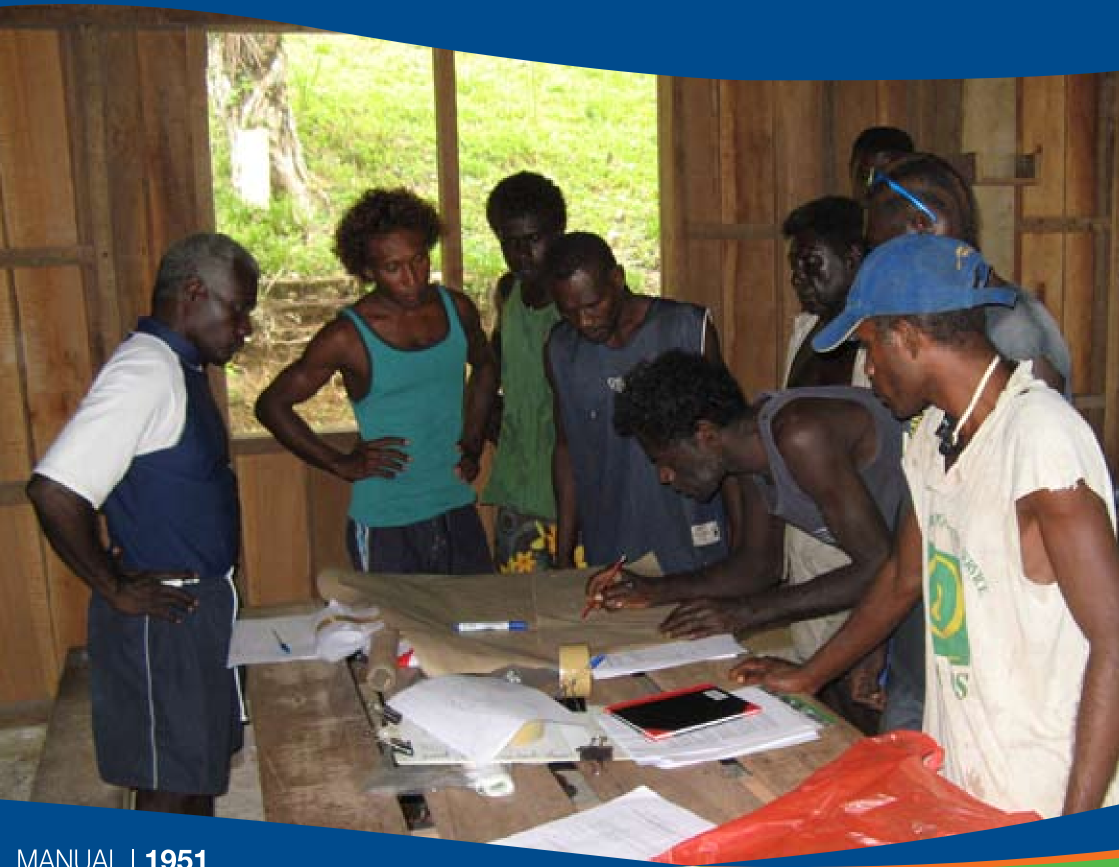

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Engaging Local Communities in Aquatic Resources Research

Technical manual prepared for the Project: Improved fisheries productivity and management in tropical reservoirs, CP-PN34: Challenge Program on Water and Food

CGIAR Challenge Program on WATER & FOOD

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Engaging Local Communities in Aquatic Resources Research and Activities: A Technical Manual

C Bene
EK Abban
P van Zwieten
HR Dankwa
R Brummett
JK Ofori
N Obirih-Opareh
J Kolding

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N Obirih-Opareh
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INTRODUCTION

Fishery biologists find small fisheries notoriously difficult to assess quantitatively. Such fisheries are often the venue for diverse activities and often spread geographically along the seacoast, the swampy shore of a floodplain, or small tributaries in a dense tropical forest. Myriad small operators and individual entrepreneurs fish under informal rules, with no logbooks, registration numbers, or sometimes even permanent homes. To complicate assessment, small-scale fishers usually target dozens of different species at different times of year, using up to 20 different kinds of fishing gear, each affecting the fishery differently. Exacerbating the difficulty is that small fisheries in developing countries are often perceived as producing little fish or commercial value and therefore attract little or no attention from national decision-makers. The absence of data is the rule for these fisheries, and detailed and comprehensive sets of quantitative data the exception. As a consequence, fishery biologists in developing countries interested in evaluating, for instance, the status of the stocks exploited by small-scale fishers generally do so with very limited resources.

One of the few pragmatic solutions to overcome these constraints is to try to work directly with fishers by setting up a form of community-based or self-monitoring system. In this system, the fishers themselves collect and record the data, which scientists analyze later. Beyond the cost-effectiveness of this approach, a community system may offer other important advantages. It may (1) be the critical first step towards setting up a community management system for fisheries; (2) improve communication among scientists, managers and fishers as the data come directly from the fisheries; and (3) make fishers more willing to comply with existing or future regulations by involving them in making decisions.

Fishers, however, do not have a good reputation among scientists and fishery management agencies, who usually view them as the main cause of resource degradation through overexploitation or the use of illegal and destructive fishing methods. They perceive fishers as unreliable or biased, either intentionally because it may serve their interest to underreport their catch, or involuntarily as a consequence of limited education. Common reactions of colleagues is that fishers “can’t even write their name, and you want them to record their daily landings for you?” and “if they can write, how can you trust their data?”

Engaging local communities in research on aquatic resources is challenging, the way littered with prejudices and obstacles. However, it can be done and is cost effective, with high rewards for all involved. The objective of this technical manual is to relay the field experience of a group of scientists who have worked extensively in small fisheries in sub-Sahara Africa and Asia and lay out a series of simple and pragmatic pointers on how to establish and run initiatives for community catch assessment. The manual relies in particular on practical experience gained implementing Project 34 of the Challenge Programme on Water and Food: Improved Fisheries Productivity and Management in Tropical Reservoirs. When carefully and tactfully implemented, community assessment not only generates data relatively cost-effectively but, more importantly, generates quantitative data that are reliable, accurate and replicable. This manual is therefore aimed at fishery biologists or their peers who are willing to rely on fishers to generate the fishery data that they need for their research.

Box 1: Fishery authorities as tax collectors

Local fisheries department officers have a particularly bad reputation in fishing communities, in particular (but not exclusively) in Francophone sub-Saharan Africa (Cameroon, Niger, Mali, Central African Republic, etc.). In those countries, the predecessors of the department of fisheries were the agents of the notorious *offices des eaux et forets* (water and forest department), whose main mission was to enforce the regulatory and tax-extraction system for forest and fishery resources. In line with the colonial authority from which they directly descended, modern agents often used the compelling power of their rifles and sticks to complete their missions, often leading to abuse and extortion. This legacy of tax extraction and repression still greatly affects current relations between local agents of the department of fisheries and fisherfolk, who clearly distrust them and often make reference to the repressive methods adopted by their predecessors to enforce the law.

TYPES OF FISHERIES DATA USUALLY REQUIRED WITH FISHERS' COLLABORATION

Fisheries professionals spend a major part of their time collecting data. The efficient and effective collection of data is fundamental for management and can mean the difference between successful knowledge or inconclusive or useless information (Ticheler et al. 1998). Traditionally, fishery data are collected by research officers and assistants from governmental research institutes. For small artisanal fisheries, the methods are usually quite similar, derived from proposals from the fisheries divisions of the United Nations Development Programme or the Food and Agriculture Organization of the United Nations in the 1970s (e.g., Bazigos 1974, Caddy & Bazigos 1985). The techniques are mainly experimental gillnet surveys for biological parameters and fishery independent data, frame surveys for inventories of all fish production factors, and catch-and-effort surveys for daily catches and effort data. Sampling the aquatic environment or multiple landing places in most small fisheries is, however, an expensive logistical challenge. Consequently the precision, accuracy, usefulness and (not least) efficiency of these methods have often been questioned (Orach-Meza 1991). The unreliability of landing statistics is a notorious problem in most small fisheries (Misund et al. 2002). Apparently, however, few other sampling alternatives have been developed or tried (Cowx 1996, Ticheler et al. 1998).

Extracting information from a sample follows careful consideration of which variables to measure, in what quantities and at which stage of the process. The simplest information about fisher communities is the number of fish species present, which is easily biased by the sampling gear. For quantitative stock assessment and monitoring, one normally needs to record the number, weight and sometimes length of the specimens caught. If catches are big or the landing sites numerous, it may be necessary to examine only a random representative sub-sample, provided that it is appropriately large to yield reliable total estimates. “Sub-sampling”, defined as stepwise sampling of large catches, requires careful consideration of which species to select for total enumeration and which should be sub-sampled and how. Size and morphometric differences mean individual species are rarely randomly distributed in the catch.

For individual species, the classical series of parameters is (1) weight or volume; (2) length, which, in some advanced fisheries, is substituted with age; and (3) sex and maturity.

These data alone provide variables that form the cornerstone of present fishery stock assessment and management. The numbers and size of fish in a population determine the potential for exploiting those fish stocks. Data on maturity provide important information on biology and reproduction for initial management and enable separate estimates of the abundance of immature and mature fish. Determining modal increments in length or actual age, where it can be done satisfactorily, provides the basis for estimating growth and mortalities and, very importantly, year-class strength variation, all of which are essential for assessing yields and current status. Age-structured models like virtual population analysis and yield per recruit require that populations be grouped by age or length.

Weight measurements. In fisheries weight is normally proportional to most basic statistics (landings, stock sizes or relative density) given in weight units. In addition, change in weight (1) better reflects the production of a population and of the individual organism in terms of somatic and gonad growth than measurement of length alone does; (2) may reflect changes in the nutritional condition of fish; and (3), measured as annual weight increments or growth, is significant for assessing commercial value. Weight is applied to the entire catch, subunits of the catch (e.g., species) and individual specimens.

However, weighing specimens is more difficult, inaccurate and time consuming than measuring length. Weight can be replaced by displacement volume, which is especially useful with live fish. Hanging balances for the total catch or the total catch by species are reasonably satisfactory (and robust, even when working at sea in bad weather), but they are not sensitive enough for individually measuring small fish. All types of weighing devices require periodic calibration, and researchers need to be aware of several sources of bias:

- external disturbances such as wind and boat motion;
- how long the specimens have been out of water and subject to drying or, conversely, the amount of water in the weighing container;
- the contents of fish stomachs; and
- the relative weight of such inner organs as the liver and gonads, etc.

Length measurements. Length measurements are easy to make with a measuring board or callipers but require many observations and, therefore, a large sample. The three most common standards are total length, used for species with rounded or truncate tails; fork length, for species with forked tails; and standard length, used mostly for larvae and in taxonomic studies. The three ways of measuring are to the nearest whole unit below the fish's actual length, the nearest unit above, or the nearest unit either way.

Measuring must therefore be well defined, standardized and conducted in accordance with previous studies or recommendations. The most commonly used measurement these days is fork length (which equals total length in species with rounded tails) and the nearest unit below. All reports should clearly state their measuring method and practice. Conversion factors can be established for translating data from one standard to another.

Teaching local fishers from Laos (Mekong River) to take length measurements

As length measurements are easy to take and offer many additional advantages, not least making the quality and validity of collected data easy to check (see Box 2), length is considered one of the most important parameters to measure when using local fishers in the sampling programme (Ticheler et al. 1998).

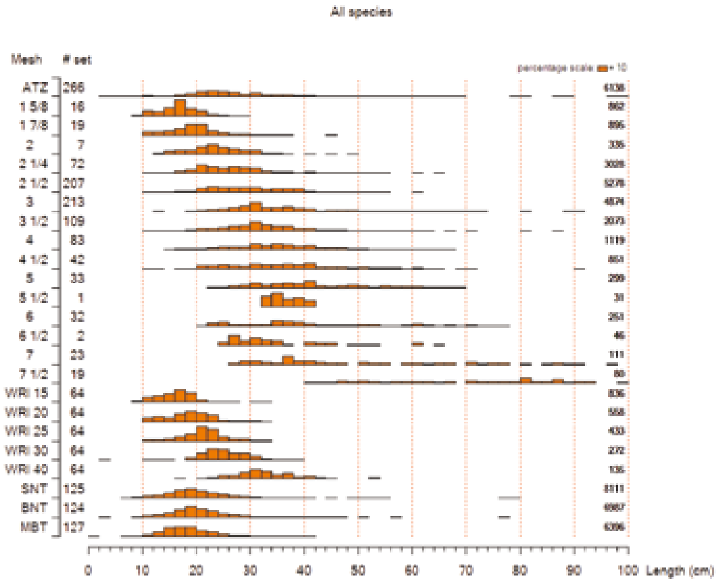
When employing local people in sampling, the information to be collected should generally be kept to a minimum and as simple as possible, to secure continuity and minimize bias. Ticheler et al. (1998) reported recording for each catch only the date, time of fishing (day or night), fishing method (gear) and locality. For each individual fish caught, only the species, mesh size by which it was caught and length to the nearest centimetre were recorded. Net settings that yielded no catch were also indicated. With this simple design, these authors showed that the participation of local fishers made possible obtaining large quantities of cheap and reliable data that allow for a fully length-based stock assessment

Box 2: Length measurements

Why length measurements? They offer many advantages:

- Individual length measurements are easy to take, even in large numbers, and have fewer causes of bias than do individual weight measurements.
- Length frequency distributions provide information on the demographic structure of the sampled population.
- Individual lengths are easily translated into weights from species-specific length-weight relationships using the relation weight = a length^b and then automatically summed up to total weight.
- Measuring the rate of change in length of individuals or populations is an approach to estimating growth.
- All age-based assessment models can easily be converted into length-based equivalents if a growth function or an age-length key is available.
- Length is often better than age as an indicator of recruitment, maturity and fecundity.
- Most capture methods are highly size selective, and gear-specific length distributions are used to estimate selectivity curves and estimations of fishing mortality by size or age.
- In many fisheries, length defines the size legal for harvesting.
- Individual length measurements facilitate quality control of data collected by fishers, as artisanal fishers are unable to forge selectivity curves of different species in a range of mesh sizes and record these data in a random manner. Therefore, by simply plotting the recorded length frequencies by species against the various gears or mesh sizes, the quality is easily deduced from the shape of the distributions.

Securing representativeness of the data. Length-frequency distributions of fish caught by sampling gear and mesh sizes. All distributions are skewed normal with different modes according to expectations. (From local fishers data on Lake Volta 2007-2008)



of an otherwise inaccessible small fishery, including growth, mortality, and estimations of fishing patterns and potential yields (Kolding et al. 2003).

COMMUNITY ENTRY

This section describes how a study team introduces itself and reveals the object of its work to a community whose collaboration it considers to offer potential benefits to the study. The section highlights in particular the steps that should be executed simply, decisively and at the appropriate time for maximum effect. For example, the first item on the list is for the study team to establish clear project objectives and activities for presentation to the community. This has been highlighted because it is usually assumed that members of the study team are all aware of the study objectives, but this assumption is not always confirmed.

These are the steps to follow:

1. Establish clear project objectives and activities for presentation to the community. Avoid having different team members present different scenarios to different community members on the side.
2. Project team representatives enter the identified community to seek an audience with the traditional authority. This should be done through either an opinion leader or a respected community member.
3. During the meeting with the traditional authority, present clear objectives, an overview of intended activities and their potential benefits for the community.
4. Use very simple language and show respect.
5. Invite questions after the presentation, which may lead to further explanation for better community understanding and involvement. Be patient and do not hesitate to repeat explanations if necessary.
6. In all discussions, emphasize that the scientific team needs community participation to accomplish the study objectives.
7. Do not insist on a decision regarding participation immediately after the presentation, but rather help the community fix another day for their response.
8. Ask the traditional authority to nominate a contact person for the project team to regularly inform toward getting work going.
9. Establish with the contact person the best possible rapport.
10. After establishing a working mode with community authorities, inform the district or local government authority of the project and of the community's participation, which may entail registering the project with the district or local government authority.

The step after community entry is to establish personnel involvement and work arrangements and scheduling, as well as the incentives for community members' direct involvement along with the contact person. This would usually entail the following:

1. Present the project's objectives and intended activities again to the contact person.
2. Allow the contact person to select the special personnel required for the team, but insist that nominees who lack aptitude or a positive attitude can be replaced with better choices.
3. Advise the community that the team will actively gauge the quality of data and information that it receives.
4. Discuss remuneration for community members engaged by the project team.

5. Introduce community members' specific or special functions and explain what is required of them.
6. Maintain the relationship with the contact person and any natural leaders that may emerge from the working team, routinely seeking their assessment of how well the working team understands its assignment and adjusting the approach as necessary.
7. Keep the contact person updated on work generally and on the inputs and attitudes of the community group specially assigned to research activities.
8. Occasionally report to the chief or other traditional authority.

Box 3: Keeping community members informed

It is necessary to keep communities informed about what members of research teams may be up to in community water, such as sampling aquatic flora and fauna, and when these activities will normally take place. This is because sampling may seem unusual and unfavourable to communities, especially when the water body is a source of domestic supply for the community. In one case, sampling fish in dry season pools was mistakenly reported to the community chief as "some people poisoning the drinking water". The chief had the team escorted into the community by men wielding bows and arrows. Fortunately, the team was known to the chief and some members of the community. Confusion could have been avoided if the team had first informed the chief, who would have announced their impending presence in the community.

Box 4: Tending to fishers' interests in working with the scientific team

Maintaining long and productive working relationships with community groups requires a visiting group such as a scientific study team to consider what interests the community groups may have in working with them other than financial gain and to satisfy reasonable interests. Keeping the community group happy with the relationship obviously serves the interests of the visiting group.

The interests that encourage community individuals to strive to produce good work include the following:

- recognition from peers and the community in general of their capability to generate data or perform a service appreciated by an external group of educated people;
- their recognition as integral members of a study team and thus their capability of undertaking scientific study; and
- the promise of sharing the outcomes of the project with the community, to expand their knowledge of their own environment and perhaps provide a new approach to managing their environment to their advantage.

Under these conditions, it is particularly important to allow community members engaged in the study to address local and other public meetings, elaborating on points or issues and demonstrating the knowledge they are acquiring.

Community members may have specific reasons to enhance their knowledge by participating in a study group's work. In Ghana, for example, farmers and fishers compete annually for awards. In these competitions, fishers' knowledge of all aspects of fisheries — e.g., the stock situation, the catch and changes in it, record keeping, and fisheries laws — enhance competitors' performance.

Box 5. Confidentiality in light of research being used and abused by traditional authorities and fishery and tax authorities

Generating data with and/or about fishers' activities is not without danger, as some of the information may be confidential, such as where and when fishers fish, the size of their catch or the income it generates, or even details about the use of illegal gear. This information may be used against cooperating fishers. Critical issues of confidentiality therefore need to be carefully addressed before the data can be published or otherwise disseminated. Although the department of fisheries is one obvious institution that could misuse the information, other local actors can be interested in the data or, more broadly, in the research process. It is not rare for traditional authorities to use the fact that some researchers are working with local fishers to advance their own agenda. In virtually every circumstance, some groups or individuals will use the presence of researchers in the vicinity of villages one way or another.

SECURING REPRESENTATIVENESS OF DATA

All sampling requires that data be representative, and all data are variable, requiring that precision be ensured by a broad spread of observations. Most data are also uncertain because of bias and deviation of observed mean from true mean. Sampling must therefore be designed to ensure that it is randomized, such that each element in the population has the same chance of being recorded, avoiding bias and thereby improving accuracy. Taking a large sample through replication also contributes to increased precision. Replication depends on the availability of time, capacity and funding. True randomization in fisheries is in practice very difficult because sampling gear is selective, the spatial and temporal distributions of the population are unknown, and catches are often sorted and portions discarded before reaching land.

Ensuring randomization when using local fishers may be a serious problem if the fishers are not representative of the entire fishery. Further, ensuring randomization in individual catches, if less than the whole catch is recorded, may create additional problems, as very few people, even scientists, are able to select a random sub-sample from a heterogeneous catch of many different species and sizes.

When using local fishers as counterparts in a scientific investigation, it is very important that local authorities and communities alike clearly understand the objectives. If local people understand the aim of the investigation, they will generally be able to assist in sampling design. It is therefore important that time and resources be allocated prior to sampling to establish dialogue, mutual understanding and trust between fishers and scientists.

Experience shows, however, that it is almost impossible for people not to show bias by selecting the largest specimens in a catch. Further, when a large catch of different sizes is emptied from a container for measurement, the largest specimens tend to glide away to the edges of the heap, making them more likely to be picked. It is therefore generally advisable to ask local fishers to measure all the fish they landed rather than a sub-sample and reduce instead the number of parameters to be measured (see the section above "Types of fisheries data usually required with fishers' collaboration").

Sometimes it may be advantageous to have mutual control replications performed by scientists on the one hand and local fishers on the other to evaluate how representative the data is. This was done by Ticheler et al. (1998) and Kolding et al. (2003) in their study of the Bangweulu fisheries of Zambia. They found distinct differences in catch composition using the same gear depending on where it was used and by whom. The differences could simply arise from different ways of setting the same nets. While the local scientists or their assistants set the nets primarily in open water to reduce the time subsequently spent removing weeds from the net, the fishers set their nets closer to the banks to target specific species and improve their catches. The results clearly showed that the traditional gillnet surveys carried out by the Fisheries Department were not representative of the catch composition of actual fishers using artisanal gears. This example illustrates that there is always some bias when sampling fish populations and that using local people, who have different objectives and experience, can help in evaluating the representativeness of data. The soundness of most sampling procedures is more often assumed than evaluated.

Local fishers "sample" every time they go fishing, and the huge number of "replications" engenders immense local knowledge of the fish they target. They often systematically change their gear and/or fishing grounds to adapt to variation — sometimes seasonal variation — in the behaviour of different species. This knowledge is a free bonus for scientists, providing them with an understanding of fish populations' seasonal behaviour and patterns of migration that they otherwise would have spent many years acquiring.

A major advantage of using local fishers who use their own gear to sample is the possibility of getting an estimate of the quantitative changes in fishing activity over seasons and the spatial allocation of effort. More important is the opportunity of getting a direct, unbiased picture of the catch and its size composition from all the gears employed in the fishery, allowing an objective evaluation of the selectivity and impacts of all the gears used, including illegal ones. The most common regulations on most small fisheries restrict gear and fish size, and practically all of these regulations are based on assumptions rather than facts.

Small fisheries have multiple species caught with highly various gears. Many of the gears — and particularly the traditional ones such as seines, small-mesh nets, drive or beat fishing, barriers, and weirs — are often banned for not being selective and, presumably, driving down fish populations. However, the actual impact of these methods is rarely investigated, and the true aim of the regulation may be to protect, for political or social reasons, the position in a fishery of other, less-efficient gear (Panayotou 1982). In the few instances where the actual impact of unselective illegal gear on small fisheries has been studied, it is an open question how detrimental these methods are (Misund et al. 2002, Kolding et al. 2003).

TRAINING SELECTED GROUP OF FISHERS

Before embarking on data collection with fishers, it is essential to fully realize what is being asked of them. They are asked to record their catches and efforts daily for a prolonged period, often requiring activities that are outside their ordinary routine, such as taking length measurements. Fishers should not only be capable of keeping records but also have an interest in the work. The scientist should carefully consider how this interest can be satisfied through, for instance, meetings in which results are shown and discussed or, more individually, by regularly returning summarized results. Payment is one thing, but rewarding curiosity and interest can stimulate the long-term commitment needed for this work. Further, the scientist should be prepared to explain exactly and honestly his own interest in the work.

A second consideration is the design of the logbook in terms of both data and layout. A rule of thumb is to ask only for data that are directly observable and, as much as possible, in line with actual fishing operations — i.e., what a fisher does anyway. To know what this is, the scientist needs to study the fishery carefully by interviewing fishers on their operations and finding out if observations of interest are perceived and measured by fishers — and, if so, how. The researcher should not ask for the depth in metres if fishers use another measure (such as the *sai* depth measure used in northern Vietnam, which is about 1.5 metres). A second rule of thumb is never to ask for calculated data. If one requires, for example, travel time to the fishing ground and soaking time for the net, do not ask for “total hours travelled” or “total soaking time”, which are calculated or, more likely, roughly estimated. Ask fishers instead to record in the logbook the time of departure, of setting the net, of hauling it in and of landing — all of which are directly observable: "I went out at nine in the morning, set my net at ten, hauled in the net around four in the afternoon, and was back at six in the evening." In the layout of the logbook, these times should be recorded below one another instead of next to one another, to make it readily apparent that departure time should be earlier than setting time, etc. Equally, it is better to ask for catches by weight or number than for catch rates (e.g., catch per hour), or to ask for revenues received for a species instead of price per kilogramme.

A logbook can be designed at a desk but should be tested thoroughly, starting with training selected fishers to use it, always with this question in mind: "Are the requested data in accordance with their actual operations, perceptions and descriptions?" The researcher needs to ask the following questions in preliminary surveys or discussions with fishers. It should be decided how species names are recorded and what local names fishers use. Often fishers have different names for the same species in different size categories. Asking fishers to give their local names with the aid of pictures of fish encountered in the ecosystem goes a long way toward ensuring the correct recording of fish. It is important to agree on names in a group training session. In fisheries with multiple species, many commercially unimportant fish are known in broad categories as "trash fish" or "small fish", etc. Any data requests in logbooks that deviate from actual operations, perceptions and measurements require thorough training. Fishers asked to use global positioning system instruments, Secchi disks or depth measurers require thorough training so that all participating fishers record data the same way.

Training sessions for logbook use can take a day or several evenings and should be conducted with a group of about 10 fishers per instructor, or a maximum of 15. An agenda could be as follows:

1. Introduce the purpose of the research, emphasizing the aims of the researcher and the potential benefits for fishers.
2. Present the logbook sheets generally, showing the whole book and daily sheets.
3. Discuss the daily sheets in detail, conducting small exercises on various sections. For instance, a small exercise should be conducted on finding locations on maps, differences between timing travel and timing actual setting and lifting of gears, species names, length measurements (see Boxes 2 and 6), and sub-sampling.
4. Conduct a larger exercise in which the researcher reports on a day's fishing, giving all necessary data. The catch can be represented by heaps of stones or a sample of fish bought from the market. Fishers then fill in a sheet.

5. Show an example of the full logbook of at least 31 sheets to cover 1 month, the main message being that information should be provided for all days. If no fishing takes place, that fact should be noted.
6. Go over the terms and conditions of the contract, including allowances, bonus systems and conditions under which the contract can be annulled by either the fisher or the researcher. Indicate how the researcher can assure the quality of the data.
7. Sign the contract, formally sealing the deal in the presence of officials from the community and the management and research institutions.
8. Hand out the first logbooks for the pre-testing phase, make final agreements on when the logbooks will be collected, and set a new meeting for after the pre-testing phase.
9. End the session.

Box 6. Steps for measuring fish length

1. Provide a measuring board (Figure 1).
2. Explain the units of measurement on the board and how to read them to the nearest millimetre.
3. Provide bold markings on the measuring board at convenient intervals, e.g., 10 centimetres, to make reading easier and faster.
4. Explain the type of length measurement required (e.g., forked length or total length) using species with both equal and unequal lower and upper caudal fins, those with rounded or truncate caudal fins, and those without caudal fins such as *Gymnarchus.*
5. Demonstrate positioning fish on the measuring board to record the type of length measurement required.

PRE-TESTING PHASE

As important as the initial phase of researching the fishery to learn how it actually operates is the logbook pre-testing phase. Good logbook design can never be achieved wholly at a desk. Even if a good training session has been successfully completed (see above), some issues will remain incompletely understood unless and until fishers actually use the logbook. Examples taken from experience illustrate some of the problems that can be encountered:

1. Fishers were asked to measure all fish but, for large catches, only up to 30 specimens as a sub-sample. The method of sub-sampling was not understood and had to be explained again.

2. Fishers agreed to measure daily the length of fish from small-mesh nets, but it appeared that it was too much work to do, and the small fish also appeared to have limited market value. It was clear that the data would be of dubious value if the programme was maintained in this way. It was subsequently agreed that small-mesh nets would be used only 2 days per week.
3. Trawlers were asked to note the time of setting and hauling the net of every trawl during a trip. It appeared that the fishers did not note the timing of the hauls while at sea and wrote the data in their logbooks only after they returned home. This resulted in many mistakes, with hauls sometimes recorded taken out earlier than they were set. It was subsequently agreed that only the time of setting of the first haul and the time of taking in the last haul would be noted, as well as the total number of hauls during a trip.
4. Fishers were asked to note the catch of every species encountered in their daily trawl. It appeared that many species were categorized as “trash fish”, while important species were often subdivided into commercial categories that have different value, e.g., large, medium-sized and small shrimp. Some fishers in the programme usually, but not always, noted all species and only one category of shrimp, and others usually, but not always, filled in only commercial categories. It was decided in a follow-up meeting that all fishers would always record only commercial categories.
5. Fishers from a small pelagic fishery were asked to weigh their daily catch. The possibility of doing so was discussed during the training session, and all fishers agreed that they could do it. After the pre-testing month, it appeared that the scales were of greatly variable quality, while actual trading practice was to use as units buckets of fish of a certain size. Some fishers attempted to sum up all the buckets and multiply it by a weight (whose method of determination was unclear), making the results highly inconsistent and dubious. It was subsequently decided that fishers should note only the number of buckets of fish caught. Each month, a researcher weighed a number of sample buckets used by each of the fishers in the programme to obtain an estimate with which to convert the logbook bucket numbers into catch weights.
6. After a month, it appeared that one fisher charged with filling in the grid reference had so much trouble understanding the map and writing that the resulting data was of very dubious quality. He was asked if someone else in his crew or household could help him collect data. As the answer was no, he was dismissed from the programme. Suspicion had arisen during training that this could happen, and the fisher was told then that he would be given the benefit of the doubt, with the possibility after pre-testing that he might be dropped.

Sometimes logbooks need to be redesigned. Aligning times vertically eliminated many errors of the type noted in example 3 above. Further, measurement units that appear to be perfectly logical turn out in practice to be different from ordinary practice, creating dubious data when it is unclear whether the trained method or actual practice was used. Ways of measuring that are difficult to understand should never be used (e.g., standard length; use fork length instead). Lastly, the examples show that researchers need to be ready to compromise between the scientific need for precision and what measurements can be achieved in actual practice with people who are not schooled in research methodologies but do measure things all the time.

INSTITUTIONAL PROBLEMS

Despite all the practical advice and recommendations provided above, and even when all precautions have been taken, circumstances will still arise in which the social or institutional context of the community, or of the larger society, make data collection impossible. Data collection for instance can be severely impeded by the strict enforcement of closed seasons or protected areas for which research exceptions are denied with the valid argument that they could set precedents that make future enforce more difficult or create friction in the fishing community when the difference between fishing for research and fishing for livelihood cannot easily be explained. By contrast, in Lake Victoria fishers can fish using nets with undersized mesh for research purposes if the exception is granted by the Tanzanian Fisheries Research Institute and discussed with beach management committees.

In other circumstances, fishers may feel that declaring their individual catch is too risky and likely to expose them to taxes or other forms of income extraction by various local government agencies. Beyond the question of whether those taxes are necessarily, or whether local governments equitably redistribute the funds by providing public services to the fishing communities, the fear of those taxes may be so strong that it simply deters everyone from completing any form of landing- or catch-record system, regardless of how much effort researchers have invested in establishing a trusting relationship. The only way to avoid this problem is for the researcher to guarantee that any information received from fishers will be confidential and that no analyses of data will be published in a form that allows the identification of individual contributors of data.

In other cases, requesting a fairly large number of community members to engage in illegal activity may be a major obstacle, as is the case, for instance, when fishers lack licenses. Researchers face particular difficulty in asking fishers to record illicit landings. Again, the researcher must convince participating fishery management and research institutions and the fishers themselves that the data are collected with complete confidentiality.

In any case, having official permission from the authorities to work with fishers in a protected area, or to use nets with mesh smaller than the legal minimum, is necessary to ensure the collaboration of the fishing community.

With these constraints in mind, it is still sometimes possible to obtain data from fishers, even about illegal activities, if the researcher is able to demonstrate independence from the authorities and has gained the confidence and trust of fishers and research and management institutions that the research will contribute to better understanding of the fisheries and, potentially, better management. This requires time and patience. Each situation may require adapting a different method or approach. Researchers must therefore be flexible, ingenious and innovative. The search for the same type of data in different ecological or socioeconomic contexts may require very different approaches.

ETHICS

Indigenous communities put a great premium on when and how things should be done. It is therefore generally important for researchers to confess to community elders their ignorance about how things are done in the community and ask to be excused for not observing protocol or to engage a local person for guidance. For example, it is not accepted that strangers should enter a chief’s house to talk on their own behalf. It is expected that the strangers use somebody from the community to introduce them and tell their story briefly, before the strangers are invited to explain their mission more fully.

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For further information on publications please contact:

Business Development and Communications Division
The WorldFish Center
PO Box 500 GPO, 10670 Penang, Malaysia
Tel : (+60-4) 626 1606
Fax : (+60-4) 626 5530
Email : worldfishcenter@cgiar.org

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