

**CONDUCTING RAPID BIOLOGY-BASED ASSESSMENTS
USING LOCAL ECOLOGICAL KNOWLEDGE**

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ABSTRACT

Local people living in the Mekong River basin hold a large amount of Local Ecological Knowledge (LEK). While LEK has inherent value, scientists are becoming increasingly interested in accessing LEK to advance scientific knowledge, and improve resource management. Certainly local people also have an interest in using LEK to improve natural resource management. However, not everyone who tries to access and apply LEK makes use of appropriate approaches and methods for collecting and analysing LEK. Therefore, efforts need to be made to both develop approaches for accessing and analysing LEK, and to disseminate information about appropriate methods for researchers who may not have extensive experience with LEK. There are also important ethical issues surrounding LEK. While this paper does not address all of the important issues associated with LEK, it does raise some practical methodological points that will hopefully be useful, especially for those with the need to conduct rapid biology-based local assessments of natural resources. Five methods used in combination are presented as an example of the importance of triangulation in collecting and analysing LEK. While this article considers LEK mainly within the context of fishers and fisheries in Laos, the issues discussed are certainly relevant in other situations, and with regard to other natural resources in other countries as well.

Key words: Biodiversity Assessment, Fish Biodiversity, Laos; Local Ecological Knowledge, Mekong

INTRODUCTION

People living in the Southeast Asia hold a large amount of Local Ecological Knowledge (LEK)², be it with regards to terrestrial wild mammals and their habitats (STEINMETZ, 1999), forest ecosystems (BAIRD, 2000), or medicinal plants (ANDERSON, 1993). LEK also has many other applications, be it within the realms of biodiversity conservation or community development, and it is increasingly being used in inter and trans-disciplinary settings, such as in relation to Participatory Rapid Appraisals (PRAs) and Community-based Natural Resource Management (CBNRM). For example, ethno-botany is a field that frequently makes use of both LEK and other scientific methods. While this article uses examples from freshwater fish and fisheries in the Mekong River basin in Laos to consider methodological points in relation to LEK, the issues discussed here are of equal relevance

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²Other commonly used terms used for LEK include Traditional Ecological Knowledge (TEK) and Indigenous Ecological Knowledge (IEK). Most recently, Hugh Raffles (2002) has proposed a new term 'intimate knowledge', and I agree with him that this term is very appropriate. However, because LEK is better known within the literature, I have chosen to use it here.

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to people interested in other biological resources, as well as natural resource management and community participation more generally.

It has already been demonstrated that many fishers in the Mekong River basin have considerable LEK when it comes to freshwater fish and fisheries (HAGGAN *ET AL.*, 2006; BAIRD & FLAHERTY, 2005; BAIRD, 2003; POULSEN & VALBO-JOERGENSEN, 2000; BAIRD *ET AL.*, 1999). At the same time, scientific information related to fish and fisheries is generally still quite limited (ROBERTS & WARREN, 1994; HILL & HILL, 1994; KOTTELAT & WHITTEN, 1996; AHMED *ET AL.*, 1998; BARAN *ET AL.*, 2001), although there have been some advancements in recent years. LEK is inherently valuable, especially when used by local people for their own natural resource management purposes. Although this is not the subject of this article, it is nonetheless critical to recognize that the local applications of LEK, in which local people retain ownership and control of knowledge and make use of it for their own natural resource management purposes, represents an area that deserves careful consideration and should not be ignored. The objective of this paper is, thus, not to relegate fishers' LEK to being simply a tool for scientists to use. Instead, it should be recognised that conventional scientific knowledge and LEK have equal value, and can complement each other in the context of research, management and monitoring. This is especially the case when the ecosystem approach to natural resource management is adopted. It therefore makes perfect sense for scientists to try to learn about the rich LEK of locals in order to advance their own scientific knowledge, as well as to improve the management of natural resources.

Scientists are increasingly interested in making use of LEK, and are more and more recognising the value of LEK in itself. But unfortunately, not all of those who collect LEK-based data make use of appropriate methods for doing so. Thus, the focus of this article is on the above. Efforts need to be made to develop methods for collecting and analysing information based on LEK, and disseminate information about appropriate approaches for researchers, including those who may not have extensive experience with regard to LEK. At the same time, developing participatory approaches for involving the owners of LEK in resource assessments is another important area worthy of attention. This is particularly important for biologists and other natural scientists, as they generally have not received any specific training regarding methods associated with LEK, and they are getting more interested in LEK. Moreover, LEK is being increasingly used to complement other biological assessment tools (see, for example, the many papers written by biologists about fishers' LEK in HAGGAN *ET AL.* (2003; 2006).

Neither social nor natural scientists have all the answers when it comes to assessing natural resources, including biological diversity, and considering management questions. On the one hand, social scientists often lack sufficient understanding about biology and ecology related issues (JOHANNES, 1981). Natural scientists, on the other hand, may lack knowledge about effective interviewing methods and participatory approaches for working with local people. This may result in over-reliance on standardized methods, like structured interviews. Inexperienced or untrained interviewers may also ask leading (or misleading) questions, misinterpret answers due to the misuse of tools, and make other fundamental interviewing mistakes (MILES & HUBERMAN, 1994; KVALE, 1996). In reality, the skills of both social and natural scientists are necessary for accessing LEK, and for supporting the management of natural resources using LEK (JOHANNES, 2001; GARCIA-ALLUT *ET AL.*, 2003).

This article raises some practical methodological issues that, it is hoped, will benefit researchers with a need to conduct rapid biology-based local assessments using LEK, particularly with regard to fish and fisheries but also in relation to other biological resources as well. In fact, the issues presented here should be applicable for other types of resources and contexts. Five methods that can be used in combination are presented as an example of the importance of triangulation in collecting and analysing data associated with fishers' LEK. It is not that these are the only appropriate methods for collecting LEK, and flexibility is required, depending on field conditions and research objectives, but this article does show how these methods, when used in combination, can compliment each other and lead to more rigorous and accurate results.

SOME IMPORTANT METHODOLOGICAL ISSUES

Researchers with an interest in accessing LEK, be it from fishers or the users of other biological resources, should have at least a basic understanding of the habitats, species and harvesting methods that they discuss with local people, as the more researchers know about these things, the more likely that they will be able to access and understand LEK (JOHANNES, 1981). To illustrate this point, imagine that you are an electrical engineer with a detailed understanding of various technical processes. Then imagine being interviewed by someone who knows nothing about electrical engineering. How would you respond to general questions about electrical engineering from a person who obviously does not understand the field? You would probably provide simple and non-technical answers. You would certainly not offer many details, as you would know that the interviewer is incapable of understanding them. You would probably not even be very concerned with the exact technical accuracy of your responses, since you would know that the interviewer does not know enough to see any faults in your answers anyway. It certainly would not be worth your time to put much thought into responses. Indeed, if you decided to provide some technical details, the interviewer would be at great risk of either misinterpreting the details, or incorrectly recording them, since the interviewer would not really understand the context of the information being received.

One important principle is mutual respect. Communities worldwide will tell outrageous tales to strangers, certainly for their own amusement, but also because the ability of the 'outsider' to 'catch on' is an index of how well they will interact with or fit into the community of people being engaged. The classic instance is that of the distinguished anthropologist Margaret Mead who interviewed Samoan teenagers about their sexual habits, then published everything they told her (MEAD, 1928), much of it spurious (FREEMAN, 1983; 1998). Although it is unlikely that Mead deliberately falsified her work, she spent too little time in the field, was too unquestioning of her informants, and her fervent belief in cultural relativism blinded her to the prank that was played on her. A modern analogy would be of an earnest young researcher from another country, fresh out of university, conducting a short interview with mischievous teenagers in a shopping mall in order to prove a preconceived hypothesis without any independent check on the accuracy of what they said.

Researchers who interview local fishers face similar cultural obstacles to good communication, further complicated by translation and interpretation problems. Should

anyone be surprised that the data collected regarding LEK is often incomplete and incorrect? This is especially likely to be the case when local people are not provided with meaningful opportunities to participate in assessment processes. However, more often than not, researchers with inadequate interview methods blame locals for data that are later found to be inaccurate, rather than recognising their own deficiencies in collecting and analysing the data.

It is important for researchers to make those being interviewed aware that they too have knowledge of local resources. It is often useful to make informants aware about the interviewers' knowledge during informal discussions, and before beginning structured or semi-structured interviews, although this may not always be possible or easy for various reasons. Early on, it may sometimes be necessary to point out obviously inaccurate statements made by overly eager or unthinking interviewees who may be too quick to respond to questions, due to their lack of confidence in the abilities of the interviewers, because they do not think that interviews are important, or since they do not think that it is particularly important to provide accurate responses to queries, or are 'testing' or poking fun at the interviewer (see MEAD, 1928; FREEMAN, 1983; 1998; and example above). This may embarrass informants, but if the mistakes are pointed out politely, and are recognised by those being interviewed as mistakes once identified, it should make interviewees more serious about ensuring that their responses are well considered. It will also help the people to respect the researchers and the interview process more. For example, during one group interview that the author conducted in a village in Khammouane Province, in Central Laos, one informant found the interview to be 'a joke', and initially was quick to answer questions without considering the accuracy of his answers. He dominated the rest of the group, refusing to allow others to answer before him. Therefore, errors in his answers had to be pointed out to make him take the interview seriously. This technique has been successfully used in Laos by the author a number of other times as well, but using it too much, or in an impolite or arrogant way is unlikely to lead to the desired result. It is generally only appropriate to do this once or twice at the beginning of some interviews, and only to make the point that the interviews should be taken seriously, and that the interviewers are really concerned about getting accurate answers.

The use of multiple methods to help verify and validate data is called triangulation (MILES & HUBERMAN, 1994; KVALE, 1996), and is of critical importance for researching LEK in fisheries in areas such as Laos where little is known about biodiversity and the learning curve is potentially steep.

METHODS FOR TRIANGULATION

The author commonly makes use of five complementary methods to validate overall findings of freshwater fish biology in the Mekong River basin. These methods fall into both the natural and the social sciences, and involve both quantitative and qualitative methods, as follows.

1. Review peer-reviewed and 'gray literature' to determine what has been documented and what information is still lacking. This helps to concentrate effort on poorly documented species or areas, or questions that require more investigation. Literature on fish and fisheries in Laos is often limited, as is the case for many other tropical areas, and other disciplines,

but there are usually at least some relevant documents, and they should not be ignored.

2. Use colour photographs of fish thought to occur in the area of interest or nearby. There has been considerable debate in Mekong countries regarding the usefulness of photographs for identifying species or groups of species. The author's experience is that fishers, even from remote areas where photos of fish have never been seen, are often quite capable of identifying fish from colour photos. However, there are sometimes problems related to changes in the scale and colour of fish, and because photos are two-dimensional, and do not reflect the context in which the fishes are obtained or viewed. Moreover, some groups of fish are more difficult to identify than others, and locally relevant identifying characteristics may not all be shown in photographs. Rare species will be more difficult to identify, and it should be recognized that some fishers do not care much about the smallest species (FREIRE & PAULY, 2003). The experience of the investigator is critical in helping to provide clues regarding what types of errors are likely to commonly occur, and should be high in the minds of investigators.

3. Use local names in order to indicate if species identified in photos are those that the fishers believe they have identified. In Laos, local names often vary from place to place, even amongst members of the same ethnic groups. In southern Laos, some fish species can have seven or more local names, while others have only one. Still other names are used to refer to many small species (see BERLIN, 1992; BAIRD *ET AL.*, 1999). However, these patterns of name use can help to indicate the accuracy of photograph identifications. Again, experience is critical in helping to identify what types of errors are common and should be high in minds of investigators. For example, in Lao language there are only five base colours used in local areas: black, white, red, yellow and green (see BROWN, 1984; BERLIN, 1992). Therefore, it should be of no surprise that a fish described as "green" is actually what we would call 'blue'. Over time, as local names are recorded in the literature, and the local use of names becomes better understood, the pool of information will make names increasingly useful for identifying species in particular areas. Local names also have other uses, such as providing hints about the behavioral habits of certain species, and linkages between different species and particular cultural aspects in society. Much more could be added, but to the purposes of this article, it seems appropriate to limit the discussion.

4. Use species-specific fish behaviour indicators in interviews for questioning interviewees. This is another important tool for identifying fish, and especially for learning more about the behaviours of different species. This method, combined with photographs and local names, can help improve the chances of good identifications, but its value is conditional on the researcher knowing the species well enough to ask specific questions about their behaviours and understand the relevance and accuracy of responses. For example, based on a photograph, the author was informed that a particular species of pangasid catfish was found in a particular small river in Khammouane, Laos. A local name provided raised a doubt as to whether the species was really found in the river, as it had previously only been known from the mainstream Mekong River. A number of probing questions about the behaviour of the species determined that the fishers had misidentified the photo, and that they actually meant to identify another species.

5. Collect specimens to verify fish species identified during interviews. Steps 1–4 help researchers to target species of particular interest. Specimen collection is generally done either by asking local people to help catch fish, or by researchers collecting fish specimens. Specimens are generally photographed, and some are preserved for future taxonomic

investigation. This standard scientific research method is important for confirming fish identification, but again, especially in places like in the Mekong River basin, where the fish fauna is still not well-known (RAINBOTH, 1996), it is not enough in itself for understanding the resource, as those who use only specimens do not have contextual information about the species, or their behaviour. Furthermore, species records alone cannot indicate how local people use and manage fish. Nor do specimens provide social information related to fisheries, or historical perspectives important for understanding changes in population structures and local utilisation patterns.

DISCUSSION

It is critical to know local names of biological resources, including fish species, otherwise it will not be possible to effectively disseminate useful management information to local people and government officials, who are often the ones responsible for management at the end of the day, and who generally do not know the Latin names, especially for rare and unusual species. This certainly does not mean that the use of Latin names is not critical, but they are rarely sufficient for all purposes. Moreover, it can be very useful to master both scientific and local names in order to understand what species local people are providing LEK about. Many good reports about biological resources, be it fish, mammals or plants remain largely unused by local managers in Southeast Asia, partially due to confusion regarding what local names should be applied for species identified in technical reports using only Latin names. Some biology journals also shy away from publishing articles that include local names, a practice that needs to change. It is also equally important to not just include local names in articles, without including Latin names.

Ideally, one would use all five methods described in this article in the order that they have been presented, rather than just one or two in isolation, although due to field conditions this may not always be possible. Moreover, there is no reason why other methods not listed here cannot also be added when appropriate. Using just one or a few of these methods is unlikely to provide rigorous results; used together, however, they can support each other, leading to excellent results. In other words, the whole is greater than the sum of the parts.

Hundreds of interviews with fishers in various parts of Laos and other countries in the region have helped indicate to the author what fishes locals can generally easily identify, and what species they cannot (see BAIRD *ET AL.*, 1999). For example, it is virtually impossible to get reliable identifications, local names and fish behavior information about the smallest species of fish, such as loaches in the genera *Nemacheilus* and *Schistura*, for which there are a large number of species in the Mekong (KOTTELAT, 1998). Therefore the author rarely spends much time trying to collect such information during interviews. All the limitations must be recognized, and interview methods should only be used when there is a reasonable chance of getting useful information. Otherwise, one is simply collecting suspect data, and wasting time. One major problem is that many researchers are not aware of the limitations of interviews, or of other methods, and if they are aware, they may simply 'throw out the baby with the bathwater'. Extreme positions for or against interview methods are equally dangerous. A pragmatic approach is what is required.

When conducting interviews with local people, the author prefers to interview between three and five fishers at a time. The use of small groups helps to ensure that there is 'peer

review' amongst the fishers at the time any information is provided, but it avoids problems related to too many respondents during large group interviews. Creating a good atmosphere is critical so that everyone feels comfortable. However, it is important for the interviewer to guide small group interviews to ensure that one person does not dominate the group. Fishers between 40 and 55 years old are generally the most appropriate to interview, at least in the Lao context, because they have considerable experience by that age, yet are still active as fishers, thus avoiding having to test the more distant memories of older fishers who have largely stopped fishing. However, there are also cases when it is valuable to interview the oldest people about the distant past. Certainly, identifying the right people to interview is always important with these types of exercises (DAVIS & WAGNER, 2003).

Unfortunately, the validation of data in cooperation with local fishers is rarely done and this sometimes leads to the use of poor quality data. Data collected by local people should, whenever possible, be brought back to local people for verification. They are the owners of the data, and they have the right to confirm that it is recorded correctly. More importantly, they should approve the use of the data whenever possible. For example, before publishing the book *The Fishes of Southern Laos* (BAIRD *ET AL.*, 1999), the authors brought the data collected back to a group of key local people for verification. In this case, the validation process was important, as a number of errors were found and corrected during the exercise. Local fishers also confirmed that they were happy to have their LEK included in the book. Although full local data validation may not always be possible for various reasons, including logistical, funding and timing limitations, it should be done as often as possible.

It should be emphasised that conducting surveys using the above tools is only fully possible when one has a reasonable command of the local language, and of the local culture of those people being interviewed. One's ability to speak the language of those interviewed is critical for ensuring useful communications with fishers and users of other natural resources, especially in countries like Laos, where locals never speak European languages, including English and French.

It is also true that LEK is likely to be especially valuable outside of addressing narrow disciplinary questions, as important as they may be. In ecosystem management, for example, it is necessary to consider a broad range of species and habitats, and their interactions, as well as political, socio-economic and cultural factors that are of relevance to management questions. One of the advantages of LEK is that it transcends both disciplines and resources, as local people do not limit their knowledge to particular disciplines or resources. Instead, they incorporate whatever knowledge is of practical value, and therefore LEK can contribute insights without the constraints that are sometimes evident when it comes to particular disciplines. LEK is never stagnant, and is also developing. LEK often incorporates indigenous knowledge that has been passed down over generations, but it almost certainly is based on practical experiences of users as well.

Finally, while the focus of this article has been on the use of tools for collecting and assessing LEK by natural scientists, it must be stated that it is always important to provide the owners of LEK with as many opportunities as possible to meaningfully participate in processes involving their LEK. The active involvement of local people is particularly important, as LEK is not something that can be easily extracted from the social and cultural contexts of the people who own the knowledge. There are also important ethical reasons for encouraging knowledge owners to meaningfully participate in exercises associated with

LEK and natural resources of particular interest and importance to local people, for whatever reasons. Therefore, LEK is not just a research tool, but also a principle of management.

CONCLUSIONS

LEK is certainly a valuable resource that has long been of fundamental importance to the everyday lives of local people involved in natural resource management. It is, therefore, not surprising that natural scientists and other researchers are becoming increasingly interested in accessing LEK, be it about fish and fisheries or other natural resources. But, as outlined in this article, there are many important methodological issues that need to be carefully considered when conducting rapid biology-based local assessments using LEK, especially in the context of non-industrialised countries like Laos, where rural people continue to know a great deal about nature. There are also important ethical questions that need to be considered, such as the context in which LEK is applied and roles that LEK owners are allowed to play in assessment and management.

This article is admittedly limited, as it has mainly attempted to address some practical issues of particular interest to those involved in the natural sciences, but it should be of value for those who are thinking about questions surrounding LEK and natural resource management more generally. Hopefully this article will help stimulate some thought regarding LEK, including how it can complement other methods frequently applied by natural scientists.

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REFERENCES

- AHMED, M., H. NAVY, L. VUTHY, AND M. TIONGCO. 1998. Socioeconomic Assessment of Freshwater Capture Fisheries in Cambodia: Report on a Household Survey. Mekong River Commission, Phnom Penh.
- ANDERSON, E. F. 1993. Plants and People of the Golden Triangle: Ethnobotany of the Hill Tribes of Northern Thailand. Dioscorides Press, Portland, OR, USA.
- BAIRD, I. G. 2000. The ethnoecology, land-use, and livelihoods of the Brao-Kavet indigenous peoples in Kok Lak commune, Voen Say district, Ratanakiri province, northeast Cambodia. The Non-Timber Forest Products (NTFP) Project, Ban Lung, Ratanakiri, Cambodia, 57 pp.
- BAIRD, I. G. 2003. Local ecological knowledge and small-scale freshwater fisheries management in the Mekong River in southern Laos. Pages 87–99 *in* N. Haggan, C. Brignall, and L. Wood (eds.), Putting Fishers' Knowledge to Work. UBC Fisheries Centre Research Reports 11(1), Vancouver, B.C., 504pp.

- BAIRD, I. G., AND M. S. FLAHERTY. 2005. Mekong River fish conservation zones in southern Laos: assessing effectiveness using local ecological knowledge. *Environmental Management* 36(3): 439–454.
- BAIRD, I. G., V. INTAPHAISY, P. KISOUVANNALATH, B. PHYLVANH, AND B. MOUNSOUPHOM. 1999. The Fishes of Southern Lao (in Lao). Lao Community Fisheries and Dolphin Protection Project, Ministry of Agriculture and Forestry, Pakse, Lao PDR.
- BARAN, E., N. VAN ZALINGE, AND NGOR PENG BUN. 2001. Floods, floodplains and fish production in the Mekong basin: present and past trends. Contribution to the Asian Wetlands Symposium 2001, 27–30 August 2001, Penang.
- BERLIN, B. 1992. Ethnobiological Classification. Principles of Categorization of Plants and Animals in Traditional Societies. Princeton University, Princeton, NJ, USA.
- BROWN, C. H. 1984. Language and Living Things. Uniformities in Folk Classification and Naming. Rutgers University Press, New Brunswick, NJ, USA.
- DAVIS, A., AND J. R. WAGNER. 2003. Who knows? On the importance of identifying “experts” when researching local ecological knowledge. *Human Ecology* 31(5): 463–489.
- FREEMAN, D. 1983. Margaret Mead and Samoa: The Making and Unmaking of an Anthropological Myth. Australian National University, Canberra.
- FREEMAN, D. 1998. The Fateful Hoaxing of Margaret Mead: An Historical Analysis of Her Samoan Research. Westview Press, Boulder, CO, USA.
- FREIRE, K. M., AND D. PAULY. 2003. What’s in there: Common names of Brazilian marine fishes. Pages 439–444 in N. Haggan, C. Brignall, and L. Wood (eds.), Putting Fishers’ Knowledge to Work. UBC Fisheries Centre Research Reports 11(1), Vancouver, B.C., 504 pp.
- GARCIA-ALLUT, A., A. FRIERE, J. BARREIRO, AND D. E. LOSADA. 2003. Methodology for integration of fishers’ ecological knowledge in fisheries biology and management using knowledge representation [artificial intelligence]. Pages 227–237 in N. Haggan, C. Brignall, and L. Wood (eds.), Putting Fishers’ Knowledge to Work, UBC Fisheries Centre Research Reports 11(1), Vancouver, B.C., 504 pp.
- HAGGAN, N., C. BRIGNALL, AND L. WOOD (eds.). 2003. Putting Fishers’ Knowledge to Work. UBC Fisheries Centre Research Reports 11(1), Vancouver, B.C., 504 pp.
- HAGGAN, N., B. NEIS, AND I. G. BAIRD (eds.). 2006 (in press). Fishers Knowledge in Fisheries Science and Management. UNESCO, Paris.
- HILL, M. T., AND S. A. HILL. 1994. Fisheries ecology and hydropower in the Mekong River: An evaluation of run-of-the-river projects. Mekong Secretariat, Bangkok.
- JOHANNES, R. E. 1981. Word of the Lagoon: Fishing and Marine Lore in the Palau District of Micronesia. University of California Press, Berkeley, CA, USA.
- JOHANNES, R. E. 2001. The need for a centre for the study of indigenous fishers’ knowledge. SPC Traditional Marine Resource Management and Knowledge Information Bulletin, 13.
- KOTTELAT, M. 1998. Fishes of the Nam Theun and Xe Bangfai basin, Laos, with diagnoses of twenty-two new species (Teleostei: Cyprinidae, Balitoridae, Cobitidae, Coiidae and Odontobutidae). *Ichthyol. Expl. Frshw.* 9(1): 1–128.
- KOTTELAT, M., AND T. WHITTEN. 1996. Freshwater biodiversity in Asia with special reference to fish. World Bank Technical Paper No. 343, The World Bank, Washington D.C.
- KVALE, S. 1996. Interviews: An Introduction to Qualitative Research Interviewing. Sage, Thousand Oaks, CA, USA.
- MEAD, M. 1928. Coming of Age in Samoa: A Psychological Study of Primitive Youth for Western Civilization. William Morrow, New York.
- MILES, M.B., AND A.M. HUBERMAN. 1994. Qualitative Data Analysis, 2nd edn. Sage, Thousand Oaks, CA.
- POULSEN, A. F., AND J. VALBO-JOERGENSEN (eds.). 2000. Fish migrations and spawning habits in the Mekong mainstream - a survey using local knowledge. AMFC Technical Report, Mekong River Commission, Vientiane.
- RAFFLES, H. 2002. Intimate knowledge. *International Journal of Social Sciences* 173: 325–335.
- RAINBOTH, W. J. 1996. Field Guide to Fishes of the Cambodian Mekong. Food and Agriculture Organisation of the United Nations, Rome.
- ROBERTS, T., AND T. WARREN. 1994. Observations on fishes and fisheries in southern Laos and northeastern Cambodia, October 1993–February 1994. *Nat. Hist. Bull. Siam Soc.* 42: 87–115.
- STEINMETZ, R. 1996. The ecological science of the Karen in Thung Yai Naresuan wildlife sanctuary, Western Thailand. Pages 84–107 in M. COLCHESTER AND C. ERNI (eds.), Indigenous Peoples and Protected Areas in South and Southeast Asia: From Principles to Practice. International Work Group for Indigenous Affairs, Copenhagen.

