

Measuring Livelihoods and Environmental Dependence

Methods for Research and Fieldwork

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Chapter 1

Why Measure Rural Livelihoods and Environmental Dependence?

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There is in my opinion a right way and we are capable of finding it.
Albert Einstein (1954, *Ideas and Opinions*, Crown Publishers,
New York)

The hidden harvest

Measuring rural livelihoods and environmental dependence is not straightforward. Environmental resources are important to millions of poor households in developing countries, yet there is not an established right way to systematically collect data that convey their importance. Such resources, harvested in non-cultivated habitats ranging from natural forests to rangelands and rivers, often contribute significantly to households' current consumption, provide safety nets or pathways out of poverty. The uncertainty regarding the numbers can easily lead to either under- or overestimations (Angelsen and Wunder, 2003). Environmental income often consists of many different and sometimes irregularly collected resources: the forest fruits picked during herding, the medicinal plants collected when grandfather was sick, last month's particularly rich fish catch, and so on. A myriad of resources gathered from multiple sources makes environmental income much harder to recall and quantify than a single annual corn or sorghum harvest. A high share of environmental resources are not traded in markets but consumed directly, further complicating their valuation. The body of literature quantifying environmental resources in rural livelihoods is slowly increasing (for example, Cavendish, 2000; Fisher, 2004; Mamo et al, 2007; Vedeld et al, 2007; Narain et al, 2008; Babulo et al, 2009; Kamanga et al, 2009), but has yet to be widely acknowledged in rural

development circles – as becomes evident from recent reviews of rural income and livelihood studies that exclude environmental income (for example, Ellis and Freeman, 2005a).

The general shortage of a representative sample of studies, coupled with the diversity in the quality and methods used in the few existing ones, leave key questions unanswered: how important are environmental resources for poverty alleviation in quantitative terms? When they are important, is it because they can help lift the poor out of poverty or are they mainly useful as gap fillers and safety nets preventing extreme hardship? How do different resource management regimes and policies affect the benefits accruing to the poor? Answers to such questions are essential to design effective policies and projects to alleviate rural poverty. Yet, there is surprisingly little systematic knowledge to answer them adequately.

Published and unpublished quantitative environmental income studies are hard to compare due to methodological differences. In a summary of 54 studies on household environmental income, Vedeld et al (2004, pxiv) noted: ‘The studies reviewed displayed a high degree of theoretical and methodological pluralism, and the substantial variability in reporting of specific variables and results is partly explained through such pluralism. This variability must, however, also be attributed to methodological pitfalls and weaknesses observed in many studies.’ Methodological challenges include: (a) data generated using long (for example, one-year) recall periods, which is likely to seriously underestimate environmental incomes derived from a myriad of sources (Lund et al, 2008; see also Chapter 7); (b) inconsistent key definitions, for example, what is considered a forest or how income is defined, may differ across studies, making findings incomparable; (c) a host of survey implementation problems, such as failure to adequately train enumerators or check data while in the field, resulting in questionable data quality; and (d) a widespread perception that it is too difficult and costly to obtain high quality environmental income data. The geographical coverage of available studies is also limited, with most coming from dry southern and eastern Africa. Thus, while our knowledge regarding environmental income and rural livelihoods is incrementally improving, we believe that more in-depth studies across a range of sites are required, preferably using best-practice and unified methodologies that enable comparison and synthesis. This book is designed to be an instrument to help make it happen.

Designing and implementing household and village surveys for quantitative assessment of rural livelihoods in developing countries is challenging, with accurate quantification of income from biologically diverse ecosystems, such as forests, bush, grasslands and rivers, being particularly hard to achieve. However, as the above published studies indicate, this ‘hidden harvest’ (Scoones et al, 1992; Campbell and Luckert, 2002) is too important to ignore. Fieldwork using

state-of-the-art methods and, in particular, well-designed household questionnaires, thus becomes an imperative to adequately capture environmental income dimensions of rural welfare. In fact, current poverty alleviation strategies in most developing countries draw to a significant extent on results from household surveys; environmental income estimates are, however, often not included in the standardized living standards measurement surveys (Oksanen and Mersmann, 2003). Studies based on such surveys are thus inadequate for understanding the diversity of rural income generation in developing countries.

One attempt to overcome this shortage of data is a large global-comparative research project: the Poverty Environment Network (PEN), described later in this chapter. The book draws widely on the methodological experiences from PEN.

Purpose of this book

This book aims to provide a solid methodological foundation for designing and implementing household and village surveys to quantify rural livelihoods, with an emphasis on quantifying environmental income and reliance in developing countries. All the major steps are covered, from pre-fieldwork planning, in-the-field sampling, questionnaire design and implementation, to post-fieldwork data analysis and result presentation. The intention is to provide input to the entire research process, in the specific context of developing and implementing operational research ideas using quantitative approaches in developing countries, while limiting the ‘remember the malaria pills’ and ‘get to know the local culture’ generalized advice that is covered well in other books.

The book is aimed at: (a) graduate students and researchers doing quantitative surveys on rural livelihoods, including (but not limited to) the environment, and (b) practitioners in government agencies, international aid agencies and non-governmental organizations (NGOs) involved in fieldwork in relation to project implementation (for example, baseline and impact studies) in developing countries.

The book relates to three broad groups of literature: (a) the limited body of works at the graduate student level on broad field methods and introductions to the practicalities of fieldwork (for example, Barrett and Cason, 1997; Scheyvens and Storey, 2003); (b) the extensive literature on quantitative surveys in general, including work on business research methods (for example, Bryman and Bell, 2003) and measurement of living standards (for example, Grosh and Glewwe, 2000); and (c) the emerging body of literature on livelihoods in developing countries (for example, Ellis, 2000; Ellis and Freeman, 2005b; Homewood, 2005).

This book has four major distinctive features in relation to this pre-existing body of knowledge. First, it fills a gap between the three types of literature by giving a thorough review of using quantitative methods in rural livelihoods studies in developing countries. Second, it deals not only with quantitative household and village surveys, but covers the entire research process, as opposed to books focusing on methods (for example, Foddy, 1993), analysis of survey data (Deaton, 1997), fieldwork practicalities (for example, Barrett and Cason, 1997) or livelihood case studies (for example, Homewood, 2005). Third, it centres on rural livelihoods with environmental dependence as the predominant example of how to deal with livelihoods complexity, as opposed to other approaches that focus on issues such as health, education and agricultural income while disregarding information on environmental incomes (for example, Grosh and Glewwe, 2000). Fourth, as explained in the next section, it draws on the extensive comparable experiences in the PEN project of more than 50 researchers who have implemented and supported quantitative household and village surveys across a variety of continents, countries and cultures.

The Poverty Environment Network (PEN)

PEN is an international network and research project on poverty, environment and forest resources, organized by the Center for International Forestry Research (CIFOR). It was established in 2004 in order to address the environmental income issues identified in the introduction to this chapter, which have particular relevance for natural forests. The core of PEN is a tropics-wide collection of uniform socio-economic and environmental data at the household and village levels, undertaken by 33 PEN partners (mainly PhD students) and supported by some 20 PEN resource persons (CIFOR researchers, associates and external university partners acting as supervisors with active field presence), jointly generating a global database with more than 9000 households from 25 countries. The PEN project is arguably the most comprehensive study done in the field of poverty and environment, and will serve as the basis for the first global-comparative and quantitative analysis of the role of tropical environmental resources in poverty alleviation. This book is written by PEN partners and resource persons who have been involved in the design and implementation of PEN, as well as dozens of other projects collecting similar data.

PEN is built on the observation that some of the best empirical data collection is done by PhD students: they often spend long periods in the field and personally supervise the data collection process, thereby getting high quality

data – something that established university researchers often lack the time to achieve. The basic PEN idea was to achieve two goals: (a) use the same ruler (same questionnaires and methods) to make data comparable, and (b) promote good practices and thus increase the quality of data. In short, the value added of the individual studies can be substantially enhanced by using standardized and rigorous definitions and methods, which permit comparative analysis.

The first phase of PEN from 2004 to 2005 focused on identifying and designing the research approach and the data collection instruments and guidelines, and at the same time building up the network through PEN partner recruitment. Fieldwork and data collection by PEN partners started in 2005. After completion in 2009, a third phase of data cleaning, establishing the global data set, data analysis and writing began. The project is expected to be completed in 2012, and the PEN data set will eventually be made publicly available for use by researchers.

The PEN research approach

During early discussions and workshops, a consensus quickly emerged that, in order to get reliable estimates of environmental resource uses, a detailed recording (income accounting) method was needed, using short recall periods – one year being far too long for the accuracy aimed for. This was particularly inspired by work done in Zimbabwe by Cavendish (2000) and Campbell et al (2002). It was also decided that PEN data collection should consist of three types of quantitative surveys (in addition to an attrition and temporary absence survey) covering a full year:

- Two village surveys (V1, V2).
- Two annual household surveys (A1, A2).
- Four quarterly household surveys (Q1, Q2, Q3, Q4).

The timing of the surveys is shown in Figure 1.1. Data collection requires a fieldwork period of no less than ten months. The village surveys (V1–V2) collect data that are common to all households, or show little variation among them (cf. Chapter 6); V1 is done at the beginning of the fieldwork to get background information on the villages, while V2 is done at the end of the fieldwork period to get information for the 12 months of accumulated recall period covered by the surveys. The household surveys were grouped into two categories: (a) annual household surveys, with A1 at the beginning of fieldwork providing household information serving as a baseline (demographics, assets, forest-related information), while A2 at the end collected information for the 12 month period covered by the surveys (for example, on risk); and (b) the four quarterly

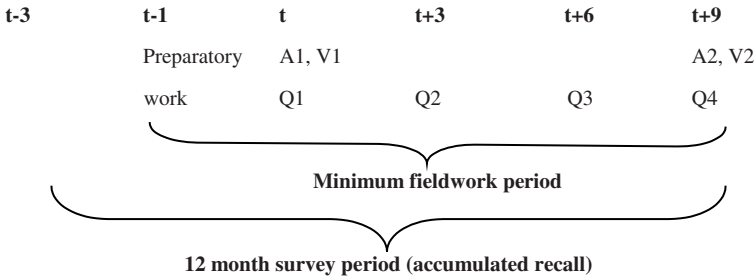


Figure 1.1 *The timing of village and household surveys in a PEN study*

household surveys that focused on collecting detailed income information. All research tools (the prototype questionnaires and the associated technical guidelines; the template for data entry; the codebook; and the data cleaning procedures) can be downloaded from the PEN website (www.cifor.cgiar.org/pen). Prototype questionnaires are available in English, French, Spanish, Portuguese, Chinese, Indonesian, Nepalese and Khmer. While PEN pursued a common methodology, all prototype questionnaires were pretested and adapted to local conditions at each research site. Each PEN partner submits his/her final data set, along with a narrative adhering to a standard template and providing detailed contextual site information, to the global database.

A key feature of the PEN research project is the collection of high quality data through the quarterly household surveys. These include detailed data collection on all types of income, not just environmental sources. In addition to the higher accuracy and reliability of quarterly income surveys, various income-generating activities often have considerable seasonal variations, and documenting these can help us understanding fluctuations and seasonal gap fillers. The recall period in the quarterly income surveys was generally one month, which would then be extrapolated to the three-month period. The exception was agricultural income and ‘other income’ (remittances, pension, and so on) that used three months, as these are major income sources (easier to remember) and might be irregular (thus the full 12-month period is covered). The PEN technical guidelines also emphasize that all major products with irregular harvesting, for example, short-lived mushrooms harvested for sale on a large scale or the occasional sale of a timber tree from private land, should be identified early on, for example, during preparatory fieldwork and pretesting of questionnaires. A one-month recall in quarterly surveys entails the risk of missing out on these activities, thus a three-month recall was applied for such products. In general, the recall period has to be selected optimizing a trade-off between completeness and accuracy in the respondents’ recall, which will vary across economic activities (Chapter 7).

Coverage and selection of PEN study sites

PEN sites cover major sub-continental areas in Africa, Asia and Latin America (Figure 1.2). Being a collaborative research project, PEN did not have the authority, nor the resources, to fully determine the location of the individual PEN study sites or villages. However, in general study localities were chosen so as to: (a) display at least a minimum level of forest dependence; (b) meet criteria relevant to the topics of each individual study (going beyond the core of PEN); and (c) meet PEN's site sampling criteria of representation and variation (Chapter 4). Globally, we had study site gaps in West Africa and Indochina that were subsequently filled in through targeted external fund-raising and collaboration with partners in these regions. Regarding representation, the aim was to avoid too many special cases, for example, areas with unusually valuable forest products, unusually favourable or unfavourable conditions for income generation, or a history of very heavy donor intervention. The lack of centrally planned study site selection implies, of course, that one *cannot* draw generalized conclusions for a country from one single PEN study site, for example, stating that the forest income share in Zambia is identical to the one found in our PEN case study.

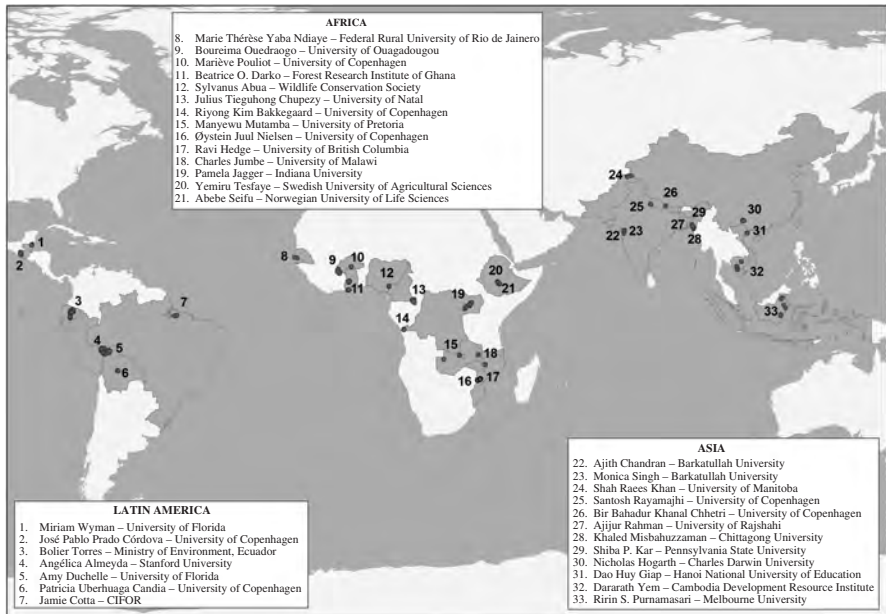


Figure 1.2 Geographical location of the PEN study sites and lists of site-responsible scientists

To achieve a representative sample, PEN paid particular attention to variation within study areas. We searched explicitly for variation along key gradients (such as market distance, vegetation types, land tenure and institutions, population density and growth, predominance of ethnic groups and commercial stakeholders, sources of risk and levels of poverty) to make site results representative of a larger universe – for example, a district or province of the country being studied (Cavendish, 2003). Not all these gradient variations are found within any single study area and gradients often correlate, making choices easier: market-remote areas tend to be poorer yet richer in natural vegetation, less densely populated yet with a higher share of indigenous people. PEN partners were advised by their PEN supervisors during start-up workshops on how to choose study areas, and selection of villages within those areas.

To be included in the global PEN data set, a minimum sample of 100 households was required. Most studies had higher samples, with an average of about 240–250 households. While PEN sites and villages were thus selected according to explicit stratification criteria, the within-village selection of households followed random sampling, using household lists and pre-existing censuses (see Chapter 4).

Lessons learned from PEN planning and implementation

The basic PEN idea, to develop a common set of methods and establish a network of primarily PhD students to generate a critical pool of high quality and comparable data, has scope for being replicated in relation to other research topics. Some lessons learned from PEN may therefore have wider interest for those who want to do global-comparative research:

- A high-profile research institution should be leading such an effort in order to sell and market the idea, attract qualified PhD students and their supervisors, as well as other external collaborators.
- Allow for sufficient time to jointly develop common prototype instruments and technical guidelines, developing and agreeing on these may take a year or more. This key initial activity should be well advanced before recruitment of PhD students, who otherwise may drop out because their time schedule does not allow them to wait for the research instruments. At the same time, an inclusive process in developing and modifying methods will increase partners' ownership and commitment to the project.
- Establish meeting places for project partners. PEN had annual workshops, the initial ones focused on PEN methods and implementation; and later on data cleaning, analysis and presentation of preliminary results. Additional fora included an electronic news letter and a mailing list. Web-based discussion groups could also be used (not done in PEN).

- A global–comparative project needs to provide tangible benefits to the partners (in exchange for the data provided): networking, sponsored participation in workshops and conferences, joint discussion of methods, standardized quality check and feedback on collected data, supervision from resource persons, assistance in funding applications and advice on data analysis and writing. The drawbacks also need to be communicated, for example, strict centralized quality control and pressure to deliver data on time.
- Allow ample time for data checking, cleaning, and harmonization of comparative standards; this takes more time than planned in 99 per cent of cases. Standardized central data quality control procedures should be funded and established; individual timelines should be established for data submission.

PEN also *ex post* conducted a survey among PEN partners to evaluate the PEN prototype questionnaires and lessons learned from the field. Five areas stand out in the responses:

- Stay in the field as much as possible. The field presence is essential to build trust, collect contextual information and supervise the data collection. This is indeed one reason why field data by PhD students are among the best – more senior researchers often cannot set aside sufficient time to be present in the field.
- Have a dedicated team of enumerators. The enumerators and field assistants are critical for successful fieldwork. Identify and select good enumerators, train them, pay them reasonable salaries, be clear in communication and boost morale by regular interactions and team-building exercises. Being in the field and arranging social activities were the two most common ways to maintain enumerator motivation. However, random checks of performance may also be necessary to discourage sloppiness and data falsification.
- Building relations with respondents is the key to success. Explain the purpose of the research to the local people, respect them and get to know them – ‘Hang out with people, celebrate with them, play with their children.’ Spend as much time as possible talking to the local people ‘since the qualitative understanding is critical to understanding/interpreting quantitative results’.
- Check and double-check data. Check questionnaires as soon as possible after the interviews, correct errors, enter data early (preferably in the field). Also, do not underestimate the time required for data cleaning and management post-fieldwork, it can be grossly underestimated.
- Have a plan – and a plan B. ‘Flexibility, patience, courage, determination and a sense of adventure is essential to successfully pull off something like this.’ Field research is a logistical challenge.

Structure and content of this book

This book focuses on the design and implementation of surveys – as opposed to other research methods, such as experiments, archival analysis or case studies. Surveys gather information by asking questions of respondents. This method has advantages when focusing on contemporary events, when no control of behavioural events is required, and when answering categorical research questions of the what/who/where/how many/how much type (Yin, 2009). In particular, this book is focused on questionnaire surveys that are administered by enumerators through personal interviews with respondents. The book covers the entire research process, from generating research ideas and hypotheses to collecting and analysing data, and communicating the results. Figure 1.3 presents a schematic overview of the relationship between the research process and chapter content. Chapters 2–8 focus on activities and considerations that should start before fieldwork, Chapters 9–11 on activities and issues during fieldwork, and Chapters 12–14 on post-fieldwork activities. In practice, the research process is iterative and facts disclosed during the preparatory field stages may require revisions in research design. Hence, interpretation of the stylized figure should allow for various feedback flows.

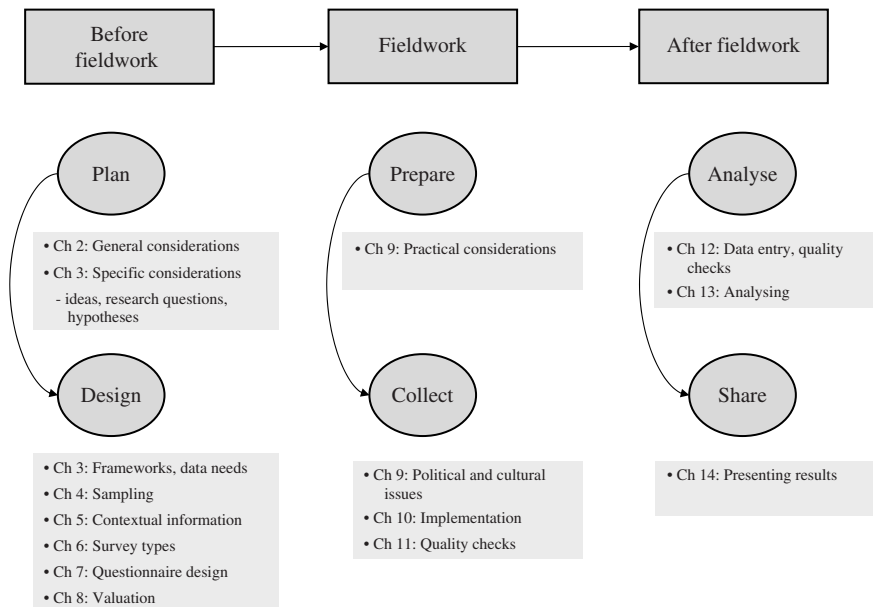


Figure 1.3 Overview of the relationship between the research process and chapter content

The type of field research described in this book involves collecting large amounts of empirical data in developing countries and can be demanding in terms of finances, researcher time and respondent patience. Therefore, before setting out, it is worthwhile to consider the justifications for going. In Chapter 2, Victoria Reyes-García and William D. Sunderlin argue that field research is justifiable because it can increase the scientific understanding of a problem through providing access to data not otherwise sufficiently available, deeper contextual understanding, enhanced data quality and inspiration to challenge conventional wisdom. Field research also enables identification of locally perceived problems, as well as insertion of local views into the policy process. The chapter further provides an overview of the various interests involved in evaluating the merits of research. It encourages researchers to be mindful of local research priorities, to involve local people in the research conceptualization and design, and to reflect on sources of personal motivation.

Having decided to do field-based research, the research project starts with the development of a proposal. According to Arild Angelsen and co-authors of Chapter 3, the research proposal should answer two essential questions: *what* will be investigated, and *how*. The chapter outlines eight essential steps and describes the process of developing research ideas, objectives, questions and hypotheses that are based on the theoretical foundation and empirical evidence of a scientific field. Furthermore, the proposal needs to identify the data needed to answer the research questions and test the hypotheses, and state how the data are to be generated and analysed. The chapter offers a schematic framework for developing a logically coherent research design, emphasizing the need for consistency between the ‘what’ and ‘how’ questions.

Deciding on who and how many to include in a sample – and how to select them – is fundamental to any empirical research. In Chapter 4, Gerald Shively argues that the decision regarding a sampling strategy must take the research questions and hypotheses as its point of departure, as well as an identification of the target population for the research, in other words, what population the results should be representative of. The sampling strategy should allow both for variation that enables one to answer the research questions and for generalization to the target population. The chapter provides examples of probability and non-probability sampling procedures, as well as rules of thumb and more formal procedures to decide on a sample size.

Continuing with the design of the research, contextual information will both inform and complement quantitative household surveys. In Chapter 5, Georgina Cundill and co-authors use the Sustainable Livelihoods Framework to discuss types of contextual information useful for situating and understanding livelihood strategies and for preparing a household survey. Types of data and

potential collection methods are presented for five livelihood assets; policy, institutions and processes; and the vulnerability context. The authors emphasize the need for the researcher to spend time discussing with and listening to people, trying to understand their perceptions concerning what is important.

Having defined what data are needed, the researcher will continue to select methods for data collection. In order to collect data at the appropriate level (for example, not overload household questionnaires) and format, Pamela Jagger and Arild Angelsen in Chapter 6 present a framework for deciding which surveys to undertake. The choices of scale (household versus village) and survey format depend on two key questions: (a) at which level does the variable vary, and (b) are representative quantitative figures needed in the later analysis? To complement other chapters focusing on the household level, the chapter provides approaches for detailed description of village-level data collection and outlines different village-level sources of data. Other types of surveys covered are surveys of prices and wages, value chains, local institutions and groups.

When it is clear what data needs should be covered by the household survey, the next step is to design the questionnaire and formulate specific questions. Overarching Chapter 7, by Arild Angelsen and Jens Friis Lund, is the need to decompose and translate overall data needs into questions that can be meaningfully answered by respondents without compromising construct validity in the process. At the end of this process, one should have a questionnaire consisting of a set of logically ordered questions that are concrete, specific, simple and using neutral formulations and carefully defined terms. Accordingly, the chapter provides guidelines on this decomposition and translation process, as well as on design and formulations of the specific questions.

Accurate and reliable estimation of non-marketed environmental product values is essential in order to generate trustworthy income data. In Chapter 8, Sven Wunder and co-authors describe some of the structural obstacles found in rural economies of developing countries and then proceed to outline and review six different practical methods for how to assign values to non-marketed goods. They end the chapter by introducing techniques for checking the validity and reliability of values.

With a good research design in hand, it is time to embark on the field data collection. In Chapter 9, Pamela Jagger and co-authors use their PEN fieldwork experience to provide suggestions for how to make fieldwork a fruitful and pleasant experience by spending time attempting to understand the political context, understanding and behaving respectfully within the cultural context and planning the practicalities concerning the research team's stay in the study area. The chapter argues that the study of natural resources is fraught with political complexity, emphasizes the need to conduct the research transparently

and share findings with the local communities, and discusses health and safety aspects of staying in the study area.

The considerable time and efforts spent on preparation should ensure that the conditions for fieldwork are optimal. To then make the actual data collection a success – in other words, to collect data of high quality – one factor of utmost importance is the quality of the enumerators hired to implement the survey. In Chapter 10, Pamela Jagger and co-authors address the issues of selection, training and upholding the continued motivation of enumerators, aspects of field research often omitted from survey method descriptions. A crucial part of survey fieldwork is the management of the questionnaires used to capture the data. The chapter suggests ways of storing and keeping track of questionnaires, and provides a protocol for checking the questionnaires in the field.

Getting quality data is a major focus of this book. In Chapter 11, Jens Friis Lund and co-authors focus on how data quality may be affected by systematic measurement errors, in other words, errors arising during the implementation of the survey that systematically affect the measurement of a variable across a sample. The multiple reasons for systematic measurement errors are outlined along with procedures on how to avoid or minimize them, focusing on issues related to enumerators and questionnaire administration, respondents' strategic behaviour and understanding, and bounded knowledge.

In Chapter 12, Ronnie Babigumira addresses an aspect as important to data quality as sample selection, questionnaire design and enumerator selection and training: data entry and checking. The chapter cautions against combining the various steps of data entry and analysis and provides a thorough discussion of how best to code, enter and check data. Examples of typical errors illustrate the importance of the chapter's advice, and the advantage of using codes rather than storing data as text is emphasized.

After the collecting, entering, checking and cleaning of the data, the researcher should be, finally, ready to start the analyses that may answer the research questions initially set out. Gerald Shively and Marty Luckert in Chapter 13 suggest approaches to data analysis, starting with exploration of data using descriptive statistics, and moving on to hypothesis-driven analyses using multiple regression analysis to establish cause-and-effect relationships. The importance of formulating unambiguous hypotheses, based on theory or empirical studies, with accurately defined variables is emphasized, and common pitfalls in data interpretation are presented.

The last steps of the research process are the write-up and communication of the findings with the purpose of 'making a difference', in other words, to influence policies and practices. In Chapter 14, Brian Belcher and co-authors argue that research can influence policies through multiple and iterative pathways, including identification and involvement of the intended audience

already in the research design phase, and the conscious use of other media complementing the scientific paper. Recognized as the standard format for communication of research results, the structure of the scientific paper is outlined and suggestions for efficient writing are made.

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