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**THE CONSEQUENCES OF SMALL RICE FARM MECHANIZATION PROJECT**

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**CONSEQUENCES OF FARM MECHANIZATION PROJECT  
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#### ABSTRACT

*A brief description of the sample areas and villages selected for the Consequences of Farm Mechanization study in the Philippines is presented. Data came from the household census in March 1979 and household surveys in the 1979 wet season and 1980 dry season. Results show that there were no significant differences across villages in the demographic characteristics of households, average farm area and land use. Marked differences were seen when villages were compared in terms of irrigated area, cropping intensity, land tenure, degree of mechanization and assets. The degree of mechanization, measured in terms of area plowed by machine, was found to be closely associated with irrigation, cropping intensity and assets.*

## INTRODUCTION

The Philippine component of the Consequences of Farm Mechanization Project was conducted in Cabanatuan City and the town of Guimba in Nueva Ecija province. The province is located in Central Luzon region, which is considered to be the rice granary of the Philippines. Table 1 shows the region's share in rice production, relative to other regions, from 1970 to 1977. Some 13 - 20% of Philippine rice is produced in Central Luzon. The second table shows Nueva Ecija's average yield /ha compared to all provinces for the years 1972 to 1979; yields in this province were 16 - 17% higher than the national average.

Cabanatuan city is predominantly irrigated and highly mechanized. As of 1976, roughly 60% of the riceland was irrigated and there were about 185 2- and 4-wheel tractors in the city.<sup>1/</sup> In contrast, only 20% of the riceland in Guimba was irrigated although the tractor population, at 160 in 1976 was quite comparable.

The eight village sites are described in the succeeding paragraphs. The results presented came from the household census conducted in March-April 1979 and the sample surveys conducted during the wet season of 1979 and the dry season of 1980. The household census covered all households in the village while the survey covered stratified randomly selected households in villages.

### Demographic characteristics of sample villages.

Results from the household census show that in 1979 a majority of the household heads in the sample villages were farmers (Table 3). The highest percentage of farm households was in San Andres (87%), followed by Narvacan and Galvan with approximately 80%. The share of the landless labor households varied in each village from 5-18%. The percentage of non-agricultural workers was much higher in the villages in Cabanatuan City than in Guimba. This might be explained by the villages' proximity to the city proper where a variety of non-farm employment opportunities are to be found.

Table 4 presents some demographic characteristics of the sample households by village. The average age of the household head ranged from 40-48 years, average education of household head was about 4-5 years and average experience of farm operating household heads ranged from 14-22 years. The average total number of children was almost the same across villages at 6 per household. By age group, except in one village (Narvacan), the number of children 10 years and over exceeded those below 10 years.

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<sup>1/</sup> Census of Agriculture, Bureau of Agricultural Economics 1976. (Unpublished).

## Agro-economic characteristics of sample villages

### Land and farm characteristics

The physical and farm characteristics of each village are presented in Table 5. Bunol had the largest area of farmland, approximately 422 has. Average farm area was similar in every village at approximately 2.0 has. while the average number of parcels per farm ranged from 1.08 in Caalibangbangan to 1.59 in San Andres. The variation in average size of holding becomes more pronounced when the comparison across villages is made by land tenure category. From Table 6, results from the wet season survey show that average size of owned land ranged from 1.30 - 2.54 has., partly-owned land from 1.50 - 5.00 has., leased land from 1.40 - 2.60 has. and share-cropped land from 1.30 - 4.00 has.

By land use, almost all the total farm area in every village was planted to improved rice (Table 7). Only a very small portion of the land was planted to traditional rice, corn and other crops such as sorghum, tomatoes, mungbeans, stringbeans and fresh chillies. Yield of improved rice ranged from 1.6 - 4.5 tons/ha. during the wet season and 1.9 - 4.7 tons/ha. during the dry season (Table 8). Yield of traditional rice was from 0.7 - 3.3 tons/ha during the wet season and 4.0 - 5.5 tons/ha. during the dry season. By village, Lagare registered the highest yield during both seasons. The average rice cropping intensity for the households included in the census ranged from 103-199%; the highest being in the gravity-irrigated villages of San Isidro, Lagare and Caalibangbangan.

The distribution of farm area by water regime is shown in Table 9. As expected, most of the area in irrigated villages (San Isidro, Lagare and Caalibangbangan) was double cropped while in the rest of the villages less than 10% of the area was double cropped. Exceptions were the villages of Narvacan I and Bunol where the percentage of double cropped parcels were comparatively high (33-47%) due to a number of irrigation pumps (see Table 12).

Some of the agro-ecological conditions of the villages are shown in Table 10. From interviews with farmers, although each village reported different soil colors, all were predominantly clay loams, except for Kalikid Sur where soil texture was predominantly sandy loam. In terms of topography most of the area in each village but Kalikid Sur was flat. Hence, only a small area faced restricting factors such as waterlogging/flooding, general infertility, and sandiness.

### Degree of mechanization and comparative labor inputs

To determine the level of mechanization in each of the villages, we used the following as indicators: (a) area tilled by machine vs. animal (Table 11); (2) ownership of machines and draft animals by residents (Table 12). Using the 1978 wet season data, the villages were classified into 3 levels of mechanization: highly mechanized, moderately mechanized and non-mechanized. The highly mechanized villages were San Isidro, Lagare and Caalibangbangan. In these, about 94-98% of the area were plowed using 2-and/or 4-wheel tractor only or in combination with a carabao<sup>2/</sup> (Table 11). The area tilled by machine was 62% in Bunol and 71% in San Andres, and these were classified as moderately mechanized. In contrast, the mechanized area in Kalikid Sur, Galvan and Narvaca I comprised only 26-33% of the total, the remainder being plowed by carabao.

The distribution of the sources of power is shown in Table 12. For more meaningful results, we expressed the number of each type of power source in relation to total farm area in every tillage. Thus, San Isidro may be said to have the highest farm land: carabao ratio at 10. In contrast, it had the lowest land: 2-wheel tractor ratio at 5.67 compared to 422 has/2-wheel tractor in Bunol. This implies that San Isidro had the lowest carabao population yet the highest tractor population in 1979.

In terms of labor input, Table 13 shows that the labor input for land preparation in the wet season was 35-164% higher on non-mechanized compared to mechanized farms. In the dry season, the difference was more pronounced at 123-369%. Looking at total labor input, a significant difference between farm types existed in Galvan during the wet season and in San Isidro and Caalibangbangan during the dry season.

A more interesting point came out when comparison was made between seasons. The same table shows that while labor input on mechanized farms were almost identical in both seasons, labor input on non-mechanized farms increased by as much as 84% in the dry season. This may be attributed partly to the following: (1) higher labor requirement for land preparation due to harder and drier soil; (2) higher labor requirement for care/cultivation (specifically, irrigation), as in the case of pump irrigated farms; and (3) higher labor requirement for post-production activities due primarily to higher yields.

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<sup>2/</sup> In this combination, the animal is used for plowing the corners of the field.

### Economic characteristics

Some of the economic characteristics of the villages are presented in Tables 14 and 15. In the wet season of 1979, the combined off- and non-farm income per household was highest in Bunol at about US \$388 and lowest in Narvacan at US \$33. In the rest of the villages, average supplementary income ranged from US\$156-295. By source, average income and employment from non-farm activities were significantly higher than those from off-farm activities in all villages. The main reason for this is that non-farm activities consist mostly of regular type of employment, thus requiring regular working days and generating regular income. In contrast, employment off-farm is seasonal. The same pattern was seen in the dry season (except for San Isidro where average off-farm income was slightly higher than income from non-farm activities). In terms of total income, the average per household (at US \$128-313) was generally less variant across villages compared to the previous season. Also, during this season there were more households with supplementary income, most of which was derived from non-farm sources. The increase in the number of households with supplementary income may be due to the fact that some farm households, specifically those without irrigation facilities, could not cultivate their farms during the dry season.

As of wet season 1979 average total assets ranged from US \$1678-2993 per households. The highest average was found in San Isidro while the lowest was in Bunol. In general, the major assets were agricultural land, farm machinery non-agricultural land and animals (draft and productive combined).

### Summary

Although the sample villages are located in two different areas, they were homogenous in terms of occupational distribution of households, demographic features of households, farm holding and land use. In 1979, 48-87% of the households in the villages were headed by a farmer about 40-48 years of age and who had a formal education of 4-5 years. The average size of farm holding was around 2.0 has. planted primarily to improved variety of rice.

The villages varied when comparisons were made related to water regime, land tenure and mechanization. In general, except in Kalikid Sur, farms in the villages located in Cabanatuan City, i.e., San Isidro, Lagare and Caalibanglangan, were irrigated-double cropped. This is mainly because of the presence of gravity-irrigation in the area. The same villages exhibited a high level of mechanization, as evidenced by the fact that in 1978, 94-98% of their farm area were plowed using mechanical power. In contrast, mechanized area in Kalikid Sur, Galvan

and Narvacan I covered only 26-33% of the total area which is predominantly rainfed. An exception was Narvacan I where more than 50% of the total area was pump-irrigated. With regard to land tenure, the distribution of farms varied greatly across villages and the observed trend was not found to be associated with either mechanization or water control.

Table 1. Regional distribution of rice production, Philippines, 1970-1977.

Region	1970	1971	1972	1973	1974	1975	1976	1977
Philippines (000 sacks of 50 kgs)	104668	106858	102002	88292	111883	113201	123189	129121
	<u>% Total Production</u>							
Ilocos	12.3	12.2	12.8	9.7	9.7	7.5	9.4	7.9
Cagayan Valley	9.8	13.1	13.3	13.0	12.0	12.6	12.0	12.6
Central Luzon	19.1	18.9	12.9	17.8	19.6	17.7	16.2	16.0
Southern Tagalog	12.3	12.5	11.7	14.1	12.7	12.8	12.5	12.7
Bicol	10.6	7.1	10.7	9.9	9.8	10.3	10.0	10.2
Western Visayas	10.7	11.4	11.3	11.8	11.8	12.2	12.5	13.9
Central Visayas	1.5	2.0	2.1	2.00	2.1	2.0	2.0	2.1
Eastern Visayas	4.1	4.8	4.4	4.1	3.7	3.8	3.7	3.6
Western Mindanao	4.5	2.8	2.9	3.8	4.3	4.6	4.8	4.9
Northern Mindanao	5.3	6.4	6.6	5.4	5.8	6.7	6.9	7.2
Southern Mindanao	9.8	8.8	11.3	8.4	8.5	9.8	10.0	8.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Bureau of Agricultural Economics.

**Table 2. Comparative paddy yield in Nueva Ecija and in all provinces,\*  
1972-1979 (kg./ha).**

Crop year	Yield (kg./ha)	
	Nueva Ecija	All provinces
1972/73	1,746.8	1,416.8
1973/74	2,081.2	1,628.0
1974/75	1,852.4	1,601.6
1975/76	1,993.2	1,720.4
1976/77	2,485.0	1,820.0
1977/78	3,115.0	1,965.0
1978/79	3,540.0	2,075.0

\* Average for all provinces.

Source: Bureau of Agricultural Economics, Statistics Division.

Table 3. Distribution of households by occupational group in 8 villages of Cabanatuan City and Guimba, Nueva Ecija, March 1979.

Village	Total no.	Distribution by occupational group (%)		
		Farm operator	Landless laborer	Non-agricultural worker
<u>Cabanatuan</u>				
1. San Isidro	200	55.5	15.5	29.0
2. Lagare	153	69.9	18.3	11.8
3. Kalikid Sur	282	48.9	5.3	45.7
4. Caalibangbangan	410	48.3	17.1	34.6
<u>Guimba</u>				
1. Galvan	134	80.6	14.2	5.2
2. Narvacan I	89	80.9	7.9	11.2
3. San Andres	125	87.2	11.2	1.6
4. Bunol	283	70.3	17.3	12.4
<b>TOTAL</b>	<b>1676</b>	<b>62.2</b>	<b>13.9</b>	<b>23.9</b>

Table 4. Demographic characteristics by village, wet season 1979: Nueva Ecija, Philippines.

Demographic characteristics	AREA/VILLAGE							
	CABANATUAN				GUIMBA			
	San Isidro	Lagare	Kalikid Sur	Caalibang-bangan	Galvan	Narvacan I	San Andres	Bunol
0. No. of households	49	47	24	77	35	39	45	53
1. Average age of HH head (yrs)	47.6	46.3	45.1	44.7	46.3	39.7	41.6	45.1
2. Average education of HH head (yrs)	4.9	3.7	3.9	4.6	3.9	4.8	5.4	5.1
3. Average experience in farming (yrs) (farm operators only)	22.4	17.5	18.9	21.12	21.50	14.2	17.1	19.3
4. Average HH composition (excl. permanent laborer)								
Male (10 years and over)	2.4	2.0	2.7	2.3	2.2	2.0	2.2	2.2
Female (10 years and over)	2.1	2.2	2.0	1.9	2.1	1.6	1.9	2.1
Child (male or female below 10 yrs.)	1.3	1.2	1.2	1.7	1.2	2.0	1.5	1.2
Total	5.9	5.4	5.9	5.9	5.5	5.6	5.6	5.5
5. Average no. of permanent laborers/HH								
Male	0.1			0.2	0.3	0.3	0.1	0.1
Female								
Total	0.1			0.2	0.3	0.3	0.1	0.1

Table 5. Farm characteristics of 8 villages in Cabanatuan and Guimba, Nueva Ecija, Philippines, wet season, 1978.

Item	San Isidro	Lagare	Kalikid	Caalibang-bangan	Galvan	Narvacan	San Andres	Bunol
0. Total land area								
1. Number of farms	111	107	138	198	108	72	109	199
2. Total farm area	260.71	194.48	374.33	358.53	188.25	130.47	215.67	421.92
3. Average farm area	2.35	1.82	2.71	1.81	1.74	1.81	1.98	2.12
4. Total no. of parcels operated	152	131	162	214	131	87	173	260
5. No. of parcels per farm	1.37	1.22	1.17	1.08	1.21	1.21	1.59	1.31
6. Total area planted to rice	254.31	194.48	293.38	348.93	183.25	129.45	209.21	394.24
7. Average area planted to rice	2.29	1.82	213	1.76	1.70	1.80	1.94	1.98
8. Overall rice cropping intensity (%)	200,1	178,9	107,2	179,6	104,5	154.4	107,3	134,8

Table 6. Tenure of cultivators by village, wet season 1979 and dry season 1980: Nueva Ecija, Philippines.

Type of land tenure holding	AREA/VILLAGE															
	CABANATUAN								GUMBA							
	San Isidro		Lagare		Kalikid Sur		Caalibangbangan		Galvan		Narvacan I		San Andres		Bunol	
WS	DS	WS	DS	WS	DS <sup>b/</sup>	WS	DS	WS	DS	WS	DS	WS	DS	WS	DS	
Owner <sup>a/</sup> (>75% owned)																
Total landholding (ha.)	27.97	32.12	3.90	3.90	33.50		69.88	80.27	66.74	6.10	62.46	27.95	71.22	23.19	8.4	12.20
Average size of holding	2.54	2.14	1.30	1.30	4.20		2.18	2.11	2.0	1.52	2.23	2.15	2.16	2.11	2.1	1.74
No. of reporting	11	15	3	3	8		32	38	33	4	28	13	33	11	4	7
Part owner <sup>a/</sup> (25-75% owned)																
Total landholding	16.40	13.85	15.00	10.30	5.00		3.35				1.50		14.70		10.50	
Average size of holding	3.28	4.62	5.00	5.15	5.00		1.68				1.50		2.45		3.50	
No. of reporting	5	3	3	2	1		2				1		6		3	
Lessee																
Total landholding	55.65	41.25	70.91	73.46	23.42		37.70	21.84		2.00					53.88	28.18
Average size of holding	2.32	2.58	2.15	2.16	2.60		1.4	1.56		1.00					1.86	1.48
No. reporting	24	16	33	34	9		23	14		2					29	19
Share-cropper																
Total landholding			2.25	1.50	3.25			1.10			4.00					1.50
Average size of holding			1.3	1.50	1.62			1.10			4.00					0.75
No. reporting			2	1	2			1			1					2
Others																
Total landholding	6.00	13.40		2.50	9.25		1.25	6.25	0.75	0.50	10.00	2.00	3.85	3.60	17.75	7.30
Average size of holding	6.00	2.23		2.50	3.08		0.63	1.56	0.75	0.50	1.25	1.00	1.28	0.90	2.54	1.46
No. reporting	1	6		1	3		2	4	1	1	8	2	3	4	7	5

<sup>a/</sup> Includes amortizing owners.

<sup>b/</sup> No cultivation during this season due to the absence of irrigation facilities.

Table 7. Land use by village, wet season 1979 and dry season 1980: Nueva Ecija, Philippines.

Land use	AREA/VILLAGE															
	CABANATUAN						GUIMBA									
	San Isidro		Lagare		Kalikid Sur		Caalibangbanaan		Galvan		Narvacan I		San Andres		Panol	
WS	DS	WS	DS	WS	DS	WS	DS	WS	DS	WS	DS	WS	DS	WS	DS	
1. No. of households	49	49	47	47	24	24	76	76	35	35	39	39	45	45	53	53
No. reporting a crop	41	40	41	41	23	0	59	59	35	7	37	15	42	15	43	24
Total landholding (ha)	146.02	100.62	92.06	91.66	75.42		112.18	109.46	67.11	8.60	77.96	29.95	89.77	26.79	90.53	49.18
Total area of cropped land	105.02	98.67	89.81	90.66	45.72		108.32	107.67	60.24	2.95	70.66	12.55	84.16	9.56	77.95	24.41
2. Total area devoted to:																
a) Main crops																
Rice traditional					1.40			0.50	0.50				0.25		2.25	0.50
Rice improved	105.02	98.67	89.81	90.66	44.22		105.42	105.07	59.74	2.95	69.66	11.55	33.91	9.56	74.55	23.91
Corn & others traditional							2.40	2.10							1.15	
Corn & others improved							0.50				1.00	1.00				
b) Second crops																
c) Third crops																

Table 8. Comparative area and yield by village, wet season 1979 and dry season 1980, Nueva Ecija, Philippines.

Area/Village/ Average yield	No. report- ing		MAIN CROP																
			Rice trad.		Rice imp.		Corn trad.		Corn imp.		OTHER CROPS								
			WS	DS	WS	DS	WS	DS	WS	DS	Fresh chillies		Stringbeans		Tomatoes		Mungbeans		Sorghu
										WS	DS	WS	DS	WS	DS	WS	DS	DS	
<b>CABANATUAN</b>																			
1. San Isidro	41	40																	
Yield (kg/ha)					3224	3647													
Area (ha)					105.02	98.67													
2. Lagare	41	41																	
Yield (kg/ha)					4545	4694													
Area (ha)					89.81	93.66													
3. Kalikid Sur	23	-																	
Yield (kg/ha)						1609													
Area (ha)					690	44.32													
4. Caalibangbangan	59	59																	
Yield (kg/ha)					4000	3717	4332	188	-										
Area (ha)					0.50	105.42	105.07	1.30	0.25			4387	309	2213	4028	9317	3000	576	1000
												0.60	0.35	0.15	1.00	0.35	0.25	0.50	0.25
<b>GUIMBA</b>																			
1. Galvan	35	7																	
Yield (kg/ha)						1953	2865												
Area (ha)					1380	59.74	2.95												
2. Narvacan I	37	15																	
Yield (kg/ha)						2278	2649	0											
Area (ha)						69.66	10.55	1.00											1628
																			1.00
3. San Andres	42	15																	
Yield (kg/ha)						1945	1928												
Area (ha)					3312	83.91	9.56												
4. Bunol	43	34																	
Yield (kg/ha)					1446	2332	3877	78											
Area (ha)					1.75	74.55	23.91	1.15											

Table 9. Distribution of farm area by level of irrigation, 8 villages in Cabanatuan and Guimba, Nueva Ecija, Philippines, wet season, 1978.

Village	Total has.	% Rainfed	AREA		
			1 crop	% Irrigated	
				2 crops	3 or more crops
<u>Cabanatuan</u>					
1. San Isidro	260.71	18	15.7	65.0	17.5
2. Lagare	194.48	1.0	20.1	78.9	-
3. Kalikid Sur	374.33	91.6	1.2	7.2	-
4. Caalibangbangap	358.53	0.6	19.8	79.6	
<u>Guimba</u>					
1. Galvan	188.25	91.2	4.3	4.5	-
2. Narvacan I	130.47	31.5	14.2	54.3	-
3. San Andres	215.67	91.3	1.4	7.3	-
4. Bunol	421.92	54.3	10.9	34.2	-

Table 10. Agro-ecological conditions by crop by village, wet season 1979: Nueva Ecija, Philippines.

Agro-ecological condition	San Isidro			Lacare			Kalikid Sur			Csalibangbanan			Galvan			Narvacan I			San Andres			Eunol		
	Rice imp. ha	Rice trad. ha	Other crops ha	Rice imp. ha	Rice trad. ha	Other crops ha	Rice imp. ha	Rice trad. ha	Other crops ha	Rice imp. ha	Rice trad. ha	Other crops ha	Rice imp. ha	Rice trad. ha	Other crops ha	Rice imp. ha	Rice trad. ha	Other crops ha	Rice imp. ha	Rice trad. ha	Other crops ha	Rice imp. ha	Rice trad. ha	Other crops ha
Total area	106.02			91.05		1.0	71.32	2.9		107.58		3.95	65.99			75.96		1.0	69.773			81.53		9.0
1. Soil texture																								
a. clay	3.0			5.00			2.0			1.3			9.5			-			18.4			29.1		
b. clay loam	34.0			37.6		1.0	15.0			65.18		1.5	36.29			64.66			50.603			30.8		
c. loam	3.5			8.3			-			0.9			-		-	-			1.25			3.0		
d. silt	-			-			-			5.5			-		-	-			-			3.0		
e. silt loam	-			2.1			14.02	2.5		8.0		0.6	-		2.0		1.0		2.75			4.0		
f. sandy	13.5			7.4			16.5	1.4		8.9			4.8		1.8				6.18			1.7		3.5
g. sandy loam	29.62			30.46			24.0			17.8		1.85	15.4		7.5				10.59			18.93		5.5
2. Soil color																								
a. red	12.5			26.65			36.52	1.4		13.05		0.5	3.0		4.55				3.24			6.25		
b. gray	19.25			-			-			13.01		0.45	13.4		15.5				27.853			15.25		
c. brown	37.3			41.26			19.5			25.3			22.05		26.75		1.0		22.98			37.73		9.0
d. black	32.5			23.15		1.0	15.5	2.5		56.22		3.0	27.54		29.16				35.7			10.7		
e. others	4.47			-			-			-			-		-				-			-		
3. Topography																								
a. flat	89.02			74.46		1.0	21.25			84.23		2.8	55.59		59.33		1.0		66.533			66.3		8.0
b. sloping	14.15			15.2			46.27	3.9		25.35		1.15	10.30		13.25				21.84			9.73		1.0
c. steep	-			-			-			-			-		-				-			-		
d. very steep	-			-			-			-			-		3.25				-			-		
e. corraced	2.85			1.4			3.0			-			-		1.13				1.0			3.0		
f. others	-			-			1.0			-			-		-				-			2.5		
4. Restricting factors																								
a. waterlogging/slogging	9.5			30.8			7.0			27.05		1.75	10.7		33.23		1.0		13.98			1.25		
b. general infertility	2.0			-			4.5	1.4		1.0			2.4		-				3.0			-		
c. erosion	-			-			-			-			-		-				-			-		
d. rocks and stones	-			-			1.25			-			-		-				-			-		
e. sandiness	-			-			7.5			-			-		-				-			-		
f. marshiness	-			-			-			-			-		-				-			-		
g. salinity	-			-			-			-			-		-				-			-		
h. others	-			-			-			-			-		-				-			-		
i. none	94.52			60.26		1.0	51.27	2.5		79.53		2.2	52.89		42.23				74.388			89.24		9.0

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Table 11. Distribution of area by primary tillage (ploughing) used, 8 villages in Cabanatuan and Guimba, Nueva Ecija, Philippines, wet season 1978.

Village	Total area (has)	% Distribution of area by primary tillage used						TOTAL
		Carabao	2-wheel	4-wheel	carabao+ 2-wheel	carabao+ 4-wheel	2-wheel+ 4-wheel	
<u>Cabanatuan</u>								
1. San Isidro	260.71	1.6	50.3	1.3	45.4	1.4	-	100.0
2. Lagare	194.48	6.4	51.3	5.4	26.6	8.5	1.8	100.0
3. Kalikid Sur	374.33	73.8	1.6	7.7	14.8	1.6	0.5	100.0
4. Caalibangbangan	258.53	6.1	18.4	14.6	33.3	13.7	13.9	100.0
<u>Guimba</u>								
1. Galvan	188.25	70.9	0.8	1.9	21.2	2.8	2.4	100.0
2. Narvacan I	130.47	67.0	5.2	15.0	2.7	5.7	4.4	100.0
3. San Andres	215.67	28.6	11.9	9.4	29.0	13.6	7.5	100.0
4. Bunol	421.92	38.2	2.2	16.7	9.0	6.9	27.0	100.0

Table 12. Number of farm power sources and land-power source ratio in 8 villages in Nueva Ecija, Philippines, March 1979.

Village	Number						Land-power source ratio*(has/carabao or machine)					
	Carabao	2-wheel	4-wheel	Thresher	Rice Mill	Pump	Carabao	2-wheel	4-wheel	Thresher	Rice Mill	Pump
<b><u>Cabanatuan</u></b>												
1. San Isidro	26	46	1	4	2	3	10.02	5.67	260.71	65.18	130.36	86.90
2. Lagare	43	33	1	-	-	2	4.52	5.89	194.48	-	-	97.24
3. Kalikid Sur	202	-	-	-	-	9	1.85	-	-	-	-	41.59
4. Caalibangbangan	149	16	4	2	2	2	2.41	22.41	89.63	179.27	179.27	179.27
<b><u>Guimba</u></b>												
1. Galvan	49	1	-	-	-	4	3.84	188.25	-	-	-	47.06
2. Narvacan I	57	-	-	-	-	27	2.29	-	-	-	-	4.83
3. San Andres	78	4	-	-	-	20	2.76	53.92	-	-	-	10.78
4. Bunol	166	1	2	2	2	36	2.54	421.92	210.96	210.96	210.96	11.72

\*Total farm area over number of draft animals or machines.

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Table 13. Comparative labor input by type of farm in 8 villages in Cabanatuan and Guimba, Nueva Ecija:  
Wet Season 1979 and Dry season 1980 (man-days/ha).

Type of farm/season	San Isidro	Lagare	Kalikid Sur	Caali- bangbangan	Galvan	Narvacan I	San Andres	Bunol
<u>WET SEASON 1979</u>								
Mechanized farms*								
Land preparation	4.2	5.6	***	4.4	8.5	***	5.3	***
Total labor input	57.2	60.6		56.2	59.3		65.0	
Non-mechanized farms**								
Land preparation	***	***	12.2	7.0	11.1	13.7	14.0	12.3
Total labor input			71.8	59.7	66.6	79.1	70.6	61.1
<u>DRY SEASON 1980</u>								
Mechanized farms								
Land preparation	4.6	4.7	-	4.1	-	***	***	-
Total labor input	58.9	52.8	-	54.4	-			-
Non-mechanized farms								
Land preparation	21.6	10.5	-	14.0	23.9	16.5	16.7	20.3
Total labor input	80.6	49.8	-	60.4	122.3	82.0	90.0	101.6

\* Refer to farms which were prepared (i.e., plowed, harrowed, levelled) using a 2-wheel tractor only or in combination with a carabao.

\*\* Refer to farms which were prepared using a carabao.

\*\*\* Excluded due to very few observations (less than 3 farms).

Table 14. Average employment and income from off- and non-farm sources by village, Nueva Ecija, Philippines, wet season 1979 and dry season 1980.

Source of household income	AREA/VILLAGE							
	CABANATUAN				GUIMBA			
	San Isidro	Lagare	Kalikid Sur	Caalibang-bangan	Galvan	Narvacan I	San Andres	Bunol
<u>WET SEASON 1979</u>								
1. Off-farm								
No. of households	8	10	1	16	6	6	7	13
Ave. no. of members per HH	5.6	7	2	5	5	3	6	5
Ave. employment (days) per HH	122	97	20	93	66	43	92	162
Ave. income per HH(US\$)*	125.72	141.41	45.20	137.37	161.31	32.91	80.78	199.50
2. Non-farm								
No. of households	8	5	7	24	9		6	12
Ave. no. of members per HH	7	6	6	7	6		6	6
Ave. employment (days) per HH	142	105	167	159	183		169	197
Ave. income per HH US\$)*	353.92	167.39	217.51	303.89	255.13		439.00	591.53
3. Mixed off- and non-farm								
No. of households	1			1	1			
Ave. no. of members per HH	8			5	5			
Ave. employment (days) per HH	201			108	208			
Ave. income per HH(US\$)*	396.00			67.73	263.73			
4. Total off- and non-farm								
No. of households	19	16	8	41	16	6	13	25
Ave. no. of members per HH	7	7	5	6	5	5.5	6	6
Ave. employment (days) per HH	129	97	149	130	128	43	127	178
Ave. income per HH(US\$)*	294.88	156.11	195.97	231.91	204.00	32.91	246.11	387.69
<u>DRY SEASON 1980</u>								
1. Off-farm								
No. of households	8	7	1	16	6	4	16	12
Ave. no. of members per HH	6.3	6.6	4	5.6	5.3	5.0	6.6	6.0
Ave. employment per HH(days)	134	150	17	79	73	23	40	137
Ave. income per HH(US \$)**	260.81	193.48	43.42	123.87	89.67	54.38	52.93	191.55
2. Non-farm								
No of households	12	6	7	17	17	11	8	16
Ave. no. of members per HH	7.3	6.0	5.3	6.4	5.8	7.6	5.4	4.2
Ave. employment per HH(days)	148	109	128	115	133	86	103	123
Ave. income per HH(US \$)**	223.23	225.72	383.06	327.51	260.04	201.36	277.04	294.79
3. Mixed off- and non-farm								
No. of households	2	1	1	1	2			
Ave. no. of members per HH	5.5	8.0	3.0	7.0	4.5			
Ave. employment per HH(days)	219	274	25	126	124			
Ave. income per HH(US \$)**	840.13	251.32	94.21	328.95	299.28			
4. Total off- and non-farm								
No. of households	22	14	9	34	25	15	24	28
Ave. no. of members per HH	6.8	6.4	4.9	6.0	5.6	6.9	6.2	5.0
Ave. employment per HH(days)	149	141	104	98	118	69	61	129
Ave. income per HH(US \$)**	292.98	211.43	313.23	231.72	222.29	162.17	127.63	250.54

\*US \$1=₱7.50

\*\*US \$1=₱7.60

Table 15. Average present value of assets by village, wet season 1979: Nueva Ecija, Philippines (US\$)\*

Type of asset	San Isidro	Lagare	Kalikid Sur	Caali-bangbangan	Galvan	Narvacan I	San Andres	Bunol
0. No. of samples	49	47	24	77	35	39	45	53
1. Draft animals	91.16	107.23	336.11	182.68	138.29	234.45	243.17	172.58
2. Productive animals	91.78	75.98	124.36	44.89	71.03	81.08	69.51	102.98
3. Buildings	121.67	140.18	55.25	132.16	32.91	61.85	148.06	63.02
4. Farm implements or tools	140.66	139.49	67.08	96.49	53.04	67.31	56.33	58.05
5. Agricultural land	1085.71	397.16	726.94	1179.56	1411.16	994.19	2041.14	474.87
6. Non-agricultural land	581.98	335.72	722.33	368.45	101.04	5.13	57.48	588.79
7. Vehicles	194.06	114.56	10.07	208.61	-	13.29	127.73	15.15
8. Home consumer durables	307.74	154.83	31.17	183.35	85.61	78.19	41.82	77.73
9. Farm machinery	377.79	556.82	-	311.65	61.90	167.57	325.57	103.70
10. Total	2992.57	2022.00	2073.61	2671.57	1960.61	1703.13	2924.29	1677.98

\* 1US\$ = ₱7.5.

## CONSEQUENCES OF SMALL RICE FARM MECHANIZATION PROJECT

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