Poverty Alleviation through Diversification

The Case of Integrated Agriculture Aquaculture, Palawan, Philippines

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Abstract

Elaborating sustainable livelihood approaches to reduce poverty is a continuing challenge for development planners throughout the developing world. In Southeast-Asian countries, small scale farming, rice farming in particular, represents the dominat source of income. Due to low prices, stagnant or decreasing yields and changes in climate, rice production is becoming less profitable for farmers. The role of poor farmers in degrading natural resources while searching for accessible income sources is well known in the Philippines. Small-scale farmers are confronted with the problem of declining productivity in rice farming and a limited farm output, which frequently is not enough to provide income or at least food for the farm household throughout the year. Farmers are forced to look for alternatives, which simultaneously favours farm diversification as a possible option. In this presentation, panel data collected in the Philippine province of Palawan are used to point out the conditions of small scale farming and predominant constraints farmers are facing today. Diversification of existing farming systems can play a significant role in improving livelihoods of the farming households. Basically, poor rural people do not rely for their livelihood on agriculture alone, but as long as there are few opportunities due to almost non-existing labour markets in remote areas, practical solutions on the field have to be elaborated to overcome food shortages. Data from an economic analysis of an integrated agriculture aquaculture (IAA) farming system at a model-project site "on-station" provides evidence of the potential of diversification to alleviate poverty of small-scale farmers in the region. Utilizing this data as a foundation, attention focuses on practical possibilities "on-farm" of implementing IAA components to diversify individual production systems and to identify deriving economic impacts and constraints of the adjustment.

1. Introduction

Poverty remains a significant challenge in the Philippines, and its a challenge that continous to grow: the number of poor Filippinos is increasing. Rural poverty has proven to be particularly intractable (ADB 2005a). Within the conceptual framework of the sustainable livelihoods approach (DFID 1999), key constraints hampering poverty reduction can be

identified and assigned to the lack of capital assets such as human-, natural-, physical-, social- and financial capital, farmers vulnerability, powerlesness and aversion to risks. The importance of access to different kinds of capital assets can vary with specific and local circumstances. Consequently there is a demand of comprehensive understanding of contexual circumstances, operating environments and enabling conditions (ADB 2005b). Focusing on poverty alleviation, appropriate development concepts have to be elaborated and adjusted to the local conditions to meet the particular requirements of the farmers. The farming system of integrated agriculture aquaculture (IAA) can be regarded as a promising option to create additional cash-income and thus alleviating poverty, caused by an increase in productivity through a multiple use of farmland (ROSENTHAL et al. 1996).

Taking the specific conditions of Cabayugan region on the island of Palawan into account, the objective of the present article is the assessment of the suitability of IAA as development approach for small-scale farmers. Based on the economic analysis of the local "CIAAP" (*Cabayugan Integrated Agriculture Aquaculture Project*) IAA model-project, promising components of the farming system are identified. Following attention is exemplary focused on a further development of practical possibiblities "on-station" to increase productivity of the farming system. Deriving economic impacts and related constraints of the adjustment on farmers` fields are ultimately highlighted.

2. Materials and Methods

The results presented in this paper are based on qualitative and quantitative methods of primary data collection and inquiry. A household survey was conducted in Cabayugan region, Palawan, Philippines, consisting of 87 households, representing one fifth of the entire population in the area. Furthermore qualitative methods such as semi-structured interviews, identification of key-informants, focus group discussions and field visits were used to complete the picture. Moreover, a 2 year investigation period within the scope of the NGO "CIAAP" allowed useful insights in the potential and constraints of integrated farming systems. The realization of several seminars on agricultural production techniques for farmers in the region provided additional and important information on farmers` perception.

3. Results

Household Survey, access to capital assets

Generally, the characteristic features of the region can be described with a marginal access to capital assets. Following key findings of the household survey underline the poor conditions for agricultural development:

Human capital - Access to sources of information on agricultural production techniques is insufficient and information providers in developing human capital are rare. Health facilities are not available. Almost every household predominantly generates income via small-scale

farming activities while off-farm working opportunities are limited. The share of off-farm work on total household income in the sample amount to 25% per household. ***Social Capital*** – Organizations or networks that facilitate exchanges of experience or disseminate knowledge or information in practice are absent. Social safety nets do exist. In emergency situations, farmers seek help in the neighbourhood, borrowing rice or cash to overcome food shortages. ***Natural Capital*** – Almost every household is in the possession of farmland. The average farm size in the sample is 3.8 ha with a share on upland and lowland of 50% respectivly. A division by farm size into three groups, [*group 1*] < 2ha, [*group 2*] 2-4ha, [*group 3*] > 4ha, indicated the highest number of households in group 1 amounting to 42,5% in the sample. Only one percent of the households is in the possession of fish ponds. A limited reliable water supply sets limits to agricultural production. 25% of rice farms are rain fed, realizing only one crop of rice per year. Depending on irrigation facilities the remaining farmers are able to harvest a maximum of two crops per year on average. Natural calamities in the form of floodings occurred twice in the past year, leading to crop failures in lowland areas for about one third of the households. ***Physical Capital*** – Access to roads and transportation is poor. Although there is an irregular public transport to the islands capitol, frequent visits remain unaffordable due to high transportation costs. Thus market access for agricultural products is connected with high transaction costs for the individual farmer. The largest proportion of families in the region using unsafe water sources, predominantly in the form of dug wells. Electricity is nonexisting. ***Financial Capital*** – Access to financial resources is generally limited. Formal credit sources are unreachable due to lack of credit worthiness. Microfinance is absent in the region and a limited availability of working capital is a key factor for hampering farm development. The numbers presented in table 1 provide an impression of the current situation and clearly underline the unfavourable conditions of the households. Taking into consideration that poverty incidence in families amount to 76% and 39% in group 1 & 2 respectively, it significantly demonstrates the powerlessness of the households.

Table 1: Annual Total HH Income and Poverty Threshold in the Sample

	Group			
	1 (≤ 2ha)	**2 (2-4ha)**	**3 (> 4ha)**	**All**
Average Total HH income per year [USD]	**711**	**1051**	**1863**	**1092**
Average total HH income per person [USD]	**163**	**253**	**430**	**265**
Poverty Threshold [USD per person per year]		**211**		
Poverty incidence [% families]	**76**	**39**	**22**	**51**

Source: NSCB 2003, own survey and calculation n = 80

Rice farming is contributing 80% to the total net farm income of the households. The average rice farm size is 1.4 ha and productivity is generally low with an average yield of 2.8 t/ha. Besides rice, ***fruit and vegetable crops*** are cultured by 98% and 55% of the households respectively, with a *low level of diversification.* Vegetable are predominatly cultured in backyards on a subsistence level, whereas fruit crops are irregularly marketed, contributing

12% to the total net farm income in the sample. ***Livestock*** is kept by 98% of the households, mainly on an extensive level. Free range chicken raising with an average number of 20 chicken is commonly found, using a native chicken strain of low productivity, but resistance to common diseases. One or two pigs are kept per household, mainly for finance savings reasons. Ducks and goats are rarely seen. Rice farming is frequently not enough to secure self subsistence. 41% of the households in the sample facing food shortages throughout the year. Searching for additional income, ruthless resource use practices to overcome food shortages are well known in the region. Environmentally sound and sustainable alternatives have to be immediately put in place which both protect the environment from further destruction and simultaneously secure farmers` livelihoods.

4. Integrated Agriculture Aquaculture – Economic Analysis

The economic analysis is based on a one year production cycle of the CIAAP model-project. The IAA system was adjusted to the local conditions, focusing on the use of natural resources available in the region. A gross margin of the 1,5 ha project of US$ 1135 underlines the potential of IAA to generate cash income above average. Compared to the average total household income of the corresponding group 1 (see Table 1), a remarkable increase in income can be noted. Looking at the gross margin of individual production methods on a per ha basis, a variation of numbers in height is evident.

Table 2: Gross Margin of the CIAAP Model-Project

Code	Production Method	Area (ha)	Gross Margin (USD)	Gross Margin / ha (USD)
1	Vegetable	0,090	260	2888
2	Chicken	0,015	32	2136
3	Ducks	0,135	244	1804
4	Papaya	0,037	59	1608
5	Prawns	0,220	158	716
6	Rice	0,467	229	490
7	Tilapia	0,261	162	622
8	Bananas	0,079	92	1165
9	Goats	0,008	15	1870
10	Compost	0,042	-86	-2065
11	Fodder Plants	0,113	-29	-260
	Total Area	1,467		
	Gross Margin		1135	

Source: Own calculation

5. Prerequisites and Ranking of IAA Components

Despite the economic potential, farmers are unable to adopt the entire IAA system at once, rather they would choose one or two components to start with. Beyond economic criteria, additional factors have to be taken into account to assess the suitability of IAA components,

meeting the specific conditions of the farmers. The identification and consideration of prerequisites of IAA components such as: *(a) Traditional use, existing knowledge of operation (b) Low requirement of initial investment, (c) Fast return of investment, (d) Existing market demand, (e) Realizability in the field (f) Access to necessary inputs* and *(g) Useful synergy effects* can facilitate a successfull integration on farmers fields. Theoretically, transferring of IAA components to farmers fields seems to be an approriate way to increase farm income on an environmentally sound and sustainable basis. However, following ***key barriers*** have been identified which hamper the development approach in the region:

1. Availability of financial resources
2. Access to information, extension, skills
3. Varying conditions on farmers fields

Because of prevailing financial constraints a gradual expansion of production methods to farmers is advisable. Consequently a ranking of components was carried out using the above mentioned indicators.

Table 3: Ranking of IAA Components

Subsystem	Gross Margin	Initial Investment	Knowledge Requirement	Realizability	Access to Inputs	Return of Investment	Synergy Effects	Ranking
Ducks	■■■	■■■	■■■■	■■■	■■■■	■■■	■■■■	1
Tilapia	■■	■	■	■	■	■	■■■■	2
Etc.								…

■ Slightly applicable ■■ Moderately applicable ■■■ Applicable ■■■■ Highly Applicable

In the particular case, the integration of duck rearing is rated to be more applicable for farmers in Cabayugan region than tilapia culture. Thus, attention has to be focused on the elaboration of practical possibilities enabling the farmers to integrate and successfully operate duck raising in the field.

6. Appropriate Possibilities on Farm – The Example of Rice-Duck Farming

Issues for consideration

The combination of duck rearing and rice farming contains valuable synergy effects. Ducks can be used to control the golden snail population in the rice field which is a common pest in the region. A number of 30 birds / ha can be regarded as sufficient to control the snail problem. In the same way, snails can be cultured separately to further reduce feed costs for the ducks. Naturally, the farmer will also benefit from egg production. Initial investment is generally low and changes to the farming system are of manageable extent. The integration requires some essential measures: Ducks need elaborate housing, protecting the birds during night time from wild animals like snakes, wild cats and lizards. A low-cost house made out of

bamboo with a floor area of 14 m² is sufficient for 30 ducks. Ducks can find certain amounts of natural food in the rice field and adjacent waters, but additional feed to be given at 50g / bird / day is recommendable. Feed costs can be reduced by a minimum of 10% by culturing snails for feed supply. Ducks start laying eggs at the age of 24 weeks. Straw leftovers from the last rice harvest may be kept and spread in the duck house weekly. Proper sanitation and health care are very important to maintain a healthy stock. Sick birds should immediately be isolated and treated. While ploughing, the ducks are used to eliminate the snail population on the field. Fencing of the rice field during seedbed stage and fencing of the duck area during transplanting stage is mandatory to avoid that ducks feed on rice seeds or destroy the young sensitive plants.

The result of the cash-flow analysis of rice-duck farming based on the specific conditions on a farmers field indicated an increase in farm benefit compared to rice farming alone (310 USD / year) of 30% amounting to a netflow of USD 437 / year.

Table 4: Cash-Flow Analysis of Rice-Duck-Farming (USD)

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Inflow	0	0	19	19	19	19	19	419	19	19	19	419
Outflow	-56	-7	-7	-7	-85	-9	-9	-135	-85	-9	-9	-135
Netflow	-56	-63	-51	-39	-106	-96	-86	199	133	143	153	437

Source: own field investigation and calculation

Taking into consideration that rice farming alone is contributing 80% to the annual net farm income, the integration of duck rearing in rice farming systems can be regarded as promising.

7. Conclusion

There is a great potential for small scale farmers to alleviate poverty through diversification in the form of integrated agriculture aquaculture. Focusing on the specific conditions of farmers it has to be underlined that the possibilities to transfer IAA components to farmers fields are limited. Several key barriers hamper the practical realization for the farmer. Among others, limited financial resources of the households have to be emphasized, making it difficult for the farmer to adopt several components of IAA at once. Consequently, focus has to be set on the application of low-cost technologies and gradual development. Diversification through the adoption of only one additional component can result in remarkable monetary benefits.

Feasable and beneficial development of IAA on a larger scale mainly depends on public and private institutions to facilitate necessary activities. In this context, the provision of agricultural extension is of central importance. Furthermore an improvement of access to capital assets is essential. Without institutional or organizational assistance, poverty will remain a serious problem for people living in Cabayugan region.

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