

The UHP initial linkages are illustrated in Figure 3 which depicts the initial funding component (DNR, NIA, Ford Foundation), research and outreach components (with AUDP and Kalahan Foundation), and links with other government units, such as BAI and UPSEC.

The Pilot Agro-forestry Project Design

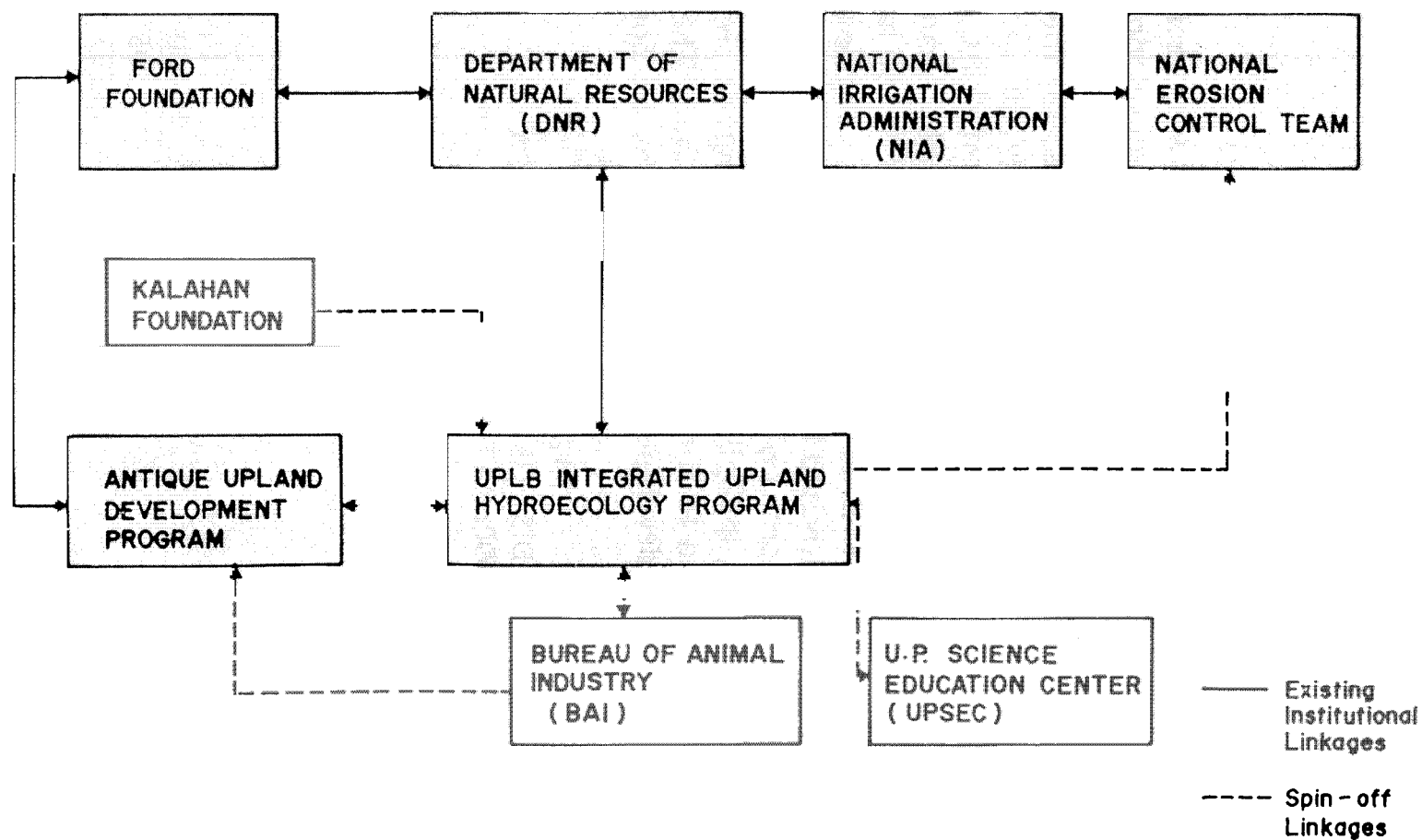
The UHP agro-forestation involves the following activities: (1) the setting up of a demonstration farm; (2) the development of a barangay nursery; (3) the securement and provision of farm inputs; (4) the application of various agro-forestry schemes; (5) the continuous education of the farmers in upland technology; (6) the development of community organizations, communication skills, cooperatives for marketing, and other activities; and (7) the securement of land tenure. The pilot project covers approximately 150 hectares of farmland tilled by the SAMABUN's Christian members, and 50 hectares of the areas cultivated by the Igorot members.

During the first few months of project implementation in 1977, mangoes, citrus, coconuts, ipil-ipil, and other seedlings as presented in Table 3 were distributed to the SAMABUN members. The experimentation nursery was developed. Farmers' classes on conserva-

Seedling type

Mangoes
 Budded citrus
 Dwarf coconut hybrids
 Cashew
 Jackfruit
 Coffee
 Pili
 Giant ipil-ipil
 (for borders)

Source: UHP (1980).



Source : UHP

FIGURE 3
EXISTING AND GENERATED INSTITUTIONAL LINKAGES OF THE UPLAND
HYDROECOLOGY PROGRAM IN 1978.

tion concepts were held, and observation trips were made to UPLB and UHP stations in Mt. Makiling and Batangas.

The UHP generally facilitated the acquisition of the tree seedlings, and the farmers were left on their own with respect to adapting the suggested agricultural component. Diversification is a key feature of the AFDP, as depicted by the demonstration farm's layout in Figure 4. In addition, the following are illustrated:

- (a) the construction of rice terraces;
- (b) the presence of the following tree crops: kakawate, mango, jackfruit, citrus, coconut;
- (c) the use of a legume, *stylosanthes guyanenses*, as cover;
- (d) the interspersing of tree crops with agricultural crops such as sorghum, sweet potato, mapinta;
- (e) a well and a farm pond (marked "W" and "FP");
- (f) the training center (SP); and
- (g) a pasture area for goats and carabao.

The demonstration farm serves as an experiment station for the researchers and as a concrete example to the farmer cooperators on how agro-forestation could benefit from: observations of schemes at the demonstration farm, UHP training activities, and community efforts to develop and maintain the nursery aside from the farm.

Data Sources and Limitations

The major events directly relevant to the implementation of the Villarica AFDP and the present analysis are summarized in Table 4. The timing of the studies conducted by various research groups vis-à-vis the important AFDP-related activities indicate that: (a) base line information is available from the NIA-IBP, MADECOR, and NCSO studies; (b) researches which are conducted by the project implementors characterize initial AFDP and community conditions; and (c) the ESIA/WID survey was undertaken only within two years of project implementation.

The ESIA/WID survey — conducted a year after the UHP socioeconomic surveys were made — was designed mainly to look into the project processes, initial impacts, and interrelationships with other development projects. It focused on a sample of Pantabangan residents, including the Villarica AFDP cooperators. On the other hand, the UHP studies focused on Villarica residents only. Differen-

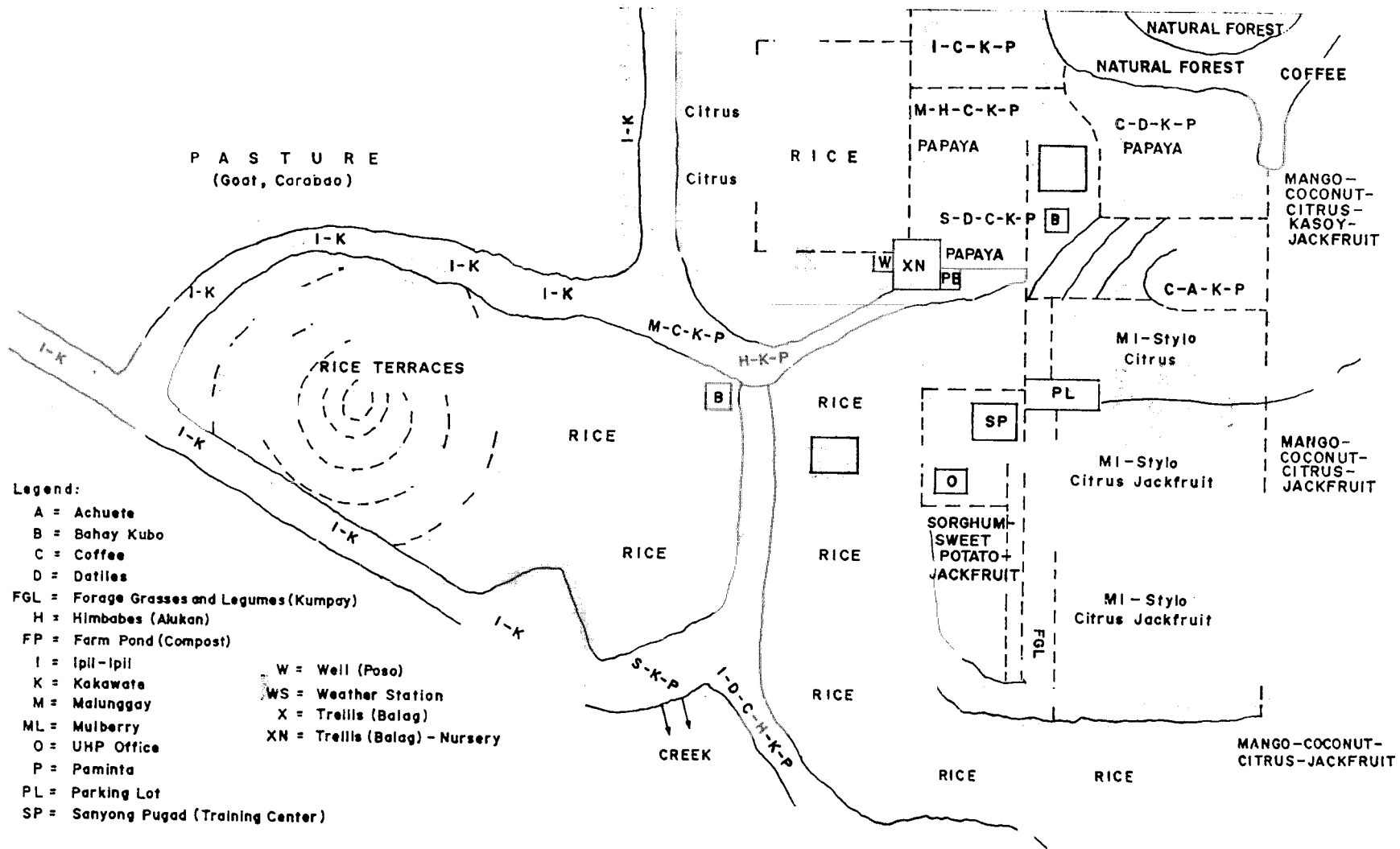


FIGURE 4
THE VILLARICA AFDP DEMONSTRATION FARM

TABLE 4
MAJOR EVENTS WHICH ARE RELEVANT TO AGRO-FORESTATION IN VILLARICA, PANTABANGAN

Quarter Year				
	January-March	April-June	July-September	October-December
pre-1978	*relocation of old Pantabangan town residents to New Pantabangan and other resettlement sites (1973) *provision of support activities such as the World Food Program; training of skills in fishing, rabbit raising, dressmaking, among others. ° surveys conducted by NIA-IEP, NIA-MADECOR, NCSO.			
1978		*ARGSOD orientation and ship training program — start of series of training seminars (representative sample of Pantabangan residents) covering 200 participants	*identification of constraints of grassland rehabilitation (UHP)	*start of BFD communal tree farming (21 Villarica families) *first publication of Balitang Pantabangan
1979	*organization of SAMABUN Christian cooperators *preparation of UHP demonstration farm *start of transport of seedlings to Villarica	*UHP intensive farmers' classes *start of ARGSOD Phase II *petitions for provision of inputs filed at different government agencies (ARGSOD) non-Villarica	*organization of Igorot cooperators of UHP AFDP ° UHP survey (economics team)	*first meeting of credit union (ARGSOD) *establishment of permanent orchard nurseries

Table 4 (Continued)

Quarter Year				
	January-March	April-June	July-September	October-December
			°ARGSOD evaluation of trainees	°UHP survey (sociology team)
1980	*building of farm ponds (UHP) *preparation of marketing arm for funding by PBSP and registration with SEC *seeding of fruit trees at nurseries (SAMABUN) *building of training center for farmers at demonstra- tion site (UHP) *preparation of study site (UHP) *building of fire breaks	*allocation of seedlings to SAMABUN members *zoning of individual farms	*preparation of credit union's registration with MLGCD (ARGSOD) *typhoon ARING	°ESIA/WID survey *replacement of Panta- bangan Mayor

ces in survey instruments between the ESIA/WID and the UHP surveys also deterred any comparisons between variables covered by both surveys.

In addition, the ESIA/WID survey employed nonstratified random sampling for its research design to assure the inclusion of an adequate number of respondents who were taking part in various forest conservation activities. On the other hand, the earlier studies conducted by the MADECOR, NIA/IEP and NCSO did not use the same sampling design. Thus, any comparisons that may be made on certain variables covered by the two sets of studies are either supplemented by additional information or made with certain qualifications in the present study.

In addition to these information sources, the UHP annual reports, the research papers produced by graduate students working under the advisorship of UHP personnel, and data gathered through constant communication with project implementors were used in the progress and impact studies. More often than not, such information is unbiased since it is generated by individuals who are interested in learning lessons from the pilot project being undertaken on agro-forestation. In fact, the present investigator found the project implementors quite frank about their own assessment of the project's progress, whether positive or negative.

Villarica: Site Profile

a. Environment

The soil characteristics of the Villarica cooperators' farms are presented in Table 5. They indicate that (1) the soil is more acidic, (2) organic content is lower, and (3) available phosphorus is lower in content than that of Puting Lupa, Mt. Makiling. However, the available phosphorus for the Villarica sample (2.16 ppm) is higher than that of the sample obtained from another part of Pantabangan (1.56 ppm).

Lucero's (1981) study of termites at a .6-hectare farm left unattended by a farmer who had found employment at the BFD local office yields important information. The farm was intentionally burned earlier, to facilitate clearing and subsequent cultivation. The dominance of cogon, which is characteristic of areas subjected

TABLE 5
SOIL CHARACTERISTICS OF VILLARICA AFDP COOPERATORS' FARMS^a

Farm Lot Number	pH	Organic Matter (%)	Available phosphorus (ppm)	Calcium (ml/100g)	Magnesium (ml/100g)
1	5.70	0.75	0	34.71	12.97
2	5.10	3.22	1.40	20.45	12.67
3	5.55	3.19	0.70	36.60	10.31
4	7.20	4.60	26.95	33.99	6.87
5	6.18	2.79	8.05	29.67	9.64
6	6.05	2.41	7.70	28.69	9.45
7	5.55	2.59	5.95	33.93	12.37
8	6.18	1.96	2.80	38.49	8.59
9	5.32	2.59	0	28.17	10.87
10	5.42	2.51	0	27.53	11.57
11	5.50	2.67	0	16.67	7.63
12	5.65	3.34	5.60	36.74	9.66
13	5.32	2.84	4.20	22.32	7.45
14	5.72	2.60	0.35	23.82	10.15
15	6.10	2.48	4.55	32.10	6.99
16	5.20	2.67	0.35	24.47	15.83
17	5.40	3.00	0.35	37.27	13.05
18	5.25	2.22	0	16.26	11.82
19	5.32	3.32	0	14.04	10.20
20	5.20	1.70	0	26.34	8.79
21	5.58	3.45	2.45	31.13	12.32
22	5.60	0.97	0	30.91	10.43
23	5.95	2.70	1.75	3.24	9.24
24	5.28	2.41	0	33.03	12.78
25	5.72	3.67	10.85	30.76	10.05
26	5.90	1.89	2.45	35.31	12.46
27	5.65	2.41	1.05	31.10	9.62
28	5.30	3.06	16.45	27.41	10.57
29	5.85	2.93	2.10	33.85	12.54
Average	5.65	2.65	3.66	29.18	10.58

a. Taken at a depth of 0-20 centimeters.

Source: Lucero (1981)

to burning, and the presence of the fire-tolerant species, alibangbang, is evident.

Lucero's findings indicate the following:

- (a) Soil pH, organic matter and nutrient content of termite-modified soil are generally lower than those of surrounding soil.
- (b) "The amount of soil carried by termites above ground is strongly dependent on the amount of litter biomass on the ground" as in the case of higher soil transport figures for the secondary forest area.

Another study by a UHP researcher, Baguinon (1981), focuses on earthworm activity to gather basic information related to the earthworm's role in enhancing soil fertility. Baguinon's study indicates that: (a) there are "more earthworm species in secondary forests than either grassland or ipil-ipil"; (b) factors other than pH or soil acidity affect earthworm species distribution and composition; and (c) earthworms' seasonal activities are affected by the rainfall pattern. The study then recommends further research on some species in Villarica to focus on the following: (a) grassland fire management aspects related to earthworm activity, and (b) production and dissemination of earthworm species which can survive deforestation and which could aid in the restoration of soil fertility.

Notably, such studies are generally exploratory and therefore need to be followed by other researches. Moreover, they present early project conditions of the Villarica farms; they do not focus yet on farms which have applied the agro-forestation scheme.

b. Income, Production/Productivity and Labor

Tables 6 and 7 illustrate the income distribution of a sample of Villarica cooperators and noncooperators, based on a survey by the UHP sociology research team. The annual family income before the farmers resettled in Villarica was higher, on the average, than the income after resettlement, even while the figures are expressed in current terms. For instance, for the UHP cooperators, only 8.5 percent reported an annual income of at most ₱1,000; in 1978, 41 percent already reported such income. Obviously, farmers' income (at least from their point of view) decreased considerably

TABLE 6
ANNUAL FAMILY INCOME BEFORE RESETTLING IN VILLARICA

Income	SAMABUN Members		Non-Members	
	Number	Percent of total	Number	Percent of total
P1,000 or below	5	8.5	2	13.3
P1,001 — P3,000	16	27.1	3	20.0
3,001 — 5,000	16	27.1	4	26.7
5,001 — 7,000	14	23.7	2	13.3
7,001 — 9,000	4	6.8	2	13.3
9,001 — 11,000	2	3.4	1	6.7
above 11,000	—	—	1	6.7
no estimate	2	3.4	—	—
Total	59	100.0	15	100.0

Source: Samonte (1980, Table 8).

TABLE 7
TOTAL INCOME OF VILLARICA RESPONDENTS IN 1978

Income	SAMABUN Members		Non-Members	
	Number	Percent of total	Number	Percent of total
P1,000 or below	24	40.7	6	40.0
P1,001 — P3,000	27	45.8	4	26.7
3,001 — 5,000	4	6.8	4	26.7
5,001 — 7,000	3	5.1	1	6.7
7,001 — 9,000	1	1.7	—	—
Total	59	100.0	15	100.0

Source: Samonte (1980, Table 9).

upon transfer to the resettlement area. Floro (1980a) thus speaks of the "marginalization of farmers" due to the displacement which occurred after the dam's construction.

Several private and public agencies provided assistance to the community to improve the quality of life of the newly resettled Pantabangeños. The World Food Program donated food while the Ministry of Agrarian Reform (MAR) gave out subsistence loans and direct production assistance.

Farm production is mostly for subsistence, especially in the case of rice. Table 8 shows that 88 percent of the UHP economic research team's survey respondents consumed all of the rice that they produced and that vegetable production did not have a marketable surplus, while the fuelwood gathered was mainly for household consumption. Floro (1980) reported on production becoming more labor-intensive, though channelled at low productive activities, partly due to a marked lack of alternative income-gathering activities. Floro's analysis was based on the figures presented in Table 9 which were gathered through interviews with some of the farmers. More man-days are spent on land preparation, watering, and weeding in the upland area than in the rainfed lowland farm. The overall difference in labor input amounts to 120 man-days.

Contrary to the 1974 Pantabangan profile of cash income coming mainly from employment, the major occupation particularly for the Villarica residents in 1979 was farming. This is evident from Table 10 which shows a small difference between the proportion farmers for the project cooperators versus the noncooperators.

Employment in the National Irrigation Administration (NIA), which is a prominent government agency in the watershed, has not been a promising source of income. Table 11 shows that, of the high percentage of Villarica residents who formerly worked at NIA (in 1974), 61 percent were permanently terminated from their jobs. In addition, of those 16 who were still employed with NIA in 1979, four laborers, or 25 percent, were temporarily terminated, i.e., laid off for a few months before being hired again.

And yet, prospects for employment with other agencies or a private firm may be bleak, since there is not much commercial activity in the watershed, and the education of the residents is inadequate. Table 12 shows that only 3.4 percent of the Villarica project cooperators have had some college education.

TABLE 8
PERCENTAGE SHARES OF SELECTED TOTAL OUTPUT TO THE MARKET, BY NUMBER OF SAMPLE
HOUSEHOLDS AS OF 1979, VILLARICA, PANTABANGAN, NUEVA ECIIJA

Percentage sold to market (%)	TYPE OF OUTPUT							
	Palay No. of house- holds engaged in production ^a	Percent- age	Vegetables No. of house- holds engaged in production	Percent- age	Fuelwood No. of house- holds engaged in production	Percent- age	Fish No. of house- holds engaged in production	Percent- age
0	35	87.5	14	30.4	51	83.6	3	50
1 – 20%	3	7.5	4	8.7	3	5	—	—
21 – 40%	1	2.5	3	6.5	—	—	—	—
41 – 60%	1	2.5	4	8.7	1	1.6	1	16.7
61 – 80%	—	—	5	10.9	—	—	—	—
81 – 100%	—	—	7	15.2	6	9.8	2	33.3
Total	40	100.0	46 ^b	100.0	61	100.0	6	100.0

a. This includes households who rent out their farms and get a share of the harvest.

b. Figures do not add up to total.

Source: Floro (1980b), Table 2.

TABLE 9
COMPARISON OF LABOR REQUIREMENT IN LAND CULTIVATION
(FOR PALAY), 1972 AND 1979
BARRIO VILLARICA, PANTABANGAN, NUEVA ECIJA

Tasks	Total man-days for land cultivation (per hectare)	
	Before resettlement ^a 1972	After resettlement ^b 1979
Land Preparation		
Land clearing (<i>Paghahawan</i>)	12	89
Plowing (<i>Pag-aararo</i>)	12	18
Planting (<i>Pagtanim</i>)	6	3
Watering (<i>Pagdidilig</i>)	12	45
Weeding (<i>Paggagamas</i>)	30	36
Fertilizer application	.2	.5
Harvesting and processing (<i>Pag-aani at Pagpapasan</i>)	34	39
Total	106.2	229.5

a. This is for a rainfed lowland area.

b. This is for a nonirrigated upland area adopting the nonburning method of clearing.

Source: Floro (1980b), Table 3.

TABLE 10
PRIMARY OCCUPATION OF VILLARICA RESPONDENTS, 1979

Occupation	SAMABUN Members		Non-Members	
	Number	Percent of total	Number	Percent of total
Farmer	51	86.4	11	73.3
BFD employee	2	3.4		
UHP laborer	1	1.7	—	
NIA laborer	2	3.4	1	6.7
Sotrekeeper	1	1.7		
Hair stylist/ dressmaker	1	1.7		
Driver			1	6.7
Fisherman			2	13.3

Source: Samonte (1980), Table 54.

TABLE 11
1979 STATUS OF NIA's TEMPORARY LABORERS
FROM BARRIO VILLARICA, PANTABANGAN, NUEVA ECIIJA HIRED
IN 1974

	Number	Percent ^a
Temporary NIA laborers	16	39
a) No period of termination	12	29
b) Temporarily terminated between periods of employment	4	10
Permanently terminated NIA laborers	25	61
a) Urban worker (outside Pantabangan)	8	24
b) Kaingin farmer	10	20
c) Marginal employment	3	7
d) Fisherman	2	5
e) Unemployed	2	5
Total	41	100

a. The sum of percentages is slightly above 100 because of the rounding of figures.

Source: Floro (1980a), Table 16; based on data from NIA Records Division, Pantabangan, Nueva Ecija.

TABLE 12
EDUCATIONAL ATTAINMENT OF VILLARICA RESPONDENTS, 1979

	SAMABUN Members		Non-Members	
	Number	Percent of total	Number	Percent of total
None	7	11.9	1	6.7
Grade I-IV	15	25.4	8	53.3
Grade V-VI	30	50.8	5	33.3
I-IV years, high school	5	8.5	1	6.7
I-V years, college	2	3.4	—	—
Total	59	100.0	15	100.0

Source: Samonte (1980), Table 3.

The educational profile is a little better for the respondents' family members: the nonproject cooperators' distribution of family members according to highest educational attainment indicates better educated siblings (Table 13).

With such a minimal chance of improving the standard of living for most residents of Villarica, it is no wonder, then, that out-migration occurs more frequently among the tenant farmers, as well as among the hired nonagricultural workers (Table 14). The presence of landless workers is also indicated in the table.

TABLE 13
EDUCATIONAL ATTAINMENT OF VILLARICA RESPONDENTS'
FAMILY MEMBERS, 1979

	SAMABUN Member		Non-Member	
	Number	Percent of total	Number	Percent of total
None	83	28.4	24	25.3
Kindergarten	9	3.1	7	7.4
Grade I-IV	70	24.1	15	15.8
Grade V-VI	62	21.3	26	27.4
1st - 4th year, H.S.	57	19.6	10	10.5
1st - 4th year, college	9	3.1	13	3.7
Graduate	1	nil		
Total	291	100.0	95	100.0

Source: Samonte (1980), Table 5.

TABLE 14
OCCUPATIONS OF OUT-MIGRANTS FROM BARRIO VILLARICA,
PANTABANGAN, NUEVA ECIJA AS OF JANUARY, 1980

Occupation	Number	Percent
1. Tenant-farmer	13	45
2. Hired non-agricultural worker	10	34
3. Owner-cultivator or independent farmer	3	10
4. Self-employed	2	7
5. Agricultural landless worker	1	4
Total	29	100

Source: Floro (1980b), Table 4.