PN-AAU-222
43223

POSSIBILITIES FOR INTEGRATION OF ECOLOGICAL LAND USE CAPABILITY CLASSIFICATION AND AGROECOSYSTEM ANALYSIS TECHNIQUES

Joseph A. Tosi Jr.
December 1985

This document was produced for the Environment Planning and Management Project of the International Institute for Environment and Development under Contract No. SA/FA/86-03.

The author of this report is General Manager and Land Use Ecologist of the Tropical Science Center, San José, Costa Rica.

The Environment Planning and Management Project is a cooperative agreement between the International Institute for Environment and Development and the United States Agency for International Development to respond to requests for assistance from developing countries in a variety of environmental and natural resource management problems.

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International Institute for Environment and Development
1717 Massachusetts Ave. N.W.
Washington, D.C. 20036
(202) 462-0900

BACKGROUND

In early 1985, the International Institute for Environment and Development (IIED) decided to develop a program and policy on the subject of "sustainable agriculture" to be operated under the Environmental Planning and Management Project it administers for the United States Agency for International Development (USAID). On July 9 and 10, 1985, the organization hosted a workshop of invited and in-house experts on this subject at its offices in Washington, D.C. Unfortunately, no concensus was reached at this meeting on a precise, scientific definition of the term "sustainable agriculture", but there was sufficient agreement on the overall concept and its implications for IIED to be able to move ahead cautiously, seeking more specific policy goals and operationally-efficient means to their achievement.

Preceding this workshop, the theme of sustainable agriculture had been explored by Peter Freeman (1), a private consultant to USAID and IIED. His original paper was reviewed subsequently by thirteen outside authorities. For the workshop, Freeman summarized his original paper, made a synopsis of the reviewers commentaries, and provided a gamut of possible definitions of the term sustainable agriculture (2). Included were a number of observations, conclusions, and recommendations which I believe to be particularly relevant, as follows:

> "Within development institutions, the term "sustainable agriculture" was found to be an acceptable goal statement consistent with current thinking.
>
> Low input agriculture for resource-poor farmers and agriculture adapted to marginal environments are growing priorities among international assistance agencies. They compel an examination (and application) of ecological strategies and better use of biological resources rather than reliance on imported energy, fertilizers, and biocides.
>
> Sustainable agriculture "technologies" or "systems" suited to the diversity of (cultural and natural) environments in the Third World do not yet exist in a form that development assistance agencies can (confidently) offer. Moreover, Industrialized World agricultural biases and scientific reductionism may be significant obstacles to achieving interdisciplinarity in the research and development of environmentally-sensitive production techniques."
>
> "Sustainable agriculture must be based upon solid science, but the scientific basis is apparently in the earliest stage of development: this creates a dilemma for policy formulation and promotion.
>
> Sustainable agriculture could constitute a goal as well as a conceptual framework for the integration of various research and development functions which separately have tended towards a synthesis, but which have not yet been linked within a unifying concept, other than agricultural development.
>
> 'Agroecology" was recognized as a promising new scientific field, entirely compatible with the concept of sustainable agriculture and not likely to

antagonize agricultural scientists having temperate zone biases.

Agroecology and agroecosystem analysis were defined as field-oriented research methods bringing the science of ecology to bear on the analysis and improvement of agricultural science."

The ideas behind agroecological analysis were elucidated and discussed during the course of the July workshop by Dr. Gordon Conway, Center for Environmental Technology, Imperial College, London. Conway's procedure, developed over the past five years, combines a rigorous framework derived from formal systems analysis with the broadest possible interdisciplinary base, flexibility, and a workshop environment which brings together all "players" in an eco-development scenario for a specified area or region (3). It has been tested and refined in northeast Thailand, in Pakistan, and most recently in the Bicol region of the Phillipine Islands. The present report is based upon my personal observation of, and some participation in, the Phillipine workshop between November 13 and 17, 1985.

The author monitored this workshop at the request of IIED. His purpose was to become familiar with the Conway agroecosystem analysis technique as applied to an on going development situation in a tropical country in order to assess the possibility for effective integration of that technique with the ecological land capability analysis methods developed and being applied to practical development situations in Latin America by the Tropical Science Center.

As a participant in the Washington workshop hosted by IIED, I had presented a short paper covering the Tropical Science Center's ecological land capability classification as a prerequisite to sustainable agriculture and rural land development. This paper elucidated interest amongst those present, and the suggestion was made that the agroecosystem analysis technique developed by Dr. Conway might be enhanced by addition of land capability evaluations as part of the data base (4). To avoid repetition, that paper is appended as Exhibit I of this report.

THE LAKE BUHI AGROECOSYSTEMS ANALYSIS WORKSHOP

This workshop was held in Naga City (Aristocrat Hotel), Bicol (Southern Luzon), Phillipines between November 13 and 18, 1985. My itinerary from San José, Costa Rica to Naga and return is attached here as Appendix I.

A final report on the workshop, its deliberations and findings, is to be prepared in December 1985 or January 1986 by Doctors Gordon Conway and Percy Sajise, co-leaders of the exercise. Although said report was not available in time to be extracted as a reference herein, it might be a useful basic source for readers of this report when it does become available. In lieu thereof, however, I have attached pertinent sections of Dr. Conway's pre-workshop report outlining (Part I) the environmental issues of the Buhi Region to be analyzed, (Part II) the proposal for the workshop itself covering its rationale, objectives, and methodology, and (III) the program and schedule of activities actually realized, all as Exhibit II.

The Coordinator/Chairman of the workshop was Dr. Percy Sajise representing the Program on Environmental Science and Management, University of the Phillipines, Los Baños. Dr. Conway participated as Workshop Advisor. The language used was English, although many local participants seemed to be uncomfortable in this language and lapsed into Tagalog during study group sessions. Of the approximately sixty participants, approximately ~~four~~ forty represented some six major public institutions ranging from the Bicol River Basin Development Project, chiefly responsible for the integrated development of the region encompassing Lake Buhi, its watershed, and the Rinconada/Lalo irrigation area, to the Phillipine Bureau of Forestry Development. The remainder were representatives of interested local institutions, mostly private: fishermen and farmers associations and the Municipality of Buhi. Essentially the only actors not represented were the outlawed rebel group, the New People's Army, said to be active near the upper watershed area. Participants were mostly intense, highly motivated, and well-informed in their particular fields of natural or social science and knowledgeable as concerned the problems of the area. Consequently, the meeting was highly-charged and positive, as well as extremely well-organized and managed.

It would be tempting, at this point, to get involved in the details of the specific problems examined in the workshop, particularly the deteriorating conditions in the watershed, in Lake Buhi and in the Tabao River, and their relationship to overpopulation, improper land use, exploitative use of forest resources, unsound agricultural practices, defective tenancy institutions and security, overexploitation of fishery resources, and related social, economic, and politically-sensitive issues. However, this would not only be repetitive of materials already available or about to become available (Exhibit II, Final Report on Workshop, etc.), but would be far too complicated for concise coverage in this short report. I will, instead, attempt to focus on the light thrown on the Conway agroecological analysis procedure by personal involvement in a single example of its practical application, then proceed to assessment of the place and practicality of adding ecological land capability evaluation to the overall process itself.

AGROECOSYSTEM ANALYSIS

Agroecosystems and Agroecology

An ecological approach to the study of agricultural systems has been developed in recent years under the designation of agricutural ecology or agroecology. Proponents of this new field insist that agroecology is not simply ecological science applied to food crops, but rather is distinguished by its acknowledgement of socio-cultural and ecological co-evolution, and of the inseparability of social and natural systems (5). They also believe that agroecology challenges the Western paradigms of objetive knowledge in agricultural (developed from narrowly focused laboratory and field experiments) and of modernization of agriculture based solely thereon. According to Norgaard (5), the field has not been delineated too precisely, but six major premises underlie it:

"(1) Ecological and social systems, as systems, have agricultural potential.

(2) This potential has been captured by traditional farmers through a process of trial and error, natural selection, and cultural learning.

(3) Social and ecological systems have co-evolved, such that the maintenance of each is dependent upon feedbacks from the other. Knowledge, embodied in traditional cultures through cultural learning, stimulates and regulates the feedbacks between social systems and ecosystems.

(4) The nature of the potential of social and ecological systems can best be understood, given our present social and ecological knowledge, by studying how traditional farming cultures have captured the potential.

(5) Formal social and ecological knowledge, the knowledge gained from studying traditional systems, the knowledge and some of the inputs derived by conventional agricultural science, and experience with Western agricultural institutions can be combined to significantly improve both traditional and modern agroecosystems.

(6) Agricultural development through agroecology will maintain more cultural and ecological options for the future and have fewer detrimental cultural and ecological effects than conventional agricultural science approaches alone."

While all ecological systems, natural or cultural, are essentially multidisciplinary and holistic, exhibiting both vertical and horizontal hierarchial relationships, agroecosystems differ from natural ecosystems in that human culture is an important factor of the "environment" within them. Agroecologists see the conventional scientific development of new agricultural inputs and techniques and their imposition as "modern agriculture" via prevailing political and economic institutions as both disruptive of traditional cultures and destructive of their evolved cultural knowledge in agriculture and land utilization. This cultural knowledge is seen as a resource vital to the design and implementation of truly sustainable agriculture through agroecosystems research, which for its part, proposes to study ecosystems long influenced by human cultures (except for those seriously disrupted by modernization) where conventional, controlled experimentation is difficult or impossible. The knowledge gained would be used as the basis for improvements in both traditional and modern systems of agriculture.

Agroecology is in its infancy as a science and tends to focus predominantly upon field crop production. Other but less intensive soil-based socio-economic systems, such as ranching, forestry, game management, and wild-plant gathering are not excluded but have, to date, been largely unattended, a reflection of a prevailing paradigm of Western Culture: great emphasis on growth, both demographic and economic, as "development goals". Paradoxically, there has been no attention paid to social-benefit land use options, as quality water production, public recreation, gene-pool maintenance, aesthetics, and other management systems which limit uses of land for private gain.

Agronomists and social anthropologists probably make up the larger body of scientists interested in agroecology today, so that this unbalance may be expected to gradually diminish as the field expands. Presently, however, the over-riding emphasis on increased food crop production and expansion of the cultivated area (in seeking space for expanded populations) overlooks the limitations -and opportunities- inherent in the heterogenity of the natural ecosystems at all hierarchial levels: there is scant interest in agriculturally-significant qualitative variations of the natural environment, which determine biological choices and temper cultural adaptations in all landscape situations. The ecological land capability classification concept and techniques developed by the Tropical Science Center seem to be tailor-made to occupy this void: a universally applicable, directly comparable scheme of environmental and land capability classification is particularly needed if agroecology is to qualify as a truly holistic science.

Agroecological Analysis

A number of methods have been developed in recent years to achieve a more holistic approach to agricultural development in the Lesser-Developed-Countries (LSD's). Perhaps the best known is farming systems research in which the farm as a unit rather than individual fields or crops are the subjects of study. Another is integrated rural development. The latter may be preceded by a technique known as rapid rural appraisal, in which a multi-disciplinary team of experts pretends to highlight the significant factors for change in a local or regional situation. Conway (6) has pointed out that such approaches do have practical value but that they face a problem ".... common to all holistic research and development enterprises, ...of trying to encompass a breadth of view and range of disciplines and talents, while at the same time generating a common agreement on worthwhile practical action." He points out that two approaches have been tried, each with significant drawbacks, (a) beaurocratic procedures and a hierarchic leadership of the research or development team, which is efficient but likely to become rigid and non-innovative with time, and (b) formal techniques of systems analysis, using mathematical or computer models, techniques which require such specialized skills that they tend to exclude the practical field scientists with sound insights and knowledge.

Conway, therefore, proposes a sort of compromise method involving elements of both approaches plus some innovations of his own. His method has no specific title other than the Agroecosystem Analysis Procedure. Its basic concepts, rationale, content, and procedures are set forth in well-documented detail in a very recent paper in Agricultural Administration 20 (1985), while trial applications during its development in Thailand and Pakistan, of earlier date, have been written up by the same and associated authors (6,7,8). This procedure is, by any standards, impressive. Having seen it in operation at the Phillipine workshop just concluded, I would only raise the question as to its efficacy when applied practically in multiple development situations, without the personal leadership of its dynamic, dedicated, personable, and knowledgeable author. To date, he has had a guiding hand in all applications. When he is present, the method works like magic!

Conway's method (6) in detail need not be described here. Suffice to say, the exhange of viewpoints and technical knowledge in the workshop experience are

the key ingredients for success. Other requisites are (a) reliable and appropriately-detailed set of field data covering the full range of environmental and social vairables involved in a defined geographic area, and (b) agreement upon the final objectives of the analysis itself. Given the cost and logistical problems of conductiong a workshop of numerous persons, many of whom will be highly-placed hence only briefly available, the first of these two requirements must be met, with rigor, beforehand. A final decision on the second is ordinarily the first task of the workshop itself.

Once the participants have gathered, been introduced to each other, and their credentials established, a final agreement is reached in the first plenary session on the objectives to be pursued. These objectives are expressed in simple, precise, and unambiguous form and must be acceptable to all actors; they may have been suggested in provisional form and distributed beforehand by the organizers. An example from the Lake Buhi Workshop can be seen in EXHIBIT II. Logically, objectives stem from perceived problem and policy contexts, hence the decision on objectives may be preceded by a presentation of background papers dealing with policy and institutional contexts solicited from and delivered by the most knowledgeable workshop participants.

A major objective of the procedure which follows is to define a set of "key questions", or guidelines, leading to a set of hypotheses upon which research design and development implementation may be based to efficiently and economically achieve the stated objectives. In arriving at these key questions, the workshop proceeds through two major stages, first that of systems definitions, including the hierarchial ordering of the systems, both natural and social, and second, a detailed pattern analysis of the properties of each system. Initially, the identification of some systems and their boundaries may be tentative, to be revised or sharpened as the workshop generates a better picture of the key functional relationships determining system properties. But the more general nature and limits of all systems should be clearly apparent, incorporated in the data base brought to the workshop.

Great use is made of graphics. Plenary sessions of the whole group are alternated with longer periods of intensive communication and interchange in small sub-groups each of which focuses upon the pattern analysis of one or more major system. Analyses and discussions are facilitated by the use of slide and opaque projectors, white boards, and the like, patterns being projected by subject matter specialists for better understanding and critique by all participants in both the work and plenary sessions. Maps, graphs, transects, histograms, flow diagrams, decision trees, Venn diagrams, and other pictorial devices may all be used to assist in communication.

Pattern recognition is at the core of the analytic method. Conway has selected four categories: -space, time, flows, and decisions,- which together reveal the key functional relationships determining system properties. These patterns are analyzed in terms of four properties of systems, -productivity, stability, sustainability, and equitability. Both the data base and the varied special knowledge and viewpoints of the participants are brought to bear and the key questions and hypotheses are developed through the intensive and mutually-instructive interchanges of both work and plenary sessions. By the end of the workshop, there should exist a list of key questions, of hypo-

theses for research or action based upon them, a discussion of the background and issues involved, and a set of recommendations for both research and for direct actions to be taken toward development. Since many, if not all, of the participants will be involved in the implementation of these recommendations, their participation will have heightened their familiarity with and acceptation of them, as well as providing motivation for intensive follow-up action.

While the procedure is in a process of development as methodology, it is quite flexible, and can be applied at any time in a project's life but is particularly useful at the outset, and appears to be the most reasonable solution, so far devised, to the problems of achieving effective interdisciplinarity in the formal, scientific analysis of the ecodevelopment potentials for any specific geographic and social setting. The question then arises as to what if any contribution the Tropical Science Center's system of ecological land capability appraisal could make to this overall procedure.

Land Capability Classification and Agroecological Analysis

Land capability is a statement as to the highest use or uses to which any specified unit of land may be put upon a biologically-sustainable productive basis. Obviously, the determination of such capability requires the synthesis of a complex set of natural and social factors: it is a multi-disciplinary research problem.

The methodology being developed by the Tropical Science Center in San José, Costa Rica has evolved directly from logical projections of the ecological theories of Dr. L.R. Holdridge, known as the World Life Zone System of Ecological Classification (9,10,11,12). The land capability classification is simply a relationship between the life zone and association groupings of the Life Zone System, as "site qualities", and the recommendable uses of those sites for economic production of plants, animals, and other needs, except mining, given determined levels of technology and management intensity.

The three-tiered, hierarchial Life Zone System is a basic component in the classification of capability. It affords quantitative accuracy and objectivity in the identification, mapping, and description of both physical and biological properties of ecosystems and of the parameters they comprehend, all upon a comparative worldwide basis. Ecosystems so-defined and mapped, in turn, provide both the organizing principle and an analytical tool of great power for matching organisms and human cultures to the natural environment, whether undisturbed or modified by past human action. This theme is developed in greater detail in EXHIBIT I.

There is no doubt that this methodology could be usefully integrated into the Conway agroecological analysis procedure. It would appear, however, that its utility and applications might vary viz-a-viz the historical and cultural settings of the area being analyzed.

In all three workshops reported upon so far, the analysis was applied to areas with a long history of sedentary land use by traditional farmers. In such areas, favorable for agriculture in general for ecological reasons, high degrees

of cultural adaptation to environmental potential have already ocurred. Population densities are high relative to land resources, living levels are modest to low, capital resources and fossil fuel-derived inputs are usually expensive, and traditional agroecosystems are not readily modified by modernization forces without depopulating the countryside. In these circumstances, land is used very intensively, yields are moderate and close to the possible without added fossil fuel subsidy, relatively stable, and probably sustainable at these levels given modest refinements in technology. Actual land use is highly coincident with land capability on the better lands, which prevail, and are possibly in excess of capability on the poorer sites, leading to site degradation and lower yields on the latter.

In these situations, an ecologically-based land capability classification and analysis of land use would reveal that any attempt to increase productivity, either by more intensive production methods or an expansion of cultivated area, would be difficult or could not succeed and permit productivity to remain sustainable in the longer term. It might also reveal the need to decrease the area under intensive crop production, hence farming population density, on the poorer sites to protect agriculture on the better sites from the deleterious effects of soil erosion and deforestation.

In all such "Ghandian" situations, widespread in the Warm Temperate and Subtropical latitudinal regions of the Eastern Hemisphere, somewhat less-commonly in the Western Hemisphere, the ecological land capability method would be less needed for development planning and less useful as a means of achieving conservation goals in development than in areas having lower population-to-land ratios, simply because social and political forces so totally overwhelm ecological considerations in the former. No matter how ostensibly "objective" the social scientists involved, the "key questions" of the Conway procedure will center on institutional manipulations relating to social equitability and possibly to the economics of increasing fossil-fuel subsidy and not on any further adjustment of population densities and production to ecosystem realities.

The preceding is not intended to disparage the utility of including the TSC land capability methodology in the agroecological analysis procedure in such areas or regions. Introducing the World Life Zone System alone to the analysis could bring much greater sensitivity to it, especially as regards evaluation of ecological site characteristics and the potential, therefore, for assessment of alternative and possible more remunerative crops and more effective or efficient production technologies, taken from world-wide experience and already keyed to this system. At the Lake Buhi workshop, as an example, participants were unfamiliar with (or did not seriously consider) alternative crop options or more site-conserving land uses for upland sites. The analysis and the hypotheses leading to research proposals all centered on those crops already grown in the area and constituents of local culture. Yet it was obvious to me that there was a great potential to identify possible alternatives from other parts of the world, directly relatable to the "problem" sites, through application of the Life Zone System.

Perhaps the greater value of the agroecological analysis technique, coupled to the land capability methods of TSC, will be in the development planning

process for recently-colonized and adjacent "virgin" or empty areas of the Tropics and Subtropics, for which colonization is now proposed or inevitable. Such areas abound in the lower latitudes of South America and parts of Africa and Southeast Asia. Large parts of these areas have a low to very low potential for sustainable agriculture yet are being colonized because of demographic and political pressures within the prevailing "growth development" paradigm. IIED should be especially interested in these areas, where change is bound to come if only by default, and in which there is still an opportunity for ecologically-guided and socially responsible development. Large parts of these areas have a low to very low productive potential in agriculture, climates and soils which may have higher long-term productivity under radically different production and settlement systems, and a critical importance to mankind at large for little-appreciated biological populations and physical properties.

To date, no form of agroecological analysis has been applied in the Western Hemisphere tropics or subtropics, where much of this recent expansion has or will shortly take place. Yet there is great concern amongst planning institutions that this development "not harm the ecology" while at the same time, getting the most benefit from the "natural resources" and absorbing large numbers of the rural poor from already overcrowded and ecologically dissimilar agricultural heartlands. The development planning effort, however, is disparate, uncoordinated, and atomistic rather than holistic, and goal-centered, with many competitive beaurocracies and academics all pushing narrow individual interests, views, and defending professional "territories" in isolation from one another. The public policy scene is, perhaps as a consequence, equally conflicting, tending to lead to all the wrong decisions and to major blunders at the scenes of development itself, with social chaos and oftentimes political unrest and disturbance as the consequence, to say nothing of the loss of ecosystem and resource values for the future.

I believe that local or regional situations could easily be identified in a number of Latin countries, where contituencies could be found favoring at least trial applications of the agroecological analysis procedure as developed by Dr. Conway. These trial applications might lead to preparation of national or multi-national cadres as "leadership" for a more general and widespread application of his methodology. In Latin America, the ecological land capability method could easily be inserted into the analysis as a whole, inasmuch as the Life Zone System is well known and widely accepted there: almost all countries have Life Zone maps and a few are already using, officially or informally, the land capability classificaiton proposed by TSC (11,12). The only problem, initially, will be that of language.

In summary, I would urge that Conway's agroecological analysis procedure be brought to trial in a geographic situation where fragile environments and culturally non-adapted human populations are or are about to become joined in a colonization situation. It seems tailor-made for this very conflictive class of environmental developmet issue, one with which no success has been achieved to date employing other, less holistic approaches, no matter how well-intentioned.

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APPENDIX

Itinerary and Agenda

Attendance at Buhi Agroecosystems Analysis Workshop, November 14-18, 1985. Naga City, Phillipines

November 10 - Sunday	Travel between San José, Costa Rica and San Francisco, California. Overnight San Francisco.
November 11 - Monday	Travel to Manila via Tokyo.
November 12 - Tuesday	Arrive Manila, 2215 hours. Overnight Manila.
November 13 - Wednesday	AM Visit AID offices, briefing by Mr. Leonard Dayao and Mr. James Dawson, Chief ORAD/AID/ Phillipines and Gordon Conway. PM Travel to Naga City, Bicol Province.
November 14 - Thursday	First day of workshop. Registration. Plenary Session: Introduction to History of Bicol River Basin Development Program. Policy and Goals, Papers and Discussion.
November 15 - Friday	Second day of workshop. Introduction to the Procedure (G. Conway) and Group work sessions. Participation in Upland Watershed Group discussion. Systems, hierarchies and System Properties.
November 16 - Saturday	Third day of workshop. Plenary Session, presentation of working group findings. Proceed to Problems and Opportunities, begin work on Key Questions and Hypotheses, (Upland Group).
November 17 - Sunday	Fourth day of workshop. AM Terminate key questions and hypotheses, PM Plenary session, Group presentations. Meet with G. Conway on future aspects of his method, plans, and potential of land capability classification interjection in his analysis procedure. Depart Naga 1625 for Manila. Overnight Manila.
November 18 - Monday	Travel Manila - San Francisco - Boston.
November 19 - Tuesday	Free day in Massachusetts.
November 20 - Wednesday	Travel Boston - Washington (AM). Meet with Dennis McCaffrey of IIED in Washington. PM Travel Washington - San José, Costa Rica.
November 25 - 29	Prepare report

EXHIBIT I

Land Capability Survey and Land Use Planning as Prerequisite to Sustainable Agriculture and Land Development

Joseph A. Tosi Jr.

Tropical Science Center

June 1985

A paper prepared for the Workshop on Sustainable Agriculture held at the offices of the International Institute for Environment and Development, in Washington, D.C.

July 9-10, 1985

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Ideally, the concept of economic development implies a process whereby a society raises the material welfare of all its members to a level consonant with accepted standards of human dignity, health, education, security, and individual self-realization. It is implicit in the concept that such an improved state will be passed along undiminished to succeeding generations. The evolving concept of a "sustainable agriculture" as "agroecology" tends to fall, if loosely, within the broader outlines of this concept, although what will be "accepted standards" obviously varies widely from one society to another.

It has been pointed out in some of the review material that whilst great advances have been made in both the environmental and socio-cultural sciences over the last two or three decades, little of the knowledge acquired has been effectively integrated into the main body of development theory and practice, despite the fact that both developmental and environmental issues are now of paramount world concern. For this reason, if for no other, the International Institute for Environment and Development would appear to have an especially strong incentive for bringing this knowledge to the forefront in its promotion of environmentally appropriate rural development in the LDC's.

Of the many possible themes relevant to sustainable agriculture, I have chosen to comment here on land capability classfication, land use, and land use planning. These closely related topics have been central to my interests for many years. Not only would they appear to be the necessary underpinnings for sustainable agriculture, grazing or forestry anywhere in the world, but have received little notice in the various papers presented for review prior to the workshop.

Land capability classification originated in the U.S.D.A.'s soil conservation programs of the 1930's. Even today it is still largely a bailiwick of the soil survey people, worldwide. Conducted for the most part by agronomists of the "modern" school, it contains a strong bias to agricultural land use on all sorts of terrain. Further bias is prevalent in most existing classification systems due to their exclusively pedogogical foundations, unsubstantiated premises, subjectivity in field evaluations, and lack of specificity to culturally-determined levels of technical management of the land.

In a few countries of Latin America, specifically some of those where the World Life Zone System of Ecological Classification (devised by L.R. Holdridge) has come into general application under goverment auspices, the soil survey approach to land capability classification has been challenged or replaced by a more holistic ecological and socio-cultural approach. Perú, Colombia, Costa Rica, and Bolivia, for instance, have already adopted or are currently testing one or another varient of an integrated ecological system of land capability classification and mapping based upon the Life Zone System. In Costa Rica, research is well underway to develope an objective, integrated system keyed to both overall environment and human-cultural conditions as distributed geographically within the national territory. All of these classification systems are hierarchial, operate at varying levels of observation or detail, and recognize an equal social and economic status for at least five major land uses: clean-tillage, pasture, permanent ground cover crops, production forestry, and exclusiviely social-benefit uses of land under absolute protection. Selected ecological parameters - bioclimate and atmospheric,

geomorphologic, edaphic and biotic, - plus human-cultural configurations bearing on farming and other land management systems, together form a systematic and quantifiable framework for the objective measurement and precise field determination of land use capability at any specific landscape location. These classifications cum methodology are designed to operate ultimately at a detailed or farm level and require prior training of practicioners. Furthermore, a soil survey is not at all a pre-requisite to their application; a decided advantage in LDC's, particularly in the "empty areas", so-called, the "agricultural frontier" of the tropical and subtropical countries. The systems also permit rapid pre-survey appraisal of large sparsely-populated areas into which development is proposed or underway and the identification and delineation within these of smaller areas or regions which, in geographical aggregates, afford the best overall landscape situations for sustainable agricultural development or, conversely, for forestry or for non-economic use. Finally, they are structured to admit of possible different capabilities for specified individual land (mapping) units depending upon the culturally-determined technological system and management level to be applied. That is to say, room is provided for intensification of land use as established land-users acquire more capital, experience, greater skills and competence, or adopt resource conserving production practices over time.

Integrated ecological classifications of land capability have one thing in common: all that I am acquainted with are based on the Life Zone System (Holdridge, 1967). This hierarchial system places macro-climate in a primordial and independent position in relation to all other site factors, hence each life zone (which integrates major climatic factors: heat, light, and their moisture regimes with biotic factors: evapotranspiration) subtends a distinctive set of quantitative values for the total of dependent environmental factors: winds and fogs (anomalous precipitation or temperature patterns, configuration and topography, soils, drainage, vegetational physiognomy). All factor values in conjunction for a specific land unit (the smallest area delineated individually for mapping) constitute the unique ecological characteristics of the site. Land capability is considered to be a measurable function of these values for each specific farming system and level of management.

In the determination of land capability for each specific set of values, subjectivity has been reduced to a minimum through literature searches and actual field analyses of actual land use in specific cultural settings in relation to these factors and in terms of such criteria as comparative economic productivity, plant growth and behavior, soil deterioration suffered and hazard, physical limits to the operation of machinery, animal traction, and human labor, special requirements of each farming system in terms of environment, feasibility of modifications of limiting factors through works of engineering, soil conservation, drainage, irrigation, fertilization, or other treatments, and social costs and hazards both within and without the limits of the management unit. Technical or cultural management (farming) systems are defined and range from "primitive" to "advanced" categories. Further work is planned to detail the cultural farming systems classificaiton itself.

Land capability classfications are essential for land use and rural development planning. In settled areas, maps developed through survey procedures included in the methodologies must be compared directly with maps of the same area and same detail showing actual land use. The simply overlay

comparison of land capability with actual land use then indicates precisely where and to what degree actual use is consonant with or deviates from ecologically determined capability or recommended use. Appropriate plans and efficient actions for correction or intensification of occupance and production can be initiated on the basis of such comparisons.

In areas of no or only sparse human settlement, ecologically integrated land capability maps alone serve to establish the feasibility, location, and infrastructural needs for agricultural development. They further indicate, presuming that agricultural development appears desirable, the more specific nature of that development in terms of farming systems, crop selections, probable yields, recommended sizes and conformations for individual farm, ranch, or forestry production units, and many other details requisite to plans for a wholly rational development of the area or region, including the potential for a determination of human carrying capacity at given levels-of-living.

While the foregoing would seem to be self-evident to proponents of agroecology or sustainable development, curiously this has not been the case. There is such overt bias towards the "agricultural solution" to population and economic pressures in the LDC's (food production), so many vested interests and such great power in modern agronomy and animal husbandry as professions, that virtually all land is popularly believed to be suitable for farming or ranching given the appropriate capital, energy, and technical inputs. The recently introduced popular concepts of "agroforestry" and "agrosilvopastoril" are evidence for this bias: poor lands formerly considered suitable only for wood production in natural forest systems are now under these pressures proposed for settlement by the poor and landless or, in areas already deteriorating through over-use and inappropriate farming practices, the submarginal farms are now to be saved by a site restoration afforded by the incorporation of some trees with field crops or pastures. The "sustainability" of these systems will, of course, not be a matter of such wishful thinking but rather of the ecological setting for such production and the probability that these farmers can be convinced to undertake and then have the skills and motivation to perpetuate the new and more sophisticated practices.

Had I been asked, I would have suggested that this workshop focus on "sustainable land use" rather than "sustainable agriculture". For while many of us probably do mean "sustainable land use" when we use that term, the general public and most people in decision-making positions certainly do not. "Land" is an ecological variable on the most localized scale. Not all land is suitable for agricultural pursuits in any region and in some none is suitable, although other uses may be sustainable.

Sustainable agriculture will begin when qualitative site differences are mapped, illustrated and precisely quantified in their multivariate ecological qualities, and their potentials for specific cultural-use configurations and economic geographic locations established as a basis for prediction and planning, and when programs are designed and executed to promote land use in harmony with land capability, so determined.

EXHIBIT II

Buhi Agroecosystem Analysis Workshop: Report of Preliminary Visit, July 1985

By

Gordon Conway

Centre for Environmental Technology,
Imperial College of Science
and Technology, London

PART ONE

Environmental Issues of the Buhi Region

Background

In early 1979, USAID approved the financing of a project entitled, "The Bicol Integrated Area Development III (Rinconada/Buhi-Lalo)" as part of a larger strategy of developing the resource of the Bicol River Basin (The Bicol River Basin Development Program - BRBDP). The project was seen as helping to fulfill the general goal of "improving the socio-economic situations and quality of life of the rural poor" in the area. Specific goals are to increase agricultural productivity and employment opportunities, increase farmer participation in development activities that affect them and to reverse the deterioration of the upland watershed areas.

The project contains four interrelated components:

1. Lake Buhi Water Source Development

   a) control structure at lake outlet
   b) deepening of the 6 km. outlet channel (Tabao River)
   c) headworks at forebay dam to divert irrigation water

2. Lalo Irrigation Construction

   a) connector canal and flume
   b) construction and rehabilitation of irrigation canals
   c) service roads
   d) training facilities

3. Institution and Agricultural Development

   a) rotational unit groups
   b) farmer irrigation groups and associations
   c) training
   d) extension
   e) land reform

4. Agroforestation/Watershed Development

   a) bench terraces and contour farming
   b) orchard and firewood lots
   c) nurseries
   d) mountain trails
   e) training

The lead agencies for the project are the National Irrigation Administration (NIA) and the Bureau of Forest Development (BFD) with assistance from various other agencies, such as the Ministry of Agriculture and Food (MAF).

Environmental Issues

The construction phase of the project began in late 1979. Most of the activities have had few, if any, adverse consequences. Indeed in engineering terms, the project has been highly satisfactory with completions ahead of target and under cost, although the watershed development component has been less than satisfactory in meeting objectives.

However, in 1983, the construction of the control structure and the deepening of the Tabao River channel below the lake began to have a number of adverse consequences on the livelihood of the residents of the area. To begin with, it was thought that most of these were temporary problems associated with the construction phase and would go away on completion. In the last few months, however, it has become apparent that several serious problems are likely to remain and will require long-term solutions. It has also become clear that the area, in particular the watershed and the lake itself, is suffering from a large number of environmental problems of long standing (see particularly the consultancy report of Malcolm Beveridge). These too, require long-term solutions but also have an immediate significance in that they complicate the interpretation and resolution of the problems associated with the project itself. As with many environmental issues, the chain from cause to effects is complex and many factored. Some problems are wrongly ascribed to the project construction, while in other cases the construction may be guilty of compounding an already existing problem.

My own reading of the various reports and my brief visit to the area suggest a classification of issues along the following lines:

I. Temporary Problems associated with Construction Phase

A. Unexpected rises in lake water level

1. Flooding of rice fields

B. Unexpected drops in lake water level

2. Drying out of fish cages

In each case these may be partly solved by regularization and predictability of drawdown operations.

II. Permanent Problems associated with Control Structure Operations

A. Use of full water level capacity of lake (83.5 m)

1. Periodic flooding of dwellings

potential solutions: a) compensation
b) relocation
c) operate to less than full capacity

2. Periodic flooding of cropped land

   potential solutions: as 1. above

B. Use of low water level capacities of lake (below 81.5 m)

3. Periodic drying out of fish cages

   potential solutions: as in 1 above plus
   d) floating fish cages

4. Drying up of shallow groundwater wells in Buhi municipality (possibly a temporary problem, exacerbated by 1982/83 drought but there is a likelihood that it is permanent).

   potential solutions:
   a) redrilling
   b) new wells
   c) operate to less than full capacity
   d) new water system based on supply from Itbog falls.

5. Drying up of dock at Poblacion

   potential solutions:
   a) new dock
   b) new roads around lake

6. Loss of lake transport capacity

   potential solutions: a) new roads around lake

7. Drying up of Buhi Fishwater Demonstration Fish Farm

   potential solutions: a) relocation

8. Drying out of spawning grounds at Barangay and around lake generally

   potential solutions:
   a) intensive rearing and stocking annually
   b) operate to less than full capacity

9. Health problems from domestic refuse exposed in drawdown

   potential solutions: a) improved sanitation

C. Deepening of Tabao River

10. Loss of fish cages in Tabao River and East Channel

    potential solutions:
    a) relocation
    b) compensation
    c) alternative livelihood

11. Loss of Tabao River transportation

solution: access road (completed)

D. Construction of Control Structure

12. Growth of water hyacinths in lake

potential solutions: a) hebicides
b) mechanical clearance
c) utilization for feed or compost

III. Long Standing Problems

1. Loss of migratory fish

Cause: construction of NPC dam in 1956

Potential solutions: a) system of fish ladders along Barit river
b) none

2. Decline of traditional fishing

causes: ? overfishing
? predation by Tilapia
? competition from fish cages
? declining productivity of lake

potential solutions: a) reduce fish cages
b) regulate fishing (2 cm net mesh)
c) introduce new herbivorous fish

3. Low productivity of fish cages

causes: ? declining productivity of lake
? poor quality fingerlings

potential solutions: a) use of fish shelters
b) floating cages
c) supply of good quality non-hybrid fingerlings

4. Declining water quality

causes: ? sediment from upland erosion
increased pesticide level

potential solutions: a) watershed control
b) pesticide use control

5. Sulphur upwellings

   causes: high sulphur content in inflow
   decay of natural alga blooms
   wind induced breakdown of lake stratification

   potential solutions: a) relocate fish cages
   b) maintain high water level

6. Decline to near extinction of Sinarapan (world's smallest commercial fish)

   causes: ? overfishing
   ? predation by Tilapia
   ? shrimp competition
   ? anchor worm infestation

   potential solutions: a) remove all introduced fish
   b) none

7. Typhoon damage

   causes: exposed and fragile structures

   potential solutions: a) floating fish cages

8. Erosion and sedimentation

   causes: deforestation to cropping and illegal logging

   potential solutions: a) control of logging
   b) agroforestry
   c) terracing
   d) improved land tenure

9. Declining yields on Mt. Iriga and spread of cogon grass

   cause: overcropping

   potential solutions: a) agroforestry
   b) terracing
   c) improved land tenure

Although all of these problems have been in existance for the last twenty years and more and will continue, a significant number may be excerbated by the operation of the control structure when it is fully functional.

In particular:

a) traditional fish productivity may further decline because of periodic loss of spawning grounds.

b) fish productivity, in general, may decline due to poorer water nutrient levels and to earlier and more frequent upwelling of sulphur and oxygen poor water, all due to more frequent reversals of stratification caused by low water levels.

Alongside these problems, it should also be stressed that the project has or will provide a number of benefits to the immediate Buhi area.

1. No more flooding in Tabao river.

2. Water for rice cultivation beside Tabao river

3. Bridge over control structure

4. Eventual commercial prosperity to Buhi from Lalo irrigation system productivity.

5. Irrigation water for some residents of Buhi municipality.

6. Improved livelihood in watershed.

Environmental Impact Analysis

The occurrence of problems such as these in a multipurpose lake regulation project raises a number of questions concerning the nature, scope and usefulness of environmental impact analysis. This report is not the appropriate place to discuss these fully. Such a discussion should await the full ex-post environmental impact analysis that is proposed and should, perhaps, be conducted within a much wider review of environmental assessment procedures as they are commissioned and applied by USAID. However, I have read all the pre-project studies and feel it is worthwhile to make a number of preliminary observations.

The relevant documents are:

1. BRBDP, 1979, Rinconada Integrated Development Area Feasibility Study. TAMS-TAE Joint Venture. Bicol River Basin Development Program Office. Pili, Camarines Sur. Vols: 1: Summary
   2: Fisheries Development
   3: Irrigation and Drainage Improvements
   3a: Watershed Protection/Management
   6: Municipal Water Supply

   In each of these volumes are chapters on impact on natural environments and social soundness analysis.

2. Interagency Committee on Ecological Studies, 1978, Environmental Assessment of the Bicol River Basin Development Project. Manila, Vols. 1

These constitute the pre-project environmental analysis and generally conclude that the "environment and socio-economic benefits to be derived from

the project will far outweigh any avoidable adverse effects." However, these were general studies dealing with the much larger proposed programs: in the case of 1 with the whole Rinconada project including Lake Bato and Lake Bula-Baao and in the case of 2 with the total Bicol River Development Project. The Lake Buhi regulation was only seen as one small part of these larger programs and consequently gets relatively little mention in the environmental and social soundness analyses.

Fishery development, in the TAMS-TAE study, for example, concentrates on the other lakes. The potential at Buji is seen as very limited, fish pens being of restricted value and likely to be uneconomic. The main use for Buhi was seen as a site for a hatchery for the whole Rinconada area. It was conceded that the drawdown could affect fish production. But this was assessed as likely to be nominal. Any losses could be offset by a stocking policy and by retention of high water levels for a few weeks following the wet season. (There is no mention of fish cages in the report since these were only introduced to the area subsequent to the study.)

There is also no mention of drying up of groundwater wells, save that several of the public wells were not functioning, nor was there mention of any of the other problems listed in my review above, except for the erosion in the watershed. The watershed development was seen as generally beneficial, the one potential adverse consequence being the loss of quail following reclamation of the cogon land.

The ICES study mentions that improvement at Buhi could increase the nutrient levels and hence produce algae blooms. But otherwise the report pinpoints no other adverse consequences for the Buhi area as such.

The social soundness analyses of the TAMS-TAE study ignores the Buhi area, except to suggest that higher productivity of the irrigation schemes could be of commercial benefit to the Buhi market. Otherwise, the social soundness analysis concentrates solely on the benefits to the downstream farmers.

These criticisms, of course, are made with the benefit of hindsight. My general impression is that the studies were fairly competent assessments <u>at the scale they were addressing</u>. They were sufficient to justify the overall program of development but inevitably carried out on too coarse a scale to be used as assessments of specific components, such as the Buhi-Lalo project. If separate assessments of the components had been conducted, then a significant number of potential problems should have shown up, particularly if the assessments had been directed to also include a <u>review of existing environmental problems</u>.

The final question concerns the methodology used. My own impression of environmental assessments, generally, is that they tend to ignore the important dynamics of the impacted systems. They usually take the form, as in the present studies, of single, static "snapshots" of the existing situation with a number of anticipated developments summarized in matrix form. In my view, this approach is inadequate to cope with such complex, dynamic phenomena as declining fish productivity, lake stratification and sulphur upwellings, and the impact of drawdown on fish and agricultural production. These can only

be handled by skilled analysis using qualitative and quantitative modelling and I would like to see more use of such techniques in the formal environmental assessment procedure.

Agroecosystem Analysis

The proposed ex-post environmental impact analysis should provide a more detailed basis for this kind of discussion and lead to firmer recommendations for improvement in future environmental assessment procedures. In the meantime, however, there are a significant number of environmental problems in the Buhi area which need addressing by all the agencies and individuals who are involved. The proposal for an Agroecosystem Analysis Workshop is intended to provide a focus for the ex-post environmental assessment.

The Agroecosystem Analysis technique has been developed over the past seven years as a technique for multidisciplinary analysis of man-managed ecosystems. It consists of a structured but fairly flexible workshop procedure, which allows participants to interact freely and productively with one another. The outputs are an agreed set of key questions for research and development of the systems being studied and also a set of priorities for action based on agreed guidelines and working hypotheses for development.

Details of the procedure are to be found in various published papers and in the subsequent parts of this report. It should be stressed, however, that the technique is still in many senses experimental. This will be the first occasion in which it is applied to a lake system. The workshop will also be a test of the capacity of the technique to take on a mediation function, since participants will include not only the executing agencies but also representatives of the farmers and fishermen who are most affected. There appears to be a general agreement, among those I have spoken to, that many of the problems of the Buhi area are greatly compounded by lack of information and misinformation. It is anticipated that at least in this respect the workshop will prove of value.

PART TWO

BUHI AGROECOSYSTEM ANALYSIS WORKSHOP

P R O P O S A L

Rationale

Pressures for a higher standard of living and the increase of population continuously require more food, energy, raw materials and various services. Increased utilization of available but limited resources is inevitable in order to cope with increasing demands for the satisfaction of these basic human needs.

However, the use of these resources often results in the depletion and misuse of resources, alteration of natural ecosystem processes and degradation of the natural environment. If we are concerned to maintain the ecological stability of our environment we require an optimal and efficient use of our natural resources.

The present deteriorating condition of Lake Buhi and its environs has been attributed to improper land use, exploitative use of forest areas, and unsound agricultural practices in the area. The uplands, the lowlands and Lake Buhi itself comprise a whole ecosystem, so that any alteration or modification in one component will yield corresponding effects on the other components.

In the light of the many activities in the Lake Buhi watershed, an Ex-post Environmental Impact Assessment of the Lake Buhi Hydraulic Control Structure and related projects under the Rinconada-Buhi/Lalo Integrated Area Development Project is proposed. The study will provide environmental and natural resource management information important in the resource planning and the efficient operation as well as sustainability of the said water resource project. The assessment will be based primarily on the review and evaluation of the environmental impacts to date. As part of this proposal a workshop on agroecosystem analysis of the Lake Buhi ecosystem is hereby proposed to convene the various research disciplines, government and private groups engaged or interested in Lake Buhi. The purpose of the workshop will be to define the framework of analysis for the proposed ex post assessment and gather relevant information for the study.

Objectives:

-- To define the major features, components and dynamic properties of the agroecosystems in the Buhi area;

-- To collate all existing information with a view toward obtaining a better understanding of the Buhi agroecosystems;

-- To define the key questions for research in the area;

-- To define the key questions for development and to identify guidelines and working hypotheses for development in the area;

-- To prioritize a research and development program for a balanced agro-ecological utilization and conservation of the area.

Methodology

The discussion of policy issues and problems concerning Lake Buhi Agro-ecosystems will enable policy planners, policy implementors, and other concerned people to consider the totality of this environment. Thus, the workshop will begin with a presentation of background papers dealing with the policy institutional contexts of Buhi agroecosystem development and management.

Following this policy session, the workshop will proceed to a multidisciplinary analysis of the Buhi agroecosystems using the procedure of Agro-ecosystems Analysis. Four study groups will be established to analyze (1) the Buhi watershed, (2) Lake Buhi, (3) the Tabao River, and (4) the Lower Lalo Irrigation Project, respectively. The task of each group will be to arrive at a set of key questions for research and development and to identify guidelines and working hypotheses for development. At the end of the workshop, each group will present their findings and a plenary session of the whole workshop will determine a program of priorities for action.

The workshop participants shall be a multidisciplinary group consisting of natural and social scientists, representatives of government agencies and of the farmer and fisherment interest groups in the Buhi region.

CASE STUDY TASKS

Revise and correct all diagrams as appropriate
Identify Key Questions

HIERARCHIES

1. Identify links and flows between systems

MAPS

1. Discuss correlations and factors in land use
2. Identify new forms of land use

TRANSECTS

1. Discuss system properties
2. Discuss problems
3. Determine potential solutions to problems
4. Identify potential intensification/development

SEASONAL CALENDARS

1. Discuss constraints
2. Identify opportunities for intensification

LONG TERM GRAPHS

1. Predict future trends

FLOW DIAGRAMS

1. Discuss system properties
2. Identify constraints and missing links
3. Identify potential beneficial changes

BAR DIAGRAMS

1. Discuss role of different sources of income
2. Identify new sources of income

DECISION TREES

1. Discuss key factors in decision making
2. Identify new livelihood systems

VENN DIAGRAMS

1. Discuss missing links and gaps
2. Identify new institutional and decision making links

PART III

BUHI AGROECOSYSTEMS ANALYSIS WORKSHOP
NOVEMBER 13-18, 1985
NAGA CITY

NOVEMBER 13 (WEDNESDAY)	Arrival of Participants	
NOVEMBER 14 (THURSDAY)	Plenary Session Starts Chairman: Dr. Fred Olaño	
8:00-9:00	Registration	
9:00-9:15	Welcome Address	Director Carmelo Villacorta
9:15-9:45	Introduction of Participants Objectives of Workshop Review of Timetable	Dr. Percy E. Sajise
9:45-10:15	History of BRBDP Integrated Area Development Project Rinconada/Buhi-Lalo	Dr. Fred Olaño
10:15-10:30	BREAK	
10:30-12:00	Policy and Goals Papers	
10:30-10:45	a) BRBDP	Director Carmelo Villacorta
10:45-11:00	b) NIA	Mr. Virgilio Brusas
11:00-11:15	c) BFD	Mr. Sabado Batcagan
11:15-11:30	d) BFAR	
11:30-11:45	e) MAF	Director Agustin Mago
11:45-12:00	f) NPC	
12:00- 1:30	LUNCH	
1:30- 3:30	Policy and Goals Papers (Community Representatives)	
1:30- 2:00	g) Buhi municipality	
2:00- 2:30	h) Buhi fishermen's organization	
2:30- 3:00	i) Upland Farmers organization	
3:00- 3:30	j) Irrigations association	
3:30- 4:00	BREAK	
4:00- 5:00	Discussion	
NOVEMBER 15 (FRIDAY)	Plenary Session Chairman: Dr. Percy E. Sajise	
8:30- 9:30	Agroecosystems in Buhi	Dr. Gordon Conway
9:30-10:30	Agroecosystems Analysis	Dr. Gordon Conway
10:30-10:45	BREAK	
10:45-11:00	Study Groups Briefings	
11:00-12:00	Break into four case study groups 1. Upland Agroecosystem 2. Lake Buhi Agroecosystem 3. Tabao River and Structure 4. Service Area	

Tasks: System Hierarchies
Pattern Analysis: Space, time, flows decisions
System Properties: Productivity, stability sustainability, equitability

1:00- 5:00	Study Groups Sessions (Continuation) Distribution of Study Materials	

NOVEMBER 16 (SATURDAY) Plenary Session
Chairman: Dr. Percy E. Sajise

8:30- 9:45	Upland Report	
9:45-10:30	Lake Buhi Report	
10:30-10:45	BREAK	
10:45-12:00	Tabao River Report Service Area Report	
12:00- 1:00	LUNCH	
1:00- 5:00	Study Groups Sessions	

Tasks: Key Questions for Research
Key Questions for Development
Giudelines for Development
Working Hypothesis for Development

Integrated Study Group Session

NOVEMBER 17 (SUNDAY) Plenary Session
Chairman: Dr. Gordon Conway

8:30-10:30	Upland Agroecosytem Lake Buhi	
10:30-10:45	BREAK	
10:45-12:00	Tabao River/Structure Service Area	
12:00- 1:00	LUNCH	
1:00- 2:00	Report of Integrated Study Group	
2:00- 3:45	Discussion of Key Questions Guidelines and Working Hypothesis)	Dr. Gordon Conway
3:45- 4:00	BREAK	
4:00- 5:00	Innovations Assessment	Dr. Gordon Conway

NOVEMBER 18 (MONDAY) Plenary Session
Chairman: Director Carmelo Villacorta

8:30-10:30	Program Priorities	
10:30-11:45	Review of Workshop	Drs. Sajise/Conway
11:45-12:00	Closing Address	Director Carmelo Villacorta
12:00	LUNCH	

P.M. Participants Departure