

**RAPID APPRAISAL METHODS FOR THE ASSESSMENT,  
DESIGN, AND EVALUATION OF FOOD SECURITY  
PROGRAMS**

**Gilles Bergeron**



**International Food Policy Research Institute  
2033 K Street, N.W.  
IFPRI Washington, D.C. 20006 U.S.A.**

**March, 1999**

**CONTENTS**

1. Introduction ..... 6-1

2. Instruments Guide ..... 6-4

## 1. INTRODUCTION\*

Project managers in charge of implementing activities that address food security problems need tools to (1) identify the populations that are food insecure, (2) design interventions that address the causes of food insecurity, and (3) evaluate the impact of their interventions on the food security status of project beneficiaries. This guide illustrates how Rapid Appraisal (RA) methods can provide useful insights to the research and design of food security interventions, as well as their limitations. The degree of precision required, the characteristics of the population being investigated, the ability of fieldworkers, all of these and other aspects determine whether RA methods are appropriate in any given case.

The first section of this paper presents general considerations on the advantages and disadvantages of RA methods over survey-based methods. The second section presents a set of RA tools that were tested in the field to fulfill the objectives stated above. The tools developed include community mapping, household food security ranking, conceptual mapping of food sources, seasonal food security time lines, and evaluation of intervention's impact on food security. Each instrument is presented in a similar sequence: first, a brief introduction presents the instrument and its relevance to the study of food security; second, the tool is described in terms of its specific objectives, format, methods, and products expected. Third, examples from fieldwork experimentations are provided to illustrate its use. Additional information and key references on the procedure are added in appendixes to the manual.

### **RA Methods for Local Needs Assessment, Intervention Design, and Impact Evaluation**

Rapid appraisal methods offer development workers a useful set of research and appraisal tools to obtain quickly information from local populations about their conditions and their needs. RA methods also enable local people and outsiders to plan together appropriate interventions and evaluate the impact of development interventions after these have been carried out.<sup>1</sup>

RA methods have distinct advantages over survey-based research methods: they generally involve low costs; are highly adaptable to different situations; and tend to facilitate the

---

\* Funding for data collection and analysis of these data has been supported by the International Fund for Agricultural Development (TA Grant No. 301-IFPRI). We gratefully acknowledge this funding, but stress that ideas and opinions presented here are our responsibility and should, in no way, be attributed to IFAD.

establishment of rapport with local communities, thus allowing to explore topics not easily studied otherwise, or to bring out qualitative aspects that would be missed out by close-ended surveys. They also favor analysis on the spot with local people, enabling verification of findings and enhancing the local relevance of results. However, RA methods present important disadvantages over more conventional methods, including poor generalizability of findings, lack of clear validation procedures, and susceptibility to manipulations by informants. Also, the qualitative focus of RA methods limits researchers' capacity to transform the data, thus constraining the analysis to what is reported by local informants. Besides, the quality of the information collected depends to a high degree on the skills of field personnel. The general belief that RAs are simple to apply is, in most cases, simply not true. Indeed, the selection and training of fieldworkers is much more critical than for conventional enumerators. Finally, because of their use of "participatory-type" methods, RAs tend to raise expectations among the population about program activities. Goals have to be carefully explained from the outset to avoid misconceptions. For all these reasons, the RA approach is viewed in this manual as a complement rather than an alternative to survey-based methods. RA is used to guide, inform the design of, and confirm findings from formal surveys. A combination of formal and RA methods is the best way to ensure the quality of final results.

### **General Guidelines to the Use of RA Methods**

Whenever using RA methods, a number of basic issues must be considered, including

1. *Training and selection of personnel.*<sup>2</sup> As mentioned above, the skill of fieldworkers is critical to the success of RA methods. These skills are quite different from those required by formal surveys. First is the emphasis on social skills: controlling dominant personalities in group settings while seeking the participation of silent participants—all of this without imposing one's opinions—requires superior communication abilities. Another distinctive attribute is that, unlike survey enumerators who collect data for analysis by outside researchers, RA fieldworkers have to collect, analyze, and validate the data themselves. They ARE the researchers. Hence they need a sound understanding of the aim of the research so they can, for instance, change the instrumentation used, if need be,

without losing sight of the final objectives. We cannot overstress the importance of selection and training of field personnel. See the References on training RA fieldworkers.

2. *Establishing contact.* Community life is complex, and care must be taken from the start not to unwillingly alienate groups or individuals by associating too closely with the “wrong” person(s). It is useful to make unannounced visits to a village before the first official visit,<sup>3</sup> in order to learn the basic “political language” of that community. This can be done by sending one fieldworker to the village, who establishes informal contact with anyone he/she meets. Avoiding local authorities is preferable, although not always possible. Free-flowing discussions are initiated with the people encountered, leading to questions such as: Who are the official representatives? How are they perceived? Are there factions, rivalries (political, religious, economic) in the village? Such early knowledge is invaluable when making the first official visit, and helps avoid early missteps.

Then an official visit can be scheduled. In contrast to the first informal visit, this one is well announced and involves local authorities as well as high-ranking officials of the project. This visit is preferably not used for working sessions. Rather, the aim is to explain the project goals and the type of work to be done. Permission is sought from local authorities, dates for workshops are established, and an understanding is established on who will be invited to attend.

3. *Timing of workshop and sequencing of instruments.* Project personnel must look for ways to minimize the disruption of people’s life. If possible, the meeting is held in periods or seasons of low activity; otherwise, field personnel must look for a time of day when people are back from their daily activities. Besides showing basic respect, this increases the likelihood that people will actually respond to the invitation and attend the meeting.

The sequencing of instruments during the workshop should normally follow the logical flow proposed in this paper. Some exercises can be undertaken at different moments without affecting the final results—for instance, transects and flow calendars may be done at different times if it is more convenient.

4. *Choice of informants.* Initially, all community residents are viewed as potential informants. Some of the exercises—e.g., mapping, concept definition—can be done without being selective about informants insofar as they know their community well and

are honest in their responses. Rapidly, however, and as the groups most likely to suffer from food insecurity are identified, individuals from these groups must play the central role in the discussions. Besides, within identified target groups, subgroups usually need to be considered. Typical subgroups are stratified by gender, livelihood strategy—e.g., farmers versus ranchers, age group, ethnic/caste affiliation, etc. It may be necessary to obtain contributions separately from each group, in order to capture all the relevant information. Separating groups may also be necessary if putting them together creates social tensions. Finally, just as informants are selectively identified for specific exercises, conversely, the choice of method must take into account informants' profile—e.g., if literacy level is low, the method should not require reading skills.

5. *Triangulation.* Triangulation refers to the comparison of data between sources to improve its validity and reliability. This is particularly critical with RA data—many refer to RAs as “quick and dirty” methods—for it is easily manipulated by informants, although group meetings tend to reduce this problem. The important point is that no data should ever go unchecked, especially if it is used for making important decisions. The quality of RA information may be verified in several ways: replicating the exercise with other groups, exploiting alternative sources of information (e.g., aerial photos or prior surveys), comparing results against predicted values from mathematical models, “ground truthing” by walking transects, and so on.

## **2. INSTRUMENTS GUIDE**

### **Concept Definitions**

The elicitation of local concepts is basic to establishing a common language between fieldworkers and informants. One good time to do so is at the start of each exercise, when the ideas used in this particular workshop are first introduced. The content of each concept is then discussed, so that they are defined in their local, cultural equivalent. Another approach is to hold a special “Concept Definition” workshop where all the notions used in the RA sessions are defined. Whichever method is best depends on moderator preference and on the time available.

Approaches proposed to define local concepts go from simple ones, such as brainstorming and pile sorts, to complex ones, such as Delphi methods and cultural consensus modeling (see Annex 1 for a review). Since all these techniques have the same objective (translating in local terms the concepts used in the RA sessions), however, the simplest ones should always be used unless compelling reasons require otherwise. We specify below some of the concepts to defined.

- *Community.* The universe to be mapped has to be clearly defined, so that all households in the village fall within its boundaries and any unit falling outside of it is excluded. Special cases, such as when nomad or pastoral societies are present that move in and out of the community, have to be discussed and a decision has to be made as to include these or not in the potential target group.
- *Household.* In Latin America, the nuclear family (a man, his wife, and children) is the most common type of household, but in West Africa, extended households (multiple generations/nuclear families living together) are common. The definition of a household may also change whether the focus of the projected activity is production or consumption: if the project goal is production-enhancing, then the targets are the productive units; if the intervention is for food relief, then the targets are the consumption units.
- *Food security.* From the project's point of view, food security is defined as availability and access to food by all at all times. Availability and access, however, are notional constructs that are sometimes difficult for local people to grasp. We found the following to be a useful shorthand for defining these ideas: **availability relates to communities; access relates to households.** In sum,
  - *Availability* is defined as the capacity of *communities* to obtain the supplies of food required to feed everyone that lives there. In a famine situation, for instance, the village's capacity to maintain food supplies collapses. Food becomes unavailable even for people who are wealthy. This is a case where food insecurity is due to low food availability.
  - *Access* refers to the capacity of *households* to obtain food. This dimension of food security relates mainly to *individual household wealth*. For instance, a household

that has sufficient land to harvest grain for the full year enjoys greater food security than a household whose land can provide grain only for six months of the year.

- *Seasons.* The Gregorian calendar's month names are not necessarily known to local populations. The length of months or seasons may also vary quite substantially. The seasons have to be defined before construction of the time line.

### **Community Mapping for Census Taking**

Community mapping is a versatile tool used to cheaply gather baseline information on a number of indicators—population characteristics, wealth and asset distribution, labor availability, etc. In this manual, we suggest considering the use of community mapping instead of a formal census (Table 1). We found that, besides being quicker, this method sometimes yields better results than conventional census: in northern Mali, for instance, available data from formal sources listed only 60 percent of the households identified using the community map. Further, the formal census seemed to have a tendency to bypass food-insecure households more than food-secure ones, which would have serious implications for beneficiary targeting and program design. The reason for mapping's greater precision is that it is more difficult to ignore a domestic unit once its living space has been physically represented.<sup>4</sup> Another good reason to use this tool is the high level of participation they encourage: villagers usually enjoy mapping, as it is a good way for them to communicate issues that have a spatial dimension. The construction of a map is thus a good starting place for social assessment studies. Note, however, that community mapping is not always the most appropriate tool for census taking. For instance, and in contrast to the Sahel, where villages are generally concentrated and well delimited, communities in the Amazon or in Central America are often dispersed, with undefined boundaries. Under these circumstances, community mapping is unlikely to yield good results and a formal census format may be preferred.

**Table 1 Realization of the village map**


---

Informants	All villagers; or else, selected representatives of the various stakeholder groups in the community.
Where	Large open space. For 3-D maps, preferably outside so the area may be expanded if needed.
Time	Varies with the size of the village and the degree of participation of villagers. On average, three hours should be sufficient to complete its realization.
Objective	Have informants reproduce, at reduced scale, the distinct homes and important living areas of the village. Precision must be sufficient so that all homesteads are clearly identifiable.
Materials	Depends on the type of map and intended durability. No need for fancy materials; instead, use only materials locally available, such as sand, pebbles, sticks, and so on. These are less intimidating than paper and pen for first-time participants. Once finished, the output is copied to large paper sheets or cartons.
Concepts to define	The concepts of community, household, and food security must be defined before starting this exercise. See section on concept definition.
Method	No single method exists for this exercise. Villagers are responsible for its realization and their spontaneous suggestions are encouraged so villagers feel at ease with the instrument and its use. First, a decision is made whether a bi-dimensional or tri-dimensional map will be done. A tri-dimensional map takes more time but is more precise, is easier, and is more enjoyable for villagers. On the other hand, time may be short, or the weather may not favor working outside, in which case a bi-dimensional map should be preferred. Whichever type is used, fieldworkers must ensure that the work proceeds systematically so it has the desired precision. Guidelines to that effect are, first, identify well-known features, such as the central park, the mosque, etc., and place them on the map. Then, draw the outer limit of the inhabited space in relation to these main features. Next, proceed from the center to the periphery in a concentric fashion. As work proceeds, readjustments to the initial placement of spatial features or to the outer limits of the village are made as required. As households are represented on the map, they are identified by the name of their head. Their characteristics (number of persons in the unit, presence of migrants, number of animals or fields owned, and so on) can also be added at that point.
Products	Two products are generated by this exercise. First (if a tri-dimensional map was done), the lay model is transcribed on a large sheet of paper, with households properly numbered and identified (if possible, photos of the model should also be made). All the elements of information present on the map are reported on paper, including names and number of households (note: we assume this requirement is already satisfied if a bi-dimensional format is used). The second product is a spreadsheet, which organizes the information elicited by the mapping exercise in a matrix format. All items locally associated with food security (e.g., fields, animals, etc.) that were elicited for each particular household are reported as variables in the matrix. Families are listed as rows, variables as columns. Particular attention goes into coding household identification numbers, especially in cases where extended family units are common (see a model of coding in Table 2 below).
Validation	Transects. If high precision is required, an aerial photo may be used.

---

### *Example of Community Mapping*

Tomba is a community of Northern Mali where development agencies are financing the construction of irrigation infrastructure. We visited local authorities, and informed them of our desire to conduct a series of exercises in their village, to better understand the local characteristics of food insecurity. The local council accepted our request to map the community, and agreed to invite villagers to participate in this exercise. The time was set for the afternoon of the next day, after they had returned from their daily occupations. A wide open space, used as a traditional meeting ground, was designated to hold the mapping workshop. We also requested that a selected set of informants meet a few hours before the construction of the community map, to conduct a “concept definition” workshop so we could elicit local definitions of households, wealth, and food security.

The next day, when we arrived at the meeting place, we were greatly surprised by the level of attendance: all villagers—perhaps more than 200 people—were expecting us. The workshop was obviously seen as a festive occasion, and everyone came in their finest clothes. Field personnel, who spoke the local language, began by explaining the objectives of the exercise to the villagers: reproduce their living space on the ground as exactly as possible so we could identify household units and the people living in them. We suggested to start by laying out the mosque and the central place first (since these stand in the geographic center of the village) as well as the main paths arriving to the central place. *Banco* (wet clay) was proposed as materials and the staff built a few hypothetical street walls to illustrate the idea.

At the beginning, only two or three men seemed to understand our aim. They proceeded to correct the model. Seeing them work, bystanders quickly joined in and soon all people present, men and women alike, were busy adding their own compound to the map. Controlling the work of so many people soon became impossible, and we were reduced to act simply as resource persons, answering people’s questions about procedural aspects and making sure nothing was left out. As delimitations between compounds were drawn, vigorous discussions were heard all over as to how much of that wall was owned by this compound versus its neighbor, where did this pathway end, and so on. The level of participation, of debate, and cross-checking was such that we are confident no major mistakes were made: people clearly counterbalanced one another in making the assessments and little was left unchecked.

Once the main streets and family compounds had been laid out, people began separating individual homes within compounds by making little clay mounds, each one representing a home. We then asked them to represent their domestic assets, including number of persons present in the home. On each house mound, a number of twigs were then planted to represent how many people lived there—migrant members were represented by a bent twig. Other symbols that represented the household assets were deposited in the yard adjacent to each home. Symbols used included goat feces, to represent the number of goats owned by the home, bean seeds, to represent the number of nonirrigated fields; rice seeds, to represent the number of irrigated fields; and so on.

Once the map was considered complete by informants, field staff proceeded to record the information on a large sheet of paper and the summary matrix was done (see Table 2). Particular care was taken when recording family ID numbers, as extended families were common in that village. We numbered compounds first, and domestic units second. Both compounds and domestic units were numbered in ascending sequential order (1, 2, 3, 4...), but the numbering of domestic units began anew each time we changed compounds. We also agreed that the first domestic unit named in each compound (that which received number 1) would systematically correspond to the family head (Table 3). This way of coding was used in order to allow later analysts to associate each domestic unit with the compound it belongs to, a crucial piece of information, given the importance of family networks for livelihood strategies in this region.

### **Food Security Rating**

Food security rating is a member of a family of field research techniques known as Group Informant Ratings (GIR), which allow fieldworkers to (1) quickly understand how units of interest (households, plots, etc.) are different from each other on a particular aspect (wealth, food security, etc.) and (2) classify them accordingly (Table 4). The resulting classification can be used to identify target groups for specific activities. GIR provide a rapid and low cost assessment of unit characteristics. In Wealth Ranking exercises (a popular GIR method), ratings by local informants are further credited with removing the biases of conventional survey methods by bringing intangible elements (such as status, and access to networks of support) to the

**Table 2 Matrix of household demography, assets, and food security rating: Example from Tomba (only 18 first domestic units)**

Compound Number	Domestic Unit Number	Name of head of domestic unit (HHH)	Gender of HHH	Number of domestic units	Ethnic group	Number of household members	Number of oxen	Plow (yes/no)	Number of cows	Number of goats	Irrigation fields	Non-irrigation field	Migrant fields	OL (yes/no)	Food security rating
1	1	Abdoulaye Amadou Yatara	1	4	1	10	4	1	1	1	1	1	0	1	3
1	2	Issa Madiou	1	4	1	8	0	0	0	2	1	1	1	1	1
1	3	Mamadou Kabara	1	4	1	3	0	0	0	1	1	1	2	1	2
1	4	Aligui Madiou	1	4	1	4	0	0	0	1	1	1	1	1	2
2	1	Hamadou Mahamar	1	3	1	3	0	0	0	1	1	1	0	1	1
2	2	Mahamman Hamadou	1	3	1	6	0	0	0	1	1	1	0	1	2
2	3	Abdoulaye Hamadou	1	3	1	0	0	0	0	1	1	1	2	1	2
3	1	Boubacar Madio	1	2	1	10	0	0	0	2	1	1	0	1	2
3	2	Arsina Madio	1	2	1	2	0	0	0	1	1	1	6	1	2
4	1	Djougal Iko	1	1	1	4	0	0	0	1	1	1	5	1	2
5	1	Sidar Traore	1	1	1	5	0	0	0	2	1	1	0	1	2
6	1	Djoubalo Ahidji	1	1	1	7	0	0	0	2	1	1	1	1	2
7	1	Aisa Bocar	2	1	1	7	0	0	0	1	1	1	0	1	1
8	1	Ousmane Kouly	1	1	1	4	0	0	0	1	1	1	0	1	1
9	1	Ali Oumba	1	2	1	5	0	0	0	1	1	1	0	1	2
9	2	Hamadou Oumba	1	2	1	2	0	0	0	1	1	1	1	1	2
10	1	Brema Ousmane	1	1	1	6	0	0	0	1	1	1	1	1	1
11	1	Hammadou Abdoulaye	1	1	1	8	0	0	0	1	1	1	3	1	2

**Table 3 Model used for coding compound and family numbers**

Compound number	Family number
001	01 (family head)
001	02
001	03
001	04
002	01 (family head)
002	02
003	01 (family head)
004	01 (family head)
004	02
004	03

measurement of wealth and poverty, thus bridging the gap between outsider and local perceptions of poverty.

There are problems with GIR methods, however. The first one is the inability to do cross-community comparisons: ratings produced are, by definition, contingent to each setting. GIRs may thus have high internal validity but they have no external validity whatsoever. Some attempts have been made to overcome this limitation, but no convincing alternative has yet been offered; we recommend never using a GIR scale outside the site where it was developed. Second, it must be recognized when GIR is not useful. In communities where everybody is subject to considerable stress, such as is the case with refugee communities, GIR provides spurious or irrelevant details, as differences in wealth or food security become increasingly marginal. Also, the approach is not very useful in large communities where no one can know everybody well. One may divide the larger community into wards or neighborhoods, but then the problem of standardization between subdivisions surfaces (see first point above). Limitations are also noted where populations are highly mobile (such as in pastoral societies), or where households are highly scattered (as in the Amazon). Third, GIRs appear to be very susceptible to error, both systematic and random. Our tests of the reliability of ratings suggested that the main sources of error are poor informant selection, and poor training of field personnel. This can be

**Table 4 Food security rating**


---

Purpose	Classify households in a community according to their level of food security.
Informants	Much care has to go in selecting informants. They must be long-standing members of the community, be knowledgeable, and be honest. They should represent a cross section of the community in terms of age, sex, ethnicity, or other locally relevant distinctions (caste, productive orientation, etc.). The number of informants per focus group should be from four to six. Separate groups may be created if members of different social status do not want to stand together in the same exercise; or if women remain silent in the presence of men. Then, however, the ratings produced by each different group have to be reconciled or standardized.
Format	Focus group session
Where	In a calm, private area, inside or outside
Materials	Index cards (as many as there are households in the community plus five for labeling of piles/categories), markers
Method	Of all the methods proposed in the literature, we prefer the "index card" approach for it is comprehensive and easy to control. In this method, the name of each household head is written on a separate index card. Once the categories to be used are identified (see Prior Steps) a separate pile is created to represent each particular category. Informants discuss among themselves and decide which category each household belongs to. If informants are unsure about one household, they put its card aside so the case can be resolved later. Once all households are rated, the moderator takes each pile and reads the names back to the group to give them a chance to review their classification. This may bring additional shuffling. New categories may also need to be created to accommodate intermediary or uncertain cases. If so, all cards have to be read back again to the group, until no more discrepancies are manifested. Once the final categories are made, their attributes are discussed anew, by empirically considering the characteristics of the households falling in this group.
Prior steps	Define the concepts of community; household; food security. Define a rating system: Informants should be allowed to define their own rating system, so that they feel comfortable with their assessment. Usually, three to five classes are proposed.
Time	About 1 hour
Products	A listing of all households in the community with their rating in terms of food security categories. A clear definition of what each category of HFS refers to
Validation	Control with attributes of household obtained from mapping. Obtain second opinion from different focus group. CART analysis

---

remedied by exerting considerable care in the use of the method; however, it has to be clear that it is less straightforward than it initially appeared.

For all these reasons, we recommend using GIR methods with much caution: it should be done strictly to classify populations within single communities; careful selection of key informants is required; and very careful training of field personnel is an absolute must.

### **Example of Food Security Rating**

A food security rating exercise was conducted in San Marcos, a community of Western Honduras where a rural development project is being implemented. The aim of the exercise was to examine how food security varied in the group of farmers targeted by the project. A listing of community members was provided by project managers. We randomly selected various people from that list and visited them, asking who in their opinion were the most reliable and knowledgeable informants in the village. Five persons were repeatedly pointed out by villagers. These five persons—three men and two women—were invited to participate in a focus group session. We explained to them that they would have to create a food security rating of community members. The meeting was convoked for the next afternoon, and held in the schoolyard.

After informants had arrived at the meeting place, we explained to them what we meant by “Food Security” and “Households” (see discussion above in “Concept Definition” section). We also asked them to contribute whatever else they thought should form part of these concepts. Next they were asked two questions: “Does everyone among villagers have equal access to food? (Yes/No)” and “If there are differences, how would you characterize these differences?” After some debate, a two-way classification emerged from these discussions: (1) food secure: families that never have food security problems, and (2) food marginal: families that seem to have food security problems every year.

The group was then asked to rate each household on the list in relation to this categorization. The moderator read the names of every household head in turn, asking in each case on which of the two piles should this household be placed. Informants would deliberate and then take the card and put it on the appropriate pile. Many cards created difficulties, so they were put aside for later categorization. Once the group had gone through all the cards, the moderator

asked them to consider again those that created problems, and what could be done about these. One informant eventually mentioned that it seemed all of them did not fit in either of the extreme categories; rather, they fell in between, not totally food secure nor totally food insecure. A third, intermediary category was thus added, which was defined as “families that occasionally have food security problems but not every year.” The moderator added a new corresponding pile. He then read back the names that had been put on the two first piles (Food Secure and Food Marginal) and asked if they still agreed on this rating. Many of the households from these pile were then reclassified to the intermediary category.

Once the review was completed, the moderator asked informants to consider again each class and the households in it, and asked “What makes you think these households belong to this class?” Responses to that question improved our understanding of food security differences in the community, and provided a point of entry for later project design. Mentioned characteristics were as follows:

#### Food secure group

- They work at large scale on their own lands,
- They have good ideas,
- They work hard,
- They save their money,
- They have the best lands,
- They have public responsibilities,
- They have cattle.

#### Food insecure group

- They do not have much land,
- They have to work for wages occasionally,
- Their families are numerous, and the little they produce is consumed right away,
- They sell their product before it is harvested.

#### Food marginal group

- They always have to work for wages,
- They have no money, low revenues,

- They do not make decisions, they do not have a view of the future,
- They are lazy or sick people,
- They do not have a sense of responsibility,
- They must buy all their food,
- They do not have land, or their land is insufficient.

### **Conceptual Map of Sources of (and Threats to) Food Security**

Conceptual mapping is a relatively new technique in the PRA tool set, used to specify which factors contribute to a particular outcome. It can be viewed as the qualitative version of a functional equation in which the outcome (dependent variable) is determined by a set of factors (independent variables) that can be objectively specified and ranked in terms of their respective contribution to total explained variance (Table 5).

Documented experience in the use of this technique is scarce. Our own field trials suggest that, although theoretically promising, obtaining good empirical results is a challenging task. We noted two main difficulties: first, the map is complex and requires a very skilled moderator. Second, verification is problematic: supporting evidence is difficult to obtain and requires a better knowledge of the community than the little time spent doing a RA can actually generate. Yet, this exercise can be very useful for assessing the sources of (and threats to) food supply and for this reason, project managers should be aware of its potential when exploring options for food security interventions. Basic guidelines about its use are provided below. It must be emphasized, however, that it should only be used if qualified personnel and time are available.

### **Example of Conceptual Map**

#### *Main Food Pathways and Their Prior Conditions*

Santa Teresa is a mountain community of Western Honduras. Staple foods are maize and beans. Villagers obtain these staples either by producing them or through purchases. No food donation programs are active in this community, and few households mention receiving transfers. Staples include maize and beans, grown primarily for subsistence with small quantities occasionally sold locally for cash. Wheat was once important but less of this crop is grown every year due to genetic erosion, and the small amounts produced are grown only for sale. The prior

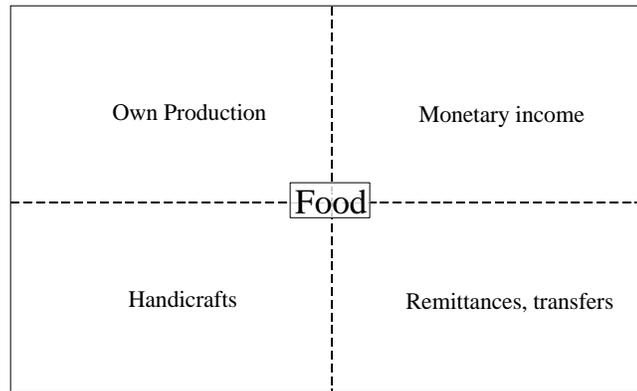
**Table 5 Conceptual map of food sources and threats to food security**

Purpose	(1) Elicit the most important pathways by which households obtain their main staple food in that community; (2) identify the most important threats to these food acquisition strategies; and (3) prioritize threats that should be addressed first.
Informants	Optimal size of group is from 8 to 12 participants. Informants must be selected to represent the distinct farming strategies found in that community. A balanced gender representation is also required.
Format	Focus group session held in a quiet, private area.
Materials	Materials include a large sheet of paper and markers of distinct colors.
Methods	This exercise is easier when limited to main staple foods (e.g., maize and beans).
<i>(a) General aspects</i>	The moderator explains to the participants that he/she wants to know the sources of their staples in this community. A simple example aspects (e.g., “growing it”) is usually sufficient for participants to understand what is expected from them. Informants will mention that they get staples from their own production, donations, purchases, etc. Always remind informants to refer only to actual, nonhypothetical sources of food. Also, a minimal number of families—e.g., at least 25 percent of households—should use this strategy before it gets recorded on the map.
<i>(b) Mapping food sources and their pathways</i>	The moderator “holds the pen” during the whole session, so the product remains organized as it fills up. The moderator mentally divides the map in “zones” to keep sources separate from one another. An example of “conceptual map zoning” is presented in Figure 1a. Once the main sources of staples are listed, each source is considered individually. The main <i>prior conditions</i> to this source are elicited. For example, a prior condition to have “Food from own production” is that there be a harvest; to have a harvest, the farmer must have land and buy inputs; both of these require capital, which may come from savings or loans; and so on. Each of the steps in this sequence corresponds to a node; the full sequence of nodes associated with a particular source is called a pathway. The pathway and its nodes are reported on the map as in Figure 1b.
<i>(c) Ranking food sources by order of importance</i>	Conceptual maps generally turn out to be very similar from one village to another. What makes them different is the relative importance of each pathway in the livelihood strategies of the villagers. Once all pathways have been identified, a subjective weighting is made between them by drawing arrows of various sizes indicating their relative importance in that community (see Figure 1c). The size of each arrow figuratively corresponds to that vector’s effect.
<i>(d) Identify threats to each food source</i>	The moderator next asks informants to identify the main threats that exist along each pathway. The link between each node is examined, and elements that may threaten this link are elicited and written on the map using a marker of different color. Here again, it is important that the threats identified correspond to those that exist in this village, and not merely theoretical ones. Since threats are usually different between sites, the map will differ between villages at this level also.
<i>(e) Prioritize threats to address first</i>	The final step is to rank threats by order of importance. Pairwise ranking is adequate for that purpose. <sup>a</sup> To keep this manageable, we suggest considering a maximum of five threats per pathway. If three pathways are identified, that makes a total of 15 threats to rank.
Prior steps	Identify main staples. Recruit informants.
Time	Approximately 2 hours
Products	Products include (1) a specification of main staple sources in the community and their relative importance; (2) an identification of the main threats to these pathways; (3) a prioritization of most important threats to consider.
Validation	The only rapid way of validating the results is to repeat the exercise with another group and triangulate findings. A household-based survey of food consumption may provide information about sources of food, but not about pathways or threats. A prolonged stay in the community (6-7 days) is needed to verify the conclusions.

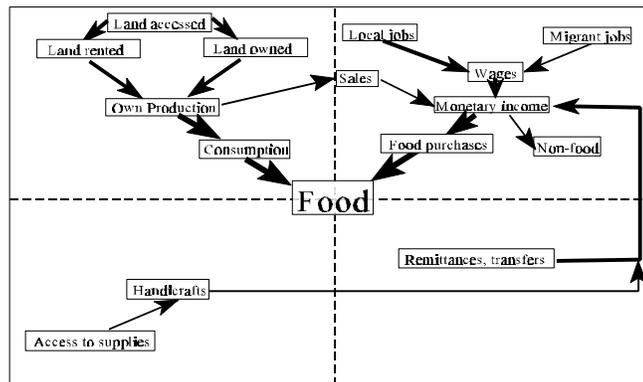
<sup>a</sup> Pairwise ranking is a common RA technique, in which every choice is iteratively compared to every other choice by asking which of the two is most important. In this way, all choices get ordered in terms of their relative importance one to the other.

**Figure 1 Conceptual maps**

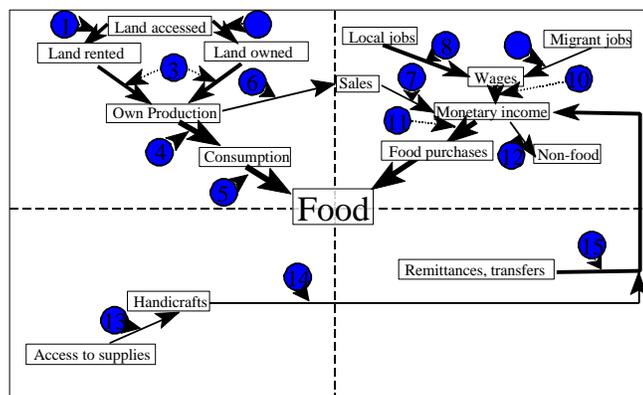
**Figure 1a Zoning of the conceptual map into quadrants**



**Figure 1b: Nodes and pathways in conceptual map**



**Figure 1c: Threats to food pathways**



- |                                   |                              |   |
|-----------------------------------|------------------------------|---|
| 1: Availability of land for rent  | 7: Total output              | 13: Arrangements to access materials                        |
| 2: Price of land                  | 8: Demand for wage labor     | 14: Handicraft output prices                                |
| 3: Rain, pests, access to capital | 9: Availability to travel    | 15: Presence of migrant member or access to income transfer |
| 4: Storage losses                 | 10: Wage levels              |   |
| 5: Capacity of HHM to use food    | 11: Prices of food           |   |
| 6: Output prices                  | 12: Prices of non-food items |   |

condition to production is access to land, labor, and inputs. Land in this village is either owned or rented by the producers. Labor depends on the family demographic cycle. Inputs are generally bought, since organic fertilizers are little used locally. The working capital for production comes from credit, savings, the sale of produce, or from wage work.

Food purchases depend on income generated from two distinct sources: sale of own production, and wage work on other people's land. The conditions that determine sales are the same as those determining production; thus land access is key to how much cash is derived from production. Wage work refers mainly to temporary migration during the coffee harvest season.

### *Threats to Food Acquisition*

*Pathway 1: Own production.* The local production of basic grains is determined by many factors. Farmers say external inputs are crucial to their production of food. Most of the money to buy these inputs comes from loans; but to obtain a loan one has to own land, be a member of a producer organization, and be free of debt. In Santa Teresa, about half of the people own some land, and they recently formed a producer association, enabling them to access credit. For them, the conditions to access credit are met—unless they have bad loans. For those with no land, however, the situation is more difficult: they may rent land, but rented land cannot be used as collateral and does not give access to credit. Besides, land rental is very insecure, due to the legal stipulation that a farmer who has worked a plot for more than three years can claim ownership to that plot. Fearing loss of their ownership rights, landowners prefer not to rent to the same person from one year to another. Landless producers thus constantly have to seek new land to sow their basic grains. This lowers the incentive to land investment, and rented land is typically more degraded and of poorer quality, making them (and the family that uses them) more vulnerable to production shortfalls. There is little way out of this situation, as the land market is tight in this area and buying land is expensive.

Assuming land and capital are secured, the next problem confronted by producers is the price of inputs, which is always increasing. This complaint is certainly legitimate in the case of basic grain producers: we know from other sources that the cost/benefit ratio in basic grain production has gone down in Honduras by up to 40 percent in the last two decades (compared with an increase of more than 200 percent in nontraditional commercial crops). This is bound to

have severe effects on a community like Santa Teresa, where people rely to a high extent on their own production to ensure their supply of basic foods.

Going down the pathway, and assuming fertilizers are obtained, farmers still have to face the hazards of erratic rainfalls, pest outbursts, postharvest losses, and so on. Irrigation systems could palliate for rain shortage, but water sources are distant and would have to be pumped, requiring a major infrastructure and high operational costs. Pest incidence is relatively low in this community, yet pesticides are needed at times, which again requires capital. Storage losses are reported to affect up to 15 percent of stored grains, due to rot and rodents.

*Pathway 2: Purchase of foods.* The capacity to buy food is related to the wealth of a household, itself a function of amount of land owned, sales from own production, access to savings, and/or earnings from wage work. We already described the threats associated with production. To these, one must now add the problem of output prices, which fluctuate quite dramatically on a seasonal basis. With respect to wage work, the most important source of employment is provided by coffee harvests. However, this source of income is premised upon the availability of household members for periods of out-migration; and to the effective demand for labor in the coffee sector, itself a function of world coffee prices and climate. Coffee harvests occur only in a short, seasonal fashion, but the incomes provided are secure and stable. Yet farmers resent this obligation to migrate, and they would rather stay at home if they could. Also, they complain that salaries are low (although we know from other sources that coffee wages have improved over the last few years). A few alternate sources of employment exist locally but they are occasional, and cannot serve as a main source of income; they also pay less.

Finally, producers mentioned that the purchase of food is affected by problems of local availability (nonexistence locally) and access (high prices); prices, they say, are particularly subject to manipulations by intermediaries.

### *Analysis and Ranking of Threats*

The threats identified above were listed for further discussion. A matrix (Table 6) was drawn to discuss the possible action, and whether any of these actions were in the project's and the community's manageable interest.

**Table 6 Matrix of threats to food acquisition, with possible actions and their likelihood**

Problem	Possible action	Likelihood of action
Inadequate tenure laws	Change land tenure law	Unlikely: tenure laws are a national policy.
High land prices	Change land market Land reform	Unlikely: the market is already quite open. Local land reform would provide no relief, as landowners in this community are smallholders.
Production hazards	Stabilize yields via technical improvement	Can be done. Technologies can be adapted to improve maize/beans/ climate/pest tolerance.
Poor access to capital	Offer credit without need for collateral	Can be done, but requires organization. Alternative credit guarantees—for instance, group lending—must be explored.
Much storage losses	Provide silos	Can be done: simple, cheap technologies exist.
Poor or unstable output prices	Diversify in high value crops to deflect poor prices of basic grains	Diversification into commercial output prices crops might be envisioned, although this needs to be paired with irrigation and roads for market access.
Poor labor market	Stabilize labor market	Unlikely: local outlets are saturated and there is no control over demand for labor in coffee.
Poor wages	Improve wage levels	Unlikely: wage levels are determined nationally.
High food prices	Remove middlemen via consumer coop	Possible, but difficult. Consumer coop requires much organization and training.
	Favor production of vegetables in home gardens	Can be done. Additionally, favors involvement of women and children in food production; and offers alternate source of income and sales.
	Improve transport	Possible, but costly. Could be paired with consumer coop.

A pairwise ranking was made to prioritize issues to be addressed by development agencies. The following were listed in order of preference:

1. Offering creative solutions that would provide credit funds without need for collateral,
2. Technical improvements for yield stabilization in basic grains,
3. Construction of storage silos,
4. Diversify production towards higher value crops,
5. Favor production of vegetables in home gardens, and
6. Create a consumer coop to remove middlemen.

### **Seasonal Food Security Time Lines**

Diagrams such as pie charts, bar graphs, and time lines are very popular among RRA workers seeking chronological representation of processes. Considerable documentation is available on the various types of chronological instruments that have been developed and their uses (see References). The time line is a particular version of these that linearly models time-bound processes (Table 7). Time lines are very flexible: one can find applications all the way from history manuals, where they are used to describe long historical sequences, to software planning tools, where they are used to describe sequential flows of activities in a project. In this manual, the technique is used to better understand the sequence of events leading to food insecurity. To do so, multiple time lines are superimposed to illustrate the connections between production and consumption flows, and cycles in asset availability and demand for cash. The data thus provided can be used at distinct phases of project design: in initial needs assessment (“When is the hungry season?” “What food runs out first?”); project design (“What combination of early/late maturation breeds could reduce the length of the hungry season?”; “When is labor available to realize projects?”); and evaluation (“How do calendars compare between the beginning and the end of the project?”).

**Table 7 Seasonal food security time lines**


---

Purpose	Describe yearly cycles of food production, food consumption, cash, and labor use
Informants	Two different groups are consulted: a set of community informants chosen from the whole village to develop a typical community time line; and a set of households viewed as most food insecure, to develop time lines for food deprived units.
Format	Focus group sessions held in a sheltered, private area
Materials	<p>A predesigned matrix (months as columns and flows as rows). Four groups of seasonal flows are considered: harvests; income; expenditures; labor; food, and cash. Each is further subdivided into single categories (see model in Annex 2):</p> <p><i>Harvests:</i> consider individually the three main crops grown locally, at least one of which is a staple (the other two may be cash crops or staples). A rating of their relative importance in terms of amount of labor they require is also provided.</p> <p><i>Cash income:</i> distinguish between income sources from agricultural sales; wage work; and sales of handicrafts. Their relative importance is also rated.</p> <p><i>Cash expenditures:</i> distinguish between production and consumption expenditures. Include only recurrent, important ones. For each, consider the total amount of cash needed, e.g., for production expenditures, informants must add costs of inputs, hired labor, animal medicine, etc., when they think of when they use most money. For consumption, they must consider the need to buy food when supplies from own production are over; school materials; and add all these in deciding when more money is needed. The calendar reports on the total.</p> <p><i>Labor:</i> Includes mainly timing of female labor. Could be divided between labor in own farm versus labor for wage.</p> <p><i>Food and cash:</i> describes periods when food and cash are scarce.</p> <p>Markers are chosen to be representative of the cycle being described (coffee, maize seeds, bean seeds, etc.)</p>
Method	<p>The calendar is laid on the floor, and participants are invited to stand all around it. The purpose of the exercise is explained, and the moderator indicates how to use markers. The exercise begins with the harvest of the most important subsistence crop in that community (first row). Say it is maize. The moderator asks participants, "In which month do you mostly harvest your maize?" One of the participants is asked to put five markers in the cell corresponding to the designated month. The moderator next asks whether harvests of this crop are obtained in other months. Another number of maize grains is deposited in the corresponding cell. It is explained to participants that the number of grains corresponds to the relative amount obtained in each month, so that months with greatest harvests have the largest numbers (five) and those with smaller harvests have the smallest number (one). Intermediary months may receive from two to four marks. Months without harvests are left blank. Each time line is revised in a similar fashion, i.e., the month of greatest importance receiving the largest number of marks, with the exception of "months where food and cash are scarce": these are inversely classified to indicate periods of greatest scarcity (months of greatest scarcity get more marks). After the community workshop, the exercise is repeated with the three most food vulnerable families (selected from Food Security Rating results). In this case, however, the time line is made specific to these households' situation. The objective here is to assess how these households' situation compares to that of the village.</p>
Prior steps	Identify the main crops and income earning activities in the community. Identify informants from the food insecure group. Describe seasons in local words.
Time	Approximately one hour per group
Products	Once finished, project staff transcribe the result on a separate sheet, coding the size of mounds from 1 (smallest) to 5 (greatest) (see model in Annex 2). Pictures are taken of the final calendar if possible. Relevant details that do not get reported on the time line are collected by the relator, to be reported later at the time of write up.
Validation	Repeat the exercise with another set of informants and compare results. Plausibility should also be corroborated with external data.

---

### **Example of Time Lines**

We use again data from the community of Santa Teresa in Honduras to illustrate the use of time lines. As already noted, mountain wheat is produced in this community in addition to the usual Honduran staples of maize and beans.

#### *Harvests*

Food harvests go from August to January, but they are divided in two distinct subperiods: August and September, and November to January. The little wheat that is still harvested comes mainly in September, although a few households also obtain small amounts of wheat in August. Maize harvest begins in November, increasing gradually until the peak month of January. Small amounts of early maize (*elote*) may be harvested also in September and October. Most beans are harvested in December, with small amounts coming up in November.

#### *Monetary Revenues*

Monetary incomes come mainly in the last two months of the year (November and December), and in the first three months of the year (January to March). Cash comes either from the sale of own production (wheat in a few cases, which is sold in September, and maize, in most cases, sold between December and March, with sales culminating in the latter month), or from wage work during the coffee harvest season, beginning in November and culminating in December and January. Some additional wage earnings are obtained in February, mainly obtained from working in coffee harvests, which implies seasonal migration. No other sources of cash are reported; trade or handicrafts were not mentioned.

#### *Women s Labor*

Women do not work in other people's fields. They only work in their family's plots. Their involvement in agriculture occurs in two periods: land preparation for maize in June, and maize harvests in December and January.

*Expenditures*

Most production expenditures occur at the time of land preparation, before the sowing of maize (May-June) and shortly after fertilizer or weed killers are needed (August-September). Consumption expenditures concentrate in the months from June to August, with a culmination in the latter month, when foodstocks are exhausted and school equipment has to be bought.

*Food Reserves and Monetary Savings*

Food reserves usually last until June. From that moment on and until September, when a few early maize cobs can be harvested, people depend almost entirely on their monetary savings to buy food. Monetary reserves reach their lowest point between the months of June and August, but the period of scarcity may begin as early as April or May. The early maize harvests in September provide some relief at that point, if the season is favorable.

*Summary of the Time Line*

In summary, the time line indicates that the supply of food is at its highest between the months of November and January. Starting between April and June, we noted a progressive decline of food and monetary resources, which culminates in August when severe scarcity is mentioned. The small harvests of maize recorded in September alleviate this situation; from that point on, food access and food availability improve progressively until the cycle begins again.

This sequence indicates a high level of dependence on the maize harvests in September and afterwards. The total maize harvest can be assessed by the end of January, and dispositions could be taken to alleviate future food shortages based on an assessment of total harvests at that date. Another indicator of future harvest performance is the quality of the rainy season. Late or poor rainfall (which can be assessed by July) can create a difficult situation for coming September and October, translating into a serious problem of food access and/or availability. A combination of these two situations can be disastrous. A monitoring of the situation at these two critical points would be useful to forestall severe food security problems.

Production expenditures occur mainly in the rainy season (May to August). Credit funds must be available in function of these months if they are to affect the current growing season.

### *Comparison with Poorer Households*

The same exercise was carried out with three households identified as food insecure by the Food Security Rating exercise. Similar situations were reported by those three households.

Differences with the general village situation were particularly evident along the following lines:

- In all cases, fewer months of harvests were reported, no matter the crop. In two cases, no maize of *segunda* (second crop cycle) was obtained, and none grew wheat.
- Income from sales of own production came in fewer months, if at all, and meant little. By contrast, income from outside sources was important. Wage work in a traditional tile factory was cited by one as a main source of income; day labor in coffee farms by another.
- The time spent by women working outside the home was much greater in two of three cases. In both cases, women worked for wages, not on their own farm. The third case corresponded to an elderly couple, who reported no sources of income at all (they subsisted on transfer income from charities).
- The period for production expenditures was much shorter in all cases.
- The months of scarcity were approximately the same, but extended for longer periods.

It was clear, from conversations with these households, that their main problem was lack of access to land, but also to labor and other productive resources. None of them owned land, and two rented small plots on a yearly basis—thus the little amounts of produce reported, either for consumption or sales. This lesser emphasis on agriculture also explains the different timing and direction of expenditures—little went to production, most went to subsistence. Women’s work is certainly of concern, as this may lower their ability to care for younger children, without apparently bringing compensation in the form of sufficient income anyway.

The lesson from the time line is that quite different strategies might need to be envisioned if the project is truly interested in dealing with food security issues. Alternatives to agricultural production—e.g., value-added transformation of locally produced goods—may do more for those particular families than agriculture-oriented interventions. The best would be to combine both.

### Monitoring and Evaluation Workshop

The last exercise aims at monitoring and evaluating the impact of the project on local food security (Table 8). It is undertaken at least one year after the beginning of the project so the activities have time to manifest some impact. It may be done on a yearly basis thereafter, to assess whether the project is on course and make changes if needed (monitoring function). It may also be realized at the end of the activities, to draw lessons and guide the design of future activities (evaluation function). Note that this exercise does not aim at replacing the monitoring and evaluation procedures based on the collection and analysis of quantitative data. Rather, the aim is to ensure that the voice of local people are heard and that their opinions on the activities and suggestions for improvements are taken into account.

Here again we found no documented experience in the literature on this topic, but our experimental trials in certain project sites proved to be very satisfactory. We estimate that there are two crucial requirements for a successful completion of this exercise: first, only the **direct** impact of activities is evaluated. Second, the outcome variables are the components of food security (i.e., food access and food availability). Income is also considered an outcome variable, as many activities directly target income, and income indirectly affects access or availability. These three dimensions are defined to the participants as follows:

1. *increased income* refers to additional sales resulting from increased production;
2. *increased food access* refers to the greater presence of food at the household level, and results when more food grains are produced as a result of project activity; and
3. *increased food availability* refers to the greater presence of food at the village level, and obtains when the activity results in additional food **being sold** in the village, thus augmenting the amount of food available in the village as a whole.

For instance, technical assistance in coffee production may result in increased income, but not in increased food access nor food availability, as coffee is not eaten. Only through the increased income generated by coffee sales may food access be improved—but it may not have this result, since the increased income may not be spent on food; thus the importance of

**Table 8 Monitoring and evaluation of impact**

Purpose	Monitor the progress of activities with respect to stated goals, and evaluate the overall impact of activities at completion to inform, orient, and improve design.
Informants	Beneficiaries of project activities
Format	Focus group session including 8-10 informants, held in a quiet, private area
Materials	Large chart prepared in advance, listing activities in rows, and whether it had an impact on income, food access, and food availability in columns. The last column is left for explaining reasons of impact or lack thereof.
Method	<ul style="list-style-type: none"> <li>• List the activities undertaken by the project in that community (list only activities that have been implemented, and which had time to have an impact; for instance, the impact of a tree nursery on community life will not be felt before some years; so this activity is not evaluated). This list may be obtained from project officers working in the community. It is later validated with local informants in the village, to ensure that the activities noted in project paperwork indeed correspond to those deployed in the community, and that no important one is omitted (or added).</li> <li>• Considering each activity in turn, ask villagers whether this activity had the effect of increasing income, food access, or food availability in the community. A good definition has to be provided for each of these notions: access refers to the food obtained at the household level. Availability refers to the food found at the village level. Income refers to cash earnings associated with the activity (see definition above).</li> <li>• Informants are asked about the reasons for the success (or failure) of the activity. For instance, if the activity is technical extension in maize production and villagers report lack of impact on food access in the first year, this may be due to a poor implementation of the activity, but it may also be due to poor rainfall or to a pest outbreak. Likewise, the failure of a credit program may be due to a late delivery of funds, but also to the unavailability of inputs locally. The actions listed in the project paperwork can be consulted to augment this characterization (i.e., each activity is supported by specific actions. In case the activity is not successful, we may ask whether the actions were indeed taken, and the failure to do so may explain why the activity did not have any impact).</li> <li>• The activities considered most successful (in terms of villagers' priorities) are listed, followed by the less successful ones, and so on, until all the activities have been listed and ranked in relation to one another.</li> <li>• This exercise is also undertaken with the technical staff in charge of the program. Comparing assessments between project managers and beneficiaries validates the findings and provides a more complete and balanced evaluation of the activities.</li> </ul>
Prior steps	Identify activities realized in this community with project staff
Time	Approximately one hour
Products	Matrix of evaluation (see Annex 3)
Validation	Compare beneficiary and project staff evaluations. Discuss discrepancies in joint discussions.

identifying only direct impacts. As another example, if the project improves bean production, and that this increased production is both sold and consumed, then the assistance will have an impact on incomes, on access, and (if beans are sold **locally**) on availability.

### **Example 1: Using the Impact Evaluation Instrument**

We take again the example of Santa Teresa to illustrate the use of the Impact Evaluation tool. The community had been visited the previous year by an NGO. This NGO had identified the following objectives for its activities in that village: increase maize yields (no target specified); increase bean yields; improve handling of minor species; train villagers in environmental protection of water sources; and train villagers in proper use of credit and implement a credit program.

#### *Increase Maize Yields*

Villagers say this goal was reached: their maize yields were higher this year than in previous ones (although the precise improvement was not known). This yield increase had positive effects on food access mainly via the augmentation of subsistence production. It had very little effect on either income or food availability, however, since only a few households sold maize.

The increase in yield was due to (1) a favorable rainfall in that season; (2) the training farmers had received from the NGO in improved seed selection, better agronomic practices, and proper use of fertilizer; and (3) to the availability of credit for purchasing inputs.

#### *Increase Bean Yield*

Bean yields were reportedly higher this year than in previous ones. This goal was reached, although again the exact improvement is not known. The increase in bean yields had positive effects on income (in Santa Teresa, beans are as much a cash crop as a staple), on food access (households' production of this staple went up), and on food availability (more of the production was sold locally).

The reasons for improved yields were similar to maize: improved agronomic practices, and better fertilization and pest control practices. Farmers also received improved genetic materials through the NGO. Favorable rains also helped production. Farmers also received credit, which allowed them to buy the inputs they had been taught to use by the NGO's agronomist.

#### *Improve Handling of Minor Species*

No activities were developed around this objective. Thus it had no effect on any of the three outcomes. Villagers said they did not know why the NGO had left aside this part of the work plan. When consulted, the NGO staff said their contract with their funding agency had come to an end, and no resources were available to develop this aspect.

#### *Train Villagers in Environmental Protection of Water Sources*

The same situation as for training in minor species was reported on this activity. No training took place, and plans for reforesting river banks were left undone. Here again, the NGO blamed this on the lack of understanding with their funding agency representative.

#### *Train Villagers in Proper Use of Credit and Implement a Credit Program*

Credit principles were taught and villagers said it was very useful. Part of the training consisted of creating a producer association responsible for channeling and administering the individual loans. The creation of this association had secondary benefits, such as providing a conduit to farmers' request for technical assistance, and providing a focal point for the realization of public goods activities like road repairs, soil conservation structures, etc. Thus, although this training had no direct effect on incomes, food access, or food availability, it was undeniably beneficial to the long-term well-being and food security of Santa Teresa's inhabitants, as it fomented better community organization.

Credit was obtained in the last production season. The effects on outcome indicators were indirect, but villagers say it had a critical influence on final yields.

## **Example 2: Using the Impact Evaluation Instrument**

The impact evaluation instrument can also be used by project managers to evaluate how well they are doing globally, how well particular classes of activities serve the objectives of improving food security, and how well particular NGOs are doing in implementing their contract. To illustrate this, we compiled results from ten communities of Western Honduras where a number of NGOs implement development activities. A total of 17 types of activities were carried out across all communities—note, however, that none of the communities hosted more than eight activities in total. Table 11 in Annex 4 reports on the results, breaking down by village (columns) and activity type (rows), each type being, in turn, divided by its impact on income (Y), food access (FA), and food availability (FD). An additional line specifies the NGO in charge of this particular community. Examination of the table offers the following insights.

- The overall rate of success was 33 percent.
- The three most successful types of intervention for improving income were agronomic training in coffee production, credit programs, and agronomic training in beans production
- The three most successful types of intervention for improving food access were agronomic training in maize production, training in care of minor species, and agronomic training in beans production and diversification of production.
- The three most successful types of intervention for improving food availability were diversification of production, training in care of minor species, and agronomic training in beans production.

This information suggests that the overall rate of success is rather low. This assessment is tempered by many factors, however, as revealed by detailed consideration of the data. First, it seems that agricultural production-oriented interventions usually work well. Other types of interventions by contrast—improving commercialization, foment alternative income-generating activities, protect the environment—do poorly. Project managers should thus consider whether to emphasize these types of activities in the future, or else (given their poor rate of success) abandon them altogether. In making this decision, due consideration should be given to the

guidelines emitted earlier to direct NGO work, and whether the conceptual tools were available to them to develop this type of activity.

Other elements may explain the poor overall rate of success: first, many activities have been implemented only recently, and have not had time to manifest their impact yet. Thus the same assessment should be made again at a later date—say, in one year—to see if the patterns documented here hold over time. Second, and unlike our example in Santa Teresa, many communities suffered from adverse climatic conditions in the last production year, and this may have thwarted any beneficial influence from the interventions.

## ANNEXES

## ANNEX 1

### METHODS FOR LOCAL CONCEPT DEFINITION

In this annex, we review a few of the most important techniques used to identify and define local concepts. Three techniques are examined: Cultural domain identification (or free listing and pile sort), Delphi analysis, and Cultural Consensus modeling.

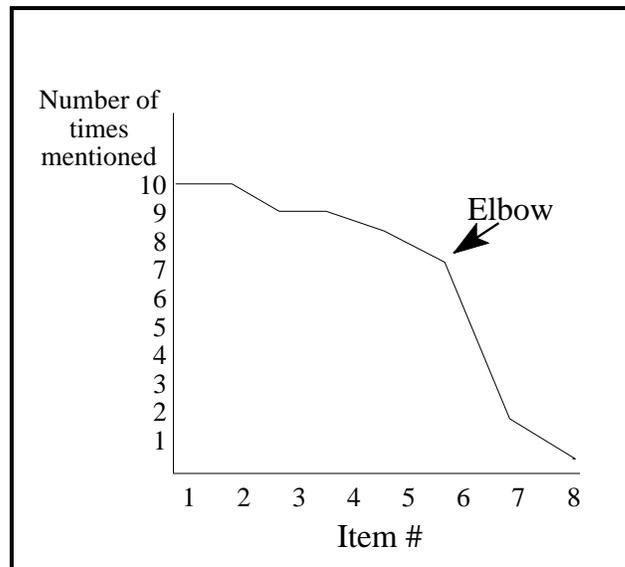
#### **Cultural Domain Identification**

Practically speaking, to define a cultural or cognitive domain is to make a list of its elements. Such a definition is needed when we have a general idea of the domain, but do not know exactly which items belong to it in the particular society under study. To determine this, anthropologists commonly use free listing techniques (akin to brainstorming sessions), in which a set of respondents is requested to name all items matching a given description.<sup>5</sup> For example, if interested in the domain of “food vulnerability,” one asks each informant to individually identify all the elements he/she associates with that term (it may be working for wages, or lacking land, but also may refer to traits that are specific to that culture, for instance, being in a caste group, or not having a camel, etc.). Once the brainstorming has elicited all the attributes associated with the term of interest, the list is further processed using particular techniques, such as “pile sorts” and “ratings.” They consist in simply counting up the number of times each item is mentioned, and sort the list in order of decreasing frequency. A well-understood concept (e.g., one that informants easily associate with their daily lives) will typically have a core set of items that are mentioned by many respondents, plus a large number of items that are mentioned by few or just one person. It is assumed that the core set of items reflects the existence of a shared cultural norm regarding that concept, while the additional items represent the idiosyncratic views of individuals (Borgatti 1993). The shared cultural norm is what is of interest.

The first step in distinguishing between the “shared” from the “idiosyncratic” is a distribution of the frequency with which brainstorming items are mentioned. If represented in a scree plot, the cut-off point between shared and idiosyncratic items should be indicated by a drop (or “elbow”) in the plot. In Figure 2, for instance, items 1 and 2 are mentioned ten times each, and others with declining frequency. The elbow method suggests a natural cutoff point between item 6 (mentioned seven times) and item 7 (mentioned twice). The concept here is thus formed

by the six first items. If no clear elbow shows, then one can pick the top  $n$  items, or items that are listed by more than  $x$  respondents, as the cultural definition of the domain.

**Figure 2 Scree plot of core items**



Whatever the rule used to eliminate noncore items, one should always ask why some respondents did not mention items that were commonly mentioned, or that were theoretically expected to be associated with the domain. In many cases, the reason why an informant does not mention a particular criteria may not be that it is irrelevant, but that it did not occur to him or her at the time of the questioning. Such “informant blanking” can be rectified through more discussion. If the variation in frequencies is due to real individual differences in opinion, however, then more steps are needed. The researcher should first make sure that the concept is clear to the informants. A concept like “food security,” for instance, may be diffused, and need to be reformulated before consensus is reached on its local meaning. It may also be that the concept per se is unfamiliar to local people. An example of this situation arose in Guatemala when indigenous people were asked about their natural resources conservation methods. The informants did not understand the question because conservation exists as an intrinsic part of the farming system, not as a set of activities independent of it. If it is concluded, as in that example, that the lack of concordance on a concept is due to the absence of a precise cognitive referent,

then the researcher should resort to one of the other strategies listed below, which relies more on “specialists” (people who understand this problem because of their particular situation or knowledge).

### **Delphi Method**

The so-called “Delphi method” is an iterative definition process designed to achieve consensus among a group of persons considered experts on a particular topic as to the criteria used in evaluating this topic. This is especially useful in situations where no standard criteria yet exist for doing this evaluation. The method is well documented and it has been used in a wide number of applications.

The procedure consists in the following steps. Begin by identifying a set of “experts,” or individuals that have a vested interest in the issue. Then each are asked a few questions, following a standard format. For instance, assuming that the two areas of interest are criteria for evaluating food security, and criteria for evaluating causes for loss of food security, these questions could take the following form:

Question 1. Assume you are in the middle of the dry season. Please list the five most important criteria you would use in assessing your food security situation on that day from your own point of view (that is, as a cattle rancher, or as a coffee grower). Once you have made your list, please rank each of these criteria from one to five, with five being the most important factor. Give reasons for the importance given to each factor. Also, give opinion as to how each could be measured.

Question 2. What are, in your opinion, the five most important reasons for deterioration in food security? Once you have made your list, please rank each of these criteria from one to five, with five being the most important factor. Give reasons for the importance given to each factor. Also, give opinion as to how each could be measured.

The next step is to reduce the quantity of information provided to a manageable number of criteria. This is necessary because of the large number of responses that may be elicited. A large

number may be useful in terms of domain mapping, but it is impractical in terms of establishing a streamlined evaluation criteria. To reduce the impact of too many responses (and also to reduce the impact of informant blanking), a second round of questioning is done, using the same cues, but asking respondents to select among the list of criteria elicited in the first round. Respondents are also informed that they do not have to list the same ones as before; rather they should consider whether any of the criteria mentioned by others would be a better criterion than any of those they originally proposed. This procedure has been demonstrated to drastically cut the number of criteria mentioned. Finally, the most important criteria are isolated using individual criteria score, ranking them from most important to least important, using a five-point Likert scale. The final list of valuation criteria may be finally reduced to the five or ten most important ones, according to this last ranking exercise.

### **Cultural Consensus Modeling**

Cultural consensus modeling describes and measures the amount and distribution of cultural knowledge among a group of informants (Romney, Weller, and Batchelder 1986). Consensus analysis has two goals: first, to determine the culturally correct answers to questions relative to a particular domain and, second, to evaluate the “cultural competence” of each informant (Borgatti 1993). The first goal is that which is most relevant to our work.

Romney, Weller, and Batchelder's cultural consensus theory is based on the insight that informants who agree with one another about some item of cultural knowledge tend to know more about the domain than informants who disagree with each other. The idea is illustrated by Boster's (1986) research on manioc classification. Boster walked 58 women through a manioc garden and asked them to identify the various plants. He found that the more women agreed with each other on the identification of the plant, the more they were likely to know what the plant actually was. In other words, as cultural competence increased, so did cultural consensus (Ryan and Martinez 1996). As for the Delphi method, a focus group of “specialized” informants are required to conduct these exercises.

### Which Method?

The choice among the three approaches presented above should be informed by the concept to be defined. This project requires that the concepts of wealth, poverty, food security and food vulnerability be defined in their local meaning. Table 9 suggests guidelines to the exploration of those concepts.

Once the meaning of those concepts has been elicited, some additional exploration may be appropriate. For instance, in the normative diet, a rank ordering of essential foods could be obtained through pairwise scoring or contingent valuation. These tools will be reviewed later.

**Table 9 Concepts to define, approach to use, and outputs to obtain**

Concept	Approach	Format/participants	Output
Wealth and poverty	Cultural domain	Focus groups/cross section of all villagers	List of attributes associated with wealth and poverty in that community
Household configurations	Cultural domain	Focus group/cross section of all villagers	List of household forms (extended, nuclear, gender of household heads) and their relative occurrence
Food security	Delphi	Separate focus groups of men, women, project staff	List of attributes associated with food-secure and food-insecure situations; may also include a list of graded responses to food insecurity (to be used as indicators)
Indicator for food security	Cultural domain	Focus group/cross section of all villagers	Ordered list of responses to food insecurity
Food vulnerability	Cultural domain	Focus group/cross section of all villagers	List of local livelihood strategies and of threats to these strategies
Normative diets	Delphi or Cultural Consensus	Focus group/senior women of households	Minimum list of foods and their quantity needed by average adult to lead a healthy life

**ANNEX 2**

**DEVELOPMENT PROJECTS MULTIPLE TIME LINES FORM (example from Honduras fieldwork)**

COMMUNITY:

**Group: (Mixed, Males, Females, Individual)**

**Date:**

	R*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Harvest of (main crop...)													
Maize harvest													
Bean harvest													
Income from production													
Income from wage work													
Incomes from other work													
Women's work in own farm													
Women's work outside													
Production expenditures													
Consumption expenditures													
Low reserves of food													
Low reserves of cash													

Main source of income R\*: \_\_\_\_\_

Rank of importance between same classes of questions

**ANNEX 3**

**IMPACT EVALUATION INSTRUMENTS (Example from Honduras)**

Community: \_\_\_\_\_

Group: \_\_\_\_\_

Rapporteur: \_\_\_\_\_

ACTIVITIES/GOALS	IMPACTS			CONDITIONS
	↗Y	↗AA	↗DA	

### Alternative Methods for Impact Evaluation: The SWOT Analysis

SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is a common tool used by program managers to elicit and analyze the relative merits and deficiencies of particular activities, and possibilities for improvement. This instrument was initially developed for use by specialists, but it can easily be adapted to a RA setting as its realization is well developed and very straightforward. SWOT analysis is easily explained to participants using a matrix (Table 10) where the time frame (present/future) is placed on one axis, and evaluations (positive/negative) are on the other.

**Table 10 SWOT matrix**

Valuation V	Time-->	Now	Future
Positive		Strengths	Opportunities
Negative		Weaknesses	Threats

This framework is particularly well-suited to examine the present performance of single development activities for food security (say, credit or technical extension) and evaluate their future implications. Considering the present, what works well and why (strengths) is first examined. Informants work in a brainstorming mode, where all comments are welcomed and listed. The same is done with what is not working, and why in present implementation plans (weaknesses). The examination of future opportunities may refer to ways to improve on present weaknesses; or new initiatives that may be added that would enhance the present strengths. Future threats refer to possible negative impacts of the activity on food security or else, the emergence of constraints that may impede the continuation of identified strengths or the realization of future opportunities. Programmatic implications naturally follow from these considerations.

## ANNEX 4

### SUMMARY OF IMPACT EVALUATION

Eighteen types of interventions were carried out in total (Table 11). Interventions were not always the same from village to village, as (1) the choice of activity was defined by community members themselves; (2) the service provider varied from village to village; and (3) programs were generally directed either at men or at women, and levels of participation varied by gender between communities. Global evaluations of the programs are thus difficult to make, and we can only offer crude measures of the general performance of the activities promoted by PLANDERO in the ten communities. Disaggregating measures by gender, by service provider, by intervention type, and by community can, however, improve the evaluation. The analysis is supported by a review of the reasons invoked by informants as to the reason for success or failure of each activity.

Respondents felt that about one of every three (32.8 percent) of PLANDERO activities improved the food security of their income. This rate of approval differs by gender, with women positively viewing the contribution of activities to food security 41 percent of the time, and men 25 percent of the time. The various dimensions of food security were also rated differently by gender. Overall, 24 percent felt it improved their income, 50 percent felt it improved the local availability of foods, and 25 percent felt it improved their access to food. When contrasted by gender, however, men viewed positively the contribution to income in 16.8 percent of cases; to food availability, in 36.9 percent of cases; and to food access in 23.2 percent of cases, while women viewed positively the contribution of income in 36.6 percent of cases; to food availability in 56.6 percent of times; and to food access in 29 percent of times (Table 12).

**Table 11 Summary of impact evaluation**

	Impacted on: Y: Income; AA:Food acc. DA:Food avai	Communities (distinguished by Male/Female Groups when appropriate) (O=Had no positive impact; 1: Had positive impact; - : Activity not reported)												N of communities where activ. deployed,M/F	Number of positive impacts, M/F groups	% of positive impacts, M/F groups	Mean rate of pos. impact across M/F groups
		1	2	3	4	5	6	7	8	9	10	11	12				
Augment production of maize (wheat)	Y	0/1	0/1	0	0	0	0	0/0	0/1	0/1	0/-	1	1/0	12/11	2/4	17/36	27
	AA	0/1	0/1	1	1	0	1	1/0	1/1	1/1	1/-	1	1/1	12/11	9/9	75/82	79
	DA	0/1	0/1	0	0	0	0	1/0	0/0	0/1	1/-	1	0/1	12/11	3.5	25/45	35
Augment production of beans	Y	-/-	-/-	0	0	0	1	-/-	1/0	-/-	0/-	1	1/1	8/7	4/3	50/43	47
	AA	-/-	-/-	0	1	0	1	-/-	1/1	-/-	0/-	1	1/1	8/7	5/5	63/71	67
	DA	-/-	-/-	0	0	0	1	-/-	1/0	-/-	0/-	1	1/1	8/7	4/3	50/43	47
Augment production of coffee	Y	-/-	-/-	1	-	-	1	-/-	0/-	-/-	-/-	-	-/-	3/2	2/2	67/100	84
	AA	-/-	-/-	1	-	-	1	-/-	0/-	-/-	-/-	-	-/-	3/2	2/2	67/100	84
	DA	-/-	-/-	1	-	-	1	-/-	0/-	-/-	-/-	-	-/-	3/2	2/2	67/100	84
Augment production of horticultural	Y	-/-	-/-	-	0	0	-	-/-	0/-	-/-	0/-	-	0	5/3	0/1	0/33	18
	AA	-/-	-/-	-	0	0	-	-/-	0/-	-/-	0/-	-	0	5/3	0/1	0/33	18
	DA	-/-	-/-	-	0	0	-	-/-	0/-	-/-	0/-	-	0	5/3	0/1	0/33	18
Diversify production	Y	0/-	-/-	-	-	-	-	-/-	-/-	0/-	-/-	-	-/-	2/-	0/-	0/-	0
	AA	1/-	-/-	-	-	-	-	-/-	-/-	0/-	-/-	-	-/-	2/-	1/-	50/-	50
	DA	0/-	-/-	-	-	-	-	-/-	-/-	0/-	-/-	-	-/-	2/-	0/-	0/-	0
Built conservation infra structures and agro forestry systems	Y	1/-	-/-	-	-	-	0	0	-/-	0/-	0/-	-	-/-	5/2	1/0	20/0	10
	AA	1/-	-/-	-	-	-	0	0	-/-	1/-	0/-	-	-/-	5/2	2/0	40/0	20
	DA	1/-	-/-	-	-	-	0	0	-/-	0/-	0/-	-	-/-	5/2	1/0	20/0	10
Protect and delimit sources of water	Y	0	-/-	-	-	-	-	-/-	-/-	0	-/-	0	-/-	3/3	0/0	0/0	0
	AA	0	-/-	-	-	-	-	-/-	-/-	0	-/-	0	-/-	3/3	0/0	0/0	0
	DA	0	-/-	-	-	-	-	-/-	-/-	0	-/-	0	-/-	3/3	0/0	0/0	0
Stop slash and burn practices	Y	1/-	-/-	-	-	-	-	0	-/-	0/-	-/-	-	-/-	3/1	1/1	33/100	67
	AA	1/-	-/-	-	-	-	-	0	-/-	1/-	-/-	-	-/-	3/1	2/1	67/100	84
	DA	1/-	-/-	-	-	-	-	0	-/-	0/-	-/-	-	-/-	3/1	1/0	33/0	17
Involve Primary school in Environmental Activities	Y	-/1	-/-	-	-	-	-	-/-	-/-	-/0	-/-	-	-/-	-/2	-/1	-/50	50
	AA	-/1	-/-	-	-	-	-	-/-	-/-	-/0	-/-	-	-/-	-/2	-/1	-/50	50
	DA	-/1	-/-	-	-	-	-	-/-	-/-	-/0	-/-	-	-/-	-/2	-/1	-/50	50

	Impacted on: Y: Income; AA:Food acc. DA:Food avai	Communities (distinguished by Male/Female Groups when appropriate) (O=Had no positive impact; 1: Had positive impact; - : Activity not reported)												N of communities where activ. deployed,M/F	Number of positive impacts, M/F groups	% of positive impacts, M/F groups	Mean rate of pos. impact across M/F groups
		1	2	3	4	5	6	7	8	9	10	11	12				
Credit education and programs	Y	0	0	1	1	0	1	1/0	-1	0/1	0	1	1/1	11/12	6/9	55/75	65
	AA	1/1	0	1	1	0	1	1/0	-1	1/1	1	1	1/1	11/12	9/10	82/83	83
	DA	1/1	0/1	0	1	0	1	1/0	-0	0/1	0	1	1/1	11/12	6/7	55/58	57
Extension in environmental protection	Y	-/-	0	-	-	-	-	-/-	-/-	-/-	-/-	0	-/-	2/2	0/0	0	0
	AA	-/-	0	-	-	-	-	-/-	-/-	-/-	-/-	0	-/-	2/2	0	0	0
	DA	-/-	0	-	-	-	-	-/-	-/-	-/-	-/-	0	-/-	2/2	0	0	0
Extension in handling minor species (also val-added production)	Y	-/-	0	0	-	-1	-	0	-0	-/-	-0	0	-/-	4/7	1/1	25/14	20
	AA	-/-	0	1	-	-1	-	0	-0	-/-	-1	0	-/-	4/7	2/3	50/43	47
	DA	-/-	0	1	-	-1	-	0	-0	-/-	-0	0	-/-	4/7	2/2	50/29	40
Improve commercialization	Y	-/-	-/-	-	-	-	0	-/-	0	-/-	-/-	-	-/-	2/2	0/0	0/0	0
	AA	-/-	-/-	-	-	-	0	-/-	0	-/-	-/-	-	-/-	2/2	0/0	0/0	0
	DA	-/-	-/-	-	-	-	0	-/-	0	-/-	-/-	-	-/-	2/2	0/0	0/0	0
Family/school garden	Y	-/-	-/-	-	-	-	-	-/-	-1	-/-	-/-	-	-/-	-1	-1	-100	100
	AA	-/-	-/-	-	-	-	-	-/-	-1	-/-	-/-	-	-/-	-1	-1	-100	100
	DA	-/-	-/-	-	-	-	-	-/-	-0	-/-	-/-	-	-/-	-1	-0	-0	0
Improve women/youth participation	Y	-/-	-/-	-	-	-	-	-	-	-0	-/-	-	-/-	-1	-0	-0	0
	AA	-/-	-/-	-	-	-	-	-	-	-1	-/-	-	-/-	-1	-1	-100	100
	DA	-/-	-/-	-	-	-	-	-	-	-0	-/-	-	-/-	-1	-0	-0	0
Foment handicraft industries	Y	-/-	-/-	-	-	-	-	-	-	-0	0/-	-	-/-	1/1	0/0	0/0	0
	AA	-/-	-/-	-	-	-	-	-	-	-1	0/-	-	-/-	1/1	0/1	0/100	50
	DA	-/-	-/-	-	-	-	-	-	-	-0	0/-	-	-/-	1/1	0/0	0/0	0
Mean rate of positive impact of activities across all villages and all groups																	32.8

Villages:

1: El Aguacate  
2: Barrio San Juan  
3: Boca del Monte  
4: La Mohaga

5: El Moral  
6: Nueva Virtud  
7: Plan El Rancho  
8: El Rosario

9: San Marcos  
10: Tepezcuintle  
11: El Pinal  
12: Laguna Seca

**Table 12** Percent viewing intervention positively on dimensions of food security, by gender

Dimensions of food security	All informants	Male informants	Female informants
Household income	24.1	16.8	36.6
Availability of food in community	50.4	36.9	56.6
Access of food by household	25.2	23.2	28.5
	32	23	40

## NOTES

1. Rapid Appraisal (RA) methods and Participatory Rural Appraisals (PRA) are often thought to be the same: they seek local input using similar techniques and assuming a similar attitude on the part of project staff. There are differences, however. The ultimate goal of PRA is community empowerment. This involves intensive community participation and assumes an open research agenda. This can hardly be done quickly. RA methods, by contrast, are meant to provide researchers with data quickly. RA requires the participation of community members but the research agenda is predefined and the time frame is short. Our use of the word “participatory” here is thus in reference to a methodological style rather than an epistemological posture.

2. For the purpose of the exercises described in this manual, a typical team is composed of one “moderator,” who explains the activities, channels the interactions, etc.; and one “relator” who takes notes and keeps track of all the information that is provided, including that which does not get transcribed on the final group output. One such team is required for each working group.

3. It is assumed that the situation here is one in which no previous contacts exist and no activities have yet been programmed for that community. The situation will obviously be different if the community graduates from a previous development program, or if development activities have already been defined.

4. This does not mean that spatial precision (distance relationships) is required. As a general rule of thumb, the greater the number of uses for the map, the more precise it should be. A sketchy bi-dimensional drawing of the area that identifies features such as neighborhood names, paths, or special buildings may suffice for household identification; although we prefer tri-dimensional maps, which are good at inviting participation, and provide an excellent level of detail. If an extensive use of the map is envisioned, then a base map should be established using aerial photos or some other true referent; this base map should be used for all other mapping purposes (see Bergeron and Scherr [1996] for examples of participatory mapping exercises).

5. This method is quite tolerant about choice of respondents: in fact, it is preferable to avoid selecting respondents, as the concept should have as wide a currency as possible among inhabitants of the target village. It is thus best carried on in a workshop setting where all villagers are invited.

## REFERENCES

- Abel, N., and M. Stocking. 1979. Rapid aerial survey techniques for rural areas. Paper for the RRA conference, December 4-7 at International Development Studies, University of Sussex, Brighton, U.K.
- Bergeron, G., and S. J. Scherr. 1996. Participatory resource mapping for policy research: An application in the hillsides of Central Honduras. Fragile Lands Program Working Paper. Environment and Production Technology Division. Washington, D.C.: International Food Policy Research Institute.
- Bernard, H. R., P. Kilworth, D. Kronenfeld, and L. Sailer. 1984. The problem of informant accuracy: The validity of retrospective data. *Annual Reviews in Anthropology* 13: 495-517.
- Borgatti, S. 1993. *Methods manual. Anthropac 4.1*. Colombia, S.C., U.S.A.: Analytic Technologies.
- Childress, L. M., D. J. Herrmann, and S. Schechter. 1995. The use of heuristics in answering questions about past events. Draft.
- Deutscher, I. 1973. *What we say/what we do: Sentiments and acts*. Glenview, Ill., U.S.A.: Scott, Foresman and Cie.
- Elinson, J. 1963. Methods of sociomedical research. In *Handbook of medical sociology*, ed. H. E. Freeman, S. Levine, and L. G. Reeder. Englewood Cliffs, N.J., U.S.A.: Prentice Hall Inc.
- Engle, P. L., and J. B. Lumpkin. 1992. How accurate are time-use reports? Effects of cognitive enhancement and cultural differences on recall accuracy. *Applied Cognitive Psychology* 6: 141-159.
- Erasmus, C. J. 1952. Changing folk beliefs and the relativity of empirical knowledge. *Southwestern Journal of Anthropology* 8: 411-428.
- Freeman, L., A. K. Romney, and S. Freeman. 1987. Cognitive structure and informant accuracy. *American Anthropologist* 89: 310-325.
- Gill, G. J. 1992. Policy analysis for agricultural resources management in Nepal. A comparison of conventional and participatory approaches. Research Support Series No. 9. HMG Ministry of Agriculture/Winrock International. Policy Analysis in Agriculture and Related Reproduce Management. Kathmandu, Nepal.

- Gupta, A. K., and IDS (International Development Studies) Workshop. 1989. Maps drawn by farmers and extensionists. In *Farmer first: Farmer innovation and agricultural research*, ed. R. Chambers, A. Pacey, and L. A. Thrupp. London: Intermediate Technology Publications.
- Hardin, R. 1982. *Collective action*. Baltimore, Md., U.S.A.: Johns Hopkins University Press.
- Lindhult, M. S., J. Fabos, P. Brown, and N. Price. 1988. Using GIS to assess conflicts between agriculture and development. *Landscape and Urban Planning* 16 (4): 333-343.
- Kroeger, A. 1983. Health interview surveys in developing countries. A review of methods and results. *International Journal of Epidemiology* 12 (4): 465-481.
- McNabb, S. L. 1990. The use of inaccurate data: A methodological critique and applications of Alaska native data. *American Anthropologist* 92: 116-129.
- Olson, M. 1965. *The logic of collective action: Public goods and the theory of groups*. Cambridge, Mass., U.S.A.: Harvard University Press.
- Romney, A. K., S. C. Weller, and W. Batchelder. 1986. Culture as consensus: A theory of culture and informant accuracy. *American Anthropologist* 88: 313-339.
- Ross, D. A., and P. Vaughan. 1986. Health interview surveys in developing countries: A methodological review. *Studies in Family Planning* 17: 78-94.
- Uraivan, Tan-Kim-Young. 1992. Participatory land use planning as a sociological methodology for natural resource management. Reproduce Management and Development Program in Chiang Mai University, Thailand Royal Forest Department, and Ford Foundation.
- Van Willigen, J., and B. deWalt. 1985. Training manual in policy ethnography. *American Anthropological Association* (Special Publication) 19.