

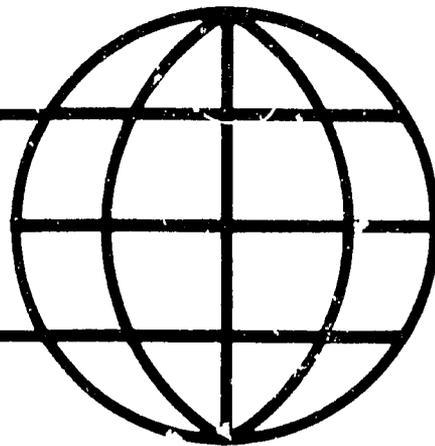
**COOPERATIVE AGREEMENT ON HUMAN SETTLEMENTS  
AND NATURAL RESOURCE SYSTEMS ANALYSIS**

AREA-BASED RESOURCE ANALYSIS  
FRAMEWORK FOR PROJECT DESIGN  
AND APPLIED RESEARCH

by

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## AREA BASED RESOURCE ANALYSIS

### FRAMEWORK FOR PROJECT DESIGN AND APPLIED RESEARCH

This paper fits into a sequence of products designed to be primarily focused on field missions. The first was the brochure which sets out in a very concise way the overall goals, objectives and other parameters of the project involving all its components.

This is one of two or three follow-up documents to the brochure. It takes the resource management component of the CA and describes for missions who are already interested in this component of the CA:

what we aim to do;

what methods we use;

what are the expected products for the host country  
and AID;

how this could assist a U.S. AID development program.

COOPERATIVE AGREEMENT ON SETTLEMENT AND  
RESOURCE SYSTEMS ANALYSIS AND MANAGEMENT

AREA BASED RESOURCE ANALYSIS  
FRAMEWORK FOR PROJECT DESIGN AND APPLIED RESEARCH

- I. Purpose
- II. Policy Guidelines
- III. Conceptual Basis
- IV. Operational Strategy
- V. Area Based Approach to Natural Resource Management
- VI. Implications for Host Country and USAID Programs

-1-

I. PURPOSE

The purpose is to create a replicable methodology for improving natural resource management which can be used in different parts of the developing world. The aim is to achieve both sustainable higher levels of productivity and the long term viability of the resource base. Sometimes this will involve rehabilitation. The focus is on resource management, using this term in its broadest sense to refer to the rationale and means by which natural resources are managed in an areal context.

II. POLICY GUIDELINES

The policy is to emphasize joint problem solving with the host country governments and the local people involved. This means generating the participation of local people and working through local institutions so that action plans can be based upon their needs and capabilities.

III. CONCEPTUAL BASIS

The Basis  
of  
Development

Primary production from natural resources is the foundation of the economies of developing countries, and better natural resource management is the key to further economic progress. Agriculture, including the management of livestock, is the predominant activity in these countries, and building up the agricultural base is a priority for most governments. Agricultural development can form the basis for secondary industries, and lead the way to self-sufficiency in foodstuffs, an important goal for most of the Third World governments.

While mineral resources may be important in certain areas, and affect the strategies for development, it is the bio-physical resources used in agriculture and related rural activities that are the chief concern of this research group.

Renewable  
Resources

The important, critical, characteristic of these resources is the fact that they are renewable. They are not fixed assets, but exist in dynamic and in manageable states. Marshes can be drained, soils can be fertilized, degraded grasslands can be reseeded or allowed to regenerate, soil erosion can be prevented by stabilizing slopes through planting trees or grasses, and forests can be maintained by management systems that involve re-planting and harvesting. Resource systems are a product of the interplay of management systems and the natural processes of the bio-physical environment. Sound management must be based on a knowledge of both the existing resource management systems and the bio-physical processes at work in the area.

Resource  
Systems

Resource systems exist at different scales. In most developing countries today there are contrasts between large scale "modernization" projects, areas of commercial farming, and small scale, often semi-subsistent, farming systems. In addition, there are also areas under government controlled management such as forests, game parks and reserves. Competition and conflict sometimes arise among the various systems.

Sound management guidelines for an area will have to deal with these issues, and, conversely, with the cooperative arrangements that have a long customary tradition in other places.

#### Development Opportunities and Problems

There exists both an opportunity and a problem side to natural resource management in developing countries. On the positive side there are opportunities for developing river basins to provide power, reservoirs, transportation links, and irrigation water for crops. There are possibilities for the improved management of stock and rangelands, for increasing soil fertility, for developing new drought resistant food crops, for linking reforestation to agriculture, for finding quick growing species of trees and shrubs to ease the current energy crises in woodfuel in certain areas.

On the problem side, it is evident in many areas that there is decreasing agricultural productivity and deteriorating natural resources. Soil erosion, deforestation, and overgrazed and denuded rangelands are major resource problems for many countries. Declining food production and firewood shortages in regions where this is the only or most important fuel are serious outcomes. The origins of these problems are the socioeconomic changes that have disrupted many customary practices of land and water management and altered the ways local resources are used; while in some areas increasing population growth has compounded the problems.

#### Improving Resource Management Systems

Without intervention, things are likely to get worse because in many areas the scale of deterioration has gone beyond the coping capacity of local people. People caught up in the daily struggle for survival do not have the means to undertake changes in management systems that might threaten their basic risk aversion strategies to provide for themselves. This is the basis for the present emphasis on natural resource management projects in developing countries.

Under the terms of the cooperative agreement, assistance can be provided to improve resource management systems, through relating increases in productivity to better understanding of the long term sustainability of an area's natural resources, and through strengthening the linkages between rural and urban activities and places.

A feature of the economic organization of developing countries is the way that modern economic activity is found in particular regions, connected with each other by transport networks that leave other areas outside the reach of markets and service delivery centers, or with poor and limited access. Improving accessibility is important for both large scale opportunity projects and problem areas, and this supports the case for looking at the regional context of natural resource management.

In operational terms, this means applying research to the regional context of sectoral projects; designing economic linkages that can make these more effective and profitable to both local people and national

enterprises. It also means designing new projects through practical concern with specific area problems, problems that are an immediate local priority such as soil erosion, landsliding, or pasture degradation and deforestation. This initial focus can then be extended to develop programs for sustained natural resource management and agricultural productivity, linking these into the national economic system.

#### IV. OPERATIONAL STRATEGY

This is based on an approach which is two-fold: a) the articulation of the spatial context of sectoral projects to promote more productive regional development; and b) the focus on recognized critical problems affecting natural resources as the way to initiate sound resource management projects.

Sectoral projects include river basin planning, social forestry projects, national parks and wildlife conservation projects, rangeland projects, and smallholder type production projects. Each tends to be the preserve of a particular single ministry. In each case, the current focus is too narrow. By expanding the scope of these projects to link up with other regional activities the returns on investment and the local benefits can both be improved. This can be done by field teams identifying the opportunities in regions where sectoral projects are located, and working out the details by which linkages can be effected. In general, technical issues and technological solutions to problems have dominated over genuine development issues as related to people in all these cases of sectoral projects. Thus, river basin development has focused on water management rather than regional productivity, forestry projects have focused on tree planting or on conservation rather than on forestry as an economic activity, and technological inputs in rangeland and smallholder production projects have been more important than the social aspects and constraints on expanded productivity.

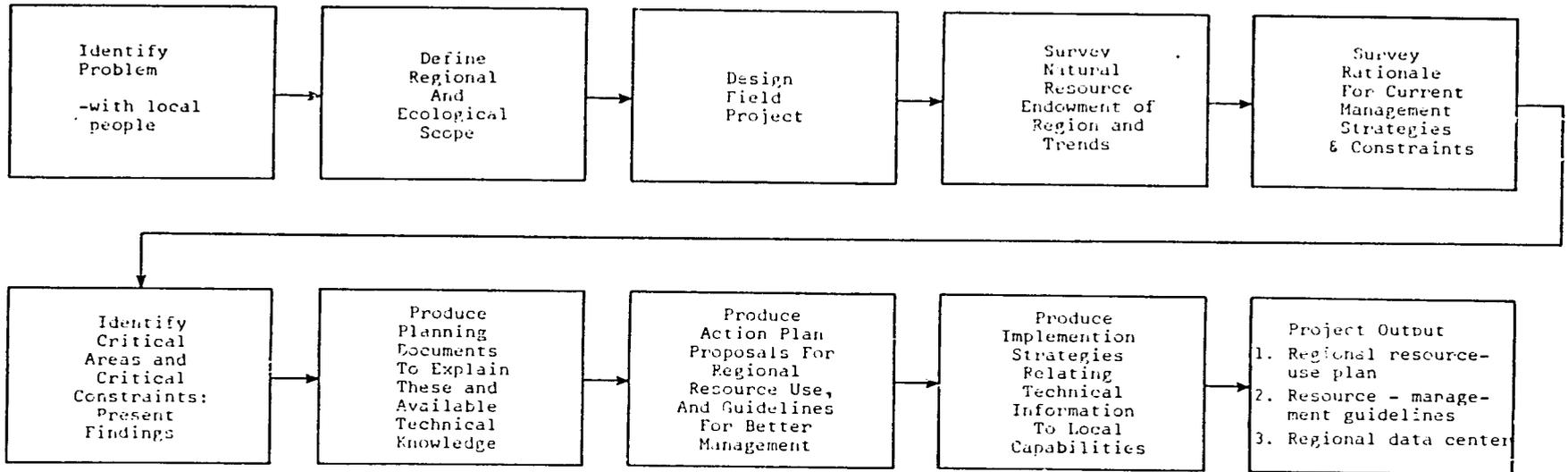
A special feature of this research group is the ability to analyze the management issues, including those related to local farming and herding systems, as well as the physical and technical issues involved in sector based planning. It is in understanding the field context of these interrelationships between the social and the physical and technical, that the key to effective natural resource planning lies. Working with the existing production systems is essential.

This same strategy applies in the case of the local problem focus as the basis for the initiation of new projects aimed at upgrading resource management. Soil erosion, for example, is the identified problem of resource management in the Sabi Valley in Zimbabwe, but the proposed solution is to work out sound management guidelines for land and water management by all resource users in the region, that is for communal farmers, commercial farmers, and government owned irrigation schemes, and others.

[See Figure 1.]

FIGURE 1

AREA-BASED APPROACH TO NATURAL RESOURCE MANAGEMENT  
PROJECTS: WORKING WITH LOCAL PARTICIPATION.  
PROCEDURES



METHODOLOGIES will combine scientific investigation of physical and technical problems with investigation of management issues, making use of field surveys, cartographic and remote sensing analysis, and social science survey techniques.

DATA will be formulated in GIS (geographic information systems) and on maps and stored in regional data center.

**NOTE:** This is an example of a problem approach.  
Sector-based approach differs in detail only.

## V. AREA BASED APPROACH TO NATURAL RESOURCE MANAGEMENT

Where change is planned, at either a large scale by sectoral projects such as river basin development, or at small scale by the promotion of smallholder projects, the nature of the existing production systems and their potential and capacity for change is the basis for action. In any one region there are likely to be a number of different systems, which may or may not impinge upon one another. Where there are effects of one system upon another, successful sustained management of natural resources will depend on coordination and on cooperation. In developing countries implementing techniques to improve or maintain the long term productivity of the resource base depends on how well this is planned in terms of the capacity for farm families and other users to adopt them. Basic information must, therefore, be obtained to discover which factors in the existing production systems affect the potential for improving the management of resources. Figure 2 summarizes a set of procedures beginning with identification of the problem and following through to the final project output.

### Problem Identifi- cation

The area based approach begins with the identification of a recognized problem. If a problem is recognized by local people, by planning authorities, or by central government, it is easier to get cooperation at all levels. The project can then move from specific intervention to deal with this generally understood problem to a broader based program for the sustained management of the regional resource base.

### Regional Scope

The second stage is to define the regional scope of the project. If, as in the case of the proposed Zimbabwe project, the initial interest is in soil erosion problems in a certain district, it is clear that the scope of the investigation must extend beyond the administrative area to a functional region related to the physical problem, i.e. the hydrological unit. Similarly exogenous factors affecting local production methods and resource allocations may mean that the scope of the inquiry will extend to market linkages or other elements of the macro-economic environment.

### Project Design

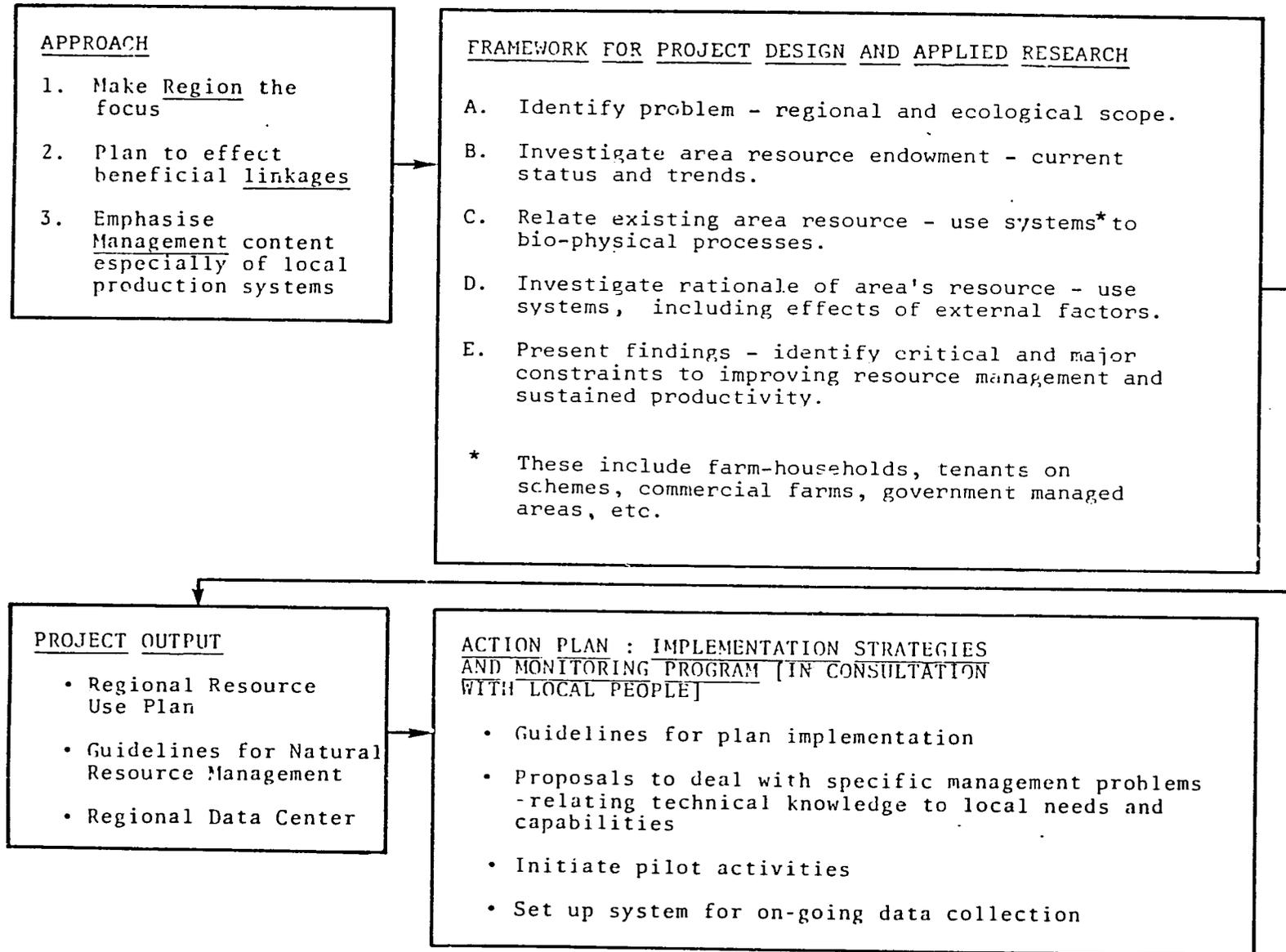
The next stage is to specify the problems at field level, and to think through the major questions that have to be dealt with in the search for proposed solutions or methods of amelioration. The purpose is to be able to specify those areas within the region where there are critical problems of resource degradation or lowered productivity or, in the case of sector linked projects, to identify areas where funds might be put into developing sets of secondary activities linked to the main project. It is also to identify problems of competition and conflict among the region's resource users. Thirdly, but importantly, it is to identify the particular constraints to improving resource management and the constraints to implementing appropriate technical solutions to specific site problems.

### Analysis of the Regional Resource Base

Data collection will focus on the natural resource endowment of the region, to identify critical areas of degradation or lowered productivity, and to assess both current status and trends. Field surveys, remote sensing data, and cartographic analysis will be combined to generate a regional data base and an information system.

FIGURE 2

## Region-Based Approach to Natural Resource Management



In analyzing a region's natural resources, it is important to integrate physical and social data. Too often information is collected and stored in ways which keep these components separate. Indeed even the physical data is often collected and stored in separate ministries and organizations, so that some basic integration will have to be made of, say, soil and slope data, or soil and water data. For planning purposes, these form the basic sets of information required to undertake such projects as irrigation schemes or the testing of new crop rotations or to set out the important measures needed for soil conservation or improved fertility.

The map is an important tool for the presentation of integrated data. Consequently, maps will be produced in response to project needs and the directions of planning authorities to become part of a set of planning documents. Types of thematic maps of this nature would include:

- a) land use system maps indicating ownership, usage, and access data;
- b) water availability maps (surface and underground), indicating user rights;
- c) land capability maps indicating such factors as the suitability for irrigation and other types of farming;
- d) soil erosion maps, indicating degrees of severity and possible sources of sediment;
- e) morphological maps to show slope factors related to farming;
- f) biomass maps of the region and relation to resource use systems.

Both primary and secondary sources of data will be used to ascertain and explicate the rationale for current resource management strategies, and to identify major constraints to improving the long term productivity of the natural resource base. A key issue will be to discover how appropriate technical information can be used in accordance with local needs and capabilities, and what constraints exist to the use of technical solutions to physical problems at specific sites in the region. Competition and conflict among the region's resource users will be identified and the reasons investigated. Resource users include local farm-households, village groups, tenants on schemes, private commercial farmers and ranchers, and large scale managers of irrigation schemes, cooperatives, and government controlled forests or rangelands. Sometimes, as in the case of Zimbabwe, there are smallholder farms operating on communally owned land with user rights that are similar to tenancies. In any one region there may also be other systems of resource use such as quarrying for sand and gravel or mining. When it comes to understanding how natural resources are to be managed on a sustained basis, the effects of all types of resource use are important.

The major interest of this research group is in helping small farmers, either to benefit from the large scale projects in an indirect way, or to take advantage of projects specifically designed to assist them with problems of resource management tied to productivity. This being the case, an important focus of social analysis is the nature of local production systems and the potential of those systems to make productive use of new resource management plans and guidelines. The farm-household is the basic production unit in many regions in developing countries, and therefore, household surveys will be undertaken to obtain direct information on resource allocations. These can be sample surveys or informal surveys depending on field circumstances.

Although information will exist in some cases, from surveys already carried out for other purposes, it will often be necessary to carry out new surveys to answer key questions.

Constraints  
to  
Improved  
Resource  
Management

In order to identify the major constraints to better natural resource management, it is practical to approach the issues from two perspectives. One is to examine the constraints to the mobilization of labor and cash into field operations; to build terraces, dig drainage ditches, or plant trees on steep slopes to prevent slippage and landslides. A common complaint among technical advisors is that there is a considerable body of information on how to deal with physical problems such as soil erosion, siltation, lowered fertility of soils, the rehabilitation of grasslands and the reforestation of denuded areas; and there are few satisfactory ways of using this technical information. Often this has to do with cost factors or labor constraints or both, and the problem is as important in the United States or Canada, for instance, as it is in the developing countries. It may be that in some cases the scale of such rehabilitation of the resource base is too great to be left to individual farmers. Other solutions may have to be sought.

The other approach is to examine constraints to changes in production practices. These are consistently related to the goals and basic needs of farm families which are very different in developing countries from the production goals of wholly commercial enterprises. There are some essential factors that underlie the rationale for resource allocation in local semi-subsistent farming systems in developing countries. Among these are:

- a) the fundamental and overriding importance of food production, which constrains all change, and often compromises commercial farm activities even on large schemes;
- b) the hand cultivation methods and labor intensive nature of much of the agriculture, and the fact that labor is also needed for other tasks such as water carrying and wood cutting;
- c) the fact that farm holdings are frequently part of land use systems that extend beyond the farming area to include use of local woodland and grazing areas, thus

resource use systems may cover different ecological zones in which access is an important factor as well as user rights, tenancies and individual ownership;

- d) the fact that many farm fields are small and scattered, which makes the introduction of new techniques of management, such as animal traction, difficult, though these are often related to important ecological differences and the ways in which these are used;
- e) the fact that although many farm-households are dependent on off-farm income to supplement their livelihood, cash is often needed for essential supplementary food supplies, medicines, school fees and clothing before it can be spared to purchase fertilizers, pesticides and other agricultural inputs.

These are important considerations in framing key questions on local and specific factors in resource allocation which must be taken into account if sustained increases in productivity are to be achieved. Sample questions are given in Appendix 1.

Any program for change in farming practices will have to produce tangible economic benefits to farmers if it is to be put into use. For this to happen, new practices must fit into the context not simply of the farming system but of the livelihood system as a whole.

Much of the poor land management now evident in Third World countries is the result of the continuation of agricultural practices which were once effective when land was plentiful and it was then possible to allow for long fallows that provided for the natural regeneration of soil fertility. Now that this is no longer feasible, new ways of maintaining soil fertility will need to be used. In some areas more elaborate indigenous systems of terracing, irrigating or field drainage practices have been abandoned over the years as community resource management systems have broken down or been disrupted by the spread of commercial farming. Investigation and re-evaluation of such indigenous methods could provide important insights for re-establishing local community involvement in resource management.

Output  
and  
Findings

The three sets of analyses, the analysis of the regional resource base, the analysis of resource use systems and the analysis of constraints to improved resource management will be integrated to present a coherent set of findings to local managers and decision makers for a new round of input from them and subsequent modification of the final presentation.

Project outputs in the form of maps, documents and draft regional production and resource management guidelines will be used to identify the specifics of regional and local problems, to identify available technical solutions, and to work out feasible implementation strategies in the light of local institutional and economic realities.

The output from this process will include:

- a) an action plan setting out regional resource use guidelines (for land use, water management and woody resources in particular);
- b) management guidelines for the implementation of this plan;
- c) policy guidelines for public and private groups involved in resource decision making;
- d) a regional data center (of greater or lesser sophistication depending on circumstances) capable of being updated and used as a basis for project planning;
- e) a report discussing the possibilities of replication of this process in other parts of the host country and its implication for national level decision making in resource management.

#### VI. IMPLICATIONS FOR HOST COUNTRY AND USAID PROGRAMS

Activities of the cooperative agreement are aimed at translating the best available technical understanding of the problems of resource use and sustained management to the prevailing circumstances of Third World countries. This is best achieved through cooperative host country - United States examination of key problems in a particular regional setting.

The terms of the agreement and our own resource limitations both ensure that few major projects will be undertaken directly. Rather we will most often be involved in design, basic analysis and pilot activities. The purpose of these activities for both the host country and USAID will be to:

- a) demonstrate a method of addressing resource management problems and possible opportunities in such a way that the local region gains maximum benefit over the long run;
- b) explore the type of institutional development which makes most sense for the country concerned;
- c) help in the growth of a region-focused institutional base by working with local people;
- d) work out with local people methodology which will create a basic data base and develop ways in which this base can be maintained and used, both for monitoring trends and in the design of project activities;
- e) identify jointly with host country institutions ways of carrying this approach to other areas in a cost-effective way.

Effective resource management is a long range task, best addressed by a combination of prototypical applied activities, appropriate institutional development, and training; all directed to the particular host country needs. The term "cooperative agreement" which describes the nature of Clark/IDA's relationship with AID will also be the style of the relationship, we trust, between the United States and host country institutions.

APPENDIX I

SAMPLE OF KEY QUESTIONS ON SMALL FARM NATURAL RESOURCE USE SYSTEMS

- i) What are the local production units?
- ii) What factors relating to labor are important or critical?
  - Size of effective family labor force
  - Demographic composition of the household
  - Availability of hired labor
  - Availability of cash to pay for labor
  - Agricultural work calendar
  - Divisions of labor
- iii) What factors relating to land are critical?
  - Land shortage or surplus?
  - Facts concerning ownership, use, access, tenancies
  - Organizaition of farm area
  - Availability of cash for investments in farm inputs
- iv) What factors relating to water are critical?
  - Is this a region where water is more critical than land availability?
  - Who owns water rights?
  - Is farming by irrigation or rainfed?
  - Who controls irrigation water?
  - Are river banks in private or public hands?
- v) What other resources does farm family depend on?
  - Woodlands for fuel?
  - Grazing outside farm area?
  - Seasonal flood lands?
- vi) How much land, labor and cash is deployed in:
 

a) food crop cultivation,	b) cash crop cultivation,
c) animal husbandry	d) tree crops?
- vii) What are the current practices, if any, of maintaining fertility of land?

APPENDIX II

FRAMEWORK FOR APPLIED RESEARCH  
IN AREA-BASED NATURAL RESOURCE MANAGEMENT

<u>SCALE</u>	<u>REGIONAL</u>	( MESO )
<u>APPROACH</u>	<u>PROBLEM FOCUS</u>	( KEY QUESTIONS )
<u>METHODS</u>	<u>INTEGRATION OF DATA FROM BEHAVIORAL AND PHYSICAL SCIENCES</u>	( CONCENTRATION ON INTERRELATIONS AND INTEGRATION OF DATA )
<u>TECHNIQUES</u>	<u>REMOTE SENSING/ MAPPING AND INFORMAL/ OR SAMPLE SURVEY TECHNIQUES. GIS.</u>	( CONCENTRATION ON INTERRELATIONS AND INTEGRATION OF DATA )
<u>UNITS OF ANALYSIS</u>	RESOURCE-USE SYSTEMS- REGION OR GEOGRAPHIC AREA	( MICRO-SCALE ( FARM-VILLAGE- ETC. ) MESO-SCALE )
<u>OUTPUTS</u>	1) RESOURCE USE PLAN FOR REGION 2) GUIDELINES FOR MANAGEMENT 3) DATA REPOSITORY	( MESO- MESO-MICRO )