

**Social Science Methods  
for the  
KNOWFISH Project**

**An Addendum to Annex IV:  
The Technical Annex**

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## Introduction

The purpose of this manuscript is to expand on the social science aspects of the Technical Annex of the KNOWFISH Project so that we can build a common idea of the sorts of problems we are addressing and how we can use the research methods available to us.

Following the Technical Annex, the social science objectives of the project are:

- A. To analyse how the candidate indicators relate to existing institutions and social contexts that influence the quality, content and use of scientific information, including both research-based information and information generated in cooperation with stakeholder groups, and;
- B. To evaluate the ability and willingness of co-management institutions to use multiple sources of knowledge in management decision-making, and what difference this use of multiple sources of knowledge makes in the actual management of fishing behaviour.

The Technical Annex mentions four social science methods that will be used to meet these objectives: key informant interviews, sorting and listing interviews, discourse analysis, and random sample surveys. The last are only to be used in Malawi, Mozambique and Zambia as part of the analysis of existing fisheries co-management programs. The second objective mentioned above was also written specifically for those three cases where functioning co-management programs can be found. In fact, this objective is really just the first objective applied to a specific institutional form. Therefore, the discussion that follows is meant to relate to the first objective.

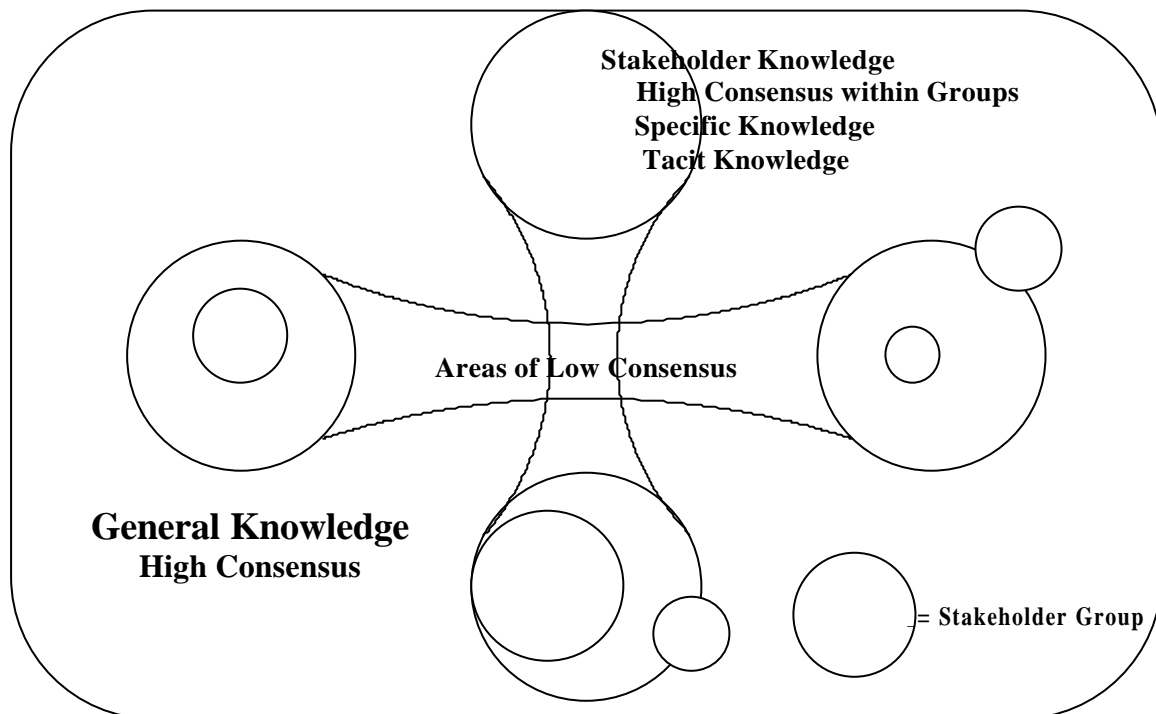
The structure of the social methods are as follows. Step one must come first, but the remaining steps, which together constitute the social evaluation of the candidate indicators, can be taken in any order and will in practice likely be going on simultaneously as opportunities present themselves.

1. Open ended, qualitative local knowledge interviews done with fishers in conjunction with the biological team. These interviews begin by creating a map of the resource and a timeline of changes respondents have seen. Then, after a general discussion of various fish species the interview moves to more specific questions based on ideas for possible indicators. The listing methods mentioned in the proposal can take place during these interviews.
2. Consensus interviews ask a sample of respondents from different stakeholder groups a series of factual questions about the resource. In this document “stakeholder” is a term meant to include our direct colleagues, i.e., government officers, management professionals, and fisheries scientists, as well as environmental and conservation groups, and user groups such as fishers, farmers, fish processors etc. The idea is to see the degree to which stakeholders agree about these basic facts.
3. Sorting interviews are also done with people from different stakeholder groups. In sorting interviews respondents place objects relevant to the resources in groups according to what they see as similar. They then explain why they sorted the objects as they did.
4. Ordering interviews are done with people from different stakeholder groups. In ordering interviews respondents order objects according to some criterion, usually but not necessarily, agreement. The respondents then explain why they ordered the statements the way they did. The interviews are also an opportunity to gather other opinions about the resource. The ordering interviews are part of what was described in the proposal as “discourse analysis.”
5. Documentary analysis is a review of reports, papers statements, press articles or any other documents that indicate positions about the resource taken by stakeholders. The analysis focuses on how they draw on scientific claims to support the arguments they are making. The documentary analysis is the second part of the discourse analysis.

## Studying the Knowledge Base for Management

KNOWFISH is a team effort of cooperation between social and natural scientists. This document is focussed on the social, rather than the biological aspects of the work. Validating the biological information gathered from interviews is our biological colleagues job while our job is to see how and to what extent the information varies according to social variables, such as stakeholder group. Their primary concern is with what people say, while our primary concern is with who says what.

**A Map of the Knowledge Base.** Figure One is a “map” of the knowledge base for management. It is one possible way of drawing a picture of the knowledge base for fisheries management. The curved rectangle at the back of Figure One is general knowledge. General knowledge is what “everybody knows” or the “common sense” about the fishery. It has very high consensus, if you asked 20 random people general knowledge questions they would all give you the same answer. The circles in the figure represent stakeholder knowledge, which is knowledge that different stakeholder groups build through their experiences with the resource and the environment. Stakeholder knowledge also has a high consensus *within the stakeholder group*. Stakeholder knowledge is about very specific things that come from the specific ways in which a stakeholder group uses or studies the resource. A lot of stakeholder knowledge will also be tacit knowledge, meaning knowledge gained through direct experience that is difficult to put into words. Remember from the social science task’s perspective government managers and fisheries scientists are just two more stakeholder groups to be treated in a methodologically even handed way with the other stakeholders. Between general and stakeholder knowledge are the things that people disagree about, the areas of low consensus between the stakeholder groups.



How do we draw the lines in this map in our particular cases? This is both a critical and difficult question. The methods that have been developed to study knowledge begin by trying to identify the boundaries of the “domain” to be studied, meaning how the population itself (whether fishers, scientists or whatever) see things are related. By looking at indicators we are already introducing a institutional distortion into the knowledge patterns we are studying. After all, “indicator” is a concept of interest to bureaucrats looking for decision rules, it is only of interest to fishers and scientists after the question of bureaucratic fisheries management begins to impinge on their lives.

The boundaries of our domain are already determined by the needs of the management bureaucracy, they are the indicators and the knowledge about the fishery that is related to the indicators. Knowledge related to the indicators include raw facts about what is going on with the resource, beliefs about causal relationships that relate these raw facts to both the state of and pressures on the resource, and beliefs about causal relationships

that suggest responses to these pressures and states. This is a domain, particularly with its reliance on beliefs about causal relationships, that is alien to many relevant stakeholder groups.

This problem takes very specific forms and is well illustrated by the findings in the pilot study. We found in Laos that the idea of something being an indicator the abundance of a fish species did not communicate very well. Direct questions like “is there anything that you see that gives you hope that there will be more of this kind of fish next year / makes you afraid there will be fewer fish next year?” usually got negative responses. When the fishers did respond they mentioned general things like habitat degradation or increases in the numbers of fishers. One of the main differences in how fishers and government officers related items in the sorting interviews was that officers grouped “fewer and fewer fish” with specific fishing behaviours, i.e. fishing while spawning, while fishers grouped it with increasing numbers of fishers and increasing market demand. This does not mean that either group would deny the importance of what the other group was pointing at. It does suggest differences, however, in the ways the group would initially define the problem. The officers, as bureaucratic fisheries managers usually do, begin by defining the domain of fisheries knowledge by linking abundance (or other management objectives) to things they can control. The fishers focus on wider issues. Managers will also see indicators as aids to control, and therefore important. To talk with the fishers about indicators will likely mean raising the questions of control first, and hence bringing them into the managers’ knowledge domain and asking them to interpret things in those terms.

These problems do not arise because of some fault in the project design. We did not invent the need to link the “worlds” of managers, scientists, fishers and other stakeholders. But we need to be clear about how difficult this problem is. The methods that have been developed by anthropologists for understanding the knowledge patterns of groups of people begin with the assumption that they are looking at just that - an existing knowledge pattern *in situ*. The domain problem means that we cannot simply import methods developed by others to study local knowledge, we have to be constantly creative.

One thing that the social side of the KNOWFISH Project is trying to do is to map the knowledge base in Figure One and then place the indicators on that map in order to see how effective they will be. The critical method for this job is consensus analysis, i.e. asking simple questions about the resource and its ecology and finding out which respondents agree with each other. The domain problem arises here in the selection of questions to be asked. The method for selecting questions recommended by those who use these methods to explore knowledge domain as they actually are is to base the questions on responses given by respondents in in-depth and loosely structured local knowledge interviews.

This is the approach we used in the Laos pilot study. Our experience there suggests that we were too shy about asking questions derived more directly from the biological team’s recommendations about candidate indicators. This was mainly because we underestimated how alien the indicator notion would be and, hence, were overly optimistic about the degree to which we would be able to discover indicators already embedded in the local knowledge. In the other cases we should be more willing to import questions into the sorting and listing interviews about candidate interviews whether or not they are based on the responses in the initial interviews. It would make less sense to bring import things into the consensus analysis that do not come from things we were told in the field, as that is meant to be a test of how much fishers and other stakeholders agree with each other.

**The Construction of Knowledge about the Resource.** The map, however, is simply a starting point for thinking about knowledge and stakeholders. It does not address the underlying question of where this knowledge comes from, i.e. how do the various stakeholders, and the management institutions, construct their specific knowledge of the resource.

Table One relates the project’s methods to a model of the types and levels of the social construction of knowledge. It suggests that we need to study five main “objects” if we are to understand the knowledge base of fisheries management. Each of these objects corresponds to a row in the table.

Because we are involved in such different cultures and fisheries it is really not possible to construct a “cook book” of methods that each case will follow. The purpose of Table One is to give us a tool to use to come to a common understanding (and we at IFM hope that we can get some feedback about any changes we would like to see in Table One) of what we hope to accomplish with each kind of method. This way as each case selects the specific methods that apply best to their situation they can keep these common objectives in mind.

The first two rows relate to the ways that individual knowledge of the resource is constructed. One possible model of how people construct their knowledge of nature is by suggesting that they learn things through their own experience and they learn things by other people telling them things. Facts and ideas about nature gathered in both of these ways are then selected for their usefulness in people’s daily lives. The first two rows of the table are related to these two ways that individuals develop their perceptions of the resource.

**Table One: Objects and Methods of Study**

<b>Object of Study</b>	<b>Object Level</b>	<b>Methods of Study</b>
Individual experience - knowledge that comes from people's experience	The Construction of the Resource through Individual Perceptions	Qualitative interviews Consensus Analysis
The social sources of validity - To whom do people give credibility.		Ordering
Shared Meanings - How well people understand one another	The Construction of the Resource through Social Discourses	Consensus Ordering Sorting
Interests - Knowledge claims made to further the speaker's interests		Documentary Research Ordering
Institutional Distortions - Simplification and reformulation of knowledge for institutional purposes		Institutional Analysis Documentary Research

Note: consensus, ordering and sorting can all be done through large random sample surveys as well as other kinds of sampling on smaller scales.

This model suggests that we can understand these two sources of perception by 1) looking at people’s direct experience and 2) finding out who they trust to be sources of what kinds of knowledge. This first job should be done through the initial interviews and through the consensus analysis. Consensus analysis can tell us about how experience is related to knowledge by looking at how the responses to the consensus analysis questions correlate with experience variables such as gear type or location of fishing activities. The second job can be done through ordering interviews in which people are asked to order stakeholder groups according to who they trust the most to tell them about the resource.

The third, fourth and fifth rows relate to how the resource is constructed through social discourses. It may not be immediately obvious how social discourses are different from the second row, social sources of validity, because they are indeed closely related. The difference is that the second row is about processes that operate inside a person’s head, a person perceives a particular source of information as credible for a certain type of information and believes that information when it comes from that source. The association is between two individual perceptions. The last three rows, on the other hand, are about how meanings get constructed on an interpersonal level. Symbols take on meaning from other symbols and these meanings are drawn upon by people in communications. Clearly, this still involves associations being made by individual people, but within social discourses associations are seen as valid by many people, or by particular groups, and these associations may

even take on symbolic meanings of their own. These interpersonal associations must also be studied in their own right if a full picture of the social construction of the natural resource is to be created.

The third row asks the question of how well the different stakeholders understand one another. Do different stakeholder groups see the resource in different ways and, if so, what do they differ about and why. Do the words and symbols they use in association with the resource differ? Clues to this can be gleaned from consensus, ordering and sorting interviews.

The fourth row relates the claims that stakeholders make to their own economic and political interests. All stakeholder groups will emphasize facts and interpretations of facts that support their own positions in management debates and these selections of facts will be reflected even in general knowledge interviews like ours. Often there is a close association between facts and claims that people gather from their own economic activities and the facts and claims that defend those activities in management debates.

The last row asks the question of how management institutions (and possibly other institutions will be relevant) change knowledge to fit institutional needs. This is most often a process of simplifying facts and interpretations of facts related to the resource so that they can be used as part of a decision making process. Such processes usually operate at higher scales than the scale at which the facts are gathered. At the very least, simplification processes reduce the richness of the information gathered at the lower scales to make it feasible to use the information in higher level institutions. Very often these institution-driven changes will distort the information into a form that is not well supported by the original knowledge base.

A description of how each of these five objects is operating in a particular case is needed if the overall construction of the resource is to be understood. The third column suggests categories of the methods that can be used to study each of the objects. The specific set of methods chosen for each case will have to be selected for each case. The book [Systematic Data Collection](#) should prove to be a valuable aid in this selection.

## Basic Research Steps

This section seeks to describe step by step the methods and describe the role that each one will play in studying the knowledge base. We cannot write a “cook book” that gives the recipe that every case study will follow. This is not possible because each culture we study is going to react to these methods differently. Every case is going to have to use their judgement. Particularly for the ordering and sorting interviews the choice of methods will have to be locally specific. This is basically a question of finding the most informative method that works well with a given community. Each social science partner will receive a copy of Weller and Romney’s [Systematic Data Collection](#) to aid them in making these judgements.

The important question, then, is “*How can I tell if the method is working well in this community.*” The answer is that you ask people to explain their answers, if they are comfortable and clear in their explanation of why they have responded the way they did, then the method is likely working well. This is perhaps the most important need for a good translator, as poor translators will often think it their duty to “clear up” confusion between the parties. Especially during the field testing, local counterparts need to be heavily involved in these evaluations, translators need to be well instructed, and probing questions need to be asked to make sure the respondent is really clear about what they are doing. This should be done even at the risk of being annoying. The next test must wait for the analysis, if the results are confusing noise the method did not work well. However, if the method passes the first test, the second test will almost always be passed.

But a few basic issues in social science research are new to some partners, and we have learned several things about using these methods in the pilot case. So this section discusses steps that need to be taken and some of what we have learned about doing them well.

### 1. Local knowledge interviews

The initial LEK interviews carried out in Work Packages Two through Eight are perhaps the most critical single operation in the entire KNOWFISH project. It is on these interviews that the rest of the research, both biological and social, depends.

Step 1. Identifying respondents. The idea is to get a small number of knowledgeable fishers covering both the spatial aspects of the ecosystem of interest and the relevant fisheries. The small number is because of the amount of work involved in transcribing and translating these interviews. We found that the best interviews have been with small groups of 2-3 fishers at one time. More respondents becomes confusing and repetitive. Individual respondents often work very well, but in some situations fishers feel more confident to respond if they have other fishers to confirm their statements.

Depending on your situation, your team will have more or less control over the selection of respondents. Local village officials will usually have to be deeply involved in the process of selection both for formal reasons and because they have the information about who the fishers are. It is important that the most knowledgeable possible fishers be identified. This will often get translated as the oldest and most successful fishers. Age alone is not very meaningful and success can reflect capital resources as much as skill, but these proxies are better than nothing. You should ensure that the fishers have been fishing in the area of interests for at least five years and look for signs that the respondent has at least not been a failure at fishing.

The research team should try to minimize the number of people present at one interview, though this can be quite difficult at times. Permission must be obtained for the use of the tape recorder. We have experienced only two refusals for taping out of 40 odd interviews, both of these were government officials. If permission is not obtained the interview may be terminated as quickly as is polite, if other opportunities for taped interviews are available, as untaped interviews are of much less use in further research.

Good translation is difficult and we should not be afraid about expending resources to get good translation. Simply being able to speak English and a local language does not mean that a person is able to translate well in interview situations. If the opportunity to get someone that is a professional translator presents itself it should be used.

It is a very good idea to immediately transfer the taped interview from audio tape to a computer file in a laptop. This ensures, for one thing, against loss of data from a broken tape. This is easily accomplished using the inexpensive Cool Edit program from Syntrillium Software (70 USD) or a similar program. A direct line from the earphone jack of the tape recorder to the line in jack on the laptop accomplishes the transfer in the time it takes to play the tape.

What follows here are the topic guidelines for these interviews used in Laos and two sets for Viet Nam, one used with fishers and the other used with government officials. They worked very well, but particularly the later parts of the interviews (questions three and higher) will have to be rewritten according to the specifics of each case.

Note that these are topic guidelines, not interview question schedules. The difference is that when an interviewer uses a question schedule they ask every question and do it the same way every time. This is used in quantitative research to ensure comparability in answers converted to numbers. We are not doing quantitative research here and these topic guidelines are very different from question schedules. The idea is not to ask every question but to guide a give and take discussion to particular topics. In the perfect qualitative interview the respondent would not respond to any questions, just talk about all the topics without the interviewer saying a word. This would be perfect because they would be putting things entirely in their own words so the researchers are learning more about how the respondent thinks about things. Questions always bias responses. In the following topic guidelines, the list of questions under each topic are reminders of what kinds of questions can be asked to get at the information we are after. Often respondents will have already talked about these things without prompted. You should not ask the questions one by one, in fact you should ask as few questions as you can and still get all the topics well covered.

### **The following guidelines were used in Laos.**

*Hello, we are from the Living Aquatic Resources Research Centre. We are trying to learn more about the fish and the river environment in order to better protect and improve the fish resource. We have found that we can get a lot of information that will help us to have a better fishery in the future by talking to the fishermen. We would like you to please talk to us for about one hour about your fishing activities. We are not going to ask you anything about your fishing that you think is private and if you don't want to answer any question you don't have to. We are also not going to tell anyone else that you told us something. Because fishermen tell us so*

*much useful information it is important that we be able to record what you tell us so that we can check back to make sure that we have understood it all. Can we please have your permission to use our tape recorder?*

**1. Discussion of the maps and the layout of the area.** Lay the sketch map out on the table or the ground. *Please show us the general areas where you fish during the year. How do you choose where you go to fish? Are there any places where you never go to fish? Why not? What fish do you fish for in each place? What gears do you use?*

**2. Discussion of the time line.** Lay out the time line of the last 30 years. *Ask: What have been the most important changes that have happened in the aquatic environment in the last 30 years? For each change ask: When did you first realize this was happening? How did you first know it was happening? Why did this change take place?*

**3. Discussion of individual species.** *What are for you the three most important fish? For each fish ask (if information was not provided in topic 1):*

*A) Why are these fish important to you? How do you fish for these fish? Are there other methods that other people use?*

*B) In the last few years has the average size of this species changed? When does this fish come to this area and when does it leave? Are there any times when the fish is never seen at all? Are there times when the fish is very abundant? From the catch of the species in one year can you tell how big the catch will be the next year?*

*C) Where does this fish spawn? Please describe how and where the fish grows during its life? What does it eat during these different times of its life? Where does it move to and from? Which are more important for having many fish, males, females or are they the same?*

**4. Discussion of Management.** *What are fishing rules that exist on this part of the Xe Don? For each rule ask who made the rule and who enforces the rule. After they have listed all the rules ask which rules are most often violated and why. What other rules might be good to make? Who should make them?*

**5. Discussion of long distance impacts.** *Do you know much about what people are doing on other places along river? Which places? How do you learn about these things? How far away? Are there things that people in other places on the river that affect the environment and the fish here? How do you know that they are creating these changes? Are there things that you do that affect the fish fished by people in other places?*

**6. Discussion of water level and quality.** *What changes have you seen in the water itself? If not mentioned ask: What changes have you seen in the water level, colour, turbidity, or algae content. Do you think these changes are important? each case*

## **The following guidelines were used with fishers in Viet Nam.**

*Hello, we are from Cantho University. We are trying to learn more about the fish and the river environment in order to better protect and improve the fish resource. We have found that we can get a lot of information that will help us to have a better fishery in the future by talking to the fishermen. We would like you to please talk to us for about one hour about your fishing activities. We are not going to ask you anything about your fishing that you think is private and if you don't want to answer any question you don't have to. We are also not going to tell anyone else that you told us something. Because fishermen tell us so much useful information it is important that we be able to record what you tell us so that we can check back to make sure that we have understood it all. Can we please have your permission to use our tape recorder?*

**1. Discussion of the maps and the layout of the area.** Lay the sketch map out on the table or the ground. *Please show us the general areas where you fish during the year. How do you choose where you go to fish? Are there any places where you never go to fish? Why not? What fish do you fish for in each place? What gears do you use? How does your fishing change in different times of the year. Why? How does your fishing change with different tides? Why?*

**2. Discussion of the time line.** Lay out the time line of the last 30 years mark end of war, mark beginning of reforms. *Ask: What have been the most important changes that have happened in the aquatic environment in the*

*last 30 years? For each change ask: When did you first realize this was happening? Why did this change take place?*

**3. Discussion of individual species.** What have been the trends in catch rates. How have you responded in your fishing practices to these changes? Probe: Why this change. Any plans for the future. What have been the trends in catch composition? What are the different kinds of shrimp species. How do you separate them. What are for you the three most important economically?

For the three most important kinds of shrimp ask: Where do you catch the most of these shrimp? Where are they never seen? Where do they migrate and when? Where do you catch the juveniles? Where do you catch adults? Where do you find shrimp with eggs. Where do find the largest shrimp? Where do you catch the smaller ones? Where do you catch the best quality shrimp of this species? What makes one shrimp of this species better than another?

#### **4. Discussion of indicators in general.**

What are the signs that tell you that you will catch many shrimp next year?

What are the signs you see now that tell you that you will catch few shrimp next year?

What are the signs that tell you that this trip you will do well? do poorly?

#### **5. Possible indicators.**

Number of adult females as proportion of the catch.

Has it changed? Why has it changed? Is this good or bad? Have you ever changed your fishing as a result of the proportion of females in the catch? Do you think the number of adult females as a proportion of the catch matters to future catches? Can any change in management influence the proportion of females in the catch? Do you think that management rules should change if the proportion adult females as a proportion of the catch decreases? Increases?

Catch per unit effort.

Has CPUE changed? Why has CPUE changed? Is this change in CPUE good or bad? Have you ever changed your fishing as a result of a change in CPUE? Do you think that CPUE now matters to future catches? Can any change in management influence your CPUE? Do you think that management rules should change if the catch per unit effort goes down.

Species composition.

Has the species composition changed? Why has it changed? Is this change good or bad? Have you ever changed your fishing as a result of a change in species composition? Do you think that species composition matters to future catches? Can any change in management influence the species composition in your catch? Do you think that management rules should change if the species composition changes? How?

Size of shrimp.

Has the size of shrimp changed? Why has the size of the shrimp changed? Is this good or bad? Have you ever changed your fishing as a result of a change in the size of the shrimp? Do you think that the size of the shrimp matters to future catches? Can any change in management influence the size of shrimp? Do you think that management rules should change if the shrimp become smaller?

Salinity, Rainfall, Water flow from rivers.

Does rainfall matter to fishing How? Have you ever changed your fishing as a result of changes in the amount of rain? Do you think that rainfall matters to future catches? Do you think that management rules should change if there is more or less rain? How? Why?

**6. Discussion of Management.** What rules are there about fishing? For each rule ask who made the rule and who enforces the rule. After they have listed all the rules ask which rules are most often violated and why. What other rules might be good to make? Who should make them? Do you see the MoFI annual reports? Do you think they make sense? Do you know how the data are collected?

The following guidelines were used for interviews with government officers in Viet Nam.

*Hello, we are from Cantho University. We are doing a study of the knowledge base of fisheries management in hopes of finding simple indicators of resource conditions that can be used for more effective fisheries management. We have been talking with many fishermen in your area about their perceptions of the resource. We are talking with government officers about their perceptions of scientific information so that we can compare it with what the fishermen are telling us and so that we can get a better idea of how you use scientific information in making management decisions. We are also not going to tell anyone else that you told us something. Because these interviews tell us so much useful information it is important that we be able to record what you tell us so that we can check back to make sure that we have understood it all. Can we please have your permission to use our tape recorder?*

1. Please describe the shrimp life cycle beginning with where they spawn and then and where they go at what age? What is the importance of the mangrove forest for the shrimp? What is the importance of the mud flats for the shrimp.
2. Do you believe the shrimp resource is declining? Why? What are the most important indicators of shrimp abundance? How do you balance habitat causes against overfishing causes?
3. Do you believe there is any real conflict, from a purely scientific viewpoint, between aquaculture development and capture fisheries for shrimp? Why or why not? What do you believe is the proper balance between aquaculture and capture fisheries? What are the most important indicators of a good balance between aquaculture and capture fisheries?
4. Given what we have said about both the declines in the resource and its relationship to aquaculture, what do you think are the most important research priorities for shrimp management and development in Ca Mau Province?
5. What are the standard fisheries rules that apply to the shrimp resource? Mesh sizes? Zones? Banned gears? Others? What is the process for setting these rules? Is it the same process for all the rules? How can a rule be modified to fit one village or another? How has it been modified in your village?
6. Now I would like to give you a list of rules that we found and for each one I would like you to explain first the biological reasons for the rules and then the social reasons. By social reason I mean things like being able to enforce rules, how the condition of the fishers was thought about?
  - 6a. What are the biological reasons for the 5 metre depth zone? What indicators were used in making or explain this decision? What are the social reasons for the 5 metre depth zone?
  - 6b. What are the biological reasons for the where the river bag nets are placed? What indicators were used in making or explain this decision? What are the social reasons for the where the river bag nets are placed? How is it decided who will fish where with bag nets? We have been told that there is some disagreement between the trawl net fishers and the bag net fishers.
  - 6c. What are the biological reasons for the ban on trammel nets? What indicators were used in making or explain this decision? What are the social reasons for the ban on trammel nets? Are there any exceptions to this ban in this village? How is it decided who will fish where with trammel nets?
  - 6d. What are the biological reasons for the ban on push nets? What indicators were used in making or explain this decision? What are the social reasons for the ban on push nets? Are there any exceptions to this ban in this village? How is it decided who will fish where with push nets?
  - 6e. What are the biological reasons for the mesh size regulations? What indicators were used in making or explain this decision? What are the social reasons for the mesh size regulations? Are there any exceptions to mesh size regulations in this village? How is it decided who will fish with these other mesh sizes.

7. Provincial only: do you have statistical information on the numbers of fishers of each gear and the shrimp catch.

## 2. Consensus analysis

The basic idea of consensus analysis is that if fishers have and are able to communicate valid information about the environment then fishers working in similar areas will agree in their answers to the questions. Agreement is seen as an indicator of the validity of the observations.

The procedure is to select a set of twenty or more dichotomous (i.e., having exactly two possible answers) factual questions about the resource. These questions will be things that fishers and others told us in the initial interviews. The responses to these questions are then tested using statistical procedures to see if there is a consensus among respondents, in other words to see if the responses fit the “cultural consensus model.”

The cultural consensus model means that 1) that respondents agree with each other to a very high degree and that 2) there is only one thing that is exerting any significant influence on their responses. We interpret this one thing as being what they actually see in nature. If the model does not apply it means that something else is having an important influence on their answers. This may be that they are observing different things, (for example, excluding the fishers who reported that they frequently fish in the mainstream Mekong improved the fit of the model in the Laos case) or that differences in knowledge and skill of the fishers is great enough to influence the responses.

**Step One: Statement Selection.** From the transcripts of the initial interviews choose at least 40 statements that are interesting and clear. Many of the 40 will drop out in the following steps, so more is better.

The selection of the statements for the consensus analysis is very important. You should select questions that:

- 1) relate to things that are of interest to the research;
- 2) are simple; and,
- 3) are clear in what they refer to.

These criteria are very important and they mean, for one thing, that it is very important that you get good transcripts of your initial interviews so that you have a broad set of questions to choose from. This was a very difficult problem for us in Laos. We did a second round of consensus interviews with a completely different set of questions and found that we got much weaker results. One important reason is that we had already used the clearest and simplest facts respondents had expressed in the initial interviews to make the questions for the first round.

After the statements are selected they must be turned into dichotomous questions. We found that a True/False or Agree/disagree format, in other words reading the statement and getting a reaction to the statement did not work that well. What worked better for us was writing out the statements in a way that included both alternatives (e.g. The butter fish A) spawns in the small tributary streams or B) does not spawn in small tributary streams.) was the form that was the clearest and worked the best. Remember that there must only be two alternatives so if you ask a statement like “The butter fish A) spawns in the small tributary streams or B) spawns in the main river.” you must be sure that these are the only possible places for the butter fish to spawn. The two answers can under no circumstances ever both be true and the two answers must cover every possibility.

Simplicity is key. We are interested in understanding how fishers see things differently in general, asking about something fairly obscure will create noise in this analysis. For example, if you are dealing with multiple species fisheries make sure that your questions relate to the more common species. Clarity is also very important, as it is in any research based on standardized questions. Double check to make sure that each question is a question about only one thing and so the meaning of both responses is unambiguous.

Finally, a series of other questions is attached to the statement to get at the stakeholder groups, the gears used, the experience of the fishers, the locations where they fish, and other relevant details. The questionnaire we used in Laos had the following initial questions:

Village Name

Date of Interview

How many years has the fisher fished?		
How many years has the fisher fished in this village?		
When in the year does the fisher fish? 1 = all year 2 = just wet season 3 = just dry season 4 = other _		
How often does the fisher fish in the Sedone mainstream?	1 = never 2 = sometimes 3 = often	
How often does the fisher fish in the tributaries to the Sedone?		
How often does the fisher fish in the back swamps?		
How often does the fisher fish in the Mekong mainstream?		
What is the most important gear the fisher uses in the dry season?	1 = Gill net 2 = Traps 3 = Cast net 4 = Long line 5 = Hook and line 6 = Seine nets 7 = Other _____	
What other gears does the fisher use in the dry season?		
What is the most important gear the fisher uses in the wet season?		
What other gears does the fisher use in the wet season?		
Does the fisher usually sell part of his catch to other people in the village?	1 = yes 2 = no	
Does the fisher usually sell part of his catch to fish traders?		

**Step Two: Preparation for field work.** Once you have selected statements the terms originally used in the local language transcripts should be the terms used in your statements. Because the dichotomous questions are probably quite different from the original statements they have to be translated and back translated to look for problems with language confusions. This means that person A takes the statements and translates them into the local language and then gives this translation to person B, who has not seen the original, and person B puts them back into English. Then the whole group looks at both the original and the back translation and finds out where there are problems of meaning. These are fixed or, if necessary, the statement is thrown out.

Then the statements must be field tested. A day (or more) is spent doing a draft of the interview with fishers. This process uncovers statements that are unclear and confusing. These are then fixed or thrown out.

**Step Three: Doing the Interviews.** The interviews should be done with a sample of respondents that is as random as possible. Consensus interviews are not used as the basis of inferential statistics, i.e. we are not going to be calculating any standard deviations and try to make precise claims about populations, so pure randomization is not necessary. The analysis is such that either the results point overwhelmingly toward consensus or we do not assume we have found a consensus. However, more randomness in asking standardized questions is always better than less.

The main thing is to cover the stakeholder groups. Try to make sure you have at least 10 interviews for every main division (stakeholder definition) you think is important. This means at least 10 for every village, at least 10 for every gear type, etc. These are bare minimums. The best way to think of it is perhaps that you get 10 interviews for the rarest and most inaccessible gear type, and as many of every other gear type (or other stakeholder category) as you can possibly get along the way.

Once you have gotten going and the team has had a chance to see these interviews in action they are fairly easy interviews to administer. The best way is if the local partners administer the interviews directly in the local language. This will save a lot of time and, therefore, increase the number of interviews, and more is always better. A thirty question consensus interview should not take more than 15 minutes to administer.

**Step Four: Data Entry.** Consensus data are entered and stored in a simple matrix of respondent by responses to questions.

**Step Five: Analysis.** A statistical analysis package, ANTHROPAC, is available for doing consensus analysis, though it needs to be used in conjunction with SPSS. The ANTHROPAC, SPSS combination is also what is needed for the other ordering, sorting and listing techniques described below. Unfortunately, the package is DOS based and, while very simple, is something of a pain to use. The statistical analysis is done of a respondent by respondent matrix of their similarities, i.e. the proportion of questions that they answered the same way. A factor analysis of this matrix yields "eigenvalues." The largest eigenvalue tells us, following our basic theory, the percentage of the variance in the matrix that is accounted for by respondents observing the same thing in the world. If there is another large eigenvalue, then that indicates that there is another important pattern that is influencing their responses. If such a pattern exists then it must represent some sort of underlying bias that is producing the pattern. We test this by comparing the first and second eigenvalue, the rule of thumb is that if the first eigenvalue is not at least three times as large as the second eigenvalue then no consensus exists among respondents. When this second eigenvalue is large relative to the first one it may represent some systematic bias that comes, for example, from different stakeholders seeing the world differently. It may also come from the systematic bias introduced when some of the questions are difficult and unclear. If we do not have a consensus we can experiment with the data to see if we can find the underlying cause. It is, of course, best if this underlying cause is not from poorly chosen or formed questions.

Using ANTHROPAC and SPSS this factor analysis to find the eigenvalues can be carried out in a fairly simple and straightforward fashion. IFM is available to aid any partner with the statistical analysis of data from any of the techniques described here.

### 3. Ordering interviews

Ordering techniques ask respondents to order statements in terms of some criteria, such as agreement. The simplest such method is a 5 point agree-disagree scale in a survey questionnaire, which is perhaps the common type of attitude measurement used in social science. There are also a good number of other ordering techniques which can give quite nuanced and sophisticated pictures of how different respondents see issues. The Q sort, described in Weller and Romney, is one such method that is widely used and gives perhaps the richest description of a respondent's attitude that can be stored in the form of numbers. I have used this technique successfully in developing countries. (I have also used this technique to generate complete gibberish in developing countries.)

Nevertheless, in the pilot case we did not carry out any ordering interviews. We did attempt to have respondents order some statements in terms of agreement but this did not work very well. A good example is one fisherman who was asked to say if he agreed or disagreed with the statement "The Selebam Dam is not good for the fish." His response was that he disagreed, because he did not think the dam was good for the fish. When asked "but doesn't that mean that you agree with the statement?" he continued to insist that he disagreed, because he really did not like the Dam, and the dam was the subject of the sentence. This convinced us that asking fishers to rate statements in terms of agreement was dangerous, because we did not have a good way of interpreting what they meant by "agree." As a result we decided that ordering techniques were not appropriate.

Each case team should read up on these ordering techniques and experiment with them in the field. If they do work, they will give richer results than the simpler sorting techniques described below.

**Steps one through five.** Although the actual interview techniques are different, steps one, two and three, described above, i.e. selection, preparation, interviews, are essentially the same for ordering, sorting and listing techniques. Data entry and analysis involves a number of essentially correlation based techniques and is described in Weller and Romney and the ANTHROPAC and SPSS manuals.

## 4. Sorting and Listing interviews

**Steps One, Two and Three.** A sorting technique was what we ended up using in the pilot study with some reasonable and interesting results. Many techniques of both kinds are described in Weller and Romney. Again, steps 1 through 3 described above are applicable to these kinds of interviews.

In Laos, we did a pile sort in which we took every object that fishers had mentioned in interviews as important for Sedone fisheries management. We wrote the names of these things on cards (totally 24 cards) and asked them to place them in any number of piles according to what they saw as similar. When we began we tried to do this with individual and did not get coherent responses. Then we started to do them with groups of 2-3 fishers and found that they worked very well.

What follows are some of the things we learned about doing good pile sort interviews. Many of these lessons apply to other techniques as well.

### 1. Basic steps

**The introduction.** After explaining the rationale of the project we found it helpful to demonstrate a pile sort using some objects close to hand. There was usually water glasses and pitchers and trays near us so we used these objects or pieces of furniture or plants. We would put things that held water in one group and things that didn't in another group, then put things made of plastic in one group and things made of glass in another group. We emphasized that all of these ways of groups were correct. We also talked about how if people put things together by what they were made of then that showed that they thought that what things are made of were important, and so on. Then we linked that to the research by explaining that that was why we were asking them to do the pile sorts because the way they grouped things that fishers had told us were important about the Xe Don river helped us better understand how they saw them.

**Laying out the cards.** We began by giving them objects one at a time in random order because we did not want to overwhelm them with the whole set immediately. This, however, seemed to bias the results a bit because they would tend to use the ones they saw first as the basis of the groups. So we changed to laying statements down one by one to form a rectangle and reading each one as we did this. Then we let them begin sorting. It took each group a few minutes to get going but, once they started, they figured out how to proceed very well.

**During the sorting.** Here we basically kept quiet. From time to time we would remind them that they could change their minds at any time and that there were no rules about how many groups or about how many objects in each group.

**Explaining the groups.** After they said they were satisfied with their groups we went through them one by one asking them to tell us why these things were together (we actually started out asking them to "name" the groups but this did not work well). We would also ask them why particular cards were in the group if the explanation they offered did not include that cards. Once or twice this led to moving cards and we allowed this, feeling that the new configurations probably more accurately reflected their opinions. This did not happen very often and if it did we would have to reevaluate this decision about whether sorts should be recorded before or after explanations.

**3. Group dynamics.** My instinct from community development work is to gently intervene when someone seems to be being excluded by encouraging them individually to participate more. This did not seem to be really appropriate to emphasize in the context of researching discourses so we did this very rarely. We did, however, keep reminding them that they need to work as a group.

One experiment that went awry was when we allowed other interested fishers to join in an ongoing group. At first this seemed a good idea as the fishers that were there from the beginning were explaining to newcomers what was going on. However, more prominent people then joined and we ended up in the unhelpful situation of a headman feeling he had to explain why statements were grouped together when he had not actually been present when they had been put together.

**4. Shuffling.** The pile of cards was shuffled thoroughly before each use to get rid of any possible suggestions from earlier groupings.

**5. Taping.** We put the tape on fast speed because sound quality is a problem for transcription. This meant that the tapes needed to be carefully watched by someone other than the interviewer (or translator if present) so that they did not run out. We also found that we had to encourage them to speak up for the recorder and this seemed to be alright.

**Step Four.** Data entry for pile sorts is a bit more complex than for the previous techniques. The initial data, experience, gear type, where fish, etc. are recorded the same way. Then a diagonal matrix is created with all the statements listed in both directions, i.e. all the statements are listed down the left side and all the statements are listed across the top. Then a one is placed in any box where the two statements appear in the same group. A complete list of which statements were in which groups should also be fit into the data set as a qualitative (string) variable.

**Step Five.** Pile sort analysis is complex and many techniques are available. The basic problem arises when the respondents are able to create as many piles as they choose. We chose to use a method based on information theory that weighted a pair of statements higher if they appear together in a smaller group. First a matrix is created for every respondent in which each possible pair of statements (one and two, one and three, one and four, two and three, two and four, etc.) is assigned a value. The value is 0 if they are not in the same group and different values for pairs that are in the same group, with the size of the value depending on the size of the group they appear together in, if they were in a smaller group together then the pair gets a larger value. Then comparisons can be made between different respondents by averaging together matrices of some set of respondents. The average of all the fishers compared with the average for all the fisheries officers, would be one example. Then we used a combination of multi-dimensional scaling and cluster analysis to compare the two groups with each other.

## 5. Documentary analysis

Documentary analysis means comparing what is being said publicly by different stakeholder groups about the resource.

**Step One.** Any article that can be found about the resource in question, either from the popular press or in scientific journals is collated.

**Step Two.** Summaries of the scientific claims that are being made and the policy proscriptions being advocated are made for each of these articles.

**Step Three.** These summaries are compared and “story lines” identified. These are positions that are being taken that put together particular scientific claims with particular policy or management ideas. There should be a small set of story lines that each of the articles, or people reported on in the articles, can be assigned to. Once this small set of story lines is identified it can be described and the stakeholder groups that make the most common use of these story lines can be identified.

**Step Four.** Once these story lines have been identified the implications of the candidate indicators for the story lines can be assessed. The degree to which the indicators reflect, or fail to reflect, a particular story line will give us valuable information about the reception that the indicator will have among the stakeholder groups that make common use of these stories.