Canadian Foodgrains Bank
Toolbox

A collection of planning, monitoring, and evaluation tools for Canadian Foodgrains Bank partners

DRAFT – May 21, 2003

Table of Contents

Canadian Foodgrains Bank collects and shares useful tools for project planning, implementation, and evaluation. These tools include questionnaires, reporting formats, and step-by-step "how-to" guides for surveys. Below is a list of tools currently available from Foodgrains Bank.

Gender Analysis Tool

To be added...

Foodgrains Bank Environmental Analysis Matrix

Canadian Foodgrains Bank has adapted an environmental analysis matrix for use in food and nutrition projects. The Canadian International Development Agency (CIDA) has also developed a user-friendly version of its own environmental analysis matrix, which is presented in the next section of the toolbox. Individual Foodgrains Bank member agencies also have developed their own tools for environmental analysis. For example, see the CRWRC Creation Stewardship Tool in the interactive CD-ROM version of the Proposal Guide.

Use an "X" to check a box only one place in each column, including "socio-economic" (population and culture), in the following table that identifies the type and significance of expected change in an environmental resource affected by this project/program or how such environmental resources might affect the project/program. Use "N/A" box if you believe a category does not apply to your project/program. Your best judgment may be used to complete this analysis, while referring to partner and available sectoral best practices/checklists as needed. Also, indicate the number of sites where this change occurs (especially in relation to multiple wells and latrines). This does not replace an Environmental Assessment.

ENVIRONMENTAL ANALYSIS TOOL									
Type of Change	Surface Water	Ground Water	Soils	Vegetation	Animals	Fish & Aquatic	Socio-Economic (Population & Culture)	# of Sites	Effect of Environmental Resource on Project/Program (specify which)
POSITIVE:									
Preservation/Conservation									
Rehabilitation									
NEUTRAL:									
N/A / No change expected									
NEGATIVE									
Insignificant									
Significant & May be reduced									
Significant & Cannot be reduced									
UNKNOWN:									
Effects, Mitigation Unknown									

Comments on back: Please list any problematic environmental features and project/program components, and what strategies or specific measures will be implemented to mitigate, alleviate or eliminate such negative, or potentially negative, effects, which may be monitored.

CIDA Environmental Analysis Matrix

A matrix is a tool that can assist you in the more systematic identification of potential effects on environmental components of a project's planned activities. Please note that a stand-alone matrix cannot replace a descriptive and analytical text to further detail the identified environmental effects and their significance.

For each project activity (to be included in the left column), the aim is to identify the environmental elements and their characteristics (top rows) that may be influenced. This will help to identify a project's potential environmental effects. In the table, an X can be placed when an effect is possible. Symbols or text can also be included to characterize the significance of the potential environmental effects.

		Water					Soil				Air		Fauna and Flora		Habitat		Human Activities				
		Under-ground		Surface																	
		Quality	Quantity	Quality	Quantity	Hydrographic patterns	Quality/Fertility	Contamination	Drainage	Erosion	Quality	Noise and vibrations	Terrestrial	Aquatic	Terrestrial	Aquatic	Demography	Customs/lifestyle	Quality of life/health	Resource and soil issues	Economic activities
Preparation and construction																					
Operations/Exploitation																					

Sectoral Best Management Practices and Checklists

The following pages contain checklists for determining environmental effects in specific sectors of activity*

These checklists, which are not exhaustive, provide outlines that can be used to identify the environmental effects in various sectors.

** From the: Handbook on Environmental Assessment of Non-Governmental Organizations and Institutions Programs and Projects, Canadian Partnership Branch, CIDA, November 1997*

CHECKLIST #1 WELL BUILDING

A. Questions relating to the well site

1. What are the uses and activities on the land where the well is planned to be built? What are the existing wells and infrastructures, and where are they located? What is the land use master plan? Is there a policy or legislation with respect to wells? Is there much traffic through the site? Were needs, expectations, social activities, patterns of consumption and water-drawing practices taken into account? Could the project lead to:
   - displacements of the population (for example, migration towards water sources and/or departures as a result of conflicts between farmers and livestock herders);
   - changes in ways of life (for example, the settling of nomads), the accentuation of social inequalities and/or the loss of territory;
   - incompatible uses (for example, due to water pollution caused by nearby industries, latrines and so on) and/or social and value conflicts in the population (such as in the case of sacred grounds) and between the various users (for example, in defining priority use);
   - water supply and/or water quality problems, additional pressures on other resources and services, such as housing and sanitation facilities;
   - a decrease or an improvement in the quality of life;
   - a better awareness of the importance of a healthy environment and sanitary conditions;
   - improved access to good quality water (consider potability, odour,
   - taste, distance to travel, women's and children's workload and so on)?

2. In what type of soil and on what type of topography is the well to be built? Is the groundwater recharge rate low? What is the quantity and quality of the groundwater and depth of the groundwater table? Do other wells tap the same source? Could the project lead to:
   - the lowering or drying up of the groundwater table;
   - the sustainable management of water resources through the creation of a water management committee, the reforestation of designated areas, a well management strategy that takes into account existing wells, and so on?

3. What types of environment, landscape, flora and fauna are present in the area? What is their specific importance? Are there nearby water sources, wooded areas, slopes and other vulnerable sites? Is the area prone to soil collapse, floods, drought, earthquakes or other disasters? Are there any known conditions of climatic stress linked to rainfall (both in terms of quantity and over time), and to temperature and humidity (high evaporation)? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, soil and so on) they contain;
   - rare or vulnerable species and/or species of economic, ecological or cultural importance?

B. Questions relating to well building

1. What are the various activities associated with preparing the site and constructing the well? Will there be blasting, excavation, levelling, clearing, soil denudation or backfilling? What are the types, quantities and source of materials (riverbeds, other natural environments, local markets) needed to construct the well? What equipment is required? How will they be conveyed to the site and stored? Could the project lead to:
   - changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain;
   - soil instability and risk of collapse;
   - erosion of soils that are fragile, thin, on sloping or barren land;
   - nuisances (foul odours, noise, vibrations, airborne dust, traffic), risks of accidents and/or health risks to workers and the local population during construction;

- pollution of groundwater (for example, if the groundwater table is close to the soil surface and there is seepage of contaminated water or solid waste), pollution of soils (oil, gasoline and so on) or air pollution (for example, emissions linked to transport);
- increased involvement of communities in taking charge of their needs;
- fair and equitable participation of the local work force and a positive effect on the economy?

C. Questions relating to the operational phase of the well

1. Will there be an increase in population as a result of migration? Will the project lead to unplanned human, agricultural or livestock-raising settlements? Will there be an increase in the demand for natural resources? Is pumping and water-drawing equipment suited to the environment (water depth, types of soil, patterns of consumption, and so on)? Could the project lead to:
   - a decrease in the quantity and quality of natural resources (water, fuelwood, arable land, wildlife and so on), if these resources cannot sustain an increase in demand and are threatened by an increase in traffic around the well site;
   - compaction of soils, changes in drainage and/or soil permeability, loss of vegetation cover as a result of increased traffic around the well site;
   - changes to the level, recharge rate and water circulation of the groundwater table and quality of the groundwater;
   - drying up of the groundwater table, if annual precipitation is very low, if evaporation is very high, if water availability during the dry season has not been considered, if the recharge rate has been ignored, if groundwater is limited or difficult to access, if the wells are too close together, if there is overutilization, and so on;
   - an increase in pressures on infrastructures and local services (schools, housing and so on);
   - an increase in harmful species and disease vectors associated with humid areas (for example, malaria and schistosomiasis);
   - nuisances, risks of accidents, health risks and problems in supplying good quality water;
   - socio-economic conflicts, or conflicts over ownership rights, land use and resource exploitation (among the various production activities, between landowners and users of the well, if the responsibility for the well has not been clearly defined, if there are occasional users who are not the stated recipients of the project and its agreements, and so on);
   - communities taking charge of their own development, through their involvement in monitoring, maintenance and user fees associated with the well;
   - an improvement in the quality of life, resulting from improved access to good quality water;
   - an improvement in environmental conservation through appropriate methods of pumping and drawing water and the restoration of degraded sites near the well, in accordance with the proposed follow-up program?

2. Is there a possibility that undesirable substances or pollutants (liquid or solid) could seep into the well, the groundwater and/or nearby water sources? Have usage, salubrity and pollution risks been considered in constructing the well (well casing above ground level, covers, fences, covered drains, collection methods, neighbouring and planned activities)? Are there:
   - risks of algal growth, if the water remains stagnant, if it is constantly exposed to light, if it becomes warmer, and if it receives nutrients;
   - sanitation facilities or latrines that could pollute the groundwater (faecal coliform);
   - nearby agricultural lands using pesticides and fertilizers;
   - possible seepage of gasoline, solvents and so on from roads, workshops, factories and so forth;
   - herds grazing close to the well that may jeopardize the water quality (faecal coliform, turbidity);
   - will there be separate areas where livestock can drink;
   - nearby cleaning activities (bathing, washing) that can contaminate well water (with soaps and suspended matter)?

CHECKLIST #2 BUILDING CONSTRUCTION

Construction of buildings, such as schools, including vocational schools, sports facilities, health clinics, community centres, small businesses and workshops (tannery, dyeing, handicraft, and so on).

A. Questions relating to the construction site

1. What are the uses and activities on the proposed site of project implementation? What are the existing infrastructures? What is the town planning scheme? What is the legislative context? What is the traffic rate of the site and the proximity of residences? What are the expectations of the local population? Could the project lead to:
   - displacements of the population (immigration, migration or transfer and resettlement);
   - changes in ways of life and/or the loss of territory (for indigenous peoples, unplanned urbanization, a disruption in the organizational structure and means of subsistence of the local population through the introduction of "modern" methods of production without prior analysis, a decrease in food security due to an increase in cash crops or industrial activities, and so on);
   - the accentuation of social inequalities (for example, due to control by industrial entrepreneurs);
   - incompatible uses (industrial area versus residential area, sacred land and so on) and/or social and value conflicts between the various possible land uses and building uses (for example, if the proposed uses are in conflict with cultural and traditional characteristics);
   - problems in supplying water, energy, fuelwood, materials, and other resources and services such as sanitation facilities and electrical equipment;
   - a decrease or an improvement in the quality of life;
   - greater awareness of the importance of a healthy environment;
   - better, more abundant and more accessible goods and services (teaching, medical care, community services, industry, the economy)?

2. What types of environment, landscape, flora and fauna are present in the area? What is their specific importance? Are there any bodies of water, wooded areas, slopes, wetlands or other vulnerable sites nearby? Is the area prone to flooding, heavy rainfall, earthquakes and other disasters? What are the soil texture, drainage and topographical features? Is the soil sufficiently stable? Are anti-erosion measures and protective measures against flooding and heavy rainfall necessary to avoid damage to the building and its structures? Has the durability of the building been studied in relation to environmental characteristics? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, soil, vegetation and so on) they contain;
   - rare or vulnerable species and/or species of economic, cultural or ecological importance (biodiversity)?

B. Questions relating to building construction

1. What are the various activities associated with site preparation and construction? Will there be demolition, excavation, levelling, clearing, soil denudation, filling, backfilling or wetland reclamation? Is there a need to build temporary shelter and supply services such as sanitation facilities, wells, water supply systems, access roads, and so on (see the appropriate checklists for these projects)? What are the types, quantities and source of construction materials? How will the materials be conveyed to the site and stored? What are the surface area, height, style and location of the buildings? Could the project lead to:
   - changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain;
   - landslides and soil instability;
   - erosion of fragile and thin soils, on sloping land or near bodies of water, if trees are to be cut;

- soil compaction or changes in drainage, soil permeability and/or loss of soil fertility;
- nuisances (foul odours, airborne dust, noise, vibrations, traffic), risks of accidents and/or health risks to workers and the local population during site preparation, building construction, and associated transport;
- soil pollution, surface water pollution (as well as groundwater pollution, if there is seepage of contaminated water or pollutants), and air pollution, if there is poor management of construction materials and wastes;
- changes to the visual quality of the landscape (aesthetics) and/or incompatibility with the landscape, architectural style and local architectural customs;
- fair and equitable participation of the local work force, and a positive effect on the economy?

C. Questions relating to the building's operational phase

1. What activities will be carried out during the operational phase? Is there a possibility of the population increasing in the area as a result of migration? Will this lead to unplanned and spontaneous human settlements? Will there be a greater demand for natural, financial, energy and agricultural resources, and so on? Could the project lead to:
   - a decrease in the quantity and quality of natural resources (water, wood, minerals and so on), if these resources cannot sustain an increase in demand resulting from an increase in population and/or increased extraction of resources for the operational activities of various types of buildings, using harmful methods of extraction;
   - additional pressures on infrastructures and local services;
   - social conflicts or conflicts over ownership rights and land use (especially if an agreement has not been reached among users and recipients and with local authorities, if the marketing system for traditional products and handicrafts is affected, if there are local rivalries, and so on);
   - an increase or decrease in local market prices;
   - socio-economic development that benefits the population and all its specific groups, and a decline in rural outmigration through socio-economic development;
   - a reinvestment of knowledge and profits into the community, and an increase in the skills of the population and all its specific groups (women, children and so on);
   - increased involvement of communities in taking charge of their own development, by monitoring and maintaining the building and its operations?

2. Depending on the use of the building, and the technologies and techniques involved, will pollutants (liquid, solid or gas waste) be used or generated? Could these substances infiltrate or be discharged into surface waters and groundwater, soil, habitats and air? How will they be managed? Are these pollutants associated with nuisances (noise, foul odours, vibrations, dust, smoke, traffic), risks of accidents (transportation, spills, explosions, fires and so on), health risks (health hazards, poisoning, and respiratory and skin problems) for workers, users of the building and the local population? Can the work environment help address these problems? More specifically:
   - will sanitation facilities pollute surface water, groundwater and soil; will organic products, toxic chemicals or radioactive substances, gaseous, liquid and/or solid, be used (for example, in medical and school laboratories, factories, and so on);
   - will biological and medical liquid and solid waste be produced (medication, syringes, blood-contaminated linen or bandages, bacterial and viral sources, animal waste, and so on);
   - will heavy metals, for example, resulting from laboratory activities and/or processing techniques, be discharged into the environment where they may accumulate and cause pollution;
   - will hazardous products (oil, lubricants, batteries, dyes, glue, solvents, acids and so on) be used;
   - will cooling waters, soaking waters, or water containing suspended matter, mercury, lead, soaps or other previously mentioned products, and so on, be discharged;
   - will there be storage, sorting, reclamation, recycling, treatment, burial or incineration of solid, liquid and gaseous waste/emissions (see appropriate checklist)?

CHECKLIST #3 FORESTRY: NURSERIES, REFORESTATION, HARVESTING

Nursery projects for the reforestation of trees and shrubs, in a natural environment or elsewhere (for example, agroforestry projects).

A. Questions relating to the nursery site and the reforestation zone

1. What are the uses and activities on the proposed site of project implementation? What are the existing infrastructures? What is the land use master plan? What are the ownership rights and land use rights associated with the site? Do the reforestation objectives and implementation Plan correspond to the local population's needs, wishes and traditional uses, and comply with government policy? Could the project lead to:
   - changes in ways of life, the accentuation of social inequalities and/or the loss of territory (for example, if specific groups of the population, such as women, farmers, livestock herders and so on, have not been consulted; if the local population's means of subsistence are disrupted by introducing "modern" methods of production, cash crops or commercial activities, without prior analysis; and so on);
   - incompatibility in land uses (loss of agricultural land, pastures and so on), multiple uses of trees and shrubs, and the various functions of woodlands (fodder as opposed to medicinal plants; subsistence uses, such as the collection of fuelwood by women, as opposed to commercial logging by companies; sacred land and so on);
   - social and value conflicts and conflicting responsibilities (between nursery owners, owners of the reforested site, other members of the community and people passing through the area, or social problems associated with an unstable, precarious or inequitable financial situation, and so on);
   - changes in ownership and land use rights (related to the notion of private and communal ownership, due to water supply problems, problems with the supply of other resources and services, and so on);
   - an effect on the local or regional economy (links between traditional and "modern" activities); a decrease or an improvement in the quality of life;
   - greater awareness of the importance of a healthy environment, the role of the vegetation cover, grazing pressure, the pressures exerted by fuelwood collection, and improvement of the environment through the reforestation of woodlands and degraded and eroded areas;
   - community involvement and clearly defined responsibilities?

2. What types of environment and landscape are present in the area? What is their specific importance? Are there nearby water sources, waterways, slopes and other vulnerable sites? What are the characteristics of the region's indigenous and exotic vegetation? What type of wildlife do these habitats support? What sources of water are available, of what quality and in what quantity? What are the characteristics of the soil (composition, texture, drainage, fertility and so on)? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, soil, vegetation, wildlife and so on) they contain;
   - rare or vulnerable species and/or species of economic, cultural or ecological importance (biodiversity)?

B. Questions relating to the nursery and to reforestation

1. What are the various site preparation activities? Will there be demolition of existing buildings, installation of fences, soil leveling and amendment, clearing, slash and burn techniques or wetland reclamation? Will the nursery require a well, an irrigation system and so on? Will the area designated for reforestation require the construction of access roads (see appropriate checklist)? Could the project lead to:

- changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain;
- soil erosion, soil compaction or changes in drainage, soil permeability and/or fertility;
- nuisances (such as noise, airborne dust), health risks and/or risks of accidents for workers and the local population;
- communities taking charge of their own development through their participation in preparatory activities?

2. What species have been selected? What are their origin and characteristics (for example, need for water and nutrients, growth rate, required space, depth and range of the root system, vulnerability to climate and insects, and maintenance needs)? What is the seed quality and source? Have seeds been chemically treated, genetically manipulated and tested for resistance and survival? Could the project lead to:
   - a change in, encroachment on or the destruction of indigenous environments and/or neighbouring agricultural environments, by introducing exotic trees and shrubs, a loss of biodiversity, and/or a decrease in agricultural yield, due to competition for nutrients, water, light, and so on);
   - environmental degradation by selecting trees and shrubs that are not well adapted to climatic conditions (rainfall pattern, variations in temperature and humidity) and pedology of the site (for example, soil acidification, run-off and erosion);
   - social and value conflicts (for example, if the population's preferences for the species to be planted, such as fruit trees, trees with multiple uses and so on, are not taken into account)?

3. What are the maintenance activities planned for the nursery and the reforestation site? Have all users of forest products been involved in the process? What techniques will be used (mechanical or manual maintenance, pesticides, organic and chemical fertilizers, plastic material, mulch, thinning, type of watering system, follow-up and monitoring, and so on)? How will the plants be conveyed to the various sites? How will they be protected? Is the means of protection (for example, care taking and the distribution of responsibilities) suited to local resources and customs? Could the project lead to:
   - the creation of habitats favourable to organisms that are harmful to the vegetation cover and/or favourable to disease vectors, through the extensive practice of monoculture, or the use of wide-spectrum pesticides, for example;
   - an increase in harmful species (for example, plants that are undesirable for agriculture, invasive plants, and so on), and disease vectors associated with humid areas (depending on water use and supply and the proximity of water sources);
   - increased risk of fire in arid areas where dry litter accumulates;
   - soil degradation (erosion, compaction, changes in drainage, for example) by using heavy machinery or inappropriate techniques on small plots of land;
   - a decline in soil fertility and water-holding capacity, resulting from a poor choice of the quantity and location of species;
   - a reduction in the quantity of available water for other uses and users, considering the water supply needs of young plants;
   - changes in the quality and quantity of groundwater (depending on the source of water supply, water availability, groundwater recharge rate, and so on) and/or a decrease in the level of soil humidity, especially in semi-arid areas;
   - risks of sedimentation in nearby waterways and erosion associated with transportation and access roads used in transferring plants from one site to another;
   - air, soil, groundwater and surface water pollution, bio-accumulation of toxic substances in the food chain, foul odours, health risks or risks of accidents (spills, seepage into water and soil, and so on), resulting from improper use, lack of protective equipment, poor management, or improper storage of pesticides (herbicides, insecticides, fungicides and so on) and/or organic and chemical fertilizers;

- greater involvement of the local population (men and women) in taking charge of their needs, through caretaking, maintenance and monitoring activities for the various sites, plants, their products, techniques and equipment;
- fair and equitable participation of the local work force and a positive effect on the local and regional economy?

4. Will harvesting take place in the reforested area? What will be the harvesting characteristics, and who will be involved? What will be the intensity of harvesting (the quantity harvested in relation to available quantity and regeneration capacity)? What is the land use Plan, and does it include subsequent plantings? What are they? If timber harvesting is planted, will there be selective cutting, regeneration schemes and protection of banks and waterways? Will there be processing of forest products? Could the project lead to:
   - compaction, erosion, run-off, or leaching of soils, resulting from the extraction of roots, the cutting of dry stems or green stems, overexploitation of the forest, and/or inappropriate means of harvesting and transportation;
   - problems of soil compaction, desertification or degradation of the vegetation cover due to livestock grazing pressure;
   - erosion of sloped areas and river banks and/or sedimentation of waterways by removing or damaging the vegetation cover (during the rainy season and the dry season);
   - decrease in soil fertility by removing leaves from the ground;
   - degradation of the vegetation cover and its regeneration capacity, through the harvesting of fruits and seeds that is not well adapted to the climate, soil conditions, or biological characteristics of trees and shrubs, and so on;
   - environmental degradation (soil erosion, compaction, loss of soil fertility and soil degradation, climatic change, loss of biodiversity, loss of wildlife habitats, change or decrease in vegetation, desertification, degradation of water cycles, and so on) associated with abusive logging methods;
   - socio-economic problems (noise, loss of subsistence resources for indigenous peoples, problems with control of resources by commercial operators, rivalries between various users and owners, unplanned and spontaneous development of agricultural facilities, absence of diversified markets, and so on) associated with abusive logging methods;
   - surface water and groundwater pollution, air and soil pollution, as a result of harvesting and processing resources;
   - an increase in population and additional pressures on water, soil, arable land, flora, fauna, infrastructures and local services, and so on;
   - socio-economic conflicts, conflicts over the use of resources and territory, ownership rights, and opposition between traditional and/or modern forestry methods;
   - any form of overexploitation of forest products that exceeds the environment's carrying capacity, that is, what an environment and its components can sustain without compromising their growth, regeneration and roles in ecological regulatory functions;
   - equitable reinvestment of profits and/or positive outcomes for the community and its specific groups;
   - sustainable economic development, forms of fair and equitable partnership, and easy access to trees and shrubs of multiple uses, for subsistence, and of good market value?

CHECKLIST #4 IRRIGATION

Irrigation projects include using surface water and/or groundwater, building canals or water distribution systems, pumping stations, reservoirs, water catchment areas, etc.

A. Questions relating to the site of the irrigation system

1. What are the uses, activities and existing infrastructures on the proposed site of project implementation? What is the land use master Plan? Is there much traffic through the site? Have people's needs, expectations, patterns of consumption and socio-economic activities been taken into account? Could the project lead to:
   - displacements of the population, changes in ways of life, housing and other cultural characteristics (by failing to consider existing positive aspects of environmental management, such as the use of agricultural residues to increase water retention in dryland soils, or by promoting cash crops over food crops, and so on);
   - the accentuation of social inequalities and/or the loss of land (for example, if there is no Plan for equitable sharing of the project's positive results among all specific groups of the population, or if the area's agricultural characteristics, such as subsistence crops and cash crops, family land, ancestral land, communal land and single ownership land, landowners and/or tenants (men and women) of agricultural land, and so on) have not been considered;
   - incompatible uses and/or social and value conflicts among the different users of the various water sources located upstream and downstream from the project site (between farmers and livestock herders, if priority use has not been subject to prior agreement, and so on);
   - a change in the visual quality of the landscape;
   - problems with water quality, water supply, energy supply, and/or additional pressures on other resources and services;
   - a decrease or an improvement in the quality of life of present and future residents;
   - optimization of water resources, by developing a multiple-use irrigation system (for agriculture, fish farming, energy and so on) depending on water availability and according to prevention principles;
   - improved access and equitable distribution of water, to foster the particular socio-economic activities of specific groups of the population and to promote food security?

2. What are the topographical features and characteristics of the soil (texture, composition, drainage, humidity, and so on)? What is the source of water to be used: surface water and/or groundwater? What are the characteristics related to the flow, volume and quality of surface water? What is the quantity, depth and quality of the groundwater table? What is the groundwater recharge rate? Could the project have effects on:
   - the characteristics of surface water and groundwater;
   - aquatic habitats, riverine habitats, and their food chains (migratory birds, fish, and so on)?

3. What types of environment, landscape, flora and fauna are present in the area? What is their specific importance? Are there bodies of water, wooded areas, sloping areas, coastal or riverine wetlands or other vulnerable sites nearby? Is the area prone to landslides, floods, drought, earthquakes or other disasters? What is the level of precipitation and how does it vary over time? Is evaporation high? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (wildlife, water and so on) they contain;
   - rare or vulnerable species and/or species of economic, ecological or cultural importance?

B. Questions relating to the construction of the irrigation system

1. What are the different activities associated with preparing the site and building the irrigation system? What are the components of this system and what surface area do they cover? What is the area to be irrigated? Will there be excavation, levelling, clearing of trees and/or brush,

backfilling, diversion of waterways, flooding of land or wetland reclamation? What are the types, quantities and sources (natural environments, local markets, other markets, and so on) of the materials to be used? What equipment is required? How will they be conveyed to the site? Could the project lead to:

- changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain;
- landslides, for example while canals are being built;
- flooding, through the creation of reservoirs, and its associated problems, such as decomposition of organic matter;
- erosion of thin and fragile soils, on sloping areas, areas close to bodies of water and areas that lack vegetation cover (either at a given time or permanently);
- soil compaction, changes in soil texture, drainage, permeability and/or water-holding capacity;
- changes in the quality, quantity and circulation of surface water and groundwater, such as by creating reservoirs and/or diverting surface water, and their associated problems, such as the creation of an imbalance in aquatic habitats;
- nuisances (noise, vibrations, dust, traffic) and/or risks of accidents for workers and the local population (for example, while building and priming reservoirs);
- soil, water and air pollution, foul odours and health risks, due to poor management of construction materials and waste;
- increased involvement of the local population and work force in taking charge of their needs;
- an effect on the local and regional economies?

C. Questions relating to the irrigation system's operational phase

1. Will there be an increase in population due to migration? Will the project promote human, agricultural or livestock herders' settlements or other unplanned spontaneous uses in the vicinity of the irrigation system? Will agriculture be intensified or expanded? Will environmental problems arise as a result (loss of natural environments and wildlife habitats, loss of biodiversity by introducing large-scale monoculture, deforestation, desertification, soil erosion and compaction, loss of fertility and soil degradation resulting from a lack of crop rotation and companion crops, changes in the water cycle, pollution, and so on)? Will agricultural, animal and fish production increase (see other pertinent documents)? Will there be a greater demand for natural resources? Can the water needs of the various users be met through the existing water supply? Is there a possibility of:
   - a decrease in the quantity and/or quality of water upstream and/or downstream;
   - socio-economic conflicts, conflicts over land ownership and land use rights, over resource harvesting, over the use of the irrigation system between farmers and other users, upstream and downstream;
   - the appearance of new social problems, for example, if the indirect effects of a potential increase in income have not been anticipated;
   - added or reduced pressures on natural resources (water, soil, arable lands, fallow lands, wildlife and so on), on infrastructures and local services (housing, schools, and so on);
   - an increase or decrease in local market prices (agricultural products, livestock products and so on) and an effect on the local and regional economies (financial resource management system, credit system, access to markets, start-up of businesses, and so on);
   - involvement of the population in water tarification and user agreements, in economic decision making, and in maintenance and follow-up of the irrigation system and water resources;
   - the population taking charge of its own development, particularly the stated project recipients;
   - an improved quality of life resulting from a healthy environment, improved access to water needed to develop socio-economic activities particular to specific groups of the population, as well as food security, such as by irrigating small plots of farm land for women, or through a reinvestment Plan for the community, its socio-economic activities, and its service needs, and so on?

2. What type of water catchment and supply system will be used (gravity, pumps, canals, conduits, reservoirs, sprinklers, drip irrigation)? Is it simple, optimal and suited to the environment and available resources? Will there be changes in the flow of surface water and/or changes in the groundwater table? Have the particular characteristics of water, soil, drainage, topography, crops, socio-economic activities, water needs and the legal context been considered in developing the irrigation system? Could the project lead to:
   - a substantial loss of water through surface evaporation in reservoirs or canals due to improper design of these structures;
   - changes in silting patterns and/or flood cycles downstream, especially if these patterns and cycles are important to the fertility of riverine soils;
   - sedimentation problems in waterways downstream, due to erosion upstream;
   - sedimentation problems in irrigation waters due to soil erosion, turbidity and silting risks in canals and reservoirs;
   - changes in aquatic and riverine habitats and their food chains;
   - a decrease in water flow which may cause water shortage problems, particularly during the dry season and downstream, a reduction in the capacity to dilute pollutants and changes in aquatic and riverine habitats;
   - a greater water flow which may cause accelerated erosion of river beds and an accumulation of sediments upstream, or in reservoirs and canals;
   - waterlogging in the rooting zone, due to a rise in the groundwater table caused by improper irrigation that exceeds the water percolation rate into the soil and lacks appropriate drainage measures, or due to the loss of water from canals and reservoirs that are not watertight, or if the soil is poorly drained (for example, in clay or lateritic soils);
   - water and soil salinization, especially in arid and semi-arid areas, considering that water input is low and evaporation high, when the level of the groundwater table rises (especially if irrigated soils have a rapid drainage, as in sandy, alluvial soils), or when the groundwater table is in contact with soil layers of high salt content, or when irrigation water is rich in salt;
   - salinization of water, through saline intrusion at the mouth of a waterway or in coastal or island areas where groundwater is in contact with seawater and its level is lowered;
   - changes in soils through the oxidation of sulphur compounds in humid coastal areas; changes in the depth, recharge rate and quality of the groundwater table;
   - drying up of the groundwater table, if the annual precipitation rate is low, if the evaporation rate is very high, if the rate of withdrawal exceeds the groundwater recharge rate, particularly in arid and semi-arid areas;
   - nuisances, risks of accidents (for example, navigation on modified waterways, risks associated with flash floods or risks related to equipment) and/or risks of diseases, such as malaria, schistosomiasis or onchocerciasis, associated with an increase in harmful species and disease vectors if water distribution systems are poorly covered, if canals and ditches are not deep enough or if grasses and sediments accumulate in them, if drainage is poor and/or if bodies of stagnant water are created;
   - better management of water resources depending on the design of the irrigation system (water conservation measures coupled with soil conservation and anti-erosion measures, users' associations, and so on)?

2. Is there a risk that pollutants (for example, pesticides or fertilizers) could be released or seep into the soil, irrigation water, surface water or groundwater? Are these pollutants associated with nuisances (odours, dust), risks of accidents (spills) and health risks (poisoning) for the population? Does irrigation water require treatment? Is there:
   - a risk of pollution by pesticides and fertilizers used on neighbouring agricultural lands;
   - a risk of algal growth, if irrigation water (canals and reservoirs) receives nutrients (eroded soils, fertilizers), is static, is in constant contact with light and becomes warmer;
   - a risk of eutrophication of bodies of water due to nutrient loading (phosphates and nitrates);
   - a risk of pesticide bio-accumulation in the food chain?

CHECKLIST #5 WATER SUPPLY

Constructing water supply systems designed to supply drinking water to the population.

A. Questions relating to the location of the water supply system

1. What are the uses, activities and existing infrastructures on the proposed site of project implementation? What is the town planning scheme? How large is the affected population? Have the people's needs, expectations, patterns of consumption and sanitary conditions been considered? Could the project lead to:
   - displacements of the population, losses of territory, changes in ways of life and/or accentuation of social inequalities (migration towards water supply points, settling of nomads, resettlement, induced urbanization, and so on);
   - incompatible uses and/or social and value conflicts between various users in the same region or between users upstream and downstream from the water supply system (industrial uses and domestic uses, traditional activities and "modern" activities, effect on indigenous peoples, and so on);
   - a change in the visual quality of the landscape;
   - water quality problems, additional pressures on other resources and services;
   - a decrease or an improvement in the quality of life;
   - better awareness of the importance of a healthy environment and sanitary conditions;
   - improved access to good quality water (potability, odour, taste, women's workload, and so on);
   - sustainable management of water resources, for example, through the creation of a supply system management committee?

2. What types of environment, landscape, flora and fauna are present? What is their specific importance? Are there nearby water sources, wooded areas, slopes and other vulnerable sites? Is the area prone to landslides, flooding and drought? In what type of soil (texture, composition, drainage, and so on) and on what topography will the system be set up? Will the system use surface water and/or groundwater? What are the characteristics of these water sources in terms of quantity, quality and supply? Could the project have an effect on:
   - the quantity and quality of surface waters and/or groundwater; environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, flora, fauna, and so on) they contain;
   - rare or vulnerable species and/or species of economic, ecological or cultural importance?

B. Questions relating to the construction of the water supply system

1. What are the various site preparation activities? What are the components of the water supply system (reservoirs, pipes, boreholes, tanks, treatment facilities, facilities for workers, and so on) and how large an area will they cover? Will there be blasting, excavation, levelling, clearing or backfilling? What materials and equipment will be involved? Are they appropriate to the region? Could the project lead to:
   - changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain;
   - soil instability and risks of the collapse of underground pipes;
   - erosion of soils that are fragile, thin, on sloping land or near bodies of water, if vegetation is cleared;
   - soil compaction or changes in drainage and/or soil permeability;
   - nuisances (foul odours, noise, vibrations, airborne dust, traffic), risks of accidents and health risks to workers and the local population and/or problems of water, soil and air pollution;
   - fair and equitable participation of the local work force and a positive effect on the economy?

C. Questions relating to the operational phase of the water supply system

1. What are the proposed uses (domestic, industrial, and so on)? Will the population increase as a result of migration? Will the project lead to spontaneous, unplanned human, agricultural or livestock-raising settlements? Will the additional water promote new forms of production requiring high water consumption? Will there be a greater demand for natural resources and a reduction in their quality? Could the project lead to:
   - additional pressures which the natural resources (water, soil, flora, and so on), infrastructures and local services (housing, schools, and so on) cannot sustain;
   - changes to the level, recharge rate, flow and quality of the groundwater table;
   - drying up of the groundwater table if the recharge rate has been ignored, if annual precipitation is very low, if evaporation is very high, if groundwater is limited or difficult to access, if there is overutilization, and so on (in coastal or island areas, this drying up could lead to the infiltration of salt water into the groundwater table);
   - changes in surface waters (due to a reduction in the flow and quantity of water downstream, changes in direction, sedimentation, pollutant dilution capacity, erosion, and so on), in aquatic and riverine habitats and their associated food chains;
   - nuisances, risks of accidents, health risks to the population (water contamination, disease vectors such as malaria and schistosomiasis associated with puddles of stagnant water);
   - social conflicts, conflicts over ownership rights, land use and resources (for example, if usage fees and conditions have not been subject to an agreement);
   - participation of the population, as a result of training in monitoring and maintaining the system;
   - an improvement in the quality of life, health conditions and socio-economic development, resulting from better access to good quality water, in accordance with the legal context and with pre-established agreements and responsibilities regarding priority uses, methods of use and disposal;
   - an improvement in environmental conservation through appropriate methods of water distribution conservation by means of control valves and reducer pipes, sand reservoirs rather than open reservoirs in arid regions, rationing during the dry season, water taxes or user fees, clear agreements and responsibilities with respect to water management, and so on), a hygiene education program, the restoration of degraded sites and environmentally sound production practices?

2. Could pollutants (liquids, solids, gases) or undesirable substances seep into the system and its water sources? Will the distributed water require treatment? Is there a possibility of:
   - algal growth in water storage reservoirs if they are not covered;
   - pollution from industrial, domestic (faecal coliform, soaps from nearby sanitary facilities and latrines, and so on), agricultural (fertilizers, pesticides) or animal (faecal coliform and turbidity) sources?

3. Is there a risk of water and soil pollution as a result of the discharge of wastewaters? What is the source of these wastewaters (homes, industries, and so on)? Is the discharged water to be recovered and treated? Are the wastewaters and residual sludges to be reclaimed? Could the project lead to:
   - nuisances (odours, noise, and so on), risks of accidents and health risks associated with the type of treatment (sedimentation, filtration, chlorination, and so on) and its characteristics (ventilation pipes, hydraulic seals, covers, and so on);
   - eutrophication (significant input of organic matter) of waterways resulting from the discharge of residual sludges and other problems of water and soil pollution associated with residual sludges;
   - changes in aquatic and riverine habitats and their associated food chains;
   - interference of wastewaters with other systems (drinking water pipes);
   - seepage of contaminated waters into soils, surface water and groundwater as a result of leaks from the wastewater recovery and treatment system, particularly if soils are permeable or the groundwater table is high;

- overflow and/or backup of wastewaters caused by pumping anddrainage stations inappropriate to the flow and quantity of wastewaters and to the characteristics of soils and topography;
- health risks (hepatitis, gastrointestinal problems, cholera, typhoid, and so on) to the population as a result of direct contact with wastewaters or residual sludges, or as a result of contamination of water or of food products watered with contaminated water?

CHECKLIST #6 WASTE MANAGEMENT

Solid waste management projects (residual materials), include collection, sorting, storage, reclamation (composting and recycling) and elimination. In developing countries, between 75% and 80% of all solid wastes are organic in origin and can therefore be composted.

A Questions relating to the location of the waste management project

1. What are the uses, activities and existing infrastructures on the proposed site of project implementation? How large is the population? What is the proximity of residences? What is the town planning scheme? What are the needs, expectations and patterns of consumption of the local population? Have existing waste reclamation patterns (for example, in agriculture and domestic activities) been built upon? What laws and/or government policies apply to waste management? What are the project's environmental objectives? Could the project lead to:
   - displacements of the population and/or losses of territory (as a result of the nuisances associated with a waste elimination site or the appropriation of this site);
   - accentuation of social inequalities (for example, the selection of a waste elimination and/or reclamation site in poorer urban marginal areas without prior consultation of the residents);
   - changes in ways of life (if the indirect effects of the system are not anticipated, for example, an increased demand for non-biodegradable processed products, such as packaging and single-use products, and so on);
   - incompatible uses and/or value conflicts, socio-economic conflicts and conflicts over ownership rights among possible uses of land and solid wastes (interference with other services, residences, tourist attractions; problems, such as odours and noise, related to traffic and the transportation of wastes; if the land use characteristics of the area are not considered, such as non-permanent housing areas and shantytowns, the presence of landowners as opposed to tenants and squatters, single-parent families and street children; if the importation of hazardous wastes into the region is promoted; if the existing informal recovery and recycling sector is not considered; and so on);
   - a reduction in the visual quality of the landscape and neighbouring property values;
   - problems with the supply of water, energy, resources and various services, such as electrical facilities;
   - a decrease or an improvement in the quality of life;
   - greater public acceptance, through public participation in designing the waste management system and choosing the site, for example;
   - greater awareness of the importance of a healthy environment and the principles of waste reduction, recovery, recycling, reclamation and, finally, elimination?

2. What types of environment, landscape, fauna and flora are present? What is their specific importance? Are there nearby bodies of water and waterways, wooded areas, slopes, marshes and other vulnerable sites? Is the area prone to flooding or soil instability? What are the characteristics of the soil (permeability, drainage, texture, and so on) and topography? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, flora, soils, and so on) they contain;
   - rare or vulnerable species and/or species of economic, cultural and ecological importance (biodiversity)?

B. Questions relating to the preparation of the waste management site

1. What are the various site preparation and construction activities? Will there be demolition, excavation, leveling, clearing, soil denudation, land drainage, construction of fences, access roads or buildings (see appropriate checklists), and so on? What instruction materials and equipment are required? Could the project lead to:

- changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the resources they contain;
- soil instability as a result of digging, backfilling, and so on;
- erosion of soils that are fragile, thin, on sloping land or near bodies of water, if there is clearing, soil denudation or use of heavy equipment, for example;
- soil compaction or changes in drainage, soil permeability and/or loss of soil fertility;
- nuisances (foul odours, airborne dust, noise, vibrations, traffic), risks of accidents and/or health risks to workers and the local population while preparing the site;
- problems of soil, air, surface water and groundwater pollution, if construction materials and wastes are poorly managed;
- fair and equitable participation of the local work force and a positive effect on the economy?

C. Questions relating to the waste management system's operational phase

1. What are the types, quantity and composition of the wastes to be collected (household, industrial, manufacturing, medical, agricultural, sewage sludge, and so on)? Do they contain toxic substances? How will the waste be collected (containers, equipment, and so on)? Will the project rely on voluntary disposal? Who will be responsible for collecting, sorting, storing, eliminating and reclaiming solid wastes? How will site security be maintained and who will be responsible for it? Is the waste management system approach based on waste reduction, elimination or reclamation? Depending on the technologies and processes involved, what are the risks of pollution of surface water, groundwater, soil and air? Are these pollution risks associated with nuisances (noise, odours, vibrations, dust, smoke, traffic), risks of accidents (transportation, spills, explosions, fires, and so on) and health risks (respiratory or skin problems, and so on) to workers and the local population? Are the proposed technologies and processes suited to the environment? If wastes are to be buried, what is the life expectancy of the site? How will the site be monitored during operations and following closure? Will closure of the site include restoration of the environment? In general, could the project lead to:
   - changes in environments or sites of economic, ecological, cultural, archaeological or historical importance and the resources they contain;
   - water and soil pollution by liquid and solid biological and medical wastes (slaughterhouse wastes, medication, syringes, blood-contaminated linen and bandages, bacterial and viral sources, and so on) and/or by heavy metals and other hazardous products (oil, batteries, paint, glue, solvents, acids, and so on);
   - dispersion of wastes and poisoning of livestock and humans if solid wastes are stored uncovered and access to the site is not restricted (spread of diseases and accumulation of toxicity in the food chain);
   - contamination of drinking water sources;
   - surface water and soil pollution resulting from the run-off of rainwater, through improperly stored solid wastes or compost, and into waterways;
   - eutrophication of bodies of water, that is, a significant input of organic matter from improperly stored wastes or compost;
   - groundwater and soil pollution through the seepage of leachates (soluble portion of decomposing solid wastes) if the landfill limit has been reached, if soils are permeable or lack sealing, if soil drainage is rapid or if the site does not have an adequate leachate recovery system, if soils have a high porosity or a low degradation capacity, if the leachate treatment system is inadequate and/or if the groundwater table is high or too close to the solid wastes being stored or buried (in general, soils consisting of clay and organic matter tend to attenuate the effect of contaminants more than sand, silt and gravel soils);
   - problems of migration, in the unsaturated zones of soils, of gases produced by anaerobic decomposition (without oxygen) of wastes buried without appropriate measures for gas ventilation and recovery, which could result in long-lasting underground fires, underground explosions, losses of deep-rooted vegetation and damage to infrastructure foundations;
   - air pollution by methane, carcinogenic volatile organic substances (benzene, for example) and other gases produced by biodegradation, if solid wastes are stored uncovered;

- air pollution by dust particles carrying pathogens and hazardous products, if solid wastes are stored uncovered;
- air pollution by toxic gases, metallic particles, methane, carbon and sulphuric compounds, if wastes are incinerated without adequate filtration measures;
- nuisances (foul odours, airborne dust, noise, vibrations, traffic), risks of accidents and/or health risks to workers and the local population (in the absence of vermin control measures, adequate site security, control of incoming and outgoing traffic, adequate equipment, appropriate cleaning and maintenance of protective clothing and equipment, and so on);
- a reduction in problems associated with uncontrolled dumping of wastes;
- a reduction of wastes at the source;
- greater assumption of responsibility by waste producers through agreements, compliance with instruments of control applied and reinforced by responsible authorities and/or taxes on solid wastes;
- increased involvement of the community in taking charge of its development through public consultation, participation, awareness activities and training during each stage of the project and the waste management system, and in maintaining, monitoring and closing the system?

2. With respect specifically to reclamation (composting and recycling), could the project lead to:
   - problems with contamination of the products to be recycled, if collection and sorting are not determined by the quality of the proposed reclamation;
   - contamination of agricultural products by toxic substances (for example, heavy metals) or by pathogens contained in organic fertilizers, for example, if wastes are improperly sorted or compost is inappropriately formulated, if solid wastes are not composted under aerobic conditions (with oxygen) and/or if the compost application rate is too high;
   - benefits to crops by using compost produced under aerobic conditions (with oxygen), using adequate mixing and aeration, without unpleasant odours, and through proper solid waste management;
   - a reduction in wastes eliminated (recovery, recycling, composting) without being detrimental to the existing informal recovery and recycling sector and without creating problems with energy consumption for recycling processes (glass, paper, plastic, aluminum, and so on);
   - the opportunity for the population to use recovered and recycled products (fabrics, iron, furniture, books, games, and so on) and to enjoy the possible economic benefits of these products;
   - entrepreneurial capacity-building and marketing of recycled products and compost to the population and all its specific groups?

CHECKLIST #7 RURAL ROADS

Construction of roads and trails where some of the effects are similar to those associated with projects for linear routes, such as small rights-of-way for energy transmission projects.

A. Questions relating to road location

1. What are the uses and activities of the area where the road is to be constructed? What roads and infrastructures are already present (underground gas, water, sewage lines, and so on)? How heavily is the area used, and what are the seasonal variations in use? How close are homes, businesses, villages and cities? What is the land use master Plan? What are the density and needs of the population? What laws and/or government policies relate to the construction of roads? Could the project lead to:
   - displacements of the population (migration; expropriation and resettlement);
   - changes in ways of life and/or land use (for indigenous populations, losses of territory, uncontrolled and unplanned urbanization, disruption in the organizational structure or means of subsistence, a faster rate of cultural change, and so on);
   - accentuation of social inequalities (depending on the means and availability of transportation for proposed users, for localities through which the road passes and their specific groups, such as women, children, the elderly, and so on, if there is an unequal distribution of access to goods and services, and so on);
   - incompatible uses and/or social conflicts, value conflicts and conflicts over ownership rights between the various users and owners of the land (if there is sacred land, traditional or recreational sites, and so on);
   - changes in the visual quality (aesthetics) of the landscape and/or incompatibility with the landscape;
   - problems with the quality and supply of materials, resources and various services;
   - a decrease or an improvement in the quality of life;
   - better access to goods and services (education, medical care, health services, markets) and de-isolation?

2. What types of environment, landscape, fauna and flora are present? What is their specific importance? Are there bodies of water, wooded areas, slopes, marshes and other vulnerable sites nearby? Is the area prone to flooding, heavy rain, intense storms, fog, freezing, earthquakes or other disasters? What are the characteristics of the soil (stability, texture and drainage) and topography? Has the durability of the road been studied? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, soils, vegetation, and so on) they contain;
   - rare or vulnerable species and/or species of economic, cultural or ecological importance (biodiversity)?

B. Questions relating to road construction

1. How large is the affected area? What are the location, area and width of the road, its side roads and structures (viaducts, tunnels, bridges, contour canals, ditches, culverts, cuts, embankments, and so on)? What type of road surfacing is proposed (hard surface, asphalt, dirt)? Will there be demolition, blasting, excavation, levelling, clearing of trees and/or brush, soil denudation, backfilling, land drainage, siltation of bodies of water? Will the project require the construction of lodgings or various services such as sanitation facilities (see appropriate checklists)? What types and quantities of construction materials will be required and where will they be obtained (local source of gravel, sand, water, and so on)? How will they be transported to the site, stored and managed? Could the project lead to:
   - changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain;

- landslides, soil instability and erosion of fragile or thin soils, if there is clearing of trees, particularly during seasons of heavy rain, if there are no proposed measures to stabilize the soil while excavating tunnels, creating embankments, and so on;
- soil compaction or changes in drainage and/or soil permeability by heavy equipment;
- variations in the level and quality of the groundwater table resulting from changes in drainage and the influx of debris due to ravines, tunnels, and so on; floods, changes in surface water, its quality, water levels and flow (seasonal and permanent, upstream and downstream) if the road crosses bodies of water and waterways, by means of structures such as bypasses, flow interrupters, water catchment areas or reservoirs; and consequent effects on aquatic fauna and flora (effects on spawning, breeding, nesting areas, and so on);
- nuisances (foul odours, airborne dust, noise, vibrations, traffic), risks of accidents and/or health risks to workers and the local population during construction;
- problems with pollution of the soil, surface water, groundwater, drinking water sources and air, if construction materials and wastes are poorly managed;
- fair and equitable participation of the local work force with no adverse effects on food security and other activities?

C. Questions relating to road use

1. Who will use this road, with what means of transportation? What will be transported? Will the products transported be heavy or have a high risk of toxicity? What will be the road's intensity of use and volume of traffic? Will use and maintenance of the road generate pollutants (liquids, solids, gases) that may seep or be discharged into surface waters and groundwater, drinking water sources, soils, habitats and air? May greater numbers of people flow through the area? Does improved access complement the development goals and activities of the community and the region? Will the project lead to spontaneous unplanned human and agricultural settlements? Will it promote access to particularly significant and/or fragile environments which would previously have been more isolated for people other than members of the local population? Will there be a greater demand for natural, financial and energy resources and for agricultural lands, and so on? Could the project lead to:
   - the collapse of the road, soil instability, erosion or gullying of fragile or thin soils, if measures are not taken to stabilize banks and soil, if buffer zones of vegetation on slopes and surrounding bodies of water and waterways are not planned, if windbreaks are not established, if degraded sites are not restored, if adequate drainage of the roadbed is not ensured, and so on;
   - increased sedimentation in surface waters (for example, if the dirt road is sensitive to rain) and possible blockage of passage structures (for water, fish, and so on) caused by suspended matter, plant debris, ice;
   - soil compaction or changes in drainage and/or soil permeability, if drainage ditches are not appropriate for soil and climatic conditions;
   - barriers to the movement, reproduction, feeding and migration routes of wildlife (migratory birds, waterfowl, fish, deer and other cervids) and livestock and/or the segmentation of their habitat;
   - an increase in harmful species (invasion of weeds along the roadside, for example) and/or degradation of the vegetation cover (for example, due to airborne dust);
   - an increase in disease vectors associated with humid areas (malaria, schistosomiasis, for example) if there are puddles of stagnant water, depending on the drainage of ditches, and so on;
   - the spread of human and livestock diseases as a result of population movements;
   - a decrease in the quantity and quality of natural resources (water, wood, fauna, minerals, and so on) if these resources cannot sustain an increase in demand generated by an increase in population (immigration or migration), its aggregation, its densification along the road or an increase in prospecting and extraction of resources by people passing through the area or at their request;
   - additional pressures on local infrastructures and services;

- nuisances (noise, odours, vibrations, dust, smoke, traffic, increased occupancy), risks of accidents (heavy road vehicles, night transportation, pedestrians, spills, explosions, fires, and so on) and health risks (respiratory problems due to smog, and so on) among users and in the localities concerned;
- pollution due to the use of pesticides to control roadside vegetation and/or maintenance materials such as salt or dust control materials;
- pollution due to seepage of oil and gas, exhaust fumes (nitrogen oxides, carbon monoxide, and so on), the type of gasoline used (lead) and/or transportation of hazardous materials and wastes;
- socio-economic conflicts (if the marketing system for traditional products is affected; if local sale prices change; if the demand for manufactured products and processed foods from other regions increases as a result of increased income; if food crops are replaced by cash crops because of the possibility of increased mobility for such products; if local producers migrate to urban areas to compensate for lost income, and so on);
- a reduction in the use of improvised roads which adversely affect environmental protection;
- socio-economic development of the population and all its specific groups (a reduction in the time and cost of transporting local products to outside markets, higher incomes, and so on), a decrease in rural outmigration through socio-economic development and the de-isolation of villages if the road serves local communities instead of simply passing through their territory for the benefit of users from more distant regions;
- increased involvement of the community in taking charge of its development through public participation in monitoring effects and regularly maintaining the road?

CHECKLIST #8 FISHING AND FISH FARMING

Fish farming and aquaculture projects (fish, shellfish, and so on) in fresh, brackish or salt water, and in natural and/or artificial environments.

A. Questions relating to the fish farming project location

1. What are the existing infrastructures (water catchments, sewers, and so on), uses and activities on the proposed site of project implementation? What is the land use master Plan? What is the population density? Do the objectives and management of the fish farming operation correspond to government policies, laws and the local population's needs and patterns of consumption? Could the project lead to:
   - displacements of the population, changes in ways of life and cultural characteristics (if means of subsistence and traditional activities are disrupted by introducing intensive methods of production and/or "modern" fishing techniques or if the positive aspects of existing methods of environmental management, such as selective fishing, and so on, are not taken into account);
   - accentuation of social inequalities and/or losses of territory (if all specific groups of the population, such as women, farmers, fishers, and so on, are not consulted; if there is no plan for equitable sharing and reallocation of the project's positive results in the community; if there is an increase in women's workload or if women are restricted to low-income processing activities, and so on);
   - incompatible land uses (loss of agricultural lands, livestock-raising sites, wetlands, wooded areas, and so on) and/or social conflicts, value conflicts and conflicts over ownership rights (among the different users of the water sources and fish resources, and so on);
   - a change in the visual quality of the landscape;
   - problems with the quality and supply of water, energy, and other resources and services;
   - a decrease or an improvement in the quality of life;
   - an improvement in food security, the nutritional value of diets (additional protein intake) and/or increased income for the population and its specific groups;
   - assumption of responsibility for the project by the community and clear distribution of responsibilities;
   - optimization of fish and water resources by recycling and enhancing multipurpose systems (for example, an irrigation system based on the availability of water and prevention principles; a fish farming system involving the re-use of pond water for agricultural irrigation)?

2. What types of environment and landscape are present? What is their specific importance? Are there bodies of water and waterways, slopes, wooded areas, coastal and riverine wetlands, coral reefs, mangrove forests and other vulnerable sites? What are the characteristics of the indigenous and exotic fish in this region (species, abundance, age classes, nutritional requirements, habitats, and so on)? What sources of water are available, and what is their quality, quantity and renewal rate? What are the characteristics of the ocean (currents, tides, and so on), topography and soil (composition, texture, drainage, water-holding capacity, acidity, and so on)? Is the area prone to soil instability and climatic stress (heavy rains, drought, hurricanes)? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, soil, vegetation, fauna, and so on) they contain;
   - rare or vulnerable species and/or species of economic, cultural or ecological importance (biodiversity)?

B. Questions relating to the fish farming site construction

1. What are the various site preparation activities? Will there be demolition, excavation, leveling, clearing of trees and/or brush, diversion of waterways, tapping of groundwater, flooding of land, transformation of wetlands or soil sealing? What are the components of the system and how large

an area will they cover (reservoirs, water pipes, pumping stations, treatment facilities, ponds, roads, and so on; see appropriate checklists)? What equipment and materials will be required? How will they be conveyed to the site? Could the project lead to:

- changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain (if creating shrimp ponds leads to the destruction of mangrove forests, if installing piers or floats causes the destruction of spawning grounds or nursery areas, and so on);
- flooding of land, by creating ponds, and its associated problems, such as decomposition of organic matter;
- erosion of fragile or thin soils, on sloping land or near bodies of water, or where no protective vegetation cover exists, if there is no plan for buffer zones of vegetation, and so on;
- soil compaction or changes in soil texture, drainage, permeability and/or water-holding capacity (when sealing the bottom of ponds, through the accumulation of debris, and so on);
- changes in the quality, quantity and circulation of surface waters and groundwater, for example, by creating ponds and/or diverting surface water, and associated problems, such as creating an imbalance in aquatic habitats;
- nuisances (foul odours, noise, dust, vibrations), risks of accidents, soil, water, air pollution and/or health risks due to improper management of construction materials and wastes;
- fair and equitable participation of the local work force?

C. Questions relating to the fish farming project's operational phase

1. What species have been selected, and what are their origin and characteristics (nutritional requirements, growth rate, habitats, reproduction rate, life cycle, competition and predation, vulnerability, and so on)? Where will eggs, larvae, alevins and juveniles be obtained? Are there risks of contamination by toxic substances? Have they been subjected to genetic manipulation? What is their resistance? Is there a possibility of:
   - changes in, encroachments on and/or the destruction of indigenous and/or adjacent environments by intentionally or accidentally introducing exotic fish; a loss of biodiversity; changes to the food chain; spread of diseases and parasites and/or a decline in fish production due to competition for habitats, food or predation, and so on;
   - a reduction in fish resources in the natural habitats due to harvesting of parent species;
   - social and value conflicts, if the preferences of the population are not considered?

2. What maintenance activities will the project require? Have all users of aquatic products been involved? What techniques will be used (water intake and circulation system, types of food, pesticides, fertilizers, antibiotics, cages, longline cultures, follow-up and monitoring, and so on)? How will fish be introduced into artificial ponds and/or natural environments? Will there be a greater demand for natural resources? Will harvesting take place? What harvesting methods will be used (nets, mesh and hook size, dredges, trawl nets, and so on) and who will use them? What will the intensity of exploitation be (the quantity harvested in relation to the available quantity and regeneration capacity)? What is the management Plan and does it include further introductions of stock? Will the project involve resource processing activities? Will there be an increase in population as a result of migration? Will the project lead to spontaneous, unplanned human settlements? Can the water requirements of the various users be met with the available water? Is there a possibility of:
   - changes to natural habitats or to the quality and quantity of surface water and groundwater;
   - undesirable growth of algae and aquatic plants as a result of fertilizer loading;
   - pollution of the air, soil, groundwater and surface water, bio-accumulation of toxic substances (lead, mercury, and so on) in the food chain, unpleasant odours, health risks and risks of accidents due to improper management of pesticides (herbicides, insecticides, sterilization, and so on), fertilizers (used to increase productivity, for example), food, antibiotics, drugs, growth hormones, wastes, and so on;
   - water, soil and air pollution, risks of accidents and/or health risks due to harvesting and processing of resources;

- conflicts over ownership rights, land use and resource harvesting (between small-scale or traditional fishing and commercial fishing, between water users upstream and downstream, among landowners, pond owners and the rest of the population, between the concepts of common ownership of surface waters and private ownership of fish products, poaching, and so on);
- socio-economic conflicts (with the income-generating activities of those having no direct contact with the project, loss of subsistence resources for indigenous peoples, problems of large-scale appropriation of resources by commercial operators, rivalries between users and owners, absence of diversified markets, distance from markets, and so on);
- additional or reduced pressures on natural resources (water, arable lands, fish, and so on), infrastructures and local services housing, schools, and so on);
- an increase or decrease in local sale prices of food products and an effect on local and regional economies (financial resource management system, credit system, access to markets, start-up of businesses, and so on);
- sustainable economic development, fair and equitable forms of partnership, ease of access to aquatic resources of subsistence value and of good market value;
- involvement of the population and all its specific groups in user and tarification agreements, in economic decision-making, in maintaining and monitoring fish and the water management plan;
- assumption of responsibilities by the population, particularly the anticipated direct recipients of the project;
- an improvement in the quality of life resulting from a healthy environment, the development of socio-economic activities, food security and better nutritional value of diets?

3. More specifically for fish farming projects in natural environments, could the project lead to:
   - changes in, encroachments on and/or the destruction of aquatic environments (such as coral reefs, reproduction sites, spawning sites, feeding sites, and so on) and the natural resources they contain, due to inappropriate fishing methods, such as blasting, poison, pressure from divers, anchors or on marshes and riverine lands as a result of increased traffic (people, vehicles, boats, and so on);
   - changes in water or tidal movements as a result of fishing gear such as traps and large structures that could block the natural flow of tides and currents;
   - an increase in sedimentation in water and/or eutrophication caused by the high input of particles generated by longline cultures of crustaceans or by piers, or by the accumulation of sand due to the slowing of water movements generated by stake or longline cultures;
   - any form of overexploitation of aquatic products exceeding the environment's carrying capacity, that is, what an environment and its components can sustain without compromising their growth, regeneration and roles in terms of ecological regulatory functions (for example, the use of non-selective harvesting methods, resulting in population reductions among target fish, other fish species, amphibians, marine mammals, molluscs, and so on; due to the abandonment or loss of nets and traps);
   - risks to navigation due to abandoned or lost nets and traps, high concentrations of enclosures, or floats and piers which reduce water quality and circulation?

4. More specifically for fish farming projects in artificial environments, could the project lead to:
   - saline intrusions into fresh water as a result of inappropriate use of groundwater;
   - an increase in harmful species and disease vectors associated with humid areas (malaria and schistosomiasis, for example) due to the presence of stagnant water puddles;
   - odours, eutrophication of surface waters, water, soil and/or air pollution as a result of discharging pond effluents (which contain little oxygen, suspended matter, commercial food residues, excrement) without prior filtration, dilution or treatment and without considering the receiving environment's carrying capacity;
   - an increase in temperature, a decrease in oxygen content or an accumulation of wastes in pond waters if water exchange and renewal conditions are not frequent enough and/or if pond water is affected by other activities (such as washing);

- overexploitation of pond resources and a short life expectancy of the project if site monitoring is inadequate, if harvesting quotas are too high or non-existent, and so on?

CHECKLIST #9 ANIMAL HUSBANDRY

Extensive and intensive animal production and management projects (cattle, poultry, goats, sheep, hogs, camels, wild animals, and so on), using confined, fixed or transhumance systems

A. Questions relating to the animal husbandry project site

1. What are the land uses, activities and existing infrastructures on the proposed site of the project? What is the land use master plan? How large is the population and the herd? Are the project objectives consistent with government and institutional policies and with the needs, expectations, patterns of consumption and traditional activities of the population? Could the project lead to:
   - changes in ways of life and cultural characteristics (for example, settling of nomad populations without considering the cultural values associated with transhumance of livestock and the adaptive nature of this environmental optimization and management strategy; if traditional herd management practices have not been studied, such as controlled access to water by local authorities in arid regions to limit the size of livestock herds on the basis of available forage, and so on);
   - displacements of the population, loss of territory and/or accentuation of social inequalities (for example, if the characteristics of the division of labour and land are not taken into account; if women or the poorest families are restricted to remote, low-productivity pasture land or to low-income activities, and so on);
   - incompatible uses of land and resources and/or social conflicts associated with values, property rights and land tenure (between users and owners of water sources and plant resources, between farmers and livestock breeders, between nomadic herders and sedentary breeders, between the various uses of livestock (subsistence, transportation, draught power and trade), between common property and private property, poaching problems, and so on);
   - problems associated with the quality and supply of natural resources (water, flora, and so on) and services;
   - a decrease or an improvement in the quality of life;
   - improvement in food security, the nutritional value of diets (increased intake of proteins), agricultural yield (due to animal traction, for instance) and/or increased income for the population and its specific groups depending on market conditions, market opportunities and the development of socio-economic activities;
   - increased community awareness and participation of the population in improving the environment by restoring degraded sites (study and control of animal movements, water conservation measures, erosion control, management follow-up, and so on);
   - optimization of land use through its enhancement for multiple purposes by means of agro-sylvo-pastoral systems that involve, for instance, using manure as fertilizer, combining forage crops and multipurpose trees, using agricultural residues as livestock feed during the dry season, planting live fences, and so on?

2. What types of environment and landscape are present in the area? What is their specific importance? Are there bodies of water, waterways, slopes, wooded areas, desertic areas or other vulnerable sites nearby? What are the characteristics of wildlife and livestock (species, abundance, age, nutritional requirements, habitats, and so on)? What are the available sources of water? What are their characteristics in terms of quality, quantity and renewal? What are the characteristics of topography and soils (composition, drainage, and so on)? What are the characteristics of the area's climate (abundance and variation of rainfall, droughts, floods, and so on) and temporal and spatial distribution of vegetation? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, soil, vegetation, wildlife, and so on) they contain;
   - rare or vulnerable species and/or species of economic, cultural or ecological importance (biodiversity)?

B. Questions relating to the animal husbandry project

1. What are the different site preparation activities? Will there be demolition of existing buildings, clearing of trees and/or brush, erection of fences, feedlots, manure collection and storage systems, construction of buildings, access roads or water supply points (see appropriate checklists)? What equipment and materials are required? Are they suited to the environment? What species have been selected and what are their origin and characteristics (nutritional requirements, water requirements, growth rate, habitats, reproduction rate, competition and predation, vulnerability, and so on)? Have they been genetically manipulated or selected? What maintenance activities are involved in the project and its management? How will livestock be fed and watered? Will there be resource processing activities (tanneries, slaughterhouses, wool production, and so on; see other relevant documents)? Will there be an increase in population due to migration? Will the project promote spontaneous, unplanned human settlements and/or an unregulated increase in animal populations? Are the size and composition of herds a function of the real, seasonal and temporal availability of water and plant resources, given the various users? Could the project lead to:
   - changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain (for example, deforestation, desertification and associated climatic changes; destruction of agricultural resources; excessive grazing of natural vegetation, including foliage, fruits, and so on; changes in plant composition; damage to young plants caused by livestock trampling; introduction of domestic animals and/or forage species resulting in a loss of biodiversity, changes in the food chain, competition with native wildlife for habitats, migration routes, food and/or predation, and so on);
   - added or reduced pressures on natural resources (water, flora, and so on) and services;
   - introduction or expansion of forage crops to optimize livestock feeding (see checklist on crop production);
   - any form of overexploitation of plant and water resources that exceeds the environment's carrying capacity, that is, the maximum population that an environment and its components can sustain without compromising their growth, regeneration and roles in ecological regulatory functions (bearing in mind the positive aspects of plant/herbivore relationships, such as seed dispersal and germination, and so on);
   - erosion of fragile or thin soils, on sloping areas or near bodies of water that can be accompanied by increased sedimentation in waters, as a result of destruction of plant cover, failure to provide for vegetated buffer strips, or unregulated, overly frequent and improper burns carried out to eliminate pests and undesirable plant species in favour of species that are palatable to livestock, and so on;
   - compaction of the soil, and changes in its structure, texture, drainage, permeability and/or water-holding capacity due to livestock trampling;
   - depletion of water supplies and degradation of water quality if the number and location of water supply points is not strategically planned, if access is not restricted on the basis of their renewal and/or if access is not prohibited during the wet season when other sources of water are available, if effective contamination prevention measures are not taken, and so on;
   - increased incidence of parasites (such as ticks) and diseases (such as trypanosomiasis, brucellosis, anthrax, fevers, respiratory and skin problems, and so on) in livestock and/or humans caused by inadequate composition of the herd and lack of diversity, pools of stagnant water, water and food contamination, and so on;
   - nuisances (foul odours, noise, dust), risks of accidents, health risks, soil pollution, water pollution (including eutrophication) and/or air pollution due to project activities (improper use of pesticides, antibiotics, hormones, vaccines, epizootic diseases, unsanitary production of milk, faecal coliforms, high concentration of animals on a small area, and so on), harvesting of resources and their subsequent processing;
   - socio-economic and value conflicts if the population's preferences for certain species or their views on genetic selection and manipulation are not taken into account, if there are conflicts between the population's various activities, and so on;

- an increase or a decrease in the local prices of food products and/or forage and an effect on local and regional economies (financial resource management system, credit system, access to markets, start-up of businesses, and so on);
- sustainable economic development and fair and equitable forms of partnership;
- involvement of the population and all its specific groups in agreements regarding the use and management of the territory and its resources, payments and control, economic decisions and monitoring of pasture management?

2. More specifically, in the case of confined animal husbandry systems (stables, pens), is there a possibility of:
   - overgrazing if overly large quantities of plant resources, intended for too large a confined livestock herd, are harvested on too small an area, whether it is the dry season or not, without considering the site's carrying capacity;
   - surface water and groundwater pollution, methane production, foul odours, and heath risks caused by improper storage, collection and use of manure?

3. More specifically, in the case of animal husbandry using transhumance systems, is there a possibility of:
   - overgrazing, if the herd is too large; if livestock movements are not synchronized with plant growth and on the basis of the characteristics of common property; if a grazing rotation system is not implemented and if the duration and period of grazing are not regulated to allow plant regrowth and renewal of water sources; if no provision is made for combining domestic species with different food preferences depending on the characteristics of the environment; if provision is not made for deferred grazing areas when necessary, and so on?

CHECKLIST #10 CROP PRODUCTION

Extensive and intensive crop production or optimization projects, which involve either an increase in cultivated areas or increased use of inputs (labour, fertilizers, pesticides, mechanization, genetically selected varieties, and so on) on areas already under cultivation.

A. Questions relating to the crop production project site

1. What are the land uses, activities and existing infrastructures on the proposed site of the project? What are the land use master Plan and land tenure? What are the characteristics of the population? What is the population density in relation to available arable lands and to the land to be rehabilitated? Are the project objectives consistent with the population's needs, wishes, subsistence activities, and traditional and socio-economic activities? What are the government policies regarding agriculture, crop production and land tenure? Could the project lead to:
   - changes in ways of life and cultural characteristics (if means of subsistence are disrupted by the introduction of "modern" production techniques, requiring additional inputs and/or cash crops; if existing positive aspects of environmental management, such as use of agricultural residues, are not enhanced, and so on);
   - displacements of the population and/or the loss of territory (migrations, expropriations, eviction of tenants or squatters, effects on aboriginal populations, and so on);
   - accentuation of social inequalities (if specific groups of the population, such as women, farmers, livestock producers, and so on have not been consulted; if the number of beneficiaries of the project is limited; if there is an increase in the workload of women; if women are limited in their choice of arable land or are restricted to subsistence activities or low-income processing activities, and so on);
   - incompatible uses of land and resources, social conflicts, value conflicts and conflicts with respect to property rights (between industrial and agricultural areas, between common ownership of public or ancestral lands and private ownership of agricultural products, between producers and breeders, stemming from problems associated with supply of water, resources and various services, and so on);
   - a decrease or an improvement in the quality of life;
   - improvement in food security and/or increased income depending on the terms of trade, accessibility to diversified markets and the development of socio-economic activities;
   - greater awareness of the importance of a healthy environment through training and community involvement in planning, management, economic decisions (fees for water use, land use), project follow-up and environmental conservation and restoration measures (study of pests, erosion control, tree planting, water conservation, perennial crops along contour lines, green fertilizers, intercropping, windbreaks, and so on);
   - optimization of land use through its enhancement for multiple purposes by means of agro-sylvo-pastoral systems or agroforestry projects, such as planting live fences, combining fruit trees, nitrogen-fixing plants or medicinal plants and vegetable crops, and so on?

2. What types of environment and landscape are present in the area? What is their specific importance? Are there bodies of water, waterways, slopes, wooded areas, wetlands, desert areas or other vulnerable sites nearby? What are the characteristics of native and exotic plant life in this region? What type of wildlife inhabits this region? What are the available sources of water? What are their characteristics in terms of quality, quantity and renewal? What are the characteristics of soils (stability, composition, texture, drainage, acidity, salinity, fertility, and so on) and topography? What are the characteristics of the area's climate (temperature, abundance and variation of rainfall, droughts, floods, natural disasters, and so on)? Could the project have an effect on:
   - environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources (water, soil, vegetation, wildlife, and so on) they contain;
   - rare or vulnerable species and/or species of economic, cultural or ecological importance (biodiversity)?

B. Questions relating to the crop production project

1. What plant species have been selected and what are their characteristics (water and nutrient requirements, growth rate, space requirements, range and depth of the root system, symbiotic species, vulnerability to climate and insects, accumulation and reaction to toxins, maintenance requirements, origin, and so on)? What are the provenance and quality of seeds? Have they been chemically treated, genetically manipulated or selected and tested for resistance? Could the project lead to:
   - changes in, encroachments on and/or destruction of indigenous environments and/or existing crops by introducing exotic species and/or monocultures resulting in a loss of biological diversity and stability, changes in plant, wildlife and insect composition, competition with natural vegetation for nutrients, water, light, and so on;
   - social and value conflicts (for instance, if the population's preferences in terms of the species to be planted are ignored, and so on)?

2. What are the different site preparation activities? Will there be demolition of existing buildings, erection of fences, earthmoving, levelling, soil amendment, clearing, slash and burn techniques or wetland reclamation? Will the construction of wells, irrigation systems, roads, and so on be required (see appropriate checklists)? What maintenance and follow-up activities will be carried out? What techniques and materials will be used (mechanized or manual maintenance, plastic materials, mulch, thinning, watering techniques, monitoring and follow-up, and so on)? Are they adapted to the environment? Is there enough water to meet the various requirements of the community and neighbouring communities? Does the project involve processing activities (agro-industries, see other relevant documents)? Could the project lead to:
   - changes in, encroachments on and/or the destruction of environments or sites of economic, ecological, cultural, archaeological or historical importance and the natural resources they contain, caused by deforestation, desertification and associated climatic changes, slash-and-burn agriculture on vast areas, and so on;
   - soil degradation (erosion, compaction, changes in drainage, fertility, water-holding capacity, and so on), particularly on steep slopes, fine or weak soils, in the case of heavy precipitation or soils having complex drainage and fertility cycles, and increased sedimentation of waters caused by: overly frequent soil tillage, inadequate burns, improper use of heavy machinery, improper clearing techniques, inappropriate selection of the quantity and spacing of species, runoff and leaching of soils following improper extraction and transport, removal of agricultural residues from the ground, elimination or damage of planted cover (wet and dry seasons), reduction of fallow duration and number of fallow lands, planting of annual field crops, such as corn, manioc and millet, on vast areas which exposes soils to risks of erosion, inappropriate timing of harvesting in extreme seasons, lack of crop rotation and loss of associated benefits in maintaining soil fertility, adoption of monoculture systems rather than companion planting, and so on;
   - soil salinization due to groundwater use that exceeds its recharge rate and to improper irrigation practices;
   - soil acidification, for instance, by converting mangrove forests to rice paddies in brackish environments;
   - an increase in harmful species (for example, undesirable plants in agriculture, invasive plants, and so on) and/or disease vectors associated with humid areas (depending on the use, supply and proximity of water sources; if agricultural practices are carried out in wetlands; if monocultures occupy extensive areas; if broad-spectrum pesticides are used, that is, nonselective pesticides, and so on);
   - changes in the quality and quantity of groundwater and surface waters (depending on availability and source of water supplies, groundwater recharge rate, other uses by the community, and so on);
   - nuisances (noise, odours, airborne dust), health risks, risks of accidents and/or problems of surface water, groundwater, soil and air pollution in preparing and maintaining plots, and in resource harvesting and processing;

- socio-economic problems (loss of subsistence resources for aboriginal populations; control of resources by large operators; rivalries between users, owners and authorities; spontaneous, unplanned agricultural settlements following an increase in population due to migration, and so on) associated with abusive resource harvesting practices;
- added or reduced pressures on water, soil, arable lands, energy sources, flora, fauna, infrastructures and local services; an increase or a decrease in the local prices of agricultural products and inputs and an effect on local and regional economies (financial resource management system, credit system, access to markets, start-up of businesses, and so on);
- equitable reallocation of profits and/or positive spin-offs in the community and its specific groups;
- assumption of responsibility by the community for its needs and the project, clear responsibilities, reinvestment of knowledge in the community and reduction of rural outmigration;
- sustainable economic development, sustainability of the agricultural system, fair and equitable forms of partnership and ease of access to subsistence resources and resources of good market value?

3. More precisely, if the project involves the use of pesticides and fertilizers, is there compliance with legislation? Have physical (such as traps, bait, weeding, crop rotation, companion planting, and so on), biological (such as using natural enemies, attractants or repellents, and so on) and chemical alternatives been studied? Is there knowledge of harmful species and their abundance, habitats and life cycle? What is the soil fertility? How do soil structure and climate affect soil fertility? What are the details of user training? What is the management and follow-up Plan for this component of the project? Are efforts directed at managing pests rather than eliminating them? Is there a possibility of:
   - eutrophication of water bodies (associated with excessive loadings of nitrates and phosphates contained in fertilizers), subsequent imbalances in aquatic ecosystems and their food chains and problems with the availability of quality water supplies;
   - soil acidification, particularly in tropical regions, due to excessive, long-term application of nitrogen fertilizers;
   - development in pest populations of resistance to pesticides due to excessive, repeated application of broad-spectrum pesticides and other pesticides;
   - elimination of beneficial non-target organisms (such as bees and other pollinating insects, nearby indigenous vegetation, and so on);
   - an imbalance in natural pest control mechanisms (for example, if the application of broad-spectrum pesticides results in elimination of their natural enemies, the pests may be able to recover more quickly and reappear);
   - air pollution (undirected aerial spraying, application on windy days, and so on), soil pollution, groundwater and surface water pollution (by seepage and/or runoff) caused by improper management of pesticides (herbicides, insecticides, fungicides, and so on) and/or organic and chemical fertilizers;
   - bioaccumulation of toxic products in the food chain (concentration in fats and in carnivores);
   - nuisances (foul odours), health risks (poisonings associated with pesticide use or ingestion of foods containing pesticide residues or faecal coliforms; neurological disorders; respiratory, skin and gastrointestinal problems; allergies; congenital defects, and so on) and risks of accidents (such as spills) resulting from improper use of pesticides (excessive concentrations, poor understanding of phytosanitary labels, application on steep slopes, near water bodies and waterways, and so on), lack of proper protective equipment (overalls, gloves, glasses, masks, and so on), poor management of pesticides and/or organic and chemical fertilizers (equipment maintenance and cleaning, storage, transportation, disposal)?

Nutrition and Health Tool

This nutrition and health tool will help you to measure and monitor the prevalence of child malnutrition, diseases, and death rates in your project area. The goals are: to report the percentage of under-5 children who are malnourished as defined by one or more of the standard indicators, the percentage of children who are affected by key symptoms, and the rate at which people in the project area are dying. By repeating the survey at various times, you can track changes in these important indicators. Note that some training is required to collect this information accurately. If this is your first time doing a nutrition and health survey, we recommend that you hire a supervisor with experience and training in this area.

Data Collection

Use the childhood nutrition and health table (below) to collect information on nutritional status and illnesses. Enter information from all under-5 children selected in your sample. Add extra rows and pages as needed. Note that a standard sample size for nutritional surveys is 30 clusters of 30 children each (a total of 900 children).

See the Appendix to this tool for detailed instructions on weighing and measuring children.

Increase the accuracy of your survey by:

- Training enumerators properly before the survey begins. Training should include a day of observed data collection, to ensure that enumerators are using the instruments properly and reading and recording the results accurately
- Ensuring that all equipment is calibrated and functioning properly
- Double checking data entry. Identify and eliminate or validate any extreme values.

Childhood Nutrition and Health Table
(Add this table to your questionnaire)

Village/Cluster No. _____ Team No. _____ Date of Survey _____

Family No.	***Child No.***	***Date of Birth***	***Age*** *(mos)*	***Sex*** *1=M 2=F*	***Height*** *(cm)*	***Weight*** *(kg)*	***Oedema*** *1=Yes 0=No*	***In the past two weeks, has the child had:***			
								Cough *1=Yes 0=No*	***Fever*** *1=Yes 0=No*	***Diarrhea*** *1=Yes 0=No*	***Vomiting*** *1=Yes 0=No*
10	1	21/04/01	22	1	82.2	11.5	0	1	1	0	0

NOTE: "Oedema" refers to bilateral pitting oedema – depressions in the skin remain after thumb pressure on the top of each foot. We have found that this symptom is often mistaken unless enumerators are well trained by a qualified person.

Mortality Questions

(Add these questions to your household questionnaire)

How many people in this household have died in the past three months? _____

How many children under 5 years of age in this household have died in the past three months? _____

Data Analysis

Child Nutrition

The child nutrition and health data should be entered into a statistical package (preferably Epi-Info, which will automatically calculate nutritional indices). The goal is to determine what percentage of children are affected by the main types of malnutrition: wasting (low weight-for-height), stunting (low height-for-age), and underweight (low weight-for-age).

In order to determine which children are malnourished, each child's weight and height needs to be compared with data from a standard population. The World Health Organization recommends that children be compared to the National Centre for Health Statistics (NCHS) dataset, which gives the heights and weights of well-nourished U.S. children. Two methods are commonly used to make this comparison. The first is to calculate a Z-score for each child. A Z-score tells you how far the child deviates from the average. In general, a Z-score of -2 indicates moderate malnutrition, and a Z-score of -3 indicates severe malnutrition for all indices. If you are using a statistical package like Epi-Info, these Z-scores can be calculated automatically. The second method is to calculate the child's height or weight as a % of the **median** height or weight for the standard population. The median is the middle score (e.g. if you had a sample of 100 children arranged from shortest to tallest, the "median" height would be the height of the 50th child). Again, if you are using a statistical package like Epi-Info, these calculations can be done automatically.

Once you have compared each child to the standard population and generated a Z-score or % of the median for each child, you are ready to calculate the prevalence of malnutrition. This is done quite simply, by counting all of the children whose Z-score or % of median is below the cut-off value for each indicator. To calculate the prevalence of wasting (indicating acute malnutrition), count all of the children in your sample with a weight-for-height Z-score less than -2. Report the result as a % of the total sample. For example, if you measured 850 children, of whom 98 had a weight-for-height Z-score less than -2, the prevalence of wasting would be 98/850 = 11.5%.

The following table provides general guidelines for interpreting the nutritional indices.

Index	Prevalence			
	Low	Medium	High	Very High
Wasting (weight-for-height Z<-2)	<5.0%	5.0-9.9%	10.0-14.9%	>=15.0%
Stunting (height-for-age Z <-2	<20.0%	20.0-29.9%	30.0-39.9%	>=40.0%
Underweight (weight-for-age Z<-2)	<10.0%	10.0-19.9%	20.0-29.9%	>=30.0%

Calculate the prevalence of severe malnutrition by repeating the analysis in the previous paragraph, using a Z-score less than -3 as the cut-off. In general, any significant prevalence of severe malnutrition is cause for concern.

Note that the definition of “Global Acute Malnutrition” includes children with low weight-for-height (Z-score less than -2) AND children with oedema. The definition of “Severe Acute Malnutrition” includes children with severely low weight-for-height (Z-score less than -3) AND children with oedema. In other words, children with oedema are considered severely malnourished, whether or not they are wasted. Oedema should be assessed only by well trained staff – otherwise it tends to be incorrectly diagnosed.

Child Health

The incidence of key childhood illnesses over the past two weeks can be analyzed using a statistics package such as Epi-Info, or the data may be simply entered into an Excel spreadsheet. The goal is to calculate the % of children that have experienced each of the key illnesses over the past two-week period.

Each row in your spreadsheet should contain the data from one child. As in the data entry form (previous page) the diseases are listed as separate columns, in which you enter “1” if the child has experienced the symptoms in the past two weeks, or “0” if the child has not experienced those symptoms.

If you have used “1”s and “0”s to code your data, you can calculate the two-week incidence by dividing the sum of each column (the total of all the “1”s) by the total number of respondents. Thus, if 203 children had diarrhea in the past two weeks and the total number of children surveyed was 988, the two-week incidence of diarrhea would be estimated at 203/988 = 21%.

Note, if some children did not respond to the question, or the data were not entered for some reason, those children should be left out of the calculation entirely. Continuing with our example, if 988 children were surveyed, but 88 did not answer the question about diarrhea, then the incidence should be calculated as 203/900 = 23%.

Mortality

In emergencies, mortality rates are often reported as a daily rate (number of deaths per 10,000 people per day). Otherwise, annual rates are generally used (number of deaths per 1,000 people per year).

The questionnaire asks for the number of deaths in the household over the past three months. To convert a three-month mortality rate to a daily rate, simply divide the number of deaths by 90 (the number of days in the recall period). To convert a three-month mortality rate to an annual rate, multiply the number of deaths by four (since a year is equal to three months times four).

Example:

You surveyed a sample of 900 households with an average household size of 5. The total sample size is 900 X 5 = 4,500 individuals. Your survey found that 7 people died in those 900 households over the past three months. Thus, over the past 90 days, there were 7 deaths per 4,500 people. That is the same as 15.55 deaths per 10,000 (= 10,000 X 7 / 4,500) per 90-day period. That is equal to 15.55 / 90 = 0.17 per 10,000 per day.

For reference, 1 death per 10,000 per day is considered a serious situation. A mortality rate of 2 deaths per 10,000 per day is considered an emergency.

The under-5 mortality rate is calculated in much the same way. Take the total number of under-5’s that died in the past 90 days, divide by the total number of under-5’s in the sample, multiply by 10,000 and divide by 90. Say that the 900 households surveyed included a total of 1,350 under-5’s. In those households, 3 children under-5 have died in the past 90 days. Thus, over the past 90 days, there were 5 deaths per 1,350 under-5’s = 37.04 deaths per 10,000 (= 10,000 X 5 / 1,350) per 90-day period. That is equal to 37.04/90 = 0.41 deaths per 10,000 per day.

For reference, an under-5 mortality rate of 2 deaths per 10,000 per day is considered a serious situation. An under-5 mortality rate of 4 deaths per 10,000 per day is considered an emergency.

Presentation

Nutrition

The minimum requirements for reporting nutritional data include a detailed methods section (describing sample selection and data collection), breakdown of the sample by age group and sex, and the nutritional data reported in a table as follows:

Table 1. Prevalence of wasting among under-5s in Anywheria Region

Indicator	Baseline		End of project	
	Girls n=462	Boys n=438	Girls n=460	Boys n=433
Wasting (WHZ <-2)	6.5	7.2	5.5	5.6
Severe Wasting (WHZ <-3)	1.0	1.3	0.5	0.5

Table 2. Prevalence of stunting among under-5s in Anywheria Region

Indicator	Baseline		End of project	
	Girls n=462	Boys n=438	Girls n=460	Boys n=433
Stunting (HAZ <-2)	23.0	21.2	21.0	21.1
Severe Stunting (HAZ <-3)	2.4	1.8	1.7	1.1

Table 3. Prevalence of underweight among under-5s in Anywheria Region

Indicator	Baseline		End of project	
	Girls n=462	Boys n=438	Girls n=460	Boys n=433
Underweight (WAZ <-2)	16.1	15.5	12.2	14.8
Severe Underweight (WAZ <-3)	1.8	1.6	1.1	0.9

Health

The minimum requirements for reporting health data include a detailed methods section (describing sample selection and data collection), breakdown of the sample by age group and sex, and the health data reported in a table as follows:

Table 1. Two-week incidence of key diseases among children in Anywheria Region

Illness	Baseline		End of project	
	Girls n=462	Boys n=438	Girls n=460	Boys n=433
Diarrhea	10.0	12.4	8.9	10.2
Vomiting	3.3	5.6	3.4	6.4
Cough	34.5	23.4	32.6	25.5
Fever	19.9	16.7	15.8	16.5

Mortality

The minimum requirements for reporting health data include a detailed methods section (describing sample selection and data collection), breakdown of the sample by age group and sex, and the mortality data reported as follows:

Mortality Rate	Baseline		End of Project	
	n	rate (/ 10,000/day	n	rate (/ 10,000/day
Crude Mortality rate (/ 10,000 / day)	4,500	0.32	4,500	0.24
u5 Mortality rate (/ 10,000 / day)	1,350	1.1	1,350	0.86

The following material is reprinted from Annex 1, "Summary Procedures", of *HOW TO WEIGH AND MEASURE CHILDREN: ASSESSING THE NUTRITIONAL STATUS OF YOUNG CHILDREN IN HOUSEHOLD SURVEYS*, prepared by the United Nations Department of Technical Co-operation for Development and Statistical Office, New York, 1986.

Precautions Before Measuring

A. Layout of the Procedures

Each step of the measurement procedures is directed at specific participants, who are named in bold letters at the beginning of each step: e.g. "Measurer", "Assistant", etc.

B. Two Trained People Required

Two trained people are required to measure a child's height and length. The measurer holds the child and takes the measurements. The assistant helps hold the child and records the measurements on the questionnaire. If there is an untrained assistant, such as the mother, then the trained measurer should also record the measurements on the questionnaire. One person alone can take the weight or arm circumference of a child and record the results if an assistant is not available.

C. Measuring Board and Scale Placement

Begin to observe possible places where the board can be positioned and the scale hung as soon as you walk towards a sample household. Be selective about where you place the measuring board and scale. It is best to measure outdoors during daylight hours. If it is cold, raining or if too many people congregate and interfere with the measurements, it may be more comfortable to weigh and measure a child indoors. Make sure there is adequate light.

D. Age Assessment

Before you measure, determine the child's age. If the child is less than two years, measure length. If the child is two years of age or older, measure height (see Annex C). If accurate age is not possible to obtain, measure length if the child is less than 85 cm. Measure height if the child is equal to or greater than 85 cm.

E. When to Weigh and Measure

Weigh and measure after verbal information has been recorded on the questionnaire. This will allow you to become familiar with the members of the household. DO NOT weigh and measure at the beginning of the interview, i.e. as soon as you enter a household, which would be more of an upsetting intrusion.

F. Weigh and Measure One Child at a Time

If there is more than one eligible child in a household, complete the entire questionnaire, including the weighing and measuring of one child. Then proceed with the next eligible child's questionnaire in the household. DO NOT weigh and measure all the children together. This can

easily cause confusion and will create a greater chance for error, such as recording one child's measurements on another child's questionnaire. Return measuring equipment to their storage bags immediately after you complete the measurements for each household.

G. Control the Child

When you weigh and measure, you must control the child. The strength and mobility of even very young children should not be underestimated. Be firm, yet gentle, with children. Your own sense of calm and self confidence will be felt by the mother and the child.

When a child has contact with any measuring equipment, i.e. on a measuring board, in the weighing pants or with an arm circumference tape, you must hold and control the child so the child will not trip or fall. Never leave a child alone with a piece of equipment. Always have physical contact with the child, except when you must let go of a child for a few seconds while taking the weight.

H. Coping with Stress

Since weighing and measuring requires touching and handling children, normal stress levels for this type of survey work are higher than for surveys where only verbal information is collected.

Explain the weighing and measuring procedures to the mother, and to a limited extent, the child, to help minimize possible resistance, fears or discomfort they may feel. You must determine if the child or mother is under so much stress that the weighing and measuring must stop. Remember, young children are often uncooperative; they tend to cry, scream, kick and sometimes bite. If a child is under severe stress and is crying excessively, try to calm the child or return the child to the mother for a moment before proceeding with the weighing and measuring.

Do not weigh or measure a child if:

a. The mother refuses.
b. The child is too sick or too distressed.
c. The child is physically deformed, which will interfere with or give an incorrect measurement. To be kind, you may want to measure such a child and make a note of the deformity on the questionnaire.

I. Recording Measurements and Being Careful

Record the measurements in pencil. If you make an error, completely erase the error and rewrite the correct numbers. Keep objects out of your hands and pencils out of your mouth, hair or breast pocket when you weigh and measure so that neither the child nor you will get hurt due to carelessness. When you are not using a pencil, place it in your equipment pack, pencil case or on the survey form. Make sure you do not have long fingernails. Remove interfering rings and watches before you weigh and measure. Do not smoke when you are in a household or when you weigh and measure.

J. Strive for Improvement

You can be an expert measurer if you strive for improvement and follow every step of every procedure the same way every time. The quality and speed of your measurements will improve with practice. You may be working with a partner to form a team. If so, you will be responsible for not only your own work, but also for the quality of work of your team.

You will be required to weigh and measure many children. Do not take these procedures for granted even though they may seem simple and repetitious. It is easy to make errors when you are not careful. Do not omit any steps. Concentrate on what you are doing.

II. Nutritional Status Measurement Summary Procedures

A. Child Height Summary Procedure (Illustration 1)*

1. **Measurer or Assistant:**
   Place the measuring board on a hard flat surface against a wall, table, tree, staircase, etc. Make sure the board is stable.

2. **Measurer or Assistant:**
   Ask the mother to remove the child's shoes and unbraid any hair that would interfere with the height measurement. Ask her to walk the child to the board and to kneel in front of the child (if she is not the assistant).

3. **Assistant:**
   Place the questionnaire and pencil on the ground (Arrow 1). Kneel with both knees on the right side of the child (Arrow 2).

4. **Measurer:**
   Kneel on your right knee only, for maximum mobility, on the child's left side (Arrow 3).

5. **Assistant:**
   Place the child's feet flat and together in the centre of and against the back and base of the board. Place your right hand just above the child's ankles on the shins (Arrow 4), your left hand on the child's knees (Arrow 5) and push against the board. Make sure the child's legs are straight and the heels and calves are against the board (Arrows 6 and 7). Tell the measurer when you have completed positioning the feet and legs.

6. **Measurer:**
   Tell the child to look straight ahead at the mother if she is in front of the child. Make sure the child's line of sight is level with the ground (Arrow 8). Place your open left hand on the child's chin. Gradually close your hand (Arrow 9). Do not cover the child's mouth or ears.

   Make sure the shoulders are level (Arrow 10), the hands are at the child's side (Arrow 11), and the head, shoulder blades and buttocks are against the board (Arrows 12, 13, and 14). With your right hand, lower the headpiece on top of the child's head. Make sure you push through the child's hair (Arrow 15).

7. **Measurer and Assistant:**
   Check the child's position (Arrows 1-15). Repeat any steps as necessary.

8. **Measurer:**
   When the child's position is correct, read and call out the measurement to the nearest 0.1 cm. Remove the headpiece from the child's head, your left hand from the child's chin and support the child during the recording.

9. **Assistant:**
   Immediately record the measurement and show it to the measurer.
   NOTE: If the assistant is untrained, the measurer records the height.

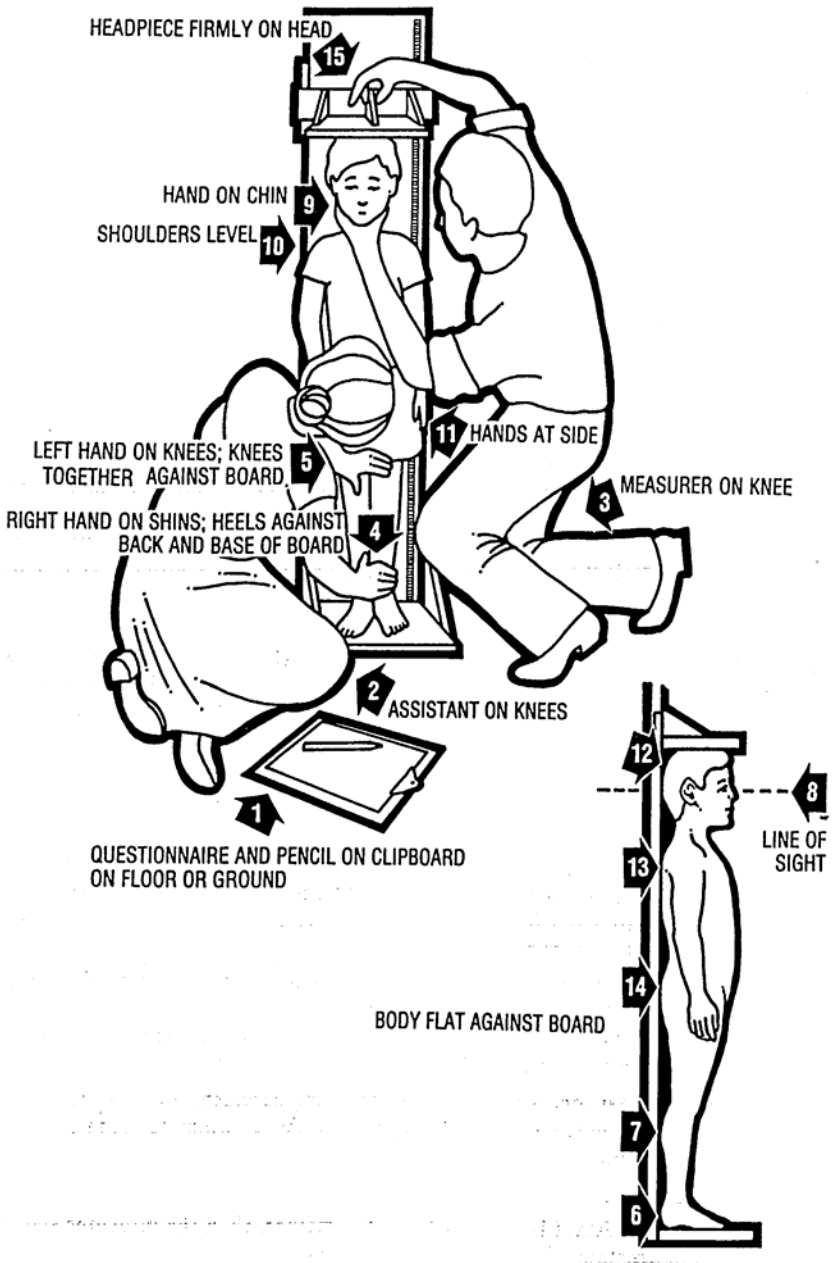
10. **Measurer:**
    Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to erase and correct any errors.

---

* If the assistant is untrained, e.g. the mother, then the measurer should help the assistant with the height procedure.

Illustration 1

Child Height Measurement



B. Child Length Summary Procedure (Illustration 2)*

1. **Measurer or Assistant:**
   Place the measuring board on a hard flat surface, i.e. ground, floor or steady table.

2. **Assistant:**
   Place the questionnaire and pencil on the ground, floor or table (Arrow 1). Kneel with both knees behind the base of the board, if it is on the ground or floor (Arrow 2).

3. **Measurer:**
   Kneel on the right side of the child so that you can hold the footpiece with your right hand (Arrow 3).

4. **Measurer and Assistant:**
   With the mother's help, lie the child on the board by doing the following:

   Assistant:
   Support the back of the child's head with your hands and gradually lower the child onto the board.

   Measurer:
   Support the child at the trunk of the body.

5. **Measurer or Assistant:**
   If she is not the assistant, ask the mother to kneel on the opposite side of the board facing the measurer to help keep the child calm.

6. **Assistant:**
   Cup your hands over the child's ears (Arrow 4). With your arms comfortably straight (Arrow 5), place the child's head against the base of the board so that the child is looking straight up. The child's line of sight should be perpendicular to the ground (Arrow 6). Your head should be straight over the child's head. Look directly into the child's eyes.

7. **Measurer:**
   Make sure the child is lying flat and in the centre of the board (Arrows 7). Place your left hand on the child's shins (above the ankles) or on the knees (Arrow 8). Press them firmly against the board. With your right hand, place the footpiece firmly against the child's heels (Arrow 9).

8. **Measurer and Assistant:**
   Check the child's position (Arrows 1-9). Repeat any steps as necessary.

9. **Measurer:**
   When the child's position is correct, read and call out the measurement to the nearest 0.1 cm. Remove the footpiece, release your left hand from the child's shins or knees and support the child during the recording.

10. **Assistant:**
    Immediately release the child's head, record the measurement, and show it to the measurer.

    NOTE: If the assistant is untrained, the measurer records the length on the questionnaire.

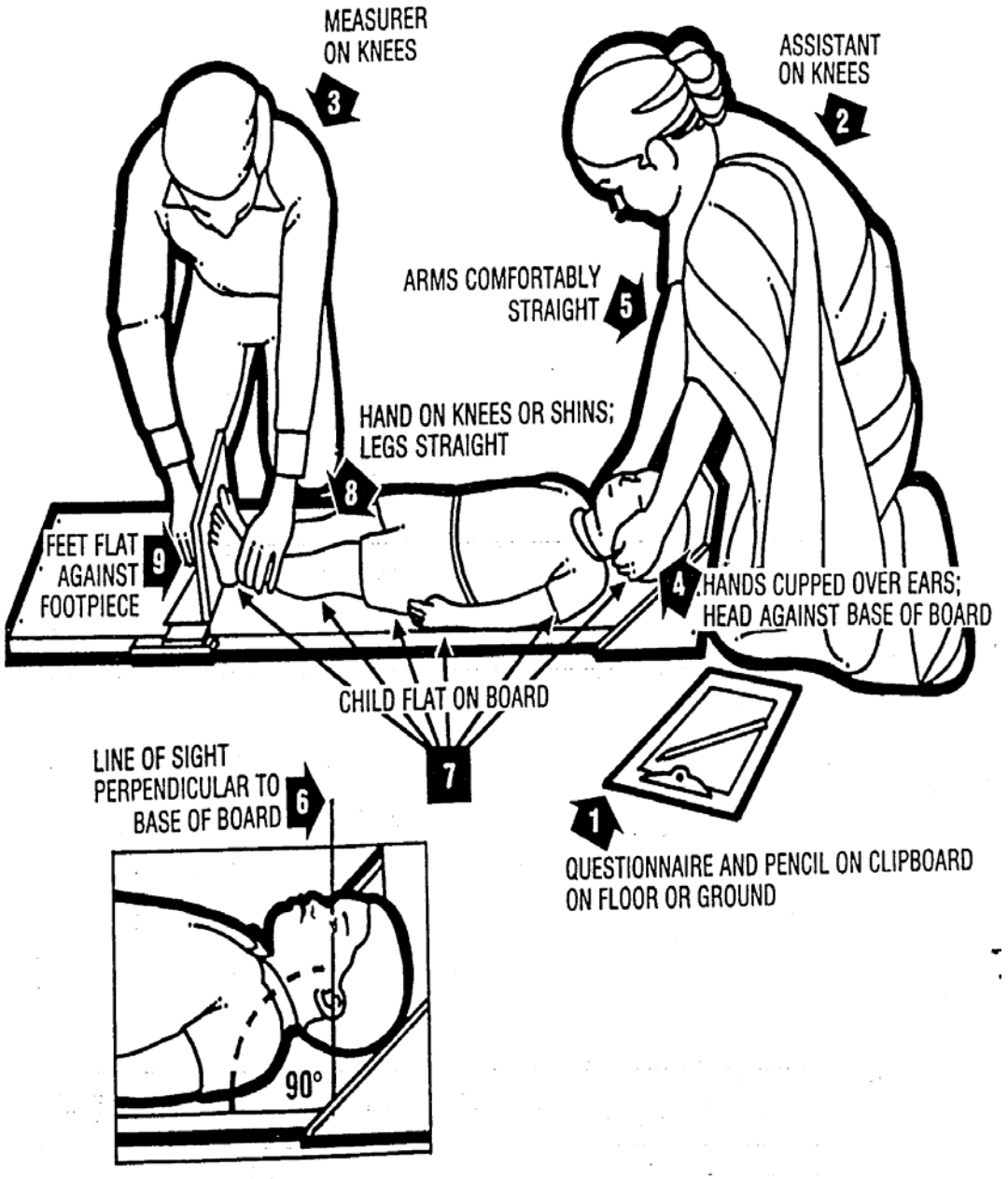
11. **Measurer:**
Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to erase and correct any errors.

---

* If the assistant is untrained, e.g. the mother, then the measurer should help the assistant with the length procedure.

Illustration 2

Child Length Measurement



C. Child Weight Summary Procedure (Illustration 3)*

1. **Measurer or Assistant:**
   Hang the scale from a tree branch, ceiling beam, tripod or pole held by two people. You may need a piece of rope to hang the scale at eye level. Ask the mother to undress the child.

2. **Measurer:**
   Attach a pair of the empty weighing pants, infant sling or basket to the hook of the scale and adjust the scale to zero, then remove from the scale.

3. **Measurer:**
   Have the mother hold the child. Put your arms through the leg holes of the pants (Arrow 1). Grasp the child's feet and pull the legs through the leg holes (Arrow 2). Make certain the strap of the pants is in front of the child.

4. **Measurer:**
   Attach the strap of the pants to the hook of the scale. DO NOT CARRY THE CHILD BY THE STRAP ONLY. Gently lower the child and allow the child to hang freely (Arrow 3).

5. **Assistant:**
   Stand behind and to one side of the measurer ready to record the measurement. Have the questionnaire ready (Arrow 4).

6. **Measurer and Assistant:**
   Check the child's position. Make sure the child is hanging freely and not touching anything. Repeat any steps as necessary.

7. **Measurer:**
   Hold the scale and read the weight to the nearest 0.1 kg. (Arrow 5). Call out the measurement when the child is still and the scale needle is stationary. Even children who are very active, which causes the needle to wobble greatly, will become still long enough to take a reading. WAIT FOR THE NEEDLE TO STOP MOVING.

8. **Assistant:**
   Immediately record the measurement and show it to the measurer.

9. **Measurer:**
   As the assistant records the measurement, hold the child in one arm and gently lift the child by the body. DO NOT LIFT THE CHILD BY THE STRAP OF THE WEIGHING PANTS. Release the strap from the hook of the scale with your free hand.

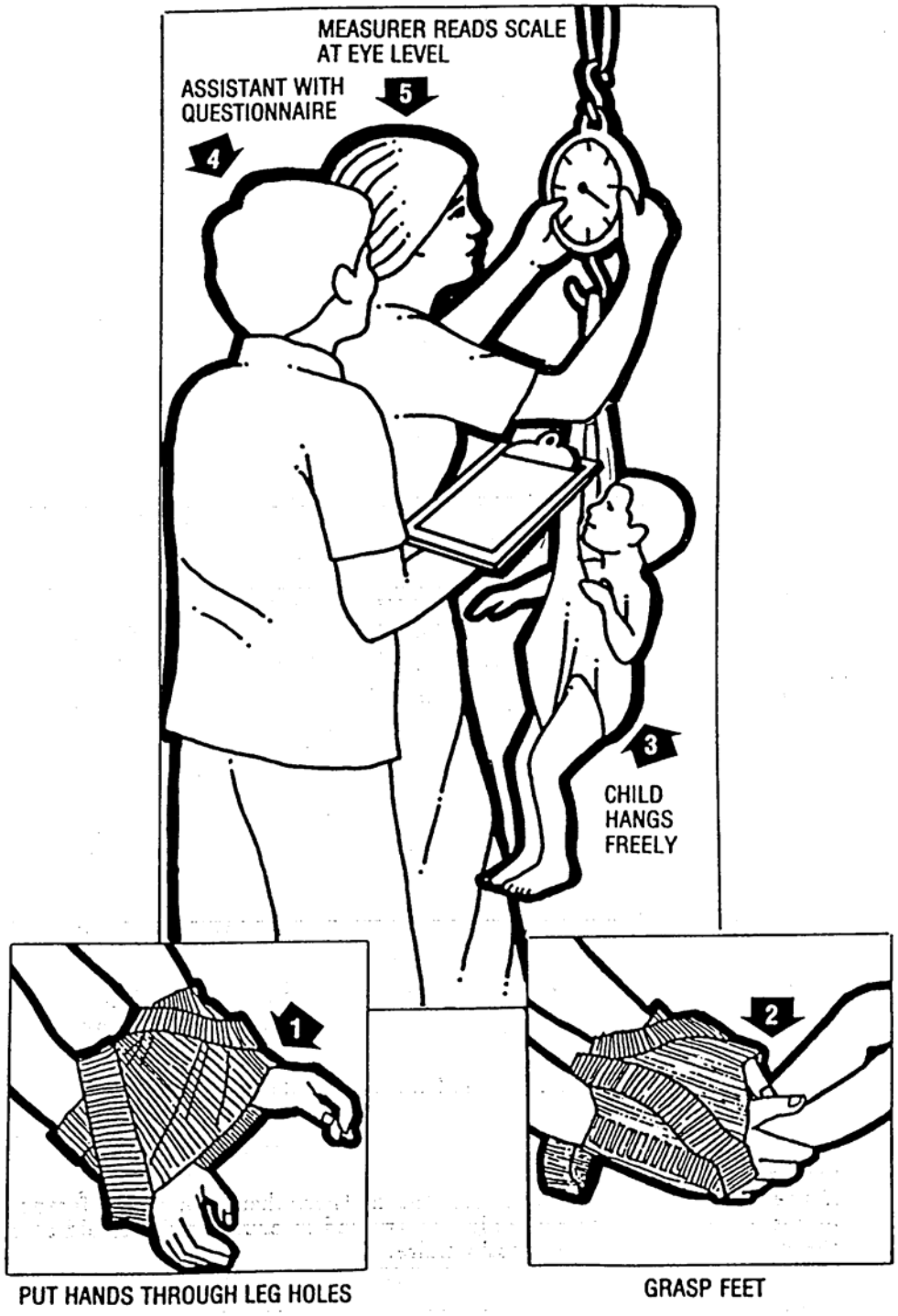
10. **Measurer:**
    Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to erase and correct any errors.

---

* If the assistant is untrained, e.g. the mother, then weight should be taken by one person only, the trained measurer, who should also record the measurement on the questionnaire.

Illustration 3

Child Weight



D. Child Mid-Upper Arm Circumference Summary Procedure (MUAC) (Illustration 4)*

1. **Measurer:**
   Keep your work at eye level. Sit down when possible. Very young children can be held by the mother during this procedure. Ask the mother to remove clothing that may cover the child's left arm.

2. **Measurer:**
   Calculate the midpoint of the child's left upper arm by first locating the tip of the child's shoulder (Arrows 1 and 2) with your fingertips. Bend the child's elbow to make a right angle (Arrow 3). Place the tape at zero, which is indicated by two arrows, on the tip of the shoulder (Arrow 4) and pull the tape straight down past the tip of the elbow (Arrow 5). Read the number at the tip of the elbow to the nearest centimetre. Divide this number by two to estimate the midpoint. As an alternative, bend the tape up to the middle length to estimate the midpoint. A piece of string can also be used for this purpose. Either you or an assistant can mark the midpoint with a pen on the arm (Arrow 6).

3. **Measurer:**
   Straighten the child's arm and wrap the tape around the arm at the midpoint. Make sure the numbers are right side up. Make sure the tape is flat around the skin (Arrow 7).

4. **Measurer and Assistant:**
   Inspect the tension of the tape on the child's arm. Make sure the tape has the proper tension (Arrow 7) and is not too tight or too loose (Arrows 8-9). Repeat any steps as necessary.

5. **Assistant:**
   Have the questionnaire ready.

6. **Measurer:**
   When the tape is in the correct position on the arm with the correct tension, read and call out the measurement to the nearest 0.1 cm. (Arrow 10).

7. **Assistant:**
   Immediately record the measurement on the questionnaire and show it to the measurer.

8. **Measurer:**
   While the assistant records the measurement, loosen the tape on the child's arm.

9. **Measurer:**
   Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to erase and correct any errors.

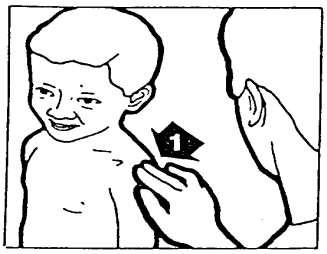
10. **Measurer:**
    Remove the tape from the child's arm.

---

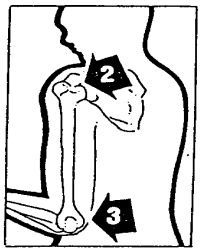
* If the assistant is untrained, e.g. the mother, then arm circumference should be measured by one person only, the trained measurer, who should also record the measurement on the questionnaire.

Illustration 4

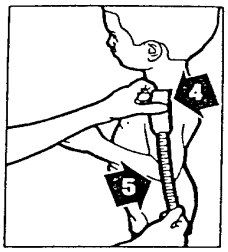
Child Mid-Upper Arm Circumference Measurement



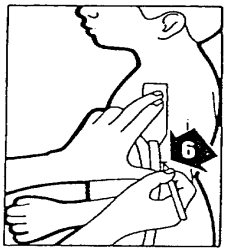
1 LOCATE TIP OF SHOULDER



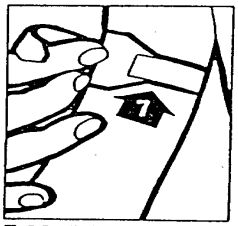
2 TIP OF SHOULDER
3 TIP OF ELBOW



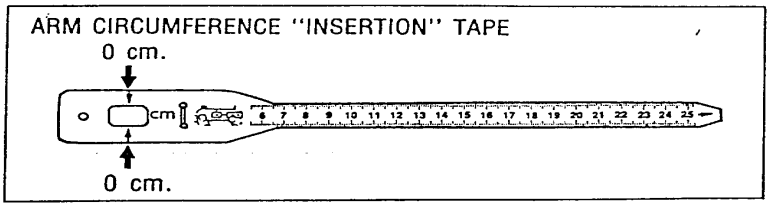
4 PLACE TAPE AT TIP OF SHOULDER
5 PULL TAPE PAST TIP OF BENT ELBOW

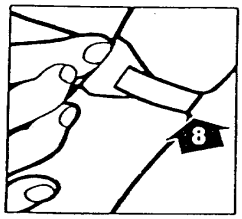


6 MARK MIDPOINT

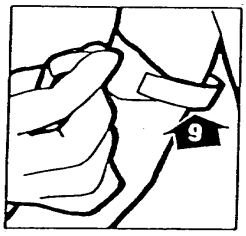


7 CORRECT TAPE TENSION

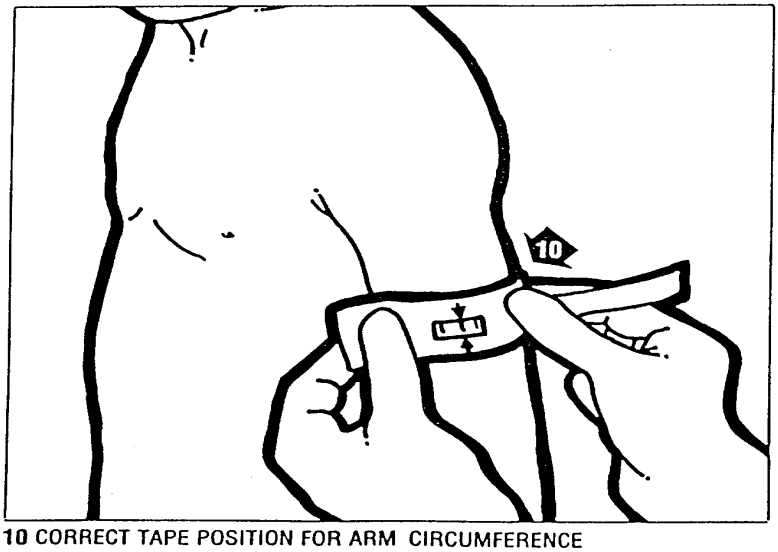




8 TAPE TOO TIGHT



9 TAPE TOO LOOSE



10 CORRECT TAPE POSITION FOR ARM CIRCUMFERENCE

Nutrition Survey Proposal – Basic Outline

1. Objectives of the Baseline Survey

The main objective of this rapid survey is to assess the current nutrition status of the population that will be used as reference data.

Specific objectives

1. To assess nutritional status of children aged 6 to 59 months.
2. To assess morbidity affecting the underfive population in the last two weeks.
3. To assess mortality affecting the underfive in the population in the last three months

2. Survey Design and Methodology

2.1 Description of the study area

To be completed by implementing organization.

2.2 Study population

At the household level the main respondent will be the mother; however, if the mother is not available at the time of the survey, the father or caretaker of the children will become the respondent. The nutritional status assessment will target all children, aged 6 to 59 months.

2.3 Sampling

Eligible households will be selected using the WHO 30 x 30 two-stage cluster sampling methodology for epidemiological studies. Names of all villages in the project area will be recorded and a total of 30 clusters (villages) will be randomly selected using probability in proportion to the size of each cluster. To achieve this random sampling, names of all clusters in the survey district will be written on pieces of paper, shuffled and the survey team members shall draw the required number of clusters.

2.4 Selection Criteria

Upon arrival at the cluster, enumerators will gather at the centre of the village (cluster). A bottle will be spun, and enumerators will be asked to go in the direction where the smaller end of the bottle points upon falling on the ground. From the first household the enumerators will go to the next closest household by the front door until all they finish all pre-numbered. A household will be eligible to participate in the survey whether or not it has an under-five child.

2.5 Survey Personnel

enumerators
Supervisors
drivers
data entry clerks
Project staff will assist in the supervision. # data entry personnel will be hired to enter all the data on daily basis from second day of the survey.

2.6 Timeframe

The survey will be carried out from ___ to ____

Activity	Number of days
1. Development of survey protocol and tools	#
2. Training of survey personnel	#
3. Pretest and feedback	#
4. Survey	#
5. Data Entry	#
6. Data cleaning and analysis	#
7. Report writing	#
Total Days	**##**

2.7 Survey tools and instruments

- A questionnaire will be developed and used to collect data during the survey. An English version will be used; however, during training the enumerators will be asked to translate the questionnaire into the local language. The translations will be discussed in detail in plenary until consensus is reached on appropriate translations.
- Height and length board: this instrument will be used to take height/length measurements for selected children under 5 years.
- Roller meter: recumbent length will be measured for all the children who will not have attained the age of two on the day of the survey using a roller meter.
- MUAC tape: a special tape for measuring mid upper arm circumference (MUAC) of children.
- Weighing Scale: this scale will be used to take weight measurements for all children. A weight measurement will be recorded on the display.

2.8 Training

A one-day training session for all survey team members will be conducted. Survey personnel will be acquainted with the programs, objectives of the survey, as well as the survey tools, instruments and methodology.

2.9 Pre-test and feedback

Before commencement of the actual survey, the survey tools and instruments shall be pre-tested at one of the villages in the study area. Each enumerator will complete two questionnaires and all pre-tested questionnaires shall be entered on computer to test the practicability of data entry. The pre-test exercise shall be discussed in plenary session and necessary changes on the questionnaire will be done accordingly.

2.10 Data collection

Data will be collected in the program area for a period of ___ days. Enumerators will take anthropometric measurements on children from selected households in each cluster.

2.11 Data entry and analysis

All the survey data will be entered in EpiInfo 6.04b or equivalent statistical package. The data shall be cleaned and all outliers shall be discarded after verification with actual questionnaires. Anthropometric data shall be analyzed using EpiNut or equivalent.

Household Food Consumption Tool

This food consumption tool will help you to measure and monitor the quantity and quality of food eaten by people in the project area. The goal is to report the percentage of the population who are not eating enough or well enough. By repeating the survey at various times, you can track changes in the amount and quality of food being eaten – are people eating more, less, or the same? This tool is based on the FANTA Guide *Measuring Household Food Consumption: A Technical Guide*, available in .pdf format from the FANTA website (www.fanta.org) or from the Foodgrains Bank.

Data Collection

Add the food frequency and diversity tables (below) to the questionnaire that you will use with households. **Make sure that you review each food on the diversity list**. Eliminate any foods that are not relevant or important to the target population. Add any foods that are relevant and important. Allow people from the target population to help you identify the key foods through focus group discussions and by testing the tool before you use it for the survey. **This is very important**. Including irrelevant foods will increase your workload. Ignoring locally important foods will reduce the usefulness of the tool.

Food Frequency Table
(Add this table to your questionnaire)

During the previous 24-hour period, did you or anyone in your household consume:

	Yes	***No***
a) Any food before a morning meal		
b) A morning meal		
c) Any food between morning and midday meals		
d) A midday meal		
e) Any food between midday and evening meals		
f) An evening meal		
g) Any food after the evening meal		
TOTAL		

NOTE: Ask about each possible meal or snack. People often leave out or forget certain meal times. Record the total number of mealtimes for the household (number of "yes" responses).

Food Diversity Table

During the previous 24-hour period, did you or anyone in your household consume:

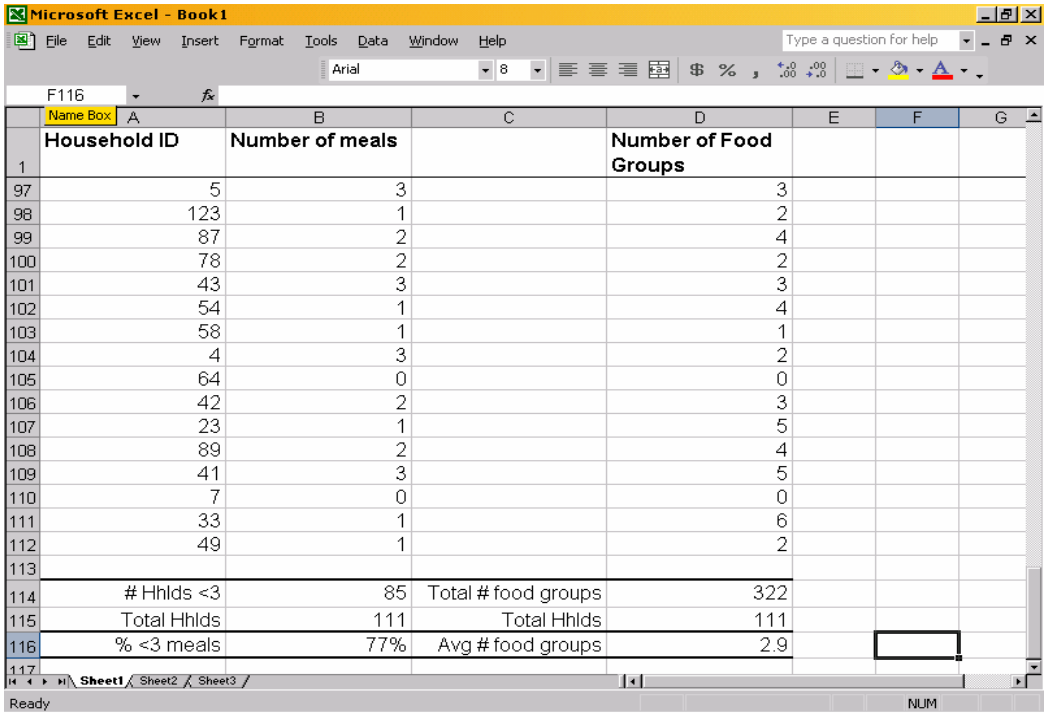
	Yes	***No***
a) Cereals (maize, rice, bread)		
b) Roots/Tubers (potato, cassava)		
c) Legumes (lentils, beans, peas)		
d) Milk/Milk Products (milk, yogurt, cheese)		
e) Eggs		
f) Meat/offal		
g) Fish/Seafood		
h) Oil/Fat (butter, vegetable oil, palm oil)		
i) Sugar/Honey		
j) Fruits (banana, orange, mango)		
k) Vegetables (spinach, onion, carrot)		
TOTAL		

NOTE: Substitute local foods as examples in each food group. Record the total number of food groups consumed by the household.

Data Analysis

The results from each questionnaire should be entered into a computer spreadsheet (e.g. Excel) or statistical package. Set up the spreadsheet as follows: leave one row for each household, one column for number of meals and one column for number of food groups. In each row enter the household ID (a number that you use to identify individual households) and the total number of meals and food groups (from the questionnaire)

We will use a simple example where 111 households were surveyed regarding their food consumption. The data were entered into an Excel Spreadsheet:



	A	B	C	D	E	F	G
1	**Household ID**	**Number of meals**		**Number of Food Groups**			
97	5	3		3			
98	123	1		2			
99	87	2		4			
100	78	2		2			
101	43	3		3			
102	54	1		4			
103	58	1		1			
104	4	3		2			
105	64	0		0			
106	42	2		3			
107	23	1		5			
108	89	2		4			
109	41	3		5			
110	7	0		0			
111	33	1		6			
112	49	1		2			
113							
114	# Hhlds <3	85	Total # food groups	322			
115	Total Hhlds	111	Total Hhlds	111			
116	% <3 meals	77%	Avg # food groups	2.9			
117							

Diet Quantity

Once all data have been entered, you can do the analysis. The most straightforward method is to calculate the % of households eating less than (for example) three meals per day. This cut-off can be altered, depending on local consumption patterns (for example, you might use two meals per day as the cut-off).

If you are using a spreadsheet such as Excel, you can use the COUNTIF formula to automatically calculate the number of households eating less than three meals per day. (In the example, the formula is =COUNTIF(B2:B112,"<3") – in other words, calculate the number of households with values less than three between B2 and B112).

You can then calculate the % by dividing the number of households consuming less than three meals per day by the total number of households (in the example: 85 households divided by the total of 111 households = 77% eating less than three meals per day). By doing a repeat survey at the mid-point or end of the project, you can assess whether the number of households with inadequate intake (less than three meals per day) has increased or decreased (a decrease might indicate an improvement in access to food).

Diet Quality

Once you have entered the number of food groups consumed by each household, you can do the analysis. The most straightforward method is to calculate the average number of food groups consumed. Simply add the total number of food groups eaten (322 in the example) and divide by the total number of households surveyed (111 in the example). This gives you the average number of food groups eaten by households in the survey area (2.9 in the example).

By doing a repeat survey at the mid-point or end of the project, you can assess whether the average number of food groups in the diet has increased or decreased (an increase might indicate an improvement in the quality of the diet – people are eating a more diverse range of foods).

Presentation

When you report this information, you may use a simple table as follows. Final reports should contain both the pre-project (baseline) results and the end-of-project results, to assess whether there has been any change in diet quantity and quality.

Table 1. Diet quantity and quality among households in Anywheria Region

Indicator	Baseline	End of project
% Eating less than three meals per day	77	40
Average number of food groups consumed	2.9	4.5

As always, your report should contain a clear description of your methods of data collection and analysis, and your interpretation of the results.

Simple Coping Strategies Tool

This simple coping strategies tool will help you to measure and monitor the use of a few key coping strategies by people in the project area. The goal is to report the percentage of the population using each key coping strategy. By repeating the survey at various times, you can track changes in the use of each coping strategy – is it being used by more people, fewer people, or the same number?

Data Collection

Add the coping strategies table (below) to the questionnaire that you will use with households. **Make sure that you review each coping strategy on the list**. Eliminate any strategies that are not relevant or important to the target population. Add any strategies that are relevant and important. Allow people from the target population to help you identify the key strategies through focus group discussions and by testing the tool before you use it for the survey. **This is very important**. Including irrelevant coping strategies will increase your workload. Ignoring locally important coping strategies will reduce the usefulness of the tool.

Coping Strategies Table
(Add this table to your questionnaire, using only locally relevant coping strategies)

In the past 30 days, if there have been times when you did not have enough food or money to buy food, how often has your household had to:

Coping Strategy	***Often***	***Rarely or Never***
a) Rely on less preferred and less expensive foods?		
b) Borrow food, or rely on help from a friend or relative?		
c) Purchase food on credit?		
d) Gather wild food, hunt, or harvest immature crops?		
e) Consume seed stock held for next season?		
f) Send household members to eat elsewhere?		
g) Send household members to beg?		
h) Limit portion size at mealtimes?		
i) Restrict adult consumption in order for small children to eat?		
j) Feed working members of household at the expense of non-working members?		
k) Ration the money you had and buy prepared food?		
l) Reduce number of meals eaten in a day?		

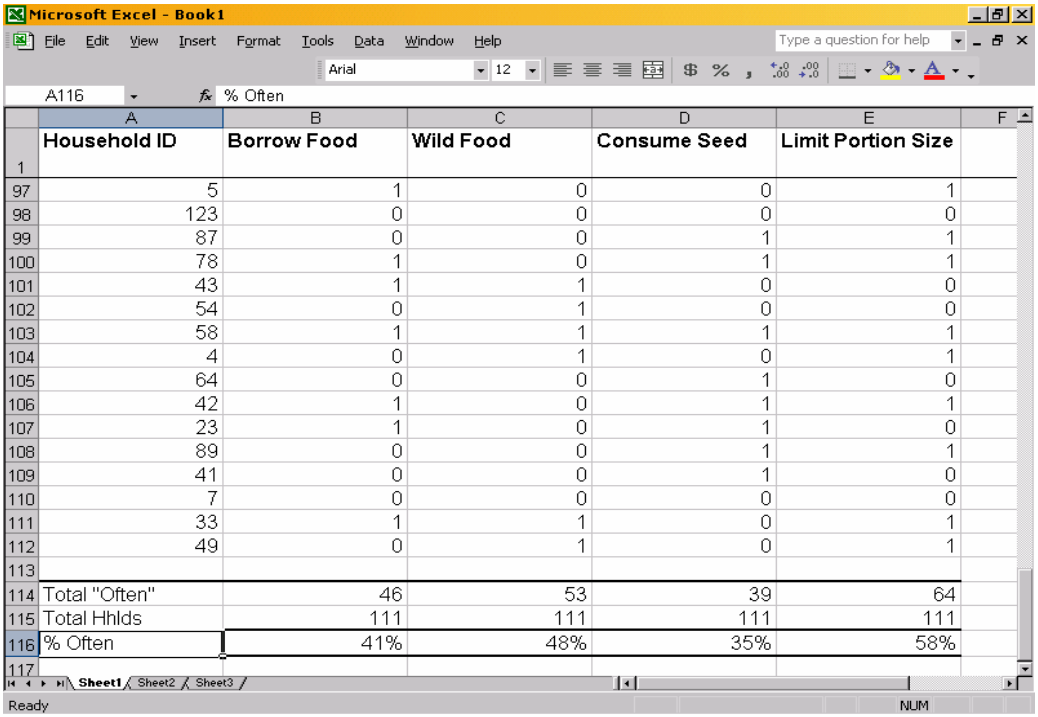
At each selected household, enumerators ask the respondent about each of the coping strategies that you have identified. For each coping strategy, they put a check mark in the appropriate column, based on how often people in the household use that strategy (often or rarely/never). There should be one and only one check mark for each coping strategy.

Data Analysis

The results from each questionnaire should be entered into a computer spreadsheet (e.g. Excel) or statistical package. Set up the spreadsheet as follows: leave one row for each household and one column for each coping strategy. In each row enter the household ID (a number that you use to identify individual households) and the score for each coping strategy. Scores are as follows:

"Rarely or Never" = 0
"Often" = 1

We will use a simple example where 111 households were surveyed regarding their use of four key coping strategies: borrowing food, collecting wild foods, consuming seed, and limiting portion sizes. These coping strategies were identified by focus groups of project participants. The data were entered into an Excel Spreadsheet:



	A	B	C	D	E	F
1	**Household ID**	**Borrow Food**	**Wild Food**	**Consume Seed**	**Limit Portion Size**	
97	5	1	0	0	1	
98	123	0	0	0	0	
99	87	0	0	1	1	
100	78	1	0	1	1	
101	43	1	1	0	0	
102	54	0	1	0	0	
103	58	1	1	1	1	
104	4	0	1	0	1	
105	64	0	0	1	0	
106	42	1	0	1	1	
107	23	1	0	1	0	
108	89	0	0	1	1	
109	41	0	0	1	0	
110	7	0	0	0	0	
111	33	1	1	0	1	
112	49	0	1	0	1	
113						
114	Total "Often"	46	53	39	64	
115	Total Hhlds	111	111	111	111	
116	% Often	41%	48%	35%	58%	
117						

Once all data have been entered, you can do the analysis. If you are using a spreadsheet such as Excel, you can simply calculate the SUM for each column. This will be the total number of households that used each coping strategy "Often" (the total of all "1"s in the column).

Divide this number by the total number of households that answered the questionnaire (111 in the example) to calculate the % of households using each coping strategy "Often".

In our example, 41% of households surveyed borrowed food, 48% collected wild foods, 35% consumed seed and 58% limited their portion sizes "often" in the past 30 days.

Presentation

When you report this information, you may use a simple table as follows. Final reports should contain both the pre-project (baseline) results and the end-of-project results, to assess whether there has been any change in the use of each coping strategy.

Table 1. Percentage of households using key coping strategies "often"

Coping Strategy	**% at Baseline**	**% At end of project**
Borrowing food	41	40
Eating wild foods	48	31
Consuming seed	35	15
Limiting portion sizes	58	59

As always, your report should contain a clear description of your methods of data collection and analysis, and your interpretation of the results.