

Commodity and product identification for value chain analysis



COMMODITY AND PRODUCT IDENTIFICATION FOR VALUE CHAIN ANALYSIS

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CONTENTS

Definitions of key terms	4
Background	5
Objective	6
Methodology	7
Research process	7
Research phases and results	8
Literature review	8
Objective	8
Methodology	8
Main findings	8
Selection criteria	8
Engages many smallholders	9
Potential for market development	9
Environmental sustainability	9
Researchability	9
Preliminary identification visit	10
Objective	10
Methodology	10
Main findings	10
Workshop: Commodity and product identification	14
Background	14
Objective	14
Methodology	14
Prioritizing the commodities	15
Workshop deliberations	15
Workshop product identification: Results	24
AAS partner organizations consultation meeting	24
Notes	27
References	28
Annex 1: Research team	29
Annex 2: List of workshop participants	30
Annex 3: List of AAS partner organization meeting participants	31

DEFINITIONS OF KEY TERMS

Value chain: the full range of activities that are required to bring a product from conception through the different phases of transformation, marketing and distribution to delivery to the final consumer (in a wider sense, also including disposal after use).

Commodity: fish and other aquatic animals that are traded fresh without any physical transformation.

Fishery product: fish or other aquatic animals that have been processed or transformed through human labor.

Smallholders: small-scale fishers, fish farmers, processors or traders.

Khmer name	English name	Scientific name
<i>Andeng</i>	Walking catfish	<i>Clarias batrachus</i>
<i>Chhpin</i>	Mekong silver barb	<i>Hypsibarbus pierrei</i>
<i>Chrakeng</i>	Snail eating barb	<i>Puntioplites proctozysron</i>
<i>Kanhchos</i>	Rate-face mystus	<i>Mystus rhegma</i>
<i>Kompleanh</i>	Three spot gourami	<i>Trichopodus trichopterus</i>
<i>Pra</i>	Pangas catfish	<i>Pangasius buechanani</i>
<i>Riel</i>	Siamese mud carp	<i>Cirrhinus siamensis</i>
<i>Ross</i>	Striped snakehead	<i>Channa striata</i>

Table 1. English and Latin names of the species referred to by their common Khmer names in the report.

BACKGROUND

This commodity and product identification research was undertaken in the context of the CGIAR Research Program on Aquatic Agricultural Systems (AAS). AAS seeks to reduce poverty and improve food security for the millions of small-scale fishers and farmers who depend on the world's floodplains, deltas and coasts. AAS combines more conventional approaches for introducing and scaling technical innovations, such as applied research and training, with approaches that foster innovation and promote institutional and policy change. Specifically, AAS utilizes participatory action research with communities to identify technology and policy solutions that best meet community long-term needs.

Participatory research empowers communities and strengthens their capacities, provides access to new knowledge, and links them effectively with other stakeholders. AAS researches key constraints driving poverty and vulnerability in aquatic agricultural systems, in order to identify solutions and propose effective development options. This study is focused on understanding how commodities and drivers of change interact and how to provide opportunities for the resource-poor.

Three main hubs for AAS research have been identified in Cambodia: the Tonle Sap region, the lowland plains and the Mekong mainstream. This particular research focused on the fisheries around the Tonle Sap Lake. The product identification process was undertaken as a collaboration between the Fisheries Administration and WorldFish to identify two fishery or other aquatic animal species or products for in-depth value chain analysis in 2014.

OBJECTIVE

The objective of this research is to strengthen the capacity of AAS to undertake value chain studies with high potential impact on smallholders.

The capacity-building aspect of this research was focused on the process of commodity and product identification for value chain analysis. Its scope was limited to fish and other aquatic animals and products in the Tonle Sap area identified for AAS intervention.

The result of the identification process was the selection of a number of commodities and products that were deemed to involve a high number of smallholders along the value chain and that have high market development potential.



Workers unload fresh catches in Chnok Tru market.

The methodology applied in this research is based on the Markets for the Poor framework of analysis that puts smallholders at the center of the research and focuses on improving participation of the resource-poor along the value chain (M4P 2008). The process of value chain analysis began by implementing a participatory process of product identification involving all stakeholders and applying selection criteria that emphasize smallholder involvement. The research process followed the steps described below.

Research process

1. Undertake a **literature review** of recent work on fisheries and aquatic animal value chains focused on the Tonle Sap area, with particular attention to species-specific work.
2. **Identify key stakeholders** that are represented in the value chain (fishers, harvesters, producers, traders, processors), as well as key research or development institutions that have worked on relevant issues.
3. Hold **consultation meetings** with identified stakeholders to develop a long list of possible commodities and products.
4. Agree on **method and selection criteria** for product ranking that (a) involve a large number of the resource-poor in the value chain; and (b) are deemed to have potential for significant further economic and market development.
5. Produce **product briefs** (where possible) for each product identified that highlight the key information and data that support the selection criteria.
6. Convene **two provincial consultation workshops** with the identified key stakeholders to list all the products identified, develop a matrix and score for each product, and use the selection criteria to rank the most important products that have the potential to present the resource-poor, and women in particular, with an opportunity to benefit from better inclusion in the market.
7. Convene a **national-level meeting with AAS partner organizations** to discuss research and activities that have been implemented in relation to fishery and aquatic product markets and value chains, and which may not have been captured in the literature review or provincial meetings.
8. **Agree on two commodities or products** for an in-depth value chain analysis to be undertaken in 2014.



Local fisher marinating his salty *khanchos* fish.

Literature review

Objective

The objective of the literature review was to identify research gaps in recent studies done for particular fish and aquatic species and products in the Tonle Sap area.

The identified research gaps are part of the selection process of two fishery or aquatic species or products to be subjected to comprehensive value chain research in 2014.

Methodology

The literature review examined the available studies done on fisheries and other aquatic animal value chains. It aimed to identify research focused on particular species or product value chains and identify gaps in this type of specific analysis.

The available literature was reviewed to identify the key species whose value chains have been researched and provide an overview of the key characteristics of overall fisheries and other aquatic animal value chains that may inform the elaboration of future more specific value chain studies.

The literature review provided a summary of the main conclusions reached in recent value chain studies regarding value chain development opportunities and constraints.

Main findings

There were comprehensive species-specific value chain studies identified for five key species (Navy et al. 2012a):

1. Giant snakehead (*Channa micropeltes*)
2. Pangasius (*Pangasianodon sp.*)
3. Croaker (*Boesemania microlepis*)
4. Reddish (*Micronema apogon sp.*)
5. Riel (*Henicorhynchus sp.*)

In addition, there was a value chain study done for small-sized fish species (Navy et al. 2012b).

Both of these recent studies provide a comprehensive analysis of the relevant value chain structure and dynamics, and thus do not

necessitate the immediate formulation of other such follow-up studies.

In contrast, there were only two articles dedicated to value chain analysis of other aquatic animals. Both of these articles are on the snake trade: "The balance of power in rural marketing networks: A case study of snake trading in Cambodia" (Brooks et al. 2010) and "Snake prices and crocodile appetites: Aquatic wildlife supply and demand on Tonle Sap Lake, Cambodia" (Brooks 2010). The findings of these studies are summarized in the literature review document.

The evident lack of literature on the subject of trade of other aquatic animals highlights an important research gap in this area.

There was also little evidence of value chain research done on fish products, such as traditional dried fish, salted dried fish or various fish pastes. The exception is one study dedicated to the development of production standards for fish paste (*prahoc*), which also points out the current limited understanding of fish product value chains.

In summary, while there has been some research done in relation to specific commercial species value chains, there is very little analysis of the value chains involving other aquatic animals or fisheries products.

Selection criteria

After the completion of the literature review, the research process focused on the establishment of selection criteria that reflected the objective of the value chain studies. The objective of these value chain studies was the following:

Provide a clearer understanding of how relevant value chains operate in the Tonle Sap, in order to inform the development of interventions aimed to address the constraints and opportunities in value chains and markets for resource-poor households.

On the basis of this objective, the research team identified the following specific criteria, which were grouped under two general headings:

1. engages many smallholders
 2. potential for market development.
- Under each general heading, the criteria were further elaborated into more specific questions to guide the discussion and selection process. These questions are detailed below.

Engages many smallholders

1. Is there a large number of people involved in the production, processing or postharvest activities of this commodity?
 - a) How common is this commodity in the selected districts?
 - b) Are there large numbers of smallholders already involved in this commodity value chain?
2. Is this a food security commodity that is important for many resource-poor households?
 - a) Is this product or commodity part of people's basic diet?
3. Are there barriers of social inclusion and gender along the chain?
 - a) Are there people included who get included or excluded from activities relating to this commodity on the basis of being part of a specific social group—due to ethnicity, recent migration or other?
 - b) Are there constraints to women's or men's participation in the value chain activities associated with this product or commodity?

Potential for market development

1. Is there strong demand for the commodity?
 - a) Has there been a historic or long-term demand for this commodity?
 - b) Is demand higher than supply for this commodity?
 - c) Are there seasonal variations in demand and supply?
2. Is there currently market access by smallholders?
 - a) Are smallholders able to reach all potential markets?
 - b) Are there untapped markets?
 - c) Is there sufficient market infrastructure available (roads, storage, transport)?

3. Is there potential for further postharvest value-adding for this commodity?
 - a) Are there opportunities for value-adding at the producer level?
 - b) Are there opportunities for value-adding at the postharvest level?
4. Are there significant market barriers to entry?
 - a) Does production or processing require a lot of technical knowledge?
 - b) Does production or processing require a lot of investment or capital?
 - c) Is the market dominated by a small number of large producers, processors or traders?

Finally, two additional aspects were considered by the research team prior to the final selection of commodities, one relating to environmental sustainability of the particular value chain and the other relating to the research already conducted on the subject. These criteria were key determinants in the final selection, as environmentally unsustainable practices or value chains that have already been the subject of in-depth analysis did not make the final selection.

Environmental sustainability

1. Are there any environmental risks or negative effects that would result from the continuation or intensification of the relevant value chain activities?
2. Can the negative effects be mitigated without impacting production or with little impact on production?

Researchability

1. Has there been any research already conducted on the value chain of this particular commodity or product?

This question links the literature review findings with the findings of the preliminary visits, and identifies species or products that have been identified as important but have already been researched in terms of value chain optimization for the resource-poor.¹

Preliminary identification visit

The literature review and elaboration of the selection criteria were followed by a number of visits to the sites selected for the research in order to initiate the direct involvement of key stakeholders in the commodity and product identification process.

Objective

The primary objective of the preliminary identification visit was to develop a long list of relevant commodities and products.

These commodities and products were discussed during the provincial workshops that followed and resulted in the selection of the two commodities or products for further value chain analysis.

The products selected for further in-depth value chain study were those that were deemed to have highest economic potential and to have the ability to promote the participation of the resource-poor along the value chain.

Methodology

Open-ended interviews were held with all identified stakeholders, including actors from all levels of the value chain, research organizations, civil society groups and external project interventions—nongovernmental organizations (NGOs) and donors—that were involved in fisheries and other aquatic animal development activities in the selected districts.

The open-ended interviews with local stakeholders focused on the following questions:

- What fish species are traded in this area?
- What processed fish products are traded in this area?
- What other aquatic animals are traded in this area?

The output of the preliminary visits and discussions was a long list of commodities and products that are locally captured or produced and traded. This long list was then presented for further discussion and finalization during the provincial workshops and provided the basis for the discussion and ranking.

Main findings

The preliminary visits took place in the provinces and districts targeted by AAS for the value chain studies in 2014. In each of the visited villages, a meeting was organized with fishers, fish farmers, processors and traders, involving both men and women who participate in various roles in the value chain. Table 2 lists the locations visited during the preliminary stage of the research, involving 5 provinces, 8 districts, 11 communes and 12 villages. These villages were also considered in terms of their agro-ecological location (i.e. water or land based, or both).

No.	Province	District	Commune	Village
1	Siem Reap	1. Sotr Nikum	1. Danrun	1. Santey
			2. Kampong Pluk	2. Muk Wat
		2. Pourk	3. Keo Por	3. Peam Ta Our
2	Battambang	3. Ek Phnom	4. Prek Norin	4. Rohal Suong
				5. Prek Toal
			5. Prey Chas	6. Prey Chas
3	Pursat	4. Bakan	6. Snam Preah	7. Tramper
			7. Meteuk	8. Bakou
		5. Kandieng	8. Raing Til	9. Raing Til
4	Kampong Thom	6. Kompong Svay	9. Phat Sanday	10. Phat Sanday
		7. Santuk	10. Prasat	11. Kampong Kor
5	Kampong Chhnang	8. Boribo	11. Ponley	12. Chnok Tru

Table 2. AAS focus communities visited during the preliminary visits for product identification.

Between 15 and 20 people attended the local stakeholder meetings in each location and contributed towards the elaboration of a long list of captured or produced and traded species. The group also discussed different local fish products and the role of men and women in all types of traditional processing activities, summarized in Table 4 and Table 5.

In some of the locations visited, the initial long lists of traded species included over 50 species of captured fish (a number far higher than anticipated by the research team). After this initial identification, participants were asked to rank the top 10 captured fish species, once by volume and once by price. The two resulting lists of ranked species were not the same, as many of the high-value species were not among the highest volumes of captured fish and vice versa. This information provided valuable background on the economic value as well as abundance of the local fisheries resources. Due to the large variety of species identified, the team selected the species that were most commonly represented across the sites and took the average values of the rankings. These averages are visually presented in Figure 1 and Figure 2.

It is interesting to note that these values represent a snapshot of seasonal fisheries, an example of which is the relative position

of *riel*, which when in season is captured in large quantities and commands a high price. However, despite the seasonal applicability of the information, the ranking presents a good starting point for discussion regarding the most “important” species.

The lists of cultured fish, other captured aquatic animals and fish products were considerably shorter and more similar in their composition. Therefore, these were not ranked by volume and price.

On the basis of the collected information, a short list was drafted for each workshop based on the commonality of fish species and other aquatic animals. The information from the various provinces were joined into a single list relevant to each workshop; in Battambang, the information also included results from Kampong Chhnang, Pursat and Kampong Thom, while in Siem Reap the results were joined with Kampong Thom.

The resulting lists were comprised of 14 to 16 commodities² and products that were to be discussed in detail, as a longer list of items was deemed to be too complex to be the subject of in-depth discussion and ranking. The lists resulting from the preliminary visits are presented in Table 3.

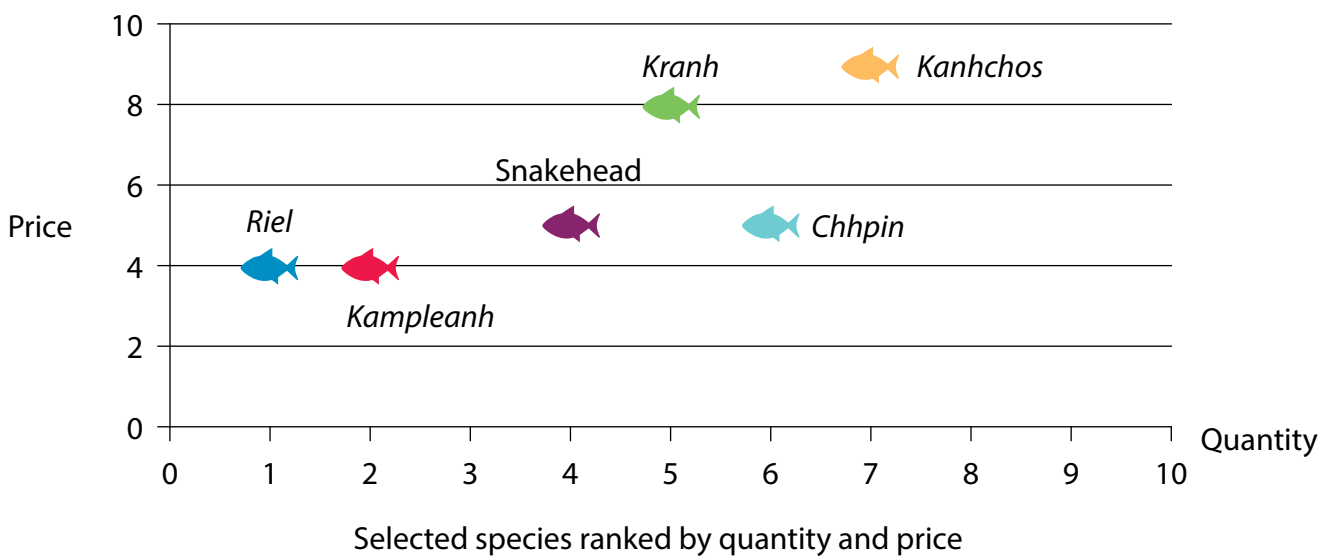


Figure 1. Ranking of top six species by price and quantity (Battambang, Pursat, Kampong Chhnang).

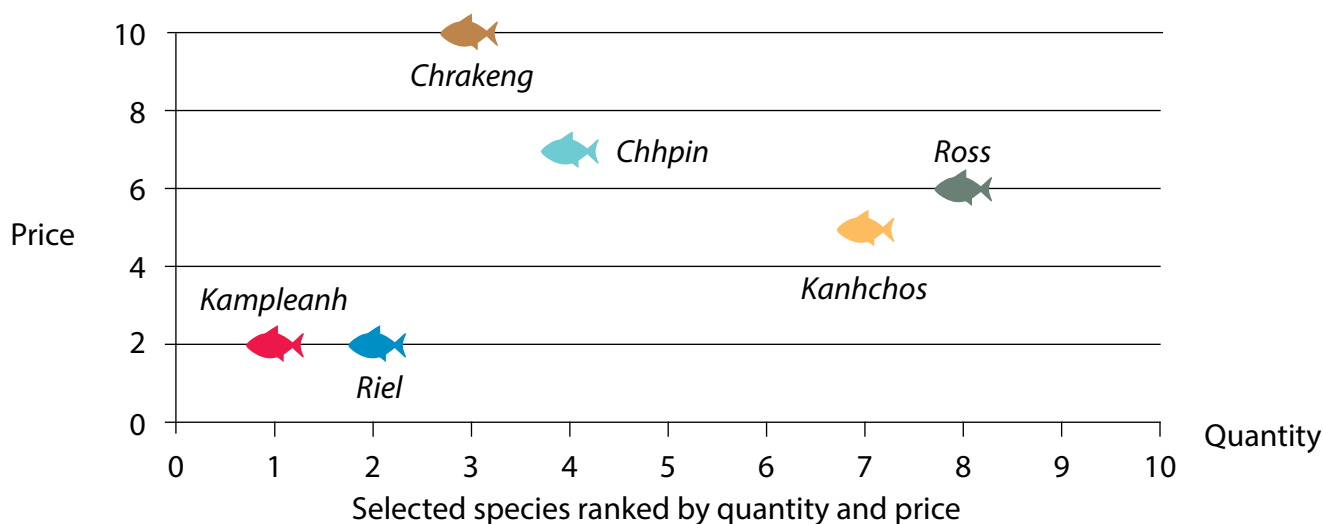


Figure 2. Ranking of top six species by price and quantity (Siem Reap and Kampong Thom).

Siem Reap workshop	
Capture fishery	1. Riel
	2. Kompleanh
	3. Chrakeng
	4. Kanhchos
	5. Chhpin
	6. Ross
Aquaculture	7. Culture fishery
	8. Pra
	9. Andeng
Other aquatic animals	10. Snake
	11. Crab
	12. Mollusk
Fishery products	13. Fish paste
	14. Smoked fish
	15. Salted dried fish

Battambang workshop	
Capture fishery	1. Riel
	2. Kompleanh
	3. Kranh
	4. Snakehead
	5. Chhpin
	6. Kanhchos
Aquaculture	7. Pra
	8. Andeng
Other aquatic animals	9. Snake
	10. Crab
	11. Mollusk
Fishery products	12. Fish paste
	13. Smoked fish
	14. Salted dried fish

Table 3. Short list based on preliminary visit results.

In addition to the identification of these commodities and products, some preliminary estimates were made in relation to community involvement in product processing. The summarized results of these discussions are presented in Table 4. The table also presents the top five species used in each of the types of products. This information links commodities with products, and it highlights raw material (raw fish) supply when focusing on the making of a particular fishery product. It also suggests links between particular species or commodity chains and product chains. For example, *riel* and *chuntul phluk* are in the top five species used in both fish paste and smoked fish; therefore, a value chain study of either one of these species will also touch on both fish paste and smoked fish products as one of the value-adding transformations along the chain.

The collected information clearly demonstrated similarities between the different communities in terms of level of involvement and gendered

division of labor in tasks related to traditional fish-processing activities. Fish paste (*prahoc*) and salted dried fish appeared to involve over half of the households in the target villages and communities, while other products such as smoked fish and fermented fish were produced by less than 20 percent of the households. Therefore, in terms of involvement of smallholders, fish processing varies according to the type of product.

Fish processing tasks were very gender specific, with women being more involved in processing than men. As demonstrated in Table 5, some products, such as fermented fish and *mam*, are reported to be exclusively produced by women. Therefore, on the basis of this gender dynamic, value chain research related to products will impact more women than an intervention focused on the capture fishery and fresh fish handling.

Type of product	Top five fish species	Involvement (% of households)	Remarks
1. Fish paste	<i>Riel</i> <i>Ross</i> <i>Kompleanh</i> <i>Chuntul phluk</i> <i>Chrakeng</i>	95	Produced for sale and household consumption
2. Salted dried fish	<i>Proma</i> <i>Pra</i> Snakehead Giant snakehead <i>Phtong</i>	80	
3. Smoked fish	<i>Riel</i> <i>Phtong</i> <i>Chrova mul</i> <i>Sleuk reusey</i> <i>Chuntul phluk</i>	20	Mostly for household consumption
4. Fermented fish	<i>Po</i> <i>Pra</i> <i>Kralong</i> <i>Chrakeng</i> <i>Chakok</i>	15	
5. Mam	<i>Bandol ampeuo</i> Giant snakehead <i>Chun lounh moan</i> <i>Chhviet</i> Snakehead	5	

Table 4. Community involvement in fish product processing and top species used (sorted by % of households involved).

Type of product	Men		Women	
	%	Tasks	%	Tasks
1. Smoked fish	40	Carrying heavy loads Fire management	60	Frying Putting fish on a stick to be smoked Getting firewood
2. Fish paste	40	Carrying heavy loads Heavy work Salting fish	60	Cutting fish Cleaning fish
3. Fermented fish	-	None	100	
4. Salted dried fish	20	Handling Heavy work	80	Cutting and cleaning fish Salting and frying
5. Mam	-	None	100	

Table 5. Gendered division of tasks in traditional fish product processing (% of involvement by gender).

This preliminary data collection was summarized and presented at the provincial workshops. Prior to the ranking and selection of commodities, the preliminary identification visit results were discussed and agreed upon.

Workshop: Commodity and product identification

Background

The workshops for commodity and product identification were the final stage of the participatory process at provincial level. The outcomes of the discussions informed the meeting with AAS partner organizations in Phnom Penh and the formulation of the value chain studies that were to be conducted by AAS in 2014.

The products selected for further in-depth value chain study were those that were deemed to have the highest economic potential and the ability to promote the participation of the resource-poor along the value chain. The findings and recommendations of the value chain studies on the selected products will feed into the planned interventions of AAS in Cambodia.

Objective

The objective was to select the top five commodities or products from the list assessed at each workshop.

The lists of five commodities or products from each workshop were compared to identify commonalities. In addition, the results were

assessed in terms of existence of relevant value chain research and environmental impacts. On the basis of these deliberations, the final two products were identified for further value chain analysis.

Methodology

- There were two provincial-level workshops—one in Siem Reap and one in Battambang—that included representatives from all the provinces visited (Annex 2: List of workshop participants).
- The research team made a presentation on the relationship between AAS and this study, as well as how the commodity and product identification process fits within value chain research.
- A summary of the findings from the preliminary visits was presented, as well as the short list of commodities and products based on the findings of the preliminary visits. Adjustments were made based on the contributions of the participants.
- The selection criteria were presented and discussed, in order to arrive at agreement with the participants on the methodology and principles behind the selection and to engage constructively in the selection process.
- Through a participatory discussion, the workshop participants located each of the commodities and products along the two axes and selected the top two for further study.

Prioritizing the commodities

Upon agreement of the list of commodities and products, as well as selection criteria to be applied, the participants began the selection process.

The participatory ranking process employed during the workshops was based on the consensus of the participants regarding the position of each commodity inside a matrix.

The matrix had two axes (Figure 3):

- X = potential for market development
- Y = engages many smallholders.

The potential for market development (axis X) and the involvement or engagement of many smallholders (axis Y) were judged on the basis of the perceptions of the workshop participants regarding the specific criteria outlined in the previous section.

Upon consideration of each of the specific criteria, each commodity was placed along the axes to reflect the consensus view of its overall score.

In order to facilitate the process and the ability of the participants to engage in the exercise, the placement of the commodity along each axis and in relation to the quadrants was done without the use of ranking and numerical scales. The outcome was based on visualization of each commodity and its place in relation to the other commodities considered within the same matrix.

Workshop deliberations

Battambang

The one-day workshop was held at Spring Park Hotel on 27 December 2013. There were 28 participants (26 male and 2 female). They were invited from various departments and organizations in Phat Sanday in Kampong Thom Province, Chnok Tru in Kampong Chhnang Province, Tramper, Raing Til, and Baku villages in Pursat Province, and Prey Chas and Rohal Suong villages in Battambang Province. They represented different stakeholders, such as the provincial Fisheries Administration, Akphivath Neary Khmer Organization (ANKO), Akpiwat Srey (AS), Analyzing Development Issues Centre (ADIC), fishers, fish farmers, processors, traders, heads of village, commune and local authorities, and heads of community fisheries. The workshop was organized by the Fisheries Administration and supported by WorldFish. Seven persons comprised the facilitating team, including officers from different departments of the Fisheries Administration's Inland Fisheries Research and Development Institute and WorldFish.

Finalizing the preliminary results

The preliminary results were presented in order to finalize the shortlisted commodities and products. As a result of further discussion of the preliminary selections, the ranking of some of the species and products was altered. The alterations are summarized Table 6.

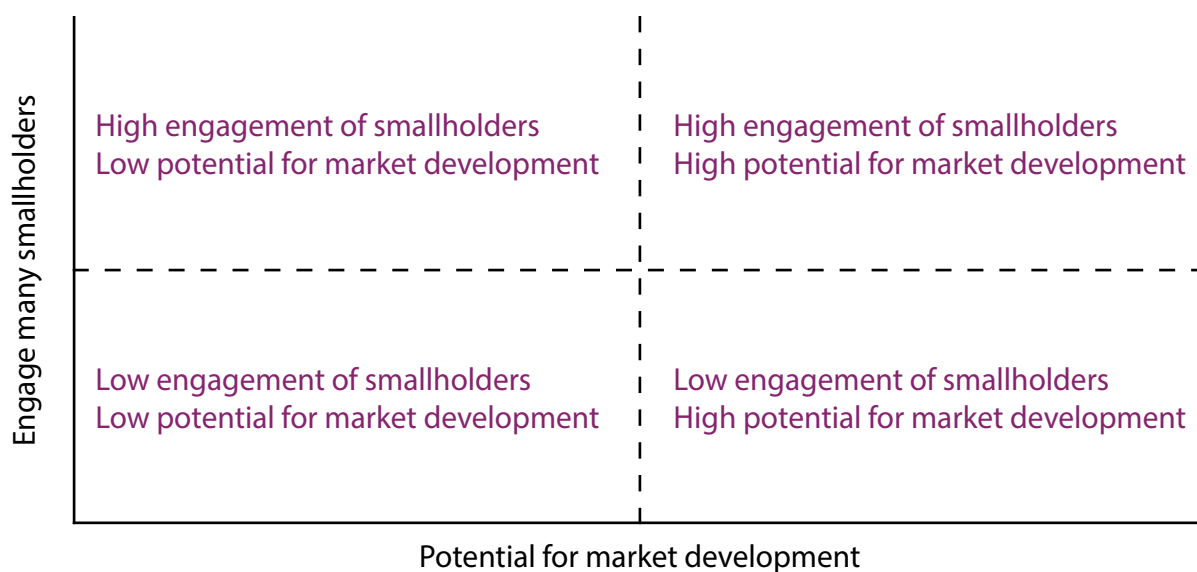


Figure 3. Ranking matrix.

Type of commodities or products	Before workshop	After workshop
1. Capture fishery	1. <i>Riel</i>	1. <i>Riel</i>
	2. <i>Kompleanh</i>	2. <i>Kompleanh</i>
	3. <i>Kranh</i>	3. <i>Andeng</i>
	4. Snakehead	4. Snakehead
	5. <i>Chhpin</i>	5. <i>Chhpin/Chrarkeng</i>
	6. <i>Kanhchos</i>	6. <i>Kanhchos</i>
2. Aquaculture	7. <i>Pra</i>	7. <i>Pra</i>
	8. <i>Andeng</i>	
3. Other aquatic animals	9. Snake	8. Snake
	10. Crab	9. Prawn
	11. Mollusk	10. Mollusk
4. Fishery products	12. Fish paste	11. Fish paste
	13. Smoked fish	12. Salted dried fish
	14. Salted dried fish	13. Smoked fish

Table 6. Shortlisted commodities and products before and after workshop.

The reasons for these alterations, as presented by the participants, are summarized as follows:

- ***Kranh*** was replaced by ***andeng*** (in capture fisheries), as *kranh* involves fewer smallholders in the value chain and its potential for market development was also estimated to be lower.
- **Cultured *andeng*** was cancelled from the list, as participants estimated that it did not involve a large number of smallholders in farming.
- **Crab** was replaced by **prawn**. This was justified on the basis of a larger involvement of smallholders in the prawn value chain, as well as a higher potential for prawn market development in comparison to crab.

After the short list was finalized, the participants engaged in the ranking of each of the commodities and products.

Table 7 summarizes the main points presented by the workshop participants during the ranking exercise. These deliberations resulted in the final ranking and selection.

According to the workshop participants, many of the species and commodities identified in the table below present value-adding opportunities at producer level. This means

that many of these commodities can be transformed into a variety of products, which leads to reduction of postharvest physical and value losses, as well as the potential to reach different markets interested in these products. In the case of traditional processing, often the technique and inputs needed are available at producer level, thus allowing for the increase of profit margins lower in the value chain.

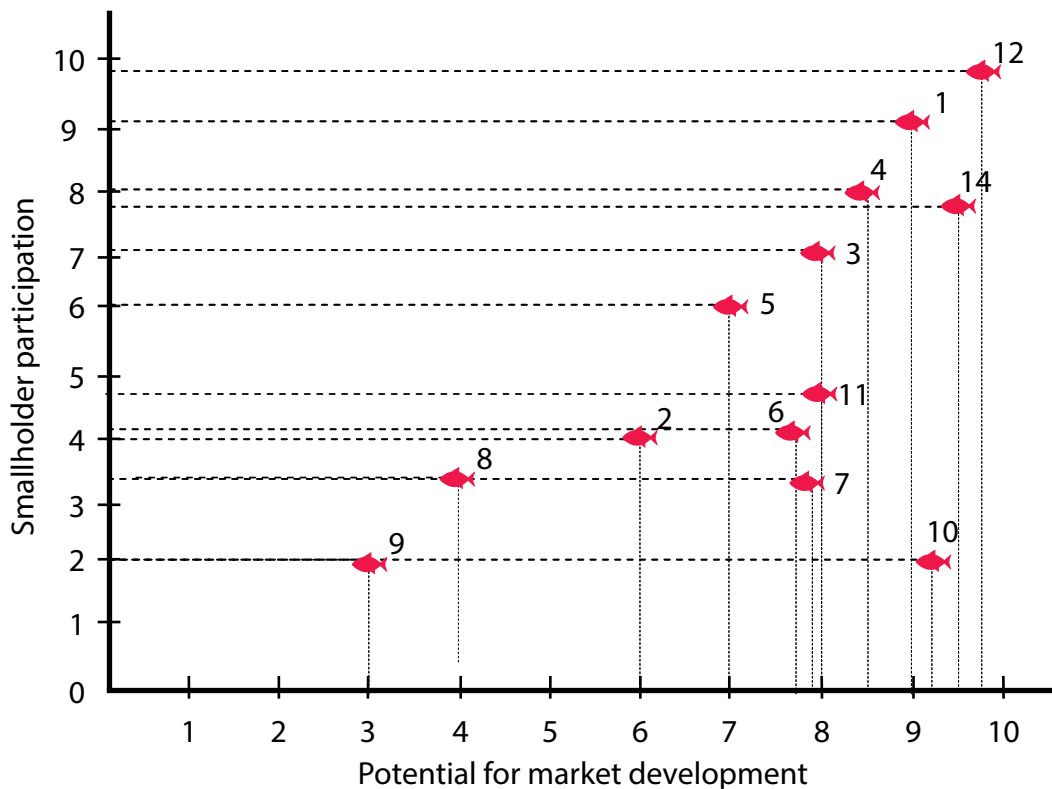
The information in Table 7 was used in creating a ranking matrix along the two main criteria axes: smallholder involvement and market potential. An image of this matrix is presented in Figure 4. The final outcome of the deliberations presented in the matrix is discussed in the next section of the report.

Final commodity and product selection

As the two workshops were to produce only two commodities or products for further research, each workshop identified the top five items to be included in the final identification of the two. This allowed the research team to base the final cut on the findings of the literature review, environmental considerations, synergies between the two workshop outcomes, and the meeting with partner organizations.

The top five commodities or products identified by the participants in the workshop in Battambang were the following:

1. fish paste
2. *riel*
3. *ross*
4. smoked fish
5. *andeng* (capture)



Legend

Type of commodity or product	Code by commodity or product inside matrix
1. Capture fishery	1. <i>Riel</i>
	2. <i>Kompleanh</i>
	3. <i>Andeng</i>
	4. <i>Ross/Snakehead</i>
	5. <i>Chhpin/Chrarkeng</i>
	6. <i>Kanhchos</i>
2. Aquaculture	7. <i>Pra</i>
	8. <i>Andeng</i>
3. Other aquatic animals	9. Snake
	10. Prawn
	11. Mollusk
4. Fishery products	12. Fish paste
	13. Salted dried fish
	14. Smoked fish

Figure 4. Ranking matrix from Battambang workshop.

CAPTURE FISHERY	
Species	Engages many smallholders
1. Riel	<ul style="list-style-type: none"> • There is significant smallholder involvement in the value chain. • It is part of resource-poor people's basic diet. • Fishing gear for capture is available. • Species is widespread in natural fishing areas.
2. Kompleanh	<ul style="list-style-type: none"> • There are fewer smallholders involved in fish capture of this species than <i>riel</i>, as this species is less abundant than <i>riel</i>. • It is not a part of resource-poor people's diet. • There is no fishing gear for capture available.
3. Andeng	<ul style="list-style-type: none"> • There is higher smallholder involvement in fish capture than <i>kompleanh</i> but less than <i>riel</i>. • It is not a part of resource-poor people's diet. • There is fishing gear for capture available. • It is more abundant in natural fishing areas than <i>kompleanh</i>.
4. Ross	<ul style="list-style-type: none"> • There are many smallholders involved in the value chain. • It is a part of resource-poor people's diet. • There is fishing gear for capture available. • It is more abundant than <i>andeng</i> and <i>kompleanh</i>.
5. Chpin/Chrakeng	<ul style="list-style-type: none"> • Not many smallholders are involved in the value chain. • It is not a part of resource-poor people's diet. • There is fishing gear for these species available.
6. Kanhchos	<ul style="list-style-type: none"> • There is significant smallholder involvement in the value chain, but it is not abundant in natural fishing areas. • It is a part of resource-poor people's diet.
Aquaculture	
7. Pra	<ul style="list-style-type: none"> • The number of smallholders involved in farming is less than those involved in capture fishery. • It is a part of resource-poor people's diet.
Other aquatic animals	
8. Snake	<ul style="list-style-type: none"> • There is limited engagement of smallholders in capture. • It is not a part of resource-poor people's diet.
9. Prawn	<ul style="list-style-type: none"> • There is significant smallholder involvement. • It is a part of resource-poor people's diet.
10. Mollusk	<ul style="list-style-type: none"> • There is significant smallholder involvement. • It is a part of resource-poor people's diet.
Fishery products	
11. Fish paste	<ul style="list-style-type: none"> • There is significant smallholder involvement in processing. • It is an important part of resource-poor people's basic diet.
12. Salted dried fish	<ul style="list-style-type: none"> • There is little engagement of smallholders. • It is a part of resource-poor people's basic diet.
13. Smoked fish	<ul style="list-style-type: none"> • Greater smallholder involvement than for salted dried fish, but less than for fish paste. • It is a part of resource-poor people's basic diet.

Table 7. Summary of discussions on each commodity or product and ranking criteria.

	Market development potential
	<ul style="list-style-type: none"> • There is high market demand and supply for this species. • There is long-term market demand for this species. • There is market access for smallholders. • There are opportunities for value-adding at the producer level. • It can be processed into many products.
	<ul style="list-style-type: none"> • There is strong market demand outstripping supply. • There is market access for the resource-poor, but stocks are limited in fishing areas.
	<ul style="list-style-type: none"> • There is strong market demand for this species, and lower supply than the demand for <i>riel</i>. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • Market demand is stronger than supply. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • Market demand is stronger than supply. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • There is seasonal market demand. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • There is market competition with imports. • There is strong market demand that is higher than supply. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • There are seasonal variations in demand and supply for this species. • There are untapped markets. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • Demand is higher than supply. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • Demand is higher than supply.
	<ul style="list-style-type: none"> • There is historic or long-term demand for this product. • Demand is higher than supply. • It can use many species. • Value is added at the producer level. • There is good market access for the resource-poor.
	<ul style="list-style-type: none"> • Market demand is not as strong as for fish paste. • There is good market access for the resource-poor.
	<ul style="list-style-type: none"> • Demand is higher than supply. • There is good market access for the resource-poor.

Siem Reap

The one-day workshop in Siem Reap was held at Century Hotel on 28 December 2013. There were 27 participants (23 male and 4 female) in the workshop (Annex 2: List of workshop participants). The participants represented various departments and organizations in Kampong Kor village in Kampong Thom Province, and Santey village, Muk Wat village, Peam Ta Uor village, and Kompong Khleang village in Siem Reap Province, as well as the provincial Fisheries Administration, the Trailblazer Cambodia Organization (TCO) and Dai Kou Kaksekar (DKK), fishers, fish farmers, processors, traders, heads of village, local authorities, and community fisheries.

Finalizing the preliminary results

The preliminary results were presented to finalize the shortlisted commodities or products. As a result of further discussion of the preliminary selection, the ranking of some of the species and products was altered. The alterations are summarized in Table 8.

The reasons for these alterations, as presented by the participants, are summarized as follows:

- *Chhpin* was replaced by *chhlonh*, as it was agreed that there are more smallholders engaged in the *chhlonh* value chain; it also presents higher market development potential.

- Crab was replaced by prawn due to higher engagement of smallholders and potential for market development.
- *Chakok* was removed from the list, as the workshop participants agreed that it was marginal in comparison to other species and their potential.

After the short list was finalized, the participants engaged in the ranking of each of the commodities and products. Table 9 summarizes the main points presented by the workshop participants during the ranking exercise. These deliberations resulted in the final ranking and selection. As in Table 7, value-adding opportunities at producer level were identified by the participants mainly in relation to traditional processing techniques, which allow for diversification of outputs at producer level and potential increase in income generation through reduction of losses and supply of different markets demanding traditional products.

The information in Table 10 was used in creating a ranking matrix along the two main criteria axes: smallholder involvement and market potential. The outputs of the workshop are presented in Figure 5. The final outcome of the deliberations presented in the matrix is presented in the next section of the report.

Type of commodity or product	Before workshop	After workshop
1. Capture fishery	1. <i>Riel</i>	1. <i>Riel</i>
	2. <i>Kompleanh</i>	2. <i>Kompleanh</i>
	3. <i>Chrakeng</i>	3. <i>Kanhchos</i>
	4. <i>Chakok</i>	4. <i>Ross/Chdor</i>
	5. <i>Chhpin</i>	5. <i>Chhlonh</i>
	6. <i>Ross/Chdor</i>	6. <i>Chrakeng</i>
	7. Culture fishery	7. <i>Pra</i>
2. Aquaculture	8. <i>Pra</i>	8. <i>Andeng</i>
	9. <i>Andeng</i>	
3. Other aquatic animals	10. Snake	9. Prawn
	11. Crab	10. Snake
	12. Mollusk	11. Mollusk
4. Fishery products	13. Fish paste	12. Fish paste
	14. Smoked fish	13. Smoked fish
	15. Salted dried fish	14. Salted dried fish

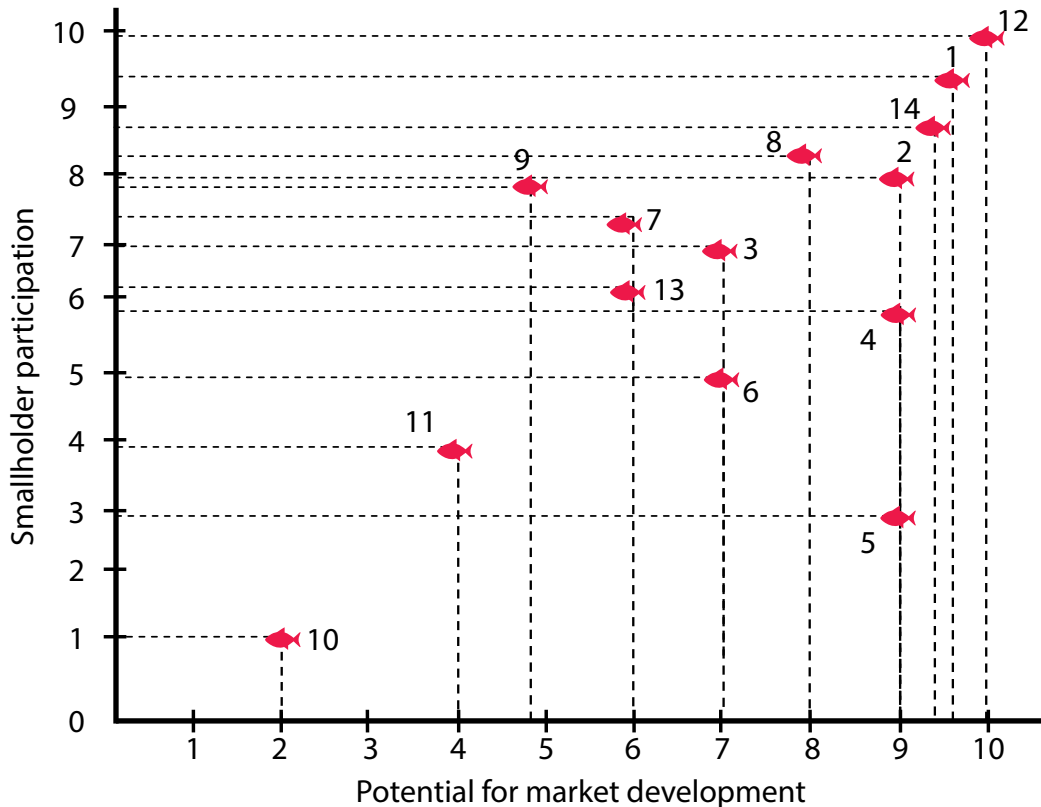
Table 8. Shortlisted commodities and products before and after workshop.

Final commodity and production selection

Each provincial workshop identified the top five products or commodities for further research, which were then used to prioritize two commodities or products for an in-depth value chain analysis. The research team based the final selection on the findings of the literature review, environmental considerations, outcomes of the two workshops, and the meeting with partner organizations.

The top five commodities or products identified by the participants in the workshop in Siem Reap were the following:

- fish paste
- *riel* and *kompleanh*
- salted dried fish
- *andeng* (culture)
- *ross* (capture)



Legend

Type of commodities or products	Code by commodity or product inside matrix
1. Capture fishery	1. <i>Riel</i>
	2. <i>Kompleanh</i>
	3. <i>Kanhchos</i>
	4. <i>Ross/Chdor</i>
	5. <i>Chhlonh</i>
	6. <i>Chrakeng</i>
2. Aquaculture	7. <i>Pra</i>
	8. <i>Andeng</i>
3. Other aquatic animals	9. Prawn
	10. Snake
	11. Mollusk
4. Fishery products	12. Fish paste
	13. Smoked fish
	14. Salted dried fish

Figure 5. Ranking matrix from Siem Reap workshop.

CAPTURE FISHERY	
Species	Engages many smallholders
1. Riel	<ul style="list-style-type: none"> • Many smallholders are involved in the value chain. • It is a part of resource-poor people's basic diet. • There is fishing gear available. • It is abundant in natural fishing areas. • It is rich in calcium. • Men and women are equally involved in fishing activity.
2. Kompleanh	<ul style="list-style-type: none"> • Fewer smallholders are involved in catching this species than <i>riel</i>, as this species is less abundant. • It is not a part of resource-poor people's diet.
3. Kanhchos	<ul style="list-style-type: none"> • There is a large number of smallholders involved in capture, but less than <i>riel</i> and <i>kompleanh</i>. • It is part of resource-poor people's diet, but less important than <i>riel</i>. • Men's participation in fish capture is higher than women's.
4. Ross	<ul style="list-style-type: none"> • Few smallholders are involved in fish capture. • It is a part of resource-poor people's diet. • There is fishing gear for capture available.
5. Chhlonh	<ul style="list-style-type: none"> • There are fewer smallholders involved in fish capture than <i>ross</i>. • It is not an abundant species. • It is not very important for food security.
6. Chrakeng	<ul style="list-style-type: none"> • There is a large number of smallholders involved in the value chain. • It is not an abundant species. • It is a part of resource-poor people's basic diet.
Aquaculture	
7. Pra	<ul style="list-style-type: none"> • Fewer smallholders are involved in farming than in fish capture. • It is part of resource-poor people's diet.
8. Andeng	<ul style="list-style-type: none"> • Fewer smallholders are involved in farming than in fish capture. • It is part of resource-poor people's diet.
Other aquatic animals	
9. Prawn	<ul style="list-style-type: none"> • Few smallholders are engaged in capture. • It is not part of resource-poor people's basic diet.
10. Snake	<ul style="list-style-type: none"> • Many smallholders are involved. • It is a part of resource-poor people's basic diet.
11. Mollusk	<ul style="list-style-type: none"> • A large number of smallholders are involved. • It is a part of resource-poor people's basic diet.
Fishery products	
11. Fish paste	<ul style="list-style-type: none"> • Many smallholders are involved in processing. • It is an important part of resource-poor people's basic diet.
12. Salted dried fish	<ul style="list-style-type: none"> • There is little engagement of smallholders in processing. • It is part of resource-poor people's basic diet.
13. Smoked fish	<ul style="list-style-type: none"> • More smallholders are involved in processing this product than salted dried fish, but fewer than fish paste. • It is a part of resource-poor people's basic diet.

Table 9. Summary of discussions on each product or commodity and ranking criteria.

Potential for market development	
	<ul style="list-style-type: none"> • There is high market demand. • There is historic long-term market demand. • There is good market access for resource-poor people. • There are opportunities for value-adding at the producer level. • It can be processed into other products, allowing for value-adding opportunities at producer level. • Constraints include market access to new markets and lack of investment capital.
	<ul style="list-style-type: none"> • Market demand is higher than supply. • There is market access for resource-poor producers.
	<ul style="list-style-type: none"> • There is strong market demand for this species, and lower supply than <i>riel</i> and <i>kompleanh</i>. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • There is strong market demand for this commodity, but it is lower than <i>riel</i>. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • There is strong market demand that is higher than supply. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • There is strong market demand, but lower supply than <i>riel</i> and <i>kompleanh</i>. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • Market demand is stronger than supply. • It can be processed into other products, allowing for value-adding opportunities at the producer level. • There is competition with imported fish.
	<ul style="list-style-type: none"> • Market demand is stronger than supply. • It can be processed into other products, allowing for value-adding opportunities at the producer level. • There is competition with imported fish.
	<ul style="list-style-type: none"> • There are seasonal variations in demand and supply. • There are untapped markets. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • Demand is higher than supply. • It can be processed into other products, allowing for value-adding opportunities at the producer level.
	<ul style="list-style-type: none"> • Market demand is higher than supply.
	<ul style="list-style-type: none"> • There is historic or long-term demand for this product. • Demand is higher than supply. • It can be processed from many species. • There is good market access for resource-poor people.
	<ul style="list-style-type: none"> • There is market demand, but less strong than fish paste. • There is market access for resource-poor people.
	<ul style="list-style-type: none"> • Demand is higher than supply. • There are many market access opportunities for resource-poor people.

In terms of environmental considerations, the research team consulted current fisheries legislation and the findings of the literature review in order to identify areas of concern. The literature review had very little to offer in terms of environmental impact analysis of different fishery value chains. However, one of the clearly identified issues in legislation, as well as in the literature, was the ban on snakehead culture. Therefore, snakehead culture was excluded as one of the potential value chain studies.

Workshop product identification: Results

Compared side by side, the top five commodities or products selected in each of the workshops were the following:

BATTAMBANG	SIEM REAP
1. fish paste (<i>prahoc</i>)	1. fish paste (<i>prahoc</i>)
2. <i>riel</i>	2. <i>riel</i> and <i>kompleanh</i>
3. <i>ross</i> (capture)	3. salted dried fish
4. smoked fish	4. <i>andeng</i> (culture)
5. <i>andeng</i> (capture)	5. <i>ross</i> (capture)

On the basis of these results, the research team proposes that one of the value chains chosen for further analysis should be fish paste (*prahoc*), as it is unanimously deemed to be the fisheries product that involves most smallholders and presents highest market potential for development. In addition, there was no in-depth value chain study identified for this product that explores the issues of improved smallholder market participation.

Riel and *kompleanh* have both been the subject of a recent value chain analysis and are an integral part of the input supply of a fish paste value chain study. Therefore, the research team suggests that there is no immediate need for further dedicated research.

The *ross* (snakehead) value chain in capture fishery has also been recently researched, and the team suggests that future interventions can be based on the existing study if further issues need additional investigation. However, the current ban on snakehead culture implies that it is not the most appropriate choice for value chain development.

Between smoked fish and salted dried fish, the research team deemed salted dried fish to be of higher research priority, as it involves important species in terms of supply, it is more widespread, and it is overall higher in the ranking at number 3 in Siem Reap.

Andeng was the final species to be considered; however, it is ranked lower than the above commodities and products, and there is a difference between the two discussion outcomes on the importance of the captured or cultured *andeng* value chain.

In summary, the final analysis of the multiple stages of the participatory identification and selection process at provincial level indicated that the most appropriate products for further value chain analysis are the following:

1. fish paste (*prahoc*)
2. salted dried fish

AAS partner organizations consultation meeting

The final step in the multilevel consultation process was a meeting with AAS partner organizations in Phnom Penh on 5 June 2014. The meeting was attended by representatives of the Human Resource and Rural Economic Development Organization (HURREDO), Akpiwat Srey (AS), Cambodian Organization for Women Support (COWS), Conservation International (CI), and Helping Address Rural Vulnerabilities and Ecosystem Stability (HARVEST). The objective of this meeting was to capture any research or implementation experience that these organizations have had in fisheries and aquaculture product development around the Tonle Sap which may not have been published or captured in the provincial-level workshops. Partners' experience and input was considered prior to the final selection of the products or commodities for the 2014 value chain study.

At this meeting, results from the provincial-level workshops were presented together with the deliberations of the value chain team regarding the top six species and products that had been identified. Participants were then asked to contribute their expert opinions regarding the identified choices by sharing their organization's experience of working on the particular species

or product in question and highlighting any opportunities or constraints.

Table 10 provides a summary of this discussion with partners and highlights main opportunities and constraints that the partners identified in their work on the identified fish species and products.

It appeared that most of the work done by partners focused on product development, rather than on any one particular species. Much attention has been given to fish paste and smoked fish.

HARVEST and CI were working on smoked fish and fish paste around the Tonle Sap, focusing on women's participation and marketing opportunities. Their experience pointed to greater opportunities for the development of smoked fish markets. Fish paste traditional markets were generally optimized, and new markets require improved product hygiene and quality standards. This is beyond the scope of partner interventions, as it would require the provision of clean water to target communities, many of which are floating villages.

Other partners, such as HURREDO, concurred with these observations and added that in their experience of working with fish farmers, there has been a great deal of interest in expanding smoked fish production using farmed species such as walking catfish.

In addition to smoked fish, salted dried fish was also deemed as potentially interesting by representatives of HURREDO and COWS, who stated that there are new markets for this product, albeit smaller than for smoked fish. One of the constraints pointed out was the loss of product value due to breakages during transport, which could potentially be improved through better handling and packaging.

In relation to value chains of culture fisheries, such as catfish culture, partners pointed out the high costs of inputs. Value chains of *riel* and *kompleanh* were also considered, as both species are used for a number of traditional products; however, their seasonal availability and low prices during the season were seen as a limitation to their potential development. In addition, *riel* and *kompleanh* were seen as closely

linked to the fish paste value chain, as these are some of the key species used for this product.

Discussions with partners therefore shifted the focus to include fish paste, smoked fish and salted dried fish as main contenders for research. Main reasons given for interest in smoked fish included the following:

- no published research on smoked fish value chain
- donor interest in development of new technologies
- market demand
- involvement of small-scale capture and culture fisheries
- potential for collaboration with partners on future interventions.

After careful examination of the opportunities and constraints encountered by partners along with the results of the provincial workshops in 2013, the main contenders for value chain research were determined to be fish paste and smoked fish, rather than salted dried fish.

A main limitation to additional fish paste market development is access to clean water. Despite this issue, many partners are engaged in providing inputs related to production or marketing processes. Thus, fish paste is still deemed to be a traditional product that may benefit from external value-chain-related inputs in order to maximize value and benefits for many small producers.

Interventions planned under AAS in 2014–2015, such as the provision of safe water to remote villages, therefore offer an opportunity to overcome a main constraint (access to clean water) in fish paste development. Therefore, while other partners have limited their current work on fish paste, there is a general consensus that a value chain study on fish paste would be widely beneficial not only for AAS interventions but also to other stakeholders involved in this area.

Finally, results from the multilevel consultation process identified the following two products as the most potentially beneficial subjects for value chain research for AAS:

1. fish paste (*prahoc*)
2. smoked fish

COMMODITY	OPPORTUNITIES	CONSTRAINTS	PARTNERS
1 Riel and kompleanh	<ul style="list-style-type: none"> high demand existing skills for processing <i>riel</i> in fish paste and smoked fish <i>kompleanh</i>—salted fish and fish paste in many cases not processed, thus lost opportunity 	<ul style="list-style-type: none"> limited supply of these species, decline in catch production and transportation costs high, while market price low fishers in debt to middlemen and bound to sell to them seasonality of <i>kompleanh</i>, thus limited supply legal restrictions 	<ul style="list-style-type: none"> CI
2 Ross (capture)	<ul style="list-style-type: none"> none of the identified partners currently specifically working in relation to this species 		
3 Andeng (catfish culture)	<ul style="list-style-type: none"> can be smoked to add value link to smoked fish value chain increasing number of ponds 	<ul style="list-style-type: none"> low fresh product market price expensive fingerlings and no local hatcheries high input costs 	<ul style="list-style-type: none"> HARVEST HURREDO
PRODUCT			
1 Salted dried fish	<ul style="list-style-type: none"> value-addition to fish high demand 	<ul style="list-style-type: none"> in less demand than smoked fish fragility of product, resulting in value losses due to transport damages 	<ul style="list-style-type: none"> HURREDO COWS
2 Fish paste (<i>prahoc</i>)	<ul style="list-style-type: none"> improvement of quality high demand 	<ul style="list-style-type: none"> barriers to quality improvement linked to provision of clean water, which is beyond the scope of partner interventions chemicals used to keep fish fresh 	<ul style="list-style-type: none"> HARVEST CI
3 Smoked fish	<ul style="list-style-type: none"> improvement of quality value-addition to fish improved skills and technology (availability of smoke stoves) high demand high market price 	<ul style="list-style-type: none"> low quality of product, affecting shelf life proper packaging environmental issues related to wood use negative health implications of smoke inhalation 	<ul style="list-style-type: none"> HARVEST CI HURREDO

Table 10. Commodities and products: Opportunities and constraints for market development according to AAS partners (5 June 2014).

NOTES

- ¹ Note that the literature review does not indicate what research findings and recommendations have been translated into practical interventions. Further deliberations and action plans can draw on such research.
- ² The total number to be included in the discussion was arbitrarily determined by the team on the basis of the time constraints within which the final selection had to take place.

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ANNEX 1: RESEARCH TEAM

The research team was composed of the following subject-matter experts:

Name	Position	Organization	Email/Telephone
Ms. Hap Navy	Deputy Director	Inland Fisheries Research and Development Institute, Fisheries Administration	hapnavy@yahoo.com
Mr. Pech Bunna	Deputy Director	Community Fisheries Development Department, Fisheries Administration	pechbunna@yahoo.com
Mr. Kiet Seng	Officer	Department of Fisheries Postharvest Technologies and Quality Control, Fisheries Administration	kiet_seng@yahoo.com 016 942867
Mr. Pel Samnang	Officer	Department of Aquaculture Development, Fisheries Administration	pel.samnang@yahoo.com 012 9455470
Mr. Loeng Nob	Assistant/ Research Assistant (Ms. Hap Navy)	Inland Fisheries Research and Development Institute	loengnob@yahoo.com

ANNEX 2: LIST OF WORKSHOP PARTICIPANTS

Participant types at the Battambang and Siem Reap provincial workshops
Dates: 27–28 December 2013

Battambang provincial workshop on 27 December 2013:

No.	Type of participant	Number of participants
1	Provincial Fisheries Administration	6
2	Fisher	5
3	Processor	2
4	Trader	1
5	Fish farmer	2
6	Community fishery	7
7	Local authority	2
8	NGO (ANKO, AS and ADIC)	3
	Total	28

Note: Total of 28 participants (2 female).

Siem Reap provincial workshop on 28 December 2013:

No.	Type of participant	Number of participants
1	Provincial Fisheries Administration	4
2	Fisher	5
3	Processor	4
4	Trader	3
5	Fish farmer	2
6	Community fishery	5
7	Local authority	1
8	NGO (DKK and TCO)	2
	Total	27

Note: Total of 27 participants (4 female).

ANNEX 3: LIST OF AAS PARTNER ORGANIZATION MEETING PARTICIPANTS

Participants at national-level meeting with AAS partner organizations
Phnom Penh, WorldFish Offices
5 June 2014

Organization	Participant(s)
Human Resource and Rural Economic Development Organization (HURREDO)	Mr. Kem Ratha and Mr. Taing Vanchan
Cambodian Organization for Women Support (COWS)	Ms. Chanputheary Chum
Akpiwat Srey (AS)	Mr. Chin Vuthy
Conservation International (CI)	Mr. Srorn Chantorn
Helping Address Rural Vulnerabilities and Ecosystem Stability (HARVEST)	Ms. Susan Novak



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