

Integrated Fish Farming in West Java – Social and Economic Considerations

U.W. SCHMIDT

Fisheries Officer
Fisheries Department
FAO, Rome, Italy



Feeding the fish in a kangkung-fish integrated system, West Java. Photos by the author.

Fish farming has traditionally been combined with other agricultural production in West Java. Activities associated with fish culture include raising ducks, chickens, horses, water buffaloes, rice, aquatic plants, and even food processing, such as rice milling and the manufacture of soybean cake.

An investigation¹ was made by the Indonesian Inland Fisheries Research Institute in 1979 with FAO assistance, of the more significant systems, including fish culture in combination with rice, aquatic vegetables and mendong (a fibrous plant which is used to make mats and baskets), as well as with ducks and chickens.

Farm level socioeconomic

Based on data obtained from a sample of small-scale, experienced farmers, profiles of microeconomic and socioeconomic

efficiencies of the various systems were prepared. These profiles were then used to see whether and how the farmers benefit from integrating fish farming with other primary production. Evaluation and comparative study showed some interesting results.

For example, the integration of rice and fish gave an average increase in revenue of 28%; more fish was consumed in the



household and the existing family labor was utilized to a fuller extent.

The culture of aquatic vegetables, kangkung (*Ipomea reptans*) and genjer (*Limncharis flava*) together with fish increased returns to an even higher extent, in relative terms. As the average unit sizes were, however, much smaller, revenues in absolute terms were rather modest. Nevertheless, the continuous harvesting of the vegetables produced a low, but stable, income level, while the fish harvests added a few income peaks. The income flow obtained by integrated culture of aquatic vegetables and fish resembled remarkably the expenditure pattern of small farming families, with low and continuous spending for food and other necessities of day-to-day life, and a few expenditure peaks for the purchase of durable goods, family celebrations, etc.

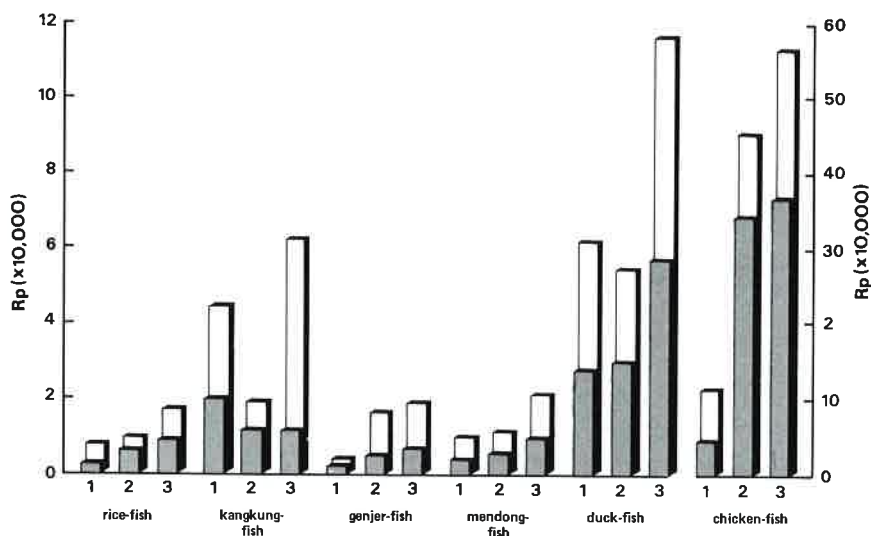
Duck-fish culture in West Java is more highly intensified than fish-crop/vegetable integration. The FAO study showed that apart from increases in revenue, more family labor was used and the overall labor intensity was raised manyfold.

A further increase in intensity was represented by the integration of fish farming and chicken raising. While using mostly family labor, the bulk of inputs used was purchased feed, which made this system rather capital intensive. Although technologically well within reach of small-scale farmers, chicken-fish farming was practiced mostly by the more dynamic and innovative farmers.

A rural fishpond, West Java (left) and a fingerling trader with his merchandise (right).



¹Integrated Aquaculture in West Java. A Socio Economic Study of Integrated Farming of Fish, Livestock and Crops by Small Farmers in West Java, Indonesia, by U.W. Schmidt, ADCP/MR/80/11, FAO, Rome 1980.



Annual costs (shaded) and incomes generated by the different types of integrated production in a 100-m² unit (\$1 = 650 Rp.). Height of bar represents gross income. Unshaded part is net income. 1 = fish only; 2 = associated product only; 3 = integrated production.

Regarding the input-output dynamics of different production factors, chicken-fish integration yielded the highest net return. It also required most labor per unit. In contrast, the modest input level of the vegetable-fish systems yielded correspondingly low returns. As in the case of duck-fish farming, inputs were provided to a large extent from internal sources, not involving cash expenditure. The most important such production factor—family labor—was used more for the animal husbandry components of the integrated system, i.e., raising fish, ducks and chickens.

Benefits and costs of integrated farming in West Java, as found in the study, are summarized in the diagram. Gross returns ranged from less than Rp. 20,000/100 m²/year for fish and vegetable integration, to more than Rp. 500,000 for chicken-fish farming (Rp. 650 = US\$1).

Although the sample sizes on which these and other findings were based were limited and would not support quantified generalizations, it can be said that the evaluated systems of integration correspond both to the means and needs of smallholders in West Java and to rural production relationships there.

Maximizing social benefits

The need to intensify production and to provide work opportunities and incomes to the maximum number of people has undoubtedly influenced farmers to use integrated systems of fish farming. It can be seen as a solution developed by rural producers in West Java to offset the increasing discrepancy between an ever-

increasing population and limited land resources. It reflects the traditional concept of cooperation rather than competition, which is largely responsible for the relative social peace in rural West Java.

As found in most cases evaluated, benefits from a given resource are shared. Many small-scale fish farmers, for example, would insist on selling both fish and aquatic vegetables to a merchant, who would market them for a modest profit, although the farmers were aware that they could realize a higher return by marketing their produce themselves. The system of maximizing social benefits is repeated in the complicated ramifications of division of labor as observed, for example, in the highly specialized fingerling trade.

Potential for development

Unlike most sectors of rural production in West Java, integrated farming still provides potential for increased productivity. The majority of those who presently practice integrated farming could increase their production if improved and appropriate technologies could be transferred to them and if other inputs, as credit, were made available. The considerable innovative potential among most farmers interviewed suggests that improved extension and credit schemes may well yield significant returns to the society from up-graded integrated aquaculture.

Technology and capital inputs, however, if supplied without a carefully balanced development strategy, can damage a fragile rural economy rather than improve the lot of the majority of the people. As it has been shown in the case of paddy culture, where the introduction of high

yielding rice varieties led to a process of concentration of more assets in fewer hands, improved aquaculture technologies may be absorbed first, and perhaps only, by the already well-off. In West Java, such development could upset the present balanced system of relatively equal income distribution. In fact, when comparing low yielding systems of integrated aquaculture, e.g., rice-fish or genjer-fish with chicken-fish farming, one can detect the potential for a similar trend. While the former produce a modest and continuous income flow which is absorbed by the daily needs of a family, the latter provides the possibility to accumulate relatively large sums of money. Cleverly invested (in land or other means of production), such rural capital could make a few people a lot richer, and possibly (by restricting access to means of production), many people a lot poorer.

Planning for development of integrated farming

For the adequate planning of sound socioeconomic development of integrated farming in West Java, there is a need to investigate further how improved aquaculture technologies can be transferred to rural producers. As an initial step, on-farm trials involving a small number of farmers would be useful. Technical and economical aspects of integrated farming could be studied, and the monitoring of the impact of improved management practices on the farmer's family and other affected groups would indicate the magnitude and nature of the social and economic change which could be caused by a large-scale development program.

This approach would also indicate infrastructural requirements necessary to facilitate such development, including credit, extension and improved marketing systems, while allowing planning 'from below' by taking motivational aspects, aims and values of the target group into consideration. Lastly, it could facilitate the design of strategies to assure that development would actually benefit the target group of small farmers with limited landholdings and no capital means, not only as the producers but also as the beneficiaries of increased agricultural output.