Prahoc and Food Security: An Assessment at the *Dai* Fisheries

CDRI Researchers, Bruce McKenney and Prom Tola examine the importance of *Prahoc* as a protein source in food security for the Cambodian poor.

Prahoc is a fermented fish paste commonly viewed as the second most important staple food for rural Cambodians, after rice. Made from small, low-value fish and eaten cooked, raw, or mixed into soups, *prahoc* provides a critical low-cost source of protein in the Cambodian diet. Moreover, as a fermented product, *prahoc* can be stored for several months without spoiling. This makes it a reliable (and ready-made) source of protein throughout the year, even when it is no longer fishing season. Despite the important role of *prahoc* in food security, research on this subject has thus far been minimal (especially compared to rice). Some key issues include increasing understanding about how *prahoc* contributes to rural livelihood strategies, assessing trends in *prahoc* commercialisation and trade, and identifying current or potential future threats to *prahoc* supply and affordability.

To explore these issues, the CDRI Natural Resources and Environment programme conducted research at the *dai* fisheries[1] of Kompong Luong, Kandal province during January-March 2003. Each year during this period of fish migration, the *dai* along the Tonle Sap River (5-30 km north of Phnom Penh) catch about 15,000 tonnes of fish, much of which are *trey riel*, *slek russey*, and other species used to make *prahoc*. Thousands of farmers come to the *dai* fisheries, especially in January, to purchase fish and make an annual supply of *prahoc*. CDRI surveyed 55 family-scale *prahoc* makers at the *dai* and interviewed a number of key informants involved in production and trade, including commercial *prahoc* makers, commercial fish sauce makers, and boat and truck transporters. Due to the limited scope of research, the modest objective of this study is to provide an initial assessment of key issues and highlight areas that may warrant policy interventions and/or more in-depth research in the future.

Farmers at the *Dai* Fisheries

Of the 55 people making *prahoc* at the *dai* surveyed for this study, all identified themselves as rice farmers. On average, they own one hectare of rice land and produce only about one tonne of rice annually for a household of six. Most come from the surrounding provinces of Kandal, Kompong Speu, and Kompong Chhnang, but some have travelled from the more distant provinces of Prey Veng and Svay Rieng. The annual trip to the *dai* to make *prahoc* is a long-running tradition – most have been coming every year for more than a decade.

Usually two or three members from a household make the trip to the *dai* after completing their rice harvest. Those from nearby provinces generally stay for 2-3 days, but people coming from Prey Veng and Svay Rieng often stay for longer periods in order to try and earn income as labourers at the *dai*. Whereas in the past farmers travelled to the *dai* by oxcart and exchanged rice for fish, it is currently much more common to travel by group in a truck and pay for fish with cash. Only about 20 percent of farmers reported purchasing fish through rice exchange alone, and an additional 20 percent bought fish using a combination of rice and cash.

Food security remains the dominant reason that farmers come to the *dai*; only about one-third of farmers reported that they plan to sell *prahoc*, and the amounts they plan to sell are small (about 50 kg on average). As shown in Table 1, 80-90 percent of farmers indicated that they come to the *dai* because they lack fish for *prahoc* making in their village and they want to ensure that they have *prahoc* for year round household consumption. About half the farmers added that it is cheaper for them to come make *prahoc* than to buy it from traders in their village. Although about 40 percent of the farmers said that they enjoy the tradition of coming to the *dai* each year, this is not a major factor in their decision to make the trip.

Prahoc Making and Consumption

Making *prahoc* involves several steps. First, farmers purchase fresh fish from traders, who have brought fish to the riverbank from *dai* operating in the river. After purchase, farmers cut off the fish heads and load the fish into a bamboo basket. These fish are then taken to the river where, through a process of stepping on the fish in the basket and dipping/stirring in the river, the fish fat and intestinal materials are removed. Removal of heads, fat, and other materials reduces the original fresh fish weight by about half (e.g., 100 kg of fresh fish becomes 50 kg of fish processed for *prahoc*). The final step is to mix in salt with the processed fish in a jar and allow a period of about a month for fermentation before eating. On average, salt represents about 30 percent of *prahoc* weight (e.g., 50 kg of processed fish would become 65 kg of *prahoc* after salt is added). Although both women and men are involved in the making of *prahoc*, women play a more dominant role. Usually it is women (and sometimes their children) who do the processing activities, while men play a greater role in loading and carrying the fish back and forth from the riverbank.

Farmers at the *dai* fisheries were asked about their household *prahoc* consumption in 2002 and the amount of *prahoc* they were making for 2003. All make enough *prahoc* to support year round consumption. Only rarely do they purchase additional *prahoc* during the year (although they may consume fish and

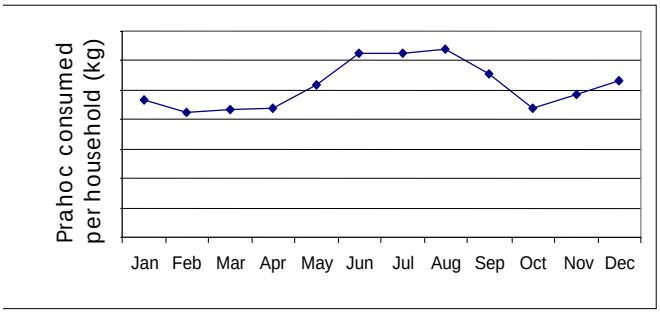
Table 1: Why Farmers Come to the *Dai* Fisheries

Factors in Decision to Travel to *Dai* Fisheries	% of Respondents*
Good availability of *prahoc* here; lack of fish for *prahoc* making in my village	89
To make sure my family has *prahoc* for year round consumption	82
Cheaper cost of *prahoc* as compared to purchasing from traders in village	55
Enjoy the annual social and cultural occasion	38
Plan to sell some *prahoc* – income generation	33

**Based on survey of 55 farmers; multiple responses allowed.*

other aquatic resources caught in rice paddies). On average, *prahoc* consumption in 2002 was 62 kg per household (or 10.1 kg per person). As shown in Figure 1, consumption was fairly constant throughout the year, though peak consumption periods occur during rice transplanting and harvesting seasons. As farmers tend to be most busy during these periods, *prahoc* represents an economical "fast food". It can also be easily used in meals during times that farmers exchange labour – the owner of the rice field being transplanted or harvested is responsible for providing meals. For 2003, farmers were making an average of 95 kg of *prahoc* for household consumption (or 15.7 kg per person), significantly more than what was consumed in 2002. This amount is probably best viewed as a maximum consumption estimate for the year, since it is likely that some farmers will find the need to sell a portion of their *prahoc* during the year (even though this is not currently planned).

Figure 1: Average Household Consumption of *Prahoc* in 2002



Prahoc Costs

Prahoc remains a remarkably low-cost food and protein source. In 2003, the average cost for a farmer to make *prahoc* at the *dai* was R360 (or $0.09) per kg. Even when farmers' other *prahoc*-making costs are taken into account, such as transportation to/from the *dai*, the cost of *prahoc* amounts to just R515 per kg (or $0.13). This is only slightly more than the price of paddy rice per kg and somewhat less than the price of milled rice per kg. Protein sources other than *prahoc* are not affordable for most Cambodian farmers. For example, a kilogram of lower quality pork with fat is typically priced around R4000-8000 ($1-$2) per kg. Chicken prices are similar. Thus, *prahoc* prices would have to rise dramatically before farmers would consider substituting away to other meat sources. This is especially true given the commonly held view that farmers have a strong preference for the taste of *prahoc* over other meats.

Rising *prahoc* costs and the lack of affordable alternative protein sources suggest the potential for food security problems in the future. At the *dai* fisheries, the cost of fish for *prahoc* rose by 60 percent from 2001 to 2003 (Table 2). Although a sharp drop in the price of salt helped to mitigate the impact of higher fish prices in 2003, salt prices are unlikely to drop to such an extent again. Salt prices were about R500 per kilo in both 2001 and 2002, but the price fell to an average of about R220 in 2003. This appears to be the result of increasing imports of cheap (likely non-iodised) salt from Vietnam that undercut prices for iodised salt produced under the control of salt producers in Kampot.[2] Farmers also indicated that, after seeing high salt prices at the *dai* in the past, many now bring cheaper salt from their village.

Table 2: Cost for Farmers to Make *Prahoc* at *Dai* Fisheries

Prahoc Costs	2003		2002		2001	
	Riels	US$	Riels	US$	Riels	US$
Fish Price (kg)[a]	201	$0.05	155	$0.04	126	$0.03
Fish Costs – 65 kg *prahoc*[b]	20,100	$5.09	15,500	$3.92	12,600	$3.19
Salt Price (kg)	218	$0.06	507	$0.13	521	$0.13
Salt Costs – 65 kg *prahoc*	3,270	$0.83	7,605	$1.93	7,815	$1.98
Total *Prahoc* Costs[c]	23,370	$5.92	23,105	$5.85	20,415	$5.17
Prahoc Cost per kg	360	$0.09	355	$0.09	314	$0.08
Fish as % of *Prahoc* Costs	86%	67%	62%			

[a] Farmers primarily purchased sleuk russey species to make prahoc in 2003 because this was the main dai catch. In 2001 and 2002, trey riel species made up most of the dai catch. If available, farmers prefer trey riel. [b] On average, farmers made 65 kg of prahoc per household in 2003. This requires 100 kg of fresh fish (equal to 50 kg processed fish) and 15 kg of salt. [c] Farmers also pay for transportation to/from dai fisheries, to stay along the riverbank overnight, and for equipment and materials. In 2003, these costs amounted to about R10,000 ($2.50) per household. When added to fish and salt costs, this raises the average cost of prahoc to about R515 ($0.13) per kg.

A Declining Supply of Fish?

According to data from the Department of Fisheries, the total fish catch at the *dai* fisheries has been quite stable over the past decade (between about 11,000 and 17,000 tonnes). Only in 1998-99 did the catch dip below this range to a little under 9,000 tonnes (Table 3). The catch of fish species used for *prahoc* has largely tracked the total catch, ranging from about 40-60 percent of the catch, except for in 2001-02 and 2002-03. During these past two years, this ratio dropped to about 20-25 percent. This surprising drop in fish species for *prahoc* appears to be the main factor behind higher fish prices over the past two years. However, this may not be the case. Fish biologists suggest that such a rapid decline in these species is not likely. As smaller species that reproduce rapidly, these fish tend to compete well in heavily fished areas compared to larger species with longer reproductive cycles. Thus, the more typical trend for catch composition is to see a decline in larger species and an *increase* smaller species. They suggest that perhaps there has not been a drop in the catch of these species, only a data collection problem.

Increasing Demand for Fish

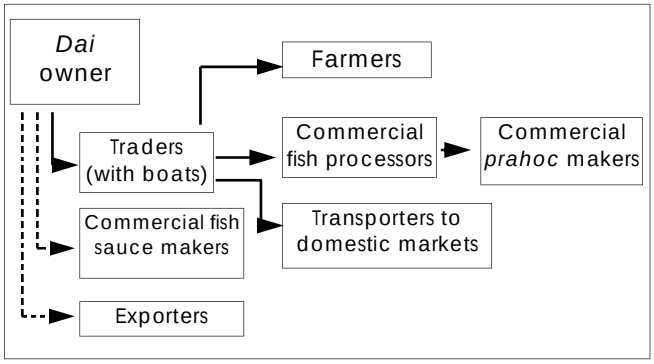
Whether the supply of fish species for *prahoc* has truly declined will remain a point of debate, but there is little doubt that demand for these species by commercial actors and exporters is increasing and contributing in some measure to rising fish prices. As shown in Figure 2, a number of interests compete for fish from the *dai* fisheries, including farmers, commercial fish processors, commercial fish sauce makers, fish transporters serving domestic markets, and fish exporters to Vietnam. Fish sales are either made directly from *dai* owners to the boats of exporters and fish sauce makers (whose facilities are along the river), or through traders who bring fish from the *dai* to the riverbank for sale to farmers, transporters, and commercial fish processors. After heads and fat are removed from fish by commercial processors, the fish are sold to commercial *prahoc* makers and transporters.

Commercial and trade activities at the *dai*

fisheries have increased significantly in recent years. For example, at the Kompong Luong *dai*, the number of commercial fish processors using machines to remove fish heads and fat has grown dramatically, from 2-3 processors in the mid-1990s to about 30-35 processors in 2003. During the peak catch periods, each of these machines can process 5-15 tonnes per day. Along with greater processing capacity, transporters indicate that the number of trucks transporting fish (both processed and unprocessed) from the *dai* to domestic markets has steadily increased over the past few years. Many of the transporters bring fish directly to village markets in the surrounding provinces for sale to farmers. Where this distribution is reaching new markets and consumers, it has the effect of expanding overall demand for fish. Greater demand for fish as inputs to products other than *prahoc*, namely fish sauce, may also be putting pressure on fish prices, but this study could not determine trends in this area. Finally, export demand for fish appears to be on the rise. Key informants note a significant increase in the number of boats exporting fish from the *dai* fisheries to Vietnam. These boats, which can carry 20-70 tonnes of fish, were observed at the Kompong Luong *dai* during research, but no estimate of the number of boats or export tonnages was possible.

Despite the greater commercial activity and increasing distribution of fish from the *dai* to rural areas, farmers are likely to continue making their annual trip to the *dai* for many years to come. First, farmers note that they come to the *dai* after their rice harvest when they have little else to do and few alternatives for productive use of their time. Second, although fish distribution is improving, many farmers indicate that they can only ensure their annual *prahoc* supply by travelling to the *dai*. Lastly, farmers want to make their own *prahoc* to ensure quality. They note that the quality and taste of commercially made *prahoc* is often substandard due to the overuse of salt and poorer fish quality (e.g., heads and fat not properly removed).

Figure 2: Trade of small, low-value fish from the *dai* fisheries



Conclusions and Recommendations

While prices of fish species used in *prahoc* have increased substantially over the past two years, there is no crisis at present. However, if the trend of rising prices were to continue over the longer term, rural Cambodians will find *prahoc* increasingly expensive. And there do not appear to be alternative sources of protein that come anywhere close to the affordability and popularity of *prahoc*. Commercialisation of activities at the *dai* fisheries can be positive for food security (by saving farmers money) if larger scale processing brings down costs, quality control can be improved, and distribution channels reach surrounding rural areas in a comprehensive manner. At the moment, these are big challenges since commercial *prahoc* making costs are about equal to farmers' costs, quality control is minimal, and many farmers still indicate that they must come to the *dai* because fish for *prahoc* making are not available in their area.

Because this study is an initial assessment, recommendations focus on areas that may deserve greater investigation and attention in the coming years. They are presented below.

- **Monitor prices of fish species used in *prahoc*, especially during the peak catch period in January.** If prices continue to climb, greater investigation should be made to determine export levels, since exports reduce domestic supply, which in turn can result in higher domestic fish prices.[3] Likewise, additional supervision of data collection methods is recommended over the next few years to ensure data quality and to help clarify the degree to which a declining fish supply may be affecting fish prices. Given the importance of *prahoc* to food security, such monitoring and data quality assurance measures are warranted. Just as rice deficits are tracked to identify food insecure areas, measures should also be taken to identify threats to *prahoc* supply and affordability.
- **Keep constraints to a minimum for trade and distribution of *prahoc* and related fish species (processed and unprocessed).** In other sectors where commercial activities have grown, there has been a tendency among government institutions

Table 3. Catch of Fish Species for Making *Prahoc* Compared to Total Catch at *Dai* Fisheries

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	Fish Catch at the *Dai* Fisheries (in tonnes) by Year[a]								
Dai Catch	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**
Fish species for making *prahoc* (January only)[c]	8,396	2,881[b]	5,741	4,044	2,349	5,344	3,291	1,712	1,887
Fish species for making *prahoc* (Season)	N/A	9,041	8,534	5,880	4,183	5,799	7,095	2,906	3,189
Total catch at *dai* fisheries (Season)	N/A	14,429	16,835	14,605	8,894	11,438	14,974	14,332	12,427
% of fish for *prahoc* out of total catch (season)	N/A	63%	51%	40%	47%	51%	47%	20%	26%

[a] Data for year and season reflect catch for six months from October to March. Catch data for 1994-95 are based on a study by the Department of Fisheries and Mekong River Commission (Lieng et al. 1995). All other years reflect estimates by the Department of Fisheries (1995-2003). [b] These data reflect the catch for December and January combined. [c] Fish species for making prahoc include trey riel, riel tob, riel awngkam, and sleuk russey. January is the month when most farmers come to the dai fisheries to make prahoc.