the father of the kepala desa who owns the land on which the well is located. He had purchased a kerosene-powered Honda pump to insure a steady supply of water for

his own land (.6 ha.) but had not shared the water with other farmers.

There have been no formal meetings of the P3A. One that had been scheduled for the first week of the month failed to take place due to the funeral of a Pukdale man that almost all the farmers attended. At this meeting Pak Hari had hoped to explain the water shortage problem, to clarify the system of water distribution, and to discuss agricultural matters. (The PPM and PPL - agricultural extension workers - who attended the last P3A meeting have not returned to the demplot to advise or guide the farmers despite their stated intention to do so.) The P3A meeting was not rescheduled so Pak Hari has been discussing these matters with the farmers individually as they work in the demplot.

Plans for August

I will continue to monitor P3A activities, farmer participation in the demplot, socio-economic issues relating to the demplot, and so on as in the preceding months. At least one of the demplot farmers should begin to harvest his corn by the end of the month, at which time I will begin collecting data on harvest yields, marketing, consumption, etc. In addition, I hope to finish collection of baseline socio-economic data regarding all demplot households.

During the week of August 19-24 I will be in Malang to teach an intensive social sciences course at the Pusat Ilmu-Ilmu Sosial of Universitas Brawijaya. In my absence, Hari Suwito will provide a weekly log to WRD. I have prepared a form that I suggest he follow in writing this report (see attached). We will experiment with this reporting procedure during my brief absence in August. If necessary, we can improve it prior to my departure for home leave (late September through early November) during which time Pak Hari will take over the responsibility of reporting on demplot activities.

cc: Ms. N. Tumavick, Chief, WRD-USAID
 Mr. A. Newman, WRD/WRD
 Dr. D. Putman, ARD/WRD
 Ir. Hartono, Kepala Pengairan, DPU-NTT
 Ir. Basuki, Ass. Teknik, P2AT-NTT
 Sdr. Hari Suwito, Staf P2AT-NTT

MEMO

TO: Nancy M. Tumavick
Chief, Water Resources Division

FROM: Suzanne E. Siskel
P2AT - Kupang, NTT

DATE: August 4, 1985

SUBJECT: Weekly Log
July 28 - August 3, 1985

Pump operation

There has been no change in the pump operations this week. P2AT continues to borrow the WHO well and still has a submersible pump in use there. This pump is very inefficient, so it is used only to provide water for about 1/2 ha. of land that lies around it.

Plans for additional and permanent facilities

According to Ir. Basuki and Totok Rudjito (head of P2AT's irrigation division), the water shortage situation will improve within a few weeks. The contract for purchasing new pumps for the demplot, digging new wells and installing permanent facilities has been approved and signed by Ir. Hartono so work should begin within a month. Recognizing the urgent need to increase the current water supply to the demplot, Ir. Basuki has requested that a new pump be installed in the existing P2AT well even before a permanent shed is built. Theoretically, at least, its debit should be 12 liters/second which will be more than the combined output of the two pumps now in use at the demplot.

- Pak Totok solicited my advice on where it would be best to situate an additional well at the demplot. Since he did not have a geological survey at hand, it was only possible to discuss the placement in vague terms. Both Pak Hari and I urged him to avoid putting an additional well on land owned by the kepala desa or his father. We suggested that the well be situated in the northeast quadrant of the demplot if possible. This area is furthest from the existing well and is the hardest to irrigate since it takes hours for pumped water to reach it (with considerable loss from evaporation and percolation along the way).

If a well can be drilled in this location (and the output from this and the original well is adequate) it might be possible to open up an additional hectare or more of adjacent land to expand the demplot. According to Pak Totok, however, budgetary considerations on this additional well. Pak Hari objects strenuously to this plan since he suspects the pump will be overused

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and therefore break down easily. Also, he is anxious to exploit as much land as possible. The debit from the proposed system would be only 5-8 liters/second - not enough to allow expansion of the demplot.

Farmer participation

With the ABRI Masuk Desa program scheduled to begin by August 7, almost all of the men in the village have been working every day to prepare for the arrival of the army personnel who will move into Pukdale. The primary activity has been to construct a village office/meeting hall. They have just laid the foundation so there is considerable work left to finish in a short time. This means that farmers have been unable to do much weeding and other work in the demplot.

Pak Hari volunteered to take over the responsibility of overseeing water distribution for the head of the P3A. This man is not only head of the water association but also assistant village head and, therefore, will be occupied most of the time with the ABRI activities. I have suggested to Pak Hari that this is a good opportunity for the other members of the P3A administration to take some responsibility in managing water distribution, but he feels he should be there to handle any problems that might develop and to work with farmers in their fields even more extensively than he has been doing over the past few months.

cc: D. Putman, ARD/WRD
A. Newman, ARD/WRD

MEMO

TO: Nancy M. Tumavick
Chief, Water Resources Division

FROM: Suzanne E. Siskel
P2AT - Kupang, NTT

DATE: August 11, 1985

SUBJECT: Weekly Log
August 4-10, 1985

Pump operation

There were several changes in the machinery this week. The pumps on both the P2AT and WHO wells were removed. Mechanics at P2AT were able to repair an old centrifugal ayak (sieve) pump that had been broken for several years. This pump is driven by a shaft that connects directly to the motor rather than by pulleys and fan belts. It was installed at the P2AT well. The pump that had been used there was taken back to P2AT in Kupang. It will be fitted with a new pulley identical to the one on the motor that is being used at the WHO well. This pump will be installed at the WHO well as soon as possible.

The "new" pump at the P2AT well ran for about 5 minutes at full power and then suddenly went dry. Pak Hari estimated that it produced about 15 liters/second. He took a sounding that put the water level at 14 m. when the pump stopped producing. It was late in the day at this point so he decided to leave the pump off for the night. The next morning the pump started without difficulty and has been running steadily at half power since then, producing 9-10 liters/second with the water level stabilizing at 5.1 m. (A sounding taken earlier in the dry season in mid-July put the water level at 4.25 m.)

P3A Meeting

An impromptu P3A meeting was held in the evening of Monday, August 5. Pak Hari had gone out to Pukdale late in the afternoon in order to mete (stay up all night, in this context to regulate water distribution). He noticed that most of the demplot farmers were returning home together from a village cooperative labor activity. He decided to take advantage of this to call them to a meeting to discuss water distribution and the use of fertilizer on their corn. He and the head of the P3A summoned the farmers and were able to get an attendance of 38 men (mainly demplot owners, their sons and brothers).

Because the meeting was called on the spur of the moment, I was not aware of it and therefore did not attend. Pak Hari reported to me the next day in considerable detail about what had

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happened. His account was verified in conversations I had later with some of the demplot farmers; though of course it did not provide an objective account of the dynamics between the P3A leadership, members and Pak Hari himself.

According to Pak Hari, the kepala desa spoke first, ordering the farmers to follow Pak Hari's instructions regarding management of the demplot. Then the head of the P3A announced that 2 of the 5 P3A group leaders had asked to be replaced because they were too busy with their cattle and gardens elsewhere to participate actively in demplot administration. The selection of replacements for these men was an informal process. Each group was asked to nominate candidates and vote among themselves. Pak Hari said that no nominations were forthcoming. He explained to the farmers that they should choose someone who would work seriously and consistently; and he suggested two people. In one case, his nominee spoke at length about why he could not take the job. Pak Hari had suggested this man because he had been one of the most difficult demplot farmers - complaining about not getting enough water, asking for wells to be placed on land he has elsewhere, never weeding his fields or participating in cooperative labor efforts to rehabilitate the demplot, etc. Pak Hari thought that he might change and become a serious participant in demplot activities if he had some responsibility for its administration. Instead, this man nominated his older brother. The group accepted his appointment by consensus.

In the case of the other group, Pak Hari suggested the largest single landowner in the demplot who is also the father of the head of the P3A and the pump operator. This choice was accepted readily by the man's group. He is well respected as one of the most diligent farmers in the village and a responsible member of the community. He does not get along well with the son who is head of the P3A, and we have not heard any complaints about nepotism as far as he is concerned. In fact, this farmer volunteered to forego planting any of his land during the first demplot crop season because he thought there would not be enough water. His land is furthest from the pump and he was the last farmer to plant.

Other issues covered at the meeting were water distribution and use of fertilizer. Pak Hari explained that each person would be scheduled to receive water within 1 or 2 days of using fertilizer, and that water would be channeled to each planted plot every 15 days. He explained the danger of over-watering and also emphasized the necessity of fertilizing corn twice, once within the first month and once within the second month of planting.

Pak Hari also told the farmers that they had to become more active in the water distribution process. He, the pump operator, and head of the P3A spend much of their time opening and closing irrigation canals and overseeing water flow to fields throughout the demplot. Only about 1/3 of all the demplot farmers have been in their fields on their scheduled water distribution days. This is due to 1) preoccupation with their cattle and gardens in other parts of the village; 2) cooperative village labor requirements;

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and 3) an attitude of laissez faire - as long as someone else is available to take care of the demplot there is no need for them to be there too. This last point is related to lingering skepticism about whether the pumping system is a temporary experiment or a permanent improvement on which they can depend.

This was the first P3A meeting since June. All communication among and between the P3A leadership, the other demplot farmers, and Pak Hari had been informal - mainly carried out in the fields as people worked or walked through the demplot - and included only a few individuals at any given time. Pak Hari argues that it has been necessary for himself, the pump operator, and the head of the P3A to manage the water distribution themselves at this early stage because the other farmers are too busy with other work. As a temporary expedient, this may have been the most effective way of getting water to all parts of the demplot. It has not, however, promoted a sense of mutual responsibility for the demplot among the farmers; and it has not facilitated the development of an effective P3A.

Pak Hari takes the "demonstration" label literally, measuring the success of the demplot in terms of the size of the harvest. This is a major concern of course, but I have grown increasingly worried about the community organization-building aspects of the demplot. Pak Hari spends almost every day and many nights at the demplot to oversee water distribution. He is doing all the agricultural extension work as well. In the short term, such involvement in the project has been crucial to its success. In the long run, however, I worry that Pak Hari's dedication to the demplot will backfire unless he begins to let the P3A take a more active role in the organization and maintenance of the water distribution system. (Pak Hari's commitment to the demplot is understandable. This is an excellent opportunity to prove himself at P2AT; and - de facto - the demplot has become his responsibility almost entirely.) He continually emphasizes that his role will diminish as soon as the AKABRI Masuk Desa program is over and the P3A leadership and farmers are no longer required by the kepala desa to work on village projects. Pak Hari also believes that one successful corn crop will prove to the farmers that the demplot is a going concern from which they can profit.

cc: D. Putman, ARD/WRD
A. Newman, ARD/WRD

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MEMORANDUM

TO: Diana Putman - USAID, ARD/WED

FROM: Hari Suwito - Staff, Agricultural Division, P2AT
(translated by S. Siskel)

DATE: August 31, 1985

SUBJECT: Monitoring Report, Fukdale Demplot
August 20-30, 1985

1. Pump operation

- The pump ran approximately 15 hours a day from 6am to 9pm.
- Diesel fuel use was 2 ltr/hour or 30 ltr/day x 10 days = 300 ltr.
- Oil use was 8 ltr. (Meditran 40) over the 10 day period (changed after every 100 hours).
- There was only minor mechanical problem during this 10 day period. On August 22, pump operation was interrupted for 2 hours because of a leaky valve, but the operator was able to fix it by himself.
- Construction of a permanent pump shed is about to begin. To make room for the new foundation, the motor now in use will be moved a short distance to the west. We will try to do this in the evening after the pump is shut down for the day, though it should take no more than about 2 hours to reposition the motor.
- P2AT made no repairs or improvements at the demplot during this 10 day period.

2. PSA Activities

- No PSA meetings have been held recently due to "AKABRI Masuk Desa" activities. All men are required to help construct a village meeting/office building through August 31.
- Since the head of the PSA has been busy with AKABRI, I have taken over the job of coordinating demplot farmer activities. I organized a cooperative labor effort among a few of the farmers who did not participate full time in the AKABRI project to repair and clean out irrigation ditches to facilitate water flow.
- As acting head of the PSA, I sought a buyer for the corn that was about to be harvested. As our consultant, Suzanne Siskel, previously reported, the selling price will be Rp. 500 per and we now have an verbal agreement with a buyer.

3. Farmer activities

- As Diana Putman and Harlan Hamsett, observed, some of the corn was infested with stem borers. Under my direction, about 1 ha. of infested corn was sprayed with the insecticide, Sumithion, on August 20 and 25. We used 2 liters of

Best Available Document

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- 2cc/ltr. concentration. This seems to have saved the crop.
- Most of the farmers have applied fertilizer to their corn twice. They have been weeding and fertilizing their fields in the late afternoon upon returning from work on the village office building, however I have suggested they apply insecticide in the early morning between 6 and 8.
 - All farming activities have been carried out by farmers and their families so there have been no hired labor expenses.
 - By August 29, one farmer began harvesting 130 ha. of corn. He has sold 5200 ears at Rp.50 each = Rp.260,000.
 - Marketing strategy - Buyers from outside have been coming unsummoned to the demplot. They pick the corn themselves, but must agree to take all that they cut (rather than selecting only the large ears). The price is Rp.100 for all corn, large and small. The farmer or his wife counts the corn cut by the buyer to be sure that payment is accurate. Consistent with previous information from demplot farmers, the farmer's wife takes and keeps the money from agricultural sales. With this marketing system the farmer has no transportation or other additional expenses after the harvest.
 - Percentage of harvest not sold - Of the demplot corn harvested so far: 125 ears were kept for home consumption and 50 ears were contributed to the local church. We have not made a calculation of percentages contained and sold yet because numbers change every day.
4. General comments on the progress of the demplot.
- Many farmers who did not support the demplot originally, are now surprised to see how much profit can be made on green corn in comparison to rice. They are anxious to plant corn again for the second demplot season.
 - Because the previously arid demplot area is so green now and promises to bring farmers there alot of money, farmers from other parts of Pakdales are growing jealous. Many of them have asked that future wells be dug near their land, and they promise that they would work harder than the current demplot farmers to make the venture successful.

MEMO

TO: Nancy M. Tumavick
Chief, Water Resources Division

FROM: Suzanne E. Fiskel
P2AT - Kupang, NTT

DATE: September 2, 1985

SUBJECT: Weekly Log
August 25-31, 1985

Note - I did not write a weekly log for the week of August 11-18 when Diana Putman and Martin Hanratty were here. I left for Malang to teach for a week at Universitas Brawijaya on August 16. The report submitted by Hari Suwito of P2AT (and sent to WRD under separate cover) actually covers the period before and during my absence.

Pump operation

The pump that had been used at the P2AT well was installed at the WHO well in the demplot. New identical pulleys were fitted on the motor and pump so that there would be no further problem with uneven wear on the fan belts due to differences in pulley size. This pump is operating for 10-15 hours a day and using diesel fuel at the rate of about 1.7 to 2 liters per hour. Its output is roughly 6 liters per second by Pak Hari's measurement. There have been no problems with either pump this week.

New construction and drilling

The construction firm, C.V. Sumber Griya Permai, began work in Pukdale as part of a 35 million rupiah contract with P2AT. Ir. Hartono appointed Pak Hari as supervisor of the firm's activities at the demplot. Thus far they have brought in rocks and sand that will be used in the pump shed foundation and in the canal linings, but no construction has begun yet.

They also have begun drilling the 8 wells that are planned for Pukdale. One well is finished. It is located to the north of the original P2AT well behind the home of the head of the P3A on land that is owned by this man's father. (The father is head of his P3A sub-group and has the largest land holding in the demplot. He is the farmer I mentioned in a previous report who waited until everyone else had planted and received an adequate amount of water to get their fields started before he planted - because he feared it would waste a lot of fuel and take too much time to get water all the way across the demplot to his land.)

This well, referred to as a sumur pantek, is 2 inches wide and will have a portable kerosene-powered Honda pump. It is intended to be used to supplement water produced by the original demplot well.

Pak Hari was particularly concerned about the saline content

of the water in this well. A 3m. deep house well in this part of the demplot produces water that is too salty to drink or use for horticultural purposes. Apparently, however, the water in the new well tasted fresh not saline; but as far as I know more sophisticated tests of the water have not been conducted.

Drilling of the second well (also a 2" sumur pantek) has been interrupted because the drill that the C.V. Griya staff were using broke down after striking rocks at about 24 meters. As with the first well, water (that did not taste salty) was encountered at 9 meters.

This second well is located about 20 meters west of the village road that roughly forms the western boundary of the demplot. The owner of this land spends almost all of his time in another part of the village where he keeps his livestock and tends a small vegetable garden. He is not involved in the P3A; but his teenaged son who does all the work on their demplot land is among the most diligent farmers in the demplot.

As far as I can determine, the sites for these two wells were chosen by the head of P2AT's irrigation division, Totok Rujito, after consulting with Pak Hari. The primary consideration was to increase the flow of water to the northern section of the demplot that has not been well served by the existing pumping system. Pak Hari also mentioned the possibility of expanding the demplot by 1/2 to 1 hectare on the western side of the village road. It is not clear how systematic the selection process was or whether or not Ir. Basuki was directly involved in it. (He had left NTT for his wedding in Central Java by the time this work began.)

As far as permission from the landowners is concerned there was no formal procedure. In the case of the first sumur pantek, Pak Totok spoke briefly to the landowner about P2AT's interest in drilling on his land. The landowner said he was happy to permit this because he needs the water. Pak Totok did not specify any limit to the area that would be taken by the well, nor was there any mention of indemnification, rental, payment for land, etc. In the case of the second well, the landowner was not available so Pak Totok spoke to his son. The young man said that his family had no objections to the drilling, but again there were no formal arrangements made.

Farmer participation

The AKABRI Masuk Desa program ended with a closing ceremony at the site of the new (still unfinished) village meeting hall/office on August 31. Presumably, now that this program is over farmers should have more time to work in their demplot fields and to become more actively involved in water distribution activities. Until now Pak Hari and the pump operator have been managing this almost without any assistance or participation from the farmers.

Almost every day vegetable sellers who have roadside stands in Tarus (midway between Kupang and Pukdale) have come to Pukdale to buy corn. So far only one farmer has begun harvesting

(the kepala desa's father). The price remains at rp.50/car. The buyers cut the corn themselves and then let the farmer or his family check their count of the harvest. The buyers pay the transport cost of about rp.7500 per truckload of 3-4000 ears.

So far none of the farmers are interested in selling corn stalks left after the harvest. They plan to use them for feed for their own livestock, though people in other parts of the village have asked the demplot farmers to consider selling them.

Within the next week at least 5 more farmers will begin selling their corn to the buyers from Tarus. Pak Hari and I have been keeping records of corn sales and consumption, and we have requested that the farmers themselves keep records for the P3A and for us. Thus far consumption is no more than about 5%, but it is premature to estimate what the actual consumption pattern will be.

Crop destruction

There is a new, unexpected hazard in the corn fields. Dogs from the village have been eating the young corn. So far losses have not been serious - no more than 1% of the total demplot crop. Three farmers with whom I spoke about the problem said that the only solution is to poison the animals, though no one has taken such severe measures yet. Rather, children have been encouraged to stay near the demplot area to chase dogs away.

The problem with stem borers infesting young (under 5 weeks old) corn stalks was overcome by using the insecticide, Sumithion, as Pak Hari reported in the last weekly log. Only two farmers had a problem with this and it was overcome before they lost more than 30-50 plants each. These two farmers had gone to the agricultural extension station (BPP) in Naibonat to ask for the insecticide. The head of the station (PPM) had told Diana Putman, Pak Hari and me when we visited him on August 15 that he would arrange to get the insecticide for farmers who came to him and could demonstrate serious need for it. In fact, the two farmers from the demplot who needed it went to the PPM a few days after our visit. He told them he did not have any and could not obtain it. Pak Hari then intervened. He went to the kabupaten level Pertanian office and was told that they did not have any Sumithion either. He then went to a dealer in Kupang, P.T. Kerta Niaga, where there was a large supply that was selling for rp.750 per half-liter bottle. It takes 2 liters per hectare (rp3000) if one sprays twice as recommended. The interval between sprayings is 5 days. The farmers who needed the insecticide gave Pak Hari the money to buy it; which he did and brought it out to them.

cc: D. Putman, ARD/WRD
A. Newman, ARD/WRD

MONTHLY REPORT - #4

August, 1985

Suzanne E. Siskel, PCAT - Kupang, NTT

Summary of principal activities and progress to date

- 1) More changes were made in the temporary pumping system. An old centrifugal pump that uses a drive shaft rather than pulleys was installed at the PCAT well and the pump from there was installed at the WHO well. The combined output is about 14 liters per second with combined fuel consumption of 3.5 to 4 liters per hour.
- 2) Work specified in a 35 million rupiah contract between PCAT and a local construction firm began at the end of the month. The contract includes drilling 8 additional wells in Fukdale, supplying new pumps, constructing a permanent pump shed at the site of the original PCAT demplot well, and lining of some of the irrigation canals.
- 3) One of the 24 demplot farmers has begun to sell his green corn. He has arranged to sell it for a fixed price of Rp.50/ear to buyers who come out to the demplot and cut the corn themselves.
- 4) A P3A meeting was held at the beginning of the month. After that there was little P3A activity because nearly all the men in Fukdale, including the demplot farmers, spent the month working on the construction of a new village office building. This obligatory community service project was directed by senior cadets from the national military academy who were assigned to Fukdale as part of the month-long AKABRI Masuk Desa program in NTT.

1. Status of the pumping system

Changes were made in the pumping system to improve its efficiency temporarily until the installation of permanent facilities and equipment is completed. The pumps on both the PCAT and WHO wells were removed. A centrifugal pump owned by PCAT that had been broken for several years was repaired and installed at the PCAT well. This pump is driven by a shaft that connects directly to the motor rather than by pulleys and fan belts. It produces about 8 liters per second, powered by the same Mitsubishi 18 horse-power diesel motor that had been used with the previous pump. Fuel consumption is 1 1/2 to 2 liters per hour.

The centrifugal pump that had been used at the PCAT well was fitted with a new pulley that matches the one on the Mitsubishi motor (same as above) at the WHO well. There should be no further problem with uneven wear of the fan belts due

to differences in pulley size now. This well produces about 6 liters/second and consumes 2 liters of diesel fuel/hour.

2. New construction and drilling

The local construction firm, C.V. Sumber Griya Permai, began work in Fukdale as part of a 35 million rupiah contract with P2AT. The plans call for drilling up to 8 small (2" interior diameter) exploratory wells. These will be fitted with portable kerosene-powered Honda pumps that are to be purchased by the construction firm under this contract. The contract also calls for construction of a permanent pump shed with room for fuel storage, for lining some sections of demplot irrigation canals, and for purchase of a centrifugal Kubota pump for the original P2AT demplot well.

To date the only work that has been completed is the drilling of one well in the northwest section of the demplot. Drilling of a second well has been interrupted since the drill being used broke when it struck rock at 24 meters. This second well is located about 20 m. west of the village road that roughly forms the demplot's western boundary.

As far as I can determine from P2AT staff, site selection for these wells was based on 1) geological factors, 2) the need to provide more water in the northeastern section of the demplot - the area furthest from and most poorly served by the P2AT pump, 3) the possibility of expanding the demplot by 1/2 to 1 hectare to the west, and 4) concern to test the saline content of the water (since one house well in the northwestern section of the demplot provides water that is too salty to drink or use for horticultural purposes). With regard to the last point, the water in the new wells tasted fresh not saline; but as far as I know more sophisticated tests have not been conducted.

3. Corn harvest

To date only one farmer has begun to harvest corn. He has arranged to sell the green corn for a fixed price of Rp50 per ear to buyers who will harvest it themselves and provide their own transport. The buyers have produce stands in Tarus along the main road halfway between Kupang and Fukdale (15 km. from each place). They sell the corn for Rp.100/ear, incurring transport costs of Rp7500 per load of 3000-4000 ears. The corn sells out within a few hours; and at least 6 buyers have made several trips to Fukdale to arrange to purchase corn from other farmers when it is ready for harvest. The demplot farmers all believe that the demand for green corn far surpasses the amount that will be harvested at the demplot this season, since there is virtually no other green corn for sale in the Kupang area. Some farmers say they will try to sell their corn themselves in the markets in Gesao and Kupang where the price should be Rp.60-100/ear.

There has been some destruction of 1-2 month old corn by stem borers and of harvest-ready green corn by village dogs,

though in neither case were losses more than about 1%. In the case of stem borers, Pak Hari Suwito learned from the agricultural extension coordinator (PPM) in Nabilonal that Sumithion is the most effective insecticide available here. The PPM did not have any available to give or sell to demplot farmers, but suggested a dealer in Kupang. He recommended applying the insecticide twice using 1 ltr./ha. each time. At Rp.1500/liter, the cost of using insecticide is Rp.3000/ha.

4. Farmer participation and P3A activities

An impromptu P3A meeting was held on the evening of August 5. It was called jointly by the head of the P3A and Pak Hari. They wanted to discuss a number of issues with the demplot farmers before the APABRI Masuk Desa program got under way and these men were required by the village head to work every day on cooperative village development projects. 30 men (all 24 demplot farmers, their sons and brothers, and the secretary and head of the village) attended the meeting. This good turnout was achieved because the head of the P3A stopped men as they walked through the demplot on their way home from another community activity and called them into the meeting.

The meeting's agenda included: 1) selection of replacements for 2 P3A sub-group leaders who resigned because of preoccupation with other responsibilities; 2) water distribution schedule; 3) use of fertilizer; and 3) a general discussion of the need for farmers to become more active in demplot activities. The meeting was chaired by the head of the P3A but both the village head and Pak Hari played central roles as well. The village head spoke harshly, ordering all the farmers to follow whatever instructions Pak Hari issued regarding demplot management. Pak Hari explained the water distribution system which, for the time being, involves giving water to farmers every 15 days and also within 2 days of their applying fertilizer. He explained that they should apply fertilizer twice within the first 2 months of planting their corn. Pak Hari also suggested nominees for the leadership of the 2 sub-groups whose leaders resigned. He did so because no nominations were forthcoming and no one volunteered for the jobs. His choices were based in one case on the reputation of the farmer as a diligent worker and responsible member of the community. The fact that this man is the largest single landowner in the demplot and is also the father of both the pump operator and the head of the P3A does not appear to be problematic (so far). The man is well respected by the other farmers and he is viewed as independent from the activities and interests of his sons. Pak Hari's choice for the second group was a man who had been the most vociferous complainer about water distribution not being adequate. Pak Hari thought the man might become more cooperative if he had some responsibility for the demplot administration and could learn first hand about organizational problems. He refused

to accept the nomination but suggested his brother. This man did accept and was approved by consensus of his sub-group.

The final order of business was to emphasize the importance of farmer involvement in demplot activities. Almost all water distribution, some weeding, maintenance of irrigation canals, and other tasks have been carried out by Pak Hari, the pump operator, and the head of the P3A. As a temporary expedient to get the demplot off to a good start, this may be effective, but it has not fostered the development of an effective P3A nor has it encouraged farmers to learn about water management.

5. Plans for September

Monitoring activities will continue as in previous months with special attention focussed on the yields from the corn harvest, marketing strategies, costs and benefits of growing corn, and so on. I will be away for about 6 weeks' home leave starting at the end of the month. Hari Suwito will monitor demplot activities and will report regularly to WRD in accordance with a monitoring/reporting schedule we devised.

cc: Ms. N. Tumavick, Chief WRD-USAID
Mr. A. Newman, ARD/WRD
Dr. D. Putman, ARD/WRD
Ir. Hartono, Kepala Pengairan, DPU-NTT
Ir. Basuki, Ass. Teknik, P2AT-NTT
Sdr. Hari Suwito, Staf P2AT-NTT

Laporan Monitoring - Demplot P2AT, Pukdale, Timor, NTT

Kepada:

Dari:

Tanggal: s/d

1. Operasi pompa:

- Pompa jalan rata-rata berapa jam per hari?
- Pemakaian solar, olie, dll.
- Kalau ada kerusakan, menjelaskan masalahnya dan langkah telah diambil untuk memperbaikinya.

Siapa memperbaikinya? (staf P2AT, operator pompa...?)

Masalah ini menghambat operasi pompa selama berapa jam? hari?

- Selain dari masalah teknik, apakah ada masalah lain yang menghalangi operasi pompa? (menjelaskannya)

- Apakah ada perbaikan selain dari yang tsb.?

2. Kegiatan P3A:

- Apakah ada rapat P3A?

Menjelaskan: alasannya, topik-topik yang dibicarakan jumlah orang yang ikut (berapa % dari petani demplot semua), dan komentar umum.

- Apakah ada kerja bakti? (untuk apa? hasilnya?, dll.)

- Apakah ada kegiatan formal atau informal lain? (menjelaskannya)

3. Kegiatan pertanian:

- Mencatat aktivitas petani dalam tanahnya (memupuk, menyiang, panen, dll.)

Siapa bekerja? (petani sendiri, anak laki-laki, anak perempuan, istrinya, tenaga buruh, dll.)

Kalau yang bekerja dibayar, berapa upahnya?

- Kalau ada panen, mencatat hasilnya petani masing-masing.

Kalau hasil tsb. sudah dijual, menjelaskan cara pemasarannya, harganya, kepada siapa dijual, dan oleh siapa dijual (si petani, istrinya, dsb.)

Ongkosnya transpor ke pasar

Pendapatan

Jumlah dan % dari hasil yang disimpan atau dimakan sendiri

- Kalau ada orang menanam, mereka tanam apa?

Bibit dari mana? harganya?

Berapa are/ha. yang ditanam?

4. Komentar umum lain mengenai kemajuan dan/atau masalah di demplot:

MEMO

TO: Nancy M. Tumavick
Chief, Water Resources Division

FROM: Suzanne E. Siskel
P2AT - Kupang, NIT

DATE: September 8, 1985

SUBJECT: Weekly Log
September 1 - 7, 1985

Pump operation

The pumps at the P2AT and WHO wells ran for about 12 hours a day with outputs of 8 and 6 liters per second respectively. According to the pump operator, each pump uses 1 1/2 to 2 liters of diesel fuel per hour (total of 36 to 48 ltr/day). He has been changing the oil in both pumps (4 liters each) on a weekly basis.

Construction and drilling

Very little has been accomplished over the last 10 days. Drilling has been interrupted for over a week since C.V. Sumber Griya Permai's drill broke down after hitting rocks at a depth of about 30 meters. Two workers came out to the site twice during the week to begin groundbreaking for the foundation of the pump shed.

Farmers' activities

Six families have begun selling their corn. So far, all of them have been selling to buyers from the roadside vegetable stands in Tarus (midway between Kupang and Pukdale). The selling price is fixed at Rp. 50 per ear and the buyers provide the labor to cut the corn. The retail price is Rp. 100/ear. The buyers incur transport costs of Rp. 7500 per truckload of 3000-4000 ears of corn. Thus, before their labor costs (if any) are factored in, the buyers make a profit of Rp. 47.500 to 48.125 per 1000 ears:

$Rp.100 \times 3000 - Rp.50 \times 3000 + 7500 = Rp.142.500/3 = Rp.47.500$
or

$Rp.100 \times 4000 - Rp.50 \times 4000 + 7500 = Rp.192.500/4 = Rp.48.125$

Three of the families who have begun to harvest their corn are trying another marketing strategy as well. Women and children in these families have been walking to the market in Desao (about 3 km. away) carrying up to 50 or 60 ears of corn each. They sell the corn at a fixed price of Rp.500 for 8 ears (Rp62,5 per ear).

One of the other farmers is selling some of his corn on commission. He gives it to children from the local elementary school to sell in the Desao market at 8 ears for Rp.500. For every Rp.3000 the children get from corn sales (ie, for every 48

ears sold), the farmer gives them 5 ears of corn.

I have spoken with 21 of the members of the PSA. None of these farmers are interested in selling corn stalks for cattle feed because they need this for their own animals. The head of the PSA told me he would agree to sell his corn stalks after harvest only if the price were Rp.25 or higher per stalk. He and the other PSA members with whom I discussed this have been giving their cattle about 90 corn stalks a day (30 stalks 3x/day). Calculating on the basis of plant spacing of 1m x 1/2m, planting 2 seeds per hole (as recommended by Pak Hari and by the local agricultural extension workers), the yield would be $20000 \times 2 = 40000$ corn stalks per ha. or enough to feed one head of cattle for 444 days.

cc: D. Putman ARD/WRD
A. Newman ARD/WRD

MEMO

TO: Nancy M. Tumavick
Chief, Water Resources Division

FROM: Suzanne E. Siskel
P2AT - Kupang, NTT

DATE: September 16, 1985

SUBJECT: Weekly Log
September 8-15, 1985

Pump operations

There has been no change in pump operations. Hari Suwito reports that P2AT has released approximately 3200 liters of diesel fuel for the pumps at Fukdale over a 3 1/2 month period. At a cost of Rp.244/ltr. this totals Rp.780.800. He estimates that by the end of the first corn harvest after approximately 4 months of pump operation the total fuel consumption will have been 3400 ltr. or Rp.829.600. This averages to almost Rp.7000/day.

Farmers' activities

A total of 11 farmers have begun marketing their corn. All of them are selling primarily to buyers from Tarus, as reported in previous weekly logs. This week Pak Hari took one farmer into Kupang to the main market with a load of 200 ears of corn. The farmer sold out all the corn at Rp.100/ear within a few minutes and, given the demand, regretted not having brought in much more to sell. He estimates that transport costs would be no more than Rp.5/ear between Kupang and Fukdale. Pak Hari explained that he assisted this farmer just to demonstrate how much more profitable it would be for Fukdale farmers to sell their corn themselves rather than to rely on buyers coming into the village and paying Rp.50/ear.

One farmer (the father of the kepala desa) has harvested 1/2 ha. of corn. He reports having sold 10,370 ears at Rp.50 for a total of Rp.518.500. He estimates that his family gave away and consumed about 1100 ears. (It was not possible to keep a careful count of the amount of corn his grandchildren and others cut.) Using his harvest as a measure for the demplot as a whole, 1 ha. would yield approximately 23,000 ears or Rp.1.150.000 less production costs as follows:

Fertilizer-	100 kg @ Rp150/kg (TSP + Urea, applied 2x) =	15.000
Insecticide-	2 ltr @ Rp1500/ltr (Sumithion, applied 2x) =	3.000
Seeds-	25 kg @ Rp150/kg (Arjuna & Harapan mainly) =	<u>3.750</u>
		Rp.21.750

or a total of Rp.1.128.250.

This particular man's corn was not planted at regular intervals nor was there a consistent number of seeds planted in each hole.

Siskel/2

The distance between holes was more or less $1 \times 3/4$ m. with 1 or 2 stalks per hole. At least 50% of the other demplot farmers followed the advice of Pak Hari and the agricultural extension workers and planted at $1 \times 1/2$ m. intervals with 3 seeds/hole. Their yields could be as much as 50% higher than the one discussed here.

Visit by Dinas Pertanian official

On Saturday (Sept. 14) Viator Parera, head of Bina Program for Dinas Pertanian here accompanied me to the demplot. He was anxious to see the site after having been designated to attend the SSIMP symposium in Puncak. He did not know anything about P2AT's activities and had not been aware of the existence of the demplot.

He asked about the involvement of the FPM and PFL in Nairbonat, assuming that they had been cooperating with P2AT in organizing extension work at the demplot. When I explained that their participation had been minimal, he insisted we stop first at their office. The only person there was the manager of the station. Pak Viator politely told him he must accompany us to the demplot and repeated throughout our visit that the manager convey to the FPM and PFL his regret that they had not been active in the demplot project.

We drove through the village so that Pak Viator could compare the demplot to other areas. He said that choosing green corn for the first crop was a good idea because of its assured marketing success, but he said it will be important to consider other possibilities in the future.

I got the distinct impression that he would like to cooperate with P2AT in this venture and that he was pleased to be able to participate in the symposium. He is a highly respected man here both by people in local government offices and by foreign consultants who have worked with him in a variety of agricultural projects.

cc: D. Putman ARD/WRD
A. Newman ARD/WRD

PEKSA : MISS DR. DIANA PULKA - UJALD, AND/WAD.
AMI : MARI LOWITO - Pol. Eksplo. Pert. P3AT IPT.
ANGKAS : SEPTEMBER 21, 1985 .
SUBJECT : MONTHLY REPORT, BUREAU DESPLOT
SEPTEMBER 11 - 20, 1985 .

I. OPERASI POMPA.

- Pompa beroperasi masih seperti biasanya yaitu rata-rata 12 jam/hari, hal ini karena lanyak sekali jagung yang sedang berbunga atau sedang mengeluarkan bulir (buah buany). Pada waktu itu tanaman jagung banyak sekali membutuhkan air, biasanya diberikan air tiap 15 hari sekali tetapi waktu sekarang ini air diberikan tiap 10 hari sekali. Air diberikan dengan interval yang agak pendek karena tanaman sedang membentuk bulir bila kekurangan air menyebabkan buah jagung tidak seperti yang diharapkan atau bisa menyebabkan kegagalan.
- Pemakaian bahan bakar solar dalam 10 hari ini masih juga seperti biasanya yaitu 300 liter dengan kebutuhan 2 liter BEM tiap jamnya.
- Pemakaian pelumas (olie) masih juga 8 liter untuk 10 hari dengan pemakaian tiap 100 jam kerja, olie harus diganti.
- Dalam 10 hari ini, operasi pompa ada sedikit kerusakan pada tgl 16/9 - 85, kerusakan ini karena siel dari pompa bocor juga klep dari pompa tersebut mengalami kebobrokan yang mengakibatkan air tidak dapat disap oleh mesin, tetapi problem ini dapat kami perbaiki bersama operator. Kerusakan ini menghambat operasi pompa selama 6 jam maka terpaksa ketua P3A dan operator kerja over time untuk mengaliri areal yang sedang mendapat giliran air.
- Selain masalah teknis, tidak ada masalah yang menghalangi jalannya operasi pompa juga sampai hari ini pun tidak ada perbaikan pada mesin pompa tersebut.

Keputusan P3A.

- Pada tanggal 18 September 1985 ada rapat P3A yang diikuti oleh ketua bersama anggotanya, dari hasil rapat tersebut menghasilkan beberapa keputusan antara lain :
 1. Kegiatan penanaman kedua termitung mulai hari ini tanggal 18 september 85, sementara air masih melayani penanaman pertama.
 2. Jenis yang di tanam Jagung, kacang hijau.
 3. Pemberian air diatur sebagai berikut : Pemberian air pertama bersamaan waktu tanam, pemberian air kedua 6 hari setelah tanam, pemberian air ke 3 lima belas hari setelah pemberian air ke 2 dan seterusnya interval tiap 15 hari

4. Harus dilakukan pemupukan dua kali selama musim tanam ini yaitu pemupukan pertama bersamaan waktu tanam sesuai 5 kg per setel r. tanam, pemupukan ke 2 diberikan bila akan mendapatkan air yang ke 4.
5. Selokan/saluran harus dibersihkan bila akan mendapat giliran air, saluran yang tidak dibersihkan maka kelompok tersebut tidak diperkenankan untuk mendapatkan giliran air.
6. Panitia bersama anggotanya bersidang dua kali dalam satu bulan atau sewaktu-waktu bisa bersidang bila ada masalah.
7. Mesin pompa beroperasi 10 jam dalam satu hari, mulai dihidupkan jam 6⁰⁰ pagi dan dimatikan pada jam 7⁰⁰ malam.
8. Setiap satu kali musim tanam (pada waktu panen) anggota diwajibkan untuk memberikan dana tabungan yang besarnya Rp.100/are guna perbaikan kecil pada mesin pompa, perbaikan saluran dll pada masa yang akan datang.
9. Sebagai imbalan kepada panitia dalam mengatur air untuk anggotanya diminta untuk memberikan satu bulir jagung tiap arenya.

Demikian keputusan rapat ini untuk dapat ditaati bersama dan dapat dirobah bilamana perlu.

Tidak ada kerja bakti dalam 10 hari ini karena 2/3 dari areal belum panen, siap untuk dinanen.

- Tidak ada kegiatan formil selama ini hanya kegiatan informil dari kami dan ketua P3A mengajar petani untuk menjual jagung muda keluar lokasi demplot seperti di pasat Qesao dan pasar Kuning, hal ini terpaksa harus ditempuh karena bila tidak maka jagung muda yang siap untuk dijual akan menjadi tua dengan demikian animo pembeli menjadi berkurang dan hasil terjual kurang laku dijual.

3. Kegiatan Pertanian.

- Aktivitas petani di dalam tanahnya seperti memupuk, menyiang dll. sudah tidak ada lagi, saat ini petani dan keluarganya selalu sibuk dengan masalah panen.
- Semua aktivitas dalam bertani dikerjakan oleh petani dan keluarganya dengan demikian petani tidak perlu lagi mengeluarkan uang untuk upah buruh dll.
- Area panen yang lebih banyak dibanding 10 hari yang lalu yaitu ± 2 ha. di dalam demplot ini. Dari areal seluas itu ± 1 ha. atau 39.000 bulir yang laku terjual sisanya dimakan sendiri dan tabung sudah terlanjur tua di ponon.

Sebetulnya petani merasa tidak rugi sula bila jagungnya tidak laku terjual dalam bentuk masih muda, mereka malahan tidak menjual jagung tersebut tetapi disisipar untuk replodukan pada bulir-bulir tanah untuk usaha tani padi sawah.

Pada bulan Desember, Januari sampai akan panen, pada bulan2 itu petani kekurangan/kesukaran makan, cari jagung yang mereka sig^{na} itu dapat digunakan untuk persediaan makan.

Kita ingat bahwa sudah tiga musim tanam sawah tadah hujan mereka kurang mendapatkan hasil yang akibatnya tidak cukup untuk makan setiap tahunnya.

- Cara Penjualan

Digambarkan pembeli datang sendiri ke lokasi, petani juga kami ajak untuk menjual hasil tersebut ke luar lokasi.

Seerti bila menjual ke pasar Desa yang jaraknya ± 2 km. dan di jalan memikul hasil tersebut mereka bawa dengan demikian tidak mengeluarkan biaya transportasi.

biarannya pekerjaan ini dilakukan oleh istri petani dan anaknya. Bila dijual ke kubang yang membawa hasil tersebut adalah petani itu sendiri dengan biaya transportasi Rp. 1000,- per karung-nya (1 karung ± 200 bulir jagung).

- Sudah ada yang menanam ke 2 pada 10 hari ini yaitu seluas 50 are dan seperti yang sudah dirapatkan bersama, setelah juga melihat untung ruginya maka dalam rapat tersebut diambil kata se pakat untuk menanam jagung lagi.

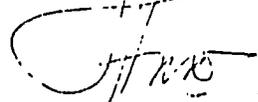
- bibit yang digunakan seperti arjuna dan harapan.

4. Komentar umum.

- Respon petani terhadap sumur pompa yang ada kami nilai semakin besar bila dibandingkan dengan sebelum mereka menemukannya. Mereka mulai sadar bahwa tanaman palawija tidak menpendaki jumlah air yang banyak dan tidak merasa takut lagi bahwa pengaliran air yang sudah kami atur itu sudah cukup untuk kebutuhan tanaman polowijanya.

- masalah didalam demplot kami anggap sudah tidak ada lagi masalah. dari luar demplot yaitu petani banyak yang merasa iri karena mereka berpendapat bahwa bisa berusaha tapi seperti itu bila disediakan fasilitas air dan mereka juga lahar tetapi mereka petani demplot saja yang diberi air oleh P2AT.

Supang, 21 September 1985
Pel. Eksplo. Dept. P2AT III.


Lari Sawito.

DAKWA : Ibu Dr. DIANA PUTRIAN - USAID, AND/AND.
DARI : HAKI SUWITO - Pel. Eksplo. Pert. PERT. NTT.
TANGGAL : OKTOBER 2, 1985.
SUBJECT : MONITORING REPORT, PUKDALE DEMPLOT
SEPTEMBER 21 - 30, 1985.

1. OPERASI POMPA.

- Pada 10 hari ini ada penggantian mesin pompa baru pada tanggal 26 September dan kebutuhan bahan bakar 1,5 liter dalam satu jamnya. mesin dengan merk Kobuta dan pompa merk Baura. Dari mesin yang baru ini dalam satu hari dapat mengairi areal seluas 20 s/d 25 are pada tempat2 yang dekat dengan mesin dan 20 are pada tempat2 yang jauh dengan mesin pompa (untuk pemberian air yang pertama).
Mesin pompa operasi dari jam 6⁰⁰ pagi sampai jam 18 sore dengan istirahat selama satu jam pada waktu siang hari dengan maksud supaya mesin tetap dingin dan tidak memaksa mesin untuk bekerja karena kondisi baru.
- Kebutuhan bahan bakar dalam 10 hari ini = untuk mesin baru
9 jam kerja x 1,5 ltr/jam x 5 hari = 67,5 liter.
Mesin lama = 10 jam x 2 ltr/jam x 4 hari = 80 liter.
Dalam 10 hari kebutuhan solar 147,5 liter.
- Air kerja termasuk air hasil dari 10 jam karena pemberian air untuk masa tanam ke I hanya tinggal 8 are yang perlu diberikan air dan pula untuk mengairi areal yang tanam baru & pemupukan.
- Dalam 10 hari ini kebutuhan olie 4 liter, olie yang digunakan meditrans 30 karena mesin masih baru.
- Tidak ada kerusakan dalam 10 hari ini karena mesin pompa yang baru begitu pula dalam hal non teknis tidak ada yang menghalangi jalannya operasi pompa.

2. KEGLATAN P3A.

- Karena ada informasi dari pemerintah daerah tingkat I dan tingkat II bahwa lokasi demplot Pukdale akan dikunjungi oleh tamu besar yaitu Bapak Duta Besar Amerika pada tanggal 24 September, maka ketua P3A mengundang para ketua Regu beserta anggotanya untuk membicarakan masalah ini.
Dalam rapat selain dihadiri oleh kepala desa juga Camat Kupang Timur.
Didalam rapat ini memutuskan bersama bahwa pada lokasi demplot harus bersih baik saluran2, areal yang belum siap ditanam, sedang ditanam maupun yang sudah ditanam.
Kerja Paksi tersebut diatas diikuti oleh semua anggota Regu dan petani Pemakai Air Demplot Pukdale,

dimulai dari tanggal 22 sampai dengan tanggal 23 September.

- Kegiatan Formil selama 10 hari ini yaitu penyambutan tamu Duta Besar dan rombongan sebanyak ± 80 orang.

Selain melihat aktivitas di dalam demplot, petani mendengarkan Duta Sambutan dari bapak Duta yang isinya bapak Duta merana se-
menter terpan hasil yang sudah dicapai oleh petani di Pukdale &
diharapkan hasil tersebut bisa meningkat dari sekarang.

3. KELIATAN BERTANI.

- Dari tanggal 21 sampai dengan tanggal 24 September tidak ada aktivitas dalam bertani.

Setelah kunjungan Duta Besar, petani mulai dipetakannya masing-masing yaitu seperti mengolah tanah untuk penanaman ke II, menanam, memupuk pertama dengan pupuk TSP dan Urea, menyiang, ada pula yang menjaga air karena mereka mendapatkan aliran.

- Seperti juga laporan2 yang lalu, semua aktivitas dalam bertani ini dikerjakan oleh petani dan keluarganya.

- Dalam 10 hari ini hanya ± 1 Ha. yang siap untuk di panen, dari area real seluas ini mereka jual, dimakan sendiri dalam bentuk muda dan lainnya sudah terlanjur kering terlambat untuk dipanen.

Dari lahan seluas itu hasilnya baru akan kami laporkan setelah selesai dalam perhitungan.

- Cara penanaman seperti juga pada 10 hari yang lalu, yaitu di lokasi mereka menjual sendiri di lokasi yang dilakukan oleh keluarga petani juga dijual keluar misalnya ke Supang yang dilakukan oleh petani sendiri.

- Dalam 10 hari ini penanaman baru, mulai bertambah yaitu dari 30 are pada 10 hari yang lalu menjadi 1,5 ha.

- Bibit yang digunakan jenis unggul seperti Arguna dan Harapan.

- Cara penanamannya mereka tambah penalamannya yaitu setelah direndam dan dicampur dengan ^{10%} semen untuk menghindari hama & penyakit baru bisa ditanam.

- Tidak ada masalah dalam penyediaan bibit karena petani sudah ada persediaan bibit dari hasil ladang pada tahun yang lalu.

4. KEBERHASILAN UJUN.

- Keiston petani bertambah dengan keberhasilan mereka setelah memetik hasil juga cara bertani pun bertambah baik karena disamping mereka mengalami dalam bertani polowijo, ada keinginan pula untuk meningkatkan hasil yang lebih baik dari panen pertama.

- Tidak ada masalah didalam demplot seperti penanaman pertama dengan mesin pompa baru dengan debit air ± 8 ltr/detik.

Cara penanaman sudah makin baik dan pemupukanpun tidak perlu lagi ditaksakan.

Tgl : 10 Hari, 10 Hari PUFAN - CEKID, ARD/WI.
Kas : HANI SUKITO. P2AT NTT.
Tanggal : 10 OKTOBER 1985
Subjek : KONTRAKING AIRBOR, PUMPAK DESPLOT
OKTOBER I - 10, 1985.

1. UMKAS, PUMPA.

- Kebutuhan bahan bakar solar dalam 10 hari = $1,5 \times 10 \times 10 = 150$ liter. Jan kerja tiap hari rata-rata 10 jam mulai jam 6⁰⁰ pagi dimatikan jam 14⁰⁰ malam, istirahat 1 jam dari jam 12 s/d jam 13 siang.
- Kebutuhan olie = 5 liter meditrans 30 dengan berminas tiap 50 jam ganti olie sebanyak 4 liter.
- Tidak ada kerusakan pompa selama ini tetapi ada sedikit masalah dalam pemberian air untuk regu A dan B karena saluran permanen di las tahap pemasangan oleh kontraktor, namun P3A tetap beresana karena air bisa masuk ke regu tersebut dengan menggunakan pipa.
- seperti laporan kami yang sudah dibaca, masalah non teknik tidak ada yang menghalangi jalannya mesin pompa.

2. KEKAWAN, P3A.

- Dalam 10 hari ini desplot bukdale mendapat kunjungan tamu besar dari yaitu Duta besar Australia, pada tanggal 7/10 - 1985.
- Dengan adanya kunjungan kedua tamu besar pada 10 hari yang lalu dan 10 hari ini lokasi menjadi selalu bersih, namun petani mer - tidak berminat untuk mengolah tanah ataupun menjual hasil. hal ini karena bila ada tamu besar selain kerja bakti, petani juga di serotkan dengan acara penyambutan yang menghabiskan waktu lebih dari tiga hari.
- Keptatan formil yaitu penyambutan tamu Duta Besar dan rombongan yang jumlahnya tidak sedikit.
- Dalam kunjungan tersebut Duta besar merasa senang dengan adanya air dari sumur bor petani dapat menggarap tanahnya.

3. KEKAWAN, BERTANI.

- Hari tanggal 5 s/d 7 Oktober tidak ada aktivitas dalam bertani. tanggal 1,2,3,4,8,9,10 aktivitas petani selain menjual hasil seperti waktu 2 sebelumnya juga mengolah tanah, menanam bibit maung an sudah ada yang memujuk ke II. seluas 60 are.
- Pada penanaman ke II ini kelihatan tidak ada hama yang menyerang tanaman seperti pada waktu penanaman pertama, namun petani ada yang menyemprot tanamannya untuk pencegahan hama, obat yang digunakan Sumithion dengan perbandingan tiap 15 liter air dicampur dengan 2cc sumithion.
- Semua aktivitas dalam usaha tani tersebut masih juga dikerjakan oleh petani dan keluarga sendiri, sebenarnya mereka mau mencari tenaga buruh untuk pengolahan tanah,

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tetapi pada bulan2 sekarang ini di P. Timor selurunya susah mencari buruh kerja karena mereka juga kerja dibeban mereka sendiri seperti memperbaiki pagar, memersihkan kebun dengan jalan membakar pohon atau semak2 yang sudah kering dll. cara berkebun seperti ini sudah menjadi tradisi petani di P. Timor. dan kerja ladang ini untuk menyambut musim hujan disamping petani bernanah bila air hujan cukup juga berladang jagung yang sebetulnya digunakan mazaran bokok bagi mereka selain padi sawah yang diusahakan pada dataran rendah.

- Hasil panen.

Keri areal seluas 6,5 ha. yang diusahakan pada penanaman pertama jumlah uang yang mereka peroleh seluruhnya Rp. 4.592.000,- (91.840 tongkol) dimana sendiri 22.260 tongkol dan kering karena terlambat ditanam = 80.300 tongkol.

- Penanaman baru tertamam menjadi ± 5 ha. penanaman ke II ini selurnya agak terlambat waktunya, hal ini memang sengaja kami suksekan supaya dalam satu tahun petani demplot tidak terganggu kegiatannya biarpun dalam areal yang kecil tetapi kami maksudkan agar petani mereka yang sedikit ber - malas2-an dapat diubah dan gairah kerja ada dalam diri mereka.

- Sampai saat ini tidak ada masalah dalam penyediaan bibit, obat2an dan pupuk. Pupuk banyak tersedia di pasar Gosao dengan harga = Rp. 5000,-/per 50 kg. begitupun obat2an untuk nama per kg. Rp 1500

- Dalam penanaman ke II ini dari pihak dinas Pertanian (PPL/PPLM) tidak pernah datang untuk memberi penyuluhan, terpaksa kami lakukan sendiri biarpun sebenarnya ada PPL yang tinggalnya tidak jauh dari lokasi demplot.

4. KEHADIRAN URUS DAN KEBALIAH DALAM KEBERHASILAN.

- menjadikan iri pada desa2 lain karena desa Pikule (demplot) selalu mendapat kunjungan tamu2 penting yang sebenarnya sebenarnya akan merembatkan petani saja.

- masalah dalam demplot.

Hasil jagung kering terlalu banyak tidak sesuai dengan yang dipromosikan akan ditanam dalam bentuk jagung muda.

Hal ini karena selain petani sendiri yang kurang pengalaman dalam menjual jagung muda untuk dijual, mereka juga tidak cept dalam penjualan. Selain itu faktor adat yang kurang menguntungkan petani sendiri seperti bila ada pesta kawin misalnya, 15 hari sebelumnya mereka sudah mengadakan persiapan dan melibatkan banyak orang, tentunya orang2 tersebut adalah petani yang seharusnya mereka kerja dibelanya masing2 begitu pula setelah selesai perkawinan masih ada acara dan kerja gotong royong membongkar rumah pesta dll. yang menghabiskan waktu ± 3 hari.

Contoh : Pada bulan September/Oktober banyak petani disekitar demplot mengadakan pesta perkawinan, aktivitas mereka dalam ber-tani menjadi tersita waktunya.

Aktivitas pemasaran hasil yang sebetulnya cepat dilakukakan menja-di terlambat akibatnya banyak sekali jagung yang sudah menjadi kering. Masalah seperti ini (adat) yang menjadi penghambat kema-juan petani di P. Timor khususnya lokasi demplot yang sedang ka-m. amati untuk diambil datanya.

Demplot Pukdale yang kami rencanakan dalam penanaman ke I ini akan mendapatkan hasil sebanyak ± Rp.12.000.000,- ternyata hanya Rp.4.542.000,- saja.

Berapa hasil jagung yang sudah kering juga sangat dibutuhkan oleh petani mengingat ± 3 tahun hasil dari usaha tani sangat kurang. (kurangnya air hujan) tetapi bila hasil tersebut dipanen sesuai dengan rencana yang sudah kami anjurkan, maka petani akan lebih banyak mendapat uang dari hasil usaha taninya.

MEMO

TO: Alvin Newman
Project Manager, SSIMP

FROM: Suzanne E. Siskel
P2AT, Kupang - NTT

DATE: December 31, 1985

SUBJECT: Summary of monitoring activities
October - December, 1985

Reporting

I was in the United States during the months of October and November. During my absence, Hari Suwito of the P2AT irrigation staff monitored demplot activities. He sent 4 reports directly to AID in October. He sent nothing else, however he wrote the attached summary of demplot activities from the end of September through 15 December. In the report below, I have summarized and clarified the major points in Pak Hari's report and included the results of my own monitoring activities since returning to Kupang.

Experience with first palawija (corn) crop

1. Pump operations and irrigation management

Prior to the opening of the demplot farmers had had no experience with irrigated palawija. In the past they have grown corn, mung beans, and peanuts but only during the rainy season. Because they did not know how much water was necessary to sustain corn and thought they were not getting enough, they constantly complained to each other, the P3A leadership, and pump operator. At the beginning of the planting season before a fixed rotation of water distribution was developed, the pump operator and head of the P3A gave in to some of the constant pressure from farmers to provide them with water on demand. This stopped some of the complaining which was undermining the role of the P3A, however it was unfair to other farmers and wasteful of fuel and water. Gradually, however, Pak Hari along with the head of the P3A and about 25% of the P3A membership experimented with various irrigation intervals until they reached an optimal rotation system (both in terms of providing the entire demplot with adequate water to sustain the planted crops and in conserving fuel and water).

They determined that each planted section of the demplot would be entitled to water 8 times as follows: twice during the initial 15 days when the corn is newly planted and fertilized for the first time, up to 5 times at 15 day intervals throughout the growing period, and once after a 12 day interval at the end of the season when the corn begins to flower.

It was also resolved that pump operation time should be approximately 10 hours/day (between 7am and 7pm with a 2-hour break). This, they decided, was a reasonable work day for the pump operator (who receives a wage of Rp20,000/month but no overtime compensation). They also wanted to prevent unnecessary wear and tear on the pump; and they assumed that operating the pump for no more than 10 hours a day constituted moderate not excessive use.

Experience during the first planting season showed that only 20 to 30 are of the demplot could be watered in one day on the basis of a 10-hour/day pump operation schedule. Given the 6 ha. total planted area, this would set watering intervals at 20 days which is insufficient. During the first planting season P2AT borrowed the WHO drinking water well that is located in the demplot in order to supplement the water supply, and they often ran the pumps at one or both of the wells for as much as 20 hours a day. Thus, they were able to test watering intervals.

On the other hand, more water was needed during this first season than should be necessary in the future. The ground in the demplot was very dry and cracked and had to be flooded to soften it before farmers could begin preparations to plant. Secondly, the temporary irrigation ditches throughout the demplot were not well maintained and some water was lost to absorption as it flowed through these channels. Thirdly, there were frequent interruptions in pump operations due to mechanical failures. Initially, P2AT set up used pumps that had not been well maintained in the past and were not properly installed, such that there were breakdowns every week for the first half of the planting season.

P2AT and the farmers assume that the new pump provided for the demplot as well as the permanent irrigation channels now being constructed will improve the efficiency of pump operation and water flow. All things being equal in subsequent planting seasons, however, the hours of pump operation will have to be extended beyond the optimal 10 that Pak Hari and the P3A specified in order to provide enough water to meet their optimal irrigation schedule.

- Other factors that reduced the efficiency of the irrigation system during this first season stemmed from the inexperience of the farmers with irrigated palawija and with their initial scepticism about the potential for the demplot's success.:

- Farmers constantly feared that their land was too dry and therefore demanded to be given water as often as once every 5 to 7 days. It was only after one farmer's corn collapsed due to over-watering that the other farmers began to believe Pak Hari's claim that corn needs less water than they expected.

- At least 50% of the farmers did not follow the advice on planting contours and spacing provided both by Pak Hari and by the local PPL and PPM (who made only one brief trip to the demplot). They were advised to plant in straight rows 1m. apart with .5m. intervals between plants. They also suggested putting 2 seeds per hole. While about 25% of the farmers followed this advice, the others planted unevenly and put in as many as 3 or 4 seeds per hole.

- At least 25% of the farmers planted local (keser) seeds on their plots. This variety has a growing time of about 60 days. The other farmers planted the improved strains Arjuna and Harapan which take about 90 days. These seed varieties were scattered throughout the demplot which meant that water had to be provided at different intervals to adjacent plots and made coordination of water flow difficult and inefficient.

- Similarly, the farmers did not coordinate their fertilization schedule with the P3A leadership and Pak Hari despite their having agreed to do so during the first P3A meetings and discussions of demplot coordination. Thus, they might demand water after they had fertilized withouth regard for the established irrigation schedule. Since water is needed within 1 or 2 days of fertilization, irrigation distribution had to be reorganized each time a farmer fertilized out of turn.

By the end of this first planting season, however, all of the farmers said they were less sceptical of Pak Hari's agricultural advice and understood the necessity for strict coordination of irrigation distribution. As they began to sell their crops and earn money from palawija for the first time during the dry season they began talking about ways to improve their yields in the second palawija season to increase their income.

Fuel consumption during the first planting season demonstrates the discrepancy between the actual irrigation needs during the first season and the optimal system devised by Pak Hari and the farmers. Fuel consumption was as follows:

3000 l. solar (at Rp.242/l.)	=	Rp.726,000
40 l. pelumas oil (at RP.1000/l.)	=	<u>40,000</u>
Total		Pr.766,000

Given the consumption rate of about 1.5 liters of solar (diesel) per hour and the length of the first demplot irrigation season (roughly 100 days), the average pump operation per day was 20 hours. (This represents the combined fuel use for the pumps on both the P2AT and WHO wells, so operating time for each pump indiviudally was usually less than 20 hours a day.)

- It is not possible yet to estimate how many hours of pump operation will be necessary in the future. The permanent irrigation system is not finished so there have been no tests of the length of time it takes to get water to the remote parts of the demplot using the permanent primary channels. In addition, pump operations during the second palawija season were suspended on November 26 when the first rains of the wet season began to fall. Finally, as many as 90% of the farmers took Pak Hari's advice about coordinating the planting of improved variety seeds, about seed spacing, and about organizing an efficient fertilization schedule. Thus, conditions that minimized the efficiency of the first season have improved.

Pak Hari does not mention the P2AT pump's output in the attached report. For most of the season, however, it was measured at about 8 or 9 liters/second. Presumably this will remain the same in the future because the pump used for the latter half of the season is a new one that will remain in operation there.

2. Marketing

Every farmer in the demplot sold green corn at the end of the the harvest. The predominant marketing strategy was the sale of corn to buyers who came from Tarus where they have roadside vegetable stands. Tarus is located halfway between Kupang and Pukdale, approximately 15 km. from each.) The buyers brought their own labor to cut the corn and provided their own transport. They paid Rp.50/ear, regardless of size. They sold this corn at Rp. 100/ear in Tarus. Buyers from Kupang who bought corn in Tarus in turn sold it for between Rp. 100-200/ear in the Kupang Pasar Impres.

Farmers in Pukdale all said that they preferred to have the buyers come to them, despite the fact that they might have made more money selling the corn themselves in Tarus or Kupang. At least 75% of the demplot farmers have gardens and livestock in other locations and they prefer to have the time during the dry season to spend tending to these other interests. At least 5 demplot farmers or members of their families did take a small percentage of their corn to market themselves in Oesao and Kupang, but this was time consuming and, given transport costs, no more profitable than selling at the demplot. The Tarus buyers made about Rp. 25 on the corn they sold after transport and labor costs of roughly Rp. 6000 per truck load. (This is rather inexact because the buyers did not always purchase the same amount of corn per trip to Pukdale. Their loads ranged from under 1000 ears to over 3000.)

The breakdown of demplot corn yields, consumption, and sales is listed on page 3 of the attached report from Pak Hari. Note that there are more than the 23 demplot farmers listed. One farmer is listed twice because he has two separate plots within the demplot. The additional farmers listed are members of demplot farmers' families (e.g. sons, brothers) who were given the use of demplot land when the owners feared they would not have enough time to work their entire demplot property. In all cases, the individuals who were given land to farm had no share-cropping or rental obligations to the land owners. It is likely that there always will be additional people using demplot land, but these will not necessarily be the same individuals from one season to the next.

Roughly 43% of the corn harvested at the demplot during this first season was sold. The figures for the amounts of corn sold and dried for storage are reliable. The farmers noted these amounts for us and also reported them to the head of the P3A (who watched the corn sales closely throughout the demplot). In addition Pak Hari collected the information from house to house and I checked it when I returned to Timor after my trip to the US. The amount of corn consumed is less accurate. This is due to the fact that children and others picked the corn without telling anyone or noting down the amounts taken. Some farmers were able to monitor this, but those with young children and grandchildren, especially, could only estimate consumption rates above what they knew had been harvested.

The following summarizes the chart prepared by Pak Hari on

page 3 of the attached report:

# of farmers:	27
total demplot land holdings:	6.09ha.
total " " planted:	6 ha.
total # ears harvested:	221,510
total # ears sold:	95,440
total amount of sales:	Rp. 4,722,000
total number ears consumed:	27,760
total " " stored:	98,310

(The total sales figure is roughly Rp50,000 less than the total should be if all corn had sold at Rp.50. The average is about Rp49. The discrepancy is due to the sales by 4 farmers at the Oesao market where they reduced their price to 3 ears for Rp.100. (In the official process documentation report I will present in late February I should have data on two corn harvests. At that time I will compare individual farmers' ratios of sales to consumption and storage for each harvest.)

At least half of the farmers might have sold more corn but refused to sell their crop when it was just green. The preference among many people in Timor and elsewhere in NTT is for rather hard, mature kernels rather than younger, softer ones." Thus, some farmers kept their corn on the stalk as much as 2 weeks longer than was necessary, despite the requests of the buyers to allow them to harvest it green. Consequently, at least 10 of the farmers complained to Pak Hari and to me that they had been wrong about the harvest time and would have earned considerably more money had they listened to the people from Tarus and from Pak Hari who encouraged them to sell their crop earlier.

None of the farmers want to sell their dried corn. They are saving it to supplement their rice supply. In fact, people eat corn as a staple regularly and some prefer it to rice. The farmers can get a kilo of dried corn for every 5-10 ears of demplot corn. If they were to sell it, the price in the Oesao market is Rp.150/kg. and in Kupang Rp.225/kg.

3. Farming practices

As mentioned above, Pak Hari and the P3A determined that plants should be spaced .5 x 1 m. apart with 2 seeds planted per hole. Farmers experimented with various sizes of mounds and with planting corn on top of mounds or between raised rows or between furrows. Because there was no systematic attempt to experiment with planting procedures there was no convincing conclusion reached, though the leaders of the P3A said they favored planting on top of mounds to prevent the corn from being waterlogged.

There was no advice or penyuluhan provided by the PPL and PPM at the BPP in Naibonat regarding this. Their only assistance came just prior to the first planting in June when they attended a P3A meeting. The meeting was poorly attended and the PPL and PPM did not spend more than about 2 hours at the demplot. Their only advice was to plant improved varieties (preferable Arjuna - though they had none available either to give or to sell to the

farmers) and to space the corn as stated above. Later in the season when there was some problem with stem borers on 3 farmers' plots, the PPM suggested using the insecticide Sumithion, but he was unable to provide it himself.

Pak Hari advised on and assisted all of the farmers with fertilization. He suggested they use the chemical fertilizers urea and TSP in a concentration of 200kg. urea and 60 kg. TSP per hectare. Since there is no KUD in Pukdale and the agricultural extension workers were not forthcoming with assistance in acquiring the fertilizer, Pak Hari took orders and money from farmers to purchase fertilizer on their behalf from a distributor in Kupang. He then transported it free of charge in the P2AT pickup truck he uses to travel to the demplot. For the entire demplot, 1560 kg. should have been used by his calculation. In fact, only 750 kg. of urea and 150 kg. of TSP were used during this first season since some of the farmers failed to fertilize at all. The cost of fertilizer is Rp.100/kg.

The insecticide, Sumithion, costs rp.3000/liter. It is used in a concentration of 2cc/liter. Only 1 hectare needed treatment so the farmers who had the problem purchased and used a total of 2 liters (rp. 6000) of insecticide during the first demplot season.

Labor for preparing the demplot land, planting, and weeding and general maintenance all came from the demplot farmers' households with the exception of one. The father of the Kepala desa who owns .6 ha. in the demplot hired young men from elsewhere in the Kecamatan who help him with his rice crop as well to work for Rp.750/day for about 15 days altogether during the first demplot season. There were from 2 to 4 men working for him each day during this time.

Second demplot crop

The first farmer to plant the second crop did so on 23 September and all the demplot was planted by mid October. At a meeting of farmers on 19 September, it was decided that they all would plant improved variety corn (though some, in fact, ended up planting local seeds instead of or as well as Harapan or Arjuna because they already had the seeds). In the first season, two farmers had planted a total of about 10 are in peanuts. These grew successfully but both farmers complained that they were too much trouble to pick and to shell and that they preferred the ease of their corn crop. A total of about 10 kg. (clean) of peanuts were harvested and will be used for home consumption only. The selling price of peanuts in Oesao is Rp.1000 and in Kupang Rp.1250. These farmers consider their having grown peanuts a savings since they would have spent at least Rp.5000 to buy peanuts over the course of the next year.

It was also agreed that farmers must report to their P3A sub-group leader when they were ready to do anything that would require their plots' receiving water quickly (i.e., plant or fertilize) so that efficient distribution could be arranged for a number of plots in the same general area. The planting was more

or less staggered from one sub-group to another to make distribution easier and more effective. Theoretically this will make marketing more successful since the corn will not mature at the same time.

There were no problems with pump operations during the initial weeks of the second demplot season, in sharp contrast to the previous one. In addition, as mentioned above, the pump has not been used since 26 November when the first rains of the season began to fall. Although rainfall in December has been scant and intermittent, it has been enough to sustain the corn. The pump on the WHO well was used very little (less than a week) and was removed from the demplot in early November.

Unlike the previous season, farmers this time were willing to clean out their irrigation ditches. In general, they have become more active in discussions with the leadership of the P3A and with Pak Hari about irrigation distribution and agricultural techniques, and they are clearly interested in the demplot's success having made money on the first crop. In addition, they have had a lot of attention from highly placed officials from outside the village. Between the months of September and December they had visits from the U.S. Ambassador, Minister Sumarlin, a large group from the Ministry of Agriculture in Jakarta, the Australian Ambassador, the Governor (on at least 3 occasions), 2 television crews who shot footage for 2 different development-oriented t.v. programs, and the Bupati, Camat, and other local officials from the Kupang area.

In addition, a team from LIPI and Bogor have set aside 9 ha. near the Kepala desa's house (and site of another P2AT well) for trials of fruits and vegetables. These are mainly "luxury" foods such as durian, rambutan, various mango varieties, guavas, soy beans (which failed the first week they were planted), and others. The Governor visited this site and chastised the Kepala desa for allowing such a tiny trial area to be set up there. He suggested that trials should be made for food people really need and that they should cover tens or hundreds of hectares. He also told the Kepala desa and other villagers that they should be ashamed of the village getting so much attention, and that they should at least make the demplot neater and more presentable for outsiders. (He was referring to clogged irrigation ditches and broken dike walls, as well as unevenly spaced corn and visual evidence of very little weeding.)

Finally, many Kepala desas have visited the site to see it and have gone to P2AT in Kupang to demand that they be provided with wells too. People from other villages and from other parts of Pukdale regularly visit the demplot and ask to be allowed to take away buckets of drinking water, and there have been several requests to bring in a tank truck to get water villages in Oesao. These are issues that the leaders of the P3A will take up in a meeting later.

At this writing, 3 farmers have begun harvesting their second corn crop. They are following the same marketing procedure as they did in the previous season and the buyers from Tarus are coming as regularly as they did at that time. There is no other corn being harvested at this time in the greater Kupang region,

so the demand for Pukdale corn is high.

Construction of the permanent irrigation system

The contractors, C.V. Griya Permai, who are building a pump house and the permanent cement irrigation channels have asked for an extension of at least a month to finish their project. They had a deadline to the beginning of December, but the foundation of the pump house has not been laid and at least 30% of the channel is unfinished. During the early part of this second demplot planting season, farmers on whose land the permanent channels are located dug parallel ditches to channel water from the pump around the demplot since the new channels follow the path of the original temporary ditches. Pak Hari has been overseeing this construction project which has meant his being at the demplot 6 or 7 days a week nearly full time since construction began in earnest in September.

Cost estimates for P3A operation of the demplot

Pages 10 to 13 of Pak Hari's report provide a breakdown of estimated costs per hectare to individual farmers for using the demplot irrigation system once P2AT is no longer funding it. His for water to reach and irrigate 30 are of the demplot per day. His calculations, then, are for payment by hour for water. (As far as I know no other payment system has been considered, although this is not an issue that people at P2AT have discussed with us.) As I mentioned above, it is not clear how much difference the new permanent irrigation ditches will make to the speed of water flow.

The calculations include an honorarium of Rp.100 for both the pump operator and the person in charge of water distribution (who until now has been the head of the P3A with Pak Hari and the pump operator), as well as a Rp50 contribution to the P3A savings.

I regard Pak Hari's figures as optimistic since they presuppose no increase in the price of fuel. Furthermore, as he points out, our evidence to date shows that it takes 20 days to irrigate the entire demplot unless the hours of pump operation are extended beyond the optimal 10.

By Pak Hari's estimate, the cost to the farmer is Rp.180,312 for water and a total of Rp 217,312 if the cost of insecticide, fertilizer, and seeds are included. Compare this, for example, with the yield per hectare of farmer #20 on page 3 of Pak Hari's report 125 ha. - Rp800,000 total sales or Rp.640,000/hectare or #13 with 20 are at Rp150,000 or Rp.750,000/ha. By these estimates, the profit potential from corn is considerable. This assumes, however, that the market for corn will remain stable, that pump operations are smooth, that the crop is successful and, importantly, that farmers will be willing to pay the nearly Rp.700/hour that will be necessary to operate the system (at minimum). Most farmers' households sell vegetables,

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bananas, and coconuts to pay for weekly household purchases; and sell off rice (when they have a surplus), pigs, or cattle when larger sums are necessary. We do not know yet how they will respond to paying cash in advance of their harvest. (Note that the most popular method of payment for labor, tractor rental, and cattle treading to prepare sawah is by *bagi hasil* - deferred payment in shares of the harvest rather than in cash.) In addition, given the difference between distances to the pump from one part of the demplot to another, farmers will not pay equally relative to the size of their portion of the demplot. This may cause considerable difficulties for the P3A.

For comparative purposes, Pak Hari included calculations for the cost of irrigating peanuts and mung beans. These are based on figures from agricultural manuals rather than on local field experience, so they should be read as very rough estimates.

MEMO

TO: Alvin Newman
Project Manager, SSIMP

FROM: Suzanne E. Siskel
P2AT - Kupang, NTT

DATE: January 24, 1986

SUBJECT: Monitoring Log
January 1-19, 1986

1. PSA Activities

About 75% of the second crop of demplot corn has been harvested. All of the farmers have sold their corn to the vegetable vendors from Tarus at Rp.50/ear. There is very little other activity in the demplot now. The primary reason is that the farmers are spending their days tending vegetable gardens and fruit trees that are located elsewhere in the village.

The second reason for the farmers' absence is extraordinary. It involves a protracted court case in which at least 25% of the demplot membership have been participating. It is not directly related to demplot operations; nonetheless it is illuminating with respect to villagers' priorities regarding expenditure of time, money, and other resources; and it provides some useful background information about sources of tension we have noticed in demplot activities. See the addendum at the end of this memo for a description of the case.

2. PSA Meeting

At Pak Hari's encouragement, the head of the PSA called meeting for 5pm on 7 January. The meeting began two hours late. (The farmers had been attending a day-long religious service to pray for rain. It took place in the Oesao sawah and was led by leaders from each of the five officially recognized religions. The event was attended by all of the demplot farmers as well as hundreds of people from villages throughout the Oesao plain.)

A total of 13 men attended the PSA meeting. These included four of the five sub-group heads and eight demplot land owners. The others were members' sons who work on their fathers' demplot land. The head of the PSA had made up an agenda to which he stuck fairly closely as he directed the meeting. He opened the meeting with a request that everyone forget the technical and inter-personal problems with the demplot that they experienced last year. He also asked everyone to cooperate better than they had in the past. The important items covered in the meeting were:

Not Available Document

1) Demplot subscription fee (iuran):

As agreed at a previous meeting each farmer is obligated to pay the PSA treasury Rp.100 per .01 ha. of land they plant in the demplot. According to the calculations of Pak Hari and the PSA leadership, the total sum collected from the first harvest should be Rp.56000. Payments totalling Rp.6000 from three farmers were delinquent at the time of this meeting. Of these men, one said he had already paid the head of his subgroup but the money had not reached the PSA treasury yet.

Another man said he did not know he was supposed to pay because: a) he does not own any demplot land; and b) the farmer whose land he is using has been exempted from iuran payment. This introduces two general policy issues:

a) There are at least ten people (mainly sons or other relatives of demplot owners) who were given portions of demplot land by the owners to farm for the first demplot season. Use of this land is outright; i.e., there are no rental, sharecropping or other compensatory arrangements. For this reason, the PSA membership requires iuran payments from the individuals who actually farm demplot land regard less of whether or not they own the land. This may be paid directly to the PSA or given to the landowner to include with his own iuran payment.

b) At a previous meeting it was agreed that the landowner who gave .01 ha. of his land without compensation for the site of the pump house should be exempted from the iuran requirement. It is not clear whether this is a permanent exemption, but it holds at least for the first year of the demplot. Because this landowner is busy with his livestock and gardens most of the time, he gave .10 ha. of his land to other (landless) men to farm. After a brief discussion, the PSA membership firmly agreed that those men are not exempted from the iuran payment. The farmer whose payment was delinquent then agreed to pay his share.

The third outstanding iuran payment is problematic. One farmer has steadfastly refused to pay. He ignored the PSA decision to collect an iuran to be kept as a savings for the future. Rather, he regards this as a payment for water. He says that the water is provided free of charge by the government, so he should not be required to pay for it. This man has been a troublemaker from the onset of the project - spreading erroneous rumors that the head of the PSA gets paid a large salary from PSAT, asking for water out of turn, failing to clean out the irrigation ditches on his property, etc. He did not attend this meeting.

It was agreed that the same iuran charge could be required after the second harvest. Payment is based upon the amount of land planted, regardless of whether the crop succeeds, whether it is sold or consumed, etc. When the second iuran payments are complete, the PSA treasurer will establish a savings account at a bank in Kupang.

2) Third demplot crop:

All of the farmers want to plant rice and some already have begun to prepare seedbeds. Pak Hari emphasized that everyone must clean out their irrigation ditches and level off their plots of land to facilitate water flow. He said that they should plant their demplot sawah before preparing their paddy elsewhere in Fukdale and Oesso since the demplot is the only land that has a guaranteed water supply (and, therefore, the best chance of a successful crop). It was agreed that all seedbeds in the demplot must be used for demplot sawah only. No one will be allowed to transplant seedling to fields outside the demplot.

3) Business raised by P3A members:

Leadership of sub-groups - Members of sub-group A complained that their leader is inattentive to demplot needs. He did not attend this meeting and it is he who has not yet turned in all iuran fees he has collected. He does not arrange for water distribution when farmers ask for it. Consequently, all members of this sub-group have had to bypass him and request water from the head of the P3A, contrary to P3A regulations. Pak Hari said that this was a matter for sub-group A only. They should meet together with the leader and discuss the problem. If all agree, they should select a different leader from among their membership.

The leader of sub-group C (the man mentioned above who has not paid his iuran because he does not own the land he works) requested permission to resign from his position. He represents his father in the P3A and, because he is more active than his father, was chosen as head of his father's sub-group. He explained that he has been chosen to be secretary for a large water users' association elsewhere in the village (for sawah irrigation from a local river) and is too busy to do both jobs. Pak Hari suggested he call his sub-group together and discuss the matter with them first.

4) Issues raised by Pak Hari:

a) Official inauguration of demplot - PCAT has been waiting to serahkan (hand over) the demplot to the bupati of Tumpang until the permanent irrigation system is fully constructed. This should take place by the end of February. The bupati has visited the demplot on numerous occasions to accompany the U.S. and Australian Ambassadors, Menteri Sumartini, teams from the MOA, etc.; however he cannot officially recognize it as a viable project under kabupaten jurisdiction until the formal, of an opening ceremony has taken place.

b) Supplying water to outsiders - Unlike all demplot families who have wells by their homes for household water needs, villagers elsewhere in Fukdale have no local water supply. At the end of the dry season there were numerous requests every day from villagers who wanted to take buckets of demplot water to their homes. These requests were granted informally out of compassion by the pump operator or the head of the P3A, however

there was no PBA policy on the matter. There were also at least five requests from people elsewhere in Cassao who wanted to bring in tanks to pump water to supply large functions such as funerals and weddings (and, demplot members suspect, to sell). The kepala desa granted at least one of these requests, but it is not clear whether there was any compensation given for the water.

There was considerable debate over a policy of outside water user privileges and fees. The main terms of agreement were:

1) The demplot farmers are more fortunate than other people because water is being provided to them by the government free of charge (for the time being). The PBA members do not want to appear greedy by denying water to people in need. Thus, they will allow other villagers to take buckets of water from the demplot whenever the pump is in operation.

2) Outsiders (from Poldale or elsewhere) may get water in drums for extraordinary events such as weddings and funerals as long as the pump is running and provided that they wait until the daily irrigation water needs have been fulfilled.

3) A charge of Rp.1000 will be levied on outsiders who ask to have the pump turned on to supply them with water regardless of the amount of water they take.

4) This policy will be reviewed when PRAT has transferred the financial responsibility of demplot operation to the PBA.

Addendum

Puldale court case

About 25% of the P3A membership have been attending court sessions in Kupang approximately once a week for the past six weeks. The case involves a minor dispute that took place in Puldale three years ago between a teenaged boy and a middle-aged man from two principal Puldale families. The teenager struck the older man during a heated argument over the outcome of a soccer game. Neutral parties say that the problem stemmed from the teenager's (and his family's) jealousy of the older man's relative wealth. The families of both men are seeking retribution and have refused for three years to settle the dispute amicably. There were no significant injuries, property loss, etc.; and everyone involved agrees that the only issue is family honor.

After one of the first sessions the judge told the parties involved that the loser of the case will incur a fine of no more than Rp.2000 or 3000 but to settle the case it will take at least ten sessions. Nonetheless, each of the the parties wants to have the case resolved by the court. Each party spends about Rp30000-50000 each week on transport, food, and other expenses in Kupang when they hire trucks to take them into the city to attend the court sessions; and there is likely to be a large feast (i.e., slaughtering one or more head of cattle, pigs, and chickens) when the case finally is closed. The cost to each party involved will be over half a million rupiah by the time the case is settled.

Usually it is difficult to bring all members of the P3A together at once for a meeting or to perform communal labor tasks. When informed about a meeting many members say they cannot attend because they are too busy working on their land outside the demplot. In contrast, up to 50 villagers have accompanied the litigants to court for each session, spending a full day away from the village each trip. Family obligation to support the litigants as well as the recreational aspects of attending the court sessions have taken priority over villagers' other activities. The costs of the case - transport, food, court fees, etc. - are borne by the immediate families of the litigants. Additional contributions of money (Rp.5000 or more) and livestock (cattle, pigs, and goats) are provided by extended family members, among whom at least three are demplot landowners. One of these individuals is the man who refuses to pay his iuran debt of Rp.1400 from the first demplot harvest. His failure to pay is not due to a lack of funds.

The head of the P3A has been required to attend the court sessions as a neutral witness and representative of the village government (assistant village head). This means that he is absent from the demplot area one full day each week for the duration of the case. In addition, at least one of the five P3A subgroup heads also has been attending the sessions regularly. Since there is no agricultural activity occurring in the demplot at this time, the absence of the P3A leadership does not cause

serious difficulties. It will be a problem later, however, if these individuals are not available to establish and coordinate a water distribution system for the rice crop that will be planted within the next month.

Some of the problems of coordinating farmer activities in the demplot stem from inter-personal hostility related to this case. Members of at least 25% of the demplot families are close relatives of the family of the teenager involved in the litigation. They are angry with the head of the P3A whose court testimony and statements prior to the opening of the case indicate that the teenager is the guilty party. They have demanded water out of turn and when they did not need it, spread the gossip that the P3A head is paid a salary by PU, refused to attend meetings, and, in the case of the man mentioned above, failed to pay the required iuran. The head of the P3A has threatened to resign his position at least three times and has had to be convinced by Pak Hari to continue in the job.

I have described this case in some detail in order to illustrate one way in which the solidarity and success of the P3A can be threatened by outside problems. All of the people involved in this case are Rotinese, as are all farmers in the current demplot and in the prospective new demplot sites. Without dwelling on ethnic stereotypes, it is apposite to note that the Rotinese characteristically are fond of politicking, competitive, and, often, hot-tempered. At P3A meetings, farmers yell at one another, stomp out of the room in anger, and may refuse to participate in activities or to uphold decisions that have been agreed upon by the majority of the membership. Many demplot members as well as other (Rotinese) villagers say that a major problem for community organization and solidarity is the lack of effective local leadership because people often cannot agree on who should be given power and authority. They also reject outsiders who are not sensitive to local customs and who do not make an effort to understand their problems. Significantly, all the farmers respect Pak Hari and usually accept his advice and direction. They say that an outsider who tries to understand and work with them is potentially a more effective and better respected leader than someone from among their own community.

cc: D. Putman ARD/WRD

MEMO

TO: Alvin Newman
Project Manager, SSIMP

FROM: Suzanne E. Sishel
P2AT - Kupang, NTT

DATE: February 5, 1986

SUBJECT: Monitoring report - meetings at prospective demplot sites

1. Background

During the month of January Pak Basuki invited me to join a team from P2AT on visits to two sites where demplots are planned for the next fiscal year. He appointed Pak Hari as leader of the group because, he said, the other members of the staff do not know what to discuss with farmers. The team also included Suboro (acting head of the Perencanaan and Irigasi divisions - new to P2AT here and replacing Totok Rudjito), Sunarco (surveyor), Hengky (Staf Perencanaan) and Martono (Pelaksana Irigasi).

The new sites are Pariti and Fukdale II, where tubewells were drilled in 1985. Selection criteria used to determine these sites are vague. Geological and hydrological factors are cited as primary but there does not seem to have been a replicable systematic selection process.

Both new sites are familiar to WRD staff. Diana Putman and Martin Harratty visited the Pariti site in August, 1985. The well, located on land owned by the former kepala desa of Pariti, was drilled last June. The second site is located about one kilometer east of the Fukdale demplot access road. A well was drilled there in January, 1985, on land owned by the current kepala desa of Fukdale just off the main highway behind his house.

2. Pariti trip

Meeting arrangements

Pak Suboro and Pak Hengky visited the site two days prior to the meeting to inform the former kepala desa and ask that he contact the other farmers in the area. The meeting was scheduled for noon on Sunday (January 11) because this is the one day during the week when farmers usually are at home. Pak Hari and I planned to meet the other P2AT staff members in Pariti. They never arrived, however, so the meeting was conducted without the technical staff. One of the men was ill and cancelled the trip without informing us. This betokens a lack of coordination among P2AT staff members. The incident also suggests that some of the

P2AT staff are not aware of the importance of developing and maintaining good relations with (potential) project participants and beneficiaries.

General information

The village is similar in some regards to Pukdale. It is almost entirely Rotinese Protestant. People raise cattle, goats, and/or pigs. They grow one crop of rice during the rainy season and also plant corn and other vegetables in gardens adjacent to their homes. A PPL lives in Pariti. He visits the farmers regularly and is working with them to open up 50 ha. of unused land to plant padi gogo (dryland rice).

The road to Pariti is at its worst now due to heavy rains. Crane transports and other large PU vehicles that have traveled over it recently have accelerated the deterioration of the road. We took a CJ-7 which had to be in 4-wheel drive for the entire trip on the Pariti road (about 30 km. from the main highway to the site). For other vehicles, such as the Colt pick-up that Pak Hari uses to travel to Pukdale, the road is impassable.

Until the road connecting Pariti to the main highway was built, access to the village was by horse or boat. (The village is located near the eastern shore of Kupang Bay.) Now, however, few people own boats. Rather, they rely upon trucks and bemos that travel back and forth between Pariti and Kupang (about a two and a half hour trip) or to the town of Camplong (a drive of about an hour and a half from the village). As long as road conditions are good, then, there is a reliable communications and marketing link with other areas. During the rainy season, however, the village is relatively isolated.

We do not know whether or not marketing of demplot crops will be a significant problem here. P2AT has not investigated this or any other agricultural or socio-economic issues. Clearly, though, the ease with which people in Pukdale have been able to sell their corn is a luxury the Pariti farmers will not enjoy.

There has been a crisis of leadership in this village since the former kepala desa retired in 1977. A replacement was elected, but few villagers actually supported him so he was not installed in office. The former village head continues to be widely respected and influential but he is not interested in holding office again. Nonetheless, he has been the liason between P2AT and the villagers. The current village secretary acts as kepala desa at events such as our meeting with the farmers. He cannot exercise the authority vested in that position, however. Whether or not the lack of formal village leadership will cause problems for P2AT later is another unexplored issue.

Farmer meeting

The head of the Pukdale FSA and the pump operator asked to accompany us to Pariti. While their primary interest was recreational, their presence at the farmer meeting was very useful (see below). The meeting was held in the former kepala

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desa's home. It began on time, unlike the meetings we have in Pukdale where the farmers usually arrive late. Twenty-two men, including the village secretary, attended the meeting. These men have land in the general vicinity of the well. Since the P2AT staff has not demarkated the demplot, however, it is not clear yet whose land will benefit from the new irrigation system. Pak Hari spoke for about half an hour, covering the following points:

1) Request for land for the pumping facilities - There is no money in P2AT's budget to provide indemnification for the land on which wells are drilled or facilities built. Therefore, he asked whether or not the owner of the land around the well would be willing to give up to .61 ha. of land where a pump house could be constructed. This land would belong to the association of water users. The former kepala desa, owner of this land, said he would give as much as P2AT requested. Pak Hari explained that a formal letter of transfer would be prepared later.

2) Request for land for irrigation ditches - Pak Hari also asked whether or not anyone objected in principle to giving up sections of their land for irrigation ditches. He explained that P2AT does not know where the boundaries of the demplot will be, nor do they know exactly where ditches will be dug since the land has not been properly surveyed. There were no objections.

3) Water users' association - Pak Hari explained how the Pukdale PSA was formed and how it functions. He told the farmers that P2AT would fund the operations and maintenance of the pumping system for two years. During that period he would spend much of his time in Pariti in order to help them with the organization of water distribution. He said he would also help with agricultural activities, though he hoped the local PUL would work together with him in this endeavor.

4) Planting palawija - When the Pariti well was drilled, its debit was 10 liters/second. This, he explained, would not provide enough water for paddy during the dry season over the estimated 10 ha. area of the demplot. Thus, the farmers would be encouraged to plant corn or other palawija crops as the farmers in Pukdale have done.

5) Payment for water - The farmers will have to cover all operating costs of the irrigation system when P2AT is no longer actively involved in the demplot. Costs will be determined according to individual water consumption. There was utter silence in the room when Pak Hari asked whether or not the farmers agreed to pay for the water later on.

At that point, the head of the Pukdale PSA began speaking to the farmers in Rotinese. He described the Pukdale demplot in detail, giving a humorous account of the farmers' initial distrust of the project, their scepticism about the sincerity of

Pak Hari and about the involvement of a foreign woman in the demplot, etc. He also listed all the prominent foreign and Indonesian government officials who have visited the demplot and described the three occasions on which TVRI has had a "shooting" there. This talk not only clarified some of the information that Pak Hari had supplied, but also had the effect of breaking the ice with the farmers. When Pak Hari resumed his discussion farmers' faces were more animated and they nodded enthusiastically throughout the rest of his presentation.

6) Water users' association - The formation, functions, and activities of the PSA in Fukdale were described. After Pak Hari asked whether or not the farmers would be willing to form a such an organization in Pariti, the head of the Fukdale group added some anecdotes in Rotinese about his leadership of the PSA. One man asked whether there would be an operating budget for the association and who would provide the initial funds. Pak Hari explained the iuran collected after each Fukdale harvest. He emphasized that the frequency, amount, and form of payment would depend upon the Pariti farmers' preference.

7) Pump operator - After introducing the pump operator from Fukdale, Pak Hari explained his function and responsibilities. He said that someone in Pariti could be trained to take this job at the new demplot. The former kepala desa immediately suggested that his son take the job since he has had experience with diesel motors. There were no comments from the other farmers.

8) Study trips - Pak Hari mentioned his hope of taking farmers from Pariti and Fukdale on visits to one another's demplots so that they might discuss common problems and observe similarities and differences in farming techniques, etc. He also wants to take them to LPST, the PDP agricultural research and extension station at Sulabitetej. (He asked that funds be allotted for this purpose in the 86-87 DIP. I do not know for certain that this proposal was accepted.)

9) Monitoring - Pak Hari briefly described my work in Fukdale and then asked me to continue. I emphasized that the data we have collected is being used to measure the impact of the demplot and that it has no connection with IPEDA or other taxes. At that point, the head of the Fukdale PSA interrupted to reiterate what I had said. His offered a very funny (and good-natured) description of my interviewing farmers, walking around the fields, waiting for hours for farmer meetings to begin, etc. He also joked that he and the other farmers are becoming consultants too since they have begun to collect data on their own crop production.

The meeting ended with the former kepala desa's assurance to us that the farmers were all enthusiastic about the demplot. He said that they will begin clearing the land around the pump,

building fences, and digging temporary irrigation ditches as soon as P2AT requests that they do so.

3. Pukdale II meeting

Due to a lack of coordination between the kepala desa and RT from the area around the Pukdale II well, two planned meetings with farmers were not announced. The P2AT team was not aware of this problem until after we had arrived at the kepala desa's house on both occasions. The third scheduling was successful. All the farmers arrived for the meeting on time; though the technical team from P2AT came an hour and a half late.

Pak Hari began the meeting before the rest of the P2AT staff arrived. He covered the same issues as he had in Pariti. His presentation was less detailed because all of the Pukdale farmers are familiar with the original demplot. In fact, at least three potential participants in the new demplot own land in the original one.

Demplot boundaries

The only additional issue discussed is the problem of demarkating the new demplot. The original surveyor's map of the area does not depict accurately the contours of the land. In addition, it designates that the demplot should be located in an area comprised primarily of land owned by a large Kupang-based cattle export company, Timor Indah, as well as land owned by the kepala desa. Timor Indah owns eight hectares of pasture land adjacent to the kepala desa's property. It is fenced off with barbed wire and is not used for agriculture. The farmers describe the soil on Timor Indah's land as asem (acidic) and say that nothing has been grown successfully there.

The kepala desa made a dramatic speech in which he said he feels guilty that the P2AT well was drilled on his land. While he appreciates this good fortune, he recognizes that it is unfair to other farmers in the area whose land may not benefit from a new irrigation system. Thus, he decided that he and the former kepala desa (who has about one hectare near the new well and is also an owner in the original demplot) will divide up part of their land to be distributed equally to any farmers in the vicinity whose land is excluded from the new demplot.

It remains an open question as to whose land will fall within the demplot's boundaries after a new survey has been conducted. The farmers volunteered to open up a potential new (unsurveyed) area by felling large palm trees (lontar and gewang) located in a grove about 100 meters from the well. After the demplot land has been designated, the farmers will fence it and dig temporary irrigation ditches.

General discussion

1) Type of irrigation system to be installed - One farmer asked whether or not the permanent irrigation system must be

identical to the one at Fukdale I. He suggested that it might be more economical to install pipes rather than to line irrigation canals with concrete. He recommended that the savings in cost be applied toward extending the network. Pak Hari agreed that this seemed more reasonable than the system constructed at the original demplot. The kepala desa emphatically stated that pipes would not work. He cited the example of problems with the drinking water supply at the nearby military compound. Outsiders in need of a water source have bored numerous holes in the pipes there in order to tap into the military's drinking water supply.

Pak Suboro from P2AT explained that land around the Fukdale II well is lower than other (potential) sections of the demplot. Water pumped from the well must be elevated so that it can flow freely to all parts of the demplot, as was the case at Fukdale I. He rejected the idea of pumping water out through an elevated pipe (which was the temporary solution at the original demplot before permanent concrete channels were constructed). He also dismissed the possibility that water can be piped successfully to all sections of the new demplot. He conceded that a new survey was needed before such decisions could be made, however. (This was the only comment made by any members of the technical staff during the meeting.)

2) LIPI trial plot - A group from LIPI and Bogor are running a seed trial on 9 hectares of land in Fukdale adjacent to the prospective demplot site. They distributed a variety of seedlings for landowners there to cultivate. These include a number of vegetables as well as rambutan, harum manis mango, salak, durian, and other fruits that do not grow in Timor (and are considered luxury foods). The LIPI group also hoped to experiment with kedele (soybeans) but the seedlings died within a week of planting.

The kepala desa spoke to the farmers at the meeting at length in Rotinese. Then he explained to us that he had clarified the difference between the LIPI project and the P2AT demplot. He said that these should be kept separate. The LIPI plot is not supposed to be irrigated and no water from the demplot will be used there.

Conclusion

The village secretary, who had attended the meeting, read the minutes. I was impressed at his ability to summarize the proceedings and produce a final product as soon as the meeting's business was concluded.

The last point of the minutes was an item that had not been discussed openly. The secretary said that small plots of land would be given to Pak Hari and to me as a gesture of the villagers' appreciation of our help. (Apparently the kepala desa had mentioned this to the other farmers when he discussed the LIPI trial plot in bahasa Roti.)

Both of us thanked the villagers for this gesture, but explained that we cannot accept anything from them. Pak Hari

joked about becoming a farmer but very firmly refused the gift of land. He insisted that the village secretary strike any mention of this gift from the minutes and emphasized that there should be no further offers of this sort to him, to me, or to anyone else from P2AT.

Re-survey of demplot land

After the meeting, the technical staff from P2AT went out with the farmers to look at the palm grove the men intend to clear. The surveyor, Pak Sunarco, said that he would conduct a re-survey of the land within a week, weather permitting. (As far as I know this re-survey has not been prepared. A violent and prolonged storm hit the region a few days after this meeting occurred; so fieldwork of this sort had to be postponed.)

cc: D. Putman ARD/WRD

Memo

To: Alvin Newman,
Project Manager, SSIMP

Date: May 7, 1986

From: Suzanne Siskel
P2AT - Kupang, NTT

Subject: Monitoring Report
March-April, 1986

Note: This report is based on information collected by myself in March and by Hari Suwito in April. Due to a family emergency, I was away from Kupang in April.

Second demplot harvest

The second demplot harvest was completed in February. The head of the P3A and the leaders of each sub-group collected information about yields and sales for their own records. Pak Hari and I collected data on yields and sales as well as on the amount of land planted and the amounts of corn that were consumed and stored. (The yields and sales figures we collected corresponded to those supplied by the P3A.)

The chart on the next page lists each individual who planted palawija (in all cases, corn) during the second cropping season. There are four individuals listed who are not demplot owners, but are members of demplot owners' families who were granted unconditional use of small portions of demplot land. One demplot owner is listed twice because he owns two separate parcels in the demplot. The columns refer from left to right to the total amount of land in hectares owned by each farmer (or the amount of land granted to non-owners); amount of land actually planted; total number of ears of corn harvested; total number of ears sold; amount earned; number of ears consumed; and number of ears stored.

The total amount of land that was planted during this second season (5.34 ha.) was considerably less than that of the previous season (6.09ha). This was due to one farmer, the man who owns the largest single parcel in the demplot. His demplot land is located farther than any other from the pump and, consequently, it takes longer to flood it. Given the initial problems with the pumping system during the first harvest season, this farmer volunteered to delay planting on much of his land until the rest of the demplot had been planted and until the water supply was consistent. He planted 60% of his 1.25 ha. plot more than one month after the other farmers had planted their land; thus his first harvest was delayed. He decided not to

Results of the Second Demplot Harvest

1	Name	Land/ha.	Ha. plantd	#Ears	Ears Sold	Rupiah	Consumed	#Stored
2	Y. Ingunau	.60	.60	16300	7500	385000	2000	6800
3	L. Fangdae	.15	.15	5000	1000	50000	500	3500
4	A. Ingunau	.13	.13	4500	3850	192500	150	500
5	Y. Fangdae	.14	.14	4000	0	0	0	4000
6	B. Fangdae	.16	.16	5000	1000	50000	200	3800
7	P. Fangdae	.20	.20	7000	1500	75000	1000	4500
8	N. Fangdae	.15	.15	5500	1000	50000	250	4250
9	An. Fngdae	.23	.23	7500	1200	60000	500	5800
10	M. Manafe	.015	.015	500	0	0	500	0
11	C. Saudale	.15	.10	2000	0	0	0	2000
12	Y. Y. Kiuk	.14	.07	1500	0	0	0	1500
13	Yth. Kiuk	.10	.10	3000	1000	50000	500	1500
14	E. Fangdae	.28	.28	10500	2000	100000	2000	6500
15	L. Fangdae	.20	.20	7500	1500	75000	500	5500
16	Y. G. Kiuk	.25	.25	10000	1100	55000	2000	6900
17	Nikolas	.08	.08	2500	0	0	2500	0
18	Ay. Fgdae	.14	.14	5000	500	25000	500	4500
19	M. Fangdae	.15	.15	5500	2000	100000	1000	2500
20	S. Fangdae	1.25	.50	15000	0	0	5000	5000
21	F. Fangdae	.76	.76	28000	4000	200000	5000	19000
22	S. Ingunau	.20	.20	7000	500	25000	500	6000
23	Z. Ingunau	.17	.17	6000	500	25000	1000	4500
24	M. Jali	.20	.20	6500	2500	125000	500	3500
25	K. Kiuk	.06	.06	2000	360	18000	0	1640
26	M. Fangdae	.17	.17	6000	1200	60000	800	4000
27	D. Fangdae	.03	.03	1000	500	25000	500	0
28	E. Fangdae	.10	.10	3800	1100	55000	0	270
		<u>7.24</u>	<u>5.34</u>	<u>178,100</u>	<u>35,860</u>	<u>Rp1,800,000</u>	<u>27,400</u>	<u>106,390</u>

attempt a second crop on that 60% of his land since he feared the rains would begin prior to harvest time and would destroy his crop.

Farmers purposely sold less of their harvests this time in order to save dried corn to be used as a staple food for home consumption in the event of a poor rice crop.

The first two demplot seasons are compared below:

	<u>1st_season</u>	<u>2nd_season</u>
Total harvested	221,510 ears	178,100 ears
" sold	95,440 " (43%)	35,860 " (20%)
" amount of sales	Rp. 4,722,000	Rp. 1,800,000
Avg./ha.	Rp. 787,000	Rp. 337,172
Total consumed	27,760 ears	27,400 ears
" dried for storage (= ±15 ears/kg.)	98,310 " (6.5 tons)	106,390 " (7 tons)
Market value of dried corn (@Rp150/kg.)	Rp. 975,000	Rp. 1,050,000
Total cash value of crop	Rp. 5,697,000	Rp. 2,850,000
Total cash value per hectare	Rp. 949,500	Rp. 533,000

Rice crop

The demplot was fully planted in paddy rice by mid-March, and harvest is expected to take place between the end of May and mid-July. Three of the farmers have tried a new seed, Cipunegara, that was obtained from a relative of a Pukdale resident who lives in Java. According to the farmers, the growth cycle is 90 days, (somewhat shorter than other varieties). Given the uncertainty of rainfall, the shorter cropping period is desirable. On the other hand, neither the taste nor the texture of this rice is up to the standard of Oesao rice (IR strains and Cisadane) so the farmers do not know whether they can market it profitably.

The pump has been used to supply water to three parcels in the demplot within the past month. The farmers whose land needed flooding purchased the fuel themselves.

The promised fertilizer and insecticide from the local PPL and PPM has never been delivered, so the farmers have had to arrange to purchase these supplies as necessary from a private supplier in Oesao. Also, the PPL has not made regular visits to the demplot.

Government palawija project

In April farmers throughout the Oesao area were called to a meeting with the bupati, camat, and kabupaten agricultural officials. They were told about a new national program to increase palawija - especially soybean - production. Six villages in the Oesao basin, including Fukdale, have been chosen to participate in the first phase of the project in Timor. The Fukdale demplot area was designated specifically by the local PPL since it has a guaranteed water supply. There was no attempt by this or any other official to discuss using the demplot with P2AT staff, however. (Other areas were selected because of their proximity to rivers or springs.)

The farmers will be provided with seeds, fertilizer and insecticide on credit, although specific arrangements for procurement of these inputs have not been made yet. The farmers are certain that they will not profit by participating in the program since they do not think that their soybean crop will succeed (due to their total lack of experience with this crop). Furthermore, even if their crops are successful, they do not believe that there will be a market for their soybeans. In fact, neither tahu and tempe nor soybeans in any other form are consumed by natives of most areas in NTT.

cc: D. Putman ARD/WRD

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Annex B

Pukdale Demplot: Summary Description

Pukdale Demplot: Summary Description
February, 1986

Description

Location: - Pukdale, Kecamatan Oesao, Kabupaten Kupang Timur, NTT
- approximately 33 kilometers from Kupang
- accessible to main highway by approximately 1 km. of dirt road

Size: - 7 hectares

Traditional use of land:

- 1 rain-fed rice crop (planted between December and February depending upon rainfall) used as cash and subsistence crop
- left fallow and used for cattle grazing during dry season

Number of landowners: 23 households

Size of individual shares within demplot: - approximately 0.5 to 2.0 ha.

Size of shares as a percent of individuals' total land holdings:

- approximately 3-20% (all demplot farmers have rice land and gardens outside the demplot in Pukdale and/or in adjacent villages)

Other projects within demplot areas:

- WID drinking water well drilled by P.U. in 1982 but not scheduled to be used officially until 1986(?) (owner of land on which it was drilled bought a Rp.500,000 Honda kerosene pump in Kupang to use on this well to irrigate his plot of .6 ha)

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Irrigation system

Temporary facilities:

- 50 m tubewell dug by Waskita Karya (?) in Jan. 1985
- operative from May through November 1985 (until onset of rainy season rendered irrigation unnecessary)
- farmer-dug irrigation ditches
- a series of new and used pumps and generators from P2AT and Waskita Karya storage were installed over the course of about 5 months (break-downs in pump operations were due to poor condition of pumps in general, broken fan belts, worn pulleys, improper alignment of pulleys, etc.)
- all pumps used were diesel-powered (Ajax, Mitsubishi, Yanmar, Kubota) and had an output of between 5 to 10 liters per second
- at this rate it took between 30 and 50 hours to flood 1 hectare depending upon distance from the pump

Permanent system:

- smaller supplementary tubewells drilled in and near demplot (to be fitted with portable kerosene pumps)
- installed between August and February (completed roughly 2 months beyond contract deadline)
- cement lined irrigation canals around approximately 33% of demplot
- cement division box

- pump house with cement foundation; reed (bebak) walls; 3 sections: for pump, fuel storage, pump operator's shelter and office
- 13 hp (?) Kubota diesel powered centrifugal pump
- system untested at this time

Operating costs (temporary system) per 4 month crop season:

- Fuel: 3000 ltr diesel (@ 1.5 ltr/hour)		
	@ Rp. 242/ltr	Rp. 726,000
40 ltr oil (4 ltr/100 hours of operation)		
	@ Rp. 1,000/ltr	Rp. 40,000
- Pump operator's monthly wage		
	@ Rp. 20,000/month x 4	<u>Rp. 80,000</u>
	Total:	Rp. 846,000

- all costs met by P2AT
- repairs on the various pumps installed ranged from replacing fan belts of various sizes costing from Rp. 2,500 to 7,500 to buying new pulleys @ Rp. 25,000; but no total figure for all repairs made on the various pumps is available.
- other minor repairs were made by the pump operator and P2AT irrigation/agriculture staff member, Hari Suwito, without calling in P2AT mechanics (i.e., replacing rubber on leaky valve, cleaning out blocked fuel lines, and having minor welding done)

Costs of construction to be collected by USAID staff.

Agricultural Activity

- Cropping:
- 2 dry season corn crops on total planned area of 6 hectares
 - varieties planted: 60 day local (keser) - 25%
90 day HYV (Arjuna & Harapan) - 75%
 - Yield (ears) potential: 40,000/ha or 240,000/total demplot
(based on spacing of 1 x .5 meters, planting 2 seeds per hole)
 - Yield (ears) actual from first crop:
 - Total harvested - 221,510 ears
 - Total sold - 95,440 @ Rp. 50/ear
 - Total amount of sales Rp. 4,722,000
 - Average/hectare Rp. 787,000
 - Total consumed - 27,760 ears
 - Total dried for storage 98,310 ears (approx. 6.5 tons, market value @ Rp. 150/kg - Rp. 949,500)

Costs of production (maximum per hectare):

- seed 25 kg @ Rp. 200 Rp. 5,000
 - fertilizer 260 kg (TSP & Urea) @ Rp. 100/kg 26,000
 - insecticide 2 liters (Sumithion) @ Rp. 3000/ltr 6,000
- Rp. 37,000

No labor costs to date - labor is from within demplot families.

Estimated cost of water use (once P2AT is no longer funding everyday operations) based on payment by pumping hour as determined by P2AT irrigation staff:*

Fuel (1.5 lrr/hour @ Rp. 242/lrr	Kp. 363
Oil & grease	50
Operator honorarium	100
Care tender honorarium	100
Contribution to P2A savings	<u>50</u>
Total/hour	Rp. 663

Total estimated cost of water per hectare (based on calculation of 30-50 hours to flood 1 hectare and total of 8 floodings during one season cycle - as determined optimal by farmers and P2AT irrigation staff member through trial and error): Rp. 159,120 - 265,200.

Total estimated cost of production (irrigation plus agricultural inputs): Rp. 190,120 - 302,200.

*Note: Differences in cost of above vs new permanent system are unknown. Methods of payment other than per pumping hour have not been considered yet.

Extension activities:

- P2AT staff member, Hari Suwito, provided informal assistance in purchase of fertilizer and insecticide, advice on cropping methods and strategies, irrigation management etc, spending 6-7 days and 2-3 nights each week in demplot during first two crop seasons.
- PHM and PPL for Pukdale were inactive during first two cropping seasons, but began visiting demplot to assist with rice crop 1-2 days/week as of early January 1986. PHM arranged for supplies of fertilizer and insecticide to be available for cash or credit. (@ 1% interest)

Marketing:

- 43% of first crop sold
Over 95% sold to vendors coming to demplot who provided own labor for harvest and own transport.*
(cost was fixed for all demplot corn @ Rp. 50/ear)

*Demplot families preferred this system to marketing the corn themselves because no labor was required and sales were guaranteed, since demand exceeded production levels.

Farmer participation

PA:

- Formed May 1985 at instigation of P2AT irrigation staff (Hari Suwiro).

- Meetings held as deemed necessary approximately once every 6 weeks by head of P3A and P2AT irrigation staff (to discuss cropping strategies, marketing, water distribution, etc.)
- Farmers proposed establishing savings account to be used for repairs to pumping system when P2AT is no longer involved. Fees are Rp. 100 per .01 ha. of planted land (or Rp. 10,000/ha.)

General observations:

- Farmers have overcome initial scepticism about reliability of irrigation system primarily due to:
 - 1) dedication of Hari Suwiro and
 - 2) success of first harvests
- Indicators of increased farmer commitment:
 - 1) Increase from about 40% to over 75% of farmers followed Hari Suwiro's advice regarding fertilizer use, planting methods and irrigation management.
 - 2) Prompt payment of seasonal contribution to P3A treasury by 95% of membership.
 - 3) Discussions at meetings of crop rotation possibilities and marketing strategies.
 - 4) Coordination of planting schedule to facilitate water distribution for third bumper crop.

Draft only.

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