Economic and Social Commission for Asia and the Pacific

CGPRT Centre Monograph No. 43

Coping against El Nino for Stabilizing Rainfed Agriculture: Lessons from Asia and the Pacific

Proceedings of a Joint Workshop
Held in Cebu, the Philippines
September 17-19, 2002

United Nations

Coping Strategies against El Nino: the Case of Selected Communities in Talugtug, Nueva Ecija, the Philippines

Florentino C. Monsalud, Jaime G. Montesur and Rene L. Limosinero[*]

Introduction

The Philippines experiences drought at least once every five years and it causes tremendous havoc to the economy. During the 1997-1998 El Nino, losses to rice and corn alone amounted to more than US$ 240,000,000 (Librero *et al.*, 1999). Under these circumstances the government reacted with a number of programs that are expected to address this problem. Among these include the Small Water Impounding Projects (SWIP).

Along with the introduced mitigation measures against the effects of El Nino are the strategies employed by farmers to cope with the impact of El Nino. Understanding the factors contributory to the effectiveness of these measures will be a useful guide to planners and policy makers.

Vulnerability of farmers to El Nino is dependent on the biophysical characteristics of their farm and on the socio-economic conditions of the community. The institutional support available to them is also critical in the level of preparedness in confronting the impact of El Nino.

Objectives

1) To determine the impacts of El Nino-related abnormal weather changes on agricultural production and farmers' income;
2) To document the existing farming systems, resources, infrastructure, institutions, and other socio-economic characteristics of selected El Nino vulnerable areas;
3) To determine the strategies employed by farmers and communities to cope with El Nino-induced agricultural risks; and
4) To draw up specific recommendations for the stabilization of upland agricultural production.

[*] Farming Systems and Soil Resources Institute, University of the Philippines Los Baños, College, Laguna, the Philippines.

Methodology

Selection of the study site

The criteria in the selection of the study site were the following: a) predominantly rainfed agricultural are; b) presence of the Small Water Impounding Project (SWIP); and c) the active involvement of the LGU.

Data collection

The study site was characterized with special focus on farming systems, agricultural resources, infrastructure, institutions, and basic socio-economic and biophysical characteristics. This information was gathered through the Participatory Rural Appraisal (PRA) that was conducted by a multi-disciplinary team. At the farmer level, data was collected through interviewing selected respondents representing the SWIP beneficiaries and non-beneficiaries (Table 1).

Table 1. Number of respondents per village

Village	Total Number of Respondents		
	SWIP Beneficiary	Non-SWIP Beneficiary	Total
Alula-Sampaloc	8	9	17
Buted	14	6	20
Maasin	14	8	22
Villa Boado	17	6	23
Total	53	29	82

Source: Survey data.

Results and discussion

The study site

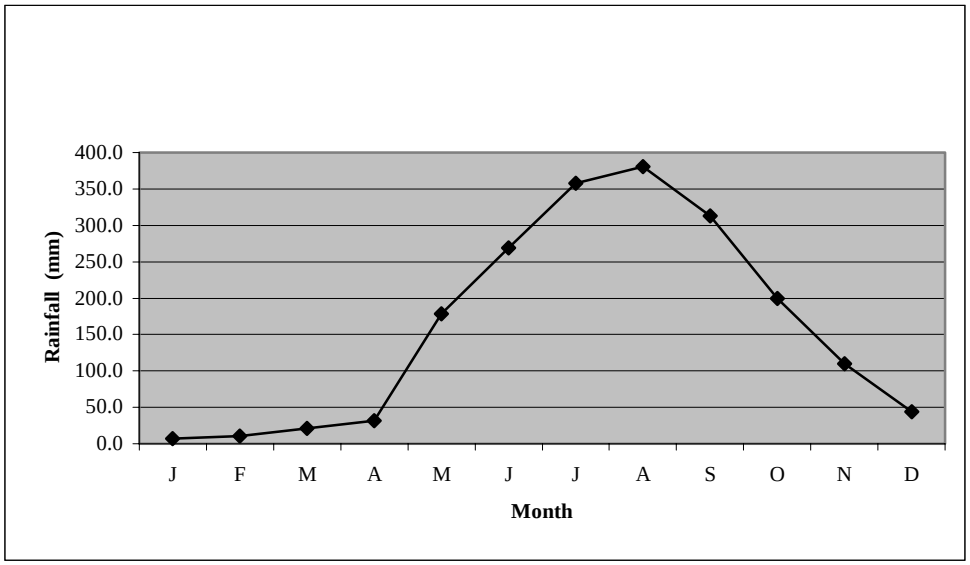
The study area was located in the Municipality of Talugtug, Nueva Ecija, the Philippines. It is situated in Central Luzon and about 180kilometers north of Manila. It covers a total land area of approximately 10,122 hectares and is divided administratively into 20 barangays (5 districts in the town proper and 23 agricultural villages).

The general topography of Talugtug is rolling to hilly in the northwestern and northeastern part. The western portion of the town is generally plain to gently sloping. About 75 per cent of the total rice production area of Talugtug is found here.

The climate in Talugtug is characterized by two distinct seasons, the wet and dry season. The wet months are form June to October while the dry period starts from Novermber and ends in May (Figure 1)

The dominant soils in the study area are Annam clay and clay loam, Maasin clay, Buted clay and Villa Boado clay (BSWM).

Figure 1. Rainfall distribution pattern



Source: OMA-Talugtug, 2002.

About 67 per cent of the land of Talugtug is devoted to agriculture while 22 per cent is pasture area (Table 2). The major portion of the cultivated agricultural area is cultivated to rice, about 6,704 ha. Other minor crops include root crops, corn and vegetables (Table 3).

Table 2. Land use of Talugtug, Nueva Ecija

Land Use	Area (ha)	Percentage
Agriculture	6,788	67
Pasture	2,257	22
Forest	618	6
Bodies of water	167	2
Built-up areas		
Residential	172	2
Institutional	21	0.2
Commercial/Industrial	0.92	0.01
Open Space	98	1.0
Total	10,122	100

Source: Survey data.

Table 3. Crops and area planted in Talugtug, Nueva Ecija

Crops	Land Area (ha)	Percent of Total Agricultural Area
Rice		
Irrigated	1,200	17.7
Rainfed	5,504.4	81.1
Vegetables	8	0.1
Corn	20	0.3
Rootcrops	56	
Total	6,788.4	100

Source: Survey data.

General characteristics of the selected villages

This study focused on agricultural communities which have been implementing the Small Water Impounding Project (SWIP). The four villages selected for this study include Alula-Sampaloc, Buted, Maasin and Villa Boado.

The selected sites are predominantly under rainfed agricultural production systems. The topography is generally rolling to hilly and small patches of flat to gently sloping. The total land area and dominant corps planted in the study area are shown in Table 4.

Table 4. Agricultural profile of selected villages in Talugtug, Nueva Ecija

Village	Land	Irrigated		Rainfed		Area Planted to:		
	Area (ha)	Farmer	Area (ha)	Farmer	Area (ha)	Veg. (ha)	Cor (ha)	Root Crops (ha)
Alula	585.2	33	50	176	231	2	-	1
Buted	433.3	22	34	80	120	10	2	10
Maasin	470.8	143	165	85	130	-	-	-
Sampaloc	421.8	3	5	106	158	1	1	5
Villa Boado	233.2	20	30	80	120	5	-	2

Source: OMA-Talugtug Report 2002.

The age of the majority of the farmers in the study area ranges form 30 to 50 years old. The predominant size of the households in these villages is from 3 to 6. As to their educational attainment, the majority of the farmers have reached secondary level. The available labor force per household is generally low with only tow. The average landholding of the farmers in the four villages is about one hectare. The majority of the farmers have been farming for more than 10 years.

About 65 per cent of the respondents practice a rice-rice cropping pattern. Based on the rainfall pattern, the first crop of rice is planted in the months of June to July while the second crop is planted in November to December (Figure 2). Other cropping pattern practiced on a limited scale include: rice-fallow system, rice-vegetables, cassava-fallow, sweet potato-fallow, vegetables-fallow, fruit trees and banana. Animals that are raised in the study area are as follows: cattle, water buffalo, goat, swine, chickens and ducks. Water buffalo, cattle and goat are important components of the farming system in the area.

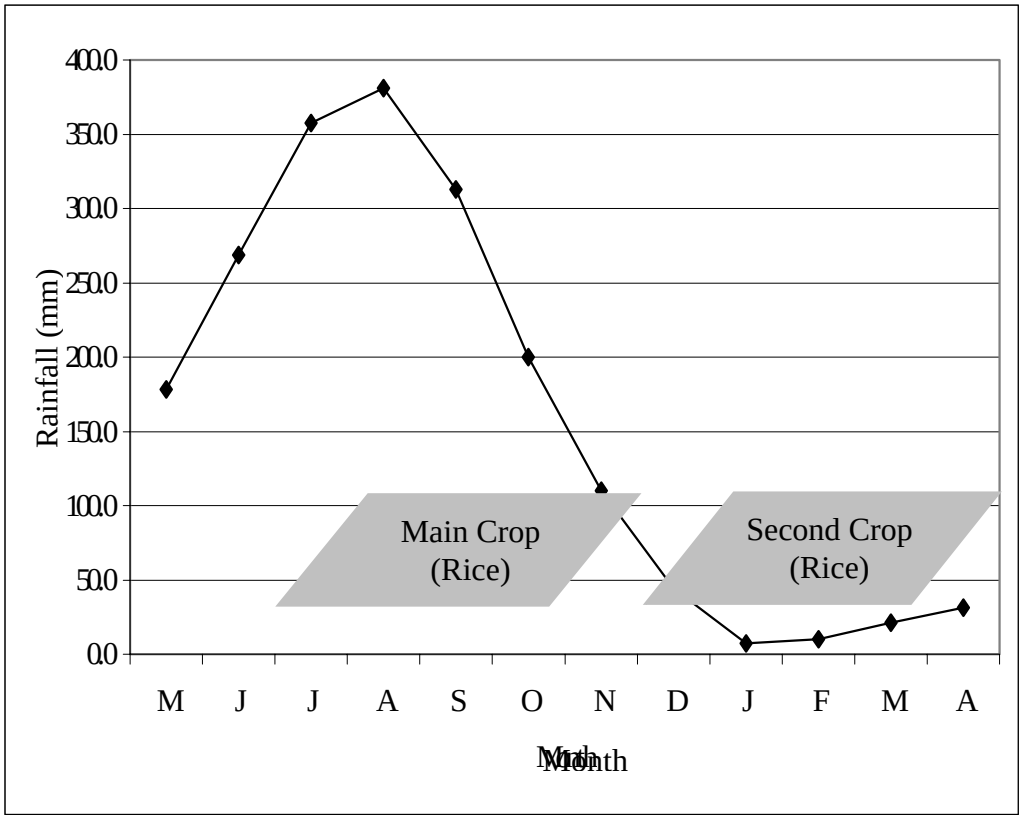
The SWIP's under study were established in 1993 (Sampaloc), 1995 (Buted), 1997 (Maasin) and 1999 (Villa Boado). A description of the SWIP's in the study area is presented in Table 5.

Table 5. Small Water Impounding Projects in Talugtug, Nueva Ecija

Location	Service Area (ha)		Watershed (ha)	Reservoir Area (ha)	Year Completed
	Wet season	Dry season			
Sampaloc	60	36	80	7.00	1993
Buted	60	32	70	7.84	1995
Maasin	100	60	218	22.64	1997
Villa Boado	60	36	75	6.19	2000

Source: Survey data.

Figure 2. Cropping calendar in the study area



Impacts of El Nino on rice yield and income

The effect of the 1997-1998 El Nino was experienced in the study. At the farm level, a significant reduction in rice yield and income was documented (Tables 6 and 7).

Table 6. Effect of El Nino on rice yield in Buted, Talugtug, Nueva Ecija

		Normal Climatic Condition		Abnormal Climatic Condition (1997-1998)	
Water	Cropping	Average Yield, kg/ha		Yield, kg/ha	
Supply	Pattern	Main Crop	Second Crop	Main Crop	Second Crop
SWIP	R-R-F	3,500	4,750	3,500	5000
Rainfed	R-F	3,500	-	1,500	-

Source: Survey data.

Table 7. Effect of El Nino on net income per hectare of rice farm, Buted, Talugtug, Nueva Ecija

Water Supply	Normal Climatic Condition Net income/ha/year (US$)	Abnormal Climatic Condition (1997-1998) Net Income/ha/year (US$)
SWIP	736.82	808.18
Rainfed	312.59	8.08

Source: Survey data.

SWIP as a mitigating measure against El Nino

The benefits derived from SWIP, other than rice production, include extra income form fish production, recreational benefits, use to irrigate vegetables and forage production along the canal. The dam also serves as a drinking area for livestock. There are members of the community who use the water in the reservoir to perform household activities. Some farmers who are not direct beneficiaries of the SWIP also enjoy the same benefits, particularly on fist catch, forage crops and recreational benefits. As shown in Table 8, the harvester and the barangay where the SEIP is located have their share in the income generated from fish production.

Table 8. Income form fish (tilapia)

Village	Year	Harvester Share (US$)	Barangay Share (US$)	Irrigators Ass. Share (US$)	Landowner Share (US$)
Buted	1998	495.35	24.76	235.29	235.29
Maasin	2000	1,183.69	59.18	562.25	562.25
Villa Boado	2000	176.98	8.84	84.08	84.08

Sold at US$ 0.88 – 0.98 per kg.
Source: Survey data.

Benefits derived form SWIP

Farmer level

Increased productivity

- Two cropping of rice made possible
- Increase in yield per unit area
- Growing of vegetables made possible
- More kinds of plants/crops can be grown like onion, garlic, tomato, and other vegetables
- Integration of fish in the rice production system
- Integration of livestock made possible
- Forage corps can grow vigorously
- Dam is used as area for livestock to drink
- Water in the reservoir is used in cleaning the animals

Risk reduction – losses due to abnormal weather may be avoided.
(El Nino also affects the first cropping; with SWIP however, success of the main crop is high).

Community level
1. Fish production made the following possible: • Availability of cheap fish • Some residents are allowed to fish if just form home consumption • Harvesters of fish receive a share of the produce • Additional income for the water users' association
2. Labor demand increased by the increase in cropping intensity and integration of fish culture.
3. Area becomes destination of some local tourists.
4. Many people from the community use the dam for swimming and washing clothes.
5. Spirit of cooperation put into practice.
6. New techniques in farming were provided by the LGU.
7. Five per cent of SWIP income goes to the barangay.
8. Construction of better roads.
9. Used as picnic area.

Municipal level
1. The presence of a SWIP in Talugtug was the main factor considered in choosing this municipality as a project site.
2. Development of a road network in the barangay was facilitated through the SWIP

The key informants indicated that the construction of better roads may not be directly implemented because of SWIP but considered it as one of the justification made for giving priority to the road improvement project. The local executive who was responsible for the road improvement was also very supportive of the SWIPs in the municipality. AT the Municipal level, they key information argued was that SWIP and activities related to it contributed in making their municipality known to other institution or donors and as a consequence other development project were introduced. The appreciation by the local government of the SEIP in a number of barangays within Talugtug, as perceived by the informants, somehow facilitated the development of the road network. The total support received and projects implemented in the municipality were linked to SEIP and hence, are considered benefits derived due to SWIP.

Consequences of SWIP Implementation

1. No need for farmers to go to other towns to work as rice harvesters.
2. Increased income.
3. Farmers are able to buy mini tractors and farm animals.
4. Additional income for the education of the children.
5. Improvement in the living conditions within the community.
6. Farmers are able to build concrete houses.
7. Farmers are able to by home appliances.
8. Better access roads provided.

SWIP is important not only because it gives assurance for the ability of water during the dry season but also contributes to making the farmers be able to mitigate the impact of El Nino. At the community level, it also offers a number of reasons why it is crucial to the lives of the people in the community.

Farmers' coping strategies

The farmers in the study area have their own strategies in coping with the impact of El Nino. Below are the major activities they have been employing:

1. Cogon (*Impirata cylindrical*) gathering.
2. Charcoal making.
3. Harvesting rice on other farms mostly outside the community or in other municipalities/provinces.
4. Working in construction and other non-farm jobs within and outside the community.

The effect of El Nino can be very serious to farmers who are not served by irrigation or a SWIP because of the following situation which are the results of crop failure:

1. More activity on charcoal making.
2. Migration which may result in neglecting agricultural activities.

Charcoal making affects the stability of the watershed. If the majority of farmer resort to cutting down trees for charcoal making, the situation may contribute to the further destruction of the watershed. Consequently, the problem of water availability is aggravated.

Migration impacts agricultural productivity because many of the farmers may find work outside their baranay or municipality more rewarding. Chances are, the farms will be attended to only when desired or when there is no longer any other alternative. This will consequently cause a lowering in the agricultural productivity and hence, food security could be affected.

Needs of farmers

The farmers have different perceived needs in their farming activities. Many expressed the need for capital which is intended for the purchase of farm inputs such as fertilizer, seeds, pesticides, field supplies and materials, It should be noted however, that the needs vary from the different villages considered.

Buted was the only site that did not express the need for capital. It instead focused on the need of the association to improve the canal by having it cemented. The other crop production related concern was on pest control.

The Sampaloc site also expressed concern for the canal to be cemented to minimize the loss of water along the earth canal. The need for capital form farm inputs and pumps was expressed at this site.

Appropriateness of SWIP

The appropriateness of SWIP as a mitigating measure against the effect of El Nino may be evaluated based on the farming system. In the study area, the main crop is rice and the design of SWIP was intended for this crop and possible diversification. The well-known addition is fish, through its introduction in the ponds. One should not forget that rice production is the farmer's primary objective; their intention is to use the water in the reservoir for rice production first before any other commodities, including fish. Therefore, in times of prolonged dry periods, major components of the faring system are affected.

It should be noted however, that changing the cropping system will always be faced with resistance on the side of the farmers. In terms of acceptance of the introduced technology, the introduction of BFS by the BSWM, it is apparent that many of the farmers are not yet ready to accept the technology at increasing productivity and decreasing the cost of fertilizer input (Table 10). Farmers are indicating a lack of capital in their production system but when the inputs are offered to them, still a number of farmers are hesitant to accept the technology. It

Community level
1. Fish production made the following possible: • Availability of cheap fish • Some residents are allowed to fish if just form home consumption • Harvesters of fish receive a share of the produce • Additional income for the water users' association
2. Labor demand increased by the increase in cropping intensity and integration of fish culture.
3. Area becomes destination of some local tourists.
4. Many people from the community use the dam for swimming and washing clothes.
5. Spirit of cooperation put into practice.
6. New techniques in farming were provided by the LGU.
7. Five per cent of SWIP income goes to the barangay.
8. Construction of better roads.
9. Used as picnic area.

Municipal level
1. The presence of a SWIP in Talugtug was the main factor considered in choosing this municipality as a project site.
2. Development of a road network in the barangay was facilitated through the SWIP

The key informants indicated that the construction of better roads may not be directly implemented because of SWIP but considered it as one of the justification made for giving priority to the road improvement project. The local executive who was responsible for the road improvement was also very supportive of the SWIPs in the municipality. AT the Municipal level, they key information argued was that SWIP and activities related to it contributed in making their municipality known to other institution or donors and as a consequence other development project were introduced. The appreciation by the local government of the SEIP in a number of barangays within Talugtug, as perceived by the informants, somehow facilitated the development of the road network. The total support received and projects implemented in the municipality were linked to SEIP and hence, are considered benefits derived due to SWIP.

Consequences of SWIP Implementation

1. No need for farmers to go to other towns to work as rice harvesters.
2. Increased income.
3. Farmers are able to buy mini tractors and farm animals.
4. Additional income for the education of the children.
5. Improvement in the living conditions within the community.
6. Farmers are able to build concrete houses.
7. Farmers are able to by home appliances.
8. Better access roads provided.

SWIP is important not only because it gives assurance for the ability of water during the dry season but also contributes to making the farmers be able to mitigate the impact of El Nino. At the community level, it also offers a number of reasons why it is crucial to the lives of the people in the community.

Farmers' coping strategies

The farmers in the study area have their own strategies in coping with the impact of El Nino. Below are the major activities they have been employing:

1. Cogon (*Impirata cylindrical*) gathering.
2. Charcoal making.
3. Harvesting rice on other farms mostly outside the community or in other municipalities/provinces.
4. Working in construction and other non-farm jobs within and outside the community.

The effect of El Nino can be very serious to farmers who are not served by irrigation or a SWIP because of the following situation which are the results of crop failure:

1. More activity on charcoal making.
2. Migration which may result in neglecting agricultural activities.

Charcoal making affects the stability of the watershed. If the majority of farmer resort to cutting down trees for charcoal making, the situation may contribute to the further destruction of the watershed. Consequently, the problem of water availability is aggravated.

Migration impacts agricultural productivity because many of the farmers may find work outside their baranay or municipality more rewarding. Chances are, the farms will be attended to only when desired or when there is no longer any other alternative. This will consequently cause a lowering in the agricultural productivity and hence, food security could be affected.

Needs of farmers

The farmers have different perceived needs in their farming activities. Many expressed the need for capital which is intended for the purchase of farm inputs such as fertilizer, seeds, pesticides, field supplies and materials, It should be noted however, that the needs vary from the different villages considered.

Buted was the only site that did not express the need for capital. It instead focused on the need of the association to improve the canal by having it cemented. The other crop production related concern was on pest control.

The Sampaloc site also expressed concern for the canal to be cemented to minimize the loss of water along the earth canal. The need for capital form farm inputs and pumps was expressed at this site.

Appropriateness of SWIP

The appropriateness of SWIP as a mitigating measure against the effect of El Nino may be evaluated based on the farming system. In the study area, the main crop is rice and the design of SWIP was intended for this crop and possible diversification. The well-known addition is fish, through its introduction in the ponds. One should not forget that rice production is the farmer's primary objective; their intention is to use the water in the reservoir for rice production first before any other commodities, including fish. Therefore, in times of prolonged dry periods, major components of the faring system are affected.

It should be noted however, that changing the cropping system will always be faced with resistance on the side of the farmers. In terms of acceptance of the introduced technology, the introduction of BFS by the BSWM, it is apparent that many of the farmers are not yet ready to accept the technology at increasing productivity and decreasing the cost of fertilizer input (Table 10). Farmers are indicating a lack of capital in their production system but when the inputs are offered to them, still a number of farmers are hesitant to accept the technology. It

should also be mentioned that in 1999, when the planting of onion to diversify was introduced, no one tried to plant onion even though the inputs were to be given fee. This needs further attention in introducing measures to mitigate the impacts of El Nino.

Table 10. Acceptance to Balanced Fertilization Strategy (BFS)

Village	Target Number of Cooperators	No. Participated	Per cent Participation
Buted	15	7	47
Maasin	26	20	77

Source: Survey data.

What is appropriate, especially during El Nino, is the avoidance to plant rice on the second cropping. If this is not acceptable, then the association should make all efforts to make sure that the SWIP only operates to capacity.

If planting rice cannot be avoided then there must be some modifications made to the cropping calendar. This way the use of water can be maximized. Also, other water conservation measures should be introduced to farmers. If water conservation is not practiced, having the SWIP will not be enough.

Conclusion

The study documented that a SWIP can help farmers cope against El Nino. It is necessary however, that farmers should be ready to make adjustment in farming practices and accept other alternative strategies like water distribution schemes to avoid total crop failure.

References

FSSRI, 2000. Participatory Rural Appraisal Report: Maasin, Talugtug, Nueva Ecija.

FSSRI, 2000a. Participatory Rural Appraisal Report: Villa Boado, Talugtug, Nueva Ecija.

Librero A.R., F.C. Decena and A.B.C. Durana, 1999. Assessment of the Effects of El Nino in Phippine Agriculture, Los Baños, Laguna, the Philippines: PCARRD.

OMA-Talugtug, 2002. Report of the Office of the Minipal Agriculturist, Talugtug, Nueva Ecija.

Philippine Council for Agriculture, Forestry and Natural Resources Research and Development, 2001. El Nino Southern Oscillation: Mitigating Measures. Los Baños, Laguna, the Philippines: PCARRD.

Talugtug Municipal Profile, 2001. Talugtug, Nueva Ecija.